

DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES

Section: 06 17 19—Cross-laminated Timber

REPORT HOLDER:

BINDERHOLZ BAUSYSTEME GmbH

EVALUATION SUBJECT:

BINDERHOLZ CLT BBS

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2018, 2015, 2012 and 2009 *International Building Code*® (IBC)
- 2018, 2015, 2012 and 2009 *International Residential Code*® (IRC)

For compliance with codes adopted by Los Angeles Department of Building and Safety (LADBS), see [ESR-4081 LABC and LARC Supplement](#).

Compliance with the following standards:

- ANSI/APA PRG-320-2019 Standard for Performance-Rated Cross-Laminated Timber

Property evaluated:

Structural

2.0 USES

Binderholz CLT BBS is a cross-laminated timber (CLT) panel for use as components in floors and roofs in Type I and II Construction (IBC) and in roof and floor decks in Type III (interior floor decks only), IV and V construction (IBC). The Binderholz CLT BBS panels are available in two formats, BBS 125 and BBS XL. When panels are installed under the IRC, an engineered design is required in accordance with IRC Section R301.1.3.

3.0 DESCRIPTION

3.1 General:

The Binderholz CLT BBS panels described in this evaluation report comply with requirements noted in Section 2303.1.4 of the 2018 and 2015 IBC, for allowable stress design (ASD) in accordance with 2018 IBC Section 2302.1(1) (2015, 2012 and 2009 IBC Section 2301.2(1)). Binderholz CLT BBS panels are plane timber building components which are made of at least three laminations of sawn and planed softwood lumber boards. Adjacent laminations are glued at an angle of 90°. The elements can be produced with a width up to 137.8 inches (3.5 meters) and a length of up to 72.2 feet (22 meters) in the BBS XL format, and with a width

of up to 49.2 inches (1.25 meters) and a length of up to 65.6 feet (20 meters) in BBS 125 format. The BBS 125 format is for use in the major strength direction only, and fabricated with large finger joints. The Binderholz CLT BBS panels are manufactured by face-bonding each layer using a formaldehyde-free, polyurethane-based structural adhesive. The laminations for CLT BBS may be edge-bonded by a mixture of melamine urea formaldehyde-based glue and hot melt glue. The layers are placed in a press to form a dimensionally stable structural element. Refer to Tables 2 and 3 for the grade and layup designations of Binderholz CLT BBS panels. Figures 1 and 2 depict the Binderholz CLT BBS 125 and BBS XL panel and section structure. Figures 4 and 5 depict example applications of the Binderholz CLT BBS 125 and BBS XL panels.

3.2 Material:

3.2.1 Wood Laminations: Wood laminations used in manufacturing Binderholz CLT BBS panels must be sawn lumber complying with the report holder's approved quality documentation. ASD reference design properties for the wood laminations are equivalent to SPF Structural Select lumber grade referenced in the NDS. See Table 1. The minimum specific gravity is 0.42.

3.2.2 Adhesives: Adhesive used to face-bond layers of Binderholz CLT BBS panels and adhesive used for finger-joints of wood laminations are one-component polyurethane based, exterior-type structural adhesives, conforming to ANSI/APA PRG-320-2019 and the product specifications in the approved quality documentation

4.0 DESIGN AND INSTALLATION

4.1 General:

Design and installation of Binderholz CLT BBS panels must be in accordance with this evaluation report, the applicable code provisions and the manufacturer's published design and installation instructions. The manufacturer's design and installation instructions must be available at the jobsite at all times during installation. The requirements specified for allowable stress design in accordance with 2018 IBC Section 2302.1(1) (2015, 2012 and 2009 IBC Section 2301.2(1)), and Chapter 10 of the 2018 or 2015 NDS, are applicable to Binderholz CLT BBS panels.

4.2 Reference Design Values:

Tables 4 through 7 provide, respectively, reference design values for bending capacities and in-plane shear capacities of Binderholz CLT BBS panels. The reference design values in Tables 4 and 7 are intended for allowable stress design (ASD) and must be adjusted in accordance with Section 4.3 of this evaluation report.

4.3 Adjustment Factors:

The reference design values in Tables 4 through 7 must be adjusted using the adjustment factors specified in Table 10.3.1 of the 2018 or 2015 NDS. The reference design values in Tables 6 and 7 must not be increased for the lumber size adjustment factor in accordance with NDS. The time dependent deformation (creep) factor, K_{cr} , of 2.0, as specified in Section 3.5.2 of the NDS must be used to calculate the total deflection due to long-term loading for Binderholz CLT BBS panels used as components in floor and roof decks under dry service condition where the moisture content in lumber in service is less than 16 percent, as in most covered structures.

4.4 Fire Resistance:

When fire resistance is required, the fire resistance for the exposed Binderholz CLT BBS panels must be determined by calculation in accordance with Chapter 16 of the 2018 or 2015 NDS. As an alternative to the NDS calculation, the Binderholz CLT BBS panels must be tested in accordance with ASTM E119 and must be rated for fire resistance in accordance with the test results and conditions of such tests.

5.0 CONDITIONS OF USE

The Binderholz CLT BBS described in this report comply with, or are suitable alternatives to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

- 5.1 Fabrication, design, and installation must comply with this evaluation report and the manufacturer’s published design and installation instructions. In the event of a conflict between the manufacturer’s published design and installation instructions and this evaluation report, the more restrictive requirements govern.
- 5.2 Use of Binderholz CLT BBS panels must be limited to dry service conditions where the moisture content in lumber in service is less than 16 percent, as in most covered structures.
- 5.3 Calculations and drawings demonstrating compliance with this evaluation report must be submitted to the code official. The calculations and drawings must be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.
- 5.4 Connections between wall panels and roof/floor panels, and other support members shall be accompanied by complete detailing and design that are satisfactory to the code official. Fasteners and connectors must be properly specified, including size, length, dimension, fastener bearing length and location. Connections must be designed in accordance with the mechanical connection provisions in NDS or proprietary connectors and fasteners recognized in a current ICC-ES evaluation report.

- 5.5 Cutting, drilling, and notching of Binderholz CLT BBS panels when used as components in floor and roof decks have not been evaluated and are outside the scope of this evaluation report.
- 5.6 The in-plane shear values for Binderholz CLT BBS panels listed in Tables 6 and 7 are applicable for in-plane shear design of the CLT panels used in roof diaphragms, and floor diaphragms. The complete diaphragm designs have not been evaluated and are outside the scope of this evaluation report.
- 5.7 Binderholz CLT BBS panels used to resist in-plane shear forces in floor and roof diaphragms must be accompanied by complete detailing and diaphragm design that are acceptable to the code official.
- 5.8 Binderholz CLT BBS panels used to resist out-of-plane transverse forces in walls must be accompanied by complete detailing and wall design that are acceptable to the code official.
- 5.9 Binderholz CLT BBS panel roof decks must be covered with approved roof coverings secured to the building or structure in accordance with applicable provisions of IBC Chapter 15.
- 5.10 Special inspection must be conducted in accordance with the applicable requirements of Sections 1704 and 1705 of the IBC.
- 5.11 Binderholz CLT BBS panels may be used as components in floor and roof decks under the IRC when an engineered design is submitted in accordance with Section R301.1.3. Binderholz CLT BBS panels are fabricated in Burgbernheim, Germany and Unternberg, Austria, under a quality-control program with inspections by ICC-ES.

6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Cross-laminated Timber Panels for Use as Components in Walls, Floors and Roofs (AC455), dated February 2019 (editorially revised June 2020).

7.0 IDENTIFICATION

- 7.1 Binderholz CLT BBS panels are identified with stamps noting the Binderholz Bausysteme GmbH name or logo (Figure 3), product layout and designation, production date and shift, and ICC-ES evaluation report number (ESR-4081).
- 7.2 The report holder’s contact information is the following:

BINDERHOLZ BAUSYSTEME GMBH
ZILLERTALSTRASSE 39
FÜGEN, TIROL 6263
AUSTRIA
+43 6245 70500
www.binderholz.com

TABLE 1—ASD REFERENCE DESIGN VALUES FOR LUMBER LAMINATIONS USED IN BINDERHOLZ CLT BBS ¹

| CLT Grade | Laminations Used in Major Strength Direction (psi) | | | | | | Laminations Used in Minor Strength Direction (psi) | | | | | |
|-----------|--|-----------------------------------|----------------|----------------|----------------|----------------|--|----------------------|----------------|----------------|----------------|----------------|
| | F _b | E ₀ (10 ⁶) | F _t | F _c | F _v | F _s | F _b | E (10 ⁶) | F _t | F _c | F _v | F _s |
| BBS 125 | 1,250 | 1.5 | 700 | 1,400 | 135 | 45 | 1,250 | 1.5 | 700 | 1,400 | 135 | 45 |
| BBS XL | 1,250 | 1.5 | 700 | 1,400 | 135 | 45 | 1,250 | 1.5 | 700 | 1,400 | 135 | 45 |

For SI: 1 psi = 6,895 Pa

¹Tabulated values are allowable design values and are not permitted to be increased for the lumber size adjustment factor in accordance with the NDS. The design values must be used in conjunction with the section properties based on the actual layout used in manufacturing the CLT panel. See Tables 4 and 5.

TABLE 2—BINDERHOLZ CLT BBS 125 PANEL LAYUPS

| BBS 125 LAYUP ¹ | CLT THICKNESS t_p ² | | LAMINATION ACTUAL THICKNESS ³ | | | | | | |
|----------------------------|----------------------------------|-------|--|------|------|------|-----------|------|-----------|
| | | | | ⊥ | | ⊥ | | ⊥ | |
| 60-3s | [mm] | 60 | 20 | 20 | 20 | | | | |
| | [in] | 2.36 | 0.79 | 0.79 | 0.79 | | | | |
| 80-3s | [mm] | 80 | 20 | 40 | 20 | | | | |
| | [in] | 3.15 | 0.79 | 1.57 | 0.79 | | | | |
| 90-3s | [mm] | 90 | 30 | 30 | 30 | | | | |
| | [in] | 3.54 | 1.18 | 1.18 | 1.18 | | | | |
| 100-3s | [mm] | 100 | 35 | 30 | 35 | | | | |
| | [in] | 3.94 | 1.38 | 1.18 | 1.38 | | | | |
| 120-3s | [mm] | 120 | 40 | 40 | 40 | | | | |
| | [in] | 4.72 | 1.57 | 1.57 | 1.57 | | | | |
| 100-5s | [mm] | 100 | 20 | 20 | 20 | 20 | 20 | | |
| | [in] | 3.94 | 0.79 | 0.79 | 0.79 | 0.79 | 0.79 | | |
| 120-5s | [mm] | 120 | 20 | 30 | 20 | 30 | 20 | | |
| | [in] | 4.72 | 0.79 | 1.18 | 0.79 | 1.18 | 0.79 | | |
| 140-5s | [mm] | 140 | 40 | 20 | 20 | 20 | 40 | | |
| | [in] | 5.51 | 1.57 | 0.79 | 0.79 | 0.79 | 1.57 | | |
| 140-5s-2 | [mm] | 140 | 20+20 | 20 | 20 | 20 | 40 | | |
| | [in] | 5.51 | 0.79+0.79 | 0.79 | 0.79 | 0.79 | 1.57 | | |
| 140-5s-3 | [mm] | 140 | 20+20 | 20 | 20 | 20 | 20+20 | | |
| | [in] | 5.51 | 0.79+0.79 | 0.79 | 0.79 | 0.79 | 0.79+0.79 | | |
| 150-5s | [mm] | 150 | 40 | 20 | 30 | 20 | 40 | | |
| | [in] | 5.91 | 1.57 | 0.79 | 1.18 | 0.79 | 1.57 | | |
| 150-5s-2 | [mm] | 150 | 20+20 | 20 | 30 | 20 | 40 | | |
| | [in] | 5.91 | 0.79+0.79 | 0.79 | 1.18 | 0.79 | 1.57 | | |
| 150-5s-3 | [mm] | 150 | 20+20 | 20 | 30 | 20 | 20+20 | | |
| | [in] | 5.91 | 0.79+0.79 | 0.79 | 1.18 | 0.79 | 0.79+0.79 | | |
| 160-5s | [mm] | 160 | 40 | 20 | 40 | 20 | 40 | | |
| | [in] | 6.30 | 1.57 | 0.79 | 1.57 | 0.79 | 1.57 | | |
| 160-5s-2 | [mm] | 160 | 20+20 | 20 | 40 | 20 | 40 | | |
| | [in] | 6.30 | 0.79+0.79 | 0.79 | 1.57 | 0.79 | 1.57 | | |
| 160-5s-3 | [mm] | 160 | 20+20 | 20 | 40 | 20 | 20+20 | | |
| | [in] | 6.30 | 0.79+0.79 | 0.79 | 1.57 | 0.79 | 0.79+0.79 | | |
| 180-5s | [mm] | 180 | 40 | 30 | 40 | 30 | 40 | | |
| | [in] | 7.09 | 1.57 | 1.18 | 1.57 | 1.18 | 1.57 | | |
| 180-5s-2 | [mm] | 180 | 20+20 | 30 | 40 | 30 | 40 | | |
| | [in] | 7.09 | 0.79+0.79 | 1.18 | 1.57 | 1.18 | 1.57 | | |
| 180-5s-3 | [mm] | 180 | 20+20 | 30 | 40 | 30 | 20+20 | | |
| | [in] | 7.09 | 0.79+0.79 | 1.18 | 1.57 | 1.18 | 0.79+0.79 | | |
| 200-5s | [mm] | 200 | 40 | 40 | 40 | 40 | 40 | | |
| | [in] | 7.87 | 1.57 | 1.57 | 1.57 | 1.57 | 1.57 | | |
| 200-5s-2 | [mm] | 200 | 20+20 | 40 | 40 | 40 | 40 | | |
| | [in] | 7.87 | 0.79+0.79 | 1.57 | 1.57 | 1.57 | 1.57 | | |
| 200-5s-3 | [mm] | 200 | 20+20 | 40 | 40 | 40 | 20+20 | | |
| | [in] | 7.87 | 0.79+0.79 | 1.57 | 1.57 | 1.57 | 0.79+0.79 | | |
| 220-5s | [mm] | 220 | 20+40 | 30 | 40 | 30 | 40+20 | | |
| | [in] | 8.66 | 0.79+1.57 | 1.18 | 1.57 | 1.18 | 1.57+0.79 | | |
| 240-5s | [mm] | 240 | 20+40 | 40 | 40 | 40 | 40+20 | | |
| | [in] | 9.45 | 0.79+1.57 | 1.57 | 1.57 | 1.57 | 1.57+0.79 | | |
| 260-7s | [mm] | 260 | 20+40 | 20 | 40 | 20 | 40 | 20 | 40+20 |
| | [in] | 10.24 | 0.79+1.57 | 0.79 | 1.57 | 0.79 | 1.57 | 0.79 | 1.57+0.79 |
| 280-7s | [mm] | 280 | 20+40 | 40 | 20 | 40 | 20 | 40 | 40+20 |
| | [in] | 11.02 | 0.79+1.57 | 1.57 | 0.79 | 1.57 | 0.79 | 1.57 | 1.57+0.79 |

For SI: 1 in. = 25.4 mm

¹The panel layouts are developed based on the ANSI/APA PRG 320, using visually graded sawn lumber noted in Section 3.2.1 of the evaluation report.

²Gross thickness of CLT panels.

³Actual thickness of lamination after planing. “||”: Face laminations are oriented parallel to the major strength direction and “⊥”: Face laminations are oriented perpendicular to the major strength direction.

TABLE 3—BINDERHOLZ CLT BBS XL PANEL LAYUPS

| BBS XL LAYUP ¹ | CLT THICKNESS t _p ² | | LAMINATION ACTUAL THICKNESS ³ | | | | | | |
|---------------------------|---|-------|--|------|------|------|-----------|------|------|
| | | | | ⊥ | | ⊥ | | ⊥ | |
| 60-3s | [mm] | 60 | 20 | 20 | 20 | | | | |
| | [in] | 2.36 | 0.79 | 0.79 | 0.79 | | | | |
| 80-3s | [mm] | 80 | 20 | 40 | 20 | | | | |
| | [in] | 3.15 | 0.79 | 1.57 | 0.79 | | | | |
| 90-3s | [mm] | 90 | 30 | 30 | 30 | | | | |
| | [in] | 3.54 | 1.18 | 1.18 | 1.18 | | | | |
| 100-3s | [mm] | 100 | 35 | 30 | 35 | | | | |
| | [in] | 3.94 | 1.38 | 1.18 | 1.38 | | | | |
| 120-3s | [mm] | 120 | 40 | 40 | 40 | | | | |
| | [in] | 4.72 | 1.57 | 1.57 | 1.57 | | | | |
| 100-5s | [mm] | 100 | 20 | 20 | 20 | 20 | 20 | | |
| | [in] | 3.94 | 0.79 | 0.79 | 0.79 | 0.79 | 0.79 | | |
| 120-5s | [mm] | 120 | 20 | 30 | 20 | 30 | 20 | | |
| | [in] | 4.72 | 0.79 | 1.18 | 0.79 | 1.18 | 0.79 | | |
| 140-5s | [mm] | 140 | 40 | 20 | 20 | 20 | 40 | | |
| | [in] | 5.51 | 1.57 | 0.79 | 0.79 | 0.79 | 1.57 | | |
| 140-5s-2 | [mm] | 140 | 20+20 | 20 | 20 | 20 | 40 | | |
| | [in] | 5.51 | 0.79+0.79 | 0.79 | 0.79 | 0.79 | 1.57 | | |
| 140-5s-3 | [mm] | 140 | 20+20 | 20 | 20 | 20 | 20+20 | | |
| | [in] | 5.51 | 0.79+0.79 | 0.79 | 0.79 | 0.79 | 0.79+0.79 | | |
| 160-5s | [mm] | 160 | 40 | 20 | 40 | 20 | 40 | | |
| | [in] | 6.30 | 1.57 | 0.79 | 1.57 | 0.79 | 1.57 | | |
| 160-5s-2 | [mm] | 160 | 20+20 | 20 | 40 | 20 | 40 | | |
| | [in] | 6.30 | 0.79+0.79 | 0.79 | 1.57 | 0.79 | 1.57 | | |
| 160-5s-3 | [mm] | 160 | 20+20 | 20 | 40 | 20 | 20+20 | | |
| | [in] | 6.30 | 0.79+0.79 | 0.79 | 1.57 | 0.79 | 0.79+0.79 | | |
| 180-5s | [mm] | 180 | 40 | 30 | 40 | 30 | 40 | | |
| | [in] | 7.09 | 1.57 | 1.18 | 1.57 | 1.18 | 1.57 | | |
| 180-5s-2 | [mm] | 180 | 20+20 | 30 | 40 | 30 | 40 | | |
| | [in] | 7.09 | 0.79+0.79 | 1.18 | 1.57 | 1.18 | 1.57 | | |
| 180-5s-3 | [mm] | 180 | 20+20 | 30 | 40 | 30 | 20+20 | | |
| | [in] | 7.09 | 0.79+0.79 | 1.18 | 1.57 | 1.18 | 0.79+0.79 | | |
| 200-5s | [mm] | 200 | 40 | 40 | 40 | 40 | 40 | | |
| | [in] | 7.87 | 1.57 | 1.57 | 1.57 | 1.57 | 1.57 | | |
| 200-5s-2 | [mm] | 200 | 20+20 | 40 | 40 | 40 | 40 | | |
| | [in] | 7.87 | 0.79+0.79 | 1.57 | 1.57 | 1.57 | 1.57 | | |
| 200-5s-3 | [mm] | 200 | 20+20 | 40 | 40 | 40 | 20+20 | | |
| | [in] | 7.87 | 0.79+0.79 | 1.57 | 1.57 | 1.57 | 0.79+0.79 | | |
| 220-5s | [mm] | 220 | 20+40 | 30 | 40 | 30 | 40+20 | | |
| | [in] | 8.66 | 0.79+1.57 | 1.18 | 1.57 | 1.18 | 1.57+0.79 | | |
| 240-5s | [mm] | 240 | 20+40 | 40 | 40 | 40 | 40+20 | | |
| | [in] | 9.45 | 0.79+1.57 | 1.57 | 1.57 | 1.57 | 1.57+0.79 | | |
| 260-5s | [mm] | 260 | 40+40 | 30 | 40 | 30 | 40+40 | | |
| | [in] | 10.24 | 1.57+1.57 | 1.18 | 1.57 | 1.18 | 1.57+1.57 | | |
| 280-7s | [mm] | 280 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| | [in] | 11.02 | 1.57 | 1.57 | 1.57 | 1.57 | 1.57 | 1.57 | 1.57 |

For SI: 1 in. = 25.4 mm

¹The panel layups are developed based on the ANSI/APA PRG 320, using visually graded sawn lumber noted in Section 3.2.1 of the evaluation report.

²Gross thickness of CLT panels.

³Actual thickness of lamination after planing. “||”: Face laminations are oriented parallel to the major strength direction and “⊥”: Face laminations are oriented perpendicular to the major strength direction.

TABLE 4—REFERENCE DESIGN VALUES FOR BINDERHOLZ CLT BBS 125 PANELS^{1,3}

| CLT LAYUP ² | CLT PANEL THICKNESS (in) | MAJOR STRENGTH DIRECTION WITHOUT LARGE FINGER JOINTS | | | | MAJOR STRENGTH DIRECTION WITH LARGE FINGER JOINTS | | | |
|--------------------------------|--------------------------|--|---|--|------------------------------------|---|---|--|------------------------------------|
| | | $(F_b S)_{eff,f,0}$ (lb _f -ft/ft) | $(EI)_{eff,f,0}$ (x10 ⁶ lb _f - in. ² /ft) | $(GA)_{eff,f,0}$ (x10 ⁶ lb _f /ft) | $V_{s,0}$ (lb _f /ft) | $(F_b S)_{eff,f,0}$ (lb _f -ft/ft) | $(EI)_{eff,f,0}$ (x10 ⁶ lb _f - in. ² /ft) | $(GA)_{eff,f,0}$ (x10 ⁶ lb _f /ft) | $V_{s,0}$ (lb _f /ft) |
| 60-3s | 2.36 | 953 | 19.1 | 0.32 | 850 | 715 | 19.1 | 0.32 | 850 |
| 80-3s | 3.15 | 1,544 | 41.2 | 0.38 | 1,134 | 1,158 | 41.2 | 0.38 | 1,134 |
| 90-3s | 3.54 | 2,144 | 64.3 | 0.48 | 1,276 | 1,608 | 64.3 | 0.48 | 1,276 |
| 100-3s | 3.94 | 2,673 | 89.1 | 0.56 | 1,417 | 2,005 | 89.1 | 0.56 | 1,417 |
| 120-3s | 4.72 | 3,811 | 152.5 | 0.64 | 1,701 | 2,858 | 152.5 | 0.64 | 1,701 |
| 100-5s | 3.94 | 2,193 | 73.1 | 0.64 | 1,417 | 1,645 | 73.1 | 0.64 | 1,417 |
| 120-5s | 4.72 | 2,838 | 113.6 | 0.69 | 1,701 | 2,129 | 113.6 | 0.69 | 1,701 |
| 140-5s 140-5s-2 140-5s-3 | 5.51 | 4,986 | 232.8 | 0.96 | 1,984 | 3,739 | 232.8 | 0.96 | 1,984 |
| 150-5s 150-5s-2 150-5s-3 | 5.91 | 5,617 | 281 | 1.14 | 2,126 | 4,213 | 281.0 | 1.14 | 2,126 |
| 160-5s 160-5s-2 160-5s-3 | 6.30 | 6,284 | 335.3 | 1.33 | 2,268 | 4,713 | 335.3 | 1.33 | 2,268 |
| 180-5s 180-5s-2 180-5s-3 | 7.09 | 7,513 | 451 | 1.28 | 2,551 | 5,635 | 451.0 | 1.28 | 2,551 |
| 200-5s 200-5s-2 200-5s-3 | 7.87 | 8,772 | 585 | 1.29 | 2,835 | 6,579 | 585.0 | 1.29 | 2,835 |
| 220-5s | 8.66 | 12,156 | 891.80 | 1.62 | 3,118 | 9,117 | 891.8 | 1.62 | 3,118 |
| 240-5s | 9.45 | 13,970 | 1,118.2 | 1.59 | 3,402 | 10,478 | 1,118.2 | 1.59 | 3,402 |
| 260-7s | 10.24 | 16,767 | 1,454.0 | 2.39 | 3,685 | 12,575 | 1,454.0 | 2.39 | 3,685 |
| 280-7s | 11.02 | 18,062 | 1,687.0 | 1.65 | 3,969 | 13,547 | 1,687.0 | 1.65 | 3,969 |

For SI: 1 in. = 25.4 mm; 1 ft. = 304.8 mm; 1 lb_f = 4.448 N

¹The tabulated values are reference design values intended for Allowable Stress Design (ASD) and must be adjusted in accordance with Section 4.2.

²The CLT layouts are developed based on the ANSI/APA PRG 320, using visually graded sawn lumber noted in Section 3.2.1 of the evaluation report.

³Binderholz CLT BBS 125 panels are only used in the major strength direction.

TABLE 5—REFERENCE DESIGN VALUES FOR BINDERHOLZ CLT BBS XL PANELS¹

| CLT LAYUP ² | CLT PANEL THICKNESS (in) | MAJOR STRENGTH DIRECTION | | | | MINOR STRENGTH DIRECTION | | | |
|--------------------------------|--------------------------|---|---|--|------------------------------------|--|--|---|-------------------------------------|
| | | $(F_b S)_{eff,f,0}$ (lb _f -ft/ft) | $(EI)_{eff,f,0}$ (x10 ⁶ lb _f - in. ² /ft) | $(GA)_{eff,f,0}$ (x10 ⁶ lb _f /ft) | $V_{s,0}$ (lb _f /ft) | $(F_b S)_{eff,f,90}$ (lb _f -ft/ft) | $(EI)_{eff,f,90}$ (x10 ⁶ lb _f - in. ² /ft) | $(GA)_{eff,f,90}$ (x10 ⁶ lb _f /ft) | $V_{s,90}$ (lb _f /ft) |
| 60-3s | 2.36 | 953 | 19.1 | 0.32 | 850 | 129 | 0.7 | 0.32 | 283 |
| 80-3s | 3.15 | 1,544 | 41.2 | 0.38 | 1,134 | 517 | 5.9 | 0.66 | 567 |
| 90-3s | 3.54 | 2,144 | 64.3 | 0.48 | 1,276 | 291 | 2.5 | 0.48 | 425 |
| 100-3s | 3.94 | 2,673 | 89.1 | 0.56 | 1,417 | 291 | 2.5 | 0.49 | 425 |
| 120-3s | 4.72 | 3,811 | 152.5 | 0.64 | 1,701 | 517 | 5.9 | 0.64 | 567 |
| 100-5s | 3.94 | 2,193 | 73.1 | 0.64 | 1,417 | 1,121 | 19.1 | 0.64 | 850 |
| 120-5s | 4.72 | 2,838 | 113.6 | 0.69 | 1,701 | 2,035 | 46.2 | 0.96 | 1,134 |
| 140-5s 140-5s-2 140-5s-3 | 5.51 | 4,986 | 232.8 | 0.96 | 1,984 | 1,121 | 19.1 | 0.69 | 850 |
| 160-5s 160-5s-2 160-5s-3 | 6.30 | 6,284 | 335.3 | 1.33 | 2,268 | 1,817 | 41.2 | 0.76 | 1,134 |
| 180-5s 180-5s-2 180-5s-3 | 7.09 | 7,513 | 451 | 1.28 | 2,551 | 3,029 | 85.9 | 1.01 | 1,417 |
| 200-5s 200-5s-2 200-5s-3 | 7.87 | 8,772 | 585 | 1.29 | 2,835 | 4,484 | 152.5 | 1.29 | 1,701 |
| 220-5s | 8.66 | 12,156 | 891.8 | 1.62 | 3,118 | 3,029 | 85.9 | 1.07 | 1,417 |
| 240-5s | 9.45 | 13,970 | 1,118.2 | 1.59 | 3,402 | 4,484 | 152.5 | 1.33 | 1,701 |
| 260-5s | 10.24 | 17,600 | 1,526.0 | 1.99 | 3,685 | 3,029 | 85.9 | 1.14 | 1,417 |
| 280-7s | 11.02 | 15,515 | 1,448.8 | 1.93 | 3,969 | 10,320 | 585.0 | 1.93 | 2,835 |

For SI: 1 in. = 25.4 mm; 1 ft. = 304.8 mm; 1 lb_f = 4.448 N

¹The tabulated values are reference design values intended for Allowable Stress Design (ASD) and must be adjusted in accordance with Section 4.2.

²The CLT layups are developed based on the ANSI/APA PRG 320, using visually graded sawn lumber noted in Section 3.2.1 of the evaluation report.

TABLE 6—REFERENCE DESIGN VALUES FOR IN-PLANE SHEAR OF THE BINDERHOLZ CLT BBS 125 PANELS¹

| CLT LAYUP ⁵ | CLT PANEL THICKNESS t_p (in) | FACE LAMINATION ORIENTATION ² (psi) | | FACE LAMINATION ORIENTATION ³ (lb/ft of width) | |
|--------------------------------|--------------------------------|--|----------------|---|----------------|
| | | ⁴ | ⊥ ⁴ | ⁴ | ⊥ ⁴ |
| 60-3s | 2.36 | - | 235 | - | 6,700 |
| 80-3s | 3.15 | - | 235 | - | 8,900 |
| 90-3s | 3.54 | - | 235 | - | 10,000 |
| 100-3s | 3.94 | - | 235 | - | 11,100 |
| 120-3s | 4.72 | - | 235 | - | 13,300 |
| 100-5s | 3.94 | - | 235 | - | 11,100 |
| 120-5s | 4.72 | - | 235 | - | 13,300 |
| 140-5s 140-5s-2 140-5s-3 | 5.51 | - | 235 | - | 15,500 |
| 150-5s 150-5s-2 150-5s-3 | 5.91 | - | 235 | - | 16,700 |
| 160-5s 160-5s-2 160-5s-3 | 6.30 | - | 235 | - | 17,800 |
| 180-5s 180-5s-2 180-5s-3 | 7.09 | - | 235 | - | 20,000 |
| 200-5s 200-5s-2 200-5s-3 | 7.87 | - | 235 | - | 22,200 |
| 220-5s | 8.66 | - | 235 | - | 24,400 |
| 240-5s | 9.45 | - | 235 | - | 26,600 |
| 260-7s | 10.24 | - | 235 | - | 28,900 |
| 280-7s | 11.02 | - | 235 | - | 31,100 |

For SI: 1 psi = 6,895 Pa

¹The tabulated values are reference design values intended for Allowable Stress Design (ASD).

²The tabulated values are ASD reference edgewise shear stress of CLT in the major strength direction ($F_{v,e,0}$) and minor strength direction ($F_{v,e,90}$).

³The tabulated values are ASD reference edgewise shear capacity of the full thickness of the CLT in the major strength direction ($F_{v,e,0} t_p$) and minor strength direction ($F_{v,e,90} t_p$). The values shall be reduced when the CLT panel thickness is less than the full thickness of the CLT panels (t_p) specified in Table 2.

⁴“||” indicates the loads applied parallel to the major strength direction of the CLT. “⊥” indicates the loads applied perpendicular to the major strength direction of the CLT.

⁵The CLT layups are developed based on the ANSI/APA PRG 320, using visually graded sawn lumber noted in Section 3.2.1 of the evaluation report.

TABLE 7—REFERENCE DESIGN VALUES FOR IN-PLANE SHEAR OF THE BINDERHOLZ CLT BBS XL PANELS¹

| CLT LAYUP ⁵ | CLT PANEL THICKNESS t_p (in) | FACE LAMINATION ORIENTATION ² (psi) | | FACE LAMINATION ORIENTATION ³ (lb/ft of width) | |
|--------------------------------|--------------------------------|--|----------------|---|----------------|
| | | ⁴ | ⊥ ⁴ | ⁴ | ⊥ ⁴ |
| 60-3s | 2.36 | 155 | 240 | 4,400 | 6,800 |
| 80-3s | 3.15 | 155 | 240 | 5,900 | 9,100 |
| 90-3s | 3.54 | 155 | 240 | 6,600 | 10,200 |
| 100-3s | 3.94 | 155 | 240 | 7,300 | 11,300 |
| 120-3s | 4.72 | 155 | 240 | 8,800 | 13,600 |
| 100-5s | 3.94 | 155 | 240 | 7,300 | 11,300 |
| 120-5s | 4.72 | 155 | 240 | 8,800 | 13,600 |
| 140-5s 140-5s-2 140-5s-3 | 5.51 | 155 | 240 | 10,300 | 15,900 |
| 160-5s 160-5s-2 160-5s-3 | 6.30 | 155 | 240 | 11,700 | 18,100 |
| 180-5s 180-5s-2 180-5s-3 | 7.09 | 155 | 240 | 13,200 | 20,400 |
| 200-5s 200-5s-2 200-5s-3 | 7.87 | 155 | 240 | 14,600 | 22,700 |
| 220-5s | 8.66 | 155 | 240 | 16,100 | 24,900 |
| 240-5s | 9.45 | 155 | 240 | 17,600 | 27,200 |
| 260-5s | 10.24 | 155 | 240 | 19,000 | 29,500 |
| 280-7s | 11.02 | 155 | 240 | 20,500 | 31,700 |

For SI: 1 psi = 6,895 Pa

¹The tabulated values are reference design values intended for Allowable Stress Design (ASD).

²The tabulated values are ASD reference edgewise shear stress of CLT in the major strength direction ($F_{v,e,0}$) and minor strength direction ($F_{v,e,90}$).

³The tabulated values are ASD reference edgewise shear capacity of the full thickness of the CLT in the major strength direction ($F_{v,e,0} t_p$) and minor strength direction ($F_{v,e,90} t_p$). The values shall be reduced when the CLT panel thickness is less than the full thickness of the CLT panels (t_p) specified in Table 3.

⁴“||” indicates the loads applied parallel to the major strength direction of the CLT. “⊥” indicates the loads applied perpendicular to the major strength direction of the CLT.

⁵The CLT layups are developed based on the ANSI/APA PRG 320, using visually graded sawn lumber noted in Section 3.2.1 of the evaluation report.

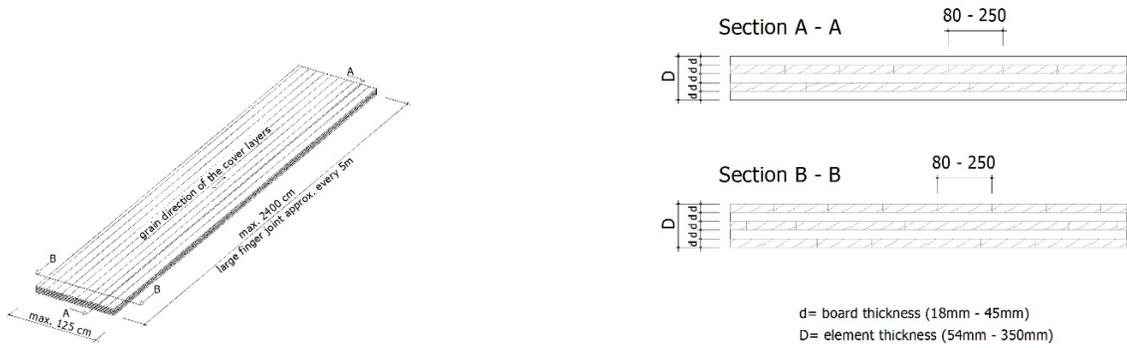


FIGURE 1—BINDERHOLZ CLT BBS 125 PANEL AND SECTION STRUCTURE

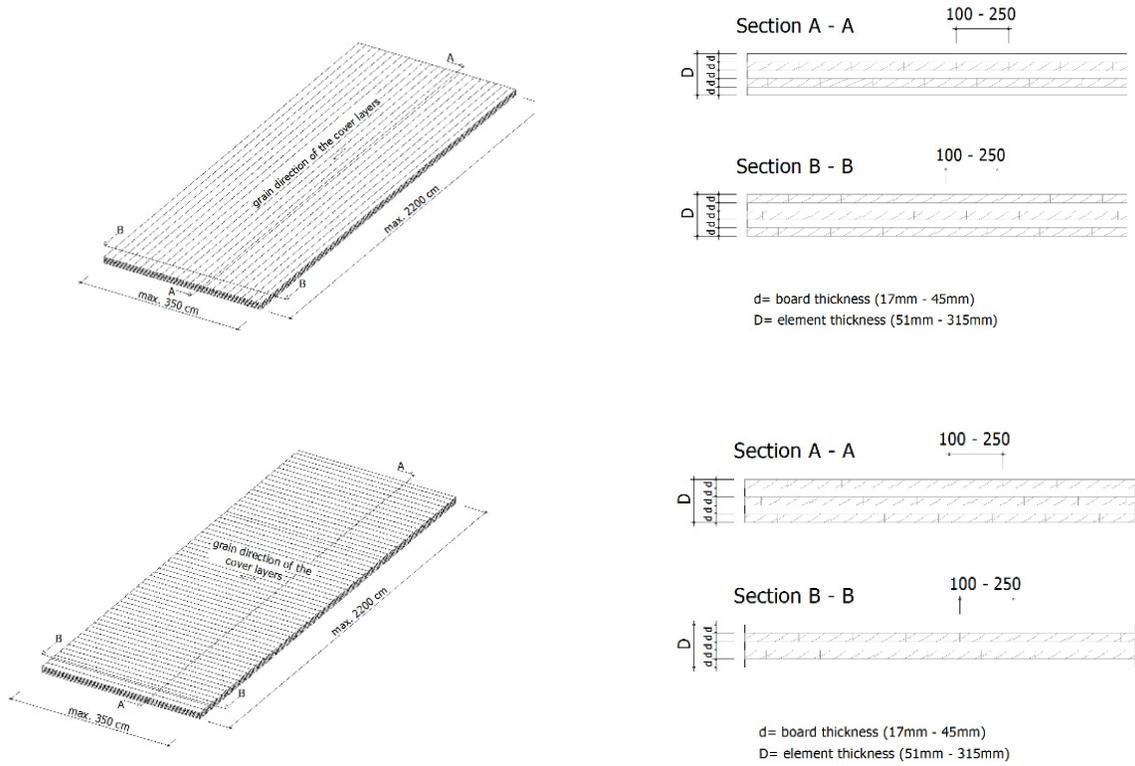


FIGURE 2—BINDERHOLZ CLT BBS XL PANEL AND SECTION STRUCTURE



FIGURE 3—COMPANY LOGO FOR BINDERHOLZ BAUSYSTEME GMBH



FIGURE 4—EXAMPLE OF BINDERHOLZ CLT BBS 125 STANDARD FORMAT



FIGURE 5—EXAMPLE OF BINDERHOLZ CLT BBS XL STANDARD FORMAT

DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES
Section: 06 17 19—Cross-laminated Timber

REPORT HOLDER:

BINDERHOLZ BAUSYSTEME GMBH

EVALUATION SUBJECT:

BINDERHOLZ CLT BBS

1.0 REPORT PURPOSE AND SCOPE**Purpose:**

The purpose of this evaluation report supplement is to indicate that the Binderholz CLT BBS, described in ICC-ES evaluation report [ESR-4081](#), has also been evaluated for compliance with the codes noted below as adopted by the Los Angeles Department of Building and Safety (LADBS).

Applicable code editions:

- 2020 *City of Los Angeles Building Code* (LABC)
- 2020 *City of Los Angeles Residential Code* (LARC)

2.0 CONCLUSIONS

The Binderholz CLT BBS, described in Sections 2.0 through 7.0 of the evaluation report [ESR-4081](#), complies with the LABC Chapters 6 and 23, and the LARC, and is subject to the conditions of use described in this supplement.

3.0 CONDITIONS OF USE

The Binderholz CLT BBS described in this evaluation report supplement must comply with all of the following conditions:

- All applicable sections in the evaluation report [ESR-4081](#).
- The design, installation, conditions of use and identification of the Binderholz CLT BBS is in accordance with the 2018 *International Building Code*® (IBC) provisions noted in the evaluation report [ESR-4081](#).
- The design, installation and inspection are in accordance with additional requirements of LABC Chapters 16 and 17, as applicable.
- Under the LARC, an engineered design in accordance with LARC Section R301.1.3 must be submitted.

This supplement expires concurrently with the evaluation report, issued June 2020 and revised November 19, 2020.

DIVISION: 06 00 00—WOOD, PLASTIC AND COMPOSITES
Section: 06 17 19—Cross-laminated Timber

REPORT HOLDER:

BINDERHOLZ BAUSYSTEME GMBH

EVALUATION SUBJECT:

BINDERHOLZ CLT BBS

1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that the Binderholz CLT BBS, described in ICC-ES evaluation report ESR-4081, has also been evaluated for compliance with the code(s) noted below.

Applicable code editions:

- 2019 *California Building Code* (CBC)

For evaluation of applicable chapters adopted by the California Office of Statewide Health Planning and Development (OSHPD) and Division of State Architect (DSA), see Sections 2.1.1 and 2.1.2 below.

- 2019 *California Residential Code* (CRC)

2.0 CONCLUSIONS

2.1 CBC:

The Binderholz CLT BBS, described in Sections 2.0 through 7.0 of the evaluation report ESR-4081, complies with CBC Chapters 6 and 23, provided the design and installation are in accordance with the 2018 *International Building Code*® (IBC) provisions noted in the evaluation report and the additional requirements of the CBC Chapters 6, 16, 17 and 23, as applicable.

The Binderholz CLT BBS have not been evaluated under Chapter 7A for use in the exterior design and construction of new buildings located in a Fire Hazard Severity Zone within State Responsibility Areas or any Wildland–Urban Interface Fire Area.

The products described in this supplement have not been evaluated for compliance with the *International Wildland–Urban Interface Code*®.

2.1.1 OSHPD: The applicable OSHPD Sections of the CBC are beyond the scope of this supplement.

2.1.2 DSA: The applicable DSA Sections of the CBC are beyond the scope of this supplement.

2.2 CRC:

The Binderholz CLT BBS, described in Sections 2.0 through 7.0 of the evaluation report ESR-4081, complies with CRC Chapters 5, 6 and 8, provided the design and installation are in accordance with the 2018 *International Residential Code*® (IRC) provisions noted in the evaluation report.

The products have not been evaluated under CRC Section R337 for use in the exterior design and construction of new buildings located in a Fire Hazard Severity Zone within State Responsibility Areas or any Wildland–Urban Interface Fire Area.

The products described in this supplement have not been evaluated for compliance with the *International Wildland–Urban Interface Code*®.

This supplement expires concurrently with the evaluation report, issued June 2020 and revised November 19, 2020.

DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES
Section: 06 17 19—Cross-laminated Timber

REPORT HOLDER:**BINDERHOLZ BAUSYSTEME GMBH****EVALUATION SUBJECT:****BINDERHOLZ CLT BBS****1.0 REPORT PURPOSE AND SCOPE****Purpose:**

The purpose of this evaluation report supplement is to indicate that the Binderholz CLT BBS, recognized in ICC-ES evaluation report ESR-4081, has also been evaluated for compliance with the codes noted below.

Applicable code editions:

- 2017 *Florida Building Code—Building*
- 2017 *Florida Building Code—Residential*

2.0 CONCLUSIONS

The Binderholz CLT BBS, described in Sections 2.0 through 7.0 of ICC-ES evaluation report ESR-4081, complies with the 2017 *Florida Building Code—Building* Chapters 6 and 23, and the 2017 *Florida Building Code—Residential* Chapters 5, 6 and 8, provided the design requirements are determined in accordance with the 2017 *Florida Building Code—Building* and the 2017 *Florida Building Code—Residential*, as applicable. The installation requirements noted in ICC-ES evaluation report ESR-4081 for the 2015 *International Building Code*® meet the requirements of the 2017 *Florida Building Code—Building* and the 2017 *Florida Building Code—Residential*, as applicable, with the following conditions:

Use of the Binderholz CLT BBS has also been found to be in compliance with the High-Velocity Hurricane Zone provisions of the 2017 *Florida Building Code—Building* and the 2017 *Florida Building Code—Residential*.

For products falling under Florida Rule 61G20-3, verification that the report holder's quality assurance program is audited by a quality assurance entity approved by the Florida Building Commission for the type of inspections being conducted is the responsibility of an approved validation entity (or the code official when the report holder does not possess an approval by the Commission).

This supplement expires concurrently with the evaluation report, issued June 2020 and revised November 19, 2020.