# ENVIRONMENTAL PRODUCT DECLARATION

as per *ISO 14025* and *EN 15804+A2*

| | |
|---|---|
| Owner of the Declaration | Rubner Holding AG - S.p.A. |
| Publisher | Institut Bauen und Umwelt e.V. (IBU) |
| Programme holder | Institut Bauen und Umwelt e.V. (IBU) |
| Declaration number | EPD-RUB-20230228-IBC1-EN |
| Issue date | 27.06.2023 |
| Valid to | 26.06.2028 |

## Rubner Sawn Timber, Rubner Sawn Timber kiln dried, Rubner Sawn Timber machine graded

## Rubner Holding AG - S.p.A

Institut Bauen und Umwelt e.V.

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RUBNER

## 1. General Information

### Rubner Holding AG - S.p.A

**Programme holder**

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

**Declaration number**

EPD-RUB-20230228-IBC1-EN

**This declaration is based on the product category rules:**

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

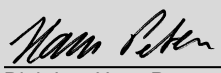
**Issue date**

27.06.2023

**Valid to**

26.06.2028

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



Dipl.-Ing. Hans Peters
(Managing Director Institut Bauen und Umwelt e.V.)

### Rubner Sawn Timber, Rubner Sawn Timber kiln dried, Rubner Sawn Timber machine graded

**Owner of the declaration**

Rubner Holding AG - S.p.A.
Handwerkerzone 2
39030 Kiens
Italy

**Declared product / declared unit**

1 m³ of kiln dried, planed, machine graded sawn timber [ST] with an average density of 459 kg/m³

**Scope:**

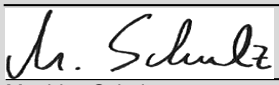
This EPD is based on a declared unit of 1 m³ of kiln dried, planed, machine graded sawn timber (moisture of 12 % at a raw density of 459 kg/m³) produced at the RUBNER production site in Rohrbach (Austria).

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 |
| ☐ internally ☒ externally |



Matthias Schulz,
(Independent verifier)

RUBNER

## 2. Product

### 2.1 Product description/Product definition

RUBNER sawn timber is produced from fresh roundwood, whereby the wood species spruce and pine are processed in accordance with *EN 1912* (Picea abies and Pinus sylvestris). The roundwood for the production of RUBNER sawnwood originates from a predominantly regional supply network, the average delivery distance of the roundwood is around 80 km. Depending on the processing level, RUBNER sawn timber is available as fresh, dried, dried/pre-planed or dried/planed/(visually) machine-graded lath, board or plank sawn timber. In the manufacturing process, prismatic timber pieces are cut from the logs in a first processing step, whereby the dimensions produced are essentially in conformity with the specifications according to *DIN 4074-1*. The individual pieces, RUBNER sawn timber, always have a fibre direction parallel to the longitudinal axis. Subsequently, kiln drying takes place, optionally in drying chambers or drying channels. The kiln-dried RUBNER sawn timber is then forwarded for further processing in the form of planing or pre-planing/grading. In the course of timber grading, the pre-planed sawn timber is classified according to visual and mechanical strength and stiffness properties.
For visual grading, the specifications according to *DIN 4074-1* apply, whereby the grading classes (S7-S13) are assigned to the European strength classes *(EN 338*) on the basis of *EN 1912*.
For machine strength grading, the specifications according to EN 14081 (all parts) apply. RUBNER sawn timber is almost completely graded by machine (98 %), only in exceptional cases is it visually graded using equipment.
Due to the kiln drying combined with the machine grading, RUBNER sawn timber has good dimensional stability and reduced cracking behaviour.
For the placing on the market of the product in the European Union/European Free Trade Association (EU/EFTA) (with the exception of Switzerland) Regulation (EU) *No. 305/2011 CPR* applies. The product meets the requirements of *EN 15497* and the CE-marking. For use, the respective national regulations apply.

### 2.2 Application

RUBNER sawn timber classified according to purely visual criteria is used in the construction sector for both decorative and structural purposes.
RUBNER sawn timber graded according to its strength can be used for the construction of load-bearing components in buildings and bridges. RUBNER sawn timber graded according to its strength is mainly used as a base material for various wood-based materials such as glulam, cross-laminated timber or finger-jointed solid structural timber.

### 2.3 Technical Data

RUBNER sawn timber has the mechanical properties required for use in timber structures according to *EN 1995* (all parts). The following technical data apply to the properties of RUBNER sawn timber. The performance data of the product are in accordance with its essential characteristics according to *EN 14081*.

**Constructional data**

| Name | Value | Unit |
|---|---|---|
| Wood types by trade names acc. to EN 1912 | spruce, pine, larch, Douglas fir | - |
| Wood moisture acc. to EN 13183-1 | < 18 | % |
| Use of wood preservatives (the wood preservative test mark to DIN 68800-3 must be indicated) | n.r. | - |
| Compressive strength parallel acc. to EN 1995 | 16 - 30 | $N/mm^2$ |
| Compressive strength rectangular acc. to EN 1995 | 2 - 3 | $N/mm^2$ |
| Tensile strength parallel acc. to EN 1995 | 8 - 30 | $N/mm^2$ |
| Tensile strength rectangular acc. to EN 1995 | 0.4 | $N/mm^2$ |
| Modulus of elasticity acc. to EN 1995 | 7000 - 16000 | $N/mm^2$ |
| Shear strength acc. to EN 1995 | 2.5 - 4 | $N/mm^2$ |
| Shear modulus acc. to EN 1995 | 440 - 970 | $N/mm^2$ |
| Dimensional deviation acc. EN 336 | Class 2 | mm |
| Length (min. - max.) | 2 - 5 | m |
| Width (min. - max.) | 0.08 - 0.35 | m |
| Height (min. - max.) | 0.01 - 0.1 | m |
| Gross density supporting components in accordance with EN 338 or DIN 1052. Non-supporting components are classified as per DIN 68364 | 350-520 | $kg/m^3$ |
| Surface quality (Possible characteristic features must be indicated) | rough sawn, planed | - |
| Risk class acc. to 68800-3 | 5 | - |
| Thermal conductivity acc. to EN 12664 | 0.12 | W/(mK) |
| Specific heat capacity acc. to EN 12664 | 1.6 | kJ/kgK |
| Water vapor diffusion equivalent air layer thickness acc. to ISO 12572 | n.r | m |
| Water vapour diffusion resistance factor acc. to ISO 12572 | 20-50 | - |
| Formaldehyde emissions acc. to EN 14081 | n.r. | $\mu g/m^3$ |

The essential properties and performance characteristics of RUBNER sawn timber comply with the requirements of *EN 14081-1:2005+A1(2011)*.

### 2.4 Delivery status

RUBNER sawn timber is produced with the dimensions according to chapter 2.3 and is delivered in domestic visual quality, visual quality or industrial quality. The tolerances according to *EN 336* are met.

### 2.5 Base materials/Ancillary materials

RUBNER sawn timber comprises kiln-dried coniferous structural timber with rectangular cross sections. (Picea abies and Pinus sylvestris), whereby no auxiliary substances and additives are used.

The product has an average density of 459 $kg/m^3$.

This product/article/at least one partial article contains substances listed in the *candidate list* (date: 17.01.2023) exceeding 0.1 percentage by mass: **no.**

This product/article/at least one partial article contains other carcinogenic, mutagenic, reprotoxic (CMR) substances in categories 1A or 1B which are not on the *candidate list*, exceeding 0.1 percentage by mass: **no**.

Biocide products were added to this construction product or it has been treated with biocide products (this then concerns a treated product as defined by the (EU) *Ordinance on Biocide Products* No. 528/2012): **no**.

### 2.6 Manufacture

RUBNER sawn timber is manufactured from sustainable wood (PEFC) sourced from sustainable forestry. After delivery to the production facility, a quality and volume assessment is carried out. After debarking, the logs are classified according to their diameter and temporarily stored at the log yard (dry & wet storage). In the sawing line, the logs are split into main and sideboards with circular saws and then (sideboards) prismatically edged.
RUBNER sawn timber that is not dried is then visually graded and packaged.
Dried RUBNER sawn timber is kiln dried after the sawing process, with a target moisture content between 10 and 18 percent.
RUBNER sawn timber graded according to strength is pre-planed after technical drying and then visually or mechanically graded by strength.
Optionally, the kiln-dried Rubner sawn timber is protected from the weather during intermediate storage and transport with foils.

### 2.7 Environment and health during manufacturing

During production, there are no negative impacts on water and soil. The resulting process wastewater is fed into the local sewage system and cleaned according to legal regulations. The resulting exhaust air is cleaned according to legal regulations. Noise emissions from industrial plants are reduced by structural measures and comply with the legal requirements.
The employee protection in the manufacturing process complies with the respective country-specific requirements, employees are provided with personal protective equipment.

### 2.8 Product processing/Installation

RUBNER sawn timber can be processed with commercially available tools. The instructions for occupational safety/assembly are to be observed.

### 2.9 Packaging

Polyethylene foils are used in small quantities during transportation.

### 2.10 Condition of use

The composition of RUBNER sawn timber corresponds to the composition according to Section 2.5 for the entire period of use.

### 2.11 Environment and health during use

Environmental protection: According to current knowledge, the intended use of RUBNER sawn timber does not present any hazards or impairments to water, air and soil.

Health protection: Under normal conditions of use, RUBNER sawn timber is not expected to cause any damage or impairments to health.

### 2.12 Reference service life

For structural applications, the reference service life according to *ISO 15686* is at least 50 years. When used as designated, no end of durability must be expected due to its natural durability (protection against moisture). When used as designated, the lifetime of RUBNER sawn timber is equal to the duration of use of the building. For structural applications, the reference service life according to *ISO 15686* is at least 50 years.
The values quoted are based on empirical values and require strict compliance with the requirements of *EN 1995-1-1* (service classes) combined with periodic inspection and maintenance. The values do not represent warranty periods from which warranty claims can be derived.

### 2.13 Extraordinary effects

**Fire**

For RUBNER sawn timber, the following applies regarding the fire behaviour according to *EN 13501-1*.

**Fire protection**

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

**Water**

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

**Mechanical destruction**

The fracture behaviour of RUBNER sawn timber is appearance typical for solid wood.

### 2.14 Re-use phase

In the event of selective de-construction, RUBNER sawn timber can easily be re-used after the end of the structure's service life.
The preferred use of RUBNER sawn timber is in the form of reuse based on the applicable country-specific requirements. If it is not reused, it will be subjected to thermal utilization for the production of heat and electricity due to the high calorific value of approx. 16.5 MJ/kg (at a humidity of u = 12 %) in compliance with the applicable country-specific requirements.

### 2.15 Disposal

If the residues are not used for any other cascading use, waste wood is disposed according to the applicable country-specific requirements. Disposal represents a possible but unusual case. RUBNER sawn timber is assigned to waste code 17 02 01 in the European list of waste *2014/955/EU*.

### 2.16 Further information

More detailed information is available at: www.rubner.com

## 3. LCA: Calculation rules

### 3.1 Declared Unit

This EPD refers to a declared unit of 1 m³ of sawn timber produced by the RUBNER group. The declared unit refers to an average density of 459 kg/m³ and wood moisture at delivery of 12 %.

**Declared unit**

| Name | Value | Unit |
|---|---|---|
| Declared unit | 1 | $m^3$ |
| Gross density | 459 | $kg/m^3$ |
| Wood moisture at delivery | 12 | % |

The analysed products represent average sawn timber produced at the RUBNER site in Rohrbach (AT).

The declared unit was calculated on a volume-weighted basis. This EPD refers to an average product manufactured at one site. All products undergo the same processing steps. A possible variability is only expected due to the use of different wood species. The upstream chain for spruce is considered representative. The robustness of the declared LCA values can thus be classified as high.

### 3.2 System boundary

The life cycle assessment of average sawn timber produced by RUBNER 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 materials (round timber, etc.) and the corresponding transports to the RUBNER production site in Rohrbach (Austria). Direct emissions from drying are based on worst-case approximations and are included in the study. RUBNER produces thermal energy in its own biomass boilers. Electricity is provided by the own photovoltaic system as well as 100 % green electricity.

**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 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 the 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 *GaBi* database. Spruce represents the majority of wood processed at RUBNER. 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 *GaBi* 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 *GaBi* database 2022.2 as well as recognised literature such as *Rüter & Diederichs 2012.*

### 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 the RUBNER group and Daxner & Merl result 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 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 *GaBi* 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 production year, and the data are based on the volumes produced on 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

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

### 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 *GaBi* background database was used to calculate the LCA (*GaBi* 10; 2022.2).

## 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.

**Information on describing the biogenic carbon content at factory gate**

| Name | Value | Unit |
|---|---|---|
| Biogenic carbon content in product | 205 | kg C |

The product is delivered without packaging. Minor quantities optionally used were neglected.

**End of life (C1-C4)**

| Name | Value | Unit |
|---|---|---|
| Energy recovery | 459 | 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 sawn 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 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.

RUBNER

## 5. LCA: Results

The following table contains the LCA results for a declared unit of 1 m³ of sawn timber produced by the RUBNER group (459 kg/m³).

**DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; ND = 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 sawn timber (459 kg/m³)**

| Parameter | Unit | A1-A3 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|
| Global Warming Potential total (GWP-total) | kg $CO_2$ eq | -7.27E+02 | 0 | 1.45E+00 | 7.62E+02 | 0 | -4.1E+02 |
| Global Warming Potential fossil fuels (GWP-fossil) | kg $CO_2$ eq | 2.85E+01 | 0 | 1.38E+00 | 3.39E+00 | 0 | -3.81E+02 |
| Global Warming Potential biogenic (GWP-biogenic) | kg $CO_2$ eq | -7.56E+02 | 0 | 6.02E-02 | 7.58E+02 | 0 | -2.92E+01 |
| Global Warming Potential luluc (GWP-luluc) | kg $CO_2$ eq | 1.36E-01 | 0 | 9.28E-03 | 7.16E-04 | 0 | -4.56E-02 |
| Depletion potential of the stratospheric ozone layer (ODP) | kg CFC11 eq | 7.97E-10 | 0 | 1.35E-13 | 4.96E-11 | 0 | -2.95E-09 |
| Acidification potential of land and water (AP) | mol $H^+$ eq | 3.57E-01 | 0 | 4.6E-03 | 7.43E-03 | 0 | 3.16E-01 |
| Eutrophication potential aquatic freshwater (EP-freshwater) | kg P eq | 2.19E-03 | 0 | 4.92E-06 | 9.88E-06 | 0 | -5.95E-04 |
| Eutrophication potential aquatic marine (EP-marine) | kg N eq | 1.43E-01 | 0 | 2.11E-03 | 1.67E-03 | 0 | 6.85E-02 |
| Eutrophication potential terrestrial (EP-terrestrial) | mol N eq | 1.31E+00 | 0 | 2.36E-02 | 1.75E-02 | 0 | 8.11E-01 |
| Formation potential of tropospheric ozone photochemical oxidants (POCP) | kg NMVOC eq | 4.83E-01 | 0 | 4.13E-03 | 4.51E-03 | 0 | 2.91E-01 |
| Abiotic depletion potential for non fossil resources (ADPE) | kg Sb eq | 1.52E-05 | 0 | 1.39E-07 | 9.23E-07 | 0 | -6.33E-05 |
| Abiotic depletion potential for fossil resources (ADPF) | MJ | 3.52E+02 | 0 | 1.81E+01 | 6.15E+01 | 0 | -6.59E+03 |
| Water use (WDP) | $m^3$ world eq deprived | 1.52E+01 | 0 | 1.54E-02 | 7.72E-01 | 0 | -2.17E+01 |

**RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 m³ sawn timber (459 kg/m³)**

| Parameter | Unit | A1-A3 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|
| Renewable primary energy as energy carrier (PERE) | MJ | 2.14E+03 | 0 | 1.25E+00 | 7.62E+03 | 0 | -2.03E+03 |
| Renewable primary energy resources as material utilization (PERM) | MJ | 7.59E+03 | 0 | 0 | -7.59E+03 | 0 | 0 |
| Total use of renewable primary energy resources (PERT) | MJ | 9.73E+03 | 0 | 1.25E+00 | 3.41E+01 | 0 | -2.03E+03 |
| Non renewable primary energy as energy carrier (PENRE) | MJ | 3.53E+02 | 0 | 1.82E+01 | 6.15E+01 | 0 | -6.59E+03 |
| Non renewable primary energy as material utilization (PENRM) | MJ | 0 | 0 | 0 | 0 | 0 | 0 |
| Total use of non renewable primary energy resources (PENRT) | MJ | 3.53E+02 | 0 | 1.82E+01 | 6.15E+01 | 0 | -6.59E+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 | 7.59E+03 |
| Use of non renewable secondary fuels (NRSF) | MJ | 0 | 0 | 0 | 0 | 0 | 0 |
| Use of net fresh water (FW) | $m^3$ | 6.21E-01 | 0 | 1.45E-03 | 3.25E-02 | 0 | -1.38E+00 |

**RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 m³ sawn timber (459 kg/m³)**

| Parameter | Unit | A1-A3 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|
| Hazardous waste disposed (HWD) | kg | 1.77E-07 | 0 | 9.61E-11 | 5.32E-09 | 0 | -8.17E-07 |
| Non hazardous waste disposed (NHWD) | kg | 1.86E+00 | 0 | 2.96E-03 | 4.63E-02 | 0 | 2.28E-01 |
| Radioactive waste disposed (RWD) | kg | 5.77E-03 | 0 | 3.37E-05 | 9.82E-03 | 0 | -5.84E-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 | 4.59E+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 sawn timber (459 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 indicator 'Potential Human exposure efficiency relative to U235'.
This impact category deals mainly with the eventual impact of low-dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure or radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, radon and from some construction materials is also not measured by this indicator.

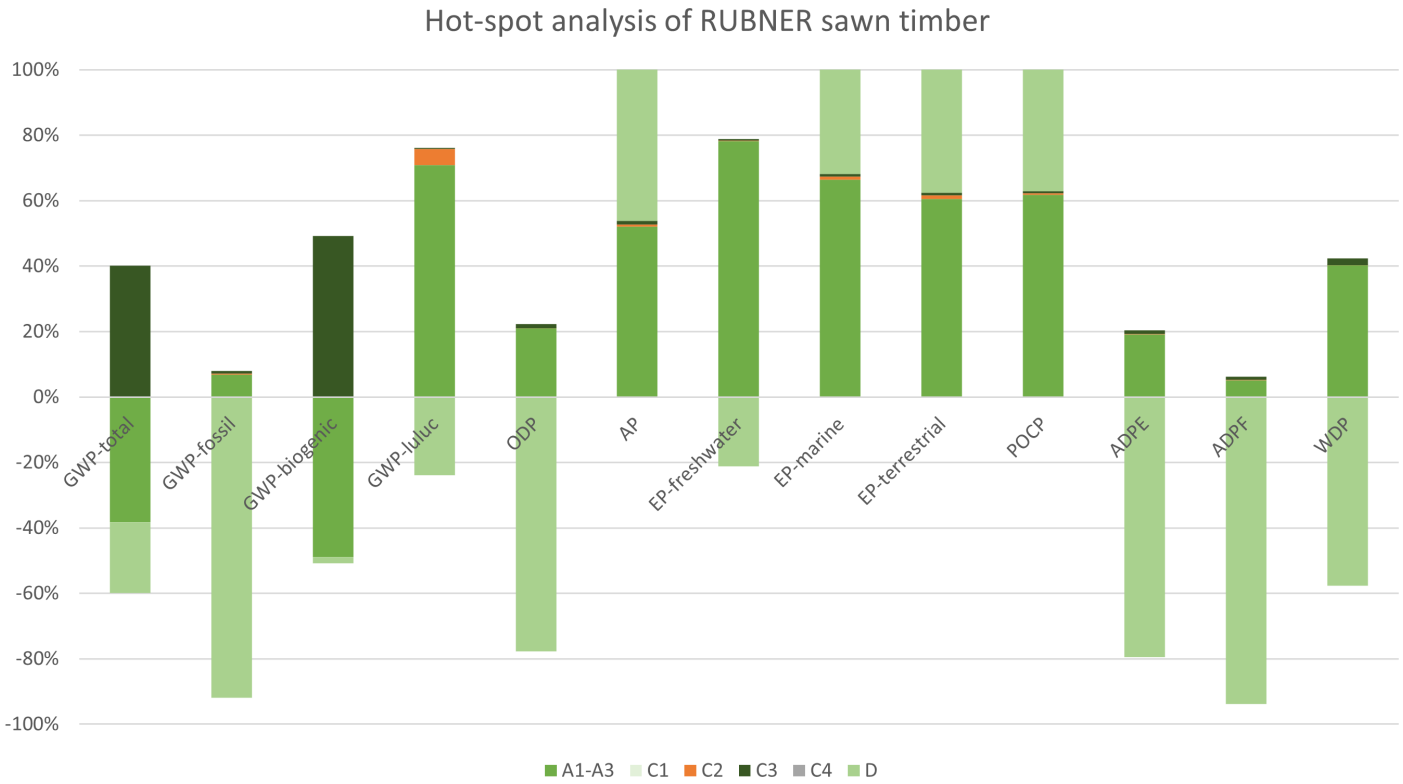
Disclaimer 2 – for the indicators 'abiotic depletion potential for non-fossil resources', 'abiotic depletion potential for fossil resources', 'water (user) deprivation potential, deprivation-weighted water consumption', 'potential comparative toxic unit for ecosystems', 'potential comparative toxic unit for humans – cancerogenic', 'Potential comparative toxic unit for humans - not cancerogenic', 'potential soil quality index'.
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 sawn timber.

The global warming potential (**GWP**) of sawn 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.




In the environmental profile of sawn timber, the upstream steps for the use of fresh sawn timber represent a driving force in the contribution to global warming (**GWP**) as well as in the use of fossil resources (**ADP fossil**). This is primarily due to the environmental burdens from the forestry processes for roundwood supply.

Due to the use of green electricity in the production, the external supply of electricity at the site represents a minor factor in the environmental profile of the product.

The declared results are representative for 100 % of the sawn timber produced.

## 7. Requisite evidence

The following evidence of environmental and health relevance was provided.

**7.1 Formaldehyde**
Not relevant, as no adhesives containing formaldehyde are used in the production process. A test report (No. 2117078/CT/2022/1/A1, 2022) confirms a formaldehyde emission below the technical detection limit.

**7.2 MDI**
Not relevant, as no MDI-containing adhesives are used in the production process.

**7.3 Fire gas toxicity**
The toxicity of the fire gases produced by the fire corresponds to the toxicity of the fire gases produced by the fire of natural wood.

**7.4 VOC emissions**
For the verification of VOC emissions, one test report (51005-002 III B, 2016) of an emission analysis according to *AgBB-Scheme 2015* for pure wood is available. Analysis was performed in accordance with *ISO 16000-3* and *ISO 16000-6*. The listed values represent lower limit values.

**VOC emissions**

| Name | Value | Unit |
|---|---|---|
| TVOC (C6 - C16) acc. to AgBB 2015 | 10 | µg/m$^3$ |
| Sum SVOC (C16 - C22) acc. to AgBB 2015 | < 5 | µg/m$^3$ |
| R (dimensionless) acc. to AgBB 2015 | 0.086 | - |
| VOC without NIK acc. to AgBB 2015 | < 5 | µg/m$^3$ |

## 8. References

**Standards**

**DIN 53436**
DIN 53436:2015, Generation of thermal decomposition products from materials for their analytic-toxicological testing.

**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 336**
EN 336:2013-12, Structural timber - Sizes, permitted deviations.

**EN 338**
DIN EN 338:2016-07, Structural timber - Strength classes.

**EN 717-1**
DIN EN 717-1:2005-01, Wood-based panels – Determination of Formaldehyde release – Part 1: Formaldehyde emission by the chamber method.

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

**EN 1995-1-1**
OEN 1995-1-1, Eurocode, 5: Bemessung und Konstruktion von Holzbauten - Teil 1-1: Allgemeines - Allgemeine Regeln und Regeln für den Hochbau - Konsolidierte Version mit nationalen Festlegungen, nationalen Erläuterungen und nationalen Ergänzungen zur Umsetzung der ÖNORM EN 1995-1-1, german Version

**EN 12664**
EN 12664:2001, 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 13183-2**
EN 13183-2:2002, Moisture content of a piece of sawn timber - Part 2: Estimation by electrical resistance method.

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

**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.

**hEN 14081**
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**ISO 12572**
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**ISO 14025**
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**ISO 14044**
DIN EN ISO 14044:2006-10, Environmental management - Life cycle assessment - Requirements and guidelines.

**ISO 16000-3**
ISO 16000-3:2011, Indoor air - Part 3: Determination of formaldehyde and other carbonyl compounds in indoor air and test chamber air - Active sampling method.

**ISO 16000-6**
ISO 16000-6:2011, 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 or MS-FID.

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**Further references**


**AgBB-Scheme 2015**
German Committee for HealthRelated Evaluation of Building Products (AgBB): Approach to health assessment of emissions of volatile organic compounds (VOCs and SVOCs) from building products.

**Candidate List**
List of substances of very high concern considered for approval (status 17.01.2023) according to Article 59 para. 10 of the REACH Regulation. European Chemicals Agency.

**GaBi**
GaBi 10, Software-System and Database for Life Cycle Engineering. 2022.2. Stuttgart, Echterdingen: Sphera, 1992-2022. Available at: https://sphera.com/product-sustainability-gabi-data-search/

**IBU 2021**
Institut Bauen und Umwelt e.V.: General Programme Instructions for the Preparation of EPDs at the Institut Bauen und Umwelt e.V. (IBU). Version 2.0, Berlin: Institut Bauen und Umwelt e.V., 2021. www.ibuepd.com

**Meyer, 1994**
Meyer, B, Boehme, C: 1994, Formaldeyhdabgabe von natürlich gewachsenem Holz, Holzzentralblatt 122 (Formaldeyhd release of naturally grown wood), S 1969-1972.

**PCR part A**
Product category rules for building-related products and services. Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report according to EN 15804+A2:2019. Version 1.3. Berlin: Institut Bauen und Umwelt e.V., 2022.

**PCR: Solid wood products**
Product category rules for building-related products and services. Part B: EPD requirements for solid wood products. Version v2, Berlin: Institut Bauen und Umwelt e.V., 31.05.2023.

**PCR 305/2011 (EU)**
REGULATION (EU) No 305/2011 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 9 March 2011 laying down harmonised conditions for the marketing of construction products and repealing Council Directive 89/106/EEC.

**Rüter & Diederichs 2012**
Ökobilanz-Basisdaten für Bauprodukte aus Holz. Work report from the Institut für Holztechnologie und Holzbiologie Nr. 2012/1. Hamburg: Johann Heinrich von Thünen-Institut.

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VERORDNUNG (EG) Nr. 1907/2006 DES EUROPÄISCHEN PARLAMENTS UND DES RATES vom 18. Dezember 2006 zur Registrierung, Bewertung, Zulassung undBeschränkung chemischer Stoffe (REACH).

**2014/955/EU**
2014/955/EU,COMMISSION DECISION of 18 December 2014 amending Decision 2000/532/EC on the list of waste pursuant to Directive 2008/98/EC of the European Parliament and of the Council.

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