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3rd PARTY VERIFIED

EPD

VERIFIED ENVIRONMENTAL PRODUCT DECLARATION | ISO 14025 & EN 15804



Owner of declaration

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 CVR: 36902701



Issued:
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Valid to:
21-03-2028

Programme

EPD Danmark
www.epddanmark.dk



- Industry EPD
- Product EPD

Basis of calculation

This EPD is developed in accordance with the European standard EN 15804+A2.

Comparability

EPDs of construction products may not be comparable if they do not comply with the requirements in EN 15804. EPD data may not be comparable if the datasets used are not developed in accordance with EN 15804 and if the background systems are not based on the same database.

Validity

This EPD has been verified in accordance with ISO 14025 and is valid for 5 years from the date of issue.

Use

The intended use of an EPD is to communicate scientifically based environmental information for construction products, for the purpose of assessing the environmental performance of buildings.

Declared product(s)

Tystø Partitioning Wall System

One product specific EPD.
 Number of declared datasets/product variations: 1

Production site

DEKO p|s
 Mårkærvej 11
 2630 Taastrup, Denmark

EPD type

- Cradle-to-gate with modules C1-C4 and D
- Cradle-to-gate with options, modules C1-C4 and D
- Cradle-to-grave and module D
- Cradle-to-gate
- Cradle-to-gate with options

Product(s) use

Partition wall to be installed and used indoors. The partition can be used in offices to divide spaces and provide an optimal view in the room, bright daylight conditions and sound isolation.

Declared unit


The declared unit is set as 1 m² glazed partition system, including components needed for installation up against stationary walls, ceiling and floor.

Year of production site data (A3)

2022

EPD version

[2], March 2023. Round off in result values is corrected.

CEN standard EN 15804 serves as the core PCR
Independent verification of the declaration and data, according to EN ISO 14025
<input type="checkbox"/> internal <input checked="" type="checkbox"/> external
Third party verifier:  _____ Mirko Miseljic



 Martha Katrine Sørensen
 EPD Danmark

Life cycle stages and modules (MND = module not declared)

Product			Construction process		Use							End of life				Beyond the system boundary
Raw material supply	Transport	Manufacturing	Transport	Installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Re-use, recovery and 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	MND	MND	MND	MND	MND	X	X	X	X	X

Product information

Product description

The main product components are shown in the table below.

Material	Weight-% of declared product
IGUs	67,13
Discarded wood	23,66
Gypsum	4,53
Plywood	3,63
EPDM rubber	0,48
Water-based wax	0,30
Glue	0,18
Nails	0,09
SUM	100

Product packaging:

The composition of the sales- and transport packaging of the product is shown in the table below.

Material	Weight-% of packaging
Wood	86,8
Polystyrene foam	7,8
Polyethylene film	5,4
SUM	100

Representativity

This declaration, including data collection and the modelled foreground system including results, represents the production of 1 m² of a glazed partition on the production site located in Taastrup. Product specific data are collected for the year 2022. Background data are based on ecoinvent 3.9.1 (released 12/2022) and are less than 10 years old. Generally, the used background datasets are of high quality with a reference year of 2022, in line with the release of the database. Most datasets are representative of Europe, and electricity is country specific (Denmark).

Hazardous substances

Tystø does not contain substances listed on the "Candidate List of Substances of Very High Concern for authorisation"

(<http://echa.europa.eu/candidate-list-table>)

Essential characteristics

Tystø is an upcycled glazed partition system made of reclaimed IGUs from demolition sites and discarded wood.

This product is not covered by harmonized European product standards.

a:gain and DEKO are working towards getting Tystø tested for acoustic performance, according to ISO 10140 and evaluated in accordance with ISO 717. Test reports, as well as other technical information, can be obtained by contacting a:gain or DEKO or on a:gain's website:

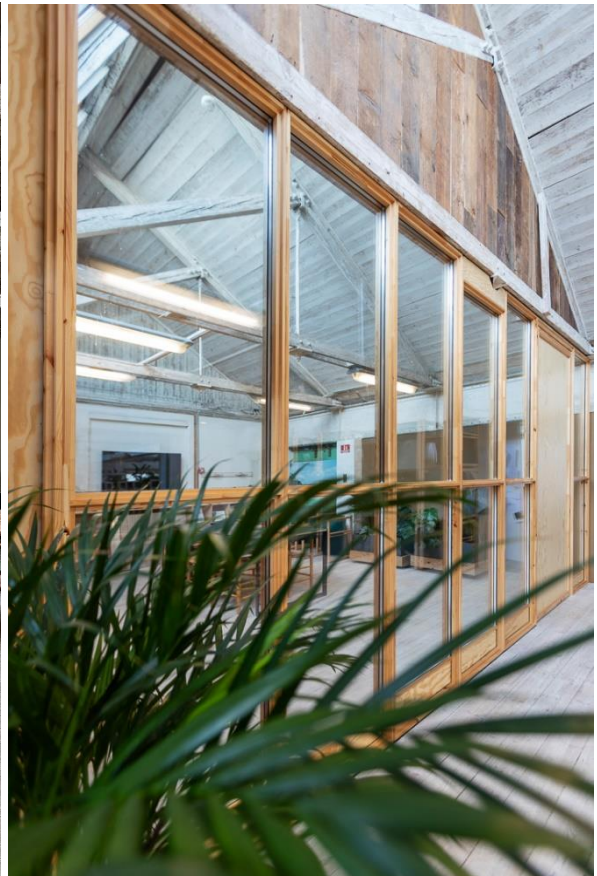
<https://again.dk/product/tystoe/>

Reference Service Life (RSL)

The reference service life of this glazed partition is 25 years for a standard indoor use at normal room temperature and moisture level.

This RSL represents the installed product's minimum expected average service. The RSL is based on DEKO's other partition systems, as these are of similar type and function and are expected to be used in an office environment and under identical exposure conditions.

Picture of product(s)



LCA background

Declared unit

The LCI and LCIA results in this EPD relate to 1 m² of glazed partition system, including components needed for installation up against stationary walls, ceiling and floor.

Name	Value	Unit
Declared unit	1	m ²
Height	2000	mm
Width	500	mm
Weight	29,793	kg
Thickness of glass pane	22	mm
Conversion factor to 1 kg	0,034	-

Functional unit

Not defined.

PCR

This EPD is developed according to the core rules for the product category of construction products

in EN 15804:2012+A2:2019. cPCR for Room Partition Systems, v. 1.7., by the Institut Bauen und Umwelt Data of PCR version: 8.1.2019 is also used.

Guarantee of Origin – certificates

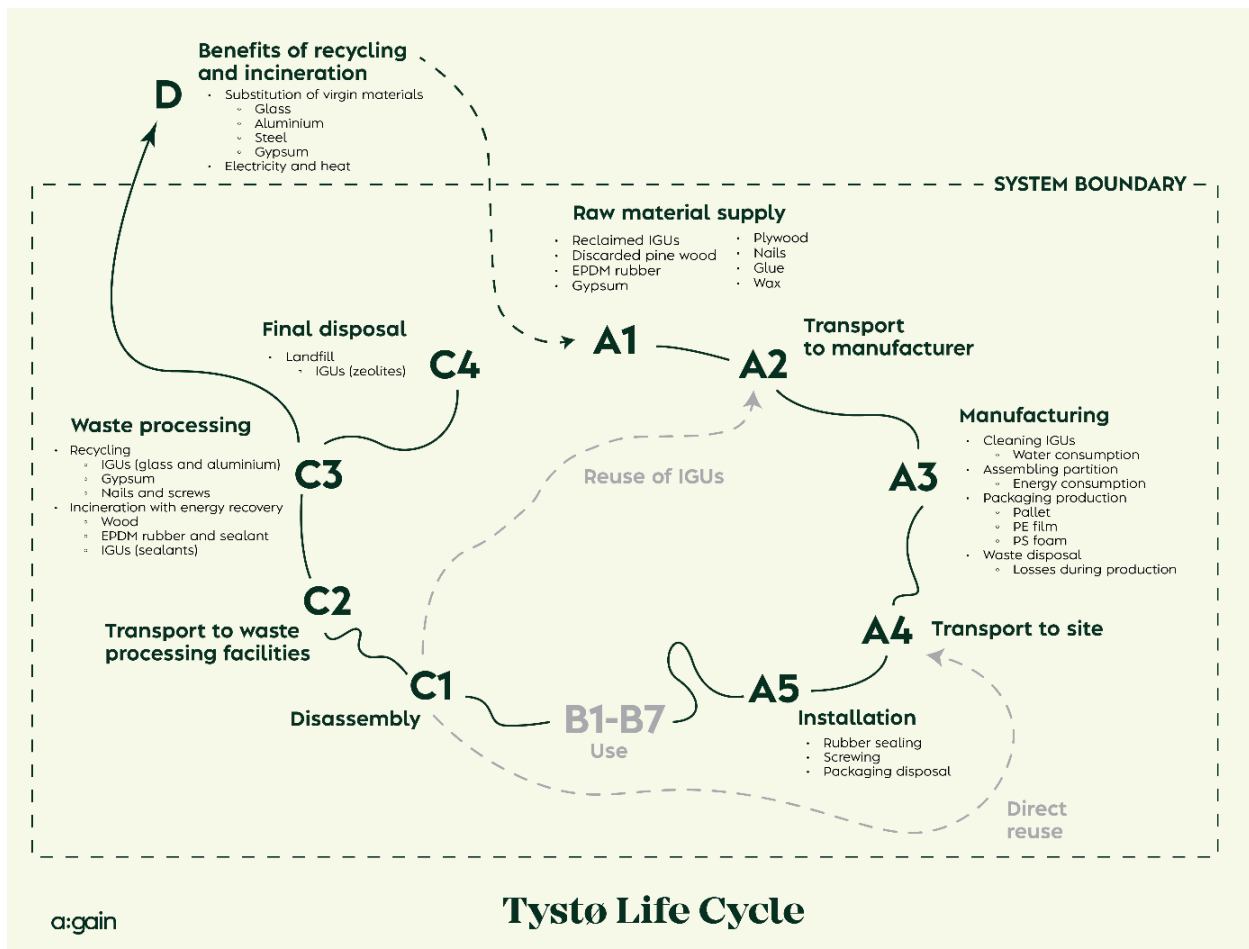
Foreground system:

No use of certified green energy. Average Danish energy mix (residual) in ecoinvent 3.9.1 is used.

Background system:

No use of certified green energy. Ecoinvent 3.9.1 database is used for all background data. For this reason, both upstream and downstream processes are modelled as an average electricity grid mix for a given country or region, depending on the specific dataset.

Flow diagram



System boundary

This EPD is based on a cradle-to-gate LCA with options, modules C1-C4 and D, in which 100 weight-% has been accounted for.

The general rules for the exclusion of inputs and outputs follows the requirements in EN 15804, 6.3.5, where the total of neglected input flows per module shall be a maximum of 5 % of energy usage and mass and 1 % of energy usage and mass for unit processes.

Product stage (A1-A3) includes:

A1 – Extraction and processing of raw materials

A2 – Transport to the production site

A3 – Manufacturing processes

The product stage comprises the acquisition of all raw materials, products and energy, transport to the production site, packaging and waste processing up to the “end-of-waste” state or final disposal. The LCA results are declared in aggregated form for the product stage, which means that the sub-modules A1, A2 and A3 are declared as one module A1-A3.

The declared product is made of reclaimed Insulated Glass Units (IGUs). Because IGUs are considered secondary materials, they are accounted as “burden free” and their extraction and related processes are outside the system boundary. The production of the remaining materials (discarded pine wood, plywood, gypsum, EPDM rubber, nails and wax) and processing of pine wood into profiles are reported in module A1. This module also includes the surface treatment of the wood with a clear water-based wax.

Module A2 accounts for transportation of all materials and packaging to the production site in Taastrup. All transportation distances were provided by DEKO, except for the IGUs and the pallet. The distance is assumed to be 100 km for the IGUs and 50 km for the wooden pallet.

Module A3 accounts for the production of the declared product. The IGUs undergo inspection and cleaning processes, whereas the frames and

spacers are cut to the desired dimensions. The IGUs, frames and spacers are afterwards assembled using the remaining materials.

In addition, packaging production and waste disposal are also reported in this module.

Data was provided by the manufacturer in the form of annual energy consumption and calculated through physical allocation, based on production quantities in 2022. Electricity is the main source of energy, yet district heating is also accounted for.

Construction process stage (A4-A5) includes:

Module A4 represents the transport of the declared product to the customer, assuming a 50 km distance.

The installation of the partition, production of ancillary materials, and additional packaging disposal are reported in module A5. As stated by the manufacturer, screws and sealant are used to attach the partition to the floor, ceiling and walls during installation. This process requires electric hand tools, which have not been included in this assessment due to its expected minimal contribution to energy consumption.

End of Life (C1-C4) includes:

Modules C1 to C4 include all end-of-life processes.

Module C1 reports the dismantling of the partition from the building. The product is dismantled using electric hand tools, whose energy is also excluded from this assessment.

In module C2, the transport of the declared product to waste processing facilities (module C3 and C4) is reported.

Although Tystø's modules were designed for disassembly and can easily be moved and reused in other spaces, this LCA assumes the worst-case – and most likely – scenario in a Danish context, where the IGUs, gypsum, nails and screws are recycled, whilst the remaining materials are

incinerated. A 50 km distance is assumed to an incineration plant and a 100 km distance is assumed to a recycling facility and landfill site.

Module C3 covers the incineration of 100 % of the wood, EPDM rubber and sealants. Before incineration, the wood goes through a chipping process and is afterwards burnt in a municipal incineration plant with fly ash extraction. During incineration, the biogenic carbon stored in the wood is released.

The remaining materials are prepared for recycling. In this case, 98 % of glass and 100 % of steel and aluminium are sent to recycling, whereas only 15 % of gypsum is recycled. During these activities, there are losses of material, which are accounted for in this study.

Module C4 accounts for the final disposal of glass, gypsum and zeolites (absorbents in the IGUs).

Re-use, recovery and recycling potential (D) includes:

Recycling and incinerating materials and packaging have potential benefits and loads beyond the system boundary. The credits for recycling and incinerating the materials are presented in module D.

Recycling of IGUs, gypsum, nails and screws is assumed to substitute the extraction of primary raw materials. Electricity and thermal energy generated during incineration is assumed to replace the average Danish electricity mix and heating from natural gas, respectively.

LCA results

ENVIRONMENTAL IMPACTS PER M ² OF PARTITION									
Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	[kg CO ₂ eq.]	-7,68E-01	1,62E-01	1,57E+00	0,00E+00	3,61E+00	1,60E+01	1,81E-02	-1,27E+01
GWP-fossil	[kg CO ₂ eq.]	1,22E+01	1,62E-01	1,33E+00	0,00E+00	3,61E+00	2,33E+00	1,80E-02	-1,26E+01
GWP-biogenic	[kg CO ₂ eq.]	-1,30E+01	1,41E-04	2,40E-01	0,00E+00	7,55E-04	1,37E+01	9,57E-05	-3,95E-02
GWP-luluc	[kg CO ₂ eq.]	3,20E-02	7,75E-05	2,86E-04	0,00E+00	4,51E-04	5,39E-04	1,07E-05	-3,14E-02
ODP	[kg CFC 11 eq.]	2,64E-07	3,58E-09	2,58E-08	0,00E+00	5,53E-08	7,00E-09	4,67E-10	-4,58E-07
AP	[mol H ⁺ eq.]	5,69E-02	3,90E-04	3,04E-03	0,00E+00	1,93E-02	3,21E-03	1,30E-04	-4,66E-02
EP-freshwater	[kg P eq.]	4,22E-03	1,16E-05	1,22E-04	0,00E+00	6,60E-05	1,38E-04	1,54E-06	-3,51E-03
EP-marine	[kg N eq.]	1,62E-02	1,07E-04	7,82E-04	0,00E+00	8,40E-03	1,70E-03	5,01E-05	-8,31E-03
EP-terrestrial	[mol N eq.]	1,69E-01	1,09E-03	8,14E-03	0,00E+00	9,08E-02	1,40E-02	5,36E-04	-1,08E-01
POCP	[kg NMVOC eq.]	5,93E-02	6,37E-04	5,52E-02	0,00E+00	3,55E-02	3,73E-03	1,83E-04	-2,70E-02
ADPm ¹	[kg Sb eq.]	1,08E-04	3,28E-07	3,26E-06	0,00E+00	1,78E-06	2,03E-06	2,77E-08	-4,72E-05
ADPf ¹	[MJ]	1,99E+02	2,35E+00	1,73E+01	0,00E+00	4,50E+01	4,43E+00	4,02E-01	-1,79E+02
WDP ¹	[m ³ world eq. deprived]	5,09E+00	1,24E-02	2,86E-01	0,00E+00	7,60E-02	5,35E-01	1,58E-03	-5,49E+00
Caption	GWP-total = Globale Warming Potential - total; GWP-fossil = Global Warming Potential - fossil fuels; GWP-biogenic = Global Warming Potential - biogenic; GWP-luluc = Global Warming Potential - land use and land use change; ODP = Ozone Depletion; AP = Acidification; EP-freshwater = Eutrophication – aquatic freshwater; EP-marine = Eutrophication – aquatic marine; EP-terrestrial = Eutrophication – terrestrial; POCP = Photochemical zone formation; ADPm = Abiotic Depletion Potential – minerals and metals; ADPf = Abiotic Depletion Potential – fossil fuels; WDP = water use								
	The numbers are declared in scientific notation, fx 1,95E+02. This number can also be written as: 1,95*10 ² or 195, while 1,12E-11 is the same as 1,12*10 ⁻¹¹ or 0,0000000000112.								
Disclaimer	¹ The results of this environmental indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.								

ADDITIONAL ENVIRONMENTAL IMPACTS PER M ² OF PARTITION									
Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	[Disease incidence]	1,27E-06	1,56E-08	3,94E-08	0,00E+00	4,61E-07	3,72E-08	2,90E-09	-4,95E-07
IRP ²	[kBq U235 eq.]	2,12E+00	3,02E-03	1,85E-02	0,00E+00	1,51E-02	6,05E-02	2,88E-04	-1,61E+00
ETP-fw ¹	[CTUe]	2,87E+02	2,39E+00	1,54E+01	0,00E+00	3,82E+01	7,44E+01	3,83E-01	-3,02E+02
HTP-c ¹	[CTUh]	1,91E-08	7,05E-11	8,18E-10	0,00E+00	5,21E-10	6,28E-10	8,83E-12	-8,68E-09
HTP-nc ¹	[CTUh]	1,94E-07	2,17E-09	1,24E-08	0,00E+00	2,12E-08	2,24E-08	1,96E-10	-2,14E-07
SQP ¹	-	2,26E+03	2,43E+00	1,48E+00	0,00E+00	5,10E+00	2,63E+00	9,14E-01	-4,17E+01
Caption	PM = Particulate Matter emissions; IRP = Ionizing radiation – human health; ETP-fw = Eco toxicity – freshwater; HTP-c = Human toxicity – cancer effects; HTP-nc = Human toxicity – non cancer effects; SQP = Soil Quality (dimensionless)								
	The numbers are declared in scientific notation, fx 1,95E+02. This number can also be written as: 1,95*10 ² or 195, while 1,12E-11 is the same as 1,12*10 ⁻¹¹ or 0,0000000000112.								
Disclaimers	¹ The results of this environmental indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.								
	² 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 nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.								

RESOURCE USE PER M² OF PARTITION

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	[MJ]	3,87E+02	3,50E-02	3,01E-01	0,00E+00	1,81E-01	4,74E-01	4,15E-03	-1,44E+01
PERM	[MJ]	1,99E+02	0,00E+00	-2,04E+01	0,00E+00	0,00E+00	-1,79E+02	0,00E+00	0,00E+00
PERT	[MJ]	5,86E+02	3,50E-02	-2,00E+01	0,00E+00	1,81E-01	-1,78E+02	4,15E-03	-1,44E+01
PENRE	[MJ]	1,88E+02	2,39E+00	1,08E+01	0,00E+00	4,58E+01	4,44E+00	4,09E-01	-1,79E+02
PENRM	[MJ]	1,28E+01	0,00E+00	-2,06E+00	0,00E+00	0,00E+00	-1,07E+01	0,00E+00	0,00E+00
PENRT	[MJ]	2,01E+02	2,39E+00	8,73E+00	0,00E+00	4,58E+01	-6,28E+00	4,09E-01	-1,79E+02
SM	[kg]	2,00E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	[MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRSF	[MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	[m ³]	1,27E-01	2,64E-04	6,96E-03	0,00E+00	1,86E-03	8,18E-03	5,80E-04	-2,36E-01
Caption	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 = Net use of fresh water								
	The numbers are declared in scientific notation, fx 1,95E+02. This number can also be written as: 1,95*10 ² or 195, while 1,12E-11 is the same as 1,12*10 ⁻¹¹ or 0,0000000000112.								

WASTE CATEGORIES AND OUTPUT FLOWS PER M ² OF PARTITION									
Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	[kg]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NHWD	[kg]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RWD	[kg]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
CRU	[kg]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MFR	[kg]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MER	[kg]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,90E+01	0,00E+00	0,00E+00
EEE	[MJ]	0,00E+00	0,00E+00	3,66E-01	0,00E+00	0,00E+00	8,83E+00	0,00E+00	0,00E+00
EET	[MJ]	0,00E+00	0,00E+00	2,04E+00	0,00E+00	0,00E+00	2,79E+01	0,00E+00	0,00E+00
Caption	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								
	The numbers are declared in scientific notation, fx 1,95E+02. This number can also be written as: 1,95*10 ² or 195, while 1,12E-11 is the same as 1,12*10 ⁻¹¹ or 0,0000000000112.								

BIOGENIC CARBON CONTENT PER M ² OF PARTITION		
Parameter	Unit	At the factory gate
Biogenic carbon content in product	[kg C]	3,68E+00
Biogenic carbon content in accompanying packaging	[kg C]	6,55E-02
Note	1 kg biogenic carbon is equivalent to 44/12 kg of CO ₂	

Additional information

LCA interpretation

Results indicate that the majority of environmental impacts are associated with the production stage (modules A1-A3), particularly the production of raw materials in module A1, which is the biggest contributor to 17 out of 19 impact categories. Energy consumption is the largest contributor to environmental impacts, as the production of raw materials is significantly energy-intensive compared to the remaining processes.

The transportation of the product's components to waste processing facilities in module C2 also contributed considerably to many impact categories. This is due to the long transportation distances, low fuel efficiency of refuse trucks and their high tailpipe emissions. Because these vehicles have a frequent stop-and-go nature, a large payload and use on-board devices, such as lifts and compactors, their emissions and contributions to environmental impacts are substantial.

The biogenic carbon in the wood is in balance across the life cycle, as carbon sequestered in the wood is released once the wood is incinerated.

Technical information on scenarios

Transport to the building site (A4)

Scenario information	Value	Unit
Fuel type	Diesel	-
Fuel consumption	0,226	l/tkm
Vehicle type	Truck with > 32 metric ton, EURO6	-
Transport distance	50	km
Capacity utilisation (including empty runs)	50	%

Installation of the product in the building (A5)

Scenario information	Value	Unit
Ancillary materials	0,10	kg
Water use	0	m ³
Waste materials (packaging)	0,37	kg
Direct emissions to air, soil or water	0	kg

Reference service life

RSL information		Unit
Reference service Life	25	Years
Outdoor environment	No	-
Indoor environment	Yes	-
Usage conditions	Find information here: https://again.dk/product/tystoe/	-
Maintenance		-

End of life (C1-C4)

Scenario information	Value	Unit
Collected separately	21,10	kg
Collected with mixed waste	8,83	kg
For reuse	0	kg
For recycling	18,95	kg
For energy recovery	8,83	kg
For final disposal	2,15	kg

Re-use, recovery and recycling potential (D)

Scenario information/Material	Value	Unit
Displaced material	17,80	kg
Electricity from waste incineration	29,93	MJ
Heat from waste incineration	119,73	MJ

Indoor air

The EPD does not give information on release of dangerous substances to indoor air because the horizontal standards on the relevant measurements are not available. Read more in EN15804+A1 chapter 7.4.1.

Soil and water

The EPD does not give information on release of dangerous substances to soil and water because the horizontal standards on the relevant measurements are not available. Read more in EN15804+A1 chapter 7.4.2.

References

Publisher	 epddanmark www.epddanmark.dk <small>Template version 2022.2</small>
Programme operator	Danish Technological Institute Buildings & Environment Gregersensvej DK-2630 Taastrup www.teknologisk.dk
LCA-practitioner	a:gain ApS Langebrogade 3H, 3rd floor 1411 Copenhagen K, Denmark LCA practitioner: Mariana Jordão
LCA software / background data	openLCA v1.11.0 / ecoinvent 3.9.1
3rd party verifier	FORCE Technology Denmark LCA Specialist Mirko Miseljic

General programme instructions

General Programme Instructions, version 2.0, spring 2020
www.epddanmark.dk

EN 15804

DS/EN 15804 + A2:2019 - "Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products"

cPCR for Room Partition Systems

Product Category Rules for Building-Related Products and Services;
 Part B: Requirements on the EPD for Room Partition Systems v. 1.7., by Institut Bauen und Umwelt Data of PCR version: 8.1.2019

EN 15942

DS/EN 15942:2011 – " Sustainability of construction works – Environmental product declarations – Communication format business-to-business"

ISO 14025

DS/EN ISO 14025:2010 – " Environmental labels and declarations – Type III environmental declarations – Principles and procedures"

ISO 14040

DS/EN ISO 14040:2008 – “ Environmental management – Life cycle assessment – Principles and framework”

ISO 14044

DS/EN ISO 14044:2008 – “ Environmental management – Life cycle assessment – Requirements and guidelines”