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NFPA 231E Storage of Baled Cotton 1984

National Fire Protection Association Batterymarch Park, Quincy, MA 02269

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Policy Adopted by NFPA Board of Directors on December 3, 1982

The Board of Directors reaffirms that the National Fire Protection Association recognizes that the toxicity of the products of combustion is an important factor in the loss of life from fire. NFPA has dealt with that subject in its technical committee documents for many years.

There is a concern that the growing use of synthetic materials may produce more or additional toxic products of combustion in a fire environment. The Board has, therefore, asked all NFPA technical committees to review the documents for which they are responsible to be sure that the documents respond to this current concern. To assist the committees in meeting this request, the Board has appointed an advisory committee to provide specific guidance to the technical committees on questions relating to assessing the hazards of the products of combustion.

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MGR-FM-83

Recommended Practice for the

Storage of Baled Cotton

NFPA 231E-1984

1984 Edition of NFPA 231E

This edition of NFPA 231E, *Recommended Practice for the Storage of Baled Cotton*, was prepared by the Technical Committee on General Storage, released by the Correlating Committee on Storage, and acted on by the National Fire Protection Association Inc., at its Fall Meeting held November 14-17, 1983, in Orlando, Florida. It was issued by the Standards Council on December 8, 1983, with an effective date of December 28, 1983, and supersedes all previous editions.

Origin and Development of NFPA 231E

In the early 1900s, a group of marine underwriters formulated regulations to reduce the frequency of excessive loss in baled cotton facilities. In 1916, following a joint conference with the cotton industry, guidelines were offered under the name of "Specifications and Standards," or simply "Marine Standards."

From 1947 through 1969, the sponsorship was through the Cotton Warehouse and Inspection Service (dissolved in 1969). In 1967, interested insurance rating bureaus were added as sponsors, and, in 1969, to prevent conflicts with various rating bureau schedules, the word "Standards" was replaced with "Recommended Good Practices"; however, since 1939 the booklet has been commonly referred to as the "Blue Book."

Numerous revisions have been made over the years to keep abreast of the times, the last in 1973. Early in 1978, the "Blue Book" committee requested the NFPA consider a standard on baled cotton storage and handling based on the "Blue Book's" recommended practices. The NFPA Correlating Committee for Storage expanded the scope to include all fibers in baled form as NFPA 44, *Storage of Combustible Fibers*, which was withdrawn many years ago.

Little data was found to be available on fire experience for baled fibers, other than cotton, and that was largely empirical in nature.

Thus, by consensus of a subcommittee formed in 1978 and made up of the cotton warehousing, cotton processing, and insurance industries, under the auspices of the Technical Committee on General Storage, this recommended practice was developed, limited to cotton fiber in baled form, with the intent to convert to a standard as field experience becomes available to further substantiate its content.

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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.

Contents

Recommended Practice for the Storage of Baled Cotton

NFPA 231E-1984

Chapter 1 Introduction

1-1 Scope.

1-1.1 This recommended practice provides fire protection guidance for the storage of baled cotton in buildings and in yards.

1-1.2 No provisions outlined are considered mandatory; however, it is suggested that property owners follow these recommended practices as a minimal means of limiting fire spread by the application of storage methods outlined, separation of major storages by fire walls or clear spaces, and by providing an adequate means of extinguishment.

1-1.3 These guidelines may be applied to new or existing facilities.

1-1.4 There is no intent to restrict new technologies or alternative arrangements that may offer improved protective features over those outlined.

1-2 General.

1-2.1 Cotton fiber is readily ignitible and will burn freely, and when stored in relatively large quantities offers special fire control problems not generally encountered in other common commodities.

Cotton fiber is compressed to various densities into baled form for transport, storage and handling, and is largely covered by a bagging of industry-accepted materials and bound by steel, synthetic, or wire bands, or wire. The bale surfaces normally present a ragged appearance due to the loose fibrous material not confined by the binding or wrapping. Frequently, the appearance is further aggravated by sampling which exposes additional fibrous material and can contribute to the rapid spread of fire.

Relatively large quantity bale storage may offer the greatest fire control problems due to the potential flashover and large area of involvement that could overcome even a well designed and supplied sprinkler system; thus, this recommended practice takes into consideration bale number limitations per building or fire division and size of storage blocks.

When the bales are tiered or piled in buildings or outdoors, the loose surface fibers are easily ignited in the presence of an ignition source and fire may flash over the entire mass or body of the material with great rapidity, commonly called "flash-over." Fire may then burrow into the bale interiors making detection and extinguishment difficult, particularly in large mass storage. A quick hot fire may then ensue and spread beyond the control of ordinary extinguishing methods.

In properly arranged storage and with adequate automatic sprinkler protection, fire is normally confined to the pile of origin, although an aisle fire can be expected to involve more than one tier or pile. Sprinklers will usually operate beyond the confines of the fire and wet down bales immediately adjacent to the burning pile.

On the other hand, if adequate sprinkler protection is lacking, tiers or piles are too large or high, aisle separation is not properly maintained, or the bales are otherwise improperly arranged, damage will be correspondingly greater, if not total, to the section, building, or area of involvement.

1-2.2 Common causes of fire in baled cotton include but are not limited to:

(a) Fire-packed bales from the ginning or other process.

(b) Steel bands breaking and striking or rubbing (friction) against each other or other metallic objects causing sparks.

(c) Extraneous sparks from vehicle exhausts, incinerators, etc.

(d) Miscellaneous sources such as cutting and welding, electrical and mechanical faults, and smoking.

1-3 Definitions. Unless expressly stated elsewhere, for the purpose of this document the following definitions apply:

Approved. Acceptable to the "authority having jurisdiction."

NOTE: The National Fire Protection Association does not approve, inspect or certify any installations, procedures, equipment, or materials nor does it approve or evaluate testing laboratories. In determining the acceptability of installations or procedures, equipment or materials, the authority having jurisdiction may base acceptance on compliance with NFPA or other appropriate standards. In the absence of such standards, said authority may require evidence of proper installation, procedure or use. The authority having jurisdiction may also refer to the listings or labeling practices of an organization concerned with product evaluations which is in a position to determine compliance with appropriate standards for the current production of listed items.

Authority Having Jurisdiction. The "authority having jurisdiction" is the organization, office or individual responsible for "approving" equipment, an installation or a procedure.

NOTE: The phrase "authority having jurisdiction" is used in NFPA documents in a broad manner since jurisdictions and "approval" agencies vary as do their responsibilities. Where public safety is primary, the "authority having jurisdiction" may be a federal, state, local or other regional department or individual such as a fire chief, fire marshal, chief of a fire prevention bureau, labor department, health department, building official, electrical inspector, or others having statutory authority. For insurance purposes, an insurance inspection department, rating bureau, or other insurance company representative may be the "authority having jurisdiction." In many circumstances the property owner or his designated agent assumes the role of the "authority having jurisdiction"; at government installations, the commanding officer or departmental official may be the "authority having jurisdiction."

Baled Cotton. A natural seed fiber wrapped and secured in industry-accepted materials, usually consisting of burlap, woven polypropylene or sheet polyethylene, and secured with steel, synthetic or wire bands or wire.

May also include linters (lint removed from the cottonseed) and motes (residual materials from the ginning process). (*See Table A-1-3.*)

Block Storage. The number of bales closely stacked in cubical form and enclosed by aisles or building sides or both.

Cold Cotton. Baled cotton five or more days old after the ginning process.

Fire-Packed. A fire that has been packed within a bale as a result of a process, ginning being the most frequent cause.

Flame-over. A fire that spreads rapidly over the exposed linty surface of the bales. In the cotton industry the common term is "flash-over" and has the same meaning.

Flash-over. See Flame-over.

Labeled. Equipment or materials to which has been attached a label, symbol or other identifying mark of an organization 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 or materials included in a list published by an organization acceptable to the "authority having jurisdiction" and concerned with product evaluation, that maintains periodic inspection of production of listed equipment or materials and whose listing states either that the equipment or material meets appropriate standards or has been tested and found suitable for use in a specified manner.

NOTE: The means for identifying listed equipment may vary for each organization concerned with product evaluation, some of which do not recognize equipment as listed unless it is also labeled. The "authority having jurisdiction" should utilize the system employed by the listing organization to identify a listed product.

Naked Bale. A bale secured with wire or steel straps without wrapping.

Racks. Any combination of vertical, horizontal, and diagonal members that support stored materials. Some rack structures use solid shelves. Racks may be fixed or portable.

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

Tiered. Bales stored directly on the floor or ground, usually on dunnage when stored outdoors and two or more bales high.

Yard Storage. Bales stored outdoors in any open area. See Chapter 5 for additional definitions that apply to yard storage only.

Chapter 2 Building Construction

2-1 Construction.

2-1.1 Buildings used for the storage of baled fibers, which are stored and protected in accordance with this recommended practice, may be of any of the types described in NFPA 220, *Standard on Types of Building Construction.*

2-1.1.1 Buildings equipped, or to be equipped, with automatic sprinkler protection should also meet the requirements outlined in Chapter 4.

2-2 Emergency Smoke and Heat Venting. Protection outlined in this recommended practice applies to buildings with or without roof vents and draft curtains.

2-3 Fire Divisions or Clear Spaces between Buildings.

2-3.1 A fire division is a building, compartment or section cutoff by fire walls or separation.

2-3.1.1 Fire divisions or clear spaces between buildings should be in accordance with NFPA 80A, *Recommended Practice for Protection of Buildings from Exterior Fire Exposures.*

2-3.1.2 Baled cotton storage generally has a fire loading in excess of 15 lb per sq ft (73 kg/m^2) which would place its classification, according to NFPA 80A, *Recommended Practice for Protection of Buildings from Exterior Fire Exposures*, in the "severe" category.

2-3.2 Fire walls should be of masonry and rated at least four hours (based on NFPA 251, *Standard Methods of Fire Tests of Building Construction and Materials*, ASTM E119, and UL 263). Such walls should be parapeted as follows:

(a) For wood frame [Type V (111-000)], and ordinary or heavy timber masonry [Type III (211-200) and IV (2 HH)] construction parapets should extend at least 5 ft (1.5 m) above the highest point of any adjacent monitor or roof structure within 50 ft (15.2 m) of the fire wall. Where monitors or roof structure adjoin a fire wall the parapet should extend not less than 7½ ft (2.3 m) horizontally from the vertical side of the roof structure. If intersecting end or side walls are other than masonry, the fire wall should extend outward 10 ft (3.1 m) beyond the same, or be "teed" at the ends 10 ft (3.1 m) each side from the wall, or "elled" 20 ft (6.2 m) and be of equivalent fire rating.

(b) For noncombustible construction [Type II (000)] other than that outlined in (c), parapets should be at least 2½ ft (0.75 m) above the roof. If intersecting side walls are other than masonry, such wall construction should conform to that outlined in (a).

(c) For noncombustible construction [Type II (222-111)] having masonry walls and with roofs of concrete, gypsum, or Class 1 (UL Classified) metal deck, the parapet should extend at least 12 in. (0.3 m) above the roof.

(d) For walls and roofs of fire-resistive construction [Type I (443-332)] parapets are not required.

NOTE: For a complete description of Construction Types I, II, III, IV, and V, see NFPA 220, *Standard on Types of Building Construction.*

2-3.3 It is preferable that fire walls be without openings. Where openings are necessary, the number should be held to the minimum required and each side should be protected by an approved and listed 3-hour rated fire door, installed in accordance with NFPA 80, *Standard for Fire Doors and Windows.* Doors should be automatic closing with detectors or fusible links installed on both sides of the opening and interconnected so that the operation of any single detector or fusible link will close both doors simultaneously.

2-3.3.1 Substantial guards of a size to protect fire doors from damage or obstruction should be provided.

Chapter 3 Storage Arrangements

3-1 General.

3-1.1* This chapter applies to buildings protected by a sprinkler system in accordance with Chapter 4, or one not so protected. Tier heights, block sizes and aisle widths outlined are acceptable, but represent recommended maximum and minimum limitations. Fire experience and fire tests of high piled commodities have shown that lower pile heights, smaller block sizes and wider aisles should result in a substantial improvement in delaying fire spread and in providing for manual fire fighting. Automatic sprinkler effectiveness is also improved substantially with a reduction in water demand and the quantity of goods subject to damage.

3-2 Storage Blocks.

3-2.1 Storage blocks, tiered or untiered, or on racks, should be limited to 700 bales of compressed cotton or 350 bales of flat cotton. (*See 3-3.3.1 for an allowable variation, and also Table A-1-3 for typical cotton bale types and approximate sizes.*)

3-2.2 The height of tiered or rack storage should be limited to a nominal 15 ft (4.6 m). Rack storage as referred to here contemplates baled cotton in a skeleton steel pipe or tubular frame, without shelving, and limited to a single or double row configuration, not in excess of two bales deep. Any variation to that described may offer a serious handicap to automatic sprinklers beyond the design capability and should be referred to the authority having jurisdiction.

3-2.3 Rack storage should not extend over aisles or doorways.

3-2.4 Racks should not be loaded beyond their design capacity, and should be designed for seismic conditions in areas where seismic resistance of a building is required.

3-3 Aisles.

3-3.1 Aisles should be provided and maintained so as to minimize the spread of fire and to permit convenient access for fire fighting, removal of storage, and salvage operations.

3-3.2 At least one main aisle, 12 ft (3.7 m) or more in width, should be provided in each fire division and arranged to subdivide the storage into two or more approximately equal areas.

3-3.3 Cross aisles separating each storage block should be at least 4 ft (1.2 m) in width. The recommended 4-ft (1.2-m) aisles will allow sprinkler water to penetrate lower areas of storage; however, it should be noted that with aisles less than 8 ft (2.4 m) in width, a fire can be expected to readily communicate from one block to another, especially in the case of an easily ignitible commodity such as cotton fiber.

3-3.3.1 When a 15 ft (4.6 m) cross aisle is provided after every fourth or fifth tiered block, each storage block may then be increased to 800 bales of compressed cotton and 400 bales of flat cotton. The purpose of this alternate method of tiered storage is to encourage wider cross aisles at least intermittently without reducing the suggested storage capacity, as an aid in reducing the flash-over fire potential. Because of the increase in block sizes, however, it is suggested that the authority having jurisdiction be consulted prior to practicing this method.

3-3.4 Cross aisles separating each-single or double-row rack storage configuration should be at least 10 ft (3.1 m) in width.

3-3.5 Aisles should be maintained clean of loose fibers.

3-4 Freshly Ginned Cotton Bales. (*See Section 5-5.*)

3-5 Other than Cotton Storage.

3-5.1 Cotton warehouses, in general, may be used for the storage of other commodities, subject to the following:

(a) There is no intent to prohibit the storage of other commodities in a building when it is not being used for baled cotton.

(b) High hazard commodities, such as nitrates or similar oxidizing materials, flammable liquids or gases, explosives, or materials of a highly combustible nature, should not be permitted when baled cotton is stored in the fire division.

(c) Any commodities that may be hazardous in combination with each other should be stored so that they cannot come in contact with each other.

3-5.1.1 When it is necessary to store other commodities with baled cotton storage, a clear space of at least 15 ft (4.6 m) should be maintained between the baled cotton storage and other commodities.

3-5.1.2 Where commodities of different classifications are allowed and stored in the same building, whether on a seasonal basis or otherwise, the protection should be adequate for the most hazardous material. For protection of other commodities refer to NFPA 231, *Standard for Indoor General Storage*, NFPA 231C, *Standard for Rack*

Storage of Materials, and NFPA 231D, *Standard for Storage of Rubber Tires*.

3-6 Clearances.

3-6.1 Proper clearances should be maintained from lights or light fixtures to prevent possible ignition. Incandescent light fixtures should have guards to prevent ignition of a commodity from hot bulbs where the possibility of contact exists.

3-6.2 No storage should be within 3 ft (0.9 m) of any electrical switch or panel boards and fuse boxes.

3-6.3 Baled cotton storage and other combustibles should be kept at least 4 ft (1.2 m) from fire door openings so that transmission of fire through a door opening is minimized.

3-6.4 At least 2 ft (0.6 m) of clearance should be maintained around all doors (other than indicated in 3-6.3), fire protection equipment (including automatic sprinkler risers, controlling valves, hose stations and portable extinguishers), and telephones for accessibility.

3-6.5 Clearance of at least 3 feet (0.9 m) should be maintained between the top of storage and the roof or ceiling construction in order to allow sufficient space for the effective use of hose streams in buildings not equipped with automatic sprinkler protection.

Chapter 4 Fire Protection

4-1 Automatic Sprinkler Systems.

4-1.1 Automatic sprinkler protection is not a requirement of this recommended practice. However, it is unfortunate that in a fire situation, human response is, in most cases, unreliable in the first critical moments of fire development. Sprinkler protection is, therefore, the most reliable method of fire detection and suppression. Property owners are encouraged to provide sprinkler protection as the best means of minimizing a large loss.

NOTE: See Section 3-5 for sprinkler protection for other than fiber storage.

4-1.2 Automatic sprinkler systems, where provided, should be installed in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*, except as modified by this Chapter.

4-1.3 For tiered or rack storage up to a nominal 15 ft (4.6 m) in height, sprinkler discharge densities and areas of application should be in accordance with Figure 4-1.3. The density provided for the area of operation may be from any point on the selected curve. It is not necessary to meet more than one point on the selected curve.

4-1.3.1 Where roof or ceiling heights would prohibit storage above a nominal 10 ft (3.1 m), the sprinkler discharge density may be reduced by 20 percent of that

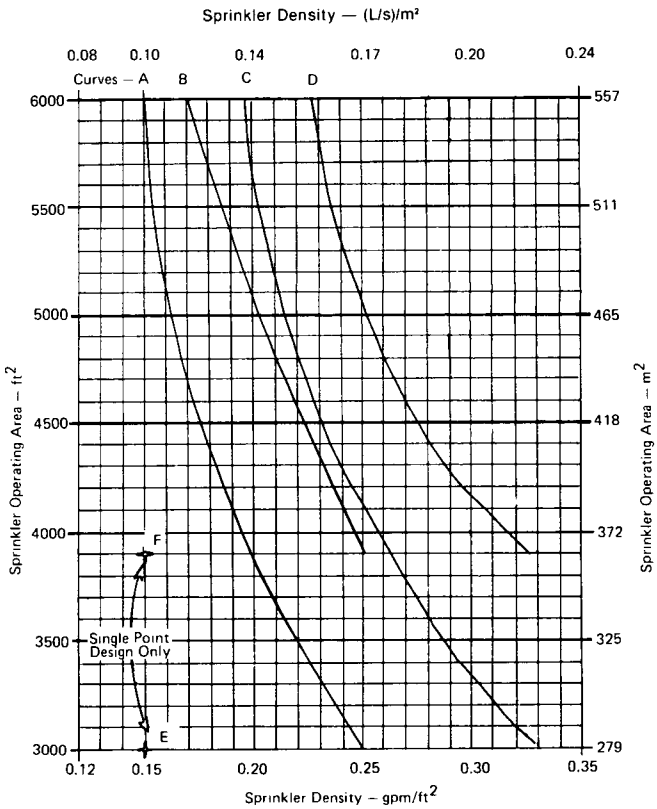

Figure 4-1.3 Sprinkler System Design Curves.

Curve		Legend
A	—	Wet-pipe system for tiered storage to 15 ft (4.6 m).
B	—	Dry-pipe system for tiered storage to 15 ft (4.6 m).
C	—	Wet-pipe system for rack storage to 15 ft (4.6 m).
D	—	Dry-pipe system for rack storage to 15 ft (4.6 m).
E	—	Wet-pipe system for untiered storage.
F	—	Dry-pipe system for untiered storage.

indicated in Figure 4-1.3, but not less than 0.15 gpm/ft² [(0.10 L/s)/m²].

4-1.3.2 Baled storage that is not tiered may be based on the single point design "E" for wet-pipe systems and "F" for dry-pipe systems. This untiered design density would limit storage to one bale high, on side or on end, and prohibit possible future tiering without a probable redesigning of the sprinkler system.

4-1.3.3 In warehouses that have mixed rack, tiered or untiered storage, or both, the curve applicable to the storage configuration should apply and the highest density requirement extend at least 15 ft (4.6 m) beyond the required operating area.

4-1.3.4 Minimum sprinkler operating areas should be 3,000 ft² (279 m²) for wet-pipe systems and 3,900 ft² (363 m²) for dry-pipe systems; maximum operating area

should not exceed 6,000 ft² (557 m²). No area credit is recommended for the use of high temperature sprinklers.

4-1.3.5* On new installations the use of sprinkler heads in the ordinary temperature range is recommended, subject to maximum ceiling temperatures as outlined in NFPA 13, *Standard for the Installation of Sprinkler Systems*.

4-1.4 Clearance between the top of the storage and the sprinkler deflectors should be at least 18 in. (.45 m). Building heights should generally be adequate with consideration to allow for proper clearance between the pile height and sprinkler deflectors. Fire tests of high piled storage have shown that sprinklers are generally more effective if between 1½ and 4½ ft (.45 m and 1.4 m) above the storage height.

4-2 Water Supplies.

4-2.1 Total water supply available should be sufficient to provide the required sprinkler discharge density over the required area, plus not less than 500 gpm (32 L/s) for hose streams.

4-2.2 Water supplies should be capable of supplying the total demand for sprinklers and hose streams for not less than two hours.

4-2.3 Recommended water supplies contemplate successful sprinkler operation when installed. However, because of the flash-over fire potential and inherent unfavorable features of cotton warehousing, there should be an adequate water supply available for fire department use.

4-3 Hydrants. At locations without public hydrants, private hydrants should be provided. (*See NFPA 24, Standard for Private Fire Service Mains and Their Appurtenances.*)

4-4 Manual Inside Protection.

4-4.1 In buildings 15,000 sq ft (1380 m²) or larger, small hose (1½ in.), with combination water-spray nozzle, should be provided to reach any portion of a storage area with due consideration to access aisle configuration with maximum length of 100 ft (30.5 m) of hose. Such small hose may be supplied from:

(a) Outside hydrants;

(b) A separate piping system for small hose stations (*see NFPA 14, Standard for the Installation of Standpipe and Hose Systems*);

(c) Valved hose connections on sprinkler risers where such connections are made upstream of the sprinkler control valves;

(d) Adjacent sprinkler systems (*see NFPA 13, Standard for the Installation of Sprinkler Systems*).

4-4.2 Portable listed fire extinguishers should be provided in accordance with NFPA 10, *Standard for Portable Fire Extinguishers*, except as amended by this chapter. Up to one-half of the required complement of portable fire extinguishers for Class A fires may be omitted in storage areas where fixed small hose lines are installed in accordance with 4-4.1.

4-4.2.1 Cotton and its wrappings represent a Class A fire. Experience has shown that extinguishment using "wet water" (a chemical agent additive to lower the surface tension of water, thus increasing its penetrating and spreading qualities) is the most effective on baled cotton fires.

Plain water, from casks and pails, pump tanks, and small pressurized tanks, is effective on surface fires but lacks the penetrating power of "wet water."

Dry chemical extinguishers using sodium bicarbonate, potassium bicarbonate, or potassium chloride base powders have been used to control a surface fire on baled fibers, mainly coating the fiber with the fire retardant powder, but such chemicals will not affect a smoldering or burrowing fire beneath the surface.

4-4.2.2 Additional listed extinguishers, suitable for Class B and C fires, or multipurpose types, should be provided at each press location and for each motorized vehicle or area of hazard other than Class A.

4-4.3 Wheeled listed wetting-agent (*see NFPA 18, Standard on Wetting Agents*) pressurized extinguishing units may be used, subject to the authority having jurisdiction, in lieu of Class A conventional types or small hose lines, distributed on the following basis:

(a) An equivalent rating of 20A for each 15,000 sq ft (1380 m²) of floor area or less.

(b) For each 30,000 sq ft (2760 m²) of floor area, or greater fraction thereof, a unit or units having the equivalent extinguishing capacity of 40A or more.

4-4.3.1 Placement of extinguishing units should be at readily accessible locations to main aisles and properly protected from damage.

4-4.4 Extinguishers should be nonfreezing types or protected against freezing where necessary.

4-5 Alarm Service.

4-5.1 Automatic sprinkler systems should have approved central station, local, auxiliary, remote station, or proprietary water flow supervised alarm service. Local water flow alarm service is acceptable where standard guard service is provided. (*See NFPA 601, Recommendations for Guard Operations in Fire Loss Prevention.*)

Alarm service should comply with one of the following: NFPA 71, *Standard for the Installation, Maintenance and Use of Central Station Signaling Systems*; NFPA 72A, *Standard for the Installation, Maintenance and Use of Local Protective Signaling Systems for Guard's Tour, Fire Alarm and Supervisory Service*; NFPA 72B, *Standard for the Installation, Maintenance and Use of Auxiliary Protective Signaling Systems for Fire Alarm Service*; NFPA 72C, *Standard for the Installation, Maintenance and Use of Remote Station Protective Signaling Systems*; or NFPA 72D, *Standard for the Installation, Maintenance and Use of Proprietary Protective Signaling Systems*.

4-5.2 To assure sprinkler valve security, accessible valves should be chained or padlocked open or both. (*See NFPA 26, Recommended Practice for the Supervision of Valves Controlling Water Supplies for Fire Protection.*)

4-6 Fire Emergency Organization.

4-6.1 Arrangements should be made to permit rapid entry into the premises by the municipal fire department, police department, or other authorized personnel in the case of fire or other emergency.

4-6.2 Plant emergency organizations, where provided, should be instructed and trained in the following procedures:

(a) Maintaining the security of the premises.

(b) Means of summoning outside aid immediately in an emergency.

(c) Use of portable fire extinguishers and small hose lines on small fires and for mop-up operations.

(d) Operation of the sprinkler system and water supply equipment.

(e) Use of material handling equipment while sprinklers are still operating to effect final extinguishment.

(f) Attendance of sprinkler system valves after the system is turned off so that the sprinklers can be reactivated if the fire rekindles.

(g) Need for, and use of breathing apparatus.

(h) Proper operation of emergency smoke and heat venting systems where provided.

4-6.2.1 Manual fire fighting operations are not a substitute for sprinkler operation. The sprinkler system should be kept in operation during manual fire fighting operations until visibility has cleared so that the fire can be clearly seen and the extent of fire reduced to a stage requiring only mopping up. It is essential that charged hose lines be available before venting is started because of a possible increase in fire intensity. When a sprinkler valve is closed, a responsible person should remain at the valve so it can be opened promptly if necessary. The water supply for the sprinkler system should be augmented where possible and care exercised so that the water supply for the sprinkler system is not rendered ineffective by the use of excessive hose streams.

Where a private fire brigade is provided, sufficient large hose (2½ in.) and related equipment should be available. (*See also Appendix B.*)

4-6.3 Information on emergency organization is given in the following publications:

NFPA SPP-13A, *Industrial Fire Brigade Training Manual.*

NFPA 27, *Recommendations for Organization, Training and Equipment of Private Fire Brigades.*

4-6.4 Fire departments should be encouraged to make periodic inspections of the property in cooperation with management and personnel for the purposes of loss prevention and prefire planning. (*See NFPA 13E, Recommendations for Fire Department Operations in Properties Protected by Sprinkler and Standpipe Systems.*)

4-6.5 A fire watch should be maintained when the sprinkler protection is not in service.

Chapter 5 Yard Storage

5-1 General.

5-1.1 This chapter is intended to apply to baled cotton storage yards designated for that purpose. Generally, yards are at or convenient to compress warehouses and gins, but may include storage at locations remote from normal operations.

5-1.2 Reference in this chapter is made to seed cotton trailers or modules, vehicles, incinerators, and other facilities, or exposures from same, only for the purpose of establishing recommended distances to designated yard storage areas.

5-2 Definitions. Unless expressly stated elsewhere, for the purpose of this chapter only, the following definitions apply:

Block. A basic yard storage unit comprising multiple row storage with clear spaces on all sides.

Designated Yard. An area marked by boundary lines intended for outside storage purposes only.

Group of Yards. Multiple yards with maximum block and minimum clear space limitations.

Protected. (*See Section 5-7.*)

Quarantine Yard. A segregated area for the storage of known or suspect fire-packed bales.

Row. A minimum yard storage unit comprised of adjoining bales.

Unprotected. Not meeting the provisions of Section 5-7.

Yard. A storage unit consisting of multiple storage blocks subject to bale and clear space limitations.

5-3 Site. Preference should be given to locations having adequate public fire and police protection, adequately supplied fire hydrants for protection of yard areas, good drainage, all weather roads or driveways for emergency vehicle use, and remoteness from buildings or other combustible storages or facilities which may constitute an exposure hazard.

5-4 Storage Arrangements.

5-4.1 Tiered storage is not recommended; however, yard or outdoor storage conditions may necessitate storage methods other than those outlined. The authority having jurisdiction should be consulted for approval in such cases.

5-4.2 Storage should be arranged so as to provide reasonable fire breaks and ready access for fire fighting.

5-4.3 A row of storage should be limited to 100 bales.

5-4.4 Maximum storage limitations should be based on the following:

(a) Protected block, 10 rows (1,000 bales).

(b) Unprotected block, 5 rows (500 bales).

(c) Protected yard, 5 protected blocks (5,000 bales).

(d) Unprotected yard, 5 unprotected blocks (2,500 bales).

(e) Protected group yard, 4 protected yards (20,000 bales).

(f) Unprotected group yard, 4 unprotected yards (10,000 bales).

5-4.5 Minimum clear spaces should be based on the following:

(a) 10 ft (3 m) between parallel rows and 25 ft (7.6 m) between rows end on.

(b) 50 ft (15.2 m) between protected or unprotected blocks.

(c) 200 ft (61 m) between protected or unprotected yards.

(d) 1000 ft (305 m) between protected or unprotected group yards.

5-4.6 Rows should be arranged so that prevailing winds blow in the direction of the parallel clear spaces between rows.

5-5 Quarantine Yards.

5-5.1 Freshly ginned cotton bales are highly subject to insidious fires, commonly called "fire-packed bales," originating from the ginning operation. Known or suspect fire-packed bales should be marked as such and kept segregated from other contents or buildings for a period of not less than five days; should no fire be detected after that period, the bales may then be handled in a normal manner. (*See Appendix B.*)

5-5.2 A clear space of at least 100 ft (30.5 m) from any yard storage and 25 ft (7.6 m) from all buildings should be established as a quarantine area for known or suspect fire-packed bales.

5-5.3 Known or suspect fire-packed bales should be separated from each other by at least a 10 foot (3 m) clear space.

5-6 Exposure Clear Space. Unobstructed clear space should be maintained to designated yard storage as follows:

(a) 100 ft (30.5 m) to any approved sprinklered building.

(b) 200 ft (61 m) to any nonapproved sprinklered or nonsprinklered building.

(c) 200 ft (61 m) to an approved incinerator.

(d) 500 ft (152.5 m) to a nonapproved incinerator or open fires.

(e) 100 ft (30.5 m) to vehicle and seed trailer or module parking areas and trash piles.

(f) 50 ft (15.2 m) to roadways and railroad mainlines and sidings.

(g) 200 ft (61 m) upwind of any reconditioning activity.

(h) Yard storage areas should be maintained clear and clean of loose cotton, dry grass, weeds and combustible trash, and for a distance of at least 50 ft (15.2 m) around the yard perimeter.

NOTE: In the case of buildings, sprinklered or unsprinklered, the above clear space may be reduced up to 50 percent if construction is fire-resistive, or facing walls are masonry and parapeted with adequately protected openings. This area reduction may also be applied to noncombustible buildings of a type limited to corrugated iron or asbestos panel walls and roof on a steel frame.

5-7 Fire Protection.

5-7.1 To qualify as a protected yard, hydrants should comply with Section 4-3 of this recommended practice except as amended by this chapter.

5-7.1.1 All areas of yard storage should be within 500 ft (152.5 m) of a fire hydrant. Adequate clearance should be maintained between storage and hydrants.

5-7.1.2 Hydrant equipment for each yard group (20,000 bales) should consist of:

(a) 250 ft (76.2 m) of 2½-in. hose.

(b) 300 ft (91.5 m) of 1½-in. hose with provisions to "Y" connect to the 2½-in. hose.

(c) Combination water-spray nozzles.

(d) Proper wrenches for hydrant operation and hose connections.

NOTE: Where hose reels are used, they should be easily pulled by two persons.

5-7.1.3 Water available to the most remote yard hydrants should be capable of delivering at least 500 gpm (1893 L/min) at an effective pressure for at least a two-hour period.

5-7.2 Approved extinguishing units should be provided on the basis of an equivalent 40A rating for each protected or unprotected yard area (*see Section 5-4*) or greater fraction thereof.

5-7.2.1 Subject to the authority having jurisdiction, self-propelled wet water unit(s) may be substituted for the 5-7.2, if one of 250 gal (946 L) or greater capacity is provided for each group yard area up to 20,000 bales total.

5-7.2.2 Placement of wheeled or self-propelled units should be at readily accessible locations within 250 ft (76.2 m) of each yard, protected from damage and maintained in good operating condition at all times.

5-7.3 Water casks and pails, if used, should be distributed at a ratio of one 40 gal (151 L) or greater size cask with two pails for each 100 bales of storage. However, wheeled wet water pressure or hand pump extinguishers may be acceptable in lieu of casks and pails.

5-7.4 All motorized vehicles used in designated yard areas should be equipped with a listed multipurpose dry chemical extinguisher of a size appropriate for the anticipated hazard. See 4-4.2 for information on portable fire extinguishers.

5-7.5 A suitable and reliable means of communication should be available to promptly summon the fire department or other appropriate personnel, to sound a general alarm in the case of fire or other emergency, or both.

5-7.6 Reference should be made to Section 4-6 of this recommended practice for fire emergency organization and procedures that may apply to yard storage.

5-8 Yard Maintenance and Operations.

5-8.1 Smoking should be strictly prohibited within 100 ft (30.5 m) of yard storage areas and signs conspicuously posted to that effect. (*See Note to Section 6-6.*)

5-8.2 All internal combustion equipment used in or around yard storage areas should be equipped with a suitable spark arrestor-type muffler properly maintained and otherwise approved by the authority having jurisdiction.

NOTE: The US Department of Transportation (DOT) has safety jurisdiction over a major segment of the trucking industry, specifically those vehicles used in transportation for interstate or foreign commerce. Reference should also be made to NFPA 512, *Standard for Truck Fire Protection*, which incorporates many requirements of DOT's *Federal Motor Carrier Safety Regulations* for the benefit of those not subject to DOT safety jurisdiction.

5-8.3 Guard watch service should be provided throughout all designated yard storage areas when cotton bales are less than 5 days old after ginning, or when total stock exceeds 1,000 bales, during all shut-down periods.

5-8.3.1 Hourly recorded rounds should be made during all nonworking hours using an approved and listed portable clock and having key stations situated to ensure complete coverage of the area of responsibility. Watch service information may be obtained from NFPA 601, *Recommendations for Guard Service in Fire Loss Prevention*, and NFPA 601A, *Standard for Guard Operations in Fire Loss Preventions*.

Attention is also directed to the value of strategically placed watch towers and floodlights where a watchman stationed at a point of vantage can keep the entire property under observation.

Chapter 6 Administration, Buildings, Equipment, Maintenance and Operations

6-1 Administration. The administration of buildings and equipment, and the maintenance thereof, is an important consideration in the reduction of fire incidence and loss. The finest buildings and protective features may be quickly abrogated by indifference to the continuous, necessary maintenance of fire loss prevention programs and protective equipment. Thus, management, at all levels, plays a critical part in the reduction of fire loss.

Aside from the recommendations outlined in this Chapter, the liaison between management and personnel should include a meaningful loss prevention program that will: (1) encourage loss prevention habits; (2) teach the prompt sounding of alarms; (3) minimize panic and effect safe evacuation; (4) instruct key personnel how to utilize fire extinguishing equipment and other protective features effectively; and (5) teach basic salvage and cleanup techniques to minimize down time of operations.

6-2 Mechanical Handling Equipment.

6-2.1 Industrial Trucks. Power operated industrial trucks and mobile equipment should comply with NFPA 505, *Firesafety Standard for Powered Industrial Trucks Including Type Designations, Areas of Use, Maintenance and Operation*. Cotton storage and handling areas are defined as Class III, Division 2, hazardous areas and require vehicles that are designated types DS, DY, ES, EE, EX, GS, LPS, and GS/LPS.

6-2.1.1 Gasoline and diesel fuel should be prohibited in cotton storage areas, platforms or exposing yard areas, except that contained in the vehicle tanks. Fueling should be done outside at a well-detached location in accordance with NFPA 30, *Flammable and Combustible Liquids Code*.

6-2.1.2 Liquefied petroleum gas fuel containers shall be exchanged or removed only outdoors. The valve at the fuel container should be closed and the engine allowed to run until the fuel line is exhausted. Tanks should be refueled only at well-detached locations. LP-Gas fuel systems on LP-Gas dual fuel powered trucks should be in accordance with the applicable provisions of NFPA 58, *Standard for the Storage and Handling of Liquefied Petroleum Gas*.

6-2.1.3 Storage battery charging equipment should be in a separate area, room or building designated for that purpose. If a separate room, the room should be lined with substantial noncombustible materials so constructed as to exclude "fly" or lint. Charging areas should be kept free of extraneous combustible materials and trash. Adequate ventilation should be provided to minimize concentrations of hydrogen gas during charging.

6-2.1.4 All mechanical equipment and refueling areas should be kept clean of accumulations of fibrous lint, oil, and trash, with particular attention paid to internal areas of vehicles.

6-2.2 Maintenance and Operations. For industrial trucks the following should be adhered to prior to entering or use in cotton storage or handling areas:

(a) All traces of fuel must be cleaned from the vehicle before it is started.

(b) Vehicles that have exhausted fuel tanks should be towed to the assigned fueling area for refueling.

(c) No repairing is permitted in cotton storage or handling areas.

(d) Alterations of the fire safety features should be prohibited.

(e) Maintenance procedures should comply with those outlined in NFPA 505, *Fire Safety Standard for Powered Industrial Trucks*. (*See 6-2.1.*)

NOTE: Lift trucks are a common cause of fires in cotton warehouses due mainly to the lack of maintenance and cleanliness, and the altering or improper substitution of fire safety features.

6-2.3 Inter-Plant Haulage. Tractors used for inter-plant hauling should be equipped with a suitable spark arrestor-type muffler properly maintained.

6-2.4 Motorized Vehicles. Motorized vehicles, other than those specified under 6-2.1, should not be permitted to enter any cotton storage area. A loading platform should be located so that trucks cannot come fully within the closing walls of a warehouse, with the truck space inclined away from the platform and lower than the platform. The loading area should be closed off from any under-floor building space.

6-2.5 Mechanical handling equipment, when not in use, should preferably be stored outside.

6-3 Building Service and Equipment.

6-3.1 Electrical Installation. It is preferred that cotton storage and handling areas be without an electrical installation; however, any that are necessary should comply with NFPA 70, *National Electrical Code®*, for Class III, Division 2, hazardous areas.

6-3.1.1 Electrical extension cords should not be allowed in storage areas. If portable lights are necessary, battery-powered lanterns or flashlights may be used.

6-3.2 No open flame heating devices, permanent or temporary, should be permitted.

6-3.3 Shops and Equipment. No repairing or reconditioning, boilers or similar equipment should be permitted in cotton storage areas. It is recommended that separate buildings be provided for such purposes or be separated from storage areas by a standard 2-hour fire wall.

6-3.3.1 The term, "reconditioning" applies mainly to cotton and means any opening, drying, cleaning, or picking of bales of loose cotton by any means whatsoever, except:

(a) Air drying (not compressed air) of baled cotton at room temperature where not more than one band is removed from each bale being so dried.

(b) Picking of baled cotton by hand only where not more than five bales are in the process of being picked on the premises at any one time, and where at least two bands remain on each bale so picked. Removal of more than one band is to be considered part of the picking process.

(c) The opening of bales in the press room for pressing or recompressing.

(d) The cleaning of baled cotton by brushing (manual only) where the process employed does not remove an appreciable quantity of lint.

Mechanical reconditioning operations should confine lint and "fly" to the reconditioning building and should be separated from cotton storage (or compress) by a standard fire wall without openings or by unobstructed clear spaces as outlined in Chapter 2.

6-4 Cutting and Welding.

6-4.1 When cutting and welding operations are necessary, the precautions contained in NFPA 51B, *Standard for Fire Prevention in Use of Cutting and Welding Processes*, should be followed.

6-4.2 Welding, soldering, brazing, or cutting should be permitted only by the authorization of management. Proper precautions should be observed and include:

(1) Assignment of a supervisor to the operation.

(2) Assurance that the area has been made firesafe.

(3) When possible, work should be removed to a safe area.

(4) When performed on equipment or building components which cannot be moved, there should be no storage below or within a 35 ft (10.7 m) radius.

(5) Floors should be swept clean and wooden floors wet down within the 35 ft (10.7 m) radius.

(6) Cutting and welding equipment to be used should be in good operating condition and properly maintained.

NOTE: Personnel operating arc welding or cutting equipment should be protected from possible shock.

(7) Openings and cracks in wood construction should be tightly covered to prevent the passage of sparks.

(8) All cotton bordering the area should be protected by flameproofed covers or otherwise shielded with metal or asbestos guards or curtains. Edges of the covers at the floor should be tight to prevent sparks from escaping. This precaution should extend to where several covers are used to protect a large storage pile.

(9) All fire protection equipment should be in service and ready for immediate use.

(10) A fire watch should be maintained, equipped with a portable extinguisher, during these operations and for not less than one hour following the completion of open flame operation.

6-5 Waste Disposal. Rubbish, trash, and other waste material should be disposed of at regular intervals. Approved waste cans with self-closing covers are recommended where needed. No open fires or incinerator operations are to be permitted within 100 ft (30.5 m) of any cotton storage building. (*For additional details see NFPA 82, Standard on Incinerators, Waste and Linen Handling Systems and Equipment.*)

6-6 Smoking. Smoking should be strictly prohibited, except in locations prominently designated as safe smoking areas. "No Smoking" signs should be conspicuously posted in prohibited areas.

NOTE: Cooperation of employees is more easily secured when a reasonable policy of control of smoking is adopted, with smoking permitted in specified locations, where there is little hazard, at specified times and under suitable supervision. Complete prohibition is likely to lead to surreptitious smoking in out of the way places where the hazard is most serious.

6-7 Maintenance and Inspection.

6-7.1 Fire walls, fire doors, fire door guards, and floors should be maintained in good repair at all times.

6-7.2 The sprinkler system and the water supplies should be maintained and serviced.

6-7.3 All portable and manual fire extinguishing equipment should be maintained and serviced.

6-7.4 As an aid in maintaining fire protection features and equipment in full service at all times, examples of two simple self-inspection forms are offered: one representing supervision of loss prevention principles, and one for automatic sprinkler systems. These form examples can be used without change or as a guide in establishing a specialized form to suit the facilities. [*See Figures A-6-7(a) and A-6-7(b).*]

6-8 Grass and Weeds. All dried grass and weeds should be kept clear from buildings for at least 50 ft (15.2 m).

Chapter 7 Referenced Publications

This chapter lists publications referenced within this document which, in whole or in part, are part of the recommendations of this document.

7-1 NFPA Publications. The following publications are available from the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

NFPA 10-1981, *Standard for Portable Fire Extinguishers*

NFPA 13-1983, *Standard for the Installation of Sprinkler Systems*

NFPA 13A-1981, *Recommended Practice for the Care and Maintenance of Sprinkler Systems*

NFPA 13E-1984, *Recommendations for Fire Department Operations in Properties Protected by Sprinkler and Standpipe Systems*

NFPA 14-1983, *Standard for the Installation of Standpipe and Hose Systems*

NFPA 18-1979, *Standard on Wetting Agents*

NFPA 24-1984, *Standard for Installation of Private Fire Service Mains and Their Appurtenances*

NFPA 26-1983, *Recommended Practices for the Supervision of Valves Controlling Water Supplies for Fire Protection*

NFPA 27-1981, *Recommendations for Organization, Training and Equipment of Private Fire Brigades*

NFPA 30-1981, *Flammable and Combustible Liquids Code*

NFPA 51B-1977, *Standard for Fire Prevention in Use of Cutting and Welding Process*

NFPA 58-1979, *Standard for the Storage and Handling of Liquefied Petroleum Gases*

NFPA 70-1984, *National Electrical Code®*

NFPA 71-1982, *Standard for the Installation, Maintenance and Use of Central Station Signaling Systems*

NFPA 72A-1979, *Standard for the Installation, Maintenance and Use of Local Protective Signaling Systems for Guard's Tour, Fire Alarm, and Supervisory Service*

NFPA 72B-1979, *Standard for the Installation, Maintenance and Use of Auxiliary Protective Signaling Systems for Fire Alarm Service*

NFPA 72C-1982, *Standard for the Installation, Maintenance and Use of Remote Station Protective Signaling Systems*

NFPA 72D-1979, *Standard for the Installation, Maintenance and Use of Proprietary Protective Signaling Systems*

NFPA 72E-1982, *Standard on Automatic Fire Detectors*

NFPA 80-1981, *Standard for Fire Doors and Windows*

NFPA 80A-1980, *Recommended Practice for Protection of Buildings from Exterior Fire Exposures*

NFPA 82-1983, *Standard on Incinerators, Waste and Linen Handling Systems and Equipment*

NFPA 220-1979, *Standard on Types of Building Construction*

NFPA 231-1979, *Standard for Indoor General Storage*

NFPA 231C-1980, *Standard for Rack Storage of Materials*

NFPA 231D-1980, *Standard for Storage of Rubber Tires*

NFPA 251-1979, *Standard Methods of Fire Tests of Building Construction and Materials*

NFPA 505-1982, *Fire Safety Standard for Powered Industrial Trucks Including Designations, Areas of Use, Maintenance and Operation*

NFPA 512-1984, *Standard for Truck Fire Protection*

NFPA 601-1981, *Recommendations for Guard Service in Fire Loss Prevention*

NFPA 601A-1981, *Standard for Guard Operations in Fire Loss Prevention*

NFPA SSP-13A, *Industrial Fire Brigade Training Manual*

7-2 Other Publications. ASTM publications are available from the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19105. UL publications are available from Underwriters Laboratories, Inc., 333 Pfingsten Road, Northbrook, IL 60062.

ASTM E119-82, *Fire Tests of Building Construction and Materials*

ASTM E380-1982, *Standard for Metric Practice*

UL 263-1976, *Tests for Fire Resistance of Building Construction and Materials*

Appendix A

This Appendix is not a part of the recommendations of this NFPA document but is included for information purposes only.

Table A-1-3 Typical Cotton Bale Types and Approximate Sizes

Bale Type	Dimensions in.	Dimensions (mm)	Avg. Wt. lb	Avg. Wt. (kg)	Volume ft³	Volume (m³)	Density lb/ft³	Density (kg/m³)
Gin Flat	55 x 45 x 28	(1397 x 1143 x 711)	500	(226.8)	40.1	(1.13)	12.5	(201)
Modified Gin Flat	55 x 45 x 24	(1397 x 1143 x 610)	500	(226.8)	34.4	(0.97)	14.5	(234)
Compressed Standard	57 x 29 x 23	(1448 x 736 x 584)	500	(226.8)	22.0	(0.62)	22.7	(366)
Gin Standard	55 x 31 x 21	(1397 x 787 x 533)	500	(226.8)	20.7	(0.58)	24.2	(391)
Compressed Universal	58 x 25 x 21	(1473 x 635 x 533)	500	(226.8)	17.6	(0.50)	28.4	(454)
Gin Universal	55 x 26 x 21	(1397 x 660 x 533)	500	(226.8)	17.4	(0.49)	28.7	(463)
Compressed High-Density	58 x 22 x 21	(1473 x 559 x 533)	500	(226.8)	15.5	(0.44)	32.2	(515)

A-3-1.1 One building, compartment, or section classed as a fire division should not contain more than 10,000 bales of cotton if protected by a sprinkler system in accordance with Chapter 4, nor more than 5,000 bales if not so protected. (*See Section 2-3.*)

A-4.1.3.5 Limited tests and actual fire experience indicate an initial low heat release; thus, sprinklers in the ordinary temperature range should offer some advantage by opening faster than would intermediate or high temperature classifications under similar conditions.

Figure A-6-7 (a)

Loss Prevention Self-Inspection Form for Baled Fiber Storage

WAREHOUSE NO.	COMPARTMENT NO.

GENERAL HOUSEKEEPING	YES	NO
1. Inside Buildings.		
a) Floor and dock areas clean of loose cotton and trash?	☐	☐
b) Covered metal containers for loose cotton and trash?	☐	☐
2. Outside Buildings.		
a) Surrounding areas free of dried grass, weeds, and combustible trash?	☐	☐
SMOKING		
a) Evidence of smoking in unauthorized areas?	☐	☐
b) Signs posted and readily visible?	☐	☐
ELECTRICAL EQUIPMENT		
a) Extension cords prohibited?	☐	☐
b) Storage in contact with lights or wiring?	☐	☐
c) Wiring properly supported and undamaged?	☐	☐
d) Circuits properly fused?	☐	☐
e) All panels, junction, switch, and receptacle boxes covered?	☐	☐
MECHANICAL EQUIPMENT		
a) Listed for fiber storage (Type DS, DY, ES, EE, EX, GS, or LPS)?	☐	☐
b) Spark retardant mufflers maintained?	☐	☐
c) Refueled outside at designated area?	☐	☐
d) Stored outside when idle?	☐	☐
e) General condition and maintenance good?	☐	☐
BUILDINGS		
a) Fire walls in good repair, including around fire door openings?	☐	☐
b) Fire doors in proper working condition and tested for ease of closing each week? (Overhead, roll-type doors should be tested at least annually.)	☐	☐
c) Fire door guards in place and maintained?	☐	☐
d) Floor and exterior walls in good repair?	☐	☐
e) Exterior wall openings have doors and windows in place that will close properly and lock?	☐	☐
f) Space under grade floor, if any, closed off?	☐	☐
STORAGE ARRANGEMENTS		
1. Storage Blocks.		
a) Within prescribed height (15 ft)?	☐	☐
b) Sprinkler heads unimpaired (18 in. clearance)?	☐	☐
c) Block sizes limited to 700 bales pressed or 350 flat?	☐	☐
d) Tiered storage stable and secure?	☐	☐
2. Aisles.		
a) At least one main aisle 12 ft or more in width?	☐	☐
b) Cross or work aisles at least 4 ft in width?	☐	☐
c) Any damaged bales, broken bands or wet stock?	☐	☐
FIRE DEPARTMENT		
a) Phone number prominently displayed at each phone?	☐	☐
b) Personnel instructed on procedure in case of fire?	☐	☐
WATCH SERVICE		
a) Making regular rounds?	☐	☐
b) All key stations punched?	☐	☐
c) Records checked, dated and filed?	☐	☐
FIRE ALARM SERVICE		
a) Automatic fire alarm system in service?	☐	☐
b) Manual pull stations clearly marked and accessible?	☐	☐
c) Date last tested?	☐	☐
MANUAL EXTINGUISHING EQUIPMENT PORTABLE EXTINGUISHERS		
1. Hand Units.		
a) Properly placed and accessible?	☐	☐
b) Recharged within the last year?	☐	☐
c) All in good condition?	☐	☐
2. Barrels and Buckets.		
a) Properly distributed?	☐	☐
b) Kept full?	☐	☐
c) Two buckets per barrel?	☐	☐
3. Mobile Equipment		
a) Properly placed and protected from damage?	☐	☐
b) Charged and ready for service?	☐	☐
INSIDE HOSE		
a) Hose and nozzle attached to each?	☐	☐
b) Racked and in good condition?	☐	☐
c) Easily accessible and ready for use?	☐	☐
d) Valves operate readily?	☐	☐
YARD HYDRANTS AND HOSE HOUSES		
a) Readily accessible?	☐	☐
b) Hose racked or reeled and in good condition?	☐	☐
c) Nozzles, spanners, hydrant wrench available?	☐	☐
d) Hydrants operable?	☐	☐
e) General condition: Good ☐ Poor ☐		

For SI Units: 1 in. = 25.4 mm; 1 ft = 0.3048 m.

REMARKS (Report on any unusual conditions and action taken):

Report by: **Date:**

Figure A-6-7(b)

Self-Inspection Form for Automatic Sprinklers in Baled Cotton Warehouses

WAREHOUSE NO.	COMPARTMENT NO.

VALVE INSPECTIONS

Instructions: Inspect locked or supervised valves at least monthly, and all unlocked valves at least weekly. Valves should be completely closed and opened at least once each year to assure ease of control and complete operation. This applies to all valves, inside and outside, as well as valves in pits controlling water supplies.

No.	Valve Location	Area Controlled	Open	Shut	Locked	Sealed

NOTE: Any valves found unlocked or unsealed should be checked for "full" open position. The 2-in. drain valve at the riser should be wide open and the flowing pressure recorded to be sure there is no obstruction in the supply line, then relocked or resealed. Give explanation for any valve found shut, unlocked or unsealed under Remarks below.

SPRINKLER SYSTEMS

Were all alarms tested? Yes☐ No☐ Dry-pipe valves on air? Yes☐ No☐
Did all alarms operate? Yes☐ No☐ Valve closets heated? Yes☐ No☐
Any sprinkler lines disconnected? Yes☐ No☐ Accelerators in service? Yes☐ No☐
Any sprinkler heads missing? Yes☐ No☐ Low point drained? Yes☐ No☐
Are extra heads on hand? Yes☐ No☐ All risers accessible? Yes☐ No☐

WATER SUPPLIES

Valves from city open? Yes☐ No☐ Fire Dept. conn. accessible? Yes☐ No☐
Gravity or Ground Tanks found full? Yes☐ No☐ If not, was it filled? Yes☐ No☐
Tank heater operating properly? Yes☐ No☐ Water temp.? _____ °F

FIRE PUMP

Turned over weekly?____Today?____ In good condition? Yes☐ No☐
Auto. control tested? Yes☐ No☐ Fuel tank full? Yes☐ No☐
Pump room well ventilated and safely heated? Yes☐ No☐
Priming tank full? Yes☐ No☐ Battery charger operating? Yes☐ No☐
Battery water level? _____Battery hydrometer reading? _____
Any delay in starting, picking up suction, or other problems?

REMARKS (explain any deficiencies or problems):

Report By: _____Date _____

Appendix B Suggestions for Fighting Fires in Baled Cotton

This Appendix is not a part of the recommendations of this NFPA document but is included for information purposes only.

B-1 Introduction.

The information contained herein is a summary of knowledge gained over the years by cotton warehousemen, fire fighters, and insurance authorities in fighting fires in the Cotton Belt.

A baled cotton fire has its own peculiarities which should be understood and respected if a large loss is to be avoided with minimum danger to personnel. Automatic sprinklers, if properly designed and supplied, can be expected to control a baled cotton fire where storage methods outlined in this recommended practice are followed, but extinguishment should not be expected.

The primary rule for any fire is to always call the responding fire department first. Fighting fires of any type is a profession in itself and, even with a well-trained private fire organization, professional aid should be effected as soon as possible and plant personnel should not be unduly exposed to the peril.

The myriad of small fibers that make up a cotton bale, especially a naked bale or one wrapped in burlap, and cover its surface, offer a highly vulnerable source of ignition as well as the potential for a rapid flame spread, known as "flash-over." The flash-over is usually followed by a slower flame spread at the surface, then tenacious burrowing into the pile between bales and penetration of the interiors of individual bales. High density bales are less vulnerable to a burrowing fire, but the consideration should not be ignored.

B-2 Causes.

Some of the causes of cotton fiber fires are variously listed as from the breaking of metal bands (ties) striking other metallic objects resulting in sparks, fire-packed bales, electrical faults, mechanical equipment (defective lift trucks), friction (bale ties rubbing together, railroad boxcars), lightning, cutting and welding, and smoking. Sparks from bale ties and fire-packed bales appear to be the most prominent fire cause. Incendiarism and exposures are also a consideration.

B-3 Incipient Stage.

If caught in the incipient stage, control can often be effected provided the proper procedures are followed. Portable extinguishing equipment, such as casks and pails, or pressurized or pump-type water units, may be used to quickly wet the exterior of the bale down.

Should small extinguishers not do the job, the use of portable wheeled "wetting agent" tanks or standpipe hose or both should then be used. The last resort would be hose streams from outside hydrants. Extreme caution should be exercised when using straight hose streams as the force of the stream may scatter the burning wads or portions of cotton over a wide area. Spray or fog nozzles are recommended, but, if not available, it may be possible to deflect a solid stream off the walls, roof, or other solid objects.