

AS/NZS 1328.2:1998

AS/NZS 1328.2

Australian/New Zealand Standard®

Glued laminated structural timber

**Part 2: Guidelines for AS/NZS 1328:
Part 1 for the selection, production
and installation of glued laminated
structural timber**

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This Joint Australian/New Zealand Standard was prepared by Joint Technical Committee TM/4, Glued Timber Products. It was approved on behalf of the Council of Standards Australia on 15 May 1998 and on behalf of the Council of Standards New Zealand on 9 June 1998. It was published on 5 September 1998.

The following interests are represented on Committee TM/4:

Adhesives and Sealants Manufacturers Association of Australia
 Forest Industries Association of Tasmania
 Glued Laminated Timber Association of Australia
 Housing Industry Association of Australia
 Master Builders Australia
 Monash University, Melbourne, Australia
 New Zealand Adhesives Industry
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Originated in Australia as part of AS 1328—1972.
Previous edition AS 1328—1987.
Originated in New Zealand as part of NZS 3606:1979.
AS 1328—1987 and NZS 3606:1979 jointly revised, amalgamated
and redesignated in part as AS/NZS 1328.2:1998.

PUBLISHED JOINTLY BY:

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Wellington 6001 New Zealand

PREFACE

This Standard was prepared by the Australian/New Zealand Joint Standards Committee TM/4 on Glued Timber Products to supplement AS/NZS 1328:Part 1 *Glued laminated structural timber – Performance requirements and minimum production requirements*. AS/NZS 1328:Part 1 is now a performance Standard based on BS EN 386:1995, and as such, contains relatively less of the prescriptive material which previously formed part of AS 1328 – 1987, *Glued-laminated structural timber* and NZS 3606:1987 *Specification for the manufacture of glue laminated timber*. These Guidelines to the selection, production and installation of glued laminated structural timber to AS/NZS 1328:Part 1 retain most of the original prescriptive material of AS 1328 – 1987 and NZS 3606:1987 but it is now given by way of advice.

Part 2 is intended to:

- (a) Assist designers and specifiers in the selection of structural glulam;
- (b) Provide manufacturers with advice on sound manufacturing practices;
- (c) Provide builders and construction supervisors on sound on-site handling and installation practices.

Because of the multiplicity of factors which affect final performance no warranty can be given nor is any implied that compliance with the recommendations contained herein will necessarily lead to compliance with the performance requirements of AS/NZS 1328:Part 1.

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STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

Australian/New Zealand Standard**Glued laminated structural timber****Part 2: Guidelines for AS/NZS 1328:Part 1 for the selection, production
and installation of glued laminated structural timber****SECTION 1 SCOPE AND GENERAL**

1.1 SCOPE This multi-purpose document is published as a companion document to AS/NZS 1328:Part 1. The information provided is informative, it is provided by way of advice only. It serves the following roles.

It provides guidelines for the production and installation of glued laminated timber (glulam) meeting the performance requirements of AS/NZS 1328:Part 1. Although compliance with the recommendations contained herein will usually produce satisfactory glulam members, complete documentation of all processes is not possible, no warranty can be given by Standards Australia and/or Standards New Zealand that this will actually occur. It is the responsibility of the specifiers, producers and users of glulam products to select, manufacture and install the product in such a way that it meets the performance requirements of AS/NZS 1328:Part 1.

It provides guidance on unified member descriptions for glued laminated timber products directed at assisting producers and users in specifying the product in a unified manner.

1.2 REFERENCED DOCUMENTS The following documents are referred to in this Standard:

AS

1604-1993	Timber – Preservative-treated – Sawn and round
1720	Timber structures
1720.1-1988	Design methods
1748-1992	Timber – Stress graded – Product requirements for mechanically stress-graded timber
2082-1979	Visually stress-graded hardwood for structural purposes
2796-1985	Timber – Seasoned hardwood – Milled products
2858-1986	Timber – Softwood – Visually stress-graded for structural purposes

AS/NZS

1328	Glued laminated structural timber
1328.1:1998	Performance requirements and minimum production requirements
1491:1996	Finger jointed structural timber
4063:1992	Timber – Stress-graded – In-grade strength and stiffness evaluation
4364:1996	Adhesives, phenolic and aminoplastic, for load-bearing timber structures: Classification and performance requirements
4490:1997	Timber – Stress-graded – Procedures for monitoring structural properties

4491:1997 Timber – Glossary of terms in timber-related standards

NZS

3602:1995 Timber and wood-based products for use in building

3603:1993 Timber structures Standard

3621:1987 Standard names of commercial timbers in New Zealand

3631:1988 New Zealand timber grading rules

NZMP

3640:1992 Specification of the minimum requirements of the NZ Timber Preservation Council Inc.

AS/NZS ISO

9000:- Quality management and quality assurance standards

9004:- Quality management and quality system elements

1.3 DEFINITIONS For the purposes of this Standard, the definitions below apply:

1.3.1 Adhesive (synonymous with glue) — substance used to bond together two or more pieces of wood.

1.3.2 Assembly time – closed — the time interval between the placing together of glued faces and the application of cramping pressure.

1.3.3 Assembly time – open — the time interval between spreading a face with glue and bringing it into contact with the face to which it is to be bonded.

1.3.4 Bond — the adherence of a hardened glueline and the timber face.

1.3.5 Characteristic strength — an estimate of the lower 5-percentile value determined with 75 % confidence, from tests on a representative sample of full size test specimens.

1.3.6 Cramping — the application of pressure to adhesive faces.

1.3.7 Cramping pressure — the cramping force per unit area applied while an adhesive hardens.

1.3.8 Double spread — the application of glue to the two faces to be adhesive bonded – see below for a definition of SINGLE SPREAD.

1.3.9 Edge joint — the junction of two pieces of a lamination edge to edge, commonly formed by gluing only and/or mechanical means such as a tongue and groove joint.

1.3.10 End joint — a glued joint in a lamination between lamination segments used to form full length laminations.

1.3.11 Equilibrium moisture content — the moisture content of timber at which it neither absorbs moisture from nor loses moisture to the surrounding atmosphere.

1.3.12 Face joint — the joint between the wide faces of laminations.

1.3.13 Finger joint — a structural end joint formed by gluing together lamination segments using similar tapered symmetrical fingers cut in the segment ends.

- 1.3.14 Glueline** — the layer of glue between two adjacent wood surfaces.
- 1.3.15 Glue spread** — the quantity of adhesive per unit area of glueline usually expressed in g/m². Typical values are in the range 200 – 300 g/m².
- 1.3.16 Glulam grade** — a grade of member 300 mm deep having the engineering properties given in Tables 1.1 and 1.2.
- 1.3.17 Horizontal laminations** — a glued assembly of laminations having the face gluelines parallel to the neutral plane of bending.
- 1.3.18 Insert** — non-structural repairs used to correct appearance defects.
- 1.3.19 Laminating** — the process of bonding two or more laminations with glue.
- 1.3.20 Lamination** — a layer of wood or veneer in a laminated member. The lamination may be made up of several pieces of timber end-jointed and/or edge-jointed to extend the width or depth and length of the member. Laminations may be arranged either horizontally or vertically.
- 1.3.21 Lamination stock** — timber from which laminations are manufactured.
- 1.3.22 Moisture content** — the mass of water in timber expressed as a percentage of the oven-dry mass of the timber.
- 1.3.23 Moisture meter** — an instrument used to indicate the moisture content of timber.
- 1.3.24 Planer skip or hit and miss** — the partial planing of the surface of timber due to variations in the sawn timber dimensions being greater than the depth of timber removed by the planer.
- 1.3.25 Pot life** — the time between the mixing of the constituent parts of an adhesive and the time when such adhesive is no longer fit for application.
- 1.3.26 Pressure area** — the area of the assembly that is under cramping pressure during the glue curing period.
- 1.3.27 Resin bleeding** — the process by which natural resins are excreted from the timber and build up on the surface.
- 1.3.28 Scarf joint** — an end joint formed by joining lamination segments with glue in which the ends have been tapered to form a sloping plane surface.
- 1.3.29 Shelf life** — the period recommended by the manufacturer of the adhesive during which its constituent parts remain fit for use.
- 1.3.30 Single spread** — the application of glue to one of two faces to be joined.
- 1.3.31 Spreading** — the application of glue to surfaces being adhesive bonded.
- 1.3.32 Squeeze out** — the excess adhesive forced out of gluelines when cramping pressure is applied.
- 1.3.33 Structural end joint** — an end joint in timber which carries measurable tensile forces.

1.3.34 Synthetic resin adhesive — an adhesive composed of synthetic resin, for example, phenolic and aminoplastic resins, including any hardener or modifier added by the user prior to use.

1.3.35 Vertical laminations — an assembly of laminations which have gluelines perpendicular to the neutral plane.

1.3.36 Wood failure — the area of wood fibre remaining on the glueline after rupture. It is expressed as a percentage of the total area excluding any area of wood defect.

1.4 MEMBER DESCRIPTIONS

1.4.1 General The Service Class gives the environmental conditions of temperature and humidity in which a glulam member will remain serviceable. The Service Class is based on the adhesive type, it does not cover preservative treatment levels. Adhesive types are defined in AS/NZS 4364 and Service Classes in AS/NZS 1328:Part 1. Appearance Grades are recommended in AS/NZS 1328:Part 1.

1.4.2 Glulam grades

1.4.2.1 GL Grades The Glulam Grades (GLxx) defined in AS/NZS 1328:Part 1 were developed by the Australian and New Zealand industries to assist designers and specifiers in the selection of suitable glulam members and their associated design properties. The description takes the form GLxx where xx is approximately equal to the characteristic modulus of elasticity in GPa. Thus GL18 represents glulam with $E = 18\,500\text{ MPa} = 18.5\text{ GPa}$. Manufacturers qualify their product as meeting GL characteristic strength values by testing it in accordance with the provisions of AS/NZS 1328:Part 1. Under best manufacturing practice the design properties cited for the GLs and given in Tables 1.1 and 1.2 are achievable.

1.4.2.2 Grading method For members of GL grades higher than the lowest in the range given in table 1.1 for the particular species, all visually graded laminations in the outer 30 % (15 % on each edge) should have its MoE verified by the manufacturer by physical tests as described in Appendix A.

NOTE: The reason for the requirement for MoE verification is that visual grading cannot determine the absolute stiffness of timber.

EXAMPLE – Consider radiata pine which is recommended for GL12 to GL8 grades. Assume that the middle 70 % of a beam is made of laminations with an average MoE of 8 GPa. The average MoE of the outer 30 % (15 % on each edge) has to have the following average MoE values:

GL grade	MoE inners	MoE outers	Overall MoE
GL12	8.0	13.3	11.5
GL10	8.0	11.0	10.0
GL8	8.0	8.0	8.0

The formula for the MoE for the outer laminations is:

$$MoE_{\text{outers}} = \frac{MoE_{GL\text{ grade}} - p^3 MoE_{\text{inners}}}{(1 - p^3)}$$

where

$p = 0.7$ is the ratio (number of inner laminations)/(total number of laminations) in the note above.