



AMERICAN INSTITUTE OF TIMBER CONSTRUCTION



AITC Product Report Number P235-001

BINDERHOLZ GMBH
Tiwagstrasse 3
6200 Jenbach, Austria

WWW.BINDERHOLZ.COM
+43 5288 601

Purpose

The purpose of this American Institute of Timber Construction (AITC) Manufacturer Product Report is to detail provisions under the *International Building Code* (IBC) and *International Residential Code* (IRC) for approval of binderholz structural glued laminated timber for use in buildings and other structures. The IBC and IRC are the model building codes generally adopted nationwide, regionally, and locally, regulating building design and construction. This Report also contains information for architects, engineers, and builders, for the design and specification of binderholz Glulam, as well as installation and construction information.

Code Provisions

Requirements for the manufacturing and use of binderholz Glulam in buildings and other structures are provided for in Sections 2303.1.3 and 2306.1 of the IBC and Sections 502.1.3, 602.1.3, and 802.1.2 of the IRC. These code sections address the manufacturing, inspection, testing, and certification of structural glued laminated timber, as well as 'layup', design (design value), and specification information in ANSI 117 and ASTM D3737. Structural glued laminated timber is defined in IBC Section 202. These provisions and their applications are summarized in [Table 1](#) below.

Quality Control, Accredited Inspection Agency, and Certification

As referenced by the IBC and IRC, ANSI A190.1 and AITC 200 provide requirements for the quality control and audit of manufacturer quality control system by an accredited inspection agency. The Pacific Lumber Inspection Bureau (PLIB), under the Trademark AITC, acts as the *approved agency* to conduct inspections and audits of the manufacture of binderholz Glulam and thereby certifies compliance to ANSI A190.1, thereby providing certification that the manufacture of binderholz Glulam complies with the IBC and IRC. Quality control by PLIB/AITC also ensures conformance to standards addressing appearance (AITC 110), dimensions (AITC 113), adhesives (ANSI 405), end joints (finger joints), as well as the compliance of the manufacturing process through quality control measures and statistical process control (AITC 200).

Pacific Lumber Inspection Bureau is accredited by the International Accreditation Service (IAS) to perform inspections and audits for conformity to ANSI A190.1 under the International Organization for Standardization (ISO) Standard 17020, Certificate AA-675 (Type A). A copy of this Certificate is available upon request. Specific questions on the PLIB inspection and certification program can be directed to PLIB/AITC at 253.835.3344 or info@plib.org.



Table 1: Code Provisions and References

Code Provisions	IBC Section	IRC Section	Reference Standards
Definition of Structural Glued Laminated Timber	202		
Approved Agency	202	R202	
Manufacturing, Identification, and Certification	2303.1.3	R502.1.3 R602.1.3 R802.1.2	ANSI A190.1 ANSI 117 ASTM D3737
Typical Connection Details	2306.1		AITC 104
Appearance Grades	2306.1		AITC 110
Dimensions	2306.1		AITC 113
Testing and Inspection	2306.1		AITC 200
Design Values	2306.1		ANSI 117
Structural Design	2306.1		ANSI 117, NDS

Notes:

1. Sections and Standards referenced are as in the 2018 and 2021 *International Building Code (IBC)* and 2018 and 2021 *International Residential Code (IRC)*.
2. ANSI is the American National Standards Institute, Washington, DC.
3. ASTM is International, West Conshohocken, PA.
4. American Institute of Timber Construction (AITC) is a registered trademark of the Pacific Lumber Inspection Bureau, Federal Way, WA.
5. NDS is the *National Design Specification® for Wood Construction (NDS)*, American Wood Council, Leesburg, VA.

Product Information and Specifications

Binderholz Glulam timbers are manufactured from Norway spruce lumber (laminations) and available in depths up to 85 inches (in.), widths up to 12 in., and lengths up to 100 feet (ft). Relevant specifications for bending members include the Stress Class and Combination Symbol, Balanced Layup, and the Appearance Grade. Specifications for timbers intended for use primarily in tension and compression are the Combination Symbol and the Appearance Grade. Binderholz Glulam is manufactured up to the sizes above and in custom shapes and sizes. More information on binderholz Glulam and additional products including curved beams, arches, glulam trusses, and timber decking is available on the website, or by direct inquiry to +43 5288 601. AITC Technical Note 24 may be used as a guide in specifying binderholz Glulam.

Treated Glulam

Where preservative-treated timbers are requested or required, binderholz Glulam timbers are manufactured (treated) in accordance with AITC 109 Standard for *Preservative Treatment of Structural Glued Laminated Timber* utilizing preservatives and retention levels recognized by the American Wood Protection Association (AWPA U1).

Design Information

Requirements for structural design with binderholz Glulam can be found in the *National Design Specification® for Wood Construction (NDS)* using design value information in accordance with ANSI 117 as shown in [Tables 2](#) and [Table 3](#) below. [Table 2](#) provides design values with balanced layups. [Table 3](#) provides design values for timbers with uniform layups.



Table 2: Reference Design Values For Binderholz Glued Laminated Timber¹

Balanced Layup Members (Tabular design values are for normal load duration and dry service conditions.)
(Design Values and Footnotes from ANSI 117-2020)

Combination Symbol	Species	EN 14080	All Loading							Bending About Y-Y Axis (Loaded Parallel to the Wide Faces of Laminations)			Bending About X-X Axis (Loaded Perpendicular to Wide Faces of Laminations)		Fasteners		
			Modulus of Elasticity			Compression Perpendicular to Grain	Tension Parallel to Grain	Compression Parallel to Grain		Bending			Shear Parallel to Grain ⁽¹⁾⁽²⁾⁽³⁾	Bending ⁽⁵⁾	Shear Parallel to Grain ⁽³⁾	Specific Gravity for Fastener Design	
			E_{axial} (10 ⁶ psi)	E_{xapp}	E_{yapp}	$F_{c,x}$ (psi)	2 or more Laminations F_t (psi)	4 or more Laminations F_c (psi)	2 or 3 Laminations F_c (psi)	4 or more Laminations F_{by} (psi)	3 Laminations F_{by} (psi)	2 Laminations F_{by} (psi)	F_{vy} (psi)	2 Laminations to 15 in. Deep ⁽⁴⁾ F_x (psi)	F_{vx} (psi)	Top or Bottom Face	Side Face
18F-E3	NSpr	GL28c	1.7	1.7	1.6	465	1250	1800	1700	2000	2000	2100	200	1950	225	0.42	0.39
22F-E5	NSpr	GL32c	1.8	1.9	1.7	490	1350	1850	1750	2100	2200	2300	200	2250	225	0.44	0.39

Table 2 Footnotes:

- 1) For members with 2 or 3 laminations, the shear design value for transverse loads parallel to the wide faces of the laminations, F_{vy} , shall be reduced by multiplying by a factor of 0.84 or 0.95, respectively.
- 2) The shear design value for transverse loads applied parallel to the wide faces of the laminations, F_{vy} , shall be multiplied by 0.4 for members with 5, 7, or 9 laminations manufactured from multiple pieces laminations (across width) that are not edge bonded. The shear design value, F_{vy} , shall be multiplied by 0.5 for all other members manufactured from multiple piece laminations with unbonded edge joints. This reduction shall be cumulative with the adjustment in footnotes a) and c).
- 3) The design values for shear, F_{vx} and F_{vy} , shall be decreased by multiplying by a factor of 0.72 for non-prismatic members, notched members, and for all members subject to impact or cyclic loading. The reduced design value shall be used for the design of members at connections that transfer shear by mechanical fasteners. The reduced design value shall also be used for determination of design values for radial tension and torsion.
- 4) The tabulated F_{bx} values are for members without special tension lams up to 15 inches in depth. If the member depth is greater than 15 inches without special tensions lams, the tabulated F_{bx} values must be multiplied by a factor of 0.88. Combination 22F-E5 is typically produced with tension laminations as qualified in accordance with ASTM D3737-A1.
- 5) Full size beam testing and comparative analysis suggest the use of $x = 20$ for the volume factor exponent described in ASTM D3737, Section 8.5.



Table 3: Reference Design Values For Binderholz Glued Laminated Timber¹

Uniform Grade Members (Tabular design values are for normal load duration and dry service conditions.)
 (Design Values and Footnotes based on evidence submitted in accordance with ASTM D3737))

Combination Symbol	Species	European Standard Designation	All Loading							Bending About Y-Y Axis (Loaded Parallel to the Wide Faces of Laminations)			Bending About X-X Axis (Loaded Perpendicular to Wide Faces of Laminations)		Fasteners	
			Modulus of Elasticity			Compression Perpendicular to Grain	Tension Parallel to Grain	Compression Parallel to Grain		Bending			Shear Parallel to Grain ¹⁾²⁾³⁾	Bending ⁵⁾		Shear Parallel to Grain ³⁾
			E_{axial} (10 ⁶ psi)	$E_{x,app}$ or $E_{y,app}$ (10 ⁶ psi)	$E_{x,min}$ or $E_{y,min}$ or $E_{axial,min}$ (10 ⁶ psi)	$F_{c,ax}$ (psi)	2 or more Laminations F_c (psi)	4 or more Laminations F_c (psi)	2 or 3 Laminations F_c (psi)	4 or more Laminations F_{by} (psi)	3 Laminations F_{by} (psi)	2 Laminations F_{by} (psi)	F_{vy} (psi)	2 Laminations to 15 in. Deep ⁴⁾ F_x (psi)	F_{vx} (psi)	G
100	NSpr	GL24h	1.6	1.5	0.79	400	1200	1650	1500	1900	1800	1800	200	1750	225	0.39
101	NSpr	GL28h	1.9	1.8	0.95	465	1400	2100	1900	2200	2100	2100	200	2000	225	0.42
102	NSpr	GL32h	2.0	1.9	1.00	490	1500	2300	2100	2400	2300	2300	200	2200 ⁶⁾	225	0.44

Table 2 Footnotes:

- 1) For members with 2 or 3 laminations, the shear design value for transverse loads parallel to the wide faces of the laminations, F_{vy} , shall be reduced by multiplying by a factor of 0.84 or 0.95, respectively.
- 2) The shear design value for transverse loads applied parallel to the wide faces of the laminations, F_{vy} , shall be multiplied by 0.4 for members with 5, 7, or 9 laminations manufactured from multiple pieces laminations (across width) that are not edge bonded. The shear design value, F_{vy} , shall be multiplied by 0.5 for all other members manufactured from multiple piece laminations with unbonded edge joints. This reduction shall be cumulative with the adjustment in footnotes a) and c).
- 3) The design values for shear, F_{vx} and F_{vy} , shall be decreased by multiplying by a factor of 0.72 for non-prismatic members, notched members, and for all members subject to impact or cyclic loading. The reduced design value shall be used for the design of members at connections that transfer shear by mechanical fasteners. The reduced design value shall also be used for determination of design values for radial tension and torsion.
- 4) The tabulated F_{bx} values are for members without special tension lams up to 15 inches in depth. If the member depth is greater than 15 inches without special tensions lams, the tabulated F_{bx} values must be multiplied by a factor of 0.88.
- 5) Full size beam testing and comparative analysis suggest the use of $x = 20$ for the volume factor exponent described in ASTM D3737, Section 8.5.
- 6) Combination 102 is a layup with tension laminations qualified in accordance with ASTM D3737 A1.



Fire Resistance and Fire Resistance Rated and Heavy Timber Construction

As provided in Section 722.1 of the IBC, the fire resistance of binderholz Glulam may be calculated in accordance with Chapter 16 of the *National Design Specification® for Wood Construction*. Binderholz Glulam may also be used in Heavy Timber construction in accordance with Section 2304.11 of the IBC and Section IBC Section 2304.9 (timber decking). More information on the use of Glulam timbers and decking in Fire-Resistance_Rated construction is available by direct inquiry to binderholz at +43 5288 601. AITC Technical Note 7 and the American Wood Council Technical Report 10 provide additional information on fire resistance of wood members, connections, and assemblies in general and applicable to glulam.

Installation and Construction

Proper handling, installation, connection detailing, and protection are important for the performance and longevity of structural glued laminated timbers. AITC 104 contains Typical Construction Details for glued laminated timbers. Requirements and recommendations for transit, storage, and erection of binderholz Glulam timbers may be found in AITC 111 and binderholz. Product information guides. Holes and notches in binderholz Glulam timbers may be evaluated in accordance with AITC Technical Note 19 and the NDS. Additional installation and construction requirements are provided by binderholz.

Mark

The AITC Mark on binderholz Glulam, **Figure 1**, indicates that the timbers have been produced under the AITC auditing program of the Pacific Lumber Inspection Bureau (PLIB) to conform to ANSI A190.1 in accordance with the International Building Code (IBC) and International Residential Code (IRC), and are suitable for approval for construction in buildings and other structures regulated by the IBC and IRC, as well as other regional and local codes based on the IBC and IRC. Binderholz staff stands ready to provide project-

specific assistance in the design, detailing, cost-estimating, and recommendations with regard to construction/erection of their glued laminated timbers. Binderholz may be contacted at +43 5288 601 or through their website, www.binderholz.com. AITC Technical Notes and Standards and additional information on structural glued laminated timber may be found at www.aitc-glulam.org or www.plib.org, or by contacting PLIB directly at 253.835.3344.



Figure 1 AITC Quality Mark Facsimile for binderholz. Plant P- 235

