ENVIRONMENTAL PRODUCT DECLARATION

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

Owner of the Declaration	Lindner Group
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-LIN-20240249-IBC1-EN
Issue date	13.06.2025
Valid to	12.06.2030

Raised Floor Panel, Type LIGNA

Lindner Group

Institut Bauen und Umwelt e.V.

ECO PLATFORM EPD VERIFIED

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1. General Information

Lindner Group

Programme holder

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

Declaration number

EPD-LIN-20240249-IBC1-EN

This declaration is based on the product category rules:

System floors, 01.08.2021
(PCR checked and approved by the SVR)

Issue date

13.06.2025

Valid to

12.06.2030

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

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

Raised Floor Panel, Type LIGNA

Owner of the declaration

Lindner Group
Bahnhofstraße 29
94424 Arnstorf
Germany

Declared product / declared unit

1 m² raised floor panel Type LIGNA without surface covering or substructure.

Scope:

This EPD relates to the production, transport and disposal of an average LIGNA raised floor panel. The results of the EPD are valid for all LIGNA raised access floors with a thickness between 28 and 38 mm.The EPD is only valid for the LIGNA raised floor panel. 4
The panel offers customization with steel sheets applied to one or both sides to meet specific static requirements or customer preferences. The environmental impacts of these options are calculated separatedly and included in the annex.

The collected production data refers to the year 2022. The production facility is located in Arnstorf, Germany.
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

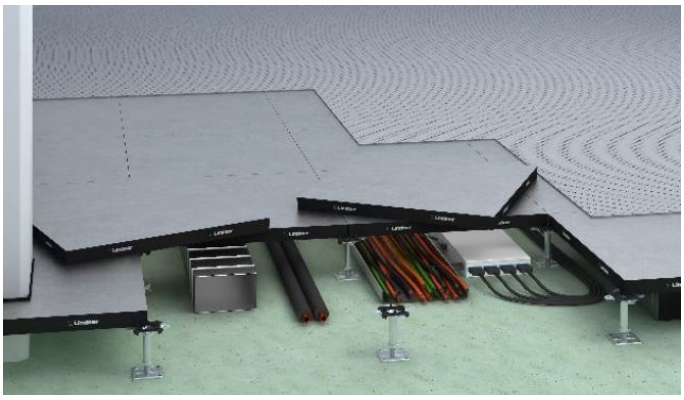
The standard EN 15804 serves as the core PCR
Independent verification of the declaration and data according to ISO 14025:2011
☐ internally ☒ externally

Mr Stephen Forson ,
(Independent verifier)

2. Product

2.1 Product description/Product definition

The declared product Lindner raised floor panel type LIGNA is a highly compressed wood-based panel, which is an essential component of the raised access floor system type LIGNA. The declared product has a thickness of 28 - 38 mm and a bulk density range of 600 - 720 kg/m³. The raised access floor panels are manufactured as standard in the dimensions 600 x 600 mm and with edge trim glued to the sides. The underside and/or top side of the panels are coated with steel sheet or humidity protection. The raised access floor panel type LIGNA was developed and tested on the basis of the test and classification standard *EN 12825* (raised access floors). The substructure (pedestals) are not considered in this EPD.In the annex a surface covering as steel sheet on one or both sides is considered.The EPD is only valid for the LIGNA panel. Steel sheets are mentioned in the annex for reference.The panel offers customization with steel sheets applied to one or both sides of the panel to meet specific static requirements or customer preferences, as mentioned in the annex.



2.2 Application

The raised access floor panel is made out of high-density wood-based material and is mainly used in public, commercial and private buildings. In combination with additional components, the raised access floor system LIGNA is created, which is used to create cavities or space for installation rooms. The raised access floor panels can be covered with all standard floor coverings, but it is necessary to match them to the different variants.

2.3 Technical Data

The raised floor system has a layer thickness ranging from 28 to 38 millimeters and a grammage weight of 17 to 27 kilograms per square meter, with a base course density of 650 kilograms per cubic meter. In terms of performance, it can withstand a static point load of 2 to 7 kilonewtons as per EN 12825 and offers fire protection classified from B-s2, d0 to F30 / REI 30 according to EN 13501 and DIN 4102

Construction Data

Name	Value	Unit
Layer thickness Base course layer thickness (from – to)	28 - 38	mm
Grammage weight	17 - 27	kg/m^2
Density Base course density	650	kg/m^3
Point load Static (EN 12825)	2 - 7	kN
Fire protection (EN 13501/DIN 4102) construction material class carrier plate*	B-s2, d0-C-s1,d0	-
Fire protection (EN 13501/DIN 4102) fire resistance*	F30 / REI 30	-
Sound insulation (laboratory values; VDI 3762 is to be observed)* standard side noise level difference D nfw	45 - 59	dB
Sound insulation (laboratory values; VDI 3762 is to be observed)* sound insulation Rw	62	dB
Sound insulation (laboratory values; VDI 3762 is to be observed)* standard side noise level L nfw	69 - 30	dB
Sound insulation (laboratory values; VDI 3762 is to be observed)* footfall noise level reduction ΔL w	16 - 33	dB

*=The listed values show the complete testing range of the LIGNA raised floor panel.
Product performance values in terms of its characteristics as per decisive technical stipulation (no CE approval mark).

2.4 Delivery status

LIGNA raised floor panels (standard 600 x 600 mm) are delivered stacked on a pallet. The stack height depends on the thickness of the panels and the respective covering applied.

2.5 Base materials/Ancillary materials

Name	Value	Unit
High density chipboard panel	99	%
Humidity protection (aluminium / aluminium-PET)	<0,05	%
Dispersion adhesive	<0,05	%
Thermoplastic adhesive (EVA)	<0,005	%
Edge trim (ABS)	<0,005	%

In addition to the declared raised access floor panel LIGNA, other components that are not part of the declaration are required for the construction of a raised access floor system. (see installation instructions for raised access floor systems).

1) 'This product/article/at least one partial article contains substances listed *in the candidate list* (date: 01.06.2024) exceeding 0.1 percentage by mass: no'.

2) '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'

3) "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

Production and treatment of the raised access floor panels are follows: the high density chipboard panels are delivered in large format and are then cut to size in a first production step. The panels are then covered with aluminium foil for humidity protection in further production steps. Edge trims are adhered

to the sides of the chipboard panels. Lindner Group operates a quality management system in conformity with *EN ISO 9001*.

2.7 Environment and health during manufacturing

The production of raised floor panels made from chipboards is carried out in facilities approved under environmental protection provisions. Lindner Group operates an energy management system in conformity with *EN ISO 50001* and an environmental management system in accordance with *EN ISO 14001*.

2.8 Product processing/Installation

The raised access floor panel LIGNA delivered to the construction site is joined together with other individual components to form a system floor. Further instructions can be found in the installation guidelines for raised access floors. Installation must be carried out by trained personnel.

2.9 Packaging

The product is delivered stacked on pallets and wrapped with cardboard. The packaging material will be disposed accordingly.

2.10 Condition of use

There is no change in the material properties during the utilisation phase. All technical values remain unchanged.

2.11 Environment and health during use

No health hazards and impairments are to be expected based on current knowledge in the case of normal, appropriate use intended for raised access floor panels. For further details see Section 7.

2.12 Reference service life

A reference service life according to *ISO 15686* cannot be calculated for this product. The technical service life is therefore derived from the table "Service life of components for life-cycle analysis according to the rating system for sustainable construction – Code No. 352.911" of the Federal Office for Construction and Regional Planning *BBSR*. The *BNB* assumes that raised floor panels will have a service life of more than 50 years. The stated service life is subject to proper use, preservation and care. There is no influence of ageing on the material properties during the utilisation phase.

2.13 Extraordinary effects

Fire

LIGNA raised floor panels are "flame retardant" according to *EN 13501- 1* and classified in building material class B-s2,d0 or C-s1, d0.

Fire prevention

Name	Value	Unit
Building material class	B or C	-
Smoke gas development	s1 or s2	-
Burning droplets	d0	-

Water

The LIGNA raised floor panel is to be installed indoors and should generally not come into contact with water. Short exposure to moisture will not damage the panel provided it can dry completely afterwards. Exposure of the raised floor system to greater amounts of water over a longer period may, however, impair its technical properties, as the product is not water resistant and the panels tend to swell in very damp or wet surroundings.

Mechanical destruction

No impacts on the environment following unforeseeable mechanical destruction. Depending on the extent of the destroyed areas, these can be replaced or newly installed without impairing functionality.

2.14 Re-use phase

The following possibilities arise with regard to the phase after the service life:

Energy utilisation
After being separated from other construction debris, the floor panel is suitable for energy recovery.

Further use / reuse
The raised floor panels can be removed in a non-destructive way and reused in unaltered form for the same purpose. Prior separation from other construction materials on the site is recommended.

Refurbishing / further use
Panels are "only" peeled off on the top side either on the construction site or in the factory. The resulting product has then been minimally refurbished and maintains all its technical qualities.

2.15 Disposal

The waste codes for the raised floor panel and its packaging are in accordance with the Waste Catalogue Ordinance (AVV) and the *European Waste Index*:

Product waste
EAK 170904 / wood
Packaging waste
EAK 15 01 03 / packaging from wood
EAK 15 01 01 / packaging from cardboard

2.16 Further information

Further product information is available at:
www.Lindner-Group.com

3. LCA: Calculation rules

3.1 Declared Unit

The declared unit is an average of 1 m² of LIGNA raised floor panel without any covering and without substructure. The average panel thickness is 37.04 mm and has an average density of 645 kg/m³.
The declared unit has a weight of 24,66 kg/m².
The results of the EPD are valid for all the LIGNA raised floor panels with a range of thickness between 28 and 38 mm. The heaviest product in the product family could have 9% more weight, the lightest panel could have 28% less weight than the dU. The results of the life cycle assessment will be representative for the whole family of Ligna panels.

Declared unit

Name	Value	Unit
Declared unit	1	m^2
Grammage	24.66	kg/m^2
Conversion factor to 1 kg	0.04	-
Gross density	645	kg/m^3
Layer thickness	0.04	m

The product might have an optional steel sheet covering on 1 side or both sides. The environmental impact of these options is declared in the annex. In order to calculate the impact of the panel with steel covering, the result of the EPD would be added acc. to the calculation formula.

3.2 System boundary

The life cycle analysis for the LIGNA raised access floor panel includes the stages "cradle to gate with options".

Modules A1-A3 are taken into account as a summarised module for the manufacturing phase, A4-A5 (construction phase), C1-C4 (disposal phase), D (potentials at the end of life and loads outside the system boundary).

In detail, the following processes were included in the information module for the production and disposal of the raised access floor panel:
- Provision processes of raw material (chipboard panel, steel, adhesive) (A1)
- Transport of raw and auxiliary to the plant (A2)
- Manufacturing processes for the floor panel, including energy expenditures and disposal of waste materials (A3)
- Production of packaging materials (A3)
- Transport from the factory gate to the construction site (A4)
- Installation is made manually. Transport of the product to different floors of the building is not taken into account (A5)
- The environmental impact of the disposal of the packaging (A5).
- Dismantling of the product is done manually (C1)
- Transport to an incineration facility C2/1 or return to production facility(C2)
- Waste treatment in an incineration facility (C3/1), refurbishment in C3
- End-of-life potential for the substitution of primary material in module D and D/1.

3.3 Estimates and assumptions

For the chipboard panel it is assumed that there is a portion of 30% wood scrap in the panel. The presumptions are based on data from the majority of the chipboard suppliers, as well as on literature.
The material inventories were to be found in the *LCA FE* database, except for the plastic granulate for the edge trim of the panel.

3.4 Cut-off criteria

In the case of all specified data collected all source materials used following production guidelines, were taken into account. Transport for packaging was taken into account. All the components for the raised access floor panel has been balanced.

3.5 Background data

For modelling the life cycle of the product under consideration, the *LCA FE* software developed by *Sphera* has been used. The data required for the upstream chain, for which no specific information is available, is taken from the Sphera database:https://sphera.com/2023/xml-data/processes.

3.6 Data quality

The range of weight deviation is between -27% and +9%, the average has been determined using a family of products with the same name, without options in surfaces. The average product aligns closely with the declared unit, making it representative of the product range.
The production of the whole family takes place in the same processes, and expenditure changes for the production are minimal; for environmental core indicators the biogenic carbon content is reliable and representative of the portfolio. As the release within oxidation will take place anyway under module C3 or C4 and they depend on the weight, the results are declared to be robust. The GWP biogenic has a share in the GWP total of approx. 88% for the production phase.

The data set quality is very good to medium. The background datasets from the LCA FE databases used are not older than 5 years. The production process for other products as the declared unit does not differ, the geographical representativity remains identical, as well as the background data.

3.7 Period under review

The base data for the life cycle assessment was collected in 2022.

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: Global

3.9 Allocation

No by-products are generated during the production process. The applied software model therefore includes no such allocation. The data collection values for electrical energy and auxiliary materials accordingly relate to the product being declared. The quantities of raw and auxiliary materials and consumables used at the raised floor panel production unit are well known, so a clear distribution by mass, surface area and weight is possible. No environmental impact is considered for the input quantity of steel scrap.
Any combustible production waste (wood dust) and the product (chipboard) are to be used to generate energy at the end of life. The resulting electrical and thermal energy is accounted for within Modules A1–A3 or is duly reflected for the subsequent system (Module D). The thermal energy released during thermal waste incineration can be regarded as equivalent to the required thermal process energy.

An R1 factor of greater than 0.6 is assumed for all waste incineration plants.
The credits are made using the German average data for electrical energy and
thermal energy from natural gas.

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. LCA FE Professional and Additional database, Content Version 2023.2,
https://gabi.sphera.com/databases/gabi-data

4. LCA: Scenarios and additional technical information

Characteristic product properties of biogenic carbon

The biogenic carbon content quantifies the amount of biogenic carbon in a construction product leaving the factory gate, and it shall be separately declared for the product and for any accompanying packaging.
If the total mass of biogenic carbon containing materials is less than 5 % of the total mass of the product and accompanying packaging, the declaration of biogenic carbon content may be omitted. The mass of packaging containing biogenic carbon shall always be declared.

Information on describing the biogenic Carbon Content at factury gate

Name	Value	Unit
Biogenic carbon content in product	9.86	kg C
Biogenic carbon content in accompanying packaging	0.14	kg C

Note: 1 kg of biogenic carbon is equivalent to 44/12 kg of CO_2.

Below find a more detailed description of the scenarios upon which the life cycle assessment was based.

Transport from the manufacturer to the point of use (A4)

This product is packed in the factory and loaded onto a lorry. It is assumed that
the lorry travels a distance of 500 km to the construction site.

Name	Value	Unit
Litres of fuel	0.053	l/100km
Transport distance to site	100	km
Capacity utilisation (including empty runs)	70	%

Installation in the building (A5)

The raised floor panels are to be mechanically installed at the construction site by professionals; the packaging is to be removed prior to installation. There are no environmental impacts connected with such installation.

Module A5 only includes the environmental impacts for disposal of the packaging.

Name	Value	Unit
Auxiliary material (not included)	-	kg
Water consumption	-	m^3
Other resources	-	kg
Electricity consumption (not relevant)	-	kWh
Other energy carriers (not relevant)	-	MJ
Output substances following waste treatment on site (packaging of the panel)	0.34	kg

The stated service life is subject to proper use, preservation and care.

Reference service life

Name	Value	Unit
Life Span (according to BBSR)	50	a
Life Span according to the manufacturer	50	a
Indoor environment (for indoor applications), e.g. temperature, moisture, chemical exposure (temperature, Grad C)	15 - 25	-

End of life cycle (C1-C4)

There are 2 end of life scenarios:
Scenario 0: 100% Refurbishment for reuse, distance to the manufacturer's plant, 100 km, yield rate 100%
Scenario 1: 100% Incineration, distance to the incineration facility 100 km, yield rate 100%

Name	Value	Unit
Scenario 0: Refurbishment for reuse	24.66	kg
Scenario 1: Incineration	24.66	kg

5. LCA: Results

The characterisation factors applied correspond with requirement of Annex C in /DIN EN 15804/.

Scenario 0: Refurbishment for reuse- represented by C1, C2, C3, C4, D
Scenario 1: Incineration - represented by C2/1, C3/1, C4/1, D/1

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	X	X	MND	MND	MNR	MNR	MNR	MND	MND	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 m² LIGNA raised acces floor panel

Parameter	Unit	A1-A3	A4	A5	C1	C2	C2/1	C3	C3/1	C4	C4/1	D	D/1
GWP-total	kg CO_2 eq	-3.19E+01	1.82E-01	9.9E-02	0	2E-01	2E-01	3.58E-01	3.69E+01	3.62E+01	5.62E-03	-4.25E+01	-1.09E+01
GWP-fossil	kg CO_2 eq	4.71E+00	1.8E-01	2.92E-02	0	2E-01	2E-01	2.79E-01	7.73E-01	0	5.61E-03	-4.75E+00	-1.08E+01
GWP-biogenic	kg CO_2 eq	-3.67E+01	5.13E-04	5.1E-01	0	-9.34E-04	-9.34E-04	7.88E-02	3.62E+01	3.62E+01	0	-3.77E+01	-8.75E-02
GWP-luluc	kg CO_2 eq	8.83E-03	1.09E-03	1.52E-05	0	1.21E-03	1.21E-03	3.66E-05	8.56E-05	0	5.7E-06	-8.8E-03	-1.09E-03
ODP	kg CFC11 eq	3.84E-11	4.51E-14	2.54E-14	0	4.97E-14	4.97E-14	5.48E-14	4.07E-12	0	9.26E-15	-3.89E-11	-1.53E-10
AP	mol H^+ eq	3.48E-02	2.38E-04	4.58E-05	0	2.68E-04	2.68E-04	3.47E-04	1.97E-02	0	1.8E-05	-3.47E-02	-1.17E-02
EP-freshwater	kg P eq	1.08E-04	4.3E-07	1.53E-08	0	4.75E-07	4.75E-07	4.01E-08	1.06E-06	0	5.08E-09	-1.07E-04	-3.38E-05
EP-marine	kg N eq	1.04E-02	8.82E-05	1.72E-05	0	1E-04	1E-04	1.19E-04	9.38E-03	0	4.52E-06	-1.03E-02	-4.24E-03
EP-terrestrial	mol N eq	1.31E-01	1.04E-03	2.07E-04	0	1.18E-03	1.18E-03	1.32E-03	1.09E-01	0	4.97E-05	-1.31E-01	-4.48E-02
POCP	kg NMVOC eq	3.07E-02	2.11E-04	4.44E-05	0	2.37E-04	2.37E-04	3.24E-04	2.41E-02	0	1.42E-05	-3.06E-02	-1.08E-02
ADPE	kg Sb eq	-2.24E-06	1.32E-08	3.51E-10	0	1.46E-08	1.46E-08	1.27E-09	3.84E-08	0	1.54E-10	2.23E-06	-1.07E-06
ADPF	MJ	9.07E+01	2.48E+00	7.09E-02	0	2.74E+00	2.74E+00	3.51E+00	1.21E+01	0	8.38E-02	-9.12E+01	-1.68E+02
WDP	m^3 world eq deprived	1.82E+00	9.59E-04	1.12E-02	0	1.06E-03	1.06E-03	1.7E-02	4.17E+00	0	-7.62E-05	-1.81E+00	-1.64E-01

GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential)

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 m² LIGNA raised acces floor panel

Parameter	Unit	A1-A3	A4	A5	C1	C2	C2/1	C3	C3/1	C4	C4/1	D	D/1
PERE	MJ	1.7E+02	1.66E-01	1.14E+00	0	1.84E-01	1.84E-01	3.3E-02	3.96E+02	0	7.53E-03	-1.68E+02	-7.43E+01
PERM	MJ	3.95E+02	0	-1.14E+00	0	0	0	-3.94E+02	-3.94E+02	0	0	-3.93E+02	0
PERT	MJ	5.65E+02	1.66E-01	0	0	1.84E-01	1.84E-01	-3.94E+02	2.1E+00	0	7.53E-03	-5.61E+02	-7.43E+01
PENRE	MJ	3.45E+01	2.49E+00	7.09E-02	0	2.74E+00	2.74E+00	3.51E+00	6.29E+01	0	8.39E-02	-3.52E+01	-1.68E+02
PENRM	MJ	5.63E+01	0	0	0	0	0	-5.63E+01	-5.63E+01	0	0	-5.61E+01	0
PENRT	MJ	9.08E+01	2.49E+00	7.09E-02	0	2.74E+00	2.74E+00	-5.28E+01	6.57E+00	0	8.39E-02	-9.13E+01	-1.68E+02
SM	kg	2.9E-01	0	0	0	0	0	0	0	0	0	-1.94E-02	0
RSF	MJ	2.01E+02	0	0	0	0	0	0	0	0	0	0	1.97E+02
NRSF	MJ	5.67E+01	0	0	0	0	0	0	0	0	0	0	5.31E+01
FW	m^3	6.28E-02	1.48E-04	2.66E-04	0	1.63E-04	1.63E-04	8.91E-04	9.81E-02	0	9.44E-07	-6.27E-02	-2.63E-02

PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary 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 material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 m² LIGNA raised acces floor panel

Parameter	Unit	A1-A3	A4	A5	C1	C2	C2/1	C3	C3/1	C4	C4/1	D	D/1
HWD	kg	6.72E-07	4.19E-12	5.17E-13	0	4.63E-12	4.63E-12	1.76E-10	8.04E-10	0	6.93E-12	-6.7E-07	-5.63E-09

NHWD	kg	4.37E-01	3.72E-04	4.6E-03	0	4.11E-04	4.11E-04	8.44E-03	3.04E-01	0	1.2E-01	-4.35E-01	-9.73E-02
RWD	kg	3.6E-03	3.27E-06	1.5E-06	0	3.61E-06	3.61E-06	3.02E-04	5.73E-04	0	9.75E-07	-3.63E-03	-7.69E-03
CRU	kg	0	0	2.68E-01	0	0	0	2.47E+01	0	0	0	0	0
MFR	kg	0	0	0	0	0	0	0	0	0	0	0	0
MER	kg	0	0	0	0	0	0	0	0	0	0	0	0
EEE	MJ	2.74E-01	0	9.6E-02	0	0	0	1.16E-01	4.59E+01	0	0	-2.73E-01	0
EET	MJ	6.16E-01	0	2.06E-01	0	0	0	2.7E-01	8.17E+01	0	0	-6.13E-01	0

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional:
1 m² LIGNA raised acces floor panel

Parameter	Unit	A1-A3	A4	A5	C1	C2	C2/1	C3	C3/1	C4	C4/1	D	D/1
PM	Disease incidence	6.14E-07	1.93E-09	3.09E-10	0	2.19E-09	2.19E-09	3.15E-09	5.9E-08	0	1.94E-10	-6.12E-07	-8.6E-08
IR	kBq U235 eq	4.99E-01	3.51E-04	1.77E-04	0	3.87E-04	3.87E-04	2.34E-02	9.13E-02	0	1.44E-04	-5.01E-01	-8.13E-01
ETP-fw	CTUe	3.87E+01	1.81E+00	3.82E-02	0	2E+00	2E+00	3.99E-01	3.87E+00	0	2.49E-02	-3.87E+01	-3.04E+01
HTP-c	CTUh	9.21E-08	3.61E-11	1.95E-12	0	3.99E-11	3.99E-11	1.73E-11	2.91E-10	0	2.95E-12	-9.17E-08	-2.18E-09
HTP-nc	CTUh	1.2E-07	1.51E-09	1.28E-10	0	1.67E-09	1.67E-09	9.67E-10	4.91E-09	0	2.82E-10	-1.2E-07	-5.38E-08
SQP	SQP	1.44E+03	8.84E-01	2.43E-02	0	9.75E-01	9.75E-01	5.31E-02	3.03E+00	0	7.83E-03	-1.43E+03	-5.16E+01

PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index

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

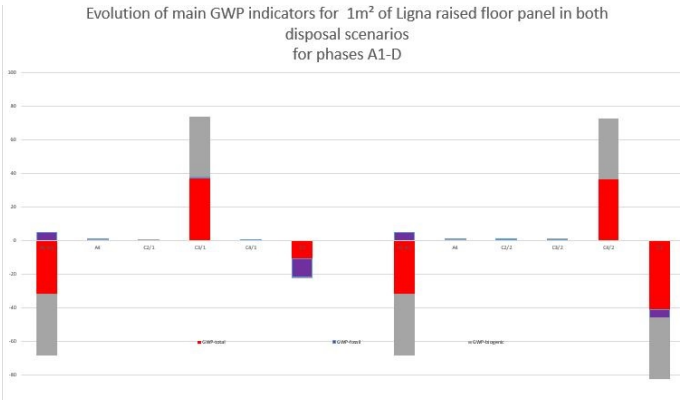
Global warming potential (GWP) for 1 m² Ligna Panel for different disposal scenarios
The high biogenic carbon content with its value of 36,15 in module A1 together with the cause GWP fossil in A3 maintain the total GWP value negative in A1-A3.

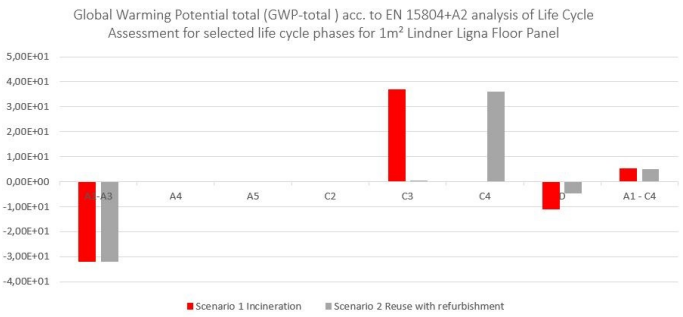
Modules A4 and A5 have a minimal impact, though for different EoL scenarios the values are different.

In contrast, Scenario 0 (Reuse with Refurbishment) only the refurbishment process in house is booked under module C3 but has a minimal value (0,35 kg CO2e). The release of the biogenic carbon in this case will be balanced under module C4.

End-of-life choices then diverge: Scenario 1 (Incineration) shows high environmental impact under module C3/1 due to the incineration process, but generates substantial energy recovery potentials under module D/1 from the incinerated raised floor panels. The GWP biogenic will be booked out under the module for incineration, C3/1.

While taking the panel back, the biogenic carbon still exists in the panel, this value for GWP biog. will be declared under D as a reuse potential, as biogenic substance retention. The potential for reuse in this case under D are based on material conservation, for 99,6% of the production of the panel under A1-A3.





7. Requisite evidence

For Lindner LIGNA raised access floor panels, the following tests were carried out as part of ongoing external monitoring or on request.

7.1
Formaldehyde
The tests of the formaldehyde content of the raised access floor panels are carried out in accordance with the provisions of formaldehyde emission according to */EN 717-1/.*
Measuring point: Eurofins Product Testing A/S, Galten Denkmark
Test Report: 392-2023-00016902_A_EN
Test results: According to the Ordinance on Prohibitions and Restrictions on the Marketing and Distribution of Certain Substances, Mixtures and Products under the Chemicals Act (ChemVerbotsV), Annex 1 (to §3) Prohibitions on Marketing, "Entry 1 Formaldehyde" column 2 (1) Coated and uncoated wood-based materials (chipboard, blockboards, veneer panels and fibreboards) may not be placed on the market if the equilibrium concentration of formaldehyde in the air of a test room caused by the wood-based material exceeds 0.1 ml/cbm (ppm).
The tested material fulfils the requirements of the Chemicals Prohibition Ordinance as follows: ChemVerbotsV [BMU publication test method 2018-11-26] valid from 1 January 2020 Chamber test EN 717-1 [x factor 2.0]: Requirements fulfilled

7.2
MDI
Testing for MDI and other isocyanates is conducted according to the respective chipboard panel supplier using the following methods: determination of methylene diphenyl isocyanate (MDI) emissions from a wood-based panel according to ISO 16000-9 and OSHA Method No. 42
Result: Emissions of MDI and other isocyanates lie below the detection limit.
Measuring point: Depending on the respective chipboard panel supplier. **7.3 Inspection for pretreatment of the input materials**
Result: The thresholds of the Federal Waste Wood Ordinance are observed.
Measuring point: Depending on the respective chipboard panel supplier. Project-related verification can be requested.

7.4 Toxicity of fire gases
The toxicity of the fire gases produced when burning raw chipboard corresponds to the toxicity of the fire gases produced when burning untreated wood. **7.5**
VOC emissions
Test Report No. G 17285A/B is available for the raised floor panel. The test institute was
/Eurofins Product Testing/ A/S, Smedeskovvej 38, DK-8464 Galten, Denmark.
Result: The LIGNA raised floor panel investigated meets the requirements for the award of the Eurofins Air Comfort Gold Label, Version 3.1.

German Committee for Health-Related Evaluation of Building Products (AgBB/ABG) performance summary (28 days)

Name	Value	Unit
TVOC (C6 - C16)	<1.0	µg/m³
Sum SVOC (C16 - C22)	0.1	µg/m³
R (dimensionless)	<1	-
VOC without NIK	<0.1	µg/m³
Carcinogenic Substances	<0.001	µg/m³

8. References

Standards

EN 15804

EN 15804:2012+A1 2013, Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products.

EN 15804

EN 15804:2012+A2:2019+AC:2021, Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products.

ISO 14025

EN ISO 14025:2011, Environmental labels and declarations — Type III environmental declarations — Principles and procedures.

Further References

Title of the software/database

Title of the software/database. Addition to the title, version. Place: Publisher, Date of publication [Access on access date].

IBU 2021

Institut Bauen und Umwelt e.V.: General Instructions for the EPD programme of Institut Bauen und Umwelt e.V., Version 2.0, Berlin: Institut Bauen und Umwelt e.V., 2021

www.ibu-epd.com

EN PCR part A
Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report according to EN15804+A2:2019 /IBU PART A/. Version 1.4

PCR Part B: System floors, version 19.10.2023, version 1.3

DIN EN 12825
DIN EN 12825:2002-04, Raised floors

DIN EN 13501-1
DIN EN 13501-1:2019-05, Classification of construction products and types into their
fire behaviour

DIN 4102-1
DIN 4102-1:1998-05, Fire behaviour of construction materials and components – Part
1: Construction materials; concepts, requirements and inspections

ISO 9001
ISO 9001:2015-09,
Quality Management Systems – Requirements

ISO 14001
ISO
14001:2015-09, Environmental Management Systems –

Requirements with
instructions for use
ISO 14044:2006
Environmental management — Life cycle assessment — Requirements and guidelines

ISO 50001
ISO
50001:2011-06, Energy Management Systems – Requirements with instructions for
use.

BBSR
Federal Institute for Research on Building, UrbanAffairs and Spatial Development (BBSR): Service lifesof construction components. Service lifes of construction components for Life Cycle Assessments according to the assessment system for sustainable construction (BNB), in: Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (ed.), 2017.

Assessment System for Sustainable Building (BNB)
BNB is an instrument for planning and evaluating sustainable and usually public construction projects. It complements the Guideline for Sustainable Building of the Federal Ministry of the Interior, Building and Community as a holistic assessment methodology for buildings and their surroundings.

European Chemicals Agency(ECHA)
ECHA, guidance and compliance materials - ensure the safe use of chemicals - scientific and technical advice on EU chemical policies www.echa.europa.eu

European Waste Index
Systematic efforts within the European Union to track and categorize waste generation and management practices across member states. This involves collecting data on waste types, quantities, disposal methods, and recycling rates to promote sustainable waste management and ensure compliance with EU environmental regulations.

Further references

LCA software GaBi
Sphera's LCA for Experts (GaBi) 10.7.1.28

LCA database
Sphera's LCA for Experts (GaBi) database 2023

AgBB
AgBB 2015-02:
Procedure for the health-related evaluation of emissions of volatile organic
compounds from construction products

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, Official Journal of the European Union, 2012

VDI 3762
The specification implies that sound insulation solutions (e.g., materials, wall constructions) must achieve a certain performance level, as measured in a laboratory setting, to meet the L_nfw standard.

European Waste Catalogue (EWC)
European Waste Catalogue. Code 17 09 04 pertains to materials like wood products found in mixed construction and demolition waste. Codes 15 01 03 and 15 01 01 are used for packaging waste, with the former relating to wooden packaging materials and the latter to paper and cardboard packaging.

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