Report on Comments — Copyright, NFPA

Report of the Committee on Uniform Fire Code

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Committee Scope: This Committee shall have primary responsibility for documents on a Fire Prevention Code that includes appropriate administrative provisions, to be used with the National Fire Codes for the installation, operation, and maintenance of buildings, structures, and premises for the purpose of providing safety to life and property from fire and explosion. This includes development of requirements for, and maintenance of, systems and equipment for fire control and extinguishment. Safety to life of occupants of buildings and structures is under the primary jurisdiction of the Committee on Safety to Life.

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

The Committee on Uniform Fire Code is presenting two Reports for adoption, as follows:


NFPA 1 has been submitted to letter ballot of the Technical Committee on Uniform Fire Code, which consists of 31 voting members. The results of the balloting, after circulation of any negative votes, can be found in the report.


NFPA 230 has been submitted to letter ballot of the Technical Committee on Uniform Fire Code, which consists of 31 voting members. The results of the balloting, after circulation of any negative votes, can be found in the report.
L.1 Introduction.

L.1.1 Origin. In the early 1900s, a group of marine underwriters formulated regulations to reduce the frequency of excessive fire loss in baled cotton facilities. In 1916, following a joint conference with the cotton industry, guidelines were established under the title Specifications and Standards (also known as Marine Standards). From 1947 through 1969, the sponsorship was transferred to 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 and confusion, the NFPA Correlating Committee for Storage expanded the scope to include all fibers in baled form, which were covered in NFPA 44, Storage of Combustible Fibers, which was withdrawn many years ago. Little data was found on fire experience for baled fibers other than cotton, and that data was largely empirical in nature.

Therefrom, the former NFPA 231E, Recommended Practice for the Storage of Baled Cotton, was developed by a consensus group formed in 1978 that was made up of the cotton warehousing, cotton processing, and insurance industries, under the auspices of the Technical Committee on General Storage. The recommendation was limited to cotton bale in baled form with the intent to convert to a standard as field experience became available to further substantiate its content.

In the 1990s, experimental work by the US Department of Agriculture, and others (Wakelyn and Hughs, 2002), investigated, for the first time in detail, the flammability of cotton bales with a packing density of at least 22 lb/ft³ (360 kg/m³). The research showed the following:

1. that such cotton bales with a packing density of at least 22 lb/ft³ (360 kg/m³) did not undergo any of the following: (a) self-heating, (b) spontaneous combustion, and (c) that the bales were of a density-packed bale, or that the bale intensity was sufficient to cause another fire or to spread to other materials.

2. that, if the bale density is greater than 14 lb/ft³ (225 kg/m³), a smoldering fire inside the bale does not spread but self-exterminates in a short time, and is not able to affect the adjacent building.

3. that the densely-packed cotton bale was exposed to smoldering fire, matches and open flames (including the gas burner ignition source) and that data was largely empirical in nature.

These investigations resulted in harmonization among the U.S. Department of Transportation (49CFR172,102, note 137), the United Nations Recommendations on the Transport of Dangerous Goods, the International Maritime Organization (the International Maritime Dangerous Goods Code) and the International Civil Aviation Organization’s Technical Instructions, with the removal of the flammable solid designation from densely-packed cotton bales, complying with ISO 8115, “Cotton Bales - Dimensions and Density” and the exemption of such cotton bales from the Hazards Materials Regulations, and which have a packing density of at least 22 lb/ft³ (360 kg/m³). The limiting density of densely-packed cotton bales was set up with a substantial margin of safety, since a fire packed bale was never able to be experimentally found in cotton bales compressed to a density greater than 14 lb/ft³ (225 kg/m³).

With the recommendation of number of general storage standards in 1999, and the incorporation of the information into NFPA 230 (Identified as Annex L) and it is shown in this annex as guidance for the user.

L.1.2 Scope.

L.1.2.1 This annex provides fire protection guidance for the storage of baled cotton in buildings and in yards.

L.1.2.2 None of the provisions outlined should be considered mandatory. However, it is recommended that property owners follow these guidelines as a minimum means of limiting fire spread by the application of the storage methods specified, by the separation of major storage using fire walls or clear spaces, and by the selection of an adequate means of extinguishment.

L.1.2.3 These guidelines can be applied to new or existing facilities.

L.1.2.4 There is no intent to restrict new technologies or alternative arrangements that offer protection features superior to those outlined.

L.1.3 General.

L.1.3.1 Cotton fiber, unless stored as densely-packed cotton bales, is readily ignitable and burns freely and, when stored in relatively large quantities, poses special fire control problems not generally encountered in other common commodities. Densely-packed cotton bales are difficult to ignite and do not burn easily.

Cotton fiber is compressed to various densities into baled form for transport, storage, and handling and is largely covered by industry-accepted packaging materials. The bales are bound by wire bands, plastic vapor sealing, or continuous high tensile steel wire (stapler) and covered with fully-coated woven polypropylene, polyethylene film or burlap. Uncovered bale surfaces normally are ragged in appearance due to the loose fibrous material not confined by the binding or winding. In the past, this ragged appearance was further exaggerated by sampling, which exposed additional fibrous material that could contribute to the rapid spread of fire. This is no longer an issue, as current cotton industry standards (for example the cotton industry practices established by the Joint Cotton Industry Bale Packaging Committee) require bales to be fully covered and sample bales to be patched thereby minimizing the presence of exposed cotton.

A storage of baled cotton bales, in relatively large quantities can pose severe fire control problems due to the potential for surface flammability and the large area of involvement that could overcome even a well-designed and supplied sprinkler system. Therefore, this annex takes into consideration limits on the number of bales, combustion, and densely-packed cotton bales, per building or fire division and the size of storage blocks.

Where 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 the fire can spread rapidly over the entire mass or body of the material. Fire then can burrow into the bale interiors making detection and extinguishment difficult, particularly in large mass storage. A quick, hot fire can then ensue and spread beyond the control of ordinary extinguishing methods. However, it has been shown (Wakelyn and Hughs, 2002) that fire will not spread rapidly over the surface of densely-packed cotton bales.

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

If adequate sprinkler protection is lacking, if tiers or piles are too large or high, if aisle separation is not properly maintained, or if the loosely packed bales are otherwise improperly arranged, damage to the section, building, or area of involvement will be more severe, if not totally destructive.

L.1.3.2 Common causes of fire in baled cotton are overheating, bales that could contain an internal smoldering fire or other fires shall be limited to the number of bales, in addition, the fire packed bales include, but are not limited to, the following:

1. Arron or other malicious acts
2. Fire-packed bales - bales of cotton containing an internal smoldering fire. These bales, normally produced during ginning, may meet the size requirements for densely-packed cotton bales, but will not meet the density (or compression) requirements. Therefore, fire-packed bales are low density, underweight, bales that could contain an internal smoldering fire, from the ginning or other process.
3. Extrinsic sparks from sources such as vehicle exhausts and industrial sparks.
4. Miscellaneous sources such as cutting and welding, electrical and mechanical faults, and smoking
L.3.3.3 Cross aisles separating each single- or double-row rack storage configuration should be at least 10 ft (3.1 m) in width.

L.3.3.4 Freshly Ginned Cotton Bales. See L.5.4.

L.3.3.5 Aisles should be maintained free of loose cotton fibers.

L.3.5 Storage of Commodities Other Than Cotton.

L.3.5.1 Cotton warehouses, in general, can be used for the storage of other commodities, subject to the following: (1) The storage of other commodities in a building is permitted where baled cotton is not stored. (2) 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 where baled cotton is stored in the fire division. (3) Any commodities that could be hazardous in combination with each other should be stored so that they cannot come in contact with each other.

L.3.5.2 Where it is necessary to store other commodities with storage of baled cotton, other than densely-packed cotton bales storage, a clear space of at least 15 ft (4.6 m) should be maintained between the baled cotton storage and other commodities.

L.3.5.3 Where commodities of different classifications are permitted and stored in the same building, whether on a seasonal or other basis, the protection should be adequate for the most hazardous material. (For protection of other commodities, refer to the main body of this standard or to the other applicable NFPA storage standards.)

L.3.6 Clearances.

L.3.6.1 Proper clearances from lights or light fixtures should be maintained 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.

L.3.6.2 No storage should be located within 3 ft (0.9 m) of any electrical switch or panel boards and fuse boxes.

L.3.6.3 Storage of baled cotton, other than densely-packed cotton bales. Baled Storage of baled cotton storage and of any other combustibles should be kept at least 10 ft (3.0 m) from fixed small hose lines.

L.4 Fire Protection.

L.4.1 Automatic Sprinkler Systems.

L.4.1.1 Automatic sprinkler protection is not part of the recommendations of this annex. However, it is unfortunate that, in a fire situation, human response is, in most cases, unreliable in the 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. (See L.3.5 for sprinkler protection for other than cotton fiber storage.)

L.4.1.2 Automatic sprinkler systems, where provided, should be installed in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems, where modified by this annex.

L.4.1.3 Clearance between the top of the storage and the sprinkler deflectors should be at least 18 in. (45 cm). Building heights should allow for proper clearance between the sprinkler heads and sprinkler deflectors. Fire tests of high-piled stored have shown that sprinklers are generally more effective if located 1 1/2 ft to 4 1/2 ft (0.45 m to 1.4 m) above the storage height.

L.4.2 Water Supplies.

L.4.2.1 The total water supply available should be sufficient to provide the required sprinkler discharge. The water supply density over the area to be protected, plus a minimum of 500 gpm (2000 L/min) for hose streams.

L.4.2.2 Water supplies should be capable of supplying the total demand required for sprinklers and hose streams to control any potential fire. Further details can be found in NFPA 13, Standard for the Installation of Sprinkler Systems, where modified by this annex.

L.4.2.3 Recommended water supplies contemplate successful sprinkler operation when installed. However, because of the potential for rapid surface flammability and inherent unfavorable features of cotton warehousing of loose cotton fibers, there should be an adequate water supply available for fire detection and suppression.

L.4.3 Hydrants. At locations without public hydrants, private hydrants should be provided in accordance with NFPA 24, Standard for the Installation of Private Fire Service Mains and Their Appurtenances.


L.4.4.1 Small Hose. In buildings of 15,000 ft² (1380 m²) or larger, small hose (1 1/2 in. (38 mm)), with combination water spray nozzle, should be provided to reach any portion of a storage area with due consideration to access aisle configuration with a maximum length of 100 ft (30 m) of hose. Such small hose should be supplied from an approved standpipe system.

L.4.4.2 Portable Fire Extinguishers. Portable listed fire extinguishers should be provided in accordance with NFPA 10, Standard for Portable Fire Extinguishers, and as amended by this section. Up to one-half of the required complement of portable fire extinguishers for Class A fires can be omitted in storage areas where fixed small hose lines are installed in accordance with L.4.4.1.
L.4.4.2.1 Cotton and its wrappings represent a Class A fire. Experience has shown that extinguishment using “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 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 fire on baled fibers and work mainly by coating the fiber with the fire-retardant powder. However, such chemicals do not affect a smoldering or burning fire beneath the surface.

L.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.

L.4.3 Wetting Agent Extinguishing Units

L.4.4.3.1 Pressurized, wheeled, listed, wetting agent extinguishing units, as specified in NFPA 18, Standard on Wetting Agents, can be used subject to the authority having jurisdiction in lieu of Class A conventional types or small hose lines, provided the following:

1. The listed extinguishing effectiveness of 20A for each 15,000 ft² (1380 m²) of floor area or less.
2. The unit(s) has an equivalent extinguishing effectiveness of 40A or more for each 30,000 ft² (2760 m²) of floor area.

L.4.4.3.2 Placement of extinguishing units should be at locations readily accessible to aisles and properly protected from damage.

L.4.4.4 Nonfreezing-Type Extinguishers. Extinguishers should be of the nonfreezing type or protected against freezing where necessary.

L.4.5 Alarm Service

L.4.5.1 Automatic sprinkler systems should have approved central station, local, auxiliary, remote station, or proprietary airflow supervised alarm service. Local waterfall alarm service is permitted where standard guard service is provided in accordance with NFPA 601, Standard for Security Services in Fire Loss Prevention. Alarm service should comply with NFPA 720, National Fire Alarm Code®.

L.4.5.2 Valves should be supervised in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems.

L.4.6 Fire Emergency Planning

L.4.6.1 Arrangements should be made to allow rapid entry into the premises by the municipal fire department, police department, or other authorized personnel in the case of fire or other emergency.

L.4.6.2 Industrial fire brigades, where provided, should be in compliance with NFPA 600, Standard on Industrial Fire Brigades.

L.4.6.3 Manual fire-fighting operations should not be considered to be a substitute for sprinkler operation. The sprinkler system should be kept in operation during manual fire-fighting operations until visibility has improved so that the fire can be clearly seen and the extent of fire has been reduced to a mop-up stage. 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 designated 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 should be exercised so that the fire can be clearly seen and the extent of fire has been reduced to a mop-up stage. 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 designated 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 should be exercised so that the water supply for the sprinkler system is not rendered ineffective by the use of excessive hose streams.

L.4.6.4 Fire department service should be encouraged to make periodic inspections of the property in cooperation with management and personnel for the purposes of loss prevention and pre-fire planning. For further information, see NFPA 13E, Recommended Practice for Fire Department Operations in Properties Protected by Sprinkler and Standpipe Systems.

L.4.6.5 A fire watch should be maintained when the sprinkler protection is not in service.

L.5 Yard Storage

L.5.1 General

L.5.1.1 This section applies to baled cotton storage yards designated for that purpose. Generally, yards are at or convenient to compression warehouses and gins but can include storage at locations remote from routine operations.

L.5.1.2 This section refers to seed cotton trailers or modules, vehicles, incinerators, and other facilities, or exposures from same, only for the purpose of establishing specified distances to designated yard storage areas.

L.5.2 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 that could constitute an exposure hazard.

L.5.3 Storage Arrangements

L.5.3.1 Tiered storage is not recommended; however, yard or outdoor storage conditions can necessitate storage methods other than those outlined. The authority having jurisdiction should be consulted for approval in such cases.

L.5.3.2 Storage should be arranged to provide reasonable fire breaks and ready access for firefighting.

L.5.3.3 A row of storage should be limited to 100 bales.

L.5.3.4 Maximum storage limitations should be as follows:

1. (1) Protected block, 10 rows (1000 bales)
2. (2) Unprotected block, five rows (500 bales)
3. (3) Protected yard, five protected blocks (5000 bales)
4. (4) Unprotected yard, five unprotected blocks (2500 bales)
5. (5) Protected group yard, four protected yards (20,000 bales)
6. (6) Unprotected group yard, four unprotected yards (10,000 bales)

L.5.3.5 Minimum clear spaces should be as follows:

1. (1) 10 ft (3.1 m) between parallel rows and 25 ft (7.6 m) between rows arranged end-to-end
2. (2) 50 ft (15 m) between protected or unprotected blocks
3. (3) 200 ft (60 m) between protected or unprotected yards
4. (4) 1000 ft (300 m) between protected or unprotected group yards
5. (5) 60 ft (500 m) between primary and secondary roads.

L.5.6 Rows should be arranged so that prevailing winds blow in the direction of the parallel clear spaces between rows.

L.5.4 Quarantine Yards.

L.5.4.1 freshly ginned cotton bales, commonly called fire packed. Low density cotton bales, are highly subject to insidious fires originating from the ginning operation. Such baled fire-packed units further details can be found D.1.3.2 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 5 days (further details can be found in section D.7.10). If no fire is detected after that period, the bales then can be handled in the appropriate manner.

L.5.4.2 A clear space of at least 100 ft (30 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.

L.5.4.3 Known or suspect fire-packed bales should be separated from each other by at least a 10 ft (3.1 m) clear space.

L.5.5 Unobstructed Clear Space

L.5.5.1 Except as noted in L.5.5.1 unobstructed clear space to designated yard storage should be maintained as follows:

1. (1) 100 ft (30 m) to any unprotected building
2. (2) 200 ft (60 m) to any nonapproved sprinklered or nonsprinklered building
3. (3) 200 ft (60 m) to an approved incinerator
4. (4) 500 ft (150 m) to a nonapproved incinerator or open fire
5. (5) 100 ft (30 m) to vehicle and seed trailer, or module parking areas and trash piles
6. (6) 50 ft (15 m) to roadways and railroad main lines and sidings
7. (7) 200 ft (60 m) upwind of any reconditioning activity

L.5.5.2 In the case of buildings, sprinklered or nonsprinklered, the clear space can be reduced up to 50 percent if construction is fire-resistant or if facing north and East.

L.5.5.3 Additional firewater storage should be provided in lieu of containers and pails.

L.5.6.1.2 Hydrant equipment for each yard group (20,000 bales) should consist of the following:

1. (1) 250 ft (75 m) of 2½-in. (65-mm) hose
2. (2) 300 ft (90 m) of 1½-in. (38-mm) hose with provisions to “Y-connect” to the 2½-in. (65-mm) hose
3. (3) Combination water spray nozzle
4. (4) Proper wrenches for hydrant operation and hose connections

L.5.6.1.3 Water available to the most remote yard hydrants should be capable of delivering at least 700 gpm (3000 L/min (500 gpm)) at an effective pressure for at least a 2-hour period.

L.5.6.1.4 Approached extinguishing units should be provided on the basis of an equivalent 40A rating for each protected or unprotected yard area (see L.5.3 ) or greater fraction thereof.

L.5.6.2.1 Subject to the authority having jurisdiction, a motorized wet water unit(s) can be substituted for that specified in L.5.6.2 provided that a unit of 250 gal (1000 L (250 gal)) or greater capacity is provided for each group yard area storing up to 20,000 bales.

L.5.6.2.2 Placement of wheeled or motorized units should be at readily accessible locations within 250 ft (75 m) of each yard, protected from sun by a type limited to corrugated iron or asbestos panel roof and on a steel frame.

L.5.6.2.3 Water containers and pails, if used, should be distributed at a ratio of one 40 gal (150-L (150 gal)) or greater container with two pails for each 100 bales of storage. However, wheeled wet water pressure extinguishers are permitted in lieu of containers and pails.

L.5.6.2.4 All motorized vehicle used in designated yard areas should be equipped with a listed multipurpose dry chemical extinguisher of a size appropriate for the anticipated hazard. (See L.4.4.2 for information on portable fire extinguishers.)

L.5.6.5 A suitable and reliable means of communication should be available to summon the fire department or other appropriate personnel promptly, to sound a general alarm in the case of fire or other emergency, or both.

L.5.6.6 Reference should be made to L.4.6 for fire emergency planning and procedures that apply to yard storage.

L.5.7 Yard Maintenance and Operations.

L.5.7.1 Smoking. Smoking should be strictly prohibited within 200 ft (30.5 m (300 ft )) of yard storage areas, and “No Smoking” signs should be posted.
Electrical Installation.

L.6.3 It is recommended that cotton storage and handling areas be free of electrical installations. However, installations that are necessary should comply with NFPA 70, National Electrical Code®, for Class III, Division 2 hazardous areas.

L.6.3.1 Electrical extension cords should be prohibited in storage areas. If portable lights are necessary, battery-powered lanterns or flashlights can be used.

L.6.3.2 Open-Flame Heating Devices. Open-flame heating devices, permanent or temporary, should be prohibited.

L.6.3.3 Shops and Equipment.

L.6.3.3.1 Repairing and reconditioning and boilers or similar equipment should be prohibited in cotton storage areas. Separate buildings should be provided for such purposes or should be separated from storage areas by a standard 2-hour fire wall.

L.6.3.3.2 The term reconditioning applies mainly to cotton and is defined as any opening, drying, cleaning, or picking of bales of loose cotton by any means whatsoever, except for the following:

(1) 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.

(2) The picking of baled cotton where not more than one band is removed from each bale being so dried.

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

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

(5) Teaches basic salvage and cleanup techniques to minimize the downtime of operations.

L.6.2 Mechanical-Handling Equipment.

L.6.2.1 Liquefied petroleum gas (LP-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, Liquefied Petroleum Gas Code.

L.6.2.1.1 Gasoline and diesel fuel should be prohibited in cotton storage areas, on platforms, and in exposing yard areas. Fueling should be done outside at a well-detached location in accordance with NFPA 30, Flammable and Combustible Liquids Code.

L.6.2.1.1.1 Gasoline and diesel fuel contained in the vehicle tanks are permitted.

L.6.2.1.2 Liquefied petroleum gas (LP-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, Liquefied Petroleum Gas Code.

L.6.2.1.3 Charging equipment for storage batteries should be in a separate area, room, or building designated for that purpose. If located in a separate room, the room should be lined with substantial noncombustible material constructed 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.

L.6.2.1.4 All mechanical equipment and refueling areas should be kept free of accumulations of film of lint, oil, and trash with particular attention paid to the internal areas of vehicles.

L.6.2.2 Maintenance and Operations. The following recommendations should be met prior to the entrance or use of industrial trucks in a storage or handling area:

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

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

(3) Repairs should be prohibited in cotton storage or handling areas.

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

(5) Maintenance procedures should comply with those outlined in NFPA 505, Fire Safety Standard for Powered Industrial Trucks Including Type Designations, Areas of Use, Conversions, Maintenance, and Operation. (See L.6.2.1.)

L.6.2.3 Intertplant Haulage. Tractors used for interplant hauling should be equipped with a properly maintained, suitable, spark arrester-type muffler.

L.6.2.4 Motorized Vehicles. Motorized vehicles, other than those specified under L.6.2.1, should not be permitted to enter any cotton storage area. A loading platform should be located so that trucks cannot fully enter inside 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.

L.6.2.5 Equipment Storage. Mechanical-handling equipment, when not in use, should be stored outside.

L.6.3 Building Service and Equipment.

L.6.3.1 Electrical Installation.
Cotton bale fires have a slower flame spread at the surface, then tenacious burrowing into the pile, a vulnerable source of ignition as well as the potential for a rapid flame spread. The primary rule for any fire is always to call the responding fire department. A fire on baled cotton, other than a single bale, with other bales or combustible materials, should be considered a hazardous situation that should be understood and respected if a large 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 standard are followed, but extinguishment should not be expected to end the fire. Where it is apparent that the fire is beyond the capability of the automatic sprinkler system or that the fire department requires assistance, auxiliary fire-fighting equipment and personnel should be used.

The primary rule for any fire is always to call the responding fire department first. Fighting fires of any type is a profession and, even where a well-trained private fire organization is available, professional aid should be called as soon as possible, and plant personnel should not be unduly exposed to the peril. The most essential drivers that make the fire grow also make cotton 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 above the stored material. Such rapid flame spread is usually followed by a slow flame spread at the surface, then tenacious burrowing into the interstices between bales and penetration of the interiors of individual bales. High density, densely-packed cotton bales are less vulnerable to rapid flame spread, surface fire, and a burrowing fire than loose fibers or low density cotton bales, but the possibility of such a fire should not be ignored.

L.7.4 Incipient Stage. If caught in the incipient stage, control can often be effected, provided the proper procedures are followed. Portable extinguishing equipment such as pails, and pressured or pump-type water units, can be used to wet down the exterior of the bale quickly. If small extinguishers are not successful, portable, wheeled, wetting agent tank or standpipe hose, or both, should be used. The last resort is water streams from outside hydrants. Extreme caution should be exercised when using straight hose streams, as the force of the water stream could carry burning or smoldering cotton over a wide area. Spray or fog nozzles are recommended, but, if not available, it might be possible to deflect a solid stream off the walls, roof, or other solid object.

Once the exterior of the bale(s) is fully wet down and fire is suppressed, the bales involved then should be removed to an outside, safe location for final extinguishment. CAUTION: An obviously burning bale should never be dragged or mechanically moved down aisles, as this is likely to spread the fire to bales or combustible materials. If the fire has progressed beyond the incipient stage or involves more than a few bales and further fire spread is likely, the building could readily prove untenable and dense smoke could quickly obscure vision. It then is best to have all personnel evacuate the building to a point of safety. As drafts, including early venting through roofs and walls, are undesirable, it is essential to leave the building unventilated and close all doors and cut off all possible drafts to the building or section involved. This reduces available oxygen to the fire, and the dense smoke suppresses fire intensity. Drafts not only provide fresh air to increase fire intensity but also blow embers from the fire, opening doors and windows, and spread the fire area and possibly overtaking the available water to the sprinkler system. The sprinkler system should be given a chance to do its job — do not ventilate! Ventilating a cotton fire can cause it to flash out of control, spread with explosive violence, and open an excessive number of sprinklers. After the fire is under control of the sprinkler system, the building compartment door should be opened only enough to use fire hose or to enter and remove the cotton. The smoldering bales should be removed to the outside as soon as possible for individual attention. Extreme caution should be exercised when entering a fire area. Entry should be on the downwind side, if possible, to avoid creating draft conditions that could cause the fire to reignite. It is important to remain alert for gas explosions. If the fire appears to flare up again, the building should be evacuated immediately and the doors again should be closed tightly and the sprinkler system should be allowed to regain control.

L.7.5 Sprinkler Failure. If the sprinkler system fails to maintain fire control, then some other means should be used, preferably through door openings only large enough for the hose.
### General Housekeeping
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
1. Evidence of smoking in unauthorized areas? [ ] [ ]
2. Signs posted and readily visible? [ ] [ ]

### Electrical Equipment
1. Extension cords prohibited? [ ] [ ]
2. Storage in contact with lights or wiring? [ ] [ ]
3. Wiring properly supported and undamaged? [ ] [ ]
4. Circuits properly fused? [ ] [ ]
5. All panels, junction, switch, and receptacle boxes covered? [ ] [ ]

### Mechanical Equipment
1. Listed for fiber storage (Type DS, DY, ES, EE, EX, GS, or LPS)? [ ] [ ]
2. Spark-retardant mufflers maintained? [ ] [ ]
3. Refueled outside at designated area? [ ] [ ]
4. Stored outside when idle? [ ] [ ]
5. General condition and maintenance good? [ ] [ ]

### Buildings
1. Fire walls in good repair, including around fire door openings? [ ] [ ]
2. Fire doors in proper working condition and tested for ease of closing each week? (Overhead, roll-type doors should be tested at least annually.) [ ] [ ]
3. Fire door guards in place and maintained? [ ] [ ]
4. Floor and exterior walls in good repair? [ ] [ ]
5. Exterior wall openings have doors and windows in place that close properly and lock? [ ] [ ]
6. Space under grade floor, if any, closed off? [ ] [ ]

### Storage Arrangements
1. Storage Blocks
   - (a) Within prescribed height [15 ft (4.6 m)]? [ ] [ ]
   - (b) Sprinkler heads unimpaired [18 in. (457 mm) 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 (3.7 m) or more in width? [ ] [ ]
   - (b) Cross or work aisles at least 4 ft (1.2 m) in width? [ ] [ ]
   - (c) Any damaged bales, broken bands, or wet stock? [ ] [ ]

### Fire Department
1. Phone number prominently displayed at each phone? [ ] [ ]
2. Personnel instructed on procedure in case of fire? [ ] [ ]

### Watch Service
1. Making regular rounds? [ ] [ ]
2. All key stations punched? [ ] [ ]
3. Records checked, dated, and filed? [ ] [ ]

### Fire Alarm Service
1. Automatic fire alarm system in service? [ ] [ ]
2. Manual pull stations clearly marked and accessible? [ ] [ ]
3. System tested within required frequency? [ ] [ ]

### 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. Containers 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
1. Hose and nozzle attached to each? [ ] [ ]
2. Racked and in good condition? [ ] [ ]
3. Easily accessible and ready for use? [ ] [ ]
4. Valves operate readily? [ ] [ ]

### Yard Hydrants and Hose Houses
1. Readily accessible? [ ] [ ]
2. Hose racked or reeled and in good condition? [ ] [ ]
3. Nozzles, spanners, hydrant wrench available? [ ] [ ]
4. Hydrants operable? [ ] [ ]
5. General condition: [ ] Good [ ] Poor

### Remarks (Report on any unusual conditions and action taken):

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**FIGURE L.6.7.4 Sample Loss Prevention Self-Inspection Form for Baled Cotton Storage.**
be certain the fire is out, the burned cotton should be removed from each hot spot while applying wet water to the hole. When the area around the hot spot is no longer warm, it can be assumed that the fire has been extinguished.

(9) The bands from the bales should not be removed. To do so exposes more lint to the fire, and the bale will probably be a complete loss.

(10) Bales involved in a fire should be closely watched for at least 5 days after the last spark is believed to have been extinguished.

L.7.10 Fire-Packed Bales. Fire-packed bales are bales of cotton suspected of containing an internal fire. In the ginning process the lint fiber is separated from the seed cotton in a continuous, automated mechanism known as the gin. During ginning, the three most common sources of ignition are: friction, sparks created by the machinery and high temperatures, usually from the process heater drying the lint fiber. Fire occurs during the ginning process when loose cotton fibers are ignited and incorporated into the lint during compression. In cases where fires occur during the ginning process, technical instructions have been developed by the US Department of Agriculture and are contained in the section on “Procedures for (fighting) Gin Fires” in the USDA-ARS Cotton Ginners Handbook. These procedures recommend that, when a fire has occurred, all lint traveling toward the bale press box is to be treated as if a fire is in the lint. The current guidelines state that the (bale) press operator is to:

1. Stay with the press and battery condenser until the fire is out.
2. Wait until all cotton is down the lint slide, and then turn the press and raise (press) the bale out of the press (hole).
3. Keep the tramper running if cotton is burning in the lint slide.
4. If a fire is in the battery condenser, wet down the areas around the flashing and rollers, and avoid letting the fire burn on the lint belt or near the flashing.
5. Isolate at least two bales before and after a suspected bale fire.
6. Under this disaster-fire-packed bales may result. Even though these bales may meet the size requirements for densely-packed baled cotton they will not meet the density (or compression) requirement. Any bale that is successfully compressed to the packing density of a densely-packed cotton bale, would have had any internal fire extinguished. Surface smoldering fires can occur even with densely-packed cotton bales. Such fires will be immediately visible to the operator, who needs to ensure that even densely-packed cotton bales produced during the ginning process should undergo a thorough inspection whenever a fire has occurred. Any cotton bale found to contain a fire should be treated as if it were a fire-packed bale until the quarantine period has ended.

Gin and warehouse forepersons train their workers to use the senses of smell, touch, and sight to find potential fire bales. In a low-density bale, with an open cotton source, ignition occurs as sudden heating of the cotton, resulting in a large fire. Sometimes the lint is too small for efficient ginning and the candle size results in a large fire. Sometimes the lint is too small for efficient ginning and the candle size results in a large fire.

In this section the comment also recommends eliminating the allowance for storage in the building if a wide central aisle is provided, to avoid conflict with the code.

(7) In L.4.2.2 the comment recommends a reference to NFPA 13, since that is what the storage facility would have to comply with if it were to use sprinklers.

(8) In L.5.4.1 the comment incorporates some clarification regarding fire-packed bales. In the event of a fire, the bale is considered out of control. If there is no fire in a fire-packed bale, the bale is returned to its use as a commodity. However, after the fire is extinguished, the fire-packed bale will usually be reworked by having cotton added to it and by being recompressed into a “densely-packed cotton bale”. If that is not done, the recommended language makes it clear that the low density bale that remains cannot be treated as a densely-packed cotton bale and it will be shipped as a low density bale, which results in a large cost penalty to the seller.

(9) In L.7.1, the comment recommends adding further explanations about causes of fire, gives references to other sections discussing fire-packed bales, completes the issue of what densely-packed cotton bales are being compared to and eliminates the exception for densely-packed cotton bales.

(10) In L.7.10 the comment replaces the erroneous information regarding fire-packed bales with information originating in the USDA Cotton Ginners Handbook.

(11) In L.5.5.2, the comment eliminates the reference to asbestos panels.

(12) The comment also cleans up a few cases where the units (SI vs. practical) have been inverted.

COMMITTEE MEETING ACTION: Reject

COMMITTEE STATEMENT: NFPA 230 is proposed for withdrawal. The annex material that the submitter is commenting on is now proposed as Annex L in NFPA 1/UFC and the submitter has submitted the same changes for proposed Annex L. See Committee Action on Comment 1-83 (Log #18) which accepts the proposed changes.

NUMBER ELIGIBLE TO VOTE: 31
BALLOT RESULTS: Affirmative: 31


COMMENT ON PROPOSAL NO: 230-10

RECOMMENDATION: Continue accepting this proposal in principle and incorporate Annex D of NFPA 230 to become the new Annex L of NFPA 1/UFC as follows:

Annex L. Protection of Baled Cotton History of Guidelines

This annex is not a part of the requirements of this NFPA document but is included for informational purposes only.

1. Introduction

L.1.1 Origin. In the early 1900s, a group of marine underwriters formulated regulations to reduce the frequency of excessive fire loss in baled cotton facilities. In 1916, following a joint conference with the cotton industry, guidelines were established under the title Specifications and Standards (also known as Marine Standards). From 1947 through 1969, the sponsorship was through the Cotton Warehouse and Inspection Service (dissolved in 1969). In 1967, the industry was succeeded by the Cotton Assurance of Baled Losses. The word Standards was replaced with Recommended Good Practices. However, since 1939, the booklet was commonly referred to as the Blue Book.
Numerous revisions were made over the years to keep current, the last made in 1973. Early in 1978, the committee for the Blue Book requested that the NFPA consider a standard on baled cotton storage and handling based on the Blue Book recommended practices. The NFPA Correlating Committee for Storage expanded the scope to include all fibers in baled form, which were covered in NFPA 44, Storage of Combustible Fibers, which was withdrawn many years ago. Little data was found on fire experience for baled fibers other than cotton, and that data was largely empirical in nature.

Therefore, the former NFPA 231E, Recommended Practice for the Storage of Baled Cotton, was developed by consensus of a task group formed in 1978 that was made up of the cotton warehousing, cotton processing, and insurance industries, under the auspices of the Technical Committee on General Storage. The recommendations were limited to cotton fiber in baled form with the intent to convert to a standard as field experience became available to further substantiate its content.

In the 1990s, experimental work by the US Department of Agriculture, and others (Wakelyn and Hughes, 2002), investigated, for the first time in detail, the flammability of cotton bales with a packing density of at least 22 lb/ft^3 (360 kg/m^3). The research showed the following:

1. (1) The limiting density of densely-packed cotton bales did not undergo any of the following: self-heating, (b) spontaneous combustion, or (c) and that the likelihood of sustained smoldering combustion internal to the cotton bale, creating a delayed fire hazard (also known as a fire-packed bale) was extremely low.

2. (2) When the densely-packed cotton bales were exposed to smoldering cigarettes, matches and open flames (including the gas burner ignition source used for the mattress tests ASTM E 1590 and California Technical Bulletin 129), the probability of initiating flaming combustion was at such a low level as to not qualify the densely-packed cotton bales as flammable solids.

These investigations resulted in harmonization between the U.S. Department of Transportation (49CFR172.102, note 137), the United Nations Recommendations on the Transport of Dangerous Goods, the International Maritime Dangerous Goods Code and the International Civil Aviation Organization’s Technical Instructions, with the removal of the flammable solid designation of densely-packed cotton bales, complying with ISO 8115, “Cotton Bales - Dimensions and Density” and the exemption of such cotton bales from the Hazardous Materials Regulations and which have a packing density of at least 22 lb/ft^3 (360 kg/m^3). The limiting density of densely-packed cotton bales was set up with a substantial margin of safety, as the bale was never found in cotton bales compressed to a density greater than 14 lb/ft^3 (225 kg/m^3). With the merger of a number of general storage standards in 1999, and the incorporation of the information into NFPA 1 UFC (Identified as Annex L) and it is shown in this annex as guidance for the user.

1.1.1.2 None of the provisions outlined should be considered mandatory. However, it is recommended that property owners follow these guidelines as a minimum means of preventing fire spread by controlling the most common fire modes specified, by the separation of major storages using fire walls or clear spaces, and by the provision of an adequate means of extinguishment.

1.1.2 These guidelines can be applied to new or existing facilities.

1.1.3 There is no intent to restrict new technologies or alternative arrangements that offer protection features superior to those outlined.

1.1.3 General.

1.1.3.1 Cotton fiber, unless stored as densely-packed cotton bales, is readily ignitable and burns freely and, when stored in relatively large quantities, poses material and storage, and handling and is largely covered by industry-accepted packaging guidelines. Compliant densely-packed cotton bales, complying with ISO 8115, “Cotton Bales - Dimensions and Density” and the International Civil Aviation Organization’s Technical Instructions, with the removal of the flammable solid designation of densely-packed cotton bales, complying with ISO 8115, “Cotton Bales - Dimensions and Density” and the exemption of such cotton bales from the Hazardous Materials Regulations and which have a packing density of at least 22 lb/ft^3 (360 kg/m^3). Densely-packed cotton bales are difficult to ignite and do not fire-packed bales are low density, underwater, bales that could contain an internal smoldering fire, from the ginning or other process.

1.2.3 Fire Divisions or Clear Spaces Between Buildings.

1.2.3.1 A fire division is a building, compartment, or section cut off by fire walls or separation.

1.2.3.1.1 Fire divisions or clear spaces between buildings should be in accordance with NFPA 80A, Recommended Practice for Protection of Buildings from Exterior Fire Exposures, in the “severe” category.

1.2.3.2 Storage of baled cotton, other than densely-packed cotton bales, generally has a fire load in excess of 15 lb/ft^2 (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.

1.2.3.2.1 Storage of baled cotton, other than densely-packed cotton bales, generally has a fire load in excess of 15 lb/ft^2 (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.

1.2.3.2.2 Fire walls should be of masonry and rated for at least 4 hours (based on NFPA 251, Standard Methods of Tests of Fire Endurance of Building Construction and Materials; ASTM E 119, Standard Methods of Fire Tests of Building Construction and Materials; and UL 263, Standard for Safety Tests of Fire Resistance of Building Construction and Materials). For a complete description of construction Types I, II, III, IV, and V, see NFPA 220, Standard on Types of Building Construction. Such walls should be parapeted as follows:

1.2.3.2.2.1 For wood frame [Type V (111-000)] and ordinary or heavy timber masonry [Type III (211-200) and Type IV (2IIH)], construction parapets should extend at least 5 ft (1.5 m) above the roof. A fire division or clear space between buildings should be in accordance with NFPA 251, Standard Methods of Tests of Fire Endurance of Building Construction and Materials; ASTM E 119, Standard Methods of Fire Tests of Building Construction and Materials; and UL 263, Standard for Safety Tests of Fire Resistance of Building Construction and Materials. Such walls should be parapeted as follows:

1.2.3.2.2.2 For non-combustible construction [Type I (900-900)] or other than that outlined in 1.2.3.2.2.1, parapets should extend at least 5 ft (1.5 m) above the roof.

1.2.3.2.3 For non-combustible construction [Type I (900-900)] or other than that outlined in 1.2.3.2.2.1, parapets should extend at least 5 ft (1.5 m) above the roof. A fire division or clear space between buildings should be in accordance with NFPA 251, Standard Methods of Tests of Fire Endurance of Building Construction and Materials; ASTM E 119, Standard Methods of Fire Tests of Building Construction and Materials; and UL 263, Standard for Safety Tests of Fire Resistance of Building Construction and Materials. Such walls should be parapeted as follows:

1.2.3.2.3.1 For wood frame [Type V (111-000)] and ordinary or heavy timber masonry [Type III (211-200) and Type IV (2IIH)], construction parapets should extend at least 5 ft (1.5 m) above the roof. A fire division or clear space between buildings should be in accordance with NFPA 251, Standard Methods of Tests of Fire Endurance of Building Construction and Materials; ASTM E 119, Standard Methods of Fire Tests of Building Construction and Materials; and UL 263, Standard for Safety Tests of Fire Resistance of Building Construction and Materials. Such walls should be parapeted as follows:

1.2.3.2.3.2 For non-combustible construction [Type I (900-900)] or other than that outlined in 1.2.3.2.2.1, parapets should extend at least 5 ft (1.5 m) above the roof.
L.3 Storage Arrangements.

L.3.1 General. This section applies to storage of baled cotton, other than densely-packed cotton bales, in buildings protected by a sprinkler system in accordance with Section L.4, or to those not so protected. The tier heights, block sizes, and aisle widths outlined are permitted 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 result in a substantial delay in fire spread and in providing for manual fire fighting. Automatic sprinkler effectiveness is also improved substantially, with a reduction in water demand and in fire damage. Fire tests with densely-packed cotton bales have shown that such products are difficult to ignite and release little heat when ignited.

L.3.2 Storage Blocks.

L.3.2.1 Storage blocks, tiered or untiered, or in racks, should be limited to 35,000 ft\(^3\) (706 cubic meters) of compressed cotton and 350 bales of uncompressed cotton (unless the bales are densely packed cotton bales). The height of tiered or rack storage should be limited to a nominal 4.6 m (15 ft). Rack storage, as used in this document, contemplates baled cotton—separated in a skeleton steel pipe or tabular frame, without shelving, and is limited to a single- or double-row configuration not in excess of two bales deep.

L.3.2.2 Rack storage should not extend over aisles or doorways.

L.3.2.4 Racks should not be loaded beyond their design capacity and should be designed for seismic conditions in areas where seismic resistance for buildings is required.

L.3.3 Aisles.

L.3.3.1 Aisles should be provided and maintained to minimize the spread of fire and to allow convenient access for fire fighting, removal of storage, and salvage operations.

L.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.

L.3.3.3 Cross aisles separating each storage block should be at least 4 ft (1.2 m) wide, (1.2 m), with a reduction in water demand and in fire damage. Fire tests with densely-packed cotton bales have shown that such products are difficult to ignite and release little heat when ignited.

L.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.

L.3.3.5 Aisles should be maintained free of loose cotton fibers.

L.3.4 Freshly Ginned Cotton Bales. See L.5.4.

L.3.5 Storage of Commodities Other than Cotton.

L.3.5.1 Cotton warehouses, in general, can be used for the storage of other commodities, provided the following: (1) The storage of other commodities in a building is permitted where baled cotton is not stored. (2) 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 where baled cotton is stored in the fire division. (3) Any commodities that could be damaged in consequence of increasing its penetrating and spreading qualities — is the most effective on baled cotton fires. Plain water is effective on surface fires but lacks the penetrating power of wet chemical extinguishers using sodium bicarbonate, potassium bicarbonate, or potassium chloride base powders have been used to control a surface fire on baled fibers and work mainly by coating the fiber with the fire-retardant powder. However, such chemicals do not affect a smoldering or burning fire beneath the surface.

L.3.5.3 Where commodities of different classifications are permitted and stored in the same building, whether on a seasonal or other basis, the protection should be adequate for the most hazardous material. (For protection of other commodities, refer to the main body of this standard or to the other applicable NFPA storage standards.)

L.3.6 Clearances.

L.3.6.1 Proper clearances from lights or light fixtures should be maintained 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.

L.3.6.2 No storage should be located within 3 ft (0.9 m) of any electrical switch or panel boards and fuse boxes.

L.3.6.3 Storage of baled cotton, other than densely-packed cotton bales. Baled storage of baled cotton is subject to the following: (1) The storage of any other combustibles should be kept at least 4 ft (1.2 m) from fire door openings so that the transmission of fire through a door opening is minimized. (2) The unit(s) has an equivalent extinguishing effectiveness of 20A for each 15,000 ft\(^2\) (1380 m\(^2\)) of floor area or less. (3) The unit(s) has an equivalent extinguishing effectiveness of 40A or more for each 30,000 ft\(^2\) (2760 m\(^2\)) of floor area.

L.3.6.4 At least 4 ft (1.2 m) from fire door openings so that the transmission of fire and to allow convenient access for fire fighting, removal of storage, and salvage operations.

L.3.6.5 A clearance of at least 3 ft (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.

L.4 Fire Protection.

L.4.1 Automatic Sprinkler Systems.

L.4.1.1 Automatic sprinkler protection is not part of the recommendations of this annex. 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. (See L.3.5 for sprinkler protection for other than cotton fiber storage.)

L.4.2 Water Supplies.

L.4.2.1 The total water supply available should be sufficient to provide the recommended sprinkler discharge density over the area to be protected, plus a minimum of 500 gpm (2000 L/min) for hose streams.

L.4.2.2 Water supplies should be capable of supplying the total demand required for sprinklers and hose streams to control any potential fire. Further details can be found in NFPA 13. Standard for the Installation of Sprinkler Systems for not less than a two-hour fire resistance rated construction.

L.4.2.3 Recommended water supplies contemplate successful sprinkler operation when installed. However, because of the potential for rapid surface flammability and inherent unfavorable features of cotton warehousing of loose cotton fibers, there should be an adequate water supply available for fire department use.

L.4.3 Hydrants. At locations without public hydrants, private hydrants should be provided in accordance with NFPA 24. Standard for the Installation of Private Fire Service Mains and Their Appurtenances.


L.4.4.1.1 Small Hose. In buildings of 15,000 ft\(^2\) (1380 m\(^2\)) or larger, small hose [1 1/2 in. (38 mm)], with combination water spray nozzle, should be provided to reach any portion of a storage area with due consideration to access aisle configuration with a maximum length of 100 ft (30 m) of hose. Such small hose should be supplied from one of the following:

L.4.4.2.1 Hydrant Systems.

L.4.4.3.1.1 Portable Fire Extinguishers. Portable listed fire extinguishers should be provided in accordance with NFPA 10. Standard for Portable Fire Extinguishers, and as amended by this section. Up to one-half of the required complement of portable fire extinguishers for Class A fires can be omitted in storage areas where fixed small hose lines are installed in accordance with L.4.4.1.
or suspect fire-packed bales. [45x44]

Section L.5 Unobstructed Clear Space.

L.5.1 Except as noted in L.5.5.1 unobstructed clear space to designated yard storage should be maintained as follows:

(1) 100 ft (30 m) to any approved sprinklered building
(2) 200 ft (60 m) to any nonapproved sprinklered or nonsprinklered building
(3) 200 ft (60 m) to an approved incinerator
(4) 300 ft (150 m) to a nonapproved incinerator or open fire
(5) 100 ft (30 m) to vehicle and seed trailer, or module parking areas and trash piles
(6) 50 ft (15 m) to roadways and railroad main lines and sidings
(7) 200 ft (60 m) upwind of any reconditioning activity

L.5.2 In the case of buildings, sprinklered or unsprinklered, the clear space can be reduced up to 50 percent if construction is fire-resistive or if facing walls are masonry and parapeted with adequately protected openings. This area reduction can also be permitted to be applied to noncombustible buildings of a type limited to corrugated iron or asbestos panel walls and roof on a steel frame.

L.5.3 Fire Protection.

L.5.6.1 To qualify as a protected yard, hydrants should comply with L.4.3, except where amended by Section L.5.

L.5.6.1.1 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 hydrant, permitted in lieu of containers and pails.

L.5.6.1.2 Hydrant equipment for each yard group (20,000 bales) should consist of the following:

(1) 250 ft (75 m) of 2%-in. (65-mm) hose
(2) 300 ft (90 m) of 3%-in. (76-mm) hose with provisions to "Y-connect" to the 2%-in. (65-mm) hose
(3) Combination water spray nozzles
(4) Proper wrenches for hydrant operation and hose connections

L.5.6.2.1 Water available to the most remote yard hydrants should be capable of delivering at least 500 gpm (2000 L/min) at an effective pressure for at least a 2-hour period. 

L.5.6.2.2 Approved extinguishing units should be provided on the basis of an equivalent 40A rating for each protected or unprotected yard area (see L.5.3) or greater fraction thereof.

L.5.6.2.3 Subject to the authority having jurisdiction, a motorized wet water unit(s) can be substituted for that specified in L.5.6.2 provided that a unit of 250 gal (1000 L) or greater capacity is provided for each yard area storing up to 20,000 bales.

L.5.6.2.4 Placement of wheeled or motorized units should be at ready accessibility locations within as follows: (a) Each yard, protected from damage, and maintained in good operating condition at all times.

L.5.6.3 Water containers and pails, if used, should be distributed at a ratio of one 40 gal (150-L) (40 gal (150-L) or greater container with two pails for each 100 bales of storage. However, wheeled wet water pressure extinguishers are permitted in lieu of containers and pails.

L.5.6.4 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 L.4.4.2 for information on portable fire extinguishers.)

L.5.6.5 A suitable and reliable means of communication should be available to summon the fire department or other appropriate personnel promptly, to sound a general alarm in the case of fire or other emergency, or both.

L.5.6.6 Reference should be made to L.4.6 for fire emergency planning and procedures that apply to yard storage.

L.5.7 Smoking. Smoking should be strictly prohibited within 100 ft (30.5 m) of yard storage areas, and “No Smoking” signs should be posted conspicuously. (See L.6.6.)

L.5.7.1 General Fire Protection. All internal combustion equipment used in or around yard storage areas should be equipped with a suitable spark arrester-type muffler properly maintained and otherwise approved by the authority having jurisdiction.

L.5.7.2 Guard Watch Service.

L.5.7.2.1 Guard watch service should be provided throughout all designated yard storage areas during all shutdown periods when fewer than 5 days have passed after cotton bales have been ginned or when the total stock exceeds 1000 bales.

L.5.7.2.2 Hourly rounds should be made and recorded during all nonworking hours by an approved and listed portable clock and having key stations situated to ensure complete coverage of the area of responsibility. Watch service information should be obtained from NFPA 601, Standard for Security Services in Fire Loss Prevention.

L.6 Administration, Buildings, Equipment, Maintenance, and Operations.

L.6.1 General Fire Protection. 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 can be abrogated quickly by neglect of 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.

In addition to the recommendations outlined in this annex, the liaison between
management and personnel should include a meaningful loss prevention program that provides the following:
(1) Encourages loss prevention habits
(2) Teaches the prompt sounding of alarms
(3) Minimizes panic and effects safe evacuation
(4) Instructs key personnel in the effective utilization of fire-extinguishing equipment and other protective features
(5) Teaches basic salvage and cleanup techniques to minimize the downtime of operations.

L.6.2 Mechanical-Handling Equipment.
L.6.2.1 Industrial Trucks. Power-operated industrial trucks and mobile equipment should comply with NFPA 505, Fire Safety Standard for Powered Industrial Trucks Including Type Designations, Areas of Use, Conversions, Maintenance, and Operation. Cotton storage and handling areas are defined as Class II, Division 2 hazardous areas and require vehicles designated as types DS, DY, EX, GS, GS/LPS, and GS/LPS.

L.6.2.1.1 Gasoline and diesel fuel should be prohibited in cotton storage areas, on platforms, and in exposing yard areas. Fueling should be done outside at a well-detached location in accordance with NFPA 30, Flammable and Combustible Liquids Code.

L.6.2.1.1.1 Gasoline and diesel fuel contained in the vehicle tanks are permitted.

L.6.2.1.2 Liquefied petroleum gas (LP-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, Liquefied Petroleum Gas Code.

L.6.2.1.3 Charging equipment for storage batteries should be in a separate area, room, or building designated for that purpose. If located in a separate room, the room should be lined with substantial noncombustible materials constructed to exclude “fly” or lint. Charging areas should be kept free of extraneous combustible materials and trash. Adequate ventilation should be provided to maintain concentrations of hydrogen gas during charging.

L.6.2.1.4 All mechanical equipment and refueling areas should be kept free of accumulations of fibrous lint, oil, and trash with particular attention paid to the internal areas of vehicles.

L.6.2.2 Maintenance and Operations. The following recommendations should be followed prior to the entrance or use of industrial trucks in a cotton storage or handling area:
(1) All traces of fuel should be cleaned from the vehicle before it is started.
(2) Vehicles that have exhausted fuel tanks should be towed to the assigned fueling area for refueling.
(3) Repairs should be prohibited in cotton storage or handling areas.
(4) Alterations of the fire safety features should be prohibited.
(5) Maintenance procedures should comply with those outlined in NFPA 505, Fire Safety Standard for Powered Industrial Trucks Including Type Designations, Areas of Use, Conversions, Maintenance, and Operation (See L.6.2.1.1).

L.6.2.3 Interplant Haulage. Tractors used for interplant hauling should be equipped with a properly maintained, suitable, spark arrester-type muffler.

L.6.2.4 Motorized Vehicles. Motorized vehicles, other than those specified under L.6.2.1, should not be permitted to enter any cotton storage area. A loading platform should be located so that trucks cannot fully enter inside the closing walls of a warehouse with the truck space inclined away from the loading platform should be located so that trucks cannot fully enter inside the loading area. The loading area should be closed off from any under-floor building space.

L.6.2.5 Equipment Storage. Mechanical-handling equipment, when not in use, should be stored on each bale so picked. Removal of more than one bale is to be considered part of the picking process.

L.6.3 Building Service and Equipment.

L.6.3.1 Electrical Installation.
L.6.3.1.1 It is recommended that cotton storage and handling areas be free of electrical installations. However, installations that are necessary should comply with NFPA 70, National Electrical Code®, for Class III, Division 2 hazardous areas.

L.6.3.1.2 Electrical extension cords should be prohibited in storage areas. If portable lights are necessary, battery-powered lanterns or flashlights can be used.

L.6.3.2 Open-Flame Heating Devices. Open-flame heating devices, permanent or temporary, should be prohibited.

L.6.3.3 Shops and Equipment.

L.6.3.3.1 Repairing and reconditioning and boilers or similar equipment should be prohibited in cotton storage areas. Separate buildings should be provided for such purposes or should be separated from storage areas by a standard 2-hour fire wall.

L.6.3.3.2 The term reconditioning applies mainly to cotton and is defined as any opening, drying, cleaning, or picking of bales of loose cotton by any means whatsoever, except for the following:
(1) Air drying (not compressed air) of baled cotton at room temperature where not more than one bale is removed from each bale being so dried.
(2) The picking of baled cotton by hand 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 hands remain on each bale so picked. Removal of more than one hand is to be considered part of the picking process.
(3) The opening of bales in the press room for pressing or recompressing.
(4) 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 recompressing 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 Section L.2.

L.6.4 Cutting and Welding.
L.6.4.1 Where cutting and welding operations are necessary, the precautions contained in NFPA 51, Standard for the Design and Installation of Oxygen–Fuel Gas Systems for Welding, Cutting, and Allied Processes, should be followed.

L.6.4.2 Welding, soldering, brazing, or cutting should be permitted only by the authorization of management. Proper precautions should be observed and should include the following:
(1) A supervisor should be assigned to the operation.
(2) The area should be made fire-safe.
(3) Work should be removed to a safe area, where possible.
(4) Where these operations are performed on equipment or building components that 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.

L.6.5 Waste Disposal.
L.6.5.1 Liquefied, trash, and other waste material should be disposed of at regular intervals. Approved waste cans with self-closing covers should be used where needed. Open fires and incinerator operations should be prohibited within 100 ft (30 m) of any cotton storage building.
L.6.5.2 For additional details, see NFPA 82, Standard on Incinerators and Waste and Linen Handling Systems and Equipment.

L.6.6 Smoking.
L.6.6.1 Smoking should be strictly prohibited, except in locations prominently designated as safe smoking areas. “No Smoking” signs should be posted conditionally in prohibited areas.
L.6.6.2 The cooperation of employees is more easily secured when a reasonable smoking policy is adopted with smoking allowed 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 locations where the hazard is most dangerous.

L.6.7 Maintenance and Inspection.
L.6.7.1 Fire walls, fire doors, fire door guards, and floors should be maintained in good repair at all times.

L.6.7.2 NFPA 25, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems, should be referenced for information on the maintenance and service of sprinkler systems and water supplies.

L.6.7.3 All portable and manual fire-extinguishing equipment should be maintained and serviced.

L.6.7.4 As an aid in maintaining fire protection features and equipment in full service at all times, Figure L.6.7.4 provides a simple self-inspection form that contains a checklist of loss prevention principles. This sample form can be used without change or as a guide in establishing a specialized form to suit individual facilities. (See Figure L.6.7.4 Formerly Figure D.6.7.4 of NFPA 25-2003 on the following page.)

L.6.8 Grass and Weeds. All dried grass and weeds should be kept clear of buildings for at least 50 ft (15 m) of any building.

L.6.9 Information on Fighting Fires in Baled Cotton.
L.6.9.1 Introduction. The information contained in this section is a summary of knowledge gained over the years by cotton storage personnel, fire fighters, and insurance authorities in fighting fires in the Cotton Belt. The most common considerations when fires occur with densely packed cotton bales are arson and exposure to a fire from an external source. A fire on baled cotton, other than densely packed cotton bales, that Cotton bale fires have peculiarities that should be understood and respected if a large loss is to be averted 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 standard are followed, but extinguishment should not be expected.

The primary rule for any fire is always to call the responding fire department.
<table>
<thead>
<tr>
<th>General Housekeeping</th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Inside Buildings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) Floor and dock areas clean of loose cotton and trash?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(b) Covered metal containers for loose cotton and trash?</td>
<td></td>
<td></td>
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<tr>
<td>2. Outside Buildings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) Surrounding areas free of dried grass, weeds, and combustible trash?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smoking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Evidence of smoking in unauthorized areas?</td>
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<td></td>
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<tr>
<td>2. Signs posted and readily visible?</td>
<td></td>
<td></td>
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<tr>
<td>Electrical Equipment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Extension cords prohibited?</td>
<td></td>
<td></td>
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<tr>
<td>2. Storage in contact with lights or wiring?</td>
<td></td>
<td></td>
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<tr>
<td>3. Wiring properly supported and undamaged?</td>
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<td></td>
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<tr>
<td>4. Circuits properly fused?</td>
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<td></td>
</tr>
<tr>
<td>5. All panels, junction, switch, and receptacle boxes covered?</td>
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<td></td>
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<tr>
<td>Mechanical Equipment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Listed for fiber storage (Type DS, DY, ES, EE, EX, GS, or LPS)?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Spark-retardant mufflers maintained?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Refueled outside at designated area?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Stored outside when idle?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. General condition and maintenance good?</td>
<td></td>
<td></td>
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<tr>
<td>Buildings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Fire walls in good repair, including around fire door openings?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Fire doors in proper working condition and tested for ease of closing each week? (Overhead, roll-type doors should be tested at least annually.)</td>
<td></td>
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</tr>
<tr>
<td>3. Fire door guards in place and maintained?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Floor and exterior walls in good repair?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Exterior wall openings have doors and windows in place that close properly and lock?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Space under grade floor, if any, closed off?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage Arrangements</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Storage Blocks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) Within prescribed height (15 ft (4.6 m))?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(b) Sprinkler heads unimpaired (18 in. (457 mm) clearance)?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(c) Block sizes limited to 700 bales pressed or 350 flat?</td>
<td></td>
<td></td>
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<tr>
<td>(d) Tiered storage stable and secure?</td>
<td></td>
<td></td>
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<tr>
<td>2. Aisles</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) At least one main aisle 12 ft (3.7 m) or more in width?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(b) Cross or work aisles at least 4 ft (1.2 m) in width?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(c) Any damaged bales, broken bands, or wet stock?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Fire Department**

1. Phone number prominently displayed at each phone? | | |
2. Personnel instructed on procedure in case of fire? | | |

**Watch Service**

1. Making regular rounds? | | |
2. All key stations punched? | | |
3. Records checked, dated, and filed? | | |

**Fire Alarm Service**

1. Automatic fire alarm system in service? | | |
2. Manual pull stations clearly marked and accessible? | | |
3. System tested within required frequency? | | |

**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. Containers 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**

1. Hose and nozzle attached to each? | | |
2. Racked and in good condition? | | |
3. Easily accessible and ready for use? | | |
4. Valves operate readily? | | |

**Yard Hydrants and Hose Houses**

1. Readily accessible? | | |
2. Hose racked or reeled and in good condition? | | |
3. Nozzles, spanners, hydrant wrench available? | | |
4. Hydrants operable? | | |
5. General condition: \[ \checkmark \text{Good} \, \square \text{Poor} \]

**Remarks** (Report on any unusual conditions and action taken):

- Report by: ____________________________
- Date: ________________________________

FIGURE L.6.7.4 Sample Loss Prevention Self-Inspection Form for Baled Cotton Storage.
first. Fighting fires of any type is a profession and, even where a well-trained private fire organization is available, 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 above the stored material. Such rapid flame spread 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, with bands or wires tightly wrapped, are less vulnerable to rapid flame spread, surface fire, and a burrowing fire than loose fibers or low-density cotton bales, but the possibility of such a fire should not be ignored.

L.7.2 Causes. Some of the causes of cotton fiber fires include the following: burning metal bands (ties) that strike other metallic objects resulting in sparks, fire-packaged cotton bales, and cotton bales, such as those in gin yards, are often placed in open areas. Additionally, the fire should be extinguished as quickly as possible. Extreme caution should be exercised in preparing and watching the path along which the burned bales are removed from the involved shed. Burning fibers of cotton are easily blown from the bale, especially in the early stages, and the bales outside. It could be necessary to move the uninvolved bales away from the exit route (or from the entire compartment) or even to make a hole in the side of the compartment. The spread of fire along the exit route caused by burning bales is not uncommon.

L.7.9 Salvage Operations. Salvage is important, and every precaution should be taken to protect the salvage. The usual severity of a fire in a cotton warehouse, along with the appearance of the charred bales, is misleading with respect to the amount of remaining salvage.

L.7.10 Previously, burning bales at the gin could not be damaged cotton, and if the charred bales are kept cool with hose streams until proper salvage operation is begun, the quantity of the loss can be reduced substantially.

The insurance department will not, until they are burned. After the fire is brought under control, all bales involved should be removed to a safe location for final extinguishment. The procedure should be to move the cotton out of the involved shed as rapidly as possible. Extreme caution should be exercised in preparing and watching the path along which the burned bales are removed from the involved shed. Burning fibers of cotton are easily blown from the bale, especially in the early stages, and the bales outside. It could be necessary to move the uninvolved bales away from the exit route (or from the entire compartment) or even to make a hole in the side of the compartment. The spread of fire along the exit route caused by burning bales is not uncommon.

L.7.10 Fire-Packed Bales. Fire-packed bales are bales of cotton suspected of containing an internal fire. In the ginning process the lint fiber is separated from the cotton seed by automated mechanical operations, involving heating of the lint to facilitate separation. During ginning, lint fibers are subjected to high temperatures, usually from the process heater drying the lint fiber. Fire occurs during the ginning process when loose cotton fibers are ignited and incorporated into the bale during compression. In cases where fires occur during the ginning process, technical instructions have been developed by the US Department of Agriculture and are contained in the section on "Procedures for (fighting) Gin Fires" in the USDA-ARS Cotton Ginners Handbook. The procedures recommend that, when a fire has occurred, all lint traveling towards the bale press box must be treated as if a fire is in the lint. The current guidelines state that the (bale) press operator is to:

Stay with the press and battery condenser until the fire is out.

(1) If available, fire department connection to the hydrants should be utilized.

L.7.7 Cotton Yard Fires. Conditions in a cotton yard fire are not as controllable as those in a warehouse fire, since draft conditions are almost entirely dependent upon the climatic conditions at the time of the fire. If an adverse wind prevails, a small involvement can easily become a catastrophe. Preplanning is particularly important in this case. Upon arrival at a cotton yard fire, the following steps should be taken immediately:

(1) If available, fire department connection to the hydrants should be utilized.

(2) Hose lines should be laid out.

(3) Using divided stream nozzles, water should be applied ahead and downwind of the fire and then worked toward the fire.

(4) Bales and damage should be checked underneath for fire.

(5) It is important to remain alert for flying sparks.

(6) The nearby uninvolved cotton should be removed to create a fire break.

(7) Burned cotton should be removed to a segregated area.

L.7.8 After Watch. Where the fire-involved cotton has been removed and leaves behind undamaged stock, a minute and unobserved spark often causes a rekindling of the previous fire with disastrous results. The involved area should be raked and carefully checked. Aided and unaided firemen should be stationed at exits to prevent the spread of fire.

L.7.6 When it is apparent that the fire is beyond the control of the sprinklers and the building should be vacated immediately and the doors again should be closed. As many hose streams, as the force of the stream could scatter the burning wads or portions of cotton over a wide area. Spray or fog nozzles are recommended, but, if not available, it might be possible to deflect a solid stream off the walls, roof, or other solid object.

Once the exterior of the bale(s) is fully wet down and fire is suppressed, the bales involved should be removed to an outside, safe location for final extinguishment.

L.7.4 Active Stage in Sprinklered Buildings. If a fire progresses well beyond the incipient stage or involves more than a few bales and further fire spread is likely, the building could readily prove untenable and dense smoke could quickly obscure vision. It then is best to have all personnel vacate the building to a point of safety. As drafts, including early venting through roofs and walls, are undesirable, it is essential to leave the building unventilated and close all doors and cut off all possible drafts to the building involved. This reduces available oxygen to the fire, and the dense smoke suppresses fire intensity. Drafts not only provide fresh air to increase fire intensity but also can blow heat away from the fire, opening sprinklers beyond the fire area and possibly overtaxing the available water to the sprinkler system. The sprinkler system should be given a chance to do its job. Ventilating a cotton fire can cause it to flash out of control, spread with explosive violence, and open an excessive number of sprinklers.

After the fire is under control of the sprinkler system, the compartment door should be opened only enough to use fire hose or to enter and remove the cotton. The smoke-removal service should be continued to remove the smoke from those compartments through which the burning bales travel before salvage operations are allowed to start. If there is any question regarding additional exposures, they should be removed, if possible, before moving the burning bales.

The building should be wetted down and moved to a safe, segregated place as soon as possible. They should be placed approximately 3.0 m (10 ft) apart in an open area away from other exposures.

(7) Care should be exercised in removing these bales so as not to start another fire in the process. If the side of the compartment is metal-clad or frame, it could be best to remove a portion of the side so that the cotton can be removed through the warehouse roof. This can remove the cotton from those compartments through which the burning bales travel before salvage operations are allowed to start. If there is any question regarding additional exposures, they should be removed, if possible, before moving the burning bales.

(8) Any outside blaze on the bale should be knocked down. The wet water should be applied to each smoldering spot on the bale. Often a handful of cotton soaked in the wet water can be applied directly on or into the smoldering cotton soaked in the wet water can be applied directly on or into the smoldering spot. Cotton fires burrow into the bale, so it is necessary to apply the wet water as far into the hole as possible, soaking the area thoroughly. In order to cool the bale, the bale should be removed to an outside, safe location for final extinguishment. When the area around the spot is no longer warm, it can be assumed that the fire has been extinguished.

(9) The bands from the bales should not be removed. To do so exposes more lint to the fire, and the bales will probably be a complete loss. Bales involved in the fire should be watched for at least 5 days after the last spark is believed to have been extinguished.

L.7.10 Fire-Packed Bales. Fire-packed bales are bales of cotton suspected of containing an internal fire. In the ginning process the lint fiber is separated from the cotton seed by automated mechanical operations, involving heating of the lint to facilitate separation. During ginning, lint fibers are subjected to high temperatures, usually from the process heater drying the lint fiber. Fire occurs during the ginning process when loose cotton fibers are ignited and incorporated into the bale during compression. In cases where fires occur during the ginning process, technical instructions have been developed by the US Department of Agriculture and are contained in the section on "Procedures for (fighting) Gin Fires" in the USDA-ARS Cotton Ginners Handbook. These procedures recommend that, when a fire has occurred, all lint traveling towards the bale press box must be treated as if a fire is in the lint. The current guidelines state that the (bale) press operator is to:

Stay with the press and battery condenser until the fire is out.
COMMITTEE MEETING ACTION: Reject

COMMITTEE STATEMENT: NFPA 230 is proposed for withdrawal. The annex material that the submitter is commenting on is now proposed as Annex L in NFPA 1 UFC and the submitter has submitted the same changes for a new Annex L. See Committee Action on Comment 1-83 (Log #18) which accepts the proposed changes.

NUMBER ELIGIBLE TO VOTE: 31

BALLOT RESULTS: Affirmative: 31

2. Wait until all cotton is down the lint slide, and then turn the press and raise (press) the bale out of the press (hole).
3. Keep the tramper running if cotton is burning in the lint slide.
4. If a fire is in the battery condenser, wet down the areas around the flashing and rollers, and avoid letting the fire burn on the lint belt or near the flashing.
5. Isolate at least two bales before and after a suspected bale fire.

Under this scenario-fire-packed bales may result. Even though these bales may meet the size requirements for densely-packed baled cotton they will not meet the density (or compression) requirement. Any bale that is successfully compressed to the packing density of a densely-packed cotton bale, would have had any internal fire rapidly extinguished due to lack of oxygen. However, surface smoldering fires can occur even with densely-packed cotton bales. Such fires will be immediately visible to the operator, who needs to ensure that even densely-packed bales produced during the ginning process should undergo a thorough inspection whenever a fire has occurred. Any cotton bale found to have a surface fire should be treated as if it were a fire-packed bale until the quarantine period has ended.

Gin and warehouse forepersons train their workers to use the senses of smell, touch, and sight to detect potential fire bales. In a low-density bale, with an internal fire, the fire usually burns through to the outside of the bale within a few hours, but it can remain undetected for several days. The obvious acrid internal fire, the fire usually burns through to the outside of the bale within a few hours, but it can remain undetected for several days. The obvious internal fire, the fire usually burns through to the outside of the bale within a few hours, but it can remain undetected for several days. Sometimes the odor is noticeable or the bale feels excessively warm. These bales are known as fire-packed bales and are a major cause of fires in baled cotton.

The recommended procedure for handling and extinguishing fire-packed bales is as follows:

1. All known or suspect fire-packed bales should be stored in the open and segregated from buildings and other storage. They should be separated about 3 ft (0.9 m) from other such bales.
2. These bales should be under constant surveillance to detect fire as soon as it moves to the surface.
3. A supply of an approved wetting agent and at least one stirrup pump should be available at all times.
4. When fire is detected, the area around the hot spot should be wetted immediately to prevent the spread of the fire. The hot spot then should be saturated with wet water. The burned cotton should be removed by hand while constantly applying water to the hole. This procedure should be continued until no warm areas are detected. It is not uncommon for several fires to be packed into a single bale.
5. Do not remove the bands from the bale, as this exposes more cotton fibers to ignition and usually results in the total loss of the bale.
6. Fire-packed bales or bales suspected of being fire-packed should remain in quarantine and under surveillance for at least 5 days. After this time, they can be considered to be safe and handled in the regular manner. Note that there is no set time after which a fire can be considered extinguished in a bale, as this depends on the thoroughness of extinguishment. However, 5 days after the fire is believed to have been extinguished is generally considered to be a rule-of-thumb safe period.


SUBSTANTIATION: The recommendations in this comment are identical to those in my comment to proposal NFPA 1-204 and to proposal NFPA 230-12.

This comment proposes changes to help bring the new Annex L of NFPA 1 (formerly Annex D of NFPA 230) into line with the modern knowledge about the fire safety issues associated with cotton storage.

1. In the introduction the comment clarifies somewhat better what the research conducted by the US Department of Agriculture and the industry showed. There were three critical aspects of that work: (a) fire-packed bales cannot exist unless the density of the bale is less than 14 pounds per cubic foot, as a high compression prevents sufficient oxygen to diffuse through the cotton to sustain combustion, (b) densely-packed cotton bales do not undergo self-heating, spontaneous combustion or internal sustained smoldering combustion and (c) densely-packed cotton bales are flammable solids per the United Nations and IMO.

2. In the introduction also, the comment explains that the density of densely-packed cotton bales gives at least a 50% margin of error (14 to 22 pounds per cubic foot) over the point where cotton bales can cause fire-packed bales.

3. In L.3.1.1, L.3.2.2, L.3.2.2, L.3.5.2, L.3.6.3 and L.7.1 the comment eliminates unnecessary exceptions for densely-packed cotton bales.

4. In L.3.2.2 the comment adds “arson and other malicious acts” as the major common cause of fires in baled cotton, and describes the characteristics of fire-packed bales.

5. In L.3.2.2 the comment limits the maximum amount of baled cotton in storage block to 25,000 cubic feet, which is consistent with Chapter 62 (now Chapter 45) of NFPA 1/UFC and Chapter 29 of IPC.

6. In L.3.3 the Annex has been made consistent with both Chapter 62 (now Chapter 45) of NFPA 1/UFC (if my comment to proposal 1-186 is accepted) and Chapter 29 of IPC. In this section the comment also recommends eliminating the allowance for increasing the level of storage if a wide central aisle is provided, to avoid conflict with the code.

7. In L.4.2.2 the comment recommends a reference to NFPA 13, since that is what the storage facility would have to comply with if it were to use sprinklers.

8. In L.5.4.1 the comment incorporates some clarification regarding fire-packed bales. It also makes clear that once there is no more fire in a fire-packed bale, the bale is returned to its use as a commodity. However, after the quarantine, the fire-packed bale will usually be reworked by having cotton added to it and by being recompressed into a “densely-packed cotton bale”. If that is not done, the recommended language makes it clear that the low density bale that remains cannot be treated as a densely-packed cotton bale and it will be shipped as a low density bale, which results in a large cost penalty to the seller.

9. In L.7.1, the comment adds new explanations about causes of fire, gives references to other sections discussing fire-packed bales, completes the issue of what densely-packed cotton bales are being compared to and eliminates the exception for densely-packed cotton bales.

10. In L.7.10 the comment replaces the erroneous information regarding fire-packed bales with information originating in the USDA Cotton Ginners Handbook.

11. In L.5.5.2, the comment eliminates the reference to asbestos panels.

12. The comment also cleans up a few cases where the units (SI vs. English) are inconsistent.