Environmental Product Declaration
according to ISO 14025 and EN 15804

MRPI
milieu relevante product informatie

This declaration is for:
X-LAM (Cross laminated timber) | German market

Provided by:
W. u. J. Derix GmbH & Co.

DERIX

program operator
Stichting MRPI®
publisher
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EN 15804 VERIFIED

COMPANY INFORMATION

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SCOPE OF DECLARATION

This MRPI®-EPD certificate is verified by **Anne-Kees Jeeninga, Advieslab VOF.**
The LCA study has been done by **Gert Jan van Beijnum, NIBE.**

The certificate is based on an LCA-dossier according to ISO14025 and NEN-EN15804+A1. It is verified according to the 'EPD-MRPI® verification protocol May 2017.v3.1'. EPDs of construction products may not be comparable if they do not comply with NEN-EN15804+A1. Declaration of SVHC that are listed on the 'Candidate List of Substances of Very High Concern for authorisation' when content exceeds the limits for registration with ECHA.

PROGRAM OPERATOR

Stichting MRPI®
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Amsterdam

ir. J-P den Hollander, Managing director MRPI®

PRODUCT
X-LAM (Cross laminated timber) German market

DECLARED UNIT/FUNCTIONAL UNIT
1 m³ cross-laminated timber (X-LAM)

DESCRIPTION OF PRODUCT
One cubic meter X-LAM suitable as constructive floor, roof and wall elements

VISUAL PRODUCT

MORE INFORMATION
https://www.derix.de/en/produkte/x-lam-brettspe rrholz/

DEMONSTRATION OF VERIFICATION		
CEN standard EN15804 serves as the core PCR[a]		
Independent verification of the declaration and data, according to EN ISO 14025:2010:		
internal:	external: X	
Third party verifier:		
Anne-Kees Jeeninga, Advieslab v.o.f.		
[a] PCR = Product Category Rules		

DETAILED PRODUCT DESCRIPTION

The manufacture of X-LAM involves drying coniferous timber boards to less than 15% moisture, followed by pre-planing and strength sorting visually and/or mechanically. Board sections identified as having strength-reduced areas are removed depending on the requisite strength class and the remaining board sections joined by finger-jointing connections to form lamellas of potentially infinite length. During the subsequent pre-planing process, the lamellas are planed on four sides to lengths ranging from 17 mm to 45 mm. In the last step the boards are glued crosswise in the press bed. After pressing and hardening, the panel is planed, bevelled, bound and packed.

Board dimensions
Length: 6.00 – 17.80 m
Width: up to 3.50 m
Thickness: up to 400 mm

Timber species / Strength classes
Spruce: C24
Moisture content: 10 % ± 2 %
Moulded density: approx. 470 kg/m³
(other timber species and strength classes on request)

Gluing – Adhesive based on melamine resin
Adhesive type 1 to EN 301, approved for gluing load-bearing timber components for interiors and exteriors, weather-resistant (emission class E1).

Reference Service Life
The reference service life of X-LAM is in line with the service life of the building when correctly designed and used as designated. Therefore a RSL of 100 years is assumed in this LCA.

Cutting and Processing
with 5-axis CNC portal machine to customer specifications
Computed burn rate: 0.65 mm / minute

Biogenic carbon
Biogenic carbon storage during lifetime of product, calculated following EN 16449.
470 kg / m³ MC 12%
413,6 kg/m³ MC 0%
C content 50%, mol weight CO2 3,67
Result in 759 kg CO2 stored per m³ of Glulam / X-LAM (http://www.opslagco2inhout.nl/en/motivatie)

Hazardous substances
The product does not contain any substance from the REACH candidates list.

COMPONENT (> 1%)	[kg / %]
Coniferous Wood (PEFC Spruce)	99%
Melamine Urea formaldehyde	1%

(*) > 1% of total mass

SCOPE AND TYPE

The product specific EPD for X-LAM is an Cradle-to-Gate with options EPD. X-LAM is manufactured in North Rhine-Westphalia, Germany. The module A4 is calculated for 1km so the module can be made specific for a project or database. The scenario for end-of-life is applicable for the German market, which is in addition to the MRPI protocol. The softwares Simapro 9.0.0 and NIBE EPD application are used to perform the LCA. The Ecoinvent 3.5 database was used. The validity of this EPD is in correspondence with the specifications of the LCA project report.

Product stage (A1-A3)

The production phase consists of the extraction of raw materials, transportation of the raw materials, processing the raw materials into the final product and the required energy for production. Packaging materials are included. Anchoring, ancillary materials, preservation treatments and other top layers, varnish are not included.

Construction process stage (A4-A5)

This stage consists the transport of the product from production plant in North Rhine-Westphalia to a construction site in Germany (1 km and therefore can be made specific). It also includes the loss of material during construction (3% assumed). The additional required production, transport and end-of-life of the lost material during construction is included. The installation at the construction site with an electric crane is included as well.

Use stage (B1-B3)

No planned maintenance for technical performance is needed, aesthetic maintenance in the form of lacquer, paint, etc. is not included.

End of life stage (C1-C4)

When the end of the life stage of the building is reached, the de-construction/demolition begins. This EPD includes the necessary transport (C2) from the demolition site to the sorting location and distance to final disposal. The end of life stage includes the final disposal to landfill (C4), incineration (C3) and needed recycling processes up to the end-of-waste point (C3). Loads and benefits of recycling, re-use and exported energy are part of module D. Module C1 is not considered.

*Supplementary information outside the building life cycle (D)*

The environmental benefits of exported energy by incineration are granted at this stage. The amount of avoided energy is based on the Lower Heating Values of the materials.

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PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport gate to site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
x	x	x	x	x	x	x	x	MNA	MNA	MNA	MNA	MNA	x	x	x	x

X = Module assessed

MNA = Module not assessed
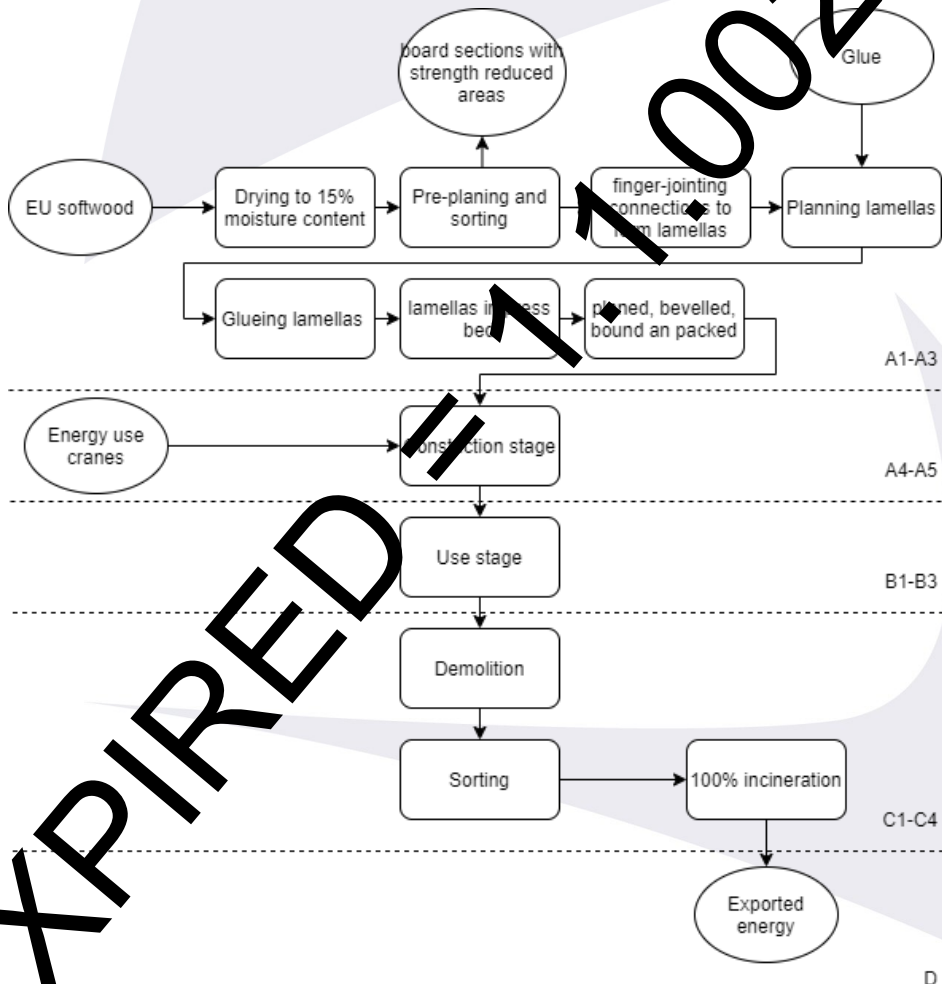
REPRESENTATIVENESS

The input data are representative for X-LAM (Cross laminated timber) a product of Derix. The data are representative for the German market.

ENVIRONMENTAL IMPACT per functional unit or declared unit

	UNIT	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	C2	C3	C4	D
ADPE	kg Sb-eq.	3.43 E-4	1.48 E-5	1.22 E-4	4.80 E-4	8.01 E-8	1.96 E-5	0.00	0.00	0.00	3.76 E-6	8.97 E-6	0.00	4.65 E-5
ADPF	MJ	1.94 E+3	1.26 E+2	6.59 E+1	2.13 E+3	6.78 E-1	8.22 E+1	0.00	0.00	0.00	2.06 E+1	5.02 E+1	0.00	-1.24 E
GWP	kg CO2-eq.	-6.42 E+2	7.59 E+0	3.64 E+0	-6.31 E+2	4.10 E-2	9.01 E+0	0.00	0.00	0.00	1.32 E+0	7.86 E+2	0.00	-3.80 E+2
ODP	kg CFC11-eq.	1.66 E-5	1.52 E-6	3.11 E-7	1.85 E-5	8.22 E-9	6.43 E-7	0.00	0.00	0.00	2.47 E-7	4.86 E-7	0.00	-3.05 E-5
POCP	kg ethene-eq.	1.95 E-1	4.81 E-3	1.46 E-2	2.15 E-1	2.60 E-5	7.26 E-3	0.00	0.00	0.00	E-4	1.92 E-2	0.00	-4.52 E-2
AP	kg SO2-eq.	9.74 E-1	2.01 E-2	8.42 E-2	1.08 E+0	1.08 E-4	4.89 E-2	0.00	0.00	0.00	.73 E-3	.01 E-1	0.00	-7.27 E-1
EP	kg (PO4)3--eq.	2.43 E-1	3.30 E-3	1.93 E-2	2.66 E-1	1.78 E-5	1.25 E-2	0.00	0.00	0.00	1. 5 E-3	2.64 E-2	0.00	-2.02 E-1

ADPE = Abiotic Depletion Potential for non-fossil resources

ADPF = Abiotic Depletion Potential for fossil resources

GWP = Global Warming Potential

ODP = Depletion potential of the stratospheric ozone layer

POCP = Formation potential of tropospheric ozone photochemical oxidants

AP = Acidification Potential of land and water

EP = Eutrophication Potential

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RESOURCE USE per functional unit or declared unit

	UNIT	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	C2	C3	C4	D
PERE	MJ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PERM	MJ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PERT	MJ	2.99 E+4	1.34 E+0	1.39 E+3	3.13 E+4	7.24 E-3	9.46 E+2	0.00	0.00	0.00	2.16 E-1	1.62 E+0	0.00	-3.29 E+2
PENRE	MJ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PENRM	MJ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PENRT	MJ	2.52 E+3	1.35 E+2	9.06 E+1	2.75 E+3	7.27 E-1	1.01 E+2	0.00	0.00	0.00	2.19 E+1	1.96 E+1	0.00	-6.43 E+3
SM	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RSF	MJ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRSF	MJ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FW	m3	1.73 E+0	2.33 E-2	1.25 E-1	1.88 E+0	1.26 E-4	8.70 E-2	0.00	0.00	0.00	3.50 E-3	5.07 E-1	0.00	-1.15 E+0

PERE = Use of renewable energy excluding renewable primary energy resources

PERM = Use of renewable energy resources used as raw materials

PERT = Total use of renewable primary energy resources

PENRE = Use of non-renewable primary energy resources excluding non-renewable energy resources used as raw materials

PENRM = Use of non-renewable primary energy resources used as raw materials

PENRT = Total use of non-renewable primary energy resources

SM = Use of secondary materials

RSF = Use of renewable secondary fuels

NRSF = Use of non renewable secondary fuels

FW = Use of net fresh water

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OUTPUT FLOWS AND WASTE CATEGORIES per functional unit or declared unit

	UNIT	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	C2	C3	C4	D
HWD	kg	1.78 E-2	7.34 E-5	1.80 E-3	1.97 E-2	3.96 E-7	7.50 E-4	0.00	0.00	0.00	1.31 E-5	2.76 E-4	0.00	2.86 E-2
NHWD	kg	3.23 E+1	1.08 E+1	3.55 E+0	4.66 E+1	5.81 E-2	1.93 E+0	0.00	0.00	0.00	1.26 E+0	4.81 E+0	0.00	-12 E+1
RWD	kg	1.58 E-2	8.62 E-4	4.55 E-4	1.71 E-2	4.65 E-6	7.16 E-4	0.00	0.00	0.00	1.39 E-4	1.37 E-4	0.00	-1.54 E-2
CRU	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MFR	kg	0.00	0.00	0.00	0.00	0.00	6.26 E-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MER	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EEE	MJ	0.00	0.00	3.60 E+1	3.60 E+1	0.00	7.21 E+0	0.00	0.00	0.00	0.00	0.00	0.00	1.20 E+3
ETE	MJ	0.00	0.00	7.28 E+1	7.28 E+1	0.00	1.24 E+1	0.00	0.00	0.00	0.00	0.00	0.00	2.43 E+3

HWD = Hazardous Waste Disposed
NHWD = Non Hazardous Waste Disposed
RWD = Radioactive Waste Disposed
CRU = Components for reuse
MFR = Materials for recycling
MER = Materials for energy recovery
EEE = Exported Electrical Energy
ETE = Exported Thermal Energy

CALCULATION RULES

Cut off criteria

There is no cut-off of inputs and outputs in any of the processes during the life cycle stage, unit processes of each declared life cycle stage are considered.

Data quality and data collection period

Specific data is collected from Derix through a questionnaire. The data collected data is based on the years 2018 for inputs and 2019 for product composition. Generic data are selected from the Ecoinvent 3.5 database.

Allocation

The energy use per cubic meter X-LAM is determined by allocating the total energy use of 2018 to the total amount of produced products in cubic meters.

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SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION

Construction stage (A4-A5)

At the construction stage scenarios for transportation to the construction site, losses at construction site and installation of the product are included. The scenarios on which the LCA is based are outlined in more detail below.

Name	Value	Unit
Transport to an construction site in Germany by Truck	1	km
Generated waste during construction	3	%
Installation of the product (m3) by electric crane	4.51	kWh

End-of-life stage (C1-C4)

At the end-of-life stage scenarios are used for waste processing. The scenarios on which the LCA is based are outlined in more detail below.

Name	Value	Unit
Transport distance for waste wood (module C2)	20	km
Incineration	100	%
Waste wood for energy recovery	474.8	kg

Benefits and loads beyond the system boundary (D)

The assumed scenario for end-of-life is 100% incineration. The exported energy substitutes fuels form average used (fossil) sources, whereby it is alleged that the generated thermal energy substitutes heat by natural gas and electrical energy substitutes the average German production mix for electricity.

Name	Value	Unit
LHV per kilogram Spruce (n=12%)	13.99	MJ
Electrical efficiency	18.09	%
Thermal efficiency	36.6	%
Exported Energy thermal	1189	MJ
Exported Energy electric	2407	MJ

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DECLARATION OF SVHC

The product does not contain any substance from the REACH candidates list.

REFERENCES

- ISO 14040:2006: Environmental management - Life cycle assessment - Principles and framework; EN ISO 14040:2006
- ISO 14044:2006: Environmental management - Life cycle assessment - Requirements and guidelines; EN ISO 14040:2006
- ISO 14025:2011: Environmental labels and declarations — Type III environmental declarations — Principles and procedures
- EN 15804+A1 2013: Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products
- EN 16485:2014 Round and sawn timber – Environmental Product Declarations – Product category rules for wood and wood-based products for use in construction

REMARKS

None

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