
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
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DIVISION 06 - WOOD AND PLASTICS

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SECTION 06100

ROUGH CARPENTRY
06/04

NOTE: Delete, revise, or add to the text in this section to cover project requirements. Notes are for designer information and will not appear in the final project specification.

This broadscope section covers wood blocking and furring for masonry walls; wood nailers and blocking for roof fascias, flashing, and cants; wood framing; rough bucks for openings in masonry walls; wood framing for architectural casework and equipment; dressed wood grounds to receive plaster and other finish materials.

This section also addresses requirements for pressure treatment of wood for fire-retardant and decay-resistant qualities.

PART 1 GENERAL

1.1 REFERENCES

NOTE: The following references should not be manually edited except to add new references. References not used in the text will automatically be deleted from this section of the project specification.

The publications listed below form a part of this section to the extent referenced:

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI B18.22.1 (1975; R 1998) Plain Washers

ANSI B18.22M (1981; R 2000) Metric Plain Washers

AMERICAN WOOD PRESERVERS BUREAU (AWPB)

AWPB LP 2 (1988) Softwood Lumber, Timber and Plywood Pressure Treated with Water-Borne Preservatives for Aboveground Use

AMERICAN WOOD-PRESERVERS' ASSOCIATION (AWPA)

AWPA A3	(2000) Determining Penetration of Preservatives and Fire Retardants
AWPA C1	(2003) All Timber Products - Preservative Treatment by Pressure Processes
AWPA C20	(1988) Structural Lumber - Fire-Retardant Treatment by Pressure Processes
AWPA C27	(1999) Plywood - Fire-Retardant Treatment by Pressure Processes
AWPA P5	(2001) Standards for Waterborne Preservatives
AWPA P8	(2001) Oil-Borne Preservatives

APA - THE ENGINEERED WOOD ASSOCIATION (APA)

APA E30	(2003) Design/Construction Guide, Residential and Commercial
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ASME INTERNATIONAL (ASME)

ASME B18.2.1	(1996) Square and Hex Bolts and Screws, Including Hex Cap and Lag Screws (Inch Series)
ASME B18.2.3.8M	(1981; R 1999) Metric Hex Lag Screws
ASME B18.6.1	(1981; R 1997) Wood Screws (Inch Series)

ASTM INTERNATIONAL (ASTM)

ASTM A 307	(2003) Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
ASTM A 36/A 36M	(2003a) Standard Specification for Carbon Structural Steel
ASTM A 525	(1993) Standard Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process
ASTM A 525M	(1991; Rev A) Standard Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process (Metric)
ASTM D 2016	(1974; R 1983) Moisture Content of Wood
ASTM E 84	(2003) Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM F 568M	(2002) Standard Specification for Carbon

and Alloy Steel Externally Threaded Metric Fasteners

INDUSTRIAL FASTENERS INSTITUTE (IFI)

IFI 502 (1982) Metric Tapping Screws

NATIONAL FOREST PRODUCTS ASSOCIATION (NFOPA)

NFOPA-03 (1998) Manual for House Framing

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

NIST PS 1 (1995) Construction and Industrial Plywood

NIST PS 20 (1999) American Softwood Lumber Standards

REDWOOD INSPECTION SERVICE (RIS)

RIS Grade Use (1998) Grades of California Redwood Lumber

SOUTHERN PINE INSPECTION BUREAU (SPIB)

SPIB 1003 (2002) Grading Rules

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS FF-B-588 (Rev D) Bolt, Toggle; and Expansion Sleeve, Screw

FS FF-N-105 (Rev B; Int Am 4) Nails, Brads, Staples, and Spikes: Wire, Cut, and Wrought

FS FF-S-325 (Int Amd 3) Shield, Expansion; Nail, Expansion; and Nail, Drive Screw (Devices, Anchoring, Masonry)

FS TT-W-571 (Rev J) Wood Preservation: Treating Practices

WEST COAST LUMBER INSPECTION BUREAU (WCLIB)

WCLIB Std 17 (1993) Standard Grading Rules for West Coast Lumber

WESTERN WOOD PRODUCTS ASSOCIATION (WWPA)

WWPA-01 (1993) Western Lumber Grading Rules 91

1.2 SUBMITTALS

NOTE: Review submittal description (SD) definitions in Section 01330, "Submittal Procedures," and edit the following list to reflect only the submittals required for the project. Submittals should be kept to the minimum required for adequate quality control. Include a columnar list of appropriate products and tests beneath each submittal

description.

The following shall be submitted in accordance with Section 01330, "Submittal Procedures," in sufficient detail to show full compliance with the specification:

SD-06 Test Reports

Tests for Moisture Content of wood shall be in accordance with ASTM D 2016, [Method A, Oven Drying Method] [Method B, Electronic Moisture Meter Method]. Material tested shall be the same material proposed for use in the project. Moisture test shall be dated no earlier than 3 months prior to the delivery of lumber materials. An additional test report will be required if the materials species or stress grade changes.

Fire-Retardant-Treated Lumber shall be according to the paragraph entitled, "Fire-Retardant-Treated Lumber," of this section.

SD-07 Certificates

Certificates shall be submitted for the following items showing conformance with the referenced standards contained in this section. Certificates for wood-framing materials, shall include grade, species and moisture.

- Framing Materials
- Anchorage and Fastener Materials
- Preservative Treated Lumber

1.3 DELIVERY, HANDLING, AND STORAGE

Wood materials shall be securely bundled and shipped with adequate moisture-resistant covers to preclude damage by weather or handling during delivery, when stored, and during construction.

Wood materials that must be stored outdoors before immediate use shall be placed in orderly piles and stored on blocks above ground. Lumber shall be stored in stacks with provision for air circulation within stacks. Material shall be protected from the elements with moisture-resistant covers.

PART 2 PRODUCTS

2.1 WOOD MATERIALS

2.1.1 General Requirements

Each piece of framing lumber, board lumber, and plywood shall bear the trademark and grade identification of the manufacturer's association or the authorized inspection bureau under rules of which the lumber is manufactured and graded.

Softwood lumber shall be seasoned S4S and kiln-dried or air-dried to the specified Moisture Content. Dressed sizes shall conform to NIST PS 20.

Structural framing lumber shall be stress graded, with each piece being rated for strength and stamped to indicate the grade and fiber stress in

bending; or it shall be certified with manufacturer's certificate of inspection.

Moisture content shall conform to the rules of the lumber association or the inspection bureau under which the lumber is graded but shall not exceed 15 percent for boards and dimensional lumber 2 inches 50 millimeter or less in thickness.

2.1.2 Structural Framing Materials

Structural framing lumber shall be southern yellow pine, west coast hemlock, coast region Douglas fir, inland Douglas fir, or larch, with the following minimum allowable unit stresses:

Minimum extreme fiber in bending (f): 1,500 psi 10.3 Megapascal

Compression parallel to grain (c): 1,000 psi 6.9 Megapascal

Compression perpendicular to grain: 365 psi 2.5 Megapascal

Modulus of elasticity (e): 1,540,000 psi 10.6 Gigapascal

2.1.3 Light-Framing Materials

Light-framing materials and studs over 10 feet 3000 millimeter in length shall be of the following species:

Southern yellow pine	No. 2 KD dimensions, SPIB 1003
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Douglas fir, coast region; western larch; west coast hemlock, white fir, ponderosa pine, western red cedar, Idaho white pine, sugar pine	Standard grade, WCLIB Std 17 and WWPA-01 Grading Rules
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Sitka spruce, western red cedar	Standard grade WCLIB Std 17
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Redwood	Construction grade, RIS Grade Use
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2.1.4 Stud-Framing Materials

Stud-framing materials for 2- by 4-inch studs, 10 feet nominal 50 by 100 millimeter studs, 3000 millimeter or less in length, shall conform to the following:

Southern yellow pine	KD stud grade, SPIB 1003
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Douglas fir, coast region, western larch, western hemlock	West Coast Studs, WCLIB Std 17; No. 2 and better, WWPA-01 Grading Rules
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2.1.5 Board Materials

Board materials shall be one of the following species:

Southern yellow pine	No. 2 boards SPIB 1003
Western red cedar, west coast hemlock, Douglas fir, larch	Utility Grade boards, WCLIB Std 17
White fir, ponderosa pine, western cedar, incense cedar, Idaho white pine, sugar pine	Utility Grade, WWPA-01 Grading Rules

2.1.6 Framing for Wood Shelving

Uprights, cleats, and framing for wood shelves shall be C-finish boards of southern yellow pine, sugar pine, Douglas fir, white fir, Englemann spruce, or western red cedar, graded in accordance with the rules under which the lumber is manufactured and graded.

2.1.7 Plywood Sheathing

[Plywood sheathing shall be unsanded interior-grade sheathing, grade stamped "Standard Int-DFPA (with exterior glue)," and manufactured in accordance with NIST PS 1, Group 1.]

[Plywood sheathing shall be unsanded exterior-grade sheathing, grade stamped "Ext-DFPA," and manufactured in accordance with NIST PS 1, Group 1.]

[Plywood sheathing shall be fire-retardant treated, tongue-and-groove exterior grade sheathing, 5/8-inch 16 millimeter minimum thickness, grade stamped "C-C Ext-DFPA," and manufactured in accordance with NIST PS 1, Group 1. After manufacture, plywood shall be fire-retardant treated as specified under "Fire-Retardant-Treated Lumber."]

2.1.8 Fire-Retardant-Treated Lumber

Lumber for wood framed partitions and solid-wood sheathing or plywood sheathing shall be fire-retardant treated by means of an approved pressure impregnating process in accordance with AWPA C1, AWPA C20 (solid wood), and AWPA C27 (plywood).

Contractor shall submit reports of the results of retention-penetration test boring cores, weight test of plywood panels, and performance ratings. Treatment and performance inspection shall be performed by an independent, qualified test agency that establishes the performance rating.

After treatment, wood materials shall have a flame-spread rating not greater than 25, with no evidence of significant progressive combustion when tested for 30 minutes duration in accordance with ASTM E 84. Fuel contributed shall not exceed 15; smoke developed shall not exceed 5.

After treatment, solid lumber materials shall have a minimum penetration of 1/2 inch 13 millimeter of fire retardant material when tested by a borer core in accordance with AWPA A3. Plywood materials shall have a minimum retention of 25 pounds per cubic foot 400 kilogram per cubic meter when tested by weighing before and after treatment.

Approved fire-retardant materials shall bear identification showing the fire performance rating thereof issued by an approved testing agency.

After treatment, solid lumber shall be kiln-dried to reduce moisture to not more than 19 percent. Plywood shall be kiln-dried to reduce moisture to

not more than 15 percent.

2.1.9 Preservative Treated Lumber

The following wood members shall be pressure-preservative treated in accordance with FS TT-W-571 or AWPB LP 2. Each piece shall bear the AWPB stamp, indicating point of treatment, preservative symbol, symbol of standard, date of treatment, and moisture content after treatment:

Wood sills, plates, rough bucks, and frames in exterior masonry wall openings

Wall plates and furring in contact with exterior masonry or concrete

Nailers that are set into, or are in contact with, concrete or masonry

Blocking and nailers for roof deck, sub fascia members, roof cants and saddles

Preservative shall be either water-borne, conforming to AWPA P5, or oil-borne conforming, to AWPA P8.

Nailers to receive membrane waterproofing and wood members to receive finish materials shall be treated with a water-borne preservative to eliminate preservative bleed-through at nails.

Wood treated with oil-borne preservatives shall be clean, free from surface oil, and properly seasoned for use.

Wood treated with water-borne preservatives shall be air-dried or kiln-dried to reduce maximum moisture content to 15 percent.

[Cut surfaces of preservative-treated materials shall be brush coated with at least two coats of copper naphthenate as specified in AWPA P8.]

Treated wood exposed in the final structure shall be free from objectionable odors and shall not be harmful or corrosive to adjacent materials or anchorages.

2.2 ANCHORAGE AND FASTENER MATERIALS

2.2.1 Nails and Staples

Nails, staples, and tacks shall conform to FS FF-N-105.

Nails for fastening interior wood partitions or rough framing shall be steel wire nails.

Nails for roof blocking, cants, and nailers shall be galvanized.

Nails used to fasten exposed wood fascias or finished wood members exposed to the weather shall be aluminum alloy or galvanized finishing nails.

Power-driven staples shall be galvanized Type III, Style 3.

2.2.2 Bolts, Nuts and Screws

Bolts and nuts shall be carbon steel, galvanized, conforming to ASTM A 307, Grade A ASTM F 568M, Class 4,8 or less.

Wood screws shall be carbon steel, galvanized, conforming to ASME B18.6.1 IFI 502.

Lag screws or lag bolts shall be commercial steel, galvanized, conforming to ASME B18.2.1 ASME B18.2.3.8M.

Expansion shields, expansion nails, and drive screw devices shall conform to FS FF-S-325.

Toggle bolts shall conform to FS FF-B-588.

Washers shall be carbon steel, galvanized, general assembly purpose type, conforming to ANSI B18.22.1 ANSI B18.22M.

2.2.3 Bar or Strap Anchors

Bar or strap anchors shall be steel conforming to ASTM A 36/A 36M. Hot-dip galvanized coating shall be in accordance with ASTM A 525, G90 ASTM A 525M, Z275.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 General

Members shall be framed for the passage of ducts and pipes and shall not be cut, notched, or bored more than one quarter of their depth without approved reinforcement.

Washers shall be provided under bolt heads or nuts in contact with wood. Lumber shall be bored to receive bolts.

Nailers, blocking, and furring shall be furnished in lengths that minimize joints.

3.1.2 Interior Partitions

Partitions shall be framed with 2- by 4-inch nominal 50 by 100 millimeter wood studs spaced [16] inches [400] millimeter [_____] on center.

Framing shall be closely fitted, accurately constructed to true plane lines and levels, and rigidly secured in place in conformance with NFOPA-03.

Partition plates shall be secured to concrete floor with anchor bolts, expansion sleeves, and lag bolts. Power-driven fasteners may be used. One anchor shall be provided near each end of the partition plate and at intermediate intervals at a maximum spacing of 4 feet 1200 millimeter on center.

Studs shall be doubled at openings. Headers shall consist of two pieces of nominal 2-inch 50 millimeter framing lumber set on edge and nailed together. Depth of header shall be determined in accordance with the NFOPA-03, except that the span for a header of two 2-by-4's nominal 50 by 100 millimeter shall not exceed 3 feet 900 millimeter.

Corners shall be constructed of not less than three studs. End studs of partitions abutting concrete or masonry shall be anchored thereto with

1/2-inch 13 millimeter (1/2-inch) expansion bolts, one near each end and at intermediate maximum intervals of 4 feet 1200 millimeter, or with power-driven threaded fasteners, same size and spacing.

Rough wood bucks and frames shall be anchored to masonry and concrete with 3/16- by 1-1/4-inch 5 by 32 millimeter (3/16- by 1-1/4-inch) steel straps, turned up 2 inches 50 millimeter at ends and extending not less than 4 inches 100 millimeter into brick, concrete masonry units, and structural facing tile. Anchors shall be placed near top and bottom of each buck and frame and at intermediate intervals of 3-feet 915 millimeter maximum.

Partitions shall have two top plates and a single bottom plate with one continuous row of horizontal wood blocking the full width of the partition, wedged and nailed in place at midheight. Partitions shall be framed for the installation of the facing material, trim, cabinets, plumbing, and other work.

Blocking and nailers, of not less than 1- by 4-inch a nominal 25 by 100 millimeter stock, shall be cut to fit horizontally and vertically between framing and nailed thereto to receive finished wall material. Solid blocking shall be provided at locations required for installation of wall-mounted cabinets, shelves, fixtures, and equipment.

3.1.3 Blocking, Cant Strips, and Nailers

Nailing strips, blocking, cant strips, and sub fascia wood members shall be continuous, cut with square ends and in maximum practical lengths.

For bolted connections, sub fascia members shall be fastened to structural steel members or concrete with 1/2-inch 13 millimeter (1/2-inch) bolts at a maximum spacing of 4 feet 1200 millimeter on center, one bolt near each end of the member. Bolt heads shall be countersunk flush with the surface of the wood. Sub fascia members shall be held to a tolerance of 1/8 inch in 10 feet 3 in 3000 millimeter.

Wood cant strips shall be not less than 4-inches 100 millimeter long and set at projections through the roof deck, expansion joints, and fascias.

Perimeter roof blocking, nailers, and cants shall be groove-cut to provide ventilation for insulation. Groove cuts shall be matched for continuity or new vent grooves cut when wide vents are built of more than one width of wood.

Bottom half of nailers shall be cut to provide a net open area equivalent to 10 percent of the edge face.

Wood vents for parapet walls and other vertical surfaces shall be 1-inch 25 millimeter nominal thickness, treated boards, installed continuously. Wall side of vent shall be cut to provide a net open area equivalent to 20 percent of the thickness edge.

3.1.4 Wood Grounds

Wood grounds shall be dressed; key beveled; preservative treated; not less than 1-1/2-inches 40 millimeter wide; the required thickness to provide for the indicated thickness of plaster; and shall be nailed at edges of plastered areas.

3.1.5 Wood Furring

Furring strips shall be erected plumb and rigid, using wood shims wherever necessary to adjust the face of the furring to a true, even plane to receive finish materials.

Exterior masonry walls shall be furred to receive lath and plaster or dry-wall finish.

Furring shall be 1- by 3-inch nominal 25 by 75 millimeter continuous strips, 16 inches 400 millimeter on center, installed vertically. Furring shall be secured to masonry or concrete with nailing plugs, clips, or masonry nails. Fasteners shall be provided at top and bottom and at 24 inches 600 millimeter on center.

Furring strips fastened to hollow structural tile or to concrete masonry units shall be secured by toggle bolts, anchor bolts, or screw expansion sleeves.

Furring for soffits, cornices, offsets, and breaks in walls and ceilings shall be formed with 1- by 4-inch 25 by 100 millimeter wood strips, 16 inches 400 millimeter on center.

Furring, attached to steel bar joists for finished ceilings, shall be 2-by 4-inch nominal 50 by 100 millimeter lumber, 16 inches 400 millimeter on center.

3.1.6 Wood Sheathing

Sheathing shall be 1-inch by 8-inch 25 by 200 millimeter nominal size boards, installed at 90 degrees to the bearing surface and fastened with at least two 8-penny nails at each bearing.

Plywood sheathing shall be of indicated thickness and installed in accordance with APA E30.

-- End of Section --