

NFPA 46
Recommended Safe
Practice for
Storage of
Forest
Products
1996 Edition



National Fire Protection Association, 1 Batterymarch Park, PO Box 9101, Quincy, MA 02269-9101

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

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

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

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NFPA 46

Recommended Safe Practice for

Storage of Forest Products

1996 Edition

This edition of NFPA 46, *Recommended Safe Practice for Storage of Forest Products*, was prepared by the Technical Committee on General Storage and acted on by the National Fire Protection Association, Inc., at its Fall Meeting held November 13-15, 1995, in Chicago, IL. It was issued by the Standards Council on January 12, 1996, with an effective date of February 2, 1996, and supersedes all previous editions.

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

This edition of NFPA 46 was approved as an American National Standard on February 2, 1996.

Origin and Development of NFPA 46

This document incorporates the subjects formerly covered in four separate documents: NFPA 46, *Outdoor Storage of Forest Products*; NFPA 46A, *Outdoor Storage of Wood Chips*; NFPA 46B, *Outside Storage of Logs*; and NFPA 47, *Retail and Wholesale Lumber Storage Yards*.

NFPA 46 was in two parts: Part I was first adopted in 1969; Part II was tentatively adopted in 1959 and officially adopted in 1961. The document was revised in 1973.

NFPA 46A was tentatively adopted in 1964 and officially adopted without change in 1965. It was revised in 1973.

NFPA 46B was tentatively adopted in 1969 and officially adopted in 1971. It was revised in 1976.

NFPA 47 was first adopted in 1951, and revised in 1961 and 1973.

The 1978 edition superseded the 1973 edition of NFPA 46, the 1973 edition of NFPA 46A, the 1976 edition of NFPA 46B, and the 1973 edition of NFPA 47. The 1985 edition was a partial revision to the 1978 edition and included reference to "hogged material."

The 1989 edition is a reconfirmation of the 1985 edition.

With the exception of some new information regarding fire mains and hydrants, and idle pallet storage, the 1996 edition is primarily a reconfirmation of the 1989 edition. However, some additional changes were made to update requirements so that they are consistent with supporting standards. Editorial changes were also made to make the document more user friendly.

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

Committee Scope: This Committee shall have primary responsibility for documents on safeguarding general warehousing and commodities stored indoors or outdoors against fire. This Committee does not cover storage specifically covered by other NFPA standards.

Contents

Chapter 1 General	46- 4	5-3 Basic Tie Yard Protection	46- 7
1-1 Purpose	46- 4	5-4 Special Tie Yard Protection	46- 8
1-2 Scope	46- 4		
Chapter 2 Definitions	46- 4	Chapter 6 Outside Storage of Wood Chips and Hogged Material	46- 8
2-1 Definitions	46- 4	6-1 Application	46- 8
Chapter 3 Retail and Wholesale Lumber Storage Yards	46- 4	6-2 General	46- 8
3-1 Application	46- 4	6-3 Pile Protection	46- 9
3-2 General	46- 4	6-4 Exposure Protection	46-10
3-3 Open Yard Storage	46- 5	Chapter 7 Outside Storage of Logs	46-10
3-4 Buildings	46- 5	7-1 Application	46-10
3-5 Exposure Protection	46- 5	7-2 General	46-10
3-6 Special Fire Prevention	46- 6	7-3 Basic Log Yard Protection	46-11
Chapter 4 Outside Storage of Lumber at Other than Retail or Wholesale Yards	46- 6	7-4 Special Log Yard Protection	46-11
4-1 Application	46- 6	Chapter 8 General Fire Protection	46-11
4-2 General	46- 6	8-1 Application	46-11
4-3 Basic Lumberyard Protection	46- 6	8-2 Operational Fire Prevention	46-12
4-4 Special Lumberyard Protection	46- 6	8-3 Exposure Protection	46-12
Chapter 5 Outside Storage of Ties, Poles, Piles, Posts, and Other Similar Forest Products at Pressure Treating Plant Yards	46- 7	8-4 Fire Detection and Extinguishment	46-13
5-1 Application	46- 7	8-5 Testing and Maintenance of Fire Protection Systems	46-13
5-2 General	46- 7	Chapter 9 Referenced Publications	46-13
		Appendix A Explanatory Material	46-14
		Index	46-14

NFPA 46

Recommended Safe Practice for Storage of Forest Products

1996 Edition

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

Information on referenced publications can be found in Chapter 9.

Chapter 1 General

1-1 Purpose. The intent of these recommendations is to provide fire protection guidance to minimize the fire hazard in areas used for the storage of forest products, particularly as they are stored outside buildings. These recommendations are not intended to be mandatory requirements. Each individual property will have its own special conditions of stock handling, exposure, and topography. For this reason, only basic fire protection principles are recommended herein, which are intended to be applied with due consideration of all local factors involved. The authority having jurisdiction should be consulted in all cases.

1-2 Scope. These recommendations cover:

- (a) retail and wholesale lumber storage yards;
- (b) outside storage of lumber and timber at other than retail or wholesale yards;
- (c) outside storage of ties, poles, piles, posts, and other similar forest products at pressure treating plant yards;
- (d) outside storage of wood chips;
- (e) outside storage of logs; and
- (f) outside storage of hogged material.

Chapter 2 Definitions

2-1 Definitions.* Unless expressly stated elsewhere, the following terms will, for the purpose of this recommended practice, have the meanings indicated below.

Alleyway. An accessible clear space between storage piles or groups of piles suitable for housekeeping operations, visual inspection of piling areas, and initial fire-fighting operations.

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

Chips. Wood chips of various species used in the manufacture of pulp. These chips are usually 1/4 in. (6.4 mm) to 1 1/4 in. (31.8 mm) in size, with nothing finer than what is retainable on a 1/4-in. (6.4-mm) screen; however, blower and conveyor systems may create some fine dust particles after screening.

Clear Space. Any area free of combustible materials. This does not preclude the storage of noncombustible materials that will not transmit an exposure fire.

Cold Deck. A single ranked pile of logs with individual logs of regular or irregular length usually 20 ft (6.1 m) to 50 ft (15.2 m) long, but greater than 8 ft (2.4 m) in length.

Cordwood. Logs 8 ft (2.4 m) or less in length customarily intended for pulpwood or fuel uses.

Cunit. 100 ft³ (2.8 m³) of solid wood or 100 ft³ (2.8 m³) of chips or hogged material.

Fire Lane. A clear space suitable for fire-fighting operations by motorized fire apparatus.

Hogged Material. Mill waste consisting mainly of hogged bark but may include a mixture of bark, chips, dust, or other by-product from trees. This also includes material designated "hogged fuel."

Lumber. Boards, dimension lumber, timber, plywood, and other similar wood products.

Ranked Piles. Piles of logs evenly arranged by conveyor, crane, or other means.

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

Stacked Piles. Piles of logs where logs are generally conveyed to the center of a pile presenting a cone shaped appearance.

Yard. The outdoor areas where lumber, wood chips, logs, and other wood products are stored outside buildings.

Chapter 3 Retail and Wholesale Lumber Storage Yards

3-1 Application.

3-1.1 The intent of the recommendations contained in this chapter is to provide fire protection guidance to minimize the fire hazard in:

- (a) retail lumberyards handling forest products and other building materials;
- (b) wholesale lumber storage yards including distribution, holding, and transshipment areas; and
- (c) buildings in retail and wholesale lumberyards used for storage of forest products or auxiliary operations.

3-1.2* In addition to the recommendations contained in this chapter, the provisions outlined in Chapter 8 should apply to all retail and wholesale lumber storage yards except as modified herein.

3-2 General.

3-2.1 Fire loss experience in lumberyards indicates that large undivided stacks, congested storage conditions, delayed fire detection, inadequate fire protection, and ineffective fire-fighting tactics are the principal factors that allow lumberyard fires to reach serious proportions. The fire hazard potential inherent in lumber storage operations with large quantities of combustible material can best be controlled by a positive fire prevention program under the direct supervision of top management and should include:

- (a) Selection, design, and arrangement of storage yard areas and materials handling equipment based upon sound fire prevention and protection principles.

(b) Facilities for early fire detection, transmission of alarm, and fire extinguishment. (See NFPA 72, *National Fire Alarm Code*.)

(c) Fire lanes to separate large stacks and provide access for effective fire-fighting operations.

(d) Separation of yard storage from yard buildings and other exposing properties.

(e) An effective fire prevention maintenance program, including regular yard inspections by trained personnel.

3-2.2 Cargo yards with lumber stored on piers or wharves, and lumber stored on raised platforms present special problems of construction and protection. NFPA 307, *Standard for the Construction and Fire Protection of Marine Terminals, Piers, and Wharves*, and the authority having jurisdiction should be consulted in each case.

3-2.3 It is recognized that retail and wholesale lumber storage yards are normally located within municipal boundaries where there are municipal water supplies available for fire protection. For basic fire protection, the municipal system should be capable of supplying at least four 2½-in. (63.5-mm) hose streams simultaneously [1000 gpm (63 L/sec) minimum]. Where large-scale fire fighting operations may be expected, larger water supplies are needed. Where protection from municipal water supplies and hydrant systems is not present or is not considered adequate by the authority having jurisdiction, a yard fire hydrant system should be provided.

3-3 Open Yard Storage.

3-3.1 Lumber stacks should be on solid ground, preferably paved or surfaced with materials such as cinders, fine gravel, or stone. Where the danger of underground fire is present, refuse- or sawdust-filled land should not be used.

3-3.2 The method of stacking should be solid wherever possible and in an orderly and regular manner.

3-3.3 It is recognized that some materials will be stored on pallets in an open yard. As stacks of empty pallets present a severe fire problem, it is recommended that empty pallets be stored in accordance with the guidelines set out in Table 3-3.3(a) and Table 3-3.3(b).

3-3.4 The height of stacks should not exceed 20 ft (6.1 m) with due regard for stability. Air-drying stickered stacks are subject to rapid fire spread through the air spaces and should therefore be kept as low as practicable.

3-3.5 Where stacks are supported clear of the ground, adequate clearance should be provided for cleaning operations under the stacks.

3-3.6 Driveways should be so spaced that a maximum grid system of not over 50 ft × 150 ft (15.2 m × 45.7 m) is produced.

3-3.7 Driveways should have a minimum width of 15 ft (4.6 m) and an all-weather surface capable of supporting fire department apparatus.

3-3.8 Where the yard has earth or crushed stone drives, boundary posts with signs designating stacking limits should be provided to indicate yard area and alley limits. In paved yard areas, painted boundary limits can be used instead of posts and signs.

Table 3-3.3(a) Recommended Clearance Between Outside Idle Pallet Storage and Building

Wall Construction		Minimum Distance, ft (m) of Wall from Storage of		
		Under 50 Pallets	50 to 200 Pallets	Over 200 Pallets
Wall Type	Openings			
Masonry	None	0	0	0
	Wired glass with outside sprinklers 1-hr doors	0	10 (3.0)	20 (6.1)
	Wired or plain glass with outside sprinklers ¾-hr doors	10 (3.0)	20 (6.1)	30 (9.1)
Wood or metal with outside sprinklers				
Wood, metal, or other		20 (6.1)	30 (9.1)	50 (15.2)

Notes:

1. Fire-resistive protection comparable to that of the wall should also be provided for combustible eave lines, vent openings, etc.
2. When pallets are stored close to a building, the height of storage should be restricted to prevent burning pallets from falling on the building.
3. Manual outside open sprinklers generally are not a reliable means of protection unless property is attended to at all times by plant emergency personnel.
4. Open sprinklers controlled by a deluge valve are preferred.

Table 3-3.3(b)

For outdoor idle pallet storage, separation between piles of idle pallets and other yard storage should be as follows:

Pile Size	Minimum Distance, ft (m)
Under 50 pallets	20 (6)
50 — 200 pallets	30 (9.1)
Over 200 pallets	50 (15.2)

3-4 Buildings.

3-4.1 Automatic sprinklers provide an efficient means of fire detection and extinguishment. Automatic sprinkler protection is therefore recommended for all large storage buildings containing combustible contents and auxiliary buildings containing hazardous operations that may constitute an exposure to outside lumber storage or other property. Automatic sprinkler protection for buildings used for indoor storage of forest products should be designed in accordance with NFPA 231, *Standard for General Storage*; NFPA 231C, *Standard for Rack Storage of Materials*; or NFPA 231F, *Standard for the Storage of Roll Paper*. The authority having jurisdiction should be consulted for requirements pertaining to automatic sprinkler installations. (See NFPA 13, *Standard for the Installation of Sprinkler Systems*.)

3-4.2 Where automatic sprinklers are not installed, large storage buildings should be subdivided by fire walls into compartments not exceeding area limits specified in generally accepted model building codes.

3-5 Exposure Protection.

3-5.1 Many retail lumberyards sell clay, concrete, and stone products. It is recommended that these and other

least burnable materials (large-size timbers and flat-stacked stock) be stored or stacked on the perimeter of the yard to act as a barrier between the yard and adjacent properties or buildings.

3-5.2 Exposure to the Yard.

3-5.2.1 Except as noted in 3-5.2.2, open yard stacking should be located with as much clear space to buildings as practicable. Building walls should have sufficient fire resistance to contain a fire that originates in the building, and windows or other openings should be reduced in size or adequately blocked to prevent radiant heat exposure to the open yard stacking. (See 8-3.1.)

3-5.2.2 Unsprinklered buildings containing hazardous manufacturing or other operations, i.e., woodworking, glazing, painting, dry kilns, auto repairing, grain or feed milling or grinding, aboveground fuel or gasoline tanks, etc., should have at least 50 ft (15.2 m) of clear space to the nearest lumber stack, shed, or warehouse. Boundary posts with signs designating stacking limits should be provided to designate the clear space to the aforementioned buildings, tanks, etc.

3-5.3 Exposure from the Yard. Because of the large quantities of material generally involved in lumberyard fires, some form of exposure protection for adjoining properties is recommended. Clear spaces or walls capable of providing fire barriers between yard storage and the exposed properties are desirable. The responsibility for the proper protection of properties adjoining a lumberyard is often a joint one to be worked out by the cooperation of the lumberyard and adjoining property owners. Refer in each case to the authority having jurisdiction.

3-6 Special Fire Prevention.

3-6.1 All power woodworking machines, except for portable units, should be equipped with refuse removal equipment conforming to NFPA 91, *Standard for Exhaust Systems for Air Conveying of Materials*.

3-6.2 Materials such as hay, coal, grain, and feed should be stored in separate buildings or in the open with adequate clear space between yard buildings or open yard storage.

Chapter 4 Outside Storage of Lumber at Other than Retail or Wholesale Yards

4-1 Application.

4-1.1 The intent of the recommendations contained in this chapter is to provide fire protection guidance to minimize the fire hazard in large yard storage areas containing lumber, timber, and other similar wood products not intended for retail or wholesale distribution at the site. Each individual property will have its own special conditions of yard use, material handling methods, and topography. For this reason, only basic fire protection principles are recommended herein, which are intended to be applied with due consideration of all local factors involved.

4-1.2 In addition to the recommendations contained in this chapter, the provisions outlined in Chapter 8 should apply to all large yard storage areas for lumber and timber at other than retail or wholesale yards, except as modified herein.

4-2 General.

4-2.1 Fire loss experience in lumber storage yards indicates that large undivided stacks, congested storage conditions, delayed fire detection, inadequate fire protection, and ineffective fire-fighting tactics are the principal factors that allow lumberyard fires to reach serious proportions. The fire hazard potential inherent in lumber storage operations with large quantities of combustible material can best be controlled by a positive fire prevention program under the direct supervision of top management and should include:

(a) Selection, design, and arrangement of storage yard areas and materials-handling equipment based on sound fire prevention and protection principles.

(b) Facilities for early fire detection, transmission of alarm, and fire extinguishment. (See NFPA 72, *National Fire Alarm Code*.)

(c) Fire lanes to separate large stacks and provide access for effective fire-fighting operations.

(d) Separation of yard storage from mill operations and other exposing properties.

(e) An effective fire prevention maintenance program, including regular yard inspections by trained personnel.

4-2.2 Cargo yards with lumber stored on piers or wharves, and lumber stored on raised platforms present special problems of construction and protection. NFPA 307, *Standard for the Construction and Fire Protection of Marine Terminals, Piers, and Wharves*, and the authority having jurisdiction should be consulted in each case.

4-3 Basic Lumberyard Protection.

4-3.1* For basic fire protection, the hydrant system should be capable of supplying at least four 2½-in. (63.5-mm) hose streams simultaneously [1,000 gpm (63 L/sec) minimum] while maintaining a positive residual pressure in the fire protection hydrant system.

Where large-scale fire fighting operations may be expected, larger water supplies with adequate mains are needed. (See Section 4-4.)

For early extinguishment with basic fire protection, hydrants should be spaced with sufficient 2½-in. (63.5-mm) hose attached so as to permit rapid hose laying to all parts of the stacking areas. For this reason, it is recommended that hydrants be spaced at about 250-ft (76.2-m) intervals so that any part of the yard can be reached with 200 ft (61.0 m) of hose. Hydrants preferably should be located at fire lane intersections. A hydrant hose house with at least 200 ft (61.0 m) of fire hose and auxiliary equipment should be provided at each hydrant. (See NFPA 24, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances*.)

4-3.2 Access to the plant and yard from public highways should be provided by all-weather roadways capable of supporting fire department apparatus.

4-3.3 The storage site should be reasonably level, solid ground, preferably paved or surfaced with material such as cinders, fine gravel, or stone. Refuse- or sawdust-filled land, swampy ground, or areas where the hazard of underground fire is present should not be used.

4-4 Special Lumberyard Protection.

4-4.1 Yards consisting of single carrier loads of green flat-stacked lumber present a minimum hazard that generally

requires only the basic protection provisions of Section 4-3 for effective fire control. High stacks of lumber stickered for air drying present a severe hazard that will require effective use of large stream equipment and greatly expanded water supplies for fire control. In yards requiring more than the basic protection provisions of Section 4-3 for effective fire control, the following provisions are recommended as a guide. The relative importance of these provisions and the degree to which they may be needed will vary with yard conditions, and the authority having jurisdiction should be consulted in all cases.

4-4.2 Powerful water supplies and large mains should be provided where adequate public or private fire department services are available. Large stream equipment, such as portable turrets and deluge sets, requires 750 gpm to 1000 gpm (47.3 L/sec to 63.1 L/sec) for each appliance. Monitor towers may require supplies in excess of 1000 gpm (63.1 L/sec) for each unit. In large yards where the hazard is severe, many of these devices might need to be operated simultaneously.

4-4.3 Fire lanes suitable for fire department operations should be provided with storage arranged so that no part of the occupied area is more than 50 ft (15.2 m) in any direction from access by motorized fire-fighting equipment. Where special extinguishing equipment, such as portable turrets, deluge sets, and monitor towers, is available, access distances may be governed by their effective reach with available water supplies. Fire lanes should be kept unobstructed, have an all-weather surface sufficiently strong to support fire apparatus, and should be of sufficient width to permit maneuvering of motorized fire apparatus.

4-4.4 Stack heights should be limited. Heights in excess of 20 ft (6.1 m) seriously restrict effective extinguishing operations. Air-drying stickered stacks are subject to a more rapid fire involvement and should be kept as low as possible.

Chapter 5 Outside Storage of Ties, Poles, Piles, Posts, and Other Similar Forest Products at Pressure Treating Plant Yards

5-1 Application.

5-1.1 The intent of the recommendations contained in this chapter is to provide fire protection guidance to minimize the fire hazard in yard storage areas containing treated and untreated ties, poles, piles, posts, and other similar forest products in yards connected with pressure treating plants, but not including the treating buildings, processes, or storage of treating materials. Each individual property will have its own special conditions of yard use, stock handling methods, and topography. For this reason, only basic fire protection principles are recommended herein, which are intended to be applied with due consideration of all local factors involved.

5-1.2 Ties, as used herein, includes ties, poles, piles, posts, and other similar forest products. Treated ties are those pressure impregnated with preservatives.

5-1.3 In addition to the recommendations contained in this chapter, the provisions outlined in Chapter 8 should apply to all outside storage of ties, poles, piles, posts, and

other similar forest products at pressure treating plant yards, except as modified herein.

5-2 General. Fire loss experience in tie storage yards indicates that large undivided stacks, congested storage conditions, delayed fire detection, inadequate fire protection, and ineffective fire-fighting tactics are the principal factors that allow fires to reach serious proportions. The fire hazard potential inherent in tie storage operations with large quantities of combustible material can best be controlled by a positive fire prevention program under the direct supervision of top management and should include:

(a) Selection, design, and arrangement of storage yard areas and materials-handling equipment based upon sound fire prevention and protection principles.

(b) Facilities for early fire detection, transmission of alarm, and fire extinguishment. (*See NFPA 72, National Fire Alarm Code.*)

(c) Fire lanes to separate large stacks and provide access for effective fire-fighting operations.

(d) Separation of yard storage from mill buildings and other exposing properties.

(e) An effective fire prevention maintenance program, including regular yard inspections by trained personnel.

5-3 Basic Tie Yard Protection.

5-3.1 Unobstructed alleyways of sufficient width for hand or cart fire hose laying operations should be provided between piles. A minimum alleyway width of 4 ft (1.2 m) is recommended. Alleyways should be spaced so that initial fire-fighting operations can be effective. With relatively open stacking (stacking that will permit penetration of fire extinguishing streams) this can usually be accomplished by providing a 4-ft (1.2-m) or greater width alleyway between alternate rows of tie stacks [*see Figure 5-3.1(a)*]. Flat crib-style stacking without space between stacks that forms solid packed rows would require a 4-ft (1.2-m) or greater width alleyway between each row. Where the stacking area does not permit a 4-ft (1.2-m) or wider alleyway between each such row, the length of the rows (distance between fire lanes) should be held to 75 ft (22.9 m) or less. In no event should such alleyways be reduced to less than 2 ft (0.6 m) in width [*see Figure 5-3.1(b)*].

5-3.2* For basic fire protection, the hydrant system should be capable of supplying at least four 2½-in. (63.5-mm) hose streams simultaneously [1000 gpm (63 L/sec) minimum] while maintaining a positive residual pressure in the fire protection hydrant system.

Where large-scale fire fighting operations may be expected, larger water supplies with adequate mains are needed. (*See Section 5-4.*)

For early extinguishment with basic fire protection, hydrants should be spaced with sufficient 2½-in. (63.5-mm) hose attached so as to permit rapid hose laying to all parts of the stacking areas. For this reason, it is recommended that hydrants be spaced at about 250-ft (76.2-m) intervals so that any part of the yard can be reached with 200 ft (61.0 m) of hose. Hydrants preferably should be located at fire lane intersections. A hydrant hose house with at least 200 ft (61.0 m) of fire hose and auxiliary equipment should be provided at each hydrant. (*See NFPA 24, Standard for the Installation of Private Fire Service Mains and Their Appurtenances.*)