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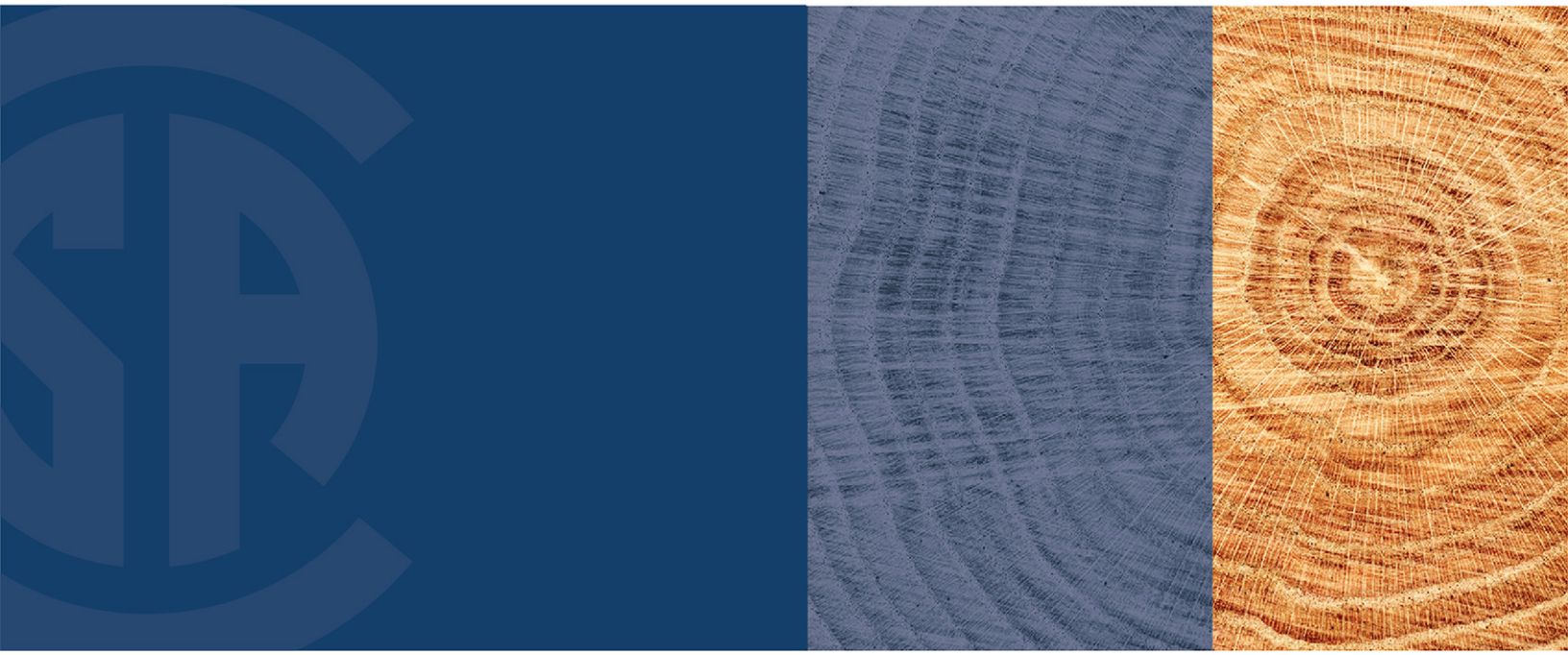
Qualification code for manufacturers of structural glued-laminated timber



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Update No. 1
O177-06
May 2013

Note: *For information about the* ***Standards Update Service****, go to* ***shop.csa.ca*** *or e-mail* ***techsupport@csagroup.org.***

Title: *Qualification code for manufacturers of structural glued-laminated timber* — originally published February 2006

The following revisions have been formally approved and are marked by the symbol delta (Δ) in the margin on the attached replacement pages:

Revised	Clauses 2, 3, 6.3.1, 9.5.1, 9.5.2, 9.6.2, 9.6.5, A.4.1, and A.4.2
New	Clause 9.3.3
Deleted	None

- Update your copy by inserting these revised pages.
- Keep the pages you remove for reference.

O177-06
Qualification code for manufacturers of structural glued-laminated timber

1 Scope

1.1
Glued-laminated timber (Glulam) is an engineered wood product requiring precise manufacturing at all stages of fabrication. The finished product can only be tested under laboratory conditions; therefore, quality control of manufacturing is necessary to ensure that the properties of Glulam are commensurate with the specified strengths assigned to Glulam in accordance with CAN/CSA-O86.

This Standard outlines requirements for the qualification of shop manufacturers of laminated structural timber that is pressure-glued using clamps or mechanical means other than nailing.

1.2
This Standard outlines requirements for determining the initial and continuing suitability of a plant's personnel, equipment, and procedures to manufacture structural glued-laminated timber in accordance with CSA O122.

This Standard qualifies individual plants. If more than one plant is operated by one fabricator, each plant requires separate qualification.

The process of glue laminating using mobile or temporary facilities is not covered by this Standard.

1.3
Certification of Glulam is not covered by this Standard. The manufacture of Glulam is covered by CSA O122.

1.4
In CSA Standards, "shall" is used to express a requirement, i.e., a provision that the user is obliged to satisfy in order to comply with the standard; "should" is used to express a recommendation or that which is advised but not required; "may" is used to express an option or that which is permissible within the limits of the standard; and "can" is used to express possibility or capability. Notes accompanying clauses do not include requirements or alternative requirements; the purpose of a note accompanying a clause is to separate from the text explanatory or informative material. Notes to tables and figures are considered part of the table or figure and may be written as requirements. Annexes are designated normative (mandatory) or informative (non-mandatory) to define their application.

1.5
This Standard is written in SI (metric) units. For conversion into yard/pound (imperial) equivalents, see Annex F.

2 Reference publications
This Standard refers to the following publications, and where such reference is made, it shall be to the edition listed below, including all amendments published thereto.

CSA (Canadian Standards Association)
CAN/CSA-O86-01
Engineering design in wood

O112 Series-M1977 (R2001), *CSA Standards for wood adhesives:*

O112.7-M1977 (R2001)
Resorcinol and phenol-resorcinol resin adhesives for wood (room- and intermediate-temperature curing)

O112.9-04
Evaluation of adhesives for structural wood products (exterior exposure)

O122-06
Structural glued-laminated timber

APA (APA — The Engineered Wood Association)
Δ PS 1-09
Voluntary Product Standard for Construction and Industrial Plywood

ASTM International (American Society for Testing and Materials)
Δ D 2395-07
Standard Test Methods for Specific Gravity of Wood and Wood-Based Materials

D 4442-92 (2003)
Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials

Δ D 7247-07ae1
Standard Test Method for Evaluating the Shear Strength of Adhesive Bonds in Laminated Wood Products at Elevated Temperatures

Δ **ISO/IEC (International Organization for Standardization/International Electrotechnical Commission)**
ISO/IEC 17065:2012
Conformity assessment — Requirements for bodies certifying products, processes and services

NRCC (National Research Council Canada)
Δ *National Building Code of Canada,* 2010

ULC (Underwriters Laboratories of Canada)
Δ CAN/ULC-S101-07
Standard Methods of Fire Endurance Tests of Building Construction and Materials

3 Definitions

In addition to the definitions in CSA O122, the following definitions apply in this Standard:

Δ **Certification agency** (hereinafter referred to as **Agency**) — an impartial body meeting the requirements of ISO/IEC 17065 that is competent to evaluate a manufacturer's ability to meet the requirements in this Standard.
Note: *In Canada, certification agencies are accredited by the Standards Council of Canada as part of the international accreditation forum.*

Layup — the arrangement of each individual lamination in a Glulam member for a specific zone, as defined in Tables 4 to 7 of CSA O122.

6 Quality control

6.1 Quality control organization

6.1.1
A written description of the quality control organization shall be accessible to the Agency examiner and the plant superintendent.

6.1.2
The quality control organization shall be independent of production personnel and shall report directly to management.

6.1.3
The head of the quality control organization shall possess and demonstrate to the Agency an adequate knowledge of lumber and its grading and preparation, the characteristics of structural adhesives, gluing procedures, the fabrication of structural timber, testing procedures, and applicable codes and standards. The head of the quality control organization shall also be able to read and understand plans and specifications.

6.1.4
The services of a professional engineer who is acceptable to the Agency shall be available to the quality control organization. The engineer shall examine and make decisions concerning those minor deviations from approved manufacturing standards for which the quality control organization requires engineering judgment. The quality control organization shall maintain a record of all decisions made by the engineer.

6.1.5
Quality control personnel shall demonstrate to the Agency an adequate knowledge of the function or functions for which they are responsible and the applicable quality control equipment.

6.2 Quality control measures
The following measures shall be taken regularly in the course of fabrication:
(a) The position of laminating grades contained in a Glulam member shall be identifiable before the clamping operation to ensure that the proper grades are used in the correct position.
(b) Thickness and quality of machining of the surface and of end joints of all laminations shall be checked in accordance with the requirements of CSA O122.
(c) The handling, storage, and mixing of all adhesives shall be checked in accordance with the requirements of plant manuals.
(d) The gluing, pressing, and setting requirements of Clause 6.4(f) shall be verified and included in quality control reports.
(e) The identification and testing of block shear, cyclic delamination, NDT lumber, and finger-joint specimens shall be checked in accordance with the requirements of CSA O122.

6.3 Quality control equipment

6.3.1
The manufacturer shall demonstrate to the Agency that the following quality control equipment is permanently available at the manufacturing plant:
Note: *The equipment marked with an asterisk (*) may be temporarily obtained from an outside source for the purposes of this Standard.*
(a) a moisture meter for measuring, to a tolerance of ± 1% in moisture content, the moisture content of laminating stock to a depth of 19 ± 2 mm from the surface in 38 mm thick material or to a depth of 10 ± 2 mm from the surface in 19 mm thick material;

(b) suitable resistors to check moisture meter calibration;
(c) a thickness gauging device having an accuracy of 0.025 mm for routine and regular measurement of laminating stock thickness, as required by CSA O122;
(d) a device that can be routinely used to apply a known load level to check the accuracy of the modulus of elasticity (E) assigned by machines used in regular production of NDT rated lumber;
(e) laboratory equipment for measurement of the viscosity of adhesive mixes*;
(f) balances having an accuracy of 0.1 g for measurement of the weight of glue spread;
(g) thermometers and hygrometers for the measurement of temperature and relative humidity in storage and working areas and adjacent to curing packages;
(h) thermometers for the measurement of the temperature of adhesive mixes;
(i) a calibrated compression cylinder, metered hydraulic pressure plate, or a similar device that will verify the accuracy of the device used to apply clamping pressure*;
(j) a calibrated torque wrench or equivalent device for the determination of the pressure on a package;
(k) equipment for the block shear test in accordance with the requirements of CSA O122;
(l) equipment for cyclic delamination tests in accordance with the requirements of CSA O122;
(m) tables, curves, charts, and conversion factors necessary for use of quality control equipment;
Δ (n) thermocouples and a potentiometer or similar equipment for the measurement of the inner bond line temperature while curing;
(o) an increment borer for the sampling of inner portions of bond lines*; and
(p) equipment for end-joint testing in accordance with the requirements of CSA O122.

6.3.2
Quality control facilities and equipment shall be maintained in operable conditions at all times. Equipment shall be calibrated at least once a year or as frequently as the equipment manufacturer recommends.

6.4 Quality control records
The quality control organization shall maintain records and/or results of the following:
(a) quality control personnel and the functions for which they are employed;
(b) routine tests of NDT lumber used for laminating stock;
(c) block shear tests;
(d) vacuum-pressure cycle tests;
(e) end-joint tests;
(f) laminating conditions and procedures for each member or group of members that is fabricated;
(g) quality control personnel responsible for each member or group of members that is fabricated; and
(h) action taken concerning material found to contain manufacturing defects.

6.5 Examination
Quality control personnel shall be observed in order to assess their ability to carry out their duties. The results of this assessment shall be reported by the examiner.

7 Manufacturing and plant manuals

7.1 Manufacturing

7.1.1
Plants covered by this Standard shall produce Glulam in accordance with the manufacturing requirements of CSA O122 and the design requirements of CAN/CSA-O86.

7.1.2
Drawings and specifications for any fabricated timber structure shall be readily available to supervisory personnel.