ENVIRONMENTAL PRODUCT DECLARATION

as per *ISO 14025* and *EN 15804+A1*

Owner of the Declaration	Parthos B.V.
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-PAR-20180063-IBC2-EN
Issue date	28.06.2018
Valid to	27.06.2024

Parthos Operable wall

Parthos B.V.

Institut Bauen und Umwelt e.V.

ECO PLATFORM

EPD VERIFIED

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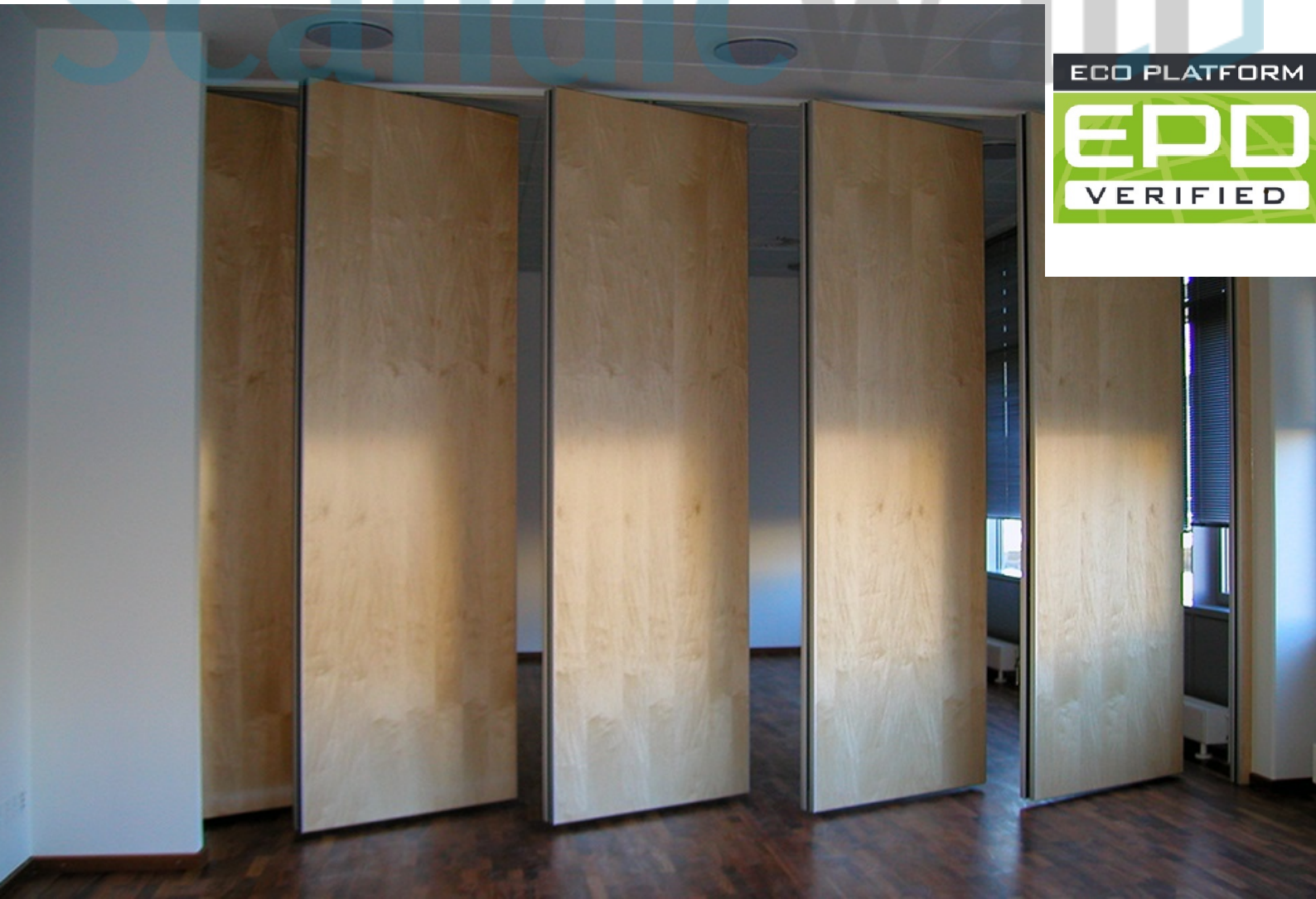


1. General Information

Parthos B.V.

Programme holder

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

Declaration number

EPD-PAR-20180063-IBC2-EN

This declaration is based on the product category rules:

Room partition systems, 01.08.2021
(PCR checked and approved by the SVR)

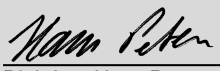
Issue date

28.06.2018

Valid to

27.06.2024

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



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

Parthos Operable wall

Owner of the declaration

Parthos B.V.
Industrieterrein 25
5981 NK Panningen
Netherlands

Declared product / declared unit

The declared unit is 1 m² of the operable wall Palace 110SI, including packaging materials, excluding the respective fastening materials.

Scope:

This Environmental Product Declaration pursues a worst-case approach for the Palace 110SI product, i.e. the product with the highest possible sound insulation and the highest weight among all Parthos partition wall elements. The data recorded is based on fiscal 2017 at the production facility in Panningen, The Netherlands.
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+A1. 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

Dr.-Ing. Andreas Ciroth,
(Independent verifier)

2. Product

2.1 Product description/Product definition

The operable wall Palace 110SI is a non-supporting internal wall, acoustically doubled on both sides. It comprises individual, wall-high elements which are mounted in a track system using one or two trolleys. The elements can be moved independently of each other. Depending on the design of the track system, this makes it possible to realise a wide variety of room partition options.

Depending on the respective design, various levels of sound insulation are achieved. By using acoustically effective surfaces, sound insulation values can also be achieved in accordance with requirements. The product is not subject to any EU harmonisation guidelines. Application of the products is subject to the respective national guidelines at the place of use.

2.2 Application

Individual, room-high elements are moved independently of each other in a track system and merged to form a closed wall.

Seals at the top and bottom of the elements are braced using the adjacent components to guarantee the requisite sound insulation and stability.

The operable wall permits variable room partitioning which can be flexibly adapted to the respective use requirements.

The system is used in buildings in the following areas in particular: trade fairs, conference rooms, universities, schools, kindergartens, offices and administrative buildings.

2.3 Technical Data

Palace 110SI construction data

Construction data

Name	Value	Unit
Sound absorption coefficient at 250 Hz	15	%
Sound absorption coefficient at 500 Hz	50	%
Sound absorption coefficient at 1000 Hz	95	%
Sound absorption coefficient at 2000 Hz	85	%
Sound absorption coefficient at 4000 Hz	50	%
Airborne sound reduction Sound reduction index acc. to /DIN EN ISO 10140:2010/	57	dB
Heat transfer coefficient	0.56	W/m^2K
Weight of wall load	0.73	kN/m^2

The product is not subject to any EU harmonisation guidelines.

2.4 Delivery status

The elements in the operable walls are produced individually to customer requirements. Frames and cover panels are supplied separately and assembled on site.

The following variant is based on this EPD:

Palace 110 SI

Element width	1,250 mm
Element height	3,300 mm
Element thickness	148 mm
Surface area	4.12 m^2
Product weight	391.4 kg
Packaging	16.6 kg
Product weight per m^2	95 kg
Packaging per m^2	4.04 kg

2.5 Base materials/Ancillary materials

The Palace 110SI full element, which was regarded as a *worst-case* EPD with the heaviest possible design, is comprised of the following, excluding packaging and production loss:

Name	Value	Unit
MDF board	39.50	%
Bitumen mat	33.50	%
Steel supports	12.00	%
Aluminium	4.10	%
Rubber	3.80	%
Plastics	3.10	%
Non-wovens	1.40	%
Glass wool	1.40	%
Zinc	0.70	%
Paper	0.50	%
Total	100	%

2.6 Manufacture

The elements are manufactured in a type of series production at several work stations, each of which is equipped with the respective requirements.

The vertical profiles are cut to size and punched as required. The upper and lower sealing profiles are compiled using prefabricated moulded aluminium and PU parts and set aside for further assembly.
The mechanisms made from tubular steel and springs required for operating the sealing profiles are also assembled and set aside.

All prefabricated components are then merged and fixed in place on horizontal assembly benches. The upper and lower sealing profiles and mechanisms for operating the sealing profiles are then mounted in the ensuing element frame.

The remaining cavity is filled with mineral wool. To prevent this wool from falling out during transport, a layer of paper is glued onto both sides.

The cover panels are cut to size on horizontal saw benches. Wood chips and waste are suctioned up and collected for direction to disposal or incineration. If the cover panels have not been supplied with a finished coating, they are glued to the requisite surface prior to cutting. This entails the use of a large-surface, horizontal press, whereby the adhesive process is accelerated by adding heat.

After cutting to size, all edges are fitted with edge banding or edging. The longitudinal edges of the cover panels are grooved to support the edgings on the interior profiles. These work steps

are carried out semi-automatically using special machines.

Mounting panels are mounted on the back of the cover panels. They serve towards securing the cover panels to the element frames. In order to improve sound insulation of the elements, so-called heavy load mats are also mounted on the back of the cover panels.

Once the frames and cover panels are finished, they are loaded onto pallets. As the measurements of the elements can vary, the pallet sizes are adapted to the respective requirements. In order to facilitate transport to the construction site, frames and cover panels are transported separately and only merged at the installation site where the frames are mounted in the tracks and then the cover panels are mounted on both sides, i.e. the mounting panels on the back are suspended from special suspension devices.

2.7 Environment and health during manufacturing

Environmental protection and work safety guidelines are observed during manufacturing.

An /FSC/ Certificate (FSC Certificate Code: HFA COC-100017, HFA-CW-100017) and the /EPD EGG 20150046 IBA -1 DE/ confirms sustainable forestry management and provides evidence of the origin of wooden materials for the particle boards.

2.8 Product processing/Installation

The following plants, machines and tools are used during production and/or assembly, including the noise protection and work safety measures associated with them:

- Machines for cutting the cover panels, glueing on the edges and adhering the surfaces
- Saws and CNC punch presses for aluminium and steel profiles
- Noise protection cabins/walls
- Extraction systems, protective walls and glare protection at all welding stations
- Extraction systems at all sawing stations
- Impact drills, cordless screwdrivers

2.9 Packaging

The Palace 110SI elements are supplied ex works on pallets. The transport packaging comprises the following components:

Component	Percentage
Wooden pallet	81%
PE foil	4%
Polystyrene strips	3%
Hardboard panel	12%
Total	100%

2.10 Condition of use

Regular (annual) maintenance is recommended during use. Some grease is required for this for moving, mechanical components.

The surfaces can be cleaned using standard household cleaning agents.

Repairs or part replacements are not usually necessary.

2.11 Environment and health during use

We are not aware of any negative impacts on health or the environment during use. When used as designated and in accordance with knowledge available today, the product does not pose any risk for air, water or soil.

2.12 Reference service life

On the basis of empirical values acquired over the past 50 years of the company's history, an average service life of 25-30 years can be assumed at approx. 60 closing cycles per year. When operable walls are used as designated, no ageing processes can be anticipated within the assumed service life. Frequent and long-term use can cause minor abrasion in the area of the tracks.
Likewise, discoloration can ensue if the surfaces are not maintained correctly.
But neither of these indications can be regarded as ageing in the true sense of the word.

2.13 Extraordinary effects

Fire

Apart from the known consequences of a fire involving wooden materials, no unusual impacts are known in the event of a fire. The following applies for cover panels:

Fire protection

Name	Value
Building material class	D
Burning droplets	D0
Smoke gas development	s2

Water

Even when exposed to water over extensive periods of time, it can be assumed that no hazardous substances are released into the environment.

Mechanical destruction

In the event of mechanical destruction, it can be assumed that no hazardous substances are released into the environment.

2.14 Re-use phase

Re-use

Owing to the product characteristics, reuse is conceivable within the service life insofar as the requirements of the new installation site are complied with.

Dismantling and reassembly can be offered and carried out by Parthos.

Recycling

Metal parts can be separated and directed to material recycling. Theoretically, particle board can also be recycled by directing the panels to new production.

Energy recovery

The particle boards, plastic, rubber and paper content can be disposed of in a waste incineration plant with flue gas cleaning, and utilised to generate heat and electricity.

Landfilling

Where no waste recycling technologies are available, it is also possible to landfill the materials.

2.15 Disposal

Packaging

Packaging components can be classified in accordance with the European Waste Catalogue and directed to energetic utilisation:

/EWC 1501 01/ Paper and cardboard packaging

/EWC 1501 02/ Plastic packaging

/EWC 1501 03/ Wooden packaging

Disposal phase

All materials can be classified in accordance with the European Waste Catalogue and directed to energetic or metallurgical utilisation:

/EWC 17 02 01/ Wood

/EWC 17 02 03/ Plastic

/EWC 17 03 02/ Asphalt, tar-free (bitumen mixtures)

/EWC 17 04 01/ Copper, bronze, brass

/EWC 17 04 02/ Aluminium

/EWC 17 04 05/ Iron and steel

2.16 Further information

Further information on data and product variants can be requested:

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E-mail: info@parthos.com

Internet: www.parthos.com

3. LCA: Calculation rules

3.1 Declared Unit

The declared unit is 1 m² of the operable wall Palace SI, including packaging materials, excluding the respective fastening materials.

Declared unit

Name	Value	Unit
Declared unit	1	m^2
Grammage without packaging	95	kg/m^2
Packaging	4,04	kg/m²
Total weight (product + packaging)	99,04	kg/m²
Conversion factor to 1 kg	95	-

3.2 System boundary

Type of EPD: Cradle to Gate (with options); the following modules are considered in accordance with /EN 15804/:

Product stage: A1 – A3:

This module includes the extraction and treatment of raw materials as well as biomass production, including all of the corresponding upstream chains and provision of electricity, steam and heat from primary energy sources, including extraction, refinement and transport thereof, as well as the requisite procurement transport to the plant gate.

Construction stage: A4 – A5:

This module comprises the distribution route as well as energetic utilisation of packaging materials.

Use stage: B6:

The use stage refers to operation of the building and comprises the use of energy for operation of the declared product, including standby energy consumption.

End-of-Life stage: C2 – C4:

This module considers transport to the recycling plant (C2) as well as the expenses incurred by collection, treatment and recycling. Biogenic carbon (e.g. from the particle board) is emitted here during incineration (C3). Glass wool is the only inert material landfilled here (C4).

Possible potentials and avoided loads beyond the system boundary: D:

Indication of potential product loads and credits outside the system boundary. These comprise energy credits from thermal utilisation of packaging waste (A5) as well as the wood and plastic components of the product (C3) in the form of the average European power mix or thermal energy from natural gas as well as material credits as the result of metal recycling.

3.3 Estimates and assumptions

- The lead rubber layer which is primarily responsible for the noise protection offered by the partition wall comprises (natural) rubber and lead oxide (PbO). For the purpose of simplification (and within the meaning of the worst-case approach), lead oxide is modelled as pure lead (Pb).
- At the end of life of the lead rubber layer, lead is recovered through recycling while the rubber is lost during this process.

3.4 Cut-off criteria

Almost all operating data is taken into consideration in Module A3. Some material flows have also been analysed with a mass percentage of less than one per cent. It can be assumed therefore that the total of all neglected mass percentages does not exceed 5% of the impact categories.

Cut-off materials:

- Copper components which could not be analysed accurately and whose mass percentage is < 0.1%
- Pallets for transport as they are made of wood and are reused, i.e. taken back from the construction site by the assembly team
- Lubricating grease for hinges
- Magnet strips for connecting the wall elements as their mass percentage is also significantly lower than 1%

The infrastructure used in the manufacturing processes (especially machines and production equipment) was not considered in the analysis. Transport expenses for packaging were also ignored.

3.5 Background data

Version 8.5 of the software system for comprehensive analysis (GaBi) was used for modelling the life cycle. All of the background data sets used were taken from the 8.0 version of

the /GaBi/ data base. The data items contained in the data bases are documented online.

The Dutch power mix was applied for Modules A1-3 while German or European data sets were largely applied for the materials on account of their availability.

The corresponding European data records were used for transport associated with distribution and installation in the building (A4-A5) and disposal scenarios (C Modules).

Due to a lack of data sets on material processing for recycling various raw materials, 'aluminium recycling' was applied as a processing data set (crushing, melting, material loss etc.) for both zinc and lead recycling.

3.6 Data quality

The data was recorded using analyses of internal production and environmental data, LCA-relevant data within the supply chain, and analyses of the relevant data for the provision of energy. The data provided and originating from the operating data records and measurements has been checked in terms of plausibility. Following intensive examination, good data representativity has been established.

The background data sets used for the analysis are generally not older than 10 years.

Exceptions are represented by two data sets from 2006 and 2007 for which no adequate more recent replacement was available:

- Paper
- Steel (worldsteel)

3.7 Period under review

The LCA is based on data recorded for the financial year 2017 at the production facility in Panningen, The Netherlands.

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: Netherlands

3.9 Allocation

There are no co-products. Within the framework of the manufacturing process, a single product is manufactured.

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 background data base used involves the *GaBi data base, version 8.5*.

4. LCA: Scenarios and additional technical information

Transport to construction site (A4)

Name	Value	Unit
Transport distance	500	km
Capacity utilisation (including empty runs)	85	%

Construction installation process (A5)

Name	Value	Unit
Waste for energy recovery	0,76	kg

Reference service life

Name	Value	Unit
Life cycle acc. to manufacturer	25-30	a

Operational energy (B6) and Water consumption (B7)

Name	Value	Unit
Electricity consumption	20.29	kWh

Electricity consumption per year, incl. standby

End of life (C1-C4)

Name	Value	Unit
Recycling	47.9	kg
Energy recovery	45.9	kg
Landfilling	1.3	kg

Re-use, recovery and recycling potential (D), relevant scenario details

Parts of the product as well as the packaging are thermally utilised in a waste incineration plant. Metal is directed to the recycling circuit.
Module D includes credits from energetic utilisation of packaging waste in Module A5 and energetic utilisation of non-metallic components of the product in Module C3. This is supplemented by material credits from recycling the metal components of the product in C3.

Name	Value	Unit
Incineration credit	46,6	kg
R1 factor waste incineration plant	> 60	%
Materials for recycling	47,9	kg

5. LCA: Results

The LCA results for one square metre of operable wall Palace 110SI are depicted in this section. Please note that the LCIA results only indicate possible impacts.

These results in the CML categories refer to potential environment impact over an analysis period of 100 years.
Long-term emissions (> 100 years) are not taken into consideration in the estimated impact.

The characterisation factors of the /CML/ (Institute of Environmental Sciences, Faculty of Science, University of Leiden, The Netherlands), version 2001, April 2013 are used.

Note: Impact estimate results are only relative statements which do not make any claims concerning the end points of the impact categories, exceeding threshold values or risks.

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE 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	X	MND	MND	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A1: 1 m² Parthos operable wall

Parameter	Unit	A1-A3	A4	A5	B6	C2	C3	C4	D
GWP	kg CO_2 eq	1.15E+02	2.83E+00	1.77E+00	9.07E+00	1.71E+00	1.02E+02	2.75E-01	-1.11E+02
ODP	kg CFC11 eq	1.97E-06	7.65E-14	1.97E-14	4.03E-11	4.72E-14	2.45E-07	-3.34E-09	1.03E-07
AP	kg SO_2 eq	1.38E+00	1.16E-02	3.67E-04	2.57E-02	8.42E-03	5.55E-02	1.71E-04	-1.31E+00
EP	kg PO_4^3 eq	8.92E-02	2.92E-03	9.06E-05	2.41E-03	2.16E-03	8.52E-03	4.8E-04	-2.65E-02
POCP	kg Ethen eq	1.4E-01	-4.81E-03	2.43E-05	1.61E-03	-3.59E-03	4.55E-03	7.71E-05	-6.99E-02
ADPE	kg Sb eq	5.43E-02	3.02E-07	1.69E-08	4.82E-06	1.42E-07	2.51E-05	1.88E-10	-7.34E-02
ADPF	MJ	2.37E+03	3.8E+01	3.25E-01	9.65E+01	2.35E+01	2.9E+02	1.99E-01	-1.26E+03

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

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A1: 1 m² Parthos operable wall

Parameter	Unit	A1-A3	A4	A5	B6	C2	C3	C4	D
PERE	MJ	-1.88E+02	2.61E+00	9.75E+00	0	1.3E+00	1.03E+03	-3.33E-02	-2.86E+02
PERM	MJ	1.03E+03	0	-9.7E+00	6.22E+01	0	-1.02E+03	0	0
PERT	MJ	8.42E+02	2.61E+00	5.63E-02	0	1.3E+00	1.28E+01	-3.33E-02	-2.86E+02
PENRE	MJ	2.31E+03	3.81E+01	1.18E+01	6.22E+01	2.36E+01	6.4E+02	8.55E-02	-1.48E+03
PENRM	MJ	3.36E+02	0	-1.15E+01	1.66E+02	0	-3.24E+02	0	0
PENRT	MJ	2.65E+03	3.81E+01	3.64E-01	0	2.36E+01	3.16E+02	8.55E-02	-1.48E+03
SM	kg	2.73E+00	0	0	1.66E+02	0	0	0	3.95E+01
RSF	MJ	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0
FW	m^3	1.38E+01	3E-03	3.81E-03	0	2.4E-03	2.34E-01	-4.01E-04	-9.69E-01

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+A1: 1 m² Parthos operable wall

Parameter	Unit	A1-A3	A4	A5	B6	C2	C3	C4	D
HWD	kg	6.05E-06	2.43E-06	2.43E-10	8.48E-02	1.37E-06	2.26E-07	0	-1.3E-05
NHWD	kg	2E+01	2.99E-03	2.6E-03	0	1.98E-03	4.36E+00	1.33E+00	-1.87E+01
RWD	kg	1.01E-01	6.01E-05	1.54E-05	7.77E-08	3.23E-05	1.05E-02	-4.47E-05	-9.12E-02
CRU	kg	0	0	0	1.17E-01	0	0	0	0
MFR	kg	0	0	0	2.74E-02	0	4.81E+01	0	0
MER	kg	0	0	0	0	0	0	0	0

EEE	MJ	9.14E+00	0	2.63E+00	0	0	1.18E+02	0	0
EET	MJ	0	0	5.1E+00	0	0	2.23E+02	0	0

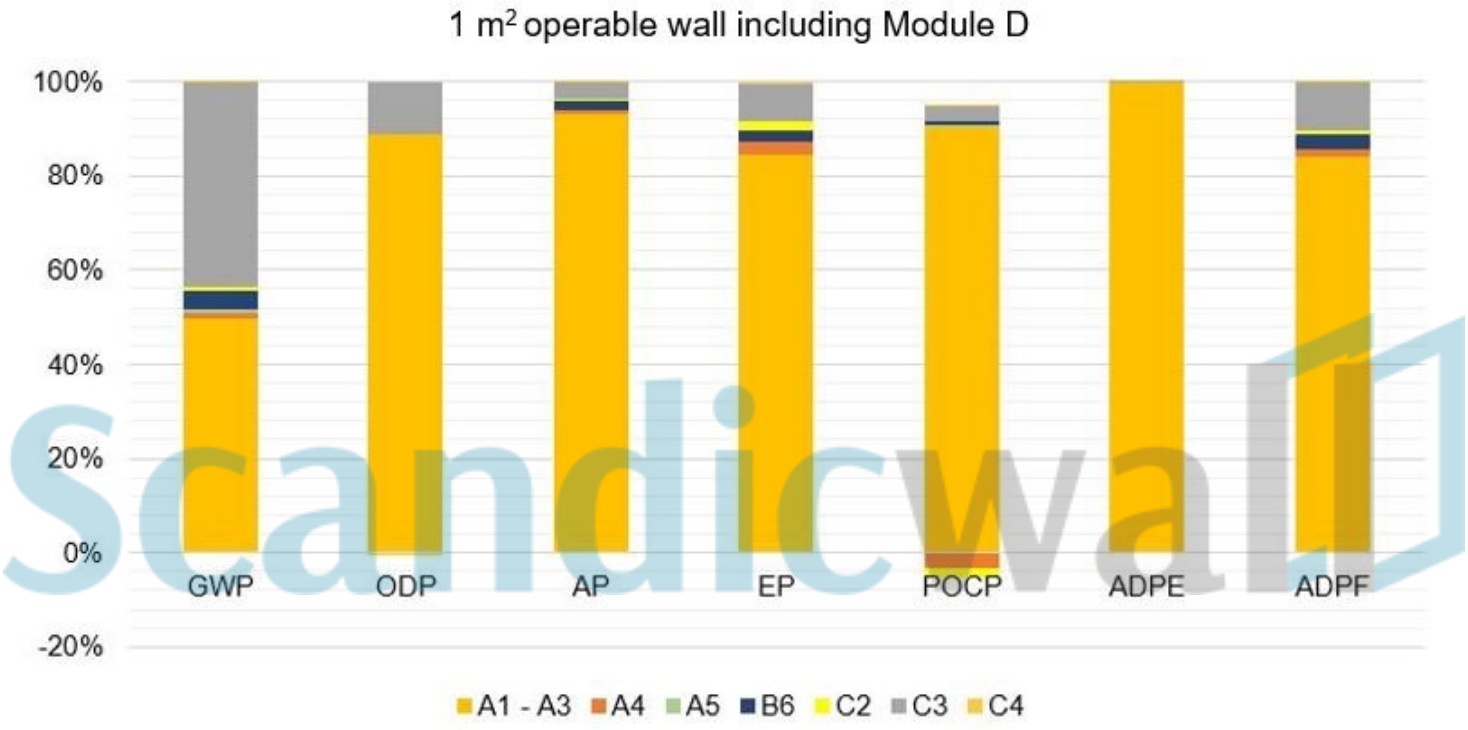
HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy

6. LCA: Interpretation

All impact categories are dominated by Modules A1-A3. This is due to the high percentage of metallurgical components, especially the extraction of lead, stainless steel and aluminium (together accounting for approx. 72% of the **Global Warming Potential** emissions (**GWP**) in A1-A3), and the associated upstream chains. The MDF board stores (biogenic) CO2 to the volume of approx. 19 kg which is released again during incineration in C3 after the use phase.

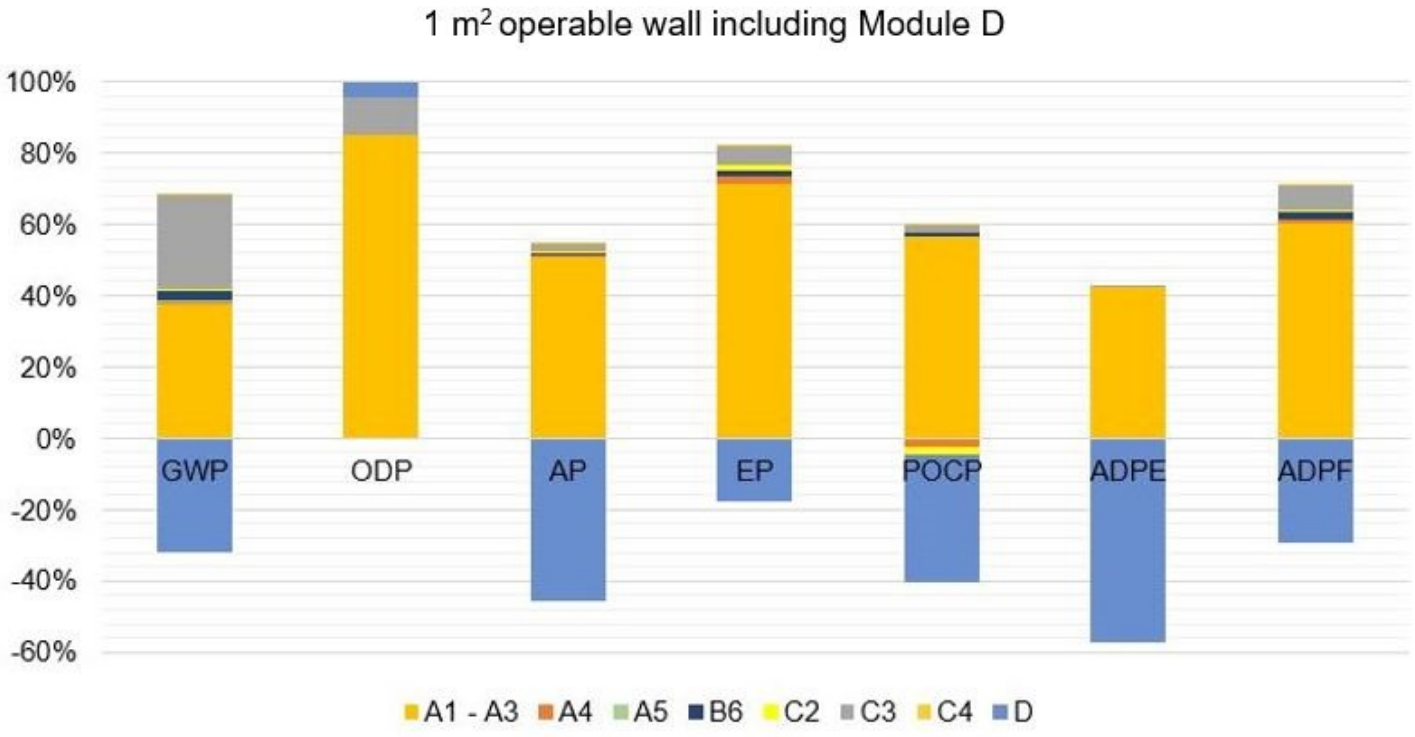
The disposal and transport of packaging materials (A4 and A5) do not make any relevant contribution to the **GWP** (approx. 2%), nor are they of any relevance in the other indicators. The **GWP** is also noticeably influenced by utilisation of the product components (C3) (a total of 38% of overall **GWP** emissions).

The greatest loads attributable to transport for distribution (A4) and disposal (C2) are caused by emissions which contribute to the **Eutrophication Potential** (**EP**).
In relation to the remaining modules, they are not however of significance in any category. The nitrogen monoxide emissions incurred during transport have a negative influence on the **Photochemical Ozone Creation Potential** (**POCP**), which leads to avoided loads.



The graphic below also includes Module D where the potentials and avoided loads associated with waste processing are indicated for both packaging (A5) and product recycling (C3).

The **Ozone Depletion Potential** (**ODP**) does not include any credits as recovered metals have only a minor influence on this category. Metal processing (C3), glass wool and the MDF board are important as they are not recovered but rather landfilled or incinerated in a low **OPD** manner.



7. Requisite evidence

Airborne sound insulation:

Test report: AA 1430-5 D dated 20 February 2016

Measuring agency: Peutz GmbH, Kolberger Str.19, 40599 Düsseldorf 7.1 VOC emissions

For products used in interior applications: Test procedure in accordance with the AgBB scheme indicating the measuring agency, date and results as a range of values. At least the following must be declared:

8. References

DIN EN ISO 10140:2010
Akustik - Messung der Schalldämmung von Bauteilen im Prüfstand.

EAK
Europäischer Abfallartenkatalog.

PCR 04/2017, Teil A
Institut Bauen und Umwelt e.V., Berlin(Hrsg.): Rechenregeln für die Ökobilanz und Anforderungen an den Projektbericht.

PCR 07/2014, Teil B
Institut Bauen und Umwelt e.V., Berlin(Hrsg.): PCR Anleitungstexte für gebäudebezogene Produkte und Dienstleistungen der Produktgruppe Raumtrennsysteme.

FSC
Forest Stewardship Council.

GaBi 8.5
Software und Datenbank zur ganzheitlichen Bilanzierung. LBP, Universität Stuttgart und thinkstep AG, 2017.

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