

Technical Note S09
Specification Guide (CAN)

Specification Guide

Ref.: National Master Specification (NMS), approved June 30, 2010

GLUED-LAMINATED CONSTRUCTION

Section 06 18 00

SPEC NOTE: This Section specifies the laminating stock, adhesive, fasteners, etc. for glued-laminated and cross-laminated structural units, including fabrication and erection.

SPEC NOTE: This Section includes general requirements and procedures for compliance with the Canada Green Building Council's (CaGBC) – LEED Canada-NC prerequisites or credits required for LEED Project certification. Coordinate with Section 01 35 21 – LEED Requirements.

1. General

1.1 RELATED REQUIREMENTS

SPEC NOTE: Edit the following paragraphs to list documents or Sections with specific information that the reader might expect to find in this Section, but is specified elsewhere. Do not include Division 00 or Division 01 Sections in this listing.

.1 [].

1.2 REFERENCES

SPEC NOTE: Edit the following paragraphs for this specific project.

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM A36/A36M-08, Standard Specification for Carbon Structural Steel.
 - .2 ASTM A47/A47M-99(2009), Standard Specification for Ferritic Malleable Iron Castings.
 - .3 ASTM A307-10, Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
 - .4 ASTM A653/A653M-10, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .2 Canada Green Building Council (CaGBC)
 - .1 LEED (Leadership in Energy and Environmental Design) Canada NC 2009 and LEED Canada CS 2009 Rating System.
- .3 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.40-97, Anticorrosive Structural Steel Alkyd Primer.
- .4 Canadian Standards Association (CSA)/CSA International
 - .1 CSA B111-1974 (R2003), Wire Nails, Spikes and Staples.

- .2 CSA G40.20-04/G40.21-04 (R2009), General Requirements for Rolled or Welded Structural Quality Steel / Structural Quality Steel.
- .3 CAN/CSA-G164-M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
- .4 CSA O86-09, Engineering design in wood.
- .5 CSA O112.9-10, Evaluation of adhesives for structural wood products (exterior exposure).
- .6 CAN/CSA-O122-06 (R2011), Structural Glued-Laminated Timber.
- .7 CSA O177-06 (R2011), Qualification Code for Manufacturers of Structural Glued-Laminated Timber.
- .8 CSA S16-09, Design of steel structures.
- .9 CSA W47.1-09, Certification of companies for fusion welding of steel.
- .5 Forest Stewardship Council (FSC)
 - .1 FSC-STD-01-001 (V4-0) EN, FSC Principles and Criteria for Forest Stewardship.
 - .2 FSC-STD-20-002 (V3-0) EN, Structure, content and local adaptation of Generic Forest Stewardship Standards.
- .6 Green Seal Environmental Standards (GS)

SPEC NOTE: Green Seal Environmental Criteria for Anti-Corrosive Paints, GC-3 is included in the revised GS-11, 2008 2nd Edition, Paints and Coatings.

- .1 GS-11-2008, 2nd Edition, Paints and Coatings
- .7 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
- .8 Society of Automotive Engineers International (SAE)
 - .1 SAE Handbook 2009.
- .9 ASME (American Society of Mechanical Engineers)
 - .1 ASME B18.2.1 – 2010 Square, Hex, Heavy Hex, and Askew Head Bolts and Hex, Heavy Hex, Hex Flange, Lobed Head, and Lag Screws.
- .10 Canadian Construction Material Centre (CCMC)
 - .1 CCMC's Registry of Product Evaluations, October 1st, 2000 On-line Edition (updated quarterly).

1.3 ADMINISTRATIVE REQUIREMENTS

- .1 [____].

1.4 ACTION AND INFORMATION SUBMITTALS

- .1 Submit in accordance with Section [01 33 00 – Submittal Procedures].

SPEC NOTE: Include requests for relevant data to be furnished by the Contractor, before, during or after construction.

- .2 Product Data:

- .1 Submit manufacturer's instructions, printed product literature and data sheets for glued-laminated constructions and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit WHMIS MSDS in accordance with Section [01 35 29.06 – Health and Safety Requirements] [01 35 43 – Environmental Procedures].
- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in [Province] [Territory] of [___], 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 Samples:
 - .1 [___].
- .5 Certifications: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - .1 Submit manufacturer's plant certification based on the material evaluation report listed in the *Registry of Product Evaluations* published by the Canadian Construction Material Centre (CCMC) or the product report published by a certification agency accredited by the Standards Council of Canada at completion of fabrication.
- .6 Test and Evaluation Reports: submit certified test reports from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.
- .7 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures.
- .8 Manufacturer's Reports:
 - .1 [___].

SPEC NOTE: Coordinate the following paragraph with Section 01 35 21 – LEED Requirements.

- .9 Sustainable Design Submittals:
 - .1 LEED Canada NC [2009] Submittals: in accordance with Section [01 35 21 – LEED Requirements].

SPEC NOTE: Edit the following paragraphs to specify certification of compliance for specific LEED requirements in one or many of the following LEED category(ies): Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources, and Indoor Environmental Quality.

- .2 Construction Waste Management:
 - .1 Submit project [Waste Management Plan] [Waste Reduction Workplan] highlighting recycling and salvage requirements.
 - .2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that [50] [75] % of construction wastes were recycled or salvaged.
- .3 Recycled Content:

- .1 Submit listing of recycled content products used, including details of required percentages or recycled content materials and products, showing their costs and percentages of [post-consumer] [and] [post-industrial] content, and total cost of materials for project.
- .4 Regional Materials: submit evidence that project incorporates required percentage [10] [20] % of regional materials and products, showing their cost, distance from project to furthest site of extraction or manufacture, and total cost of materials for project.

SPEC NOTE: Coordinate the following paragraph with Section 01 35 21 – LEED Requirements. Use the following paragraph when wood products made from FSC certified wood are required for LEED Credit MRc7, which requires that a minimum of 50 % of wood-based materials be certified.

- .5 Certified Wood:
 - .1 Submit listing of wood products and materials used, produced from wood obtained from forests certified by FSC Accredited Certification Body in accordance with FSC-STD-01-001.
 - .2 Submit vendor's and manufacturer's FSC Chain-of-Custody Certificate number.
- .6 Low-Emitting Materials:
 - .1 Submit listing of adhesives and sealants used in building, showing compliance with VOC and chemical component limits or restrictions requirements.
 - .2 Submit listing of glued-laminated products used in building, stating that they contain no added urea-formaldehyde resins.

1.5 QUALITY ASSURANCE

- .1 Qualifications :
 - .1 Manufacture structural glued-laminated members in plant certified as meeting requirements of CSA O177.
 - .2 Submit certificate of conformity based on the material evaluation report listed in the *Registry of Product Evaluations* published by the Canadian Construction Material Centre (CCMC) or the product report published by a certification agency accredited by the Standards Council of Canada at completion of fabrication.
 - .3 Fabricator for welded steel connections to be certified to CSA W47.1.
 - .4 Place, on glued-laminated or cross-laminated members, the material evaluation report number listed in the *Registry of Product Evaluations* published by the Canadian Construction Material Centre (CCMC) or the product report number published by a certification agency accredited by the Standards Council of Canada indicating manufactured in certified plant.
 - .5 Certification of material protective sealer.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section [01 61 00 – Common Product Requirements] and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements:

- .1 Deliver materials to site in original factory packaging, labeled with manufacturer's name and address.
- .2 Apply protective sealer to glued-laminated units before shipping unless specified otherwise.
- .3 Wrap architectural 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 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 glued-laminated products from nicks, scratches, and blemishes.
 - .6 Replace defective or damaged materials with new, unless written approval by the manufacturer.

SPEC NOTE: Coordinate the following paragraph with Section 01 35 21 – LEED Requirements. Use the following paragraph to ensure Construction Waste Management Plan or Waste Reduction Workplan is specified and include in article titled ACTION AND INFORMATIONAL SUBMITTALS. This may contribute towards LEED Credits as follows: Materials and Resources Credit MRc2 Construction Waste Management, either MRc2.1: Divert 50% from Landfill, or MRc2.2: Divert 75% from Landfill.

- .4 Develop [Construction Waste Management Plan] [Waste Reduction Workplan] related to Work of this Section and in accordance with Section [01 35 21 – LEED Requirements].
- .5 Packaging Waste Management: remove for reuse as specified in [Construction Waste Management Plan] [Waste Reduction Workplan] in accordance with Section [01 74 21 – Construction/Demolition Waste Management and Disposal] [and] [Section 01 35 21 – LEED Requirements].
 - .1 Ensure preservative treated wood is disposed of by means other than for recycling or reuse.
 - .2 Dispose of treated wood, end pieces, wood scraps and sawdust at sanitary landfill approved.
 - .3 Dispose of unused wood preservative material at official hazardous material collections site approved.
 - .4 Divert unused wood materials from landfill to [recycling] [reuse] [composting] facility approved.

2. Products

2.1 MATERIALS

- .1 Laminating stock:

- .1 Glued-laminated: Spruce FSC Certified, based on the material evaluation report listed in the *Registry of Product Evaluations* published by the Canadian Construction Material Centre (CCMC).
- .2 Cross-laminated: Spruce FSC Certified, to the product report published by a certification agency accredited by the Standards Council of Canada.
- .2 Adhesive: to CSA O112.9, to grade of service required in accordance with CAN/CSA-O122.
 - .1 Urea-formaldehyde free.
- .3 Sealer for glued-laminated members: penetrating type, clear, non-yellowing liquid.
- .4 Fastenings:
 - .1 Split ring connectors: hot rolled carbon steel, SAE 1010, in accordance with SAE Handbook.
 - .2 Shear plate connectors:
 - .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 ASME B18.2.1.
 - .4 Bolts: to ASTM A307.
 - .5 Side plates: to CSA G40.20/G40.21 or ASTM A36.
 - .6 Drift pins: to ASTM A307.
 - .7 Glued-laminated timber rivets: hot dipped galvanized to CSA G40.20/G40.21 or ASTM A36
 - .8 Nails and spikes: to CSA B111.
 - .9 Wood screws: to ASME B18.2.1.

SPEC NOTE: Delete the following paragraph if galvanized finish is specified.

- .5 Shop coat primer for steel connections: to CAN/CGSB-1.40.

SPEC NOTE: Delete is shop coat primer is specified. For conditions of severe exposure, increase zinc coating thickness.

- .6 Galvanizing: to CAN/CSA-G164, hot dipped, minimum zinc coating of [610] g/m².

SPEC NOTE: Seldom needed. Use only if required for high humidity atmosphere or ground contact.

- .7 Preservative: [____].
- .8 Fire retardant: [____].

2.2 FABRICATION

- .1 Fabricate members to following classifications:
 - .1 Stress grade:

- .1 Glued-laminated timber: 24F-ES/NPG (beams, columns, and ties) and/or 20F-ES/CPG (decking), for bending, compression and/or tension members, to the material evaluation report listed in the *Registry of Product Evaluations* published by the Canadian Construction Material Centre (CCMC).
- .2 Cross-laminated timber: [Standard] [Select], for bending, compression and/or tension members, to the product report published by a certification agency accredited by the Standards Council of Canada.

SPEC NOTE: Interior areas having humidity, causing equilibrium moisture content to exceed 15%, as could occur over swimming pools and arenas, specify exterior service grade.

- .2 Service grade:
 - .1 Glued-laminated timber: [Interior] [Exterior]
 - .2 Cross-laminated timber: Interior
- .3 Appearance grade:
 - .1 Glued-laminated timber: Architectural
 - .2 Cross-laminated timber: [Industrial] [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 Design connections to CSA O86, and CSA S16 unless specifically detailed, to resist shears, moments and forces indicated.
 - .1 Fabricate in accordance with CSA S16.

SPEC NOTE: Galvanize hardware in exterior locations, highly humid interiors and areas where corrosive chemicals are stored. Galvanizing may also be advisable to minimize staining of wood during prolonged erection periods.

- .5 [Galvanize] [prime] [paint] connections after fabrication.

SPEC NOTE: Coordinate the following paragraph with Section 01 35 21 – LEED Requirements. Use the following paragraph to specify VOC limits required for LEED Low-Emitting Materials Credit EQc4.2 – Paints and Coatings, where VOC and toxicity content of paints and coatings must be less than content limits of GS-11.

- .1 Anti-corrosive paint: VOC limit [250] g/L maximum to [GS-11].

3. Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for glued-laminated material installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of [____].
 - .2 Inform [____] of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 PRESERVATIVE TREATMENT

- .1 [____].

3.3 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 for construction erection drawings.
- .3 Brace and anchor members until permanently secured by structure.
- .4 Make adequate provisions for erection stresses.
- .5 Splice and join only at locations as indicated on for construction erection drawings.
- .6 Do not field cut or alter members without manufacturer's approval. If approved, preservative treat cut ends.
- .7 Erect glued-laminated decking in accordance with for construction erection drawings.
 - .1 Install glued-laminated decking in a single- or multiple-span continuous pattern as indicated on the drawings (no controlled random pattern).
 - .2 When possible, stagger end joints in adjacent elements over supports.
 - .3 Nail decking to supports and adjacent courses as shown on the drawings. When the underside of the decking is to have an architecture appearance, particular care must be taken when nailing the decking to supports or to adjacent elements, and when nailing other miscellaneous framing to the wood decking, that nails do not penetrate through the full thickness of the decking.

3.4 FIELD QUALITY CONTROL

- .1 [____].

3.5 CLEANING

- .1 Progress Cleaning: clean in accordance with Section [01 74 11 – Cleaning].
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section [01 74 11 – Cleaning].
- .3 Waste Management: separate waste materials for [reuse] [and] [recycling] in accordance with Section [01 74 11 – Construction/Demolition Waste Management and Disposal] [01 35 21 – LEED Requirements].
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.6 PROTECTION

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

END OF SECTION