Type III Environmental Product Declaration No. 597/2024

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DC – Thermopanel Wall

Owner of the EPD:

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ITB is the verified member of The European Platform for EPD program operators and LCA practitioner www.eco-platform.org

Basic information

This declaration is the Type III Environmental Product Declaration (EPD) based on EN 15804+A2 and verified according to ISO 14025 by an external auditor. It contains the information on the impacts of the declared construction materials on the environment. Their aspects were verified by the independent body according to ISO 14025. Basically, a comparison or evaluation of EPD data is possible only if all the compared data were created according to EN 15804+A2.

Life cycle analysis (LCA): A1-A3, C1-C4 and D modules in accordance with EN 15804+A2 (Cradle-to-Gate with options)

The year of preparing the EPD: 2024

The year of validation the EPD: 2024 (correction of GWP calculations for all thicknesses)

Product standard: EN 14509

Service Life: 50 years

PCR: ITB-PCR A

Declared unit: 1 m^2

Reasons for performing LCA: B2B

Representativeness: European

MANUFACTURER

DC-System insulation A/S is Danish, family-owned company. Since the early start in 1973, it has produced insulation panels for both Danish companies and companies abroad. DC-System insulation A/S has main headquarter located in Aars, Denmark (Fig.1).

DC-System exports approx. 75% of the panels produced, as well as providing complete solutions for refrigeration equipment to the export market.

The sandwich panels are CE approved according to Standard EN 14509.They have obtained a U-value that enables efficient control of heat / cold conditions in buildings where DC-System insulation panels are used.

Figure 1: A view of the DC-System Insulation A/S production plant located in Aars (Denmark).

PRODUCTS DESCRIPTION AND APPLICATION

DC-Thermopanel Wall is a sandwich panel made in an auto adhesion process where self-adhesion of the core to the faces occurs automatically without the use of an adhesive.

The panels are made from a PUR/PIR foam core with a density of min. 37 kg/m^3. Both sides of the panels have a 20 mm cement-bonded particleboard with a density of min. 1200 kg/m^3. See Figure 2 for an illustration of the panel.

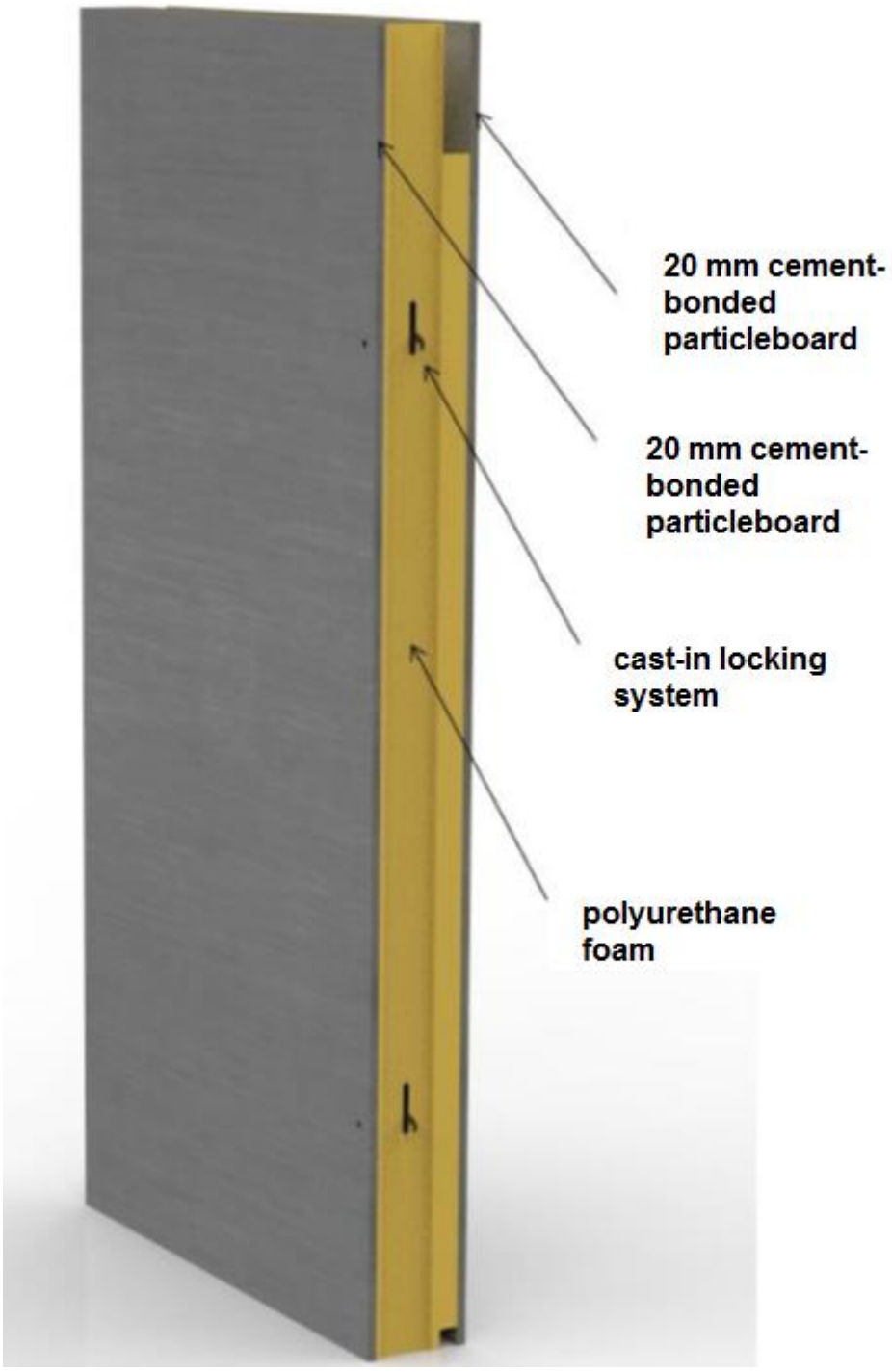

Figure 2: Illustration of the DC-Thermopanel Wall.

The basic physicochemical properties of DC – Thermopanel Wall are described below and in Tab. 1.

Application: DC – Thermopanel Wall is used as a load-bearing wall panel in building up to 2 floors. If the panel is mounted on a load-bearing structure, it can be used in buildings higher than 2 floors.

Assembly: Built-in eccentric locking system that ensures a tight assembly that also contributes to stability.

Vapor barrier: Vapor barrier is built into the panel.

Wind barrier: Wind barrier is built into the panel.

Mould, fungus: The panel cannot contribute to mold and fungus formation.

Insulation: The PU/PIR foam insulates 60% better than mineral wool, does not absorb water.

Fire: REI 30, B-s1,d0, MK : Class 1- K1 10 B-s1,d0

Production tolerances: According to EN 14509

Sound attenuation: Up to 38 dB

Surfaces: The panels are supplied with 20 mm cement-based particle board on both sides.

Assembling: The panels are supplied with cast-in eccentric locks that ensure easy installation.

Color: The panel is supplied with raw, uncoloured cement-based particle board.

Table 1: Properties of DC-Thermopanel Wall with thicknesses of 200 mm, 225 mm and 250 mm.

Panel type	Core thickness	U-value W/m^{2}K	Weight kg/m^2 min.	Fire resistance
200 mm	160	0,14	53,9	REI 30
225 mm	185	0,12	54,8	REI 30
250 mm	210	0,11	55,8	REI 30

Sealant is applied to the edge of the panels, after which they are pushed together and locked by turning the locking key in the locking hole. The excess sealant is scraped away with the bottom of the silicone tube and the hole is closed with the sealant. The assembly diagram of DC – Thermopanel Wall is shown in Figure 3.

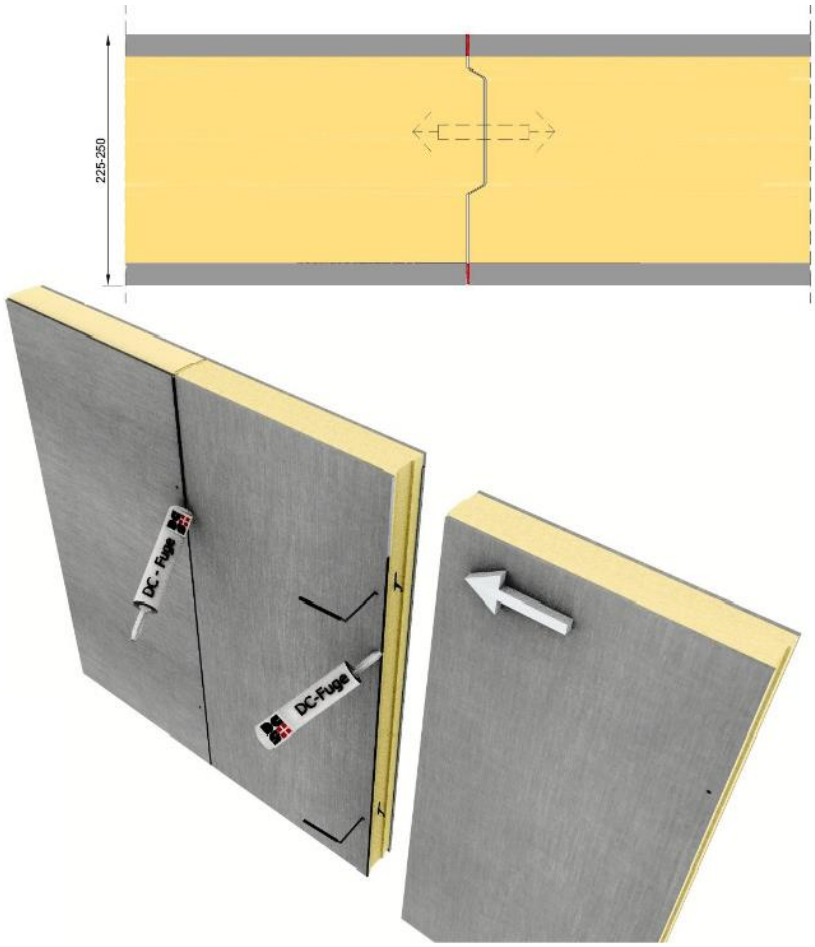

Figure 3: The scheme of DC – Thermopanel Wall installation.

More information can be found on the DC-System Insulation A/S website : *https://dc-system.dk/*

LIFE CYCLE ASSESSMENT (LCA) – general rules applied

Allocation

The allocation rules used for this EPD are based on general ITB PCR A, v. 1.6. Production of the DC-Thermopanel Wall is a line process conducted in the factory of DC-System Insulation A/S, located in Aars (Denmark). Allocation was done on product mass basis. All impacts from raw materials extraction and processing are allocated in module A1 of the LCA. Impacts from the DC-System Insulation A/S production were inventoried on the annual production volume expressed in m^2. Water and energy consumption, associated emissions and generated wastes are allocated to module A3. Energy supply was inventoried for whole production process. Packaging materials were taken into consideration.

System boundary

The life cycle analysis (LCA) of the declared products covers: product stage – modules A1-A3, end of life – modules C1-C4 and benefits and loads beyond the system boundary – module D (cradle-to-gate with options) in accordance with EN 15804 + A2. Energy and water consumption, emissions as well as information on generated wastes were inventoried and were included in the calculations. It can be assumed that the total sum of omitted processes does not exceed 5% of all impact categories. In accordance with EN 15804+A2, machines and facilities (capital goods) required for the production as well as transportation of employees were not included in LCA.

System limits

Minimum 99,0 % input materials and energy consumption (electricity, fuel oil) were inventoried in a processing plant and were included in the calculation. In the assessment, all significant parameters from gathered production data are considered, i.e. all material used per formulation, utilized thermal energy, and electric power consumption, direct production waste and available emission measurements. Tires consumption for transport was not considered. Substances with a percentage share of less than 0.1 % of total mass were excluded from the calculations. The packaging products (wooden pallets) are included. In accordance with EN 15804 + A2, machines and facilities (capital goods) required for the production as well as transportation of employees were not included in LCA.

Modules A1 and A2: *Raw materials supply and transport*

Raw materials such as cement-bonded particle boards, foams, steel locks and packaging materials come from both local and foreign suppliers. Data on transport of the different products to the manufacturing plants is collected and modelled for factory by assessor. Means of transport include big trucks EURO 5 (> 16 t) and ships (steel elements). Based on data provided by the manufacturer, all input of transport resources was inventoried. For A2 module (transport) European averages for fuel data are applied.

Module A3: *Production*

A scheme of DC-Thermopanel Wall production process is presented in Figure 4.

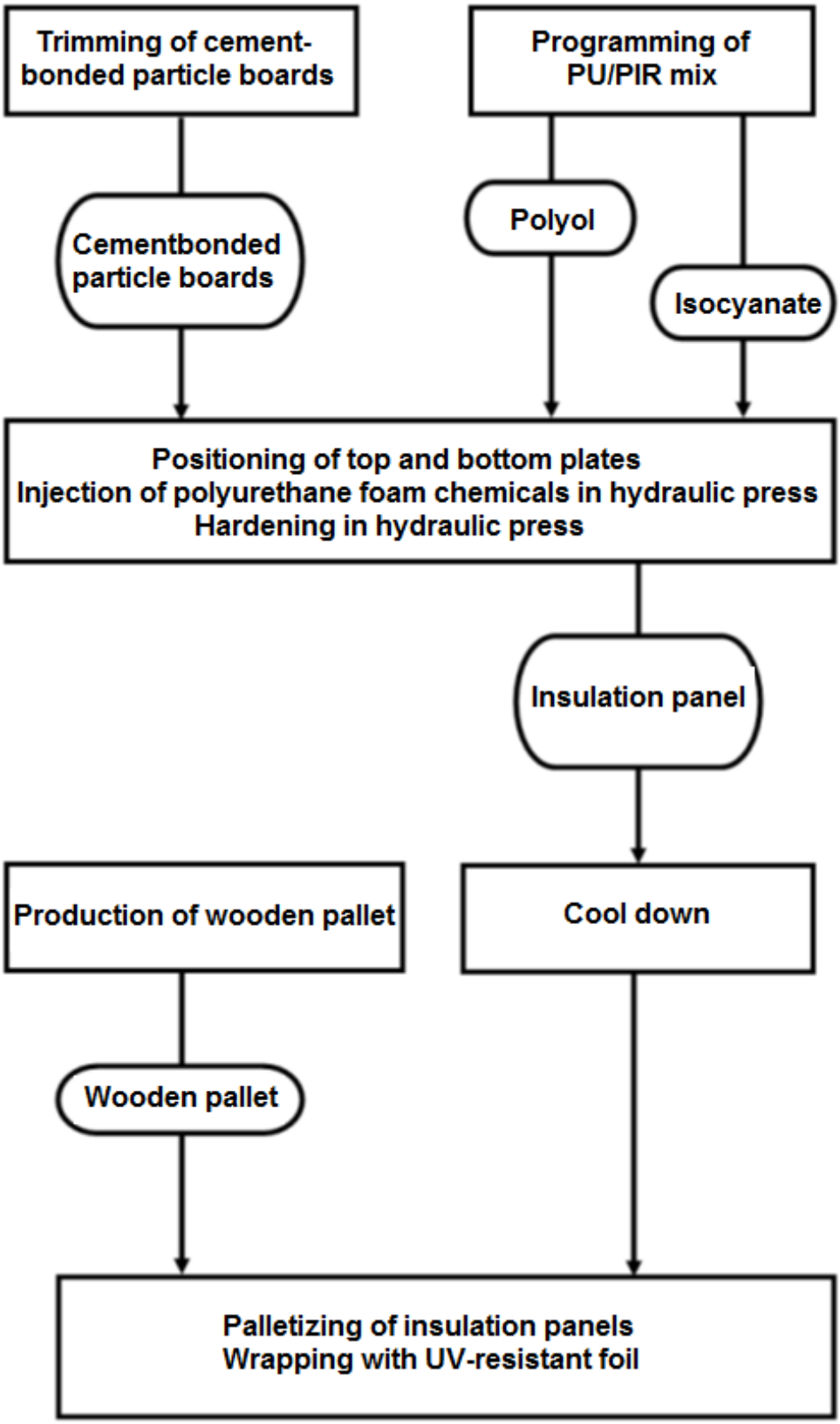

Figure 4: The scheme of DC-Thermopanel Wall production process.

Modules C1-C4 and D*: End-of-life (EoL)*

It is assumed that at the end-of-life, 100 % of DC – Thermopanel Wall are demounted using electric tools (module C1) and is transported to waste processing plant which is 50 km away, on 16-32 t lorry EURO 5 (module C2). It is assumed that 50 % of waste PU/PIR cores are processing by energy and material recovery (module C3) and 50 % cores are landfilling (module C4). The same scenario was applied for cement-bonded particle boards. End-of-life scenarios were summarized in Table 2. A potential credit resulting from the benefits by energy substitution of fossil fuels was applied and presented in module D. Utilization of packaging material which constitute less than 1 % of the total system flows was not taken into consideration.

Table 2: End-of-life scenarios for DC – Thermopanel Wall

Material	Waste processing		Landfilling
	Material recovery (reuse, recycling)	Energy recovery (incineration)	
PU/PIR core	20%	30%	50%
cement-bonded particle boards	20%	30%	50%

Data quality

The data selected for LCA analysis originates from ITB-LCI questionnaires completed by DC-System Insulation A/S using the inventory data, ITB database, Ecoinvent database v. 3.10. No specific data collected is older than five years and no generic datasets used are older than ten years. The representativeness, completeness, reliability, and consistency are judged as sufficient for calculations. Data for Danish electricity was supported by Ecoinvent database v. 3.10. Specific EPDs were used for PU/PIR foam and cement-bonded particle boards. Environmental characteristics that were not included in these EPDs sent by the manufacturer were taken from the Ecoinvent.

Assumptions and estimates

The impacts of the representative of DC-Thermopanel Wall were inventoried and calculated for all products presented in Tables 4-15 for average core density 37 kg/m^3 and thicknesses of 200 mm, 225 mm and 250 mm.

Data collection period

The data for manufacture of the declared products refers to period between 01.01.2022 – 31.12.2022 (1 year). The life cycle assessments were prepared for Europe as reference area.

Calculation rules

LCA was performed using ITB-LCA tool developed in accordance with EN 15804 + A2.

Databases

The data for the processes comes from Ecoinvent v. 3.10 and ITB-Database. Specific data quality analysis was a part of external audit. The carbon footprint of Danish electricity used for calculation is 0.224 kg CO_2/kWh.

LIFE CYCLE ASSESSMENT (LCA) – Results

Declared unit

The declaration refers to declared unit (DU) – 1 m^2 of DC-Thermopanel Wall manufactured by DC-System Insulation A/S for average core density 37 kg/m^3 and thicknesses of 200 mm, 225 mm and 250 mm.

Table 3: System boundaries for the environmental characteristic of DC-Thermopanel Wall produced by DC-System Insulation A/S.

Environmental assessment information (MD – Module Declared, MND – Module Not Declared, INA – Indicator Not Assessed)																
Product stage			Construction process		Use stage							End of life				Benefits and loads beyond the system boundary
Raw material supply	Transport	Manufacturing	Transport to construction site	Construction-installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction 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**
MD	**MD**	**MD**	**MND**	**MND**	**MND**	**MND**	**MND**	**MND**	**MND**	**MND**	**MND**	**MD**	**MD**	**MD**	**MD**	**MD**

Table 4. Life cycle assessment (LCA) results of DC-Thermopanel Wall with thickness of 200 mm - environmental impacts (DU: 1 m^2)

Indicator	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
Global Warming Potential	eq. kg CO_2	2.72E+01	6.63E+00	2.59E+00	3.64E+01	1.22E-02	4.52E-01	3.70E+01	1.61E+01	-3.42E+01
Greenhouse gas potential - fossil	eq. kg CO_2	5.72E+01	6.60E+00	2.53E+00	6.63E+01	1.14E-02	4.50E-01	1.79E+01	6.71E+00	-1.40E+01
Greenhouse gas potential - biogenic	eq. kg CO_2	-3.00E+01	2.25E-02	5.83E-02	-2.99E+01	7.88E-04	1.54E-03	1.91E+01	9.36E+00	-2.02E+01
Global warming potential - land use and land use change	eq. kg CO_2	2.51E-02	2.60E-03	2.70E-03	3.04E-02	3.62E-05	1.77E-04	2.86E-04	6.83E-04	-2.93E-04
Stratospheric ozone depletion potential	eq. kg CFC 11	4.45E-07	1.52E-06	7.56E-08	2.04E-06	2.46E-10	1.04E-07	3.99E-08	8.06E-09	-4.03E-08
Soil and water acidification potential	eq. mol H+	2.53E-01	2.74E-02	2.86E-02	3.09E-01	4.48E-05	1.83E-03	8.10E-03	1.48E-02	-8.02E-03
Eutrophication potential - freshwater	eq. kg P	2.25E-03	4.43E-04	6.79E-04	3.37E-03	9.06E-06	3.03E-05	9.80E-04	1.80E-04	-1.03E-03
Eutrophication potential - seawater	eq. kg N	4.11E-02	8.23E-03	2.79E-03	5.21E-02	1.08E-05	5.51E-04	4.35E-03	4.05E-02	-4.32E-03
Eutrophication potential - terrestrial	eq. mol N	5.18E-01	8.98E-02	2.93E-02	6.37E-01	1.23E-04	6.02E-03	3.75E-02	8.95E-02	-3.68E-02
Potential for photochemical ozone synthesis	eq. kg NMVOC	1.25E-01	2.74E-02	1.06E-02	1.63E-01	2.91E-05	1.84E-03	9.87E-03	2.58E-02	-9.67E-03
Potential for depletion of abiotic resources - non-fossil resources	eq. kg Sb	3.25E-03	2.34E-05	5.80E-06	3.28E-03	7.54E-08	1.60E-06	2.55E-06	9.57E-07	-2.59E-06
Abiotic depletion potential - fossil fuels	MJ	7.98E+02	9.80E+01	3.54E+01	9.31E+02	1.93E-01	6.68E+00	8.72E+00	5.18E+00	-9.01E+00
Water deprivation potential	eq. m^3	8.81E+00	4.53E-01	6.46E-01	9.91E+00	8.23E-03	3.09E-02	1.80E+00	4.42E-01	-1.87E+00

Table 5. Life cycle assessment (LCA) results of DC-Thermopanel Wall with thickness of 200 mm - additional impacts indicators (DU: 1 m^2)

Indicator	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
Particulate matter	disease incidence	INA	INA	INA	INA	INA	INA	INA	INA	INA
Potential human exposure efficiency relative to U235	eg. kBq U235	INA	INA	INA	INA	INA	INA	INA	INA	INA
Potential comparative toxic unit for ecosystems	CTUe	INA	INA	INA	INA	INA	INA	INA	INA	INA
Potential comparative toxic unit for humans (cancer effects)	CTUh	INA	INA	INA	INA	INA	INA	INA	INA	INA
Potential comparative toxic unit for humans (non-cancer effects)	CTUh	INA	INA	INA	INA	INA	INA	INA	INA	INA
Potential soil quality index	dimensionless	INA	INA	INA	INA	INA	INA	INA	INA	INA

Table 6. Life cycle assessment (LCA) results of DC-Thermopanel Wall with thickness of 200 mm - environmental aspects related to resource use (DU: 1 m^2)

Indicator	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
Consumption of renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	1.51E+02	1.40E+00	1.36E+01	1.66E+02	1.88E-01	9.58E-02	-1.80E+02	-2.60E+02	1.90E+02
Consumption of renewable primary energy resources used as raw materials	MJ	2.98E+02	0.00E+00	0.00E+00	2.98E+02	0.00E+00	0.00E+00	1.80E+02	2.60E+02	-1.91E+02
Total consumption of renewable primary energy resources	MJ	4.49E+02	1.40E+00	1.36E+01	4.64E+02	1.88E-01	9.58E-02	2.97E-01	9.36E-02	-3.01E-01
Consumption of non-renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	4.62E+02	9.80E+01	3.55E+01	5.95E+02	1.93E-01	6.68E+00	-1.67E+02	-1.64E+02	1.16E+02
Consumption of non-renewable primary energy resources used as raw materials	MJ	1.73E+02	0.00E+00	0.00E+00	1.73E+02	0.00E+00	0.00E+00	1.75E+02	1.69E+02	-1.25E+02
Total consumption of non-renewable primary energy resources	MJ	6.36E+02	9.80E+01	3.55E+01	7.69E+02	1.93E-01	6.68E+00	8.72E+00	5.18E+00	-9.01E+00
Consumption of secondary materials	kg	3.53E+00	3.29E-02	6.38E-03	3.57E+00	5.96E-05	2.24E-03	1.05E-02	3.75E-03	-1.06E-02
Consumption of renewable secondary fuels	MJ	4.11E-01	3.61E-04	2.73E-05	4.11E-01	2.74E-07	2.47E-05	1.81E-04	3.20E-05	-1.90E-04
Consumption of non-renewable secondary fuels	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	0.00E+00
Net consumption of freshwater resources	m^3	2.59E-01	1.23E-02	1.40E-01	4.11E-01	3.56E-04	8.41E-04	2.91E-02	1.98E-03	-2.99E-02

Table 7. Life cycle assessment (LCA) results of DC-Thermopanel Wall with thickness of 200 mm - environmental information describing waste categories (DU: 1 m^2)

Indicator	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
Hazardous waste. neutralized	kg	2.92E-01	1.10E-01	5.95E-02	4.62E-01	7.81E-04	7.50E-03	1.19E+00	2.20E-02	-1.22E+00
Non-hazardous waste neutralised	kg	2.61E+01	1.95E+00	3.20E+00	3.12E+01	4.32E-02	1.33E-01	3.30E+01	1.72E-01	-3.33E+01
Radioactive waste	kg	1.40E-02	6.73E-04	8.36E-05	1.48E-02	1.01E-06	4.60E-05	1.48E-06	3.77E-07	-1.35E-06
Components for re-use	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	0.00E+00
Materials for recycling	kg	7.91E-01	3.32E-04	1.87E-03	7.93E-01	2.46E-05	2.07E-05	2.83E-01	4.24E-05	-3.00E-01
Materials for energy recovery	kg	5.01E-04	2.45E-06	4.39E-07	5.04E-04	3.70E-09	1.67E-07	4.50E-07	3.85E-07	-4.59E-07
Energy exported	MJ	4.93E-01	1.08E-01	1.41E-01	7.43E-01	1.92E-03	7.41E-03	9.09E-03	1.69E-03	-9.37E-03

Table 8. Life cycle assessment (LCA) results of DC-Thermopanel Wall with thickness of 225 mm - environmental impacts (DU: 1 m^2)

Indicator	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
Global Warming Potential	eq. kg CO_2	2.98E+01	6.63E+00	2.59E+00	3.90E+01	1.22E-02	4.60E-01	3.80E+01	1.69E+01	-3.48E+01
Greenhouse gas potential - fossil	eq. kg CO_2	5.98E+01	6.60E+00	2.53E+00	6.90E+01	1.14E-02	4.58E-01	1.87E+01	7.51E+00	-1.42E+01
Greenhouse gas potential - biogenic	eq. kg CO_2	-3.01E+01	2.25E-02	5.83E-02	-3.00E+01	7.88E-04	1.56E-03	1.93E+01	9.36E+00	-2.06E+01
Global warming potential - land use and land use change	eq. kg CO_2	2.61E-02	2.60E-03	2.70E-03	3.15E-02	3.62E-05	1.80E-04	2.90E-04	6.89E-04	-2.98E-04
Stratospheric ozone depletion potential	eq. kg CFC 11	4.45E-07	1.52E-06	7.56E-08	2.04E-06	2.46E-10	1.06E-07	4.06E-08	8.40E-09	-4.10E-08
Soil and water acidification potential	eq. mol H+	2.57E-01	2.74E-02	2.86E-02	3.13E-01	4.48E-05	1.86E-03	8.25E-03	1.50E-02	-8.16E-03
Eutrophication potential - freshwater	eq. kg P	2.28E-03	4.43E-04	6.79E-04	3.40E-03	9.06E-06	3.08E-05	9.90E-04	1.81E-04	-1.05E-03
Eutrophication potential - seawater	eq. kg N	4.26E-02	8.23E-03	2.79E-03	5.36E-02	1.08E-05	5.61E-04	4.43E-03	4.07E-02	-4.39E-03
Eutrophication potential - terrestrial	eq. mol N	5.33E-01	8.98E-02	2.93E-02	6.53E-01	1.23E-04	6.12E-03	3.82E-02	9.02E-02	-3.74E-02
Potential for photochemical ozone synthesis	eq. kg NMVOC	1.29E-01	2.74E-02	1.06E-02	1.67E-01	2.91E-05	1.87E-03	1.01E-02	2.60E-02	-9.83E-03
Potential for depletion of abiotic resources - non-fossil resources	eq. kg Sb	3.25E-03	2.34E-05	5.80E-06	3.28E-03	7.54E-08	1.62E-06	2.58E-06	9.95E-07	-2.64E-06
Abiotic depletion potential - fossil fuels	MJ	8.67E+02	9.80E+01	3.54E+01	1.00E+03	1.93E-01	6.80E+00	8.83E+00	5.36E+00	-9.17E+00
Water deprivation potential	eq. m^3	9.37E+00	4.53E-01	6.46E-01	1.05E+01	8.23E-03	3.14E-02	1.82E+00	4.64E-01	-1.90E+00

Table 9. Life cycle assessment (LCA) results of DC-Thermopanel Wall with thickness of 225 mm - additional impacts indicators (DU: 1 m^2)

Indicator	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
Particulate matter	disease incidence	INA	INA	INA	INA	INA	INA	INA	INA	INA
Potential human exposure efficiency relative to U235	eg. kBq U235	INA	INA	INA	INA	INA	INA	INA	INA	INA
Potential comparative toxic unit for ecosystems	CTUe	INA	INA	INA	INA	INA	INA	INA	INA	INA
Potential comparative toxic unit for humans (cancer effects)	CTUh	INA	INA	INA	INA	INA	INA	INA	INA	INA
Potential comparative toxic unit for humans (non-cancer effects)	CTUh	INA	INA	INA	INA	INA	INA	INA	INA	INA
Potential soil quality index	dimensionless	INA	INA	INA	INA	INA	INA	INA	INA	INA

Table 10. Life cycle assessment (LCA) results of DC-Thermopanel Wall with thickness of 225 mm - environmental aspects related to resource use (DU: 1 m^2)

Indicator	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
Consumption of renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	1.54E+02	1.40E+00	1.36E+01	1.69E+02	1.88E-01	9.75E-02	-1.82E+02	-2.60E+02	1.94E+02
Consumption of renewable primary energy resources used as raw materials	MJ	3.00E+02	0.00E+00	0.00E+00	3.00E+02	0.00E+00	0.00E+00	1.82E+02	2.60E+02	-1.94E+02
Total consumption of renewable primary energy resources	MJ	4.54E+02	1.40E+00	1.36E+01	4.69E+02	1.88E-01	9.75E-02	3.02E-01	9.70E-02	-3.07E-01
Consumption of non-renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	4.81E+02	9.80E+01	3.55E+01	6.15E+02	1.93E-01	6.80E+00	-1.77E+02	-1.83E+02	1.18E+02
Consumption of non-renewable primary energy resources used as raw materials	MJ	1.98E+02	0.00E+00	0.00E+00	1.98E+02	0.00E+00	0.00E+00	1.85E+02	1.89E+02	-1.27E+02
Total consumption of non-renewable primary energy resources	MJ	6.79E+02	9.80E+01	3.55E+01	8.13E+02	1.93E-01	6.80E+00	8.83E+00	5.36E+00	-9.17E+00
Consumption of secondary materials	kg	4.05E+00	3.29E-02	6.38E-03	4.09E+00	5.96E-05	2.28E-03	1.07E-02	3.91E-03	-1.08E-02
Consumption of renewable secondary fuels	MJ	4.11E-01	3.61E-04	2.73E-05	4.11E-01	2.74E-07	2.51E-05	1.83E-04	3.33E-05	-1.94E-04
Consumption of non-renewable secondary fuels	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	0.00E+00
Net consumption of freshwater resources	m^3	2.83E-01	1.23E-02	1.40E-01	4.35E-01	3.56E-04	8.55E-04	2.94E-02	2.09E-03	-3.04E-02

Table 11. Life cycle assessment (LCA) results of DC-Thermopanel Wall with thickness of 225 mm - environmental information describing waste categories (DU: 1 m^2)

Indicator	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
Hazardous waste. neutralized	kg	3.35E-01	1.10E-01	5.95E-02	5.04E-01	7.81E-04	7.63E-03	1.21E+00	2.37E-02	-1.24E+00
Non-hazardous waste neutralised	kg	2.89E+01	1.95E+00	3.20E+00	3.40E+01	4.32E-02	1.35E-01	3.35E+01	1.80E-01	-3.38E+01
Radioactive waste	kg	1.41E-02	6.73E-04	8.36E-05	1.48E-02	1.01E-06	4.68E-05	1.52E-06	3.93E-07	-1.37E-06
Components for re-use	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	0.00E+00
Materials for recycling	kg	9.09E-01	3.32E-04	1.87E-03	9.12E-01	2.46E-05	2.10E-05	2.86E-01	4.38E-05	-3.05E-01
Materials for energy recovery	kg	5.69E-04	2.45E-06	4.39E-07	5.72E-04	3.70E-09	1.70E-07	4.56E-07	4.00E-07	-4.67E-07
Energy exported	MJ	5.68E-01	1.08E-01	1.41E-01	8.18E-01	1.92E-03	7.54E-03	9.21E-03	1.76E-03	-9.53E-03

Table 12. Life cycle assessment (LCA) results of DC-Thermopanel Wall with thickness of 250 mm - environmental impacts (DU: 1 m^2)

Indicator	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
Global Warming Potential	eq. kg CO_2	3.24E+01	6.63E+00	2.59E+00	4.16E+01	1.22E-02	4.67E-01	3.91E+01	1.77E+01	-3.54E+01
Greenhouse gas potential - fossil	eq. kg CO_2	6.25E+01	6.60E+00	2.53E+00	7.17E+01	1.14E-02	4.66E-01	1.96E+01	8.32E+00	-1.45E+01
Greenhouse gas potential - biogenic	eq. kg CO_2	-3.02E+01	2.25E-02	5.83E-02	-3.01E+01	7.88E-04	1.59E-03	1.95E+01	9.36E+00	-2.09E+01
Global warming potential - land use and land use change	eq. kg CO_2	2.72E-02	2.60E-03	2.70E-03	3.25E-02	3.62E-05	1.83E-04	2.94E-04	6.95E-04	-3.03E-04
Stratospheric ozone depletion potential	eq. kg CFC 11	4.45E-07	1.52E-06	7.56E-08	2.04E-06	2.46E-10	1.08E-07	4.12E-08	8.74E-09	-4.17E-08
Soil and water acidification potential	eq. mol H+	2.61E-01	2.74E-02	2.86E-02	3.17E-01	4.48E-05	1.89E-03	8.40E-03	1.51E-02	-8.29E-03
Eutrophication potential - freshwater	eq. kg P	2.31E-03	4.43E-04	6.79E-04	3.43E-03	9.06E-06	3.13E-05	9.99E-04	1.83E-04	-1.07E-03
Eutrophication potential - seawater	eq. kg N	4.40E-02	8.23E-03	2.79E-03	5.51E-02	1.08E-05	5.70E-04	4.51E-03	4.08E-02	-4.47E-03
Eutrophication potential - terrestrial	eq. mol N	5.49E-01	8.98E-02	2.93E-02	6.68E-01	1.23E-04	6.22E-03	3.90E-02	9.09E-02	-3.80E-02
Potential for photochemical ozone synthesis	eq. kg NMVOC	1.33E-01	2.74E-02	1.06E-02	1.71E-01	2.91E-05	1.91E-03	1.03E-02	2.63E-02	-1.00E-02
Potential for depletion of abiotic resources - non-fossil resources	eq. kg Sb	3.25E-03	2.34E-05	5.80E-06	3.28E-03	7.54E-08	1.65E-06	2.62E-06	1.03E-06	-2.68E-06
Abiotic depletion potential - fossil fuels	MJ	9.36E+02	9.80E+01	3.54E+01	1.07E+03	1.93E-01	6.91E+00	8.94E+00	5.54E+00	-9.32E+00
Water deprivation potential	eq. m^3	9.92E+00	4.53E-01	6.46E-01	1.10E+01	8.23E-03	3.19E-02	1.84E+00	4.87E-01	-1.93E+00

Table 13. Life cycle assessment (LCA) results of DC-Thermopanel Wall with thickness of 250 mm - additional impacts indicators (DU: 1 m^2)

Indicator	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
Particulate matter	disease incidence	INA	INA	INA	INA	INA	INA	INA	INA	INA
Potential human exposure efficiency relative to U235	eg. kBq U235	INA	INA	INA	INA	INA	INA	INA	INA	INA
Potential comparative toxic unit for ecosystems	CTUe	INA	INA	INA	INA	INA	INA	INA	INA	INA
Potential comparative toxic unit for humans (cancer effects)	CTUh	INA	INA	INA	INA	INA	INA	INA	INA	INA
Potential comparative toxic unit for humans (non-cancer effects)	CTUh	INA	INA	INA	INA	INA	INA	INA	INA	INA
Potential soil quality index	dimensionless	INA	INA	INA	INA	INA	INA	INA	INA	INA

Table 14. Life cycle assessment (LCA) results of DC-Thermopanel Wall with thickness of 250 mm - environmental aspects related to resource use (DU: 1 m^2)

Indicator	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
Consumption of renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	1.57E+02	1.40E+00	1.36E+01	1.72E+02	1.88E-01	9.91E-02	-1.83E+02	-2.60E+02	1.97E+02
Consumption of renewable primary energy resources used as raw materials	MJ	3.02E+02	0.00E+00	0.00E+00	3.02E+02	0.00E+00	0.00E+00	1.84E+02	2.60E+02	-1.97E+02
Total consumption of renewable primary energy resources	MJ	4.59E+02	1.40E+00	1.36E+01	4.74E+02	1.88E-01	9.91E-02	3.06E-01	1.00E-01	-3.12E-01
Consumption of non-renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	5.00E+02	9.80E+01	3.55E+01	6.34E+02	1.93E-01	6.91E+00	-1.87E+02	-2.03E+02	1.20E+02
Consumption of non-renewable primary energy resources used as raw materials	MJ	2.22E+02	0.00E+00	0.00E+00	2.22E+02	0.00E+00	0.00E+00	1.95E+02	2.08E+02	-1.29E+02
Total consumption of non-renewable primary energy resources	MJ	7.23E+02	9.80E+01	3.55E+01	8.56E+02	1.93E-01	6.91E+00	8.94E+00	5.54E+00	-9.32E+00
Consumption of secondary materials	kg	4.57E+00	3.29E-02	6.38E-03	4.61E+00	5.96E-05	2.32E-03	1.09E-02	4.07E-03	-1.09E-02
Consumption of renewable secondary fuels	MJ	4.11E-01	3.61E-04	2.73E-05	4.11E-01	2.74E-07	2.55E-05	1.85E-04	3.47E-05	-1.97E-04
Consumption of non-renewable secondary fuels	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	0.00E+00
Net consumption of freshwater resources	m^3	3.06E-01	1.23E-02	1.40E-01	4.58E-01	3.56E-04	8.69E-04	2.98E-02	2.19E-03	-3.10E-02

Table 15. Life cycle assessment (LCA) results of DC-Thermopanel Wall with thickness of 250 mm - environmental information describing waste categories (DU: 1 m^2)

Indicator	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
Hazardous waste. neutralized	kg	3.77E-01	1.10E-01	5.95E-02	5.47E-01	7.81E-04	7.75E-03	1.23E+00	2.54E-02	-1.26E+00
Non-hazardous waste neutralised	kg	3.16E+01	1.95E+00	3.20E+00	3.68E+01	4.32E-02	1.38E-01	3.40E+01	1.87E-01	-3.44E+01
Radioactive waste	kg	1.41E-02	6.73E-04	8.36E-05	1.49E-02	1.01E-06	4.76E-05	1.57E-06	4.08E-07	-1.39E-06
Components for re-use	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	0.00E+00
Materials for recycling	kg	1.03E+00	3.32E-04	1.87E-03	1.03E+00	2.46E-05	2.14E-05	2.88E-01	4.52E-05	-3.10E-01
Materials for energy recovery	kg	6.37E-04	2.45E-06	4.39E-07	6.40E-04	3.70E-09	1.73E-07	4.62E-07	4.15E-07	-4.75E-07
Energy exported	MJ	6.44E-01	1.08E-01	1.41E-01	8.94E-01	1.92E-03	7.67E-03	9.33E-03	1.84E-03	-9.69E-03

Verification

The process of verification of this EPD is in accordance with ISO 14025 and ISO 21930. After verification, this EPD is valid for a 5-year-period. EPD does not have to be recalculated after 5 years, if the underlying data have not changed significantly.

The basis for LCA analysis was EN 15804+A2 and ITB PCR A
Independent verification corresponding to ISO 14025 (subclause 8.1.3.) [x] external [ ] internal
External verification of EPD: Halina Prejzner, PhD Eng LCA, LCI audit and input data verification: Mateusz Kozicki, PhD Verification of LCA: Michał Piasecki, PhD. DSc. Eng

Note 1: The declaration owner has the sole ownership, liability and responsibility for the information provided and contained in EPD. Declarations within the same product category but from different programmes may not be comparable. Declarations of construction products may not be comparable if they do not comply with EN 15804 + A2. For further information about comparability, see EN 15804 + A2 and ISO 14025. Depending on the application, a corresponding conversion factor such as the specific weight per surface area must be taken into consideration.

Note 2: ITB is a public Research Organization and Notified Body (EC Reg. no 1488) to the European Commission and to other Member States of the European Union designated for the tasks concerning the assessment of building products' performance. ITB acts as the independent, third-party verification organization (17065/17025 certified). ITB-EPD program is recognized and registered member of The European Platform – Association of EPD program operators and ITB-EPD declarations are registered and stored in the international ECO-PORTAL.

Normative references

- ITB PCR A, v. 1.6 General Product Category Rules for Construction Products
- ISO 14025:2006 Environmental labels and declarations – Type III environmental declarations – Principles and procedures
- ISO 21930:2017 Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services
- ISO 14044:2006 Environmental management – Life cycle assessment – Requirements and guidelines
- ISO 15686-1:2011 Buildings and constructed assets – Service life planning – Part 1: General principles and framework
- ISO 15686-8:2008 Buildings and constructed assets – Service life planning – Part 8: Reference service life and service-life estimation
- ISO 20915:2018 Life cycle inventory calculation methodology for steel products
- EN 15804:2012+A2:2019 Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products
- ISO 14067:2018 Greenhouse gases - Carbon footprint of products — Requirements and guidelines for quantification
- EN 15942:2012 Sustainability of construction works – Environmental product declarations – Communication format business-to-business
- EN 14509:2013 Self-supporting double skin metal faced insulating panels - Factory made products - Specifications

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CERTIFICATE № 597/2024
of TYPE III ENVIRONMENTAL DECLARATION

Products:

DC - Thermopanel Wall

Manufacturer:

DC-System Insulation A/S
Nordvestvej 8, DK-9600 Aars, Denmark

confirms the correctness of the data included in the development of
Type III Environmental Declaration and accordance with the requirements of the standard

EN 15804+A2

Sustainability of construction works.
Environmental product declarations.
Core rules for the product category of construction products.

This certificate, issued on 7th February 2024 is valid for 5 years
or until amendment of mentioned Environmental Declaration

Head of the Thermal Physic, Acoustics and Environment Department
Agnieszka Winkler-Skalna, PhD

INSTYTUT TECHNIKI BUDOWLANEJ

Deputy Director for Research and Innovation
Krzysztof Kuczyński, PhD

Warsaw, February 2024