



**MADE FOR BUILDING**  
BUILT FOR LIVING

**CROSS-LAMINATED TIMBER**



## IMPRINT

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## GENERAL INFORMATION

# CROSS-LAMINATED TIMBER



## PRODUCT DESCRIPTION

KLH® - CLT is a versatile building material characterized by its dimensional stability and accuracy, and its high level of prefabrication. KLH® solid wood panels are used for wall, floor slab, and roof elements.

The biaxial qualities of CLT provide a multitude of opportunities for exciting architectural designs. KLH® elements can be combined with most building materials and structural systems to produce exciting and innovative design arrangements. By utilizing CLT in a bearing wall system, the thicknesses of floor and wall elements can be minimized to achieve an increase in building volume over traditional framed bearing wall and dropped-ceiling systems.

KLH® superstructures are erected by knowledgeable construction companies, typically using a mobile crane. An average of 25 minutes is required to place each element, depending on the complexity of the structure and site conditions. Erection of CLT for a detached residential dwelling of average size and complexity typically takes approximately 1-2 days. Erection crews are usually made up of four workers and a crane operator, and typical panel-to-panel connections are made with long wood screws and simple tools.

## MAXIMUM DIMENSIONS AND INVOICING WIDTHS

|                         |        |
|-------------------------|--------|
| Maximum panel length    | 54'-2" |
| Maximum panel width     | 11'-5" |
| Maximum panel thickness | 1'-½"  |

|                           |                           |
|---------------------------|---------------------------|
| Invoicing widths          | from 7'-5" to 11'-5"      |
| Minimum production length | 27'-1" – in 2" increments |

## MANUFACTURE

KLH® solid wood elements are made up of a least 3 layers of lumber boards that are arranged perpendicular to each other and glued together under high pressure. Depending on the project requirements, we can supply PEFC/06-34-110-certified elements as standard, and FSC® C119602-certified elements on a project-specific basis.

By cross-laminating the lumber boards, swelling and shrinkage are restrained, providing excellent dimensional stability of the finished product. In accordance with ANSI/APA PRG 320, only kiln dried lumber with a moisture content of 12% (+/-2%) is used in KLH® - CLT.

The fabrication process is subject to internal and external quality control by authorized third party auditors.

## ADHESIVES AND LAMINATION PROCESS



PEFC/06-34 -110-certified lumber stock is graded and sorted according to grade and surface quality.



Cross-laminated timber is produced on a just-in-time basis



Formaldehyde-free adhesive is used for laminating the individual layers



State-of-the-art CNC cutting machines facilitate both simple and highly complex patterns according to project requirements.

### ADHESIVES AND LAMINATION PROCESS

Only VOC-free and formaldehyde-free PUR adhesives are used with elevated temperature performance according to the current PRG 320 standard.

Adhesive is applied automatically over the entire surface at approximately 0.03 lbs/ft<sup>2</sup> per joint. Combined with a laminating pressure of 87 psi, KLH® - CLT is manufactured to consistently high standards of strength and quality.

Furthermore, production takes place in a highly controlled manufacturing environment where temperature and humidity are continuously monitored and consistently maintained, ensuring the specified moisture content of both lumber stock and finished product.

More information about the adhesives used may be found at [www.henkel-adhesives.de](http://www.henkel-adhesives.de).

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## PREFABRICATION OF BUILDING ELEMENTS

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### CNC CUTTING AND TOLERANCES

KLH® - CLT elements are prefabricated in the factory using state-of-the-art CNC cutting technology. All prefabrication is based on the approved fabrication drawings provided by the client or construction company.

For elements of a length and width greater than 10.7 ft.<sup>2</sup>, the tolerances are +/-0.1 in., for standard panel types, standard trimming and a wood moisture content of 12%. The minimum element size for standard cutting is 3 ft. x 3 ft.

In addition to standard cutting, KLH® offers project-specific cutting services, including penetrations and routing, tailored to specific project requirements.



### STANDARD CUTTING FOR WALL, FLOOR AND ROOF ELEMENTS

Cuts at right angles to the panel edges and panel surface, with diagonal cuts into the panel surface up to a maximum cutting depth of 10". Circular cuts into panel surfaces may be a maximum of 13'-1" long for floor and roof elements, and a maximum of 19'-8" long for wall elements.

Internal corners, e.g. for door and window cut-outs or other openings, are executed with rounded edges with a radius of 0.8 in. Sharp corners can be provided at an additional charge.

Standard cutting for floor and roof elements includes typical panel joints such as half-lap or spline board connections. Maximum width for milling of the joint is 3.5 in. in each adjoining element.

### OTHER CUTTING SERVICES

Any cutting not considered a standard cut is categorized as a custom cut. Following initial verification of technical feasibility, custom cuts can be executed on a project-specific basis. For custom machining services, increased tolerances might occur compared to standard machining services.

Examples of custom cuts are:

- Specialist routing
- Drilling into the panel sides or edges
- Elements with special inner and outer contours/shapes
- Half-lap joints and recesses on the underside of the panel or located in the center of the element
- Cut-outs for structural members such as steel W-shapes
- Cut-outs for rafters and beams
- Cutting of small elements (element width < 3 ft)
- Double-sided processing of elements
- Cut-outs for sockets and conduits.



## TECHNICAL APPROVALS AND CERTIFICATES



EUROPEAN TECHNICAL  
ASSESSMENT  
ETA-06/0138



UK TECHNICAL ASSESSMENT  
UKTA-0836-22/0028



FRENCH APPROVAL  
DTA 3.3/20-1016



Intertek  
C#: 5009426

PRODUCT APPROVAL  
FOR USA & CANADA  
ANSI/APA PRG 320



JAPANESE APPROVAL  
NTI-301



SEAL OF QUALITY FOR SPAIN  
AITIM 31-01



QUALITY MANAGEMENT  
In accordance with  
ISO EN 9001:2015



ENVIRONMENTAL MANAGEMENT  
In accordance with  
ISO EN 14001:2015



Promoting  
Sustainable Forest  
Management  
www.pefc.org

PEFC CERTIFICATION



FSC® CERTIFICATION



THE INTERNATIONAL EPD® SYSTEM

ENVIRONMENTAL PRODUCT  
DECLARATION (EPD)  
In accordance with  
ISO 14025 and EN 15804



For healthier building  
products we underwent  
certification by Declare

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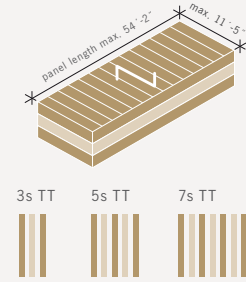
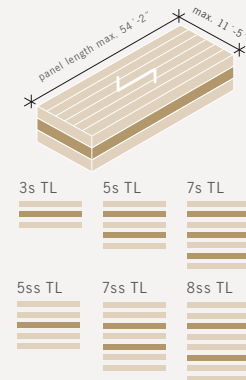
All approvals and certificates can be downloaded at [www.klhusa.com](http://www.klhusa.com)

## TECHNICAL DETAILS

|                                                 |                                                                                                                                       |
|-------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| <b>PRODUCT</b>                                  | Solid wood panels with crosswise glued laminations                                                                                    |
| <b>PRODUCT NAME</b>                             | KLH® Cross-Laminated Timber                                                                                                           |
| <b>USES</b>                                     | Structural elements for walls, floors, and roofs                                                                                      |
| <b>WOOD TYPE</b>                                | Austrian spruce (other wood species on request)                                                                                       |
| <b>PANEL BUILD-UPS</b>                          | 3-, 5-, 7-, and 8-laminations                                                                                                         |
| <b>LAMINATIONS</b>                              | Lamination thicknesses 0.79 in. - 1.57 in.<br>Sorted for quality and finger-jointed                                                   |
| <b>PANEL GRADE</b>                              | CV1M1                                                                                                                                 |
| <b>GLUE</b>                                     | Formaldehyde-free PUR adhesive                                                                                                        |
| <b>LAMINATION PRESSURE</b>                      | 12,500 psf, minimum                                                                                                                   |
| <b>MOISTURE CONTENT</b>                         | 12% (+/-2%) at delivery                                                                                                               |
| <b>MAXIMUM DIMENSIONS</b>                       | Length 54'-2" / width 11'-5" / thickness 1'-½"                                                                                        |
| <b>AVAILABLE WIDTHS</b>                         | from 7'-5" to 11'-5"                                                                                                                  |
| <b>SURFACE QUALITIES</b>                        | Non-visible (NVQ) / Industrial visible (IVQ) / Domestic visible (DVQ)<br>KLH® Select Silver Fir (DVQTA)   Special surfaces on request |
| <b>WEIGHT</b>                                   | For structural calculations, 35 pcf<br>Shipping weight, 31 pcf                                                                        |
| <b>DIMENSIONAL CHANGE WITH MOISTURE CONTENT</b> | In-plane: 0.02% per 1% change in moisture content<br>Out-of-plane: 0.24% per 1% change in moisture content                            |
| <b>NOMINAL CHAR RATE</b>                        | 1.5 in./hr.                                                                                                                           |
| <b>EFFECTIVE CHAR DEPTH</b>                     | 1.9 in. after 1 hour<br>All lamination thicknesses = 1.38 in.                                                                         |
| <b>FIRE DESIGN</b>                              | According to NDS 2024 and CSA O86                                                                                                     |
| <b>FLAME SPREAD INDEX</b>                       | Classification B                                                                                                                      |
| <b>CERTIFICATION</b>                            | ANSI/APA PRG 320-2019                                                                                                                 |

KLH® STANDARD PANEL TYPES, DIMENSIONS AND PANEL BUILD UP

|                                                       | Panel Type     | Thickness<br>(in.) | Lamination Thickness in CLT Layup |       |       |       | (in.) | (in.) | (in.) | (in.) |
|-------------------------------------------------------|----------------|--------------------|-----------------------------------|-------|-------|-------|-------|-------|-------|-------|
|                                                       |                |                    | (in.)                             | (in.) | (in.) | (in.) |       |       |       |       |
| Covering layer in the transverse panel direction TT   | 60 3s TT       | 2.36               | 0.79                              | 0.79  | 0.79  |       |       |       |       |       |
|                                                       | 70 3s TT       | 2.76               | 0.79                              | 1.18  | 0.79  |       |       |       |       |       |
|                                                       | 80 3s TT       | 3.15               | 1.18                              | 0.79  | 1.18  |       |       |       |       |       |
|                                                       | 80 3s TT (V2)  | 3.15               | 0.79                              | 1.57  | 0.79  |       |       |       |       |       |
|                                                       | 90 3s TT       | 3.54               | 1.18                              | 1.18  | 1.18  |       |       |       |       |       |
|                                                       | 100 3s TT      | 3.94               | 1.18                              | 1.57  | 1.18  |       |       |       |       |       |
|                                                       | 100 3s TT (V2) | 3.94               | 1.57                              | 0.79  | 1.57  |       |       |       |       |       |
|                                                       | 105 3s TT*     | 4.13               | 1.38                              | 1.38  | 1.38  |       |       |       |       |       |
|                                                       | 110 3s TT      | 4.33               | 1.57                              | 1.18  | 1.57  |       |       |       |       |       |
|                                                       | 120 3s TT      | 4.72               | 1.57                              | 1.57  | 1.57  |       |       |       |       |       |
|                                                       | 100 5s TT      | 3.94               | 0.79                              | 0.79  | 0.79  | 0.79  | 0.79  |       |       |       |
|                                                       | 110 5s TT      | 4.33               | 0.79                              | 0.79  | 1.18  | 0.79  | 0.79  |       |       |       |
|                                                       | 120 5s TT      | 4.72               | 1.18                              | 0.79  | 0.79  | 0.79  | 1.18  |       |       |       |
|                                                       | 120 5s TT (V2) | 4.72               | 0.79                              | 1.18  | 0.79  | 1.18  | 0.79  |       |       |       |
|                                                       | 130 5s TT      | 5.12               | 1.18                              | 0.79  | 1.18  | 0.79  | 1.18  |       |       |       |
|                                                       | 140 5s TT      | 5.51               | 1.18                              | 0.79  | 1.57  | 0.79  | 1.18  |       |       |       |
|                                                       | 140 5s TT (V2) | 5.51               | 0.79                              | 1.57  | 0.79  | 1.57  | 0.79  |       |       |       |
|                                                       | 140 5s TT (V3) | 5.51               | 1.57                              | 0.79  | 0.79  | 0.79  | 1.57  |       |       |       |
|                                                       | 150 5s TT      | 5.91               | 1.18                              | 1.18  | 1.18  | 1.18  | 1.18  |       |       |       |
|                                                       | 150 5s TT (V2) | 5.91               | 1.57                              | 0.79  | 1.18  | 0.79  | 1.57  |       |       |       |
|                                                       | 160 5s TT      | 6.30               | 1.57                              | 0.79  | 1.57  | 0.79  | 1.57  |       |       |       |
|                                                       | 175 5s TT*     | 6.89               | 1.38                              | 1.38  | 1.38  | 1.38  | 1.38  |       |       |       |
|                                                       | 180 5s TT      | 7.09               | 1.57                              | 1.18  | 1.57  | 1.18  | 1.57  |       |       |       |
|                                                       | 200 5s TT      | 7.87               | 1.57                              | 1.57  | 1.57  | 1.57  | 1.57  |       |       |       |
|                                                       | 180 7s TT      | 7.09               | 1.18                              | 0.79  | 1.18  | 0.79  | 1.18  | 0.79  | 1.18  |       |
| Covering layer in the longitudinal panel direction TL | 60 3s TL       | 2.36               | 0.79                              | 0.79  | 0.79  |       |       |       |       |       |
|                                                       | 70 3s TL       | 2.76               | 0.79                              | 1.18  | 0.79  |       |       |       |       |       |
|                                                       | 80 3s TL       | 3.15               | 1.18                              | 0.79  | 1.18  |       |       |       |       |       |
|                                                       | 80 3s TL (V2)  | 3.15               | 0.79                              | 1.57  | 0.79  |       |       |       |       |       |
|                                                       | 90 3s TL       | 3.54               | 1.18                              | 1.18  | 1.18  |       |       |       |       |       |
|                                                       | 100 3s TL      | 3.94               | 1.57                              | 0.79  | 1.57  |       |       |       |       |       |
|                                                       | 100 3s TL (V2) | 3.94               | 1.18                              | 1.57  | 1.18  |       |       |       |       |       |
|                                                       | 105 3s TL*     | 4.13               | 1.38                              | 1.38  | 1.38  |       |       |       |       |       |
|                                                       | 110 3s TL      | 4.33               | 1.57                              | 1.18  | 1.57  |       |       |       |       |       |
|                                                       | 120 3s TL      | 4.72               | 1.57                              | 1.57  | 1.57  |       |       |       |       |       |



\*not available in DVQ

## KLH® STANDARD PANEL TYPES, DIMENSIONS AND PANEL BUILD UP

| Covering layer in the longitudinal panel direction TL | Panel Type |             | Thickness<br>(in.) | Lamination Thickness in CLT Layup |       |           |       |           |       |       |
|-------------------------------------------------------|------------|-------------|--------------------|-----------------------------------|-------|-----------|-------|-----------|-------|-------|
|                                                       |            |             | (in.)              | (in.)                             | (in.) | (in.)     | (in.) | (in.)     | (in.) | (in.) |
|                                                       | 100        | 5s TL       | 3.94               | 0.79                              | 0.79  | 0.79      | 0.79  | 0.79      |       |       |
|                                                       | 110        | 5s TL       | 4.33               | 0.79                              | 0.79  | 1.18      | 0.79  | 0.79      |       |       |
|                                                       | 120        | 5s TL       | 4.72               | 1.18                              | 0.79  | 0.79      | 0.79  | 1.18      |       |       |
|                                                       | 120        | 5s TL (V2)  | 4.72               | 0.79                              | 1.18  | 0.79      | 1.18  | 0.79      |       |       |
|                                                       | 130        | 5s TL       | 5.12               | 1.18                              | 0.79  | 1.18      | 0.79  | 1.18      |       |       |
|                                                       | 130        | 5s TL (V2)  | 5.12               | 0.79                              | 1.18  | 1.18      | 1.18  | 0.79      |       |       |
|                                                       | 140        | 5s TL       | 5.51               | 1.57                              | 0.79  | 0.79      | 0.79  | 1.57      |       |       |
|                                                       | 140        | 5s TL (V2)  | 5.51               | 0.79                              | 1.57  | 0.79      | 1.57  | 0.79      |       |       |
|                                                       | 150        | 5s TL       | 5.91               | 1.57                              | 0.79  | 1.18      | 0.79  | 1.57      |       |       |
|                                                       | 150        | 5s TL (V2)  | 5.91               | 1.18                              | 1.18  | 1.18      | 1.18  | 1.18      |       |       |
|                                                       | 150        | 5s TL (V3)  | 5.91               | 0.79                              | 1.57  | 1.18      | 1.57  | 0.79      |       |       |
|                                                       | 160        | 5s TL       | 6.30               | 1.57                              | 0.79  | 1.57      | 0.79  | 1.57      |       |       |
|                                                       | 160        | 5s TL (V2)  | 6.30               | 0.79                              | 1.57  | 1.57      | 1.57  | 0.79      |       |       |
|                                                       | 170        | 5s TL       | 6.69               | 1.57                              | 1.18  | 1.18      | 1.18  | 1.57      |       |       |
|                                                       | 170        | 5s TL (V2)  | 6.69               | 1.18                              | 1.57  | 1.18      | 1.57  | 1.18      |       |       |
|                                                       | 175        | 5s TL*      | 6.89               | 1.38                              | 1.38  | 1.38      | 1.38  | 1.38      |       |       |
|                                                       | 180        | 5s TL       | 7.09               | 1.57                              | 1.18  | 1.57      | 1.18  | 1.57      |       |       |
|                                                       | 180        | 5s TL (V2)  | 7.09               | 1.18                              | 1.57  | 1.57      | 1.57  | 1.18      |       |       |
|                                                       | 190        | 5s TL       | 7.48               | 1.57                              | 1.57  | 1.18      | 1.57  | 1.57      |       |       |
|                                                       | 200        | 5s TL       | 7.87               | 1.57                              | 1.57  | 1.57      | 1.57  | 1.57      |       |       |
|                                                       | 160        | 5ss TL      | 6.30               | 1.18+1.18                         | 1.57  | 1.18+1.18 |       |           |       |       |
|                                                       | 140        | 7s TL       | 5.51               | 0.79                              | 0.79  | 0.79      | 0.79  | 0.79      | 0.79  | 0.79  |
|                                                       | 160        | 7s TL       | 6.30               | 0.79                              | 1.18  | 0.79      | 0.79  | 0.79      | 1.18  | 0.79  |
|                                                       | 180        | 7s TL       | 7.09               | 0.79                              | 1.57  | 0.79      | 0.79  | 0.79      | 1.57  | 0.79  |
|                                                       | 180        | 7s TL (V2)  | 7.09               | 1.18                              | 0.79  | 1.18      | 0.79  | 1.18      | 0.79  | 1.18  |
|                                                       | 200        | 7s TL       | 7.87               | 0.79                              | 1.57  | 0.79      | 1.57  | 0.79      | 1.57  | 0.79  |
|                                                       | 210        | 7s TL       | 8.27               | 1.18                              | 1.18  | 1.18      | 1.18  | 1.18      | 1.18  | 1.18  |
|                                                       | 220        | 7s TL       | 8.66               | 1.18                              | 1.57  | 1.18      | 0.79  | 1.18      | 1.57  | 1.18  |
|                                                       | 220        | 7s TL (V2)  | 8.66               | 1.57                              | 0.79  | 1.57      | 0.79  | 1.57      | 0.79  | 1.57  |
|                                                       | 230        | 7s TL       | 9.06               | 1.18                              | 1.57  | 1.18      | 1.18  | 1.18      | 1.57  | 1.18  |
|                                                       | 240        | 7s TL       | 9.45               | 1.18                              | 1.57  | 1.18      | 1.57  | 1.18      | 1.57  | 1.18  |
|                                                       | 245        | 7s TL*      | 9.65               | 1.38                              | 1.38  | 1.38      | 1.38  | 1.38      | 1.38  | 1.38  |
|                                                       | 260        | 7s TL       | 10.24              | 1.57                              | 1.57  | 1.18      | 1.57  | 1.18      | 1.57  | 1.57  |
|                                                       | 180        | 7ss TL      | 7.09               | 1.18+1.18                         | 0.79  | 0.79      | 0.79  | 1.18+1.18 |       |       |
|                                                       | 200        | 7ss TL      | 7.87               | 1.18+1.18                         | 0.79  | 1.57      | 0.79  | 1.18+1.18 |       |       |
|                                                       | 210        | 7ss TL      | 8.27               | 1.18+1.18                         | 1.18  | 1.18      | 1.18  | 1.18+1.18 |       |       |
|                                                       | 220        | 7ss TL      | 8.66               | 1.57+1.57                         | 0.79  | 0.79      | 0.79  | 1.57+1.57 |       |       |
|                                                       | 220        | 7ss TL (V2) | 8.66               | 1.18+1.18                         | 1.18  | 1.57      | 1.18  | 1.18+1.18 |       |       |
|                                                       | 230        | 7ss TL      | 9.06               | 1.57+1.57                         | 0.79  | 1.18      | 0.79  | 1.57+1.57 |       |       |
|                                                       | 240        | 7ss TL      | 9.45               | 1.57+1.57                         | 0.79  | 1.57      | 0.79  | 1.57+1.57 |       |       |
|                                                       | 250        | 7ss TL      | 9.84               | 1.57+1.57                         | 1.18  | 1.18      | 1.18  | 1.57+1.57 |       |       |
|                                                       | 260        | 7ss TL      | 10.24              | 1.57+1.57                         | 1.18  | 1.57      | 1.18  | 1.57+1.57 |       |       |
|                                                       | 280        | 7ss TL      | 11.02              | 1.57+1.57                         | 1.57  | 1.57      | 1.57  | 1.57+1.57 |       |       |
|                                                       | 300        | 8ss TL      | 11.81              | 1.57+1.57                         | 1.18  | 1.57+1.57 | 1.18  | 1.57+1.57 |       |       |
|                                                       | 320        | 8ss TL      | 12.60              | 1.57+1.57                         | 1.57  | 1.57+1.57 | 1.57  | 1.57+1.57 |       |       |

\*not available in DVQ

## SURFACE QUALITY

### SURFACE QUALITY

KLH® solid wood panels are typically produced from spruce laminations as standard and are available in three different visual surface qualities, which can be combined as required. This applies for all previously illustrated panel types and without restriction.

The minimum requirement criteria for each surface is illustrated in a table at [www.klh.at](http://www.klh.at)

### SUMMARY OF SURFACE QUALITIES

|                                     | DOMESTIC VISUAL QUALITY (DVQ)                                                                                                          | INDUSTRIAL VISUAL QUALITY (IVQ)                                                                                             | NON VISUAL QUALITY (NVQ)                                         |
|-------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|
| <b>AREA OF APPLICATION</b>          | Visible components in residential, school or office constructions, especially suitable for residential areas and surfaces with glazes. | Visible components in industrial and office buildings, not recommended for residential constructions.                       | Pure structural components with subsequent panelling.            |
| <b>SURFACE QUALITY GRADE</b>        | high demand                                                                                                                            | medium demand                                                                                                               | no demand                                                        |
| <b>MACHINED EDGES</b>               | chamfer on TL panels (in the panel width joint)                                                                                        | chamfer on TL panels (in the panel width joint)                                                                             | no chamfer                                                       |
| <b>SURFACE FINISH EX-FACTORY</b>    | fully sanded (one- or double sided, sanding in grain direction or across the grain)                                                    | fully sanded (one- or double sided, sanding in grain direction or across the grain, individual small rough areas permitted) | equalised (planed or sanded)                                     |
| <b>SURFACE TREATMENT AT FACTORY</b> | protective coatings & surface refinement on request                                                                                    | protective coatings on request, not recommended for surface refinement                                                      | protective coatings on request, surface refinement not available |

### SURFACE TREATMENT AND SPECIAL SURFACES

Both the industrial visual quality and the domestic visual quality panels are supplied fully sanded.

For sophisticated architectural designs and a virtually knot-free appearance, we also offer the premium timber surface KLH® Select White Fir.

Should you require UV protection, varnished elements or any other surface treatment, please contact us. The same applies to surfaces in other types of wood, which we can offer depending on customer requirements and the availability of raw materials.

#### IMPORTANT NOTE

Visual quality components require special care during loading and, where applicable, storage as well as during and after installation.

## SURFACE APPEARANCE REQUIREMENTS

| Criteria                                                                     | Domestic visual (DVQ)                                                                                                                                                                                                                                                                                                                                   | Industrial visual (IVQ)                                                                           | Non visual (NVQ)                          |
|------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|-------------------------------------------|
| Surface finish                                                               | sanded                                                                                                                                                                                                                                                                                                                                                  | sanded, individual small rough areas permitted                                                    | planed                                    |
| Wood species                                                                 | one single species                                                                                                                                                                                                                                                                                                                                      | predominantly one single species<br>spruce / fir ( $\leq 10\%$ ) are regarded as one type of wood | addition of other timber species possible |
| Colour and texture                                                           | mostly balanced                                                                                                                                                                                                                                                                                                                                         | generally balanced                                                                                | no requirements                           |
| Blue and brown stains, red tinge                                             | slight discolouration permitted ( $\leq 3\%$ )                                                                                                                                                                                                                                                                                                          | slight discolouration permitted ( $\leq 5\%$ )                                                    | no restrictions                           |
| Knots, tightly intergrown                                                    | permitted                                                                                                                                                                                                                                                                                                                                               | permitted                                                                                         | no restrictions                           |
| Knots, black                                                                 | permitted $\leq 1'' \varnothing$                                                                                                                                                                                                                                                                                                                        | permitted $\leq 1.5'' \varnothing$                                                                | no restrictions                           |
| Loose knots, knot holes                                                      | permitted $\leq 0.5'' \varnothing$                                                                                                                                                                                                                                                                                                                      | permitted $\leq 5/8'' \varnothing$                                                                | no restrictions                           |
| Resin pockets                                                                | to some extent permitted $\leq 0.1'' \times 2''$                                                                                                                                                                                                                                                                                                        | to some extent permitted $\leq 0.2'' \times 3''$                                                  | no restrictions                           |
| Piths                                                                        | to some extent permitted length $\leq 2.5'$                                                                                                                                                                                                                                                                                                             | to some extent permitted length $\leq 3.5'$                                                       | no restrictions                           |
| Bark ingrowth                                                                | not permitted                                                                                                                                                                                                                                                                                                                                           | not permitted                                                                                     | no restrictions                           |
| Wane                                                                         | not permitted                                                                                                                                                                                                                                                                                                                                           | not permitted                                                                                     | permitted                                 |
| Compression wood                                                             | to some extent permitted                                                                                                                                                                                                                                                                                                                                | to some extent permitted                                                                          | no restrictions                           |
| Boreholes from inactive insect attack                                        | not permitted                                                                                                                                                                                                                                                                                                                                           | not permitted                                                                                     | to some extent permitted                  |
| Wood moisture content during production                                      | $\leq 12\%$                                                                                                                                                                                                                                                                                                                                             | $\leq 13\%$                                                                                       | $\leq 14\%$                               |
| Cracks and joints<br>(at a reference moisture measurement of 12%)            | to some extent permitted $\leq 0.05''$                                                                                                                                                                                                                                                                                                                  | to some extent permitted $\leq 0.1''$                                                             | to some extent permitted $\leq 0.25''$    |
| Surface defects                                                              | to some extent permitted $\leq 0.5'' \varnothing$                                                                                                                                                                                                                                                                                                       | to some extent permitted $\leq 5/8'' \varnothing$                                                 | no restrictions                           |
| Surface re-treatment<br>(Filling and plugging of branch holes, strips, etc.) | permitted                                                                                                                                                                                                                                                                                                                                               | permitted                                                                                         | no restrictions                           |
| Defects on panel/lamellae edges                                              | to some extent permitted                                                                                                                                                                                                                                                                                                                                | to some extent permitted                                                                          | no restrictions                           |
| Making good of element edges<br>manually, using sand paper                   | yes                                                                                                                                                                                                                                                                                                                                                     | yes                                                                                               | no                                        |
| Chamfer on TL panels<br>(in the panel width joint)                           | yes                                                                                                                                                                                                                                                                                                                                                     | yes                                                                                               | no                                        |
| Range of validity                                                            | The given surface qualities valid:<br>- at the time of delivery<br>- only for the covering layer, not for the narrow sides<br>- for one-sided visible surfaces<br>- for narrow sides and CNC-treated surfaces, the criteria for NVQ surface quality apply<br>- for double-sided visible surfaces, a small amount of on-site reworking is to be expected |                                                                                                   |                                           |
| Crack formation                                                              | Like all solid wood products, the above stated qualities are subject to crack and joint formation as a result of drying to their future compensation moisture balance when installed due to the product characteristics. This cannot be prevented.                                                                                                      |                                                                                                   |                                           |

## NOTE

Wood is a natural product. Minor deviations from the table values are natural and are no reason for complaint.

## AREAS OF APPLICATION

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Due to the structural properties KLH® - CLT is used for stability as well as for load-bearing and non-load-bearing building components.

Cross laminated timber can also be used to create cantilevering elements, point-loaded constructions, prefabricated pods and modules.

KLH® has to date supplied cross laminated timber for more than 50,000 projects worldwide. They were completed in the following categories:

- Detached residential dwelling houses
- Multi story residential apartment buildings
- Terraced houses
- Student housing
- Retirement homes
- Schools and kindergartens
- Hotels
- Civic and Public buildings
- Event halls
- Industrial and commercial buildings
- Refurbishment & Extensions
- Special buildings
- .....



Washington Latin - Gym |  Copyright Sarah Mechling. Courtesy Perkins Eastman

## PRODUCT ADVANTAGES

### BUILDING WITH KLH® HAS MANY ADVANTAGES

- Ecologically sustainable
- Renewable resource
- Carbon neutral
- A healthy and comfortable room climate
- Lasting value
- Individuality in architecture and design
- Flexible room design without a grid pattern
- More net floor space
- Technically approved and ANSI/APA PRG 320 certified building product
- Quality controlled and ISO-certified production procedures

- CNC cutting and high accuracy of fit
- Lighter than conventional building materials
- Short construction period and dry construction method
- Suitable for earthquake regions
- Easy assembly and installation
- Less noise on site
- Smaller crews- safer sites
- Less vehicle movements for deliveries
- No requirement for curing times
- Manage tight construction sites

### FLUCTUATIONS IN ROOM CLIMATE

Wood is a natural, non-homogeneous building material which has a compensating effect on the room climate. As with all structural solid timber products, the formation of cracks and joints resulting from drying to the equilibrium moisture content under service conditions is a product-specific characteristic and cannot be completely avoided. Particular care should be taken, especially with visible-quality surfaces, to avoid significant fluctuations in the indoor climate during both the construction phase (for example, during screed drying) and the service life of the building. The recommended relative humidity is between 40% and 60%. Particularly with white-stained surfaces, crack formation may result in an undesirable and irreversible contrast effect. Building owners should be informed accordingly, and subsequent trades should be made aware of this during the construction phase.

### THERE'S MORE TO KLH® CROSS-LAMINATED TIMBER

From initial budgeting to final delivery, our experienced project team supports every stage of your mass timber project. We provide quantity take-offs, cost estimates, preliminary member sizing, and coordination with the design team. Our services include the development of detailed 3D models,

production of shop drawings, and preparation of manufacturing data for fabrication. We also coordinate the sourcing and delivery of CLT panels, connection systems, fasteners, and related project components to ensure a smooth and efficient project execution.

### ONLINE SUPPORT

Explore KLHdesigner, the all-in-one digital platform for professionals working in timber construction with KLH® - CLT. The platform offers a comprehensive set of tools and resources to streamline planning, analysis and sustainability assessment. Accessible through any web browser and on any device, KLHdesigner enables you to work anytime, anywhere.



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