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Preparing Activity: NASA Superseding  
UFGS-06 18 00 (June 2006)

## UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated 19 March 2007

Latest change indicated by CHG tags

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### SECTION 06 18 00

#### GLUE-LAMINATED CONSTRUCTION 04/07

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NOTE: This specification covers the requirements for fabrication and erection of laminated wood arches, beams, purlins, columns, and all metal shapes and hardware required for installation. The term "laminated wood" comprises suitably selected and prepared wood laminates bonded together with adhesives, the grain of which is approximately parallel longitudinally.

Drawings must include:

Details of all laminated wood members, showing cross sections and dimensions

Assumed loads, including floor live load, roof live load, wind load, and concentrated loads (partitions, equipment to be mounted on or suspended therefrom).

Layout, showing location of laminated members and floor elevations, and identification of Appearance Grades.

Details of hangers for suspended ceilings, pipes, light fixtures, or other construction, as required

Details of metal shapes and hardware required for connections.

Associated work found in other sections includes:

Pressure preservative treatment for protection against decay and insects per AITC 109: It should be incorporated into specification when wet conditions of use prevail..

Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable items(s) or insert appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

Comments and suggestions on this guide specification are welcome and should be directed to the technical proponent of the specification. A listing of technical proponents, including their organization designation and telephone number, is on the Internet.

Recommended changes to a UFGS should be submitted as a Criteria Change Request (CCR).

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## PART 1 GENERAL

### 1.1 REFERENCES

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NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a RID outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.

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The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

#### AMERICAN INSTITUTE OF TIMBER CONSTRUCTION (AITC)

AITC 109 (1998) Standard for Preservative Treatment of Structural Glued Laminated Timber

AITC 110 (2001) Standard Appearance Grades for Structural Glued Laminated Timber

AITC 111 (2005) Recommended Practice for Protection of Structural Glued Laminated Timber During Transit, Storage and Erection

AITC 113 (2001) Standard for Dimensions of Structural Glued Laminated Timber

AITC 117	(2004) Standard Specifications for Structural Glued Laminated Timber of Softwood Species, Design and Manufacturing Requirements
AITC 119	(1996) Standard Specifications for Structural Glued Laminated Timber of Hardwood Species
AITC 200	(2004) Inspection Manual
AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)	
ANSI B18.22.1	(1975; R 2003) Plain Washers
ANSI B18.22M	(1981; R 2000) Metric Plain Washers
AMERICAN WOOD-PRESERVERS' ASSOCIATION (AWPA)	
AWPA T1	(2005) Processing and Treatment Standard
ASTM INTERNATIONAL (ASTM)	
ASTM A 153/A 153M	(2005) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 283/A 283M	(2003) Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates
ASTM A 307	(2004) Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
ASTM D 3737	(2004) Standard Practice for Establishing Allowable Properties for Structural Glued Laminated Timber (Glulam)
ASTM E 84	(2005e1) Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM F 568M	(2004) Standard Specification for Carbon and Alloy Steel Externally Threaded Metric Fasteners
SOUTHERN PINE INSPECTION BUREAU (SPIB)	
SPIB 1003	(2002) Grading Rules
U.S. DEPARTMENT OF DEFENSE (DOD)	
MIL-L-19140	(1997e) Lumber and Plywood, Fire-Retardant Treated
UNDERWRITERS LABORATORIES (UL)	
UL 723	(2003; R 2005e9) Standard Test for Surface

Burning Characteristics of Building  
Materials

WESTERN WOOD PRODUCTS ASSOCIATION (WWPA)

WWPA Tech Guide

(2005) Lumber Technical Guide, Standards  
and Grading

1.2 SUBMITTALS

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NOTE: Review Submittal Description (SD) definitions in Section 01 33 00 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.

A "G" following a submittal item indicates that the submittal requires Government approval. Some submittals are already marked with a "G". Only delete an existing "G" if the submittal item is not complex and can be reviewed through the Contractor's Quality Control system. Only add a "G" if the submittal is sufficiently important or complex in context of the project.

For submittals requiring Government approval on Army projects, a code of up to three characters within the submittal tags may be used following the "G" designation to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

Choose the first bracketed item for Navy, Air Force and NASA projects, or choose the second bracketed item for Army projects.

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Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are [for Contractor Quality Control approval.] [for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Submit [Fabrication Drawings](#) and [Installation Drawings](#) in accordance with paragraph entitled, "Drawings," of this section.

SD-03 Product Data

Provide [Manufacturer's Catalog Data](#) in accordance with paragraph

entitled, "Manufacturer's Information," of this section.

#### SD-04 Samples

Submit three samples of [Exposed-to-View Surfaces](#) in accordance with paragraph entitled, "Surfaces," of this section.

#### SD-07 Certificates

Submit Certificates for [Glue-Laminated Structural Units](#) in accordance with paragraph entitled, "Quality Control."

#### SD-08 Manufacturer's Instructions

Submit [Manufacturer's Instructions](#) for the following items in accordance with paragraph entitled, "Quality Control," of this section.

[Laminated Wood Materials](#)  
[Adhesive](#)

### 1.3 FIELD MEASUREMENTS

Verify all field measurements prior to preparation of shop drawings ( [Fabrication Drawings](#) and [Installation Drawings](#)) to ensure proper fitting of the work.

### 1.4 QUALIFICATIONS FOR LAMINATING WOOD MANUFACTURER

Laminated wood members manufacturer must be an approved firm licensed by the American Institute of Timber Construction to use the AITC Custom and/or Non-Custom Product Quality Mark and to issue the AITC certificate of conformance. Manufacture of the laminated timber shall meet the requirements of [AITC 117](#) and [ASTM D 3737](#).

### 1.5 DELIVERY, HANDLING, AND STORAGE

Deliver laminated wood structural members in such quantities and at such times as to ensure the continuity of the installation of structural members and maintenance of progress schedules. Refer to [AITC 111](#).

Deliver packaged or wrapped materials in their original, undamaged wrapping, bearing label clearly identifying manufacturer's name, grade and species of lumber, type of glue, and other pertinent data. Use nonmarring slings for loading, unloading, and handling members to prevent damage to surfaces or wrapping.

Store wrapped materials in their original wrapping until ready for installation.

Place members on level supports off ground, spaced and braced to allow through ventilation. Cover wood and keep free of dirt, grease, moisture, or foreign matter that could cause staining.

### 1.6 DRAWINGS

Submit [Fabrication Drawings](#) for glue-laminated structural units consisting of fabrication and assembly details to be performed in the factory.

Provide [Installation Drawings](#) for glue-laminated structural units showing dimensions of laminated wood members, location, size, and type of reinforcement, including any reinforcement necessary for safe handling and erection of structural members. Identify each structural member and the corresponding sequence and procedure to be followed in installation, and location and details of anchorage devices that are to be embedded in other construction on layout drawings.

#### 1.7 MANUFACTURER'S INFORMATION

Include [Manufacturer's Catalog Data](#) for erection procedure of laminated structural members, including the sequence of erection, temporary supports and bracing, and lifting and handling equipment.

Submit [Manufacturer's Instructions](#) for [Laminated Wood Materials](#) and [Adhesive](#) including special provisions required to install equipment components and system packages. Detail with special notices all impedances, hazards and safety precautions.

### PART 2 PRODUCTS

#### 2.1 MATERIALS

##### 2.1.1 Lumber

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NOTE: Designer should determine the species and  
grade based on the design application and use, and  
delete the non-applicable selections below.  
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[Wood members shall be [insert Hardwood Species selected] in accordance with the provisions of [AITC 119](#).]

[Wood members shall be [coast region Douglas fir] [larch], graded in accordance with the grading provisions of [WWPA Tech Guide](#).]

[Wood members shall be southern pine, graded by the same basic provisions as used for solid sawn lumber in [SPIB 1003](#).]

Wood species shall meet the structural requirements of [ASTM D 3737](#), [AITC 113](#), [AITC 117](#) and applicable local codes.

Laminating lumber shall be kiln-dried and stress-graded to meet the requirements of [AITC 117](#).

Lumber combination shall be determined by the design requirements for each component and designated on the shop drawings. AITC lumber combination symbols shall be used for this identification.

Laminated wood members shall have a maximum moisture content of 14-percent throughout the entire piece before surfacing and bonding.

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NOTE: Select one of the following appearance grades:  
  
Premium grade has the finest appearance with a  
smooth surface free of knot holes and voids.

Architectural grade contains normal growth characteristics such as tight knots and medium seasoning checks.

Industrial grade has a greater number of open defects, including knot holes. Industrial grade is appropriate for industrial installations, floor beams, concealed construction, or other applications where appearance is not an important consideration.

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Laminated wood shall be AITC [Premium] [Architectural] [Industrial] Grade and conform to standards as established in AITC 110.

#### 2.1.2 Pressure and Fire-Retardant Treatment

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NOTE: Include heading and following paragraphs when fire-retardant treatment is required to achieve a specified flame spread rating. Fire-retardant treatment is intended and recommended only for interior use and in locations not subject to alternate wetting or drying action.

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Pressure impregnate fire-retardant treated wood by an approved process in accordance with AITC 109, and AWPA T1.

After pressure treatment, wood members shall have a UL flame spread rating not greater than 25. Wood shall show no evidence of progressive combustion when tested for 30 minutes in accordance with UL 723 and ASTM E 84.

Penetration of fire-retardant material of treated wood shall be in accordance with MIL-L-19140. Determine depth of penetration by borer cores taken from 20 pieces of each charge and tested. If 80 percent of the borings meet the penetration requirements, the charge will be accepted.

Identify approved fire retardant wood members with fire retardant rating, per AITC Technical Note 7 and as issued by an approved testing agency.

Kiln dry wood after treatment to remove the moisture injected during treatment yielding an average moisture content of not more than 19 percent.

#### 2.1.3 Adhesive

Bond laminated members with a waterproof adhesive conforming to the test requirements of ASTM D 3737 for waterproof glue, shear strength and durability.

#### 2.1.4 Finishes

[Laminated wood shall receive one factory-applied coat of sealer to the ends of members immediately after trimming. Other surfaces shall receive one coat of penetrating clear sealer.]

[Laminated wood shall receive one factory-applied coat of sealer to the ends of members immediately after trimming. No other sealer shall be required.]

[Laminated-wood members shall be left unfinished after final surfacing and



sanding.]

[Laminated-wood members shall be factory finished with a stain and clear varnish.]

[Laminated-wood members shall receive one coat of factory-applied paint primer and field-applied paint finish.]

#### 2.1.5 Hardware

Contractor shall furnish metal shapes, plates, and bars needed for assembly and connection of members. Comply with [ASTM F 568M](#).

Steel plates shall be hot-rolled carbon steel of structural quality, conforming to [ASTM A 283/A 283M](#), Grade C.

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**NOTE: Delete the following paragraphs when anchor bolts are not required. Anchor bolts are normally required for column base connections.**  
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Steel anchor bolts shall be low-carbon steel with regular hexagon nuts and carbon steel washers. Anchor bolts and nuts shall conform to [ASTM A 307](#) [ASTM F 568M](#).

Washers shall be plain washers conforming to [ANSI B18.22.1](#) [ANSI B18.22M](#).

Clean oil, dirt, rust, and foreign matter from all metal surfaces. For exterior locations, the hardware shall be hot-dipped galvanized in accordance with [ASTM A 153/A 153M](#), with coating weight as required for Class A, B, C, or D material as described therein. Coat other metal surfaces with one coat of manufacturer's standard rust-resisting metal primer applied at a minimum dry-film thickness of [0.038 millimeter](#) [1.5 mils](#).

#### 2.2 QUALITY CONTROL

Certificates for [Glue-Laminated Structural Units](#) shall include a laboratory report for the laminated wood and for the laminating adhesives as follows:

- checking of moisture content
- surfacing
- temperature of lumber at time of gluing
- adhesive mixing and spread
- adhesive pressure and curing conditions during the manufacturing process

Include in report the results of tests, shear strength, and durability of the glue line. Comply with the requirements of [ASTM D 3737](#). Material tested shall be typical of a production run of the same material to be used in the project. Tests shall be conducted within 6 months prior to delivery of the wood.

Provide Certification that structural members meet the requirements of [ASTM D 3737](#) and [AITC 200](#).

#### 2.3 SURFACES

Submit three samples, [300 millimeter](#) [12-inches](#) long by sufficient width and

thickness to illustrate the quality and color of [Exposed-to-View Surfaces](#).

## PART 3 EXECUTION

### 3.1 INSTALLATION

Conform spacing and placement of members and installation methods as indicated and approved.

### 3.2 PROTECTION AGAINST MOISTURE LOSS

After installation, cover each member with a temporary waterproof protection to maintain the moisture content of the wood. Maintain protection until members are enclosed within the building and final coats are about to be applied. Elevate initial building heat gradually to the desired level. To minimize checking do not reduce the relative humidity of the building rapidly.

-- End of Section --