

**Part 1            General****1.1                REFERENCE STANDARDS**

- .1        CSA Group
  - .1        CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
  - .2        CSA G40.20-13/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
  - .3        CAN/CSA O80 Series-15, Wood Preservation.
  - .4        CSA O86 Consolidation-14, Engineering Design in Wood.
  - .5        CSA O112.10-08(R2013), Evaluation of Adhesives for Structural Wood Products (Limited Moisture Exposure).
  - .6        CAN/CSA-O122-16, Structural Glued-Laminated Timber.
  - .7        CSA O177-06(R2015), Qualification Code for Manufacturer's of Structural Glued-Laminated Timber.
  - .8        CSA S16-14, Design of Steel Structures.
  - .9        CSA W47.1-09(2014), Certification of Companies for Fusion Welding of Steel Structures.
- .2        Forest Stewardship Council (FSC)
  - .1        FSC-STD-01-001-V52-2-2015, FSC Principle and Criteria for Forest Stewardship.

**1.2                DESIGN OF GLUE-LAMINATED CONSTRUCTION**

- .1        Details for glue laminated members must be designed as per CAN/CSA S16.1 and CAN/CSA086 to resist shear forces from the floor and roof loads indicated on drawings.
- .2        Details to connect glue laminated members to steel members must be designed and realized by the Contractor via his structural steel subcontractor.
- .3        The steel manufacturer and wood manufacturer must coordinate their work. The Contractor is responsible for defining and managing work coordination.

**1.3                ACTION AND INFORMATIONAL SUBMITTALS**

- .1        Submit in accordance with Section 01 33 00- Submittal Procedures.
- .2        Product Data:
  - .1        Submit manufacturer's instructions, printed product literature and data sheets for glued-laminated construction and include product characteristics, performance criteria, physical size, finish and limitations.
  - .2        Submit two copies of WHMIS MSDS in accordance with Section 01 35 29.06- Health and Safety Requirements.
- .3        Shop Drawings:
  - .1        Submit drawings stamped and signed by professional engineer registered or licensed in Nunavut, Canada.
  - .2        Submit erection drawings in accordance with CSA S16 and CSA O86.

- .3 Shop drawings for members: indicate stress grade, service grade and appearance grades, shop applied finishes, camber, cuts, ledgers, holes and connection details.
- .4 Submit shop drawings and construction erection drawings, including drawings illustrating steel connectors and wood members.
- .4 Samples:
  - .1 Submit for review and acceptance of each unit.
  - .2 Samples will be returned for inclusion into work.
  - .3 Submit 2 samples of connector plates.
- .5 Certifications: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
  - .1 Submit manufacturer's plant certification to CSA O177, Appendix B at completion of fabrication.
- .6 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures.

#### 1.4 CERTIFICATION

- .1 Qualifications:
  - .1 Manufacture structural glued-laminated members in plant certified by CSA as meeting requirements of CSA O177, class X.
  - .2 Submit certificate in accordance with CSA O177, Appendix B at completion of fabrication.
  - .3 Fabricator for welded steel connections to be certified to CSA W47.1.
  - .4 Place authorization labels on glued-laminated members indicating manufactured in CSA certified plant.
  - .5 Certification of material protective sealer.
- .2 The manufacturer of welded steel structural units must be certified pursuant to CAN/CSA W47.1 standard.
- .3 Wood sealant applied to structural units must be certified.

#### 1.5 ENVIRONMENTAL REQUIREMENTS

- .1 All timber used for the project must be certified "Forest Stewardship Council" (FSC) with the FSC Chain of Custody intact.
- .2 Technical datasheets and certificate numbers for the FSC Chain of Custody for wood-based products must be provided for approval prior to installation.
- .3 Wood composite products (including wood doors) and agrifibre products shall not contain any additional urea formaldehyde resin. Adhesives used in stratified members containing these products must not contain any urea formaldehyde.

#### 1.6 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00- Common Product Requirements.
- .2 Delivery and Acceptance Requirements:

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- .1 Deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
  - .2 Apply protective sealer to glued-laminated units before shipping unless specified otherwise.
  - .3 Wrap quality grade members prior to leaving plant with a moisture resistant wrapping.
  - .4 Use padded, non-marring slings for handling glued-laminated members.
  - .5 Protect corners with wood blocking.
  - .6 Make adequate provision for delivery and handling stresses.
  - .3 Storage and Handling Requirements:
    - .1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
    - .2 Slit underside of membrane covering during storage at site without defacing member.
    - .3 Store glued-laminated units and protect from weather, block off ground and separate with stripping, so air may circulate around faces of members.
    - .4 Cover glued-laminated units with opaque moisture resistant membrane if stored outside.
    - .5 Store and protect glue-laminated products from nicks, scratches, and blemishes.
    - .6 Replace defective or damaged materials with new.

**Part 2 Products****2.1 MATERIALS****.1 Timber product:****.1** Lumber species: SPF or Douglas Fir. All wood must be FSC certified.**.2 Capacity:**

Force Classification	SPF	Douglas Fir-Larch	
	Beams 24F-ES/NPG	Beams 24F-EX	Posts 16c-E
Bending strength ( $F_b$ )	30.7 MPa	30.6 MPa	14.0 MPa
Longitudinal shear strength ( $F_v$ )	2.2 MPa	2.0 MPa	2.0 MPa
Compression strength perpendicular to grain ( $F_{cp}$ )	7.5 MPa	7.0 MPa	7.0 MPa
Modulus of elasticity (E)	12 400 MPa	12 800 MPa	12 400 MPa
Compression strength parallel to grain ( $F_c$ )	33.0 MPa	30.2 MPa	30.2 MPa
Tensile strength parallel to grain ( $F_t$ )	20.4 MPa	15.3 MPa	15.3 MPa

**.2** Adhesive: to CSA O112.10, to grade of service required in accordance with CAN/CSA-O122.**.3** Sealer for glued-laminated members: penetrating type, clear, non-yellowing liquid.**.4 Fastenings:****.1** Split ring connections: hot rolled carbon steel, SAE 1010, in accordance with SAE handbook.**.2 Shear plate connections:****.1** Pressed steel type: hot rolled carbon steel, SAE 1010, in accordance with SAE handbook.**.2** Malleable iron type: to ASTM A47/A47M, grade 350.**.3** Lag screws: to ASTM A36**.4** Bolts: to ASTM A307.**.5** Side plates: to CSA G40.20/G40.21.**.6** Drift pins: to ASTM A307.**.7** Glued-laminated rivets: hot dip galvanized to ASTM A36 or CSA G40.20/G40.21.**.8** Nails and spikes: to CSA B111.**.9** Truss plates: light gauge galvanized sheet steel to ASTM A653, grade A, yield point 255 MPa.**.5** Factory-applied primer coat on all steel connections: to CAN/CGSB-1.40.

- .6 Hot dip galvanization: to CAN/CSA-G164, minimum zinc coating of 310 g/m. Apply to all exterior members exposed to weather conditions.
- .7 Preserving product: CCA-PEG. Apply to portions exposed to outside air and weather conditions.
- .8 Fire retardant: not required.

## 2.2 **FABRICATION**

- .1 Fabricate members to following classifications:
  - .1 Service grade: Interior.
  - .2 Appearance grade: Architectural.
- .2 Mark laminated members for identification during erection. Marks not to be visible in final assembly.
- .3 Do not apply sealer to areas which are to receive stained finish or preservative treatment.
- .4 Unless otherwise indicated on drawings, assemblies must be designed in accordance with CAN/CSA-086.1 and CAN/CSA-S16.1, in order to resist forces, moments, shears and efforts indicated. Assemblies must be fabricated in accordance with CAN/CSA-S16.1.
- .5 Following fabrication, assemblies must bear the seal "EcoLogo low VOC content" (as per case, either exposed or not).

## **Part 3 Execution**

### **3.1 EXAMINATION**

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for glue-laminated material installation in accordance with manufacturer's written instructions.
  - .1 Inform the Departmental Representative of unacceptable conditions immediately upon discovery.
  - .2 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from the Departmental Representative.

### **3.2 ERECTION**

- .1 Protect protective sealer from damage before erection.
  - .1 Touch up damaged areas on site with specified sealer.
- .2 Erect glued-laminated members in accordance with construction erection drawings.
- .3 Brace and anchor members until permanently secured by structure. The Contractor is responsible for the installation method.
- .4 Take necessary precautions to prevent damage to members during installation.
- .5 Splice and join only at locations as indicated on construction erection drawings.
- .6 Unless otherwise indicated (see Appendix B), do not field cut or alter members without the Departmental Representative's approval. If approved, preservative treat cut ends.
- .7 Holes shall be made at specified locations as indicated on shop drawings.
- .8 Recover wood from field cutting that can be reused.

### **3.3 FIELD QUALITY CONTROL**

- .1 Inspection and testing of materials and workmanship must be provided by the contractor. The contractor must provide the services of a Testing Laboratory that shall provide the Department Representative with a written report of all the tests performed.
- .2 The testing laboratory shall perform test to verify bolt torque, plumbness and straightness of structure.
- .3 The Testing Laboratory shall provide a complete inspection report to the Departmental Representative. This report will be necessary before acceptance of work.

### **3.4 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11- Cleaning.
- .2 Waste Management: in accordance with Section 01 74 21- Construction/Demolition Waste Management and Disposal.

**3.5 PROTECTION**

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by glue laminated construction installation.

**END OF SECTION**