

General

Load bearing components made from glued laminated timber (Glulam) are designed and carefully manufactured, top-quality construction components made from an improved material. Glulam may only be manufactured by companies who have a corresponding certification concerning the gluing suitability of load bearing timber construction components according to German standard DIN 1052. A list of companies who have provided this certification can be found on the website www.brettschichtholz.de

In the following a few generally accepted, material dependent rules shall be explained, adherence to which assures long-term stability of the structure and preservation of the appearance. In addition a few important terms and definitions for the quality determination of Glulam will be explained.

Strength classes

Glulam is, according to DIN 1052: 2008-12, produced and divided into strength classes. The strength classes and correlation to the previous strength classes according to DIN 1052-1/ A1: 1996-10 can be taken from table 1. The numerical value of the Glulam classes stands for the characteristic value of the bending strength (for Glulam according to DIN 1052: 2008-12) in N/mm². The „h“ and/or „c“ with the designation of DIN 1052: 2008-12 stands for homogeneous and/or combined symmetrical built up Glulam. Greater quantities of higher strength glued laminated timber with an homogeneous lay up construction (strength classes GL 28h and GL 32h) can only be produced with considerable time expenditure and extra costs. Therefore an attempt should always be made to use combined glued laminated timber.

If, with an order, no indication of a desired lay up is implied then, depending on the selected strength class, the following standard qualities will be supplied: GL 24h, GL 28c, GL 32c. Without an indication of a strength class GL24h will be supplied.

With the ordering of GL 32c or h, in addition, one has to bear in mind that not all sorting machines required for the manufacturing allow for the sorting of another type of wood other than spruce/fir.

Table 1: Strength classes

DIN 1052: 2008-12	Previous, no longer applicable, designations according to: DIN 1052-1/A1: 1996-10
GL 24h oder GL 24c	BS 11
GL 28h oder GL 28c	BS 14
GL 32h oder GL 32c	BS 16

Table 2: Surface qualities of Glulam

Criteria ¹	Industrial quality	Visible quality	Selection quality
1 Firmly grown knots ^{2, 3}	Permitted	Permitted	Permitted
2 Fallen and loose knots ^{2, 3}	Permitted	Up to < 20 mm ⁴ permitted from > 20 mm ⁴ to be replaced in the works	To be replaced in the works
3 Resin gall ^{3, 5}	Permitted	Resin galls are permitted up to 5 mm	Resin galls are permitted up to 3 mm
4 Knots and faulty points improved by means of knot hole plugs or „ships“ ³	Not necessary	Permitted	Permitted
5 Knots and resin galls improved by means of filler compound ³	Not necessary	Permitted ⁶	Permitted ⁶
6 Insect attack ³	Permitted are burrows up to 2 mm	Permitted are holes up to 2 mm	Not permitted
7 Pith	Permitted	Permitted	Pith visibly on the outer lamellas is not permitted
8 Cracks caused by shrinking ^{3, 5, 7}	No limit	Up to 4 mm	Up to 3 mm
9 Discolorations as a result of blue stain, red and brown stripes ⁵	No limit	Up to 10 % of the visible surface of the whole construction component	Not permitted
10 Mould ⁵	Not permitted	Not permitted	Not permitted
11 Contamination of the surface ⁵	Permitted	Not permitted	Not permitted
12 Distance between fingerjoints	No limit	No limit	On visible remaining outer lamellas, the distance between one another has to be at least 1 m
13 Surface	Levelled out	Planed and chamfered chatter permitted up to a depth of 1 mm	Planed and chamfered chatter permitted up to a depth of 0.5 mm

¹ Deviations from the limit values defined in the following in lines 2, 3, 6-9, 12, 13 are to be tolerated to the following extent: maximum of three deviations/m² visible surface for the quality of vision, maximum of one deviation/m² visible surface for selection quality.

² Permissible knot size according to DIN 4074

³ Without limitation of the number

⁴ Measurement of the diameter of the knots analogue to the measurement of the diameter of individual knots for scantlings according to DIN 4074-1: 2008-12, 5.1.2.1.

⁵ Delivery condition

⁶ Filler compound which can be painted over is to be demanded explicitly.

⁷ As in all constructional solid wood products cracks can be present. The depth of the crack, measured with a 0.1 mm thick feeler gauge and independent of the quality of the surface for construction components, may be, for members not being subject to tensile-stresses perpendicular to the grain up to 1/6 of the width of the construction component, for members being subject to tensile-stresses perpendicular to the grain, up to 1/8 of the width of the component from each side. With deeper cracks the non-critical state should be checked by an expert.

A more comprehensive and illustrated description of the surface qualities can be found in the article RADOVIC/WIEGAND „Oberflächenqualität von Brettschichtholz“ [Surface quality of glued laminated timber, German language only], which is located in the download area of the website www.brettschichtholz.de

Labelling

Components made from Glulam comply with the building authorities requirements. They are labelled by the manufacturer with the German compliance mark (Ü mark).

At the time of this bulletin's printing, Glulam labelled only with the CE mark according to DIN EN 14080:2005 is not applicable in Germany.

Surface qualities

Glulam components can be manufactured with various surface qualities and thus fulfil variable creative requirements. The desired surface characteristics are, in each case, contractually agreed upon and are, for example, itemised in the technical specifications. If nothing else is stipulated visible quality is applied.

Transport and Assembly

Transport and assembly of Glulam components should categorically only be carried out by experienced and therefore fully equipped certified specialists. Thereby, among other things, the following is to be observed:

- The possibility of applying a primer coating to the Glulam component at the factory before shipping to act as a temporary weather protection.
- Sufficient bracing, also whilst under construction.
- Soiling prevention.
- During the lifting process, as a rule, the entire section should be encompassed with heavy duty binding or some other suitable device.

Subsequent block outs, notches, openings, drilled holes and cuttings

In every case they call for a new static analysis.

Structural-physical analysis

Predominantly the outer layers of the Glulam, under construction, absorb moisture. This moisture must be gradually dispersed, until a uniform cross-sectional moisture is achieved. Careful heating and ventilation and the resulting accompanying slow reduction of the relative humidity of air and the corresponding wood moisture serves this purpose.

On the surfaces of the Glulam components and also along the glued joints **Shrinkage cracks** can appear. As in all constructional timber products cracks can be present. The depth of the crack, measured with a 0.1 mm thick feeler gauge and independent of the quality of the surface for construction components, may be, for members not being subject to tensile-stresses perpendicular to the grain up to 1/6 of the width of the construction component, for members being subject to tensile-stresses perpendicular to the grain, up to 1/8 of the width of the component from each side. With deeper cracks the non-critical state should be checked by an expert.

With **direct exposure** and strong changing climatic conditions the inclination towards crack formation increases. Even during the planning, protective measures are also provided for the construction in progress. These are, in particular, coverings and backwater free drains.

Priority is given to the constructional wood protection before the chemical wood protection. To this belongs, for example, prompt closure of the roof and outer wall surfaces immediately after assembly and also removal of construction site contingent building shell moisture by regularly ventilating it out of the building. For further details refer to the brochure „**Baulicher Holzschutz**“ [Constructional wood protection, only in German language] in the timber construction handbook of the INFORMATIONSDIENST HOLZ [WOOD INFORMATION SERVICE].

If the constructional wood protection can not be secured, the following must be especially observed:

- Apply laminations of a species with sufficient natural durability (i.e. larch, Douglas fir, yellow cedar) or
- Carry out a preservative treatment with a wood preservative applicable for the corresponding hazard class and approved by the building authorities.

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