

ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804+A2

Owner of the Declaration	Wiehag Timber Construction GmbH
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-WIG-20240079-IBB1-EN
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Valid to	04.04.2029

Glued laminated timber WIEHAG Timber Construction GmbH

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1. General Information

WIEHAG Timber Construction GmbH

Programme holder

IBU – Institut Bauen und Umwelt e.V.
Hegelplatz 1
10117 Berlin
Germany

Declaration number

EPD-WIG-20240079-IBB1-EN

This declaration is based on the product category rules:

Solid wood products, 01.08.2021
(PCR checked and approved by the SVR)

Issue date

05.04.2024

Valid to

04.04.2029



Dipl.-Ing. Hans Peters
(Chairman of Institut Bauen und Umwelt e.V.)



Florian Pronold
(Managing Director Institut Bauen und Umwelt e.V.)

Glued laminated timber

Owner of the declaration

Wiehag Timber Construction GmbH
Wiehag Straße 10
4950 Altheim
Austria

Declared product / declared unit

1 m³ of glued laminated timber with an average density of 466 kg/m³
(moisture at delivery = 11 %)

Scope:

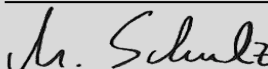
This EPD is based on a declared unit of 1 m³ of glued laminated timber (moisture of 11 % at a raw density of 466 kg/m³). The results refer to a representative average of glued laminated components including special shapes and represent the typical product variety of the company. The data basis for the preparation of the LCA is based on the production data of Wiehag Timber Construction GmbH in Altheim (Austria). The production site represents 100 % of the total production of Wiehag Timber Construction glued laminated timber.

The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

The EPD was created according to the specifications of EN 15804+A2. In the following, the standard will be simplified as *EN 15804*.

Verification

The standard EN 15804 serves as the core PCR	
Independent verification of the declaration and data according to ISO 14025:2011	
<input type="checkbox"/>	internally
<input checked="" type="checkbox"/>	externally



Matthias Schulz,
(Independent verifier)

2. Product

2.1 Product description/Product definition

WIEHAG Timber Construction glued laminated timber*1) is a dimensionally stable, homogeneously glued product which is used for load-bearing structures, primarily in timber engineering. WIEHAG glued laminated timber consists of at least 2 laminations/boards and is manufactured from kiln-dried softwood in accordance with the harmonised European *EN 14080* product standard and includes also glued solid timber as well as composite components made of glulam and glulam with universal finger joints and special forms based on the German manufacturing and design standard for timber structures *DIN 1052-10*.

*1) Called WIEHAG GLT in the remainder of this text, this term stands for glued laminated timber, glued solid timber, glulam composite components, glulam with universal finger joints and special forms of glulam.

Placement of this product on the market in the EU/EFTA (with the exception of Switzerland) is subject to Regulation (EU) No. 305/2011(CPR) of 9 March 2011. The product requires an *EN 14080* declaration of performance and CE marking. Its use is subject to the relevant national regulations.

2.2 Application

WIEHAG GLT is primarily used as a load-bearing structural glued construction product in residential and industrial buildings, as well as in timber engineering projects and even bridge construction.

In general, the glulam is not treated with chemical wood preservatives. The use of preventive chemical wood preservation according to *DIN 68800-3* is unusual and only permissible if structural wood preservation according to *DIN 68800-2* is not sufficient on its own. If, in exceptional cases, a preventive chemical wood preservative is used, this must be regulated by a general building authority approval or approval according to the Biocidal Products Regulation.

2.3 Technical Data

The product's technical performance data are declared along with its essential characteristics in the declaration of performance in accordance with the *EN 14080* harmonised product standard and are available for download from www.wiehag.com at any time.

The table below lists example structural data in accordance with *EN 14080* for GL 24h to GL 30h/c.

Structural data

Name	Value	Unit
Wood types by trade names according to EN 1912, with codes, if provided, in accordance with EN 13556 *1	PCAB Common (Norway spruce), ABAL (silver fir), PNSY (Scots pine), LADC (European larch), PSMN (Douglas fir)	-
Wood moisture according to EN 13183-1 *2	≤ 15	%
Use of wood preservatives (the DIN 68800-3 test grade of the wood preservative must be specified) *3	Where other preservative means are insufficient	-
Compressive strength parallel according to EN 14080 *4	24 - 30	N/mm ²
Compressive strength rectangular according to EN 14080 *4	2.5	N/mm ²
Tensile strength parallel according to EN 14080 *4	17 - 24	N/mm ²
Tensile strength rectangular according to EN 14080 *4	0.5	N/mm ²
Modulus of elasticity according to EN 14080 *4	11500 - 13600	N/mm ²
Shear strength according to EN 14080 *4	3.5	N/mm ²
Shear modulus according to EN 14080 *4	650	N/mm ²
Dimensional deviation according to EN 14080 *5	Width: +/- 2 mm; heights ≤ 400 mm: +4mm / -2mm; heights > 400 mm: +1% / - 0.5%; lengths (≤ 2m): +/- 2 mm; lengths (2m < / ≤ 20m): +/- 0,1%; length (> 20m): +/- 20 mm	mm, %
Length (min. - max.)	up to 51	m
Width (min. - max.)	up to 1.5	m
Height (min. - max.)	up to 3.2	m
Gross density gem. EN 14080 *4	420 - 480	kg/m ³
Surface quality (list possible variants)	Industrial quality, visible quality	-
Thermal conductivity according to EN 12664	0.13	W/(mK)
Specific heat capacity according to EN 12664	1.6	kJ/kgK
Water vapour diffusion resistance factor according to EN ISO 12572	20 to 50	-
Formaldehydeemissions according to EN 14080	≤ 0.124	mg/m ³

*1) For glued laminated timber made primarily of softwood.

*2) *EN 14080* allows other equivalent measurement methods.

*3) According to *DIN 68800-1*, wood preservative treatment is only permitted if structural measures have been exhausted, so it is uncommon.

*4) *EN 14080* allows the declaration of more elastomechanical properties, in particular flexural strength.

It is customary to specify strength classes such as GL 24h, GL 28c or GL 30h. The ranges specified here are based on

average or characteristic values for the specified strength classes.

Different values can be declared.

The declared bulk density values may deviate from this average value due to the different densities of the types of wood used.

*5) *EN 14080* specifies further tolerances, e.g. for angularity or for curved structural components.

WIEHAG GLT is predominantly manufactured from softwood (primary types of wood: spruce/fir, Douglas fir, larch, pine) in accordance with *EN 14080*. The boards for lamination are kiln-dried in a drying chamber, sorted according to strength, finger-jointed and then glued. On delivery, GLT has an average moisture content of about 10–11 %. Gluing is done with appropriate approved low-emission adhesives; detailed information can be found in Section 2.5. The mechanical strength properties of Wiehag Timber Construction GLT are based on *EN 14080*. Technical data for the product can be found in the latest versions of the declarations of performance (DOP, DOC), which are available in the download area of the homepage (www.wiehag.com).

Since the characteristics of the GLT product vary in terms of the cross-sectional structure of the number and thickness of the layers as well as their size and shape, the dimensional tolerances of the GLT product are defined based on *EN 14080* and are also described in the GLT fact sheet prepared by the Studiengemeinschaft Holzleimbau e.V.

The product characteristics of WIEHAG GLT sometimes also include wider cross-sections, which are referred to as GLT composite components. These are made from individual glued laminated timber cross-sections that are bonded over their entire surface. GLT is primarily available in strength classes GL 24, GL 28 and GL 30 and is manufactured with a combined (c) or homogeneous (h) layer structure in either the visible or industrial quality grades.

Preventive chemical wood preservatives in accordance with *DIN 68800-3* with active substances against insects and fungal infestation are permitted depending on the requirements, but should be avoided to the extent possible. They are only permitted if other protective measures for structural wood protection specified in *DIN 68800-2* are not sufficient alone.

2.4 Delivery status

WIEHAG GLT is offered in various finishing levels from standard products to special components in visible or industrial quality levels. The maximum product dimensions can be found in Section 2.3. The permissible dimensional deviations comply with *EN 14080*.

2.5 Base materials/Ancillary materials

WIEHAG BSH consists of at least two fibre-parallel bonded (duroplastic), kiln-dried softwood board laminations that have been sorted for strength.

A class 1 MUF (melamine-urea-formaldehyde) adhesive is used for finger-jointing, surface and block bonding, permitting the production of glued laminated timber for *EN 1995* service classes 1–3.

The following proportions have been determined for the composition of 1 m³ of glued laminated timber from Wiehag Timber Construction:

- Coniferous wood (atro), predominantly spruce, about 89 %
- Water about 10 %
- Glue about 1 %

The product/article/at least one part of the product contains substances on the *candidate list* (date: 14/06/2023) in the amount of over 0.1 percent of mass: no.

The product/product/at least one sub-product contains other carcinogenic, mutagenic, reproductively harmful (CMR) substances of category 1A or 1B, which are not on the candidate list, in the amount of over 0.1% by mass in at least one sub-product: no.

Biocidal products have been added to this construction product or it has been treated with biocidal products (it is therefore a treated product within the meaning of the *Biocidal Products Regulation* (EU) No. 528/2012): no.

2.6 Manufacture

WIEHAG GLT is made of softwood, predominantly spruce and fir, from sustainable forestry in accordance with PEFC or FSC standards. The wet sawn timber delivered fresh from the sawmills passes through the stacking and sorting system first. This system sorts the selections into packages with intermediate strips according to the visual characteristics of the wood. The slats are then kiln-dried in drying chambers to an average wood moisture content of about 11 % and made ready for production in an air-conditioned warehouse. During the production process, the wood moisture content and the curvature or twist of each individual wooden lamination is measured and fed to the pre-planing system or sorted out immediately, depending on requirements. In the downstream process, the laminations are evaluated visually or mechanically, depending on the wood characteristics, in order to detect the strength-relevant features. These features, which have a significant impact on the strength and rigidity of the board laminations, are marked and cut out according to the quality requirements. The boards, once sorted by strength, are finger-jointed into a continuous lamination, planed to size and cut to the desired length as specified in the lamination plan (truss structure).

After the finger-joint has cured in lamination storage, the adhesive is applied to the flat side and bonded in various pressing systems for straight and curved structural components to form a raw truss (the semi-finished product). After the curing process, the structural components are planed to size and glued again depending on the product type. This allows the fabrication of composite components with large dimensions or complex load-bearing structures. Depending on the finishing stage, woodworking equipment is then used to process the components in accordance with the design drawings. The GLT surfaces are finished to the customer's requirements and can be treated for protection against weather and assembly damage, or with a wood preservative.

2.7 Environment and health during manufacturing

The exhaust air from the manufacturing process is cleaned in accordance with legal requirements using suitable filter systems. There is no burden on water or soil. Any process waste water produced is fed into the local waste water system and treated in accordance with regulations. Noise-intensive machines are soundproofed by structural measures in accordance with the requirements of commercial law. All other waste is separated in accordance with circular economy and disposed of according to regulation by specialist companies. An *ISO 9001* quality management system has been implemented at WIEHAG's entire production site in Altheim (Upper Austria).

2.8 Product processing/Installation

WIEHAG glued laminated timber can be processed using the standard tools suitable for timber construction. The health and safety instructions must also be observed during processing and installation.

2.9 Packaging

Polyethylene (PE) films are mainly used as weather protection during storage and transportation.

2.10 Condition of use

The composition of WIEHAG glued laminated timber corresponds to the data specified in Section 2.5 throughout its service life.

2.11 Environment and health during use

Environmental protection: According to current knowledge, the use of WIEHAG glued laminated timber poses no risk to water, air or soil.

Health protection: According to the current state of knowledge, no injury or adverse effects on health are to be expected under normal conditions of use of WIEHAG GLT. WIEHAG GLT, as it is predominantly manufactured with a melamine-based adhesive (MUF), releases formaldehyde during its life cycle. The MUF-based adhesives used are classified as low-emission with regard to formaldehyde due to their low adhesive content, structure and form of use. Compared to the limit value of 0.1 ml/m³ (0.124 mg/m³) of the REACH Regulation or Chemicals Regulation (1907/2006/EC) in connection with the test (EN 717-1), these emissions are to be classified as low, in the range of 0.02 to 0.03 mg/m³.

2.12 Reference service life

Glued laminated timber has been used in timber engineering for more than 100 years. When used as directed, there is no known or expected time limit on its stability. The useful life of WIEHAG GLT is therefore the same as the useful life of the building when used as intended.

2.13 Extraordinary effects

Fire

The fire behaviour of WIEHAG GLT is classified according to EN 13501-1 as:

- Flammability class D (medium contribution to fire)
- Smoke production class s2 (average smoke intensity)
- Flaming droplets d0 (no droplets)
- The toxicity of the combustion gases corresponds to that of natural wood

Fire protection

Name	Value
Building material class	D
Burning droplets	d0
Smoke gas development	s2

Water

No ingredients that could be hazardous to water are washed out.

Mechanical destruction

The fracture behaviour of glued laminated timber from WIEHAG is typical of solid wood.

2.14 Re-use phase

If WIEHAG GLT is professionally dismantled, it can be reused or repurposed at any time without any problems. If the GLT is not reused, its calorific value of around 16 MJ/kg (at a wood moisture content of around 12 %) means that it can be used to generate energy for process heat and electricity. All country-specific regulations must be taken into account.

2.15 Disposal

Landfill disposal of waste wood is not permitted according to § 9 AltholzV (Waste Wood Ordinance).

Waste specification according to the Austrian Waste Catalogue: Code 17218

Waste code number according to the European waste list (2014/955/EU): Code 17 02 01

2.16 Further information

More information is available at www.wiehag.com

3. LCA: Calculation rules

3.1 Declared Unit

This EPD refers to a declared unit of 1 m³ of glued laminated timber produced by WIEHAG. The declared unit refers to an average density of 466 kg/m³ and a wood moisture at delivery of 11 %.

Declared unit

Name	Value	Unit
Declared unit	1	m ³
Gross density	466	kg/m ³
Wood moisture at delivery	11	%

The present study includes a declaration of average products from a manufacturer's factory. The production conditions are comparable for all products included in the average. Differences in energy consumption for different formats cannot be quantified and can be considered negligible due to their small share of the overall result.

A possible variability is to be expected due to the use of different types of wood. The upstream supply chain for spruce wood is assumed to be representative. This applies to the majority of the wood used. The robustness of the declared LCA values can therefore be categorised as good.

3.2 System boundary

The life cycle assessment of average glued laminated timber produced by WIEHAG refers to a cradle-to-gate analysis of the environmental impacts with modules C1–C4 and module D (A1–A3 + C + D). The following life cycle phases are part of the analysis:

Module A1–A3 | Production stage

The production stage includes the upstream burdens of raw material supply, their transports, and the manufacturing plant of WIEHAG Timber Construction GmbH in Altheim (Austria). Main raw material inputs therefore refer to sawn timber and the production of the adhesive system. Within the plant boundaries the sorting, drying, fingerjointing, pressing and planing as well as the packaging of the product are considered. The production site is supplied with internally produced thermal and electric energy from the company's own timber gasification heat and power plant complemented by biomass boilers. Furthermore, electricity is internally produced by the own photovoltaic system. The remaining electricity is purchased as 100 % green electricity from the external grid.

Direct emissions from drying are based on worst-case assumptions and are included in the study. Primary data from adhesive production was used as far as possible.

The packaging of the products is considered in module A1–A3 as well.

Module C1 | Deconstruction and demolition

After the removal of building components overlying the product, the joints can simply be loosened by screwing or sawing and lifted by cranes to the place of removal. Required energy demand can be neglected. The actual energy demand depends on the installation of the products and can therefore vary greatly in the building context.

Module C2 | Transport to disposal

Module C2 includes the transport to waste treatment. In this case, transport by truck over a transport distance of 50 km is assumed.

Module C3 | Waste processing

In Module C3, the chipping after the removal of the products is considered. The wooden products and with them the material-inherent properties leave the product system as secondary combustibles in module C3.

Module C4 | Disposal

The applied scenario declares the energetic recovery of the wooden products, therefore no environmental impacts are to be expected from waste processing of the products in C4.

Module D | Benefits and loads beyond the system boundary

Applying an European average scenario, module D describes the energetic recovery of the product at the end of life including the corresponding energy substitution potentials.

3.3 Estimates and assumptions

All assumptions are verified through detailed documentation and correspond to the best possible representation of reality based on the available data. Background data for wood logs refer to generic data for spruce logs in bark derived from *MLC*-database. Spruce represents the majority of wood processed at WIEHAG. The used dataset represents an approximation for all other species. Regional applicability of the used background data refers to average data under European or German conditions taken from the *MLC*-database. German data were used for the Austrian market whenever European or regionalised average data were not available. Emissions from wood drying were included in the calculations according to *Rüter & Diederichs 2012*.

3.4 Cut-off criteria

The LCA model covers all available input and output flows, which can be represented based on robust data and from which a significant contribution can be expected. Data gaps are filled with conservative assumptions of average data or generic data if available and are documented accordingly. Only data with a contribution of less than 1 % were cut off. Thus, no data were neglected, of which a substantial impact is to be expected. All relevant data were collected comprehensively. Cutoff material and energy flows were chosen carefully based on their expected quantitative contribution as well as potential environmental impacts. Thus, it can be assumed that the sum of all neglected input flows does not account for more than 5 % of the total material, water and energy flows. Environmental impacts of machines, plant and infrastructure were not included.

3.5 Background data

This study uses generic background data for the evaluation of upstream environmental impacts from *MLC 2023.2* database in the *LCA FE*-software-version 10, as well as recognised literature such as *Rüter & Diederichs 2012*.

The analysis of the major amount of adhesives used for glued laminated timber production is based on primary data from

WIEHAG's suppliers.

3.6 Data quality

Data collection is based on product-specific questionnaires. It follows an iterative process of clarifying questions via e-mail, telephone calls or in personal/web meetings. Intensive discussions between WIEHAG and Daxner & Merl results in an accurate mapping of product-related material and energy flows. This leads to a high quality of foreground data collected. Data collection relies on a consistent process according to *ISO 14044*.

The representation of the main raw materials used for the production of glued laminated timber is based on supplier-specific primary data (adhesive systems) leading to a high data quality.

The technological, geographical and time-related representativeness of the database was kept in mind when selecting background data. Whenever specific data were missing, either generic datasets or representative average data were used instead. The implemented *MLC*-background datasets refer to the latest versions available and are carefully chosen.

The assessment of the robustness of the average can be found in Section 3.1.

3.7 Period under review

Foreground data were collected in the 2022/2023 production year (01.03.2022 - 28.02.2023), and the data are based on the volumes produced on an annual basis.

3.8 Geographic Representativeness

Land or region, in which the declared product system is manufactured, used or handled at the end of the product's lifespan: Austria

3.9 Allocation

Carbon content and primary energy content of the products were assessed based on their material inherent properties according to underlying physical relationships.

The production of the declared products generates co-products such as rejects and saw dust, which are sold externally. The environmental impact of the production is allocated to the main and the co-products based on their market value in line with the recommendations according to *EN 16485*.

In addition to thermal and electrical energy, biochar is also produced at the site-specific pyrolysis plant. The allocation of the associated environmental impacts is based on the exergy content of electrical and thermal energy and the calorific value of the biochar. Due to the high fluctuation of energy prices in the past years and the associated uncertainties, an allocation based on the economic value of the products was not used. However, the allocation ratios based on exergy lie in a comparable range with the allocation based on market price.

3.10 Comparability

Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to *EN 15804* and the building context, respectively the product-specific characteristics of performance, are taken into account.

The *MLC 2023.2* background database in the *LCA FE*-software-version 10 was used to calculate the LCA.

4. LCA: Scenarios and additional technical information

Characteristic product properties of biogenic carbon

During tree growth, the wood assimilates carbon dioxide and stores biogenic carbon. The carbon stored in the product is declared in the following table. Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO₂.

Information on describing the biogenic Carbon Content at factory gate

Name	Value	Unit
Biogenic carbon content in product	208	kg C
Biogenic carbon content in accompanying packaging	-	kg C

Installation into the building (A5)

The end of life of the product packaging is not declared in module A5.

Name	Value	Unit
Packaging (Polyethylene)	0.83	kg

The end-of-life scenario used in this LCA study is based on the following assumptions:

End of life (C1–C4)

Name	Value	Unit
Energy recovery	466	kg

Reuse, recovery and/or recycling potentials (D), relevant scenario information

Name	Value	Unit
Processing rate	100	%
Efficiency of power plant	68	%

The product reaches the end-of-waste status after removal from the building, transport to processing and chipping of the product. For the end of life of the glued laminated timber product, energy recovery as secondary fuel in a biomass power plant is assumed. As the main sales market for the solid wood products is concentrated in the European region, plant-specific characteristic values correspond to a European average scenario (EU). The scenario considers a reprocessing rate of 100 % for the solid wood products after removal from the building. This assumption has to be adjusted accordingly when applying the results in the building context. At the end of life of the product, the equilibrium moisture is comparable to the moisture content at delivery. This value can vary depending on the storage of the product before energy recovery.

5. LCA: Results

The following table contains the LCA results for a declared unit of 1 m³ of glued laminated timber produced by WIEHAG (466 kg/m³).

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE OR INDICATOR NOT DECLARED; MNR = MODULE NOT RELEVANT)

Product stage			Construction process stage		Use stage							End of life stage				Benefits and loads beyond the system boundaries
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	MND	MND	MND	MND	MNR	MNR	MNR	MND	MND	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 m³ glued laminated timber (466 kg/m³)

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Global Warming Potential total (GWP-total)	kg CO ₂ eq	-6.77E+02	0	1.79E+00	7.64E+02	0	-3.87E+02
Global Warming Potential fossil fuels (GWP-fossil)	kg CO ₂ eq	8.12E+01	0	1.71E+00	3.01E+00	0	-3.66E+02
Global Warming Potential biogenic (GWP-biogenic)	kg CO ₂ eq	-7.59E+02	0	6.94E-02	7.61E+02	0	-2.09E+01
Global Warming Potential luluc (GWP-luluc)	kg CO ₂ eq	2.76E-01	0	1.57E-02	3.27E-04	0	-2.44E-02
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC11 eq	1.99E-09	0	2.21E-13	5.55E-11	0	-3.3E-09
Acidification potential of land and water (AP)	mol H ⁺ eq	5.62E-01	0	6.02E-03	6.42E-03	0	3.8E-01
Eutrophication potential aquatic freshwater (EP-freshwater)	kg P eq	1.38E-03	0	6.21E-06	1.12E-05	0	-6.76E-04
Eutrophication potential aquatic marine (EP-marine)	kg N eq	2.65E-01	0	2.76E-03	1.54E-03	0	7.52E-02
Eutrophication potential terrestrial (EP-terrestrial)	mol N eq	2.64E+00	0	3.1E-02	1.61E-02	0	8.85E-01
Formation potential of tropospheric ozone photochemical oxidants (POCP)	kg NMVOC eq	8.58E-01	0	5.45E-03	4.1E-03	0	3.13E-01
Abiotic depletion potential for non fossil resources (ADPE)	kg Sb eq	2.28E-05	0	1.13E-07	4.65E-07	0	-2.95E-05
Abiotic depletion potential for fossil resources (ADPF)	MJ	1.28E+03	0	2.31E+01	6.33E+01	0	-6.87E+03
Water use (WDP)	m ³ world eq deprived	1.75E+01	0	2.05E-02	6.7E-01	0	-1.5E+01

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 m³ glued laminated timber (466 kg/m³)

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Renewable primary energy as energy carrier (PERE)	MJ	1.75E+03	0	1.68E+00	7.72E+03	0	-2.25E+03
Renewable primary energy resources as material utilization (PERM)	MJ	7.68E+03	0	0	-7.68E+03	0	0
Total use of renewable primary energy resources (PERT)	MJ	9.43E+03	0	1.68E+00	3.78E+01	0	-2.25E+03
Non renewable primary energy as energy carrier (PENRE)	MJ	1.15E+03	0	2.32E+01	1.56E+02	0	-6.87E+03
Non renewable primary energy as material utilization (PENRM)	MJ	1.25E+02	0	0	-9.25E+01	0	0
Total use of non renewable primary energy resources (PENRT)	MJ	1.28E+03	0	2.32E+01	6.33E+01	0	-6.87E+03
Use of secondary material (SM)	kg	0	0	0	0	0	0
Use of renewable secondary fuels (RSF)	MJ	0	0	0	0	0	7.68E+03
Use of non renewable secondary fuels (NRSF)	MJ	0	0	0	0	0	9.25E+01
Use of net fresh water (FW)	m ³	5.57E-01	0	1.84E-03	3.05E-02	0	-1.25E+00

RESULTS OF THE LCA - WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 m³ glued laminated timber (466 kg/m³)

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Hazardous waste disposed (HWD)	kg	1.17E-07	0	7.19E-11	6E-07	0	-2.18E-07
Non hazardous waste disposed (NHWD)	kg	1.66E+00	0	3.54E-03	4.64E-02	0	2.26E-01
Radioactive waste disposed (RWD)	kg	1.16E-02	0	4.34E-05	1.01E-02	0	-5.98E-01
Components for re-use (CRU)	kg	0	0	0	0	0	0
Materials for recycling (MFR)	kg	0	0	0	0	0	0
Materials for energy recovery (MER)	kg	0	0	0	4.66E+02	0	0
Exported electrical energy (EEE)	MJ	0	0	0	0	0	0
Exported thermal energy (EET)	MJ	0	0	0	0	0	0

RESULTS OF THE LCA - additional impact categories according to EN 15804+A2-optional: 1 m³ glued laminated timber (466 kg/m³)

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Incidence of disease due to PM emissions (PM)	Disease incidence	ND	ND	ND	ND	ND	ND

Human exposure efficiency relative to U235 (IR)	kBq U235 eq	ND	ND	ND	ND	ND	ND
Comparative toxic unit for ecosystems (ETP-fw)	CTUe	ND	ND	ND	ND	ND	ND
Comparative toxic unit for humans (carcinogenic) (HTP-c)	CTUh	ND	ND	ND	ND	ND	ND
Comparative toxic unit for humans (noncarcinogenic) (HTP-nc)	CTUh	ND	ND	ND	ND	ND	ND
Soil quality index (SQP)	SQP	ND	ND	ND	ND	ND	ND

The additional and optional impact categories according to *EN 15804+A2* are not declared, as the uncertainty of these indicators is to be classified as high.

Disclaimer 1 – for the indicators 'abiotic depletion potential for non-fossil resources', 'abiotic depletion potential for fossil resources', 'water (user) deprivation potential, deprivation-weighted water consumption'.

The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high as there is limited experience with the indicator.

6. LCA: Interpretation

The following interpretation contains a summary of the LCA results referenced to a declared unit of 1 m³ of WIEHAG glued laminated timber.

The global warming potential (GWP) of glued laminated timber shows negative values in the production phase (**modules A1–A3**). These negative impacts result from the use of wood as raw material. Wood sequesters biogenic carbon during tree growth. The sequestered carbon does not contribute to global warming as long as it is stored in the biomass.

After its use in the building, the product is assumed to be incinerated in a biomass power plant. As a result, the incorporated carbon is emitted again to the atmosphere representing biogenic carbon dioxide emissions (**module C3**).

The negative values in the end-of-life (**module D**) result from the energetic treatment of the product. As the energy produced at the biomass power plant can substitute (mainly fossil) fuels, an environmental net benefit is generated.

Hot-spot analysis of WIEHAG glued laminated timber



Potential global warming (**GWP**) from the production WIEHAG glued laminated timber (module A1–A3) mainly results from the upstream supply chain of the wood processed in Altheim. In addition, the environmental backpack of the adhesives used for production represent an important driver in the environmental profile of the products.

Energy for the processing of the products is provided from the company's timber gasification combined heat and power plant and biomass boilers complemented by 100 % green electricity. The energetic use of wood in the timber gasification combined heat and power plant is taken into account as carbon neutral, as biogenic carbon dioxide emissions result from the biogenic carbon stored in the wood. In this context, it should be noted

that only the use of wood from sustainably managed forests can be considered accordingly. Due to the use of green electricity, electricity supply represents a minor factor in the environmental profile of the product.

The declared results are representative for 100 % of WIEHAG glued laminated timber. They refer to an annual average of the total production volume of WIEHAG including all available dimensions (width, height, length) and strength classes. The average considers the annual input quantity of wood and adhesives for all variants of WIEHAG glued laminated timber. All products undergo the same manufacturing process. Due to this fact and the homogeneous structure of the products, the

declared results are expected to be representative for all products. A product-specific allocation of annual input and output flows is not possible.

7. Requisite evidence

7.1 Formaldehyde

Measuring organisation:

Analytical Center - Casco Adhesives AB WFA

Testing location:

Sickla industriväg 6, 131 54 Nacka, Sweden

Test report and period:

Test report no. 11 F6 004

Testing period: 20/06/2011 to 18/05/2021

Methodology and results:

The test was carried out in accordance with the requirements of EN 14080. The formaldehyde emissions analysed according to EN 717-1 are 0.02 mg HCHO/m³ air and are well below the limit value of E1, which is 0.124 mg HCHO/m³ air.

7.2 Toxicity and combustion gases

The toxicity of the combustion gases produced when glued laminated timber burns corresponds to those produced when untreated wood burns.

7.3 VOC emissions

Measuring organisation:

Holz Forschung Austria - - Austrian Wood Research Association

Testing location:

Franz-Grill-Straße 7, A-1030 Vienna

Test report and period:

Test report no. 239/2014-HC

Testing period from 07/02/2014 to 27/03/2014

Measurement methodology and results:

The test chamber investigation was carried out in accordance with ISO 16000-9 (2004) in conjunction with ISO 16000-11 (2005). The VOC emissions were analysed in accordance with ISO 16000-6.

AgBB-results overview (28 days [µg/m³])

Name	Value	Unit
TVOC (C6 - C16)	163	µg/m ³
Sum SVOC (C16 - C22)	7.6	µg/m ³
R (dimensionless)	0.11	-

8. References

Standards

DIN 1052-10

DIN 1052--10:2012--05, Design of timber structures - Part 10: Additional provisions.

DIN 68800-2

DIN 68800--2:2012--02, Wood preservation - Part 2: Preventive constructional measures in buildings.

DIN 68800-3

DIN 68800--3:2012--02, Wood preservation - Part 3: Preventive protection of wood with wood preservatives.

EN 717-1

ÖNORM EN 717--1:2005--02--01, Wood-based panels - Determination of formaldehyde release - Part 1: Formaldehyde emission by the chamber method.

EN 1912

ÖNORM EN 1912:2013--10--15, Structural timber - Strength classes - Assignment of visual grades and species.

EN 1995

ÖNORM EN 1995--1-1:2019--06--01, Eurocode 5: Design of timber structures - Part 1-1: General - Common rules and rules for buildings.

EN 12664

DIN EN 12664:2001--05, Thermal performance of building materials and products - Determination of thermal resistance by means of guarded hot plate and heat flow meter methods - Dry and moist products with medium and low thermal resistance.

EN 13183-1

ÖNORM EN 13183--1:2004--02--01, Moisture content of a piece of sawn timber - Part 1: Determination by oven dry

method.

EN 13501-1

ÖNORM EN 13501--1:2020--01--15, Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests.

EN 13556

ÖNORM EN 13556:2003--09--01, Round and sawn timber - Nomenclature of timbers used in Europe.

EN 14080

ÖNORM EN 14080:2013--08--01, Timber structures – Glued laminated timber and glued solid timber - Requirements.

EN 15804

DIN EN 15804:2012+A2:2019+AC:2021, Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products.

ISO 12572

DIN EN 12572:2017--05, Hygrothermal performance of building materials and products - Determination of water vapour transmission properties - Cup method.

ISO 14025

DIN EN ISO 14025:2011--10, Environmental labels and declarations – Type III environmental declarations – Principles and procedures.

ISO 14044

DIN EN ISO 14044:2006--10, Environmental management – Life cycle assessment – Requirements and guidelines.

ISO 16000-6

DIN ISO 16000--6:2004, Indoor air - Part 6: Determination of volatile organic compounds in indoor and test chamber air by

active sampling on Tenax TA sorbent, thermal desorption and gas chromatography using MS/FID.

ISO 16000-9

ÖNORM EN ISO 16000-9:2006, Indoor air - Part 9: Determination of the emission of volatile organic compounds from building products and furnishing – Emission test chamber method.

ISO 16000-11

ÖNORM EN ISO 16000-11:2006, Indoor air - Part 11: Determination of the emission of volatile organic compounds from building products and furnishing – Sampling, storage of samples and preparation of test specimens.

Further literature

Waste Catalogue Ordinance

Waste catalogue according to Annex 5 of the Austrian Waste Catalogue Ordinance.
Ordinance of the Federal Minister for Sustainability and Tourism on a Waste catalogue (Waste Catalogue Ordinance 2020).

AgBB

Ausschuss zur gesundheitlichen Bewertung von Bauprodukten (AgBB, Committee for the Health Evaluation of Construction Products): Procedure for the health assessment of emissions of volatile organic compounds (VOC and SVOC) from construction products.

Analytical Center - Casco Adhesives AB WFA

Formaldehyde emissions according to EN 14080:2013; analysis of formaldehyde emissions according to EN 717-1:2005; Report 11 F6 004 (2011-07-07).

Biocidal Products Regulation

Regulation (EU) No. 528/2012 of the European Parliament and of the Council of 22 May 2012 concerning the making available on the market and use of biocidal products.

Holz Forschung Austria

VOC emissions testing, Emission test report according to Baubook based on the DIN ISO 16000-9 (2004); ÖNORM EN

ISO 16000-9 (2006) and ÖNORM EN ISO 16000-11 (2005) standards; test report no. 239/2014- HC (2014-03-31).

IBU 2021

General instructions for the EPD program of Institut Bauen und Umwelt e.V. (IBU). Version 2.0, Berlin: Institut Bauen und Umwelt e.V., 2021. www.ibu-epd.com

Candidate list

List of substances of very high concern for authorisation (14 June 2023), published in accordance with Article 59(10) of the REACH Regulation. European Chemicals Agency.

LCA FE

LCA FE 10, LCA for Experts Software System and Database for Life Cycle Engineering. Version 10.7.1.28. Sphera, 1992-2023.

MLC

MLC 2023.2, Database for Life Cycle Engineering implemented in LCA for Experts software system. DB v10.7 2023.2. Sphera, 1992-2023. Available at: <https://sphera.com/product-sustainability-gabi-data-search/>.

PCR Part A

Product category rules for building-related products and services. Part A: Calculation rules for the life cycle assessment and requirements for the project report in accordance with EN 15804+A2:2019. Version 1.3. Berlin: Institut Bauen und Umwelt e.V. (eds.), 2022.

PCR: Solid wood products

Product category rules for building-related products and services. Part B: EPD requirements for solid wood products. Version 5, Berlin: Institut Bauen und Umwelt e.V., 18 July 2023.

Rüter & Diederichs 2012

Rüter, S.; Diederichs, S.: Basic life cycle assessment data for construction products made of wood. Working report from the Institut für Holztechnologie und Holzbiologie No. 2012/1. Hamburg: Johann Heinrich von Thünen -Institut.



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