Environmental Product Declaration

according to ISO 14025 and EN 15804

This declaration is for:

X-LAM (Cross laminated timber) | German market

Provided by:

W. u. J. Derix GmbH & Co.

program operator

Stichting MRPI®

publisher

Stichting MRPI®

www.mrpi.nl

MRPI® registration

1.1.00280.2022

date of first issue

27-07-2020

date of this issue

08-03-2022

expiry date

08-03-2027

COMPANY INFORMATION

DERIX

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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 for walls and roof elements. Excluding anchoring, preservation, varnish, etc.

VISUAL PRODUCT

MRPI® REGISTRATION

1.1.00280.2022

DATE OF ISSUE

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MORE INFORMATION

https://www.derix.de/en/produkte/x-lam-brettsperrholz/

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 EN15804+A1. It is verified according to the 'MRPI®-EPD verification protocol November 2020.v4.0'. EPDs of construction products may not be comparable if they do not comply with 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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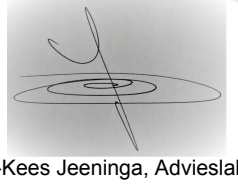
Amsterdam

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

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 VOF
[a] PCR = Product Category Rules

DETAILED PRODUCT DESCRIPTION

The manufacture of X-LAM involves drying coniferous boards and timbers to less than 15% wood moisture, followed by pre-planing and sorting visually and/or mechanically by strength. Board sections identified as having strength-reduced areas are removed depending on the requisite strength class and the ensuing board sections joined by finger-jointing connections to form lamellas of infinite length. During the subsequent pre-planing process, the lamellas are planed on four sides to strengths ranging from 17 mm to 45 mm. In the last step the manufacturer directly arrange the glued lamellas crosswise in the press bed. After pressing and hardening, the blank 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 with transparent glue line (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 (not reported within EPD), calculated following EN 16449
470 kg / m³ MC 12%
413.6 kg/m³ MC 0%
C content 50%, mol weight CO2 3,67
Results in 759 kg CO2 stored per m³ of Glulam / X-lam (http://www.opslagco2inhout.nl/en/motivatie)

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. The product is produced by Derix in Niederkróchten 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 Niederkróchten 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 needed 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.

Use stage (B1-B3)

No planned maintenance for technical performance is needed, estetic 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 isn't 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 avoid energy is based on the Lower Heating Values of the materials.

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	Reuse-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	ND	ND	ND	ND	ND	x	x	x	x

X = Modules Assessed

ND = Not Declared

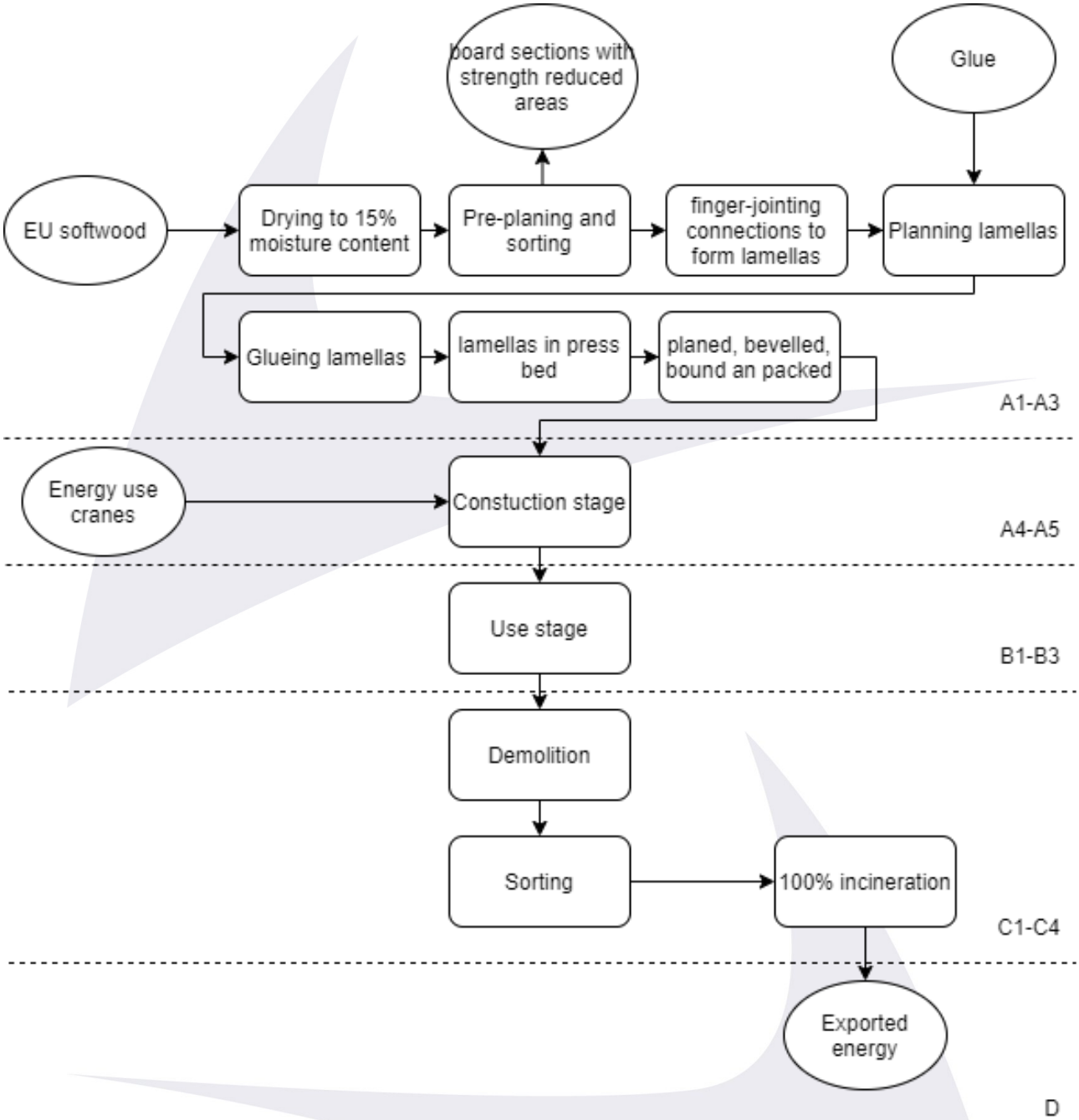


Figure: LCA process diagram according to EN 15804(7.2.1)

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 (indicators A1)

	UNIT	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	C2	C3	C4	D
ADPE	kg Sb eq.	2.80 E-4	1.48 E-5	1.20 E-4	4.16 E-4	8.01 E-8	1.76 E-5	0.00	0.00	0.00	3.76 E-6	8.97 E-6	0.00	-4.81 E-5
ADPF	MJ	1.15 E+3	1.26 E+2	4.20 E+1	1.31 E+3	6.78 E-1	9.03 E+1	0.00	0.00	0.00	2.06 E+1	5.02 E+1	0.00	-6.47 E+3
GWP	kg CO2 eq.	-6.99 E+2	7.59 E+0	1.92 E+0	-6.90 E+2	4.10 E-2	8.90 E+0	0.00	0.00	0.00	1.32 E+0	7.86 E+2	0.00	-3.93 E+2
ODP	kg CFC11 eq.	9.98 E-6	1.52 E-6	1.11 E-7	1.16 E-5	8.22 E-9	6.25 E-7	0.00	0.00	0.00	2.47 E-7	4.86 E-7	0.00	-3.16 E-5
POCP	kg ethene eq.	4.49 E-2	4.81 E-3	1.01 E-2	5.98 E-2	2.60 E-5	2.95 E-3	0.00	0.00	0.00	7.84 E-4	1.92 E-2	0.00	-4.70 E-2
AP	kg SO2 eq.	4.49 E-1	2.01 E-2	6.85 E-2	5.38 E-1	1.08 E-4	3.36 E-2	0.00	0.00	0.00	5.73 E-3	1.01 E-1	0.00	-7.51 E-1
EP	kg (PO4)3- eq.	9.82 E-2	3.30 E-3	1.49 E-2	1.16 E-1	1.78 E-5	8.13 E-3	0.00	0.00	0.00	1.15 E-3	2.64 E-2	0.00	-2.09 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

RESOURCE USE per functional unit or declared unit (A1 / A2)

	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	2.56 E+4	1.34 E+0	1.26 E+3	2.69 E+4	7.24 E-3	8.13 E+2	0.00	0.00	0.00	2.16 E-1	1.62 E+0	0.00	-3.39 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	1.35 E+3	1.35 E+2	5.54 E+1	1.54 E+3	7.27 E-1	9.79 E+1	0.00	0.00	0.00	2.19 E+1	4.96 E+1	0.00	-6.67 E+3
SM	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
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	1.35 E+0	2.33 E-2	1.14 E-1	1.48 E+0	1.26 E-4	7.68 E-2	0.00	0.00	0.00	3.50 E-3	5.07 E-1	0.00	-1.19 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

OUTPUT FLOWS AND WASTE CATEGORIES per functional unit or declared unit (A1 / A2)

	UNIT	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	C2	C3	C4	D
HWD	kg	7.60 E-3	7.34 E-5	1.49 E-3	9.17 E-3	3.96 E-7	4.64 E-4	0.00	0.00	0.00	1.31 E-5	2.76 E-4	0.00	-2.95 E-2
NHWD	kg	2.07 E+1	1.08 E+1	3.21 E+0	3.47 E+1	5.81 E-2	1.58 E+0	0.00	0.00	0.00	1.26 E+0	4.81 E+0	0.00	-1.16 E+1
RWD	kg	7.17 E-3	8.62 E-4	1.95 E-4	8.23 E-3	4.65 E-6	4.58 E-4	0.00	0.00	0.00	1.39 E-4	1.37 E-4	0.00	-1.59 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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.25 E+3
ETE	MJ	0.00	0.00	7.28 E+1	7.28 E+1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.51 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 considers for 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.

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 used. 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

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