ENVINEER

ENVIRONMENTAL PRODUCT DECLARATION

In accordance with SFS-EN 15804:2012+A2:2019 & ISO 14025 / ISO 21930

INORA EPS

INORA OY

GENERAL INFORMATION

MANUFACTURER INFORMATION

Manufacturer	Inora Oy
Address	Muovikatu 9, 74120 Iisalmi
Contact details	matti.aronen@inora.fi
Website	www.inora.fi

PRODUCT IDENTIFICATION

Product name	INORA EPS
Place(s) of production	Finland

The Building Information Foundation RTS sr.
EPDs within the same product category but from different programs may not be comparable.

EPD INFORMATION

The EPD owner has the sole ownership, liability, and responsibility for the EPD. Construction products EPDs may not be comparable if they do not comply with EN 15804 and if they are not compared in a building context.

EPD standards	This EPD is in accordance with EN 15804+A2 and ISO 14025 standards.
Product category rules	The CEN standard EN 15804 serves as the core PCR. In addition, the RTS PCR (English version, 26.8.2020) is used.
EPD author	Matias Mutila, Envineer Oy
EPD verification	Independent verification of this EPD and data, according to ISO 14025: External verification
Verification date	26.9.2023
EPD verifier	Heini Koutonen, Nordic Offset Oy
Publishing date	Not published
EPD valid until	26.9.2028

PRODUCT INFORMATION

PRODUCT DESCRIPTION

Inora EPS products are thermal insulations for buildings made of expanded polystyrene (EPS), which is light weight and effective.

PRODUCT APPLICATION

Inora EPS insulation boards are used for thermal insulation on floors, walls, ceilings and in ground as frost insulation.

TECHNICAL SPECIFICATIONS

Inora EPS insulation is produced with 8 different densities. Board can be cut to any sheet thickness based on customer requirements. The following density and properties have been used in the LCA: Thermal conductivity is 0,031 -0,036 W/mK, Compressive strength is 60 - 300 kPa (EN13163:2015), Bending strength is 100 - 450 kPa (EN13163:2015), Nominal density is 14 – 36 kg/m3.

Inora EPS products are homogeneous, thus the results are representative of all densities.

Further details can be found from the manufacturer.

PRODUCT STANDARDS

No product standards.

PHYSICAL PROPERTIES OF THE PRODUCT

The product is ready for use when delivered to the customer. Contents of the product is presented in the tables below.

PRODUCT RAW MATERIAL COMPOSITION

Product and Packaging Material	quantity p%	Usability	Origin of the raw materials
Expandable Polystyrene (EPS)	100	Non-renewable	EU

Other manufacturing materials account for <1p%.

SUBSTANCES, REACH – VERY HIGH

The product does not contain any REACH SVHC substances in amounts greater than 0,1 % (1000 ppm)

PRODUCT LIFE-CYCLE

MANUFACTURING AND PACKAGING (A1-A3)

Manufacturing starts from the raw material supply. All major upstream processes of raw material supply are included. The environmental impacts of raw material supply include emissions from raw material production and processing. All raw materials are transported to the manufacturer. Heat and steam are produced at the production plant. The electricity used is acquired from the grid.

The EPS is expanded in a pre-expander, after which the expanded EPS is transferred to silos. In the next step, the expanded EPS is moulded as blocks in a block mould. The finished blocks are transferred to the storage area, after which they are cut according to the needs of the customer.

In the production stage, the manufacturing of ancillary and packaging materials used in the production is included. Manufacturers' waste handling is considered in the production stage.

TRANSPORT (A4)

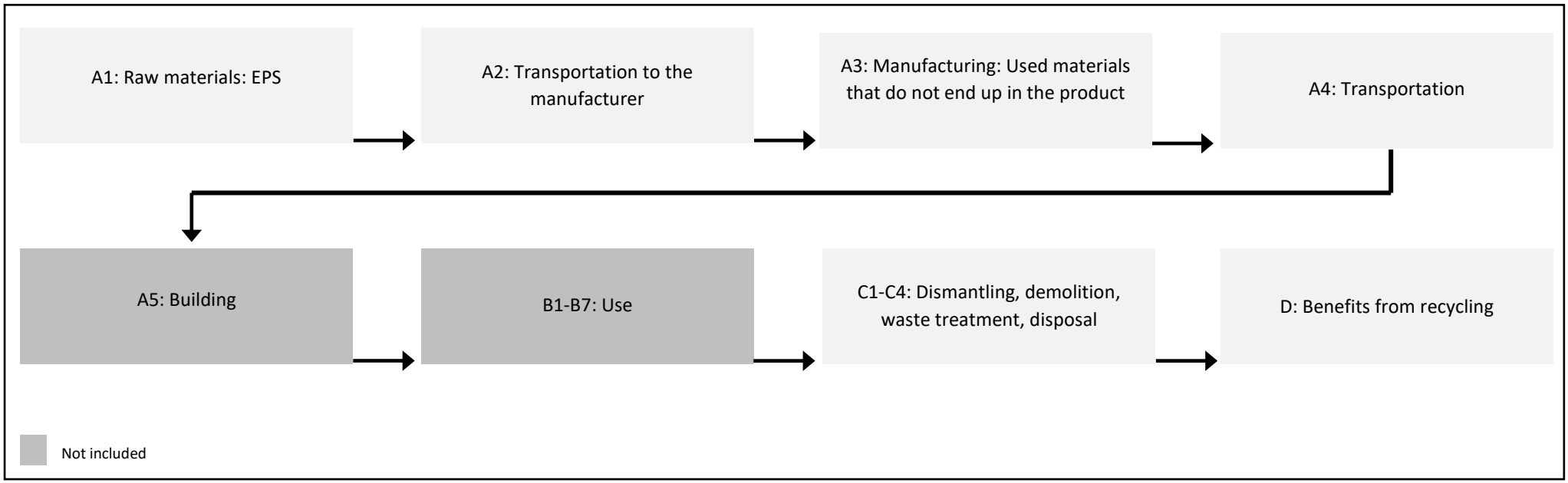
It is assumed in the conservative transport scenario that all units are transported from the manufacturer to Helsinki metropolitan area.

PRODUCT END OF LIFE (C1-C4, D)

In C1 the product is disassembled, and diesel is burned in the building machine. The scenario is based on Erlandsson, M., & Peterson, D. (2015) and Envineer's expert assessment. In C2 the disassembled product is transported to treatment where 50 km is assumed. In C3 it is assumed that 100 % of product is collected to be sent to energy recovery. Based on previous argument, C4 is assumed to be zero.

In D it is assumed that 100 % of the sorted product is incinerated and primary heat and electricity production (Heat and power co-generation, hard coal) is replaced.

MANUFACTURING PROCESS



LIFE-CYCLE ASSESSMENT

LIFE-CYCLE ASSESSMENT INFORMATION

Period for data	Year 2022

DECLARED AND FUNCTIONAL UNIT

Declared unit	m3
Mass per declared unit	18 kg

BIOGENIC CARBON CONTENT

Product's biogenic carbon content at the factory gate

Biogenic carbon content in product, kg C/m³	0
Biogenic carbon content in packaging, kg C	0

SYSTEM BOUNDARY

This analysis takes into account all mandatory modules and processes in the Standards and RTS Methodological Manual. The processes and modules considered are shown in the table below. EPD-type is cradle-to-gate with options.

Product stage			Assembly stage		Use stage							End of life stage				Beyond the system boundaries		
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	D	D
x	x	x	x	MND	MND	MND	MND	MND	MND	MND	MND	x	x	x	x	x	x	x
Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction demolition	Transport	Waste processing	Disposal	Reuse	Recovery	Recycling

X = Modules declared. Modules not declared = MND.

CUT-OFF CRITERIA

The study does not exclude any modules or processes which are stated mandatory in the EN 15804:2012+A2:2019 and the applied PCR. The study does not exclude any hazardous materials or substances.

The study includes all major raw material and energy consumption. All inputs and outputs of the unit processes, for which data is available for, are included in the calculation. There is no neglected unit process more than 1 % of total mass or energy flows. The module specific total neglected input and output flows also do not exceed 5 % of energy usage or mass.

The manufacturing processes of both product groups receive the necessary heat energy as part of steam production. The products are stored outside. The heating required by support functions (office) is minor. This has not been taken into account in the study. The cut-off has been done in accordance with the Cut-off criteria stated.

ALLOCATION, ESTIMATES AND ASSUMPTIONS

Allocation is required if some material, energy, and waste data cannot be measured separately for the product under investigation.

In this study, as per EN 15804, allocation is conducted in the following order:

1. Allocation should be avoided.

2. Allocation should be based on physical properties (e.g., mass, volume) when the difference in revenue is small.

3. Allocation should be based on economic values.

No allocations have been needed. The data has been collected per production line. No by-products are created in the production.

Allocation used in Ecoinvent 3.6 environmental data sources follows the methodology 'allocation, cut-off by classification'. This methodology is in line with the requirements of the EN 15804 -standard.

BACKGROUND DATA

One Click LCA tool and database was used to assess the upstream and downstream processes. One Click LCA -database represents the most recent data available in the form of EN 15804 compliant environmental product declarations (EPDs) as well as complementary data from Ecoinvent. Data sources are specified for each data point in the following chapters.

Ecoinvent is a widely used database which is commonly referenced in published life cycle studies. The data follows ISO14040/14044 standards, and for One Click LCA it has been converted to be suitable for use with the Standards. The data collected from Ecoinvent represents mainly Europe and is thus well suited to model products studied in this assessment. The Ecoinvent 3.6 (2019) version of resources was chosen for calculations. It must be mentioned, that Ecoinvent does not provide year specific data, but the data represents a period of time, and thus the data can be considered to be temporally relevant.

ENVIRONMENTAL IMPACT DATA

The effects are presented per declared unit, per 1 m^3 of product (e.g., 1 kg CO2e / 1 m^3 of product). Mass per declared unit is 18 kg/m^3. The results are presented in a scientific format. Data interpretation example: 1.22E-2 = 1.22*10-2 = 0.0122. Insulation products with different thicknesses can be calculated by multiplying the environmental impact results by the scaling factor represented in annex 1.

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP – total	kg CO_2e	4,41E1	3,51E0	4,39E-1	4,8E1	7,46E-1	MND	MND	MND	MND	MND	MND	MND	MND	2,97E-2	8,19E-2	6,32E1	0E0	-2,4E1
GWP – fossil	kg CO_2e	4,41E1	3,51E0	4,39E-1	4,8E1	7,52E-1	MND	MND	MND	MND	MND	MND	MND	MND	2,97E-2	8,18E-2	6,33E1	0E0	-2,4E1
GWP – biogenic	kg CO_2e	5,26E-6	0E0	0E0	5,26E-6	0E0	MND	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
GWP – LULUC	kg CO_2e	3,17E-5	1,11E-3	3,51E-4	1,49E-3	2,26E-4	MND	MND	MND	MND	MND	MND	MND	MND	2,51E-6	2,46E-5	3,96E-3	0E0	-2,58E-3
Ozone depletion pot.	kg $CFC_{-11}e$	2,77E-8	8,18E-7	1,57E-8	8,62E-7	1,77E-7	MND	MND	MND	MND	MND	MND	MND	MND	6,41E-9	1,92E-8	5,23E-7	0E0	-2,5E-7
Acidification potential	mol H^+e	1,39E-1	1,98E-2	1,89E-3	1,6E-1	3,16E-3	MND	MND	MND	MND	MND	MND	MND	MND	3,1E-4	3,44E-4	2,55E-2	0E0	-7,96E-2
EP-freshwater	kg Pe	1,47E-4	2,78E-5	1,5E-5	1,9E-4	6,12E-6	MND	MND	MND	MND	MND	MND	MND	MND	1,2E-7	6,65E-7	1,16E-4	0E0	-1,5E-3
EP-marine	kg Ne	2,48E-2	5,67E-3	3,57E-4	3,08E-2	9,52E-4	MND	MND	MND	MND	MND	MND	MND	MND	1,37E-4	1,04E-4	8,23E-3	0E0	-1,29E-2
EP-terrestrial	mol Ne	2,73E-1	6,27E-2	3,97E-3	3,4E-1	1,05E-2	MND	MND	MND	MND	MND	MND	MND	MND	1,5E-3	1,14E-3	9,09E-2	0E0	-1,52E-1
POCP (“smog”)	kg NMVOCe	1,04E-1	1,91E-2	8,38E-1	9,62E-1	3,38E-3	MND	MND	MND	MND	MND	MND	MND	MND	4,13E-4	3,68E-4	2,75E-2	0E0	-3,91E-2
ADP-minerals & metals	kg Sbe	2,34E-5	5,8E-5	4,03E-6	8,54E-5	1,28E-5	MND	MND	MND	MND	MND	MND	MND	MND	4,53E-8	1,4E-6	8,38E-5	0E0	-1,42E-5
ADP-fossil resources	MJ	1,53E3	5,4E1	1,15E1	1,6E3	1,17E1	MND	MND	MND	MND	MND	MND	MND	MND	4,08E-1	1,27E0	6,77E1	0E0	-2,54E2
Water use	m^3e depr.	7,84E0	1,97E-1	1,45E0	9,49E0	4,35E-2	MND	MND	MND	MND	MND	MND	MND	MND	7,62E-4	4,73E-3	1,49E0	0E0	-3,71E0

GWP = Global Warming Potential; EP = Eutrophication potential; POCP = Photochemical ozone formation; ADP = Abiotic depletion potential. EN 15804+A2 disclaimer for Abiotic depletion and Water use and optional indicators except Particulate matter and Ionizing radiation, human health. The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator. Required characterisation method and data are in kg P-eq. Multiply by 3,07 to get PO_4e.

USE OF NATURAL RESOURCES

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Renew. PER as energy	MJ	8,77E0	6,66E-1	5,31E-1	9,96E0	1,47E-1	MND	MND	MND	MND	MND	MND	MND	MND	2,21E-3	1,6E-2	3,36E0	0E0	-2,59E0
Renew. PER as material	MJ	9,18E0	0E0	0E0	9,18E0	0E0	MND	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Total use of renew. PER	MJ	1,79E1	6,66E-1	5,31E-1	1,91E1	1,47E-1	MND	MND	MND	MND	MND	MND	MND	MND	2,21E-3	1,6E-2	3,36E0	0E0	-2,59E0
Non-re. PER as energy	MJ	7,52E2	5,4E1	5,23E0	8,11E2	1,17E1	MND	MND	MND	MND	MND	MND	MND	MND	4,08E-1	1,27E0	6,77E1	0E0	-2,54E2

Non-re. PER as material	MJ	7,83E2	0E0	6,28E0	7,89E2	0E0	MND	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Total use of non-re. PER	MJ	1,53E3	5,4E1	1,15E1	1,6E3	1,17E1	MND	MND	MND	MND	MND	MND	MND	MND	4,08E-1	1,27E0	6,77E1	0E0	-2,54E2
Secondary materials	kg	7,32E-5	0E0	2,05E-3	2,13E-3	0E0	MND	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Renew. secondary fuels	MJ	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Non-ren. secondary fuels	MJ	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Use of net fresh water	m^3	3,01E2	1,1E-2	5,66E-2	3,01E2	2,44E-3	MND	MND	MND	MND	MND	MND	MND	MND	3,61E-5	2,65E-4	3,96E-2	0E0	-6,04E-2

PER = Primary energy resources

END OF LIFE – WASTE

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hazardous waste	kg	1,73E-2	5,28E-2	2,22E-2	9,23E-2	1,14E-2	MND	MND	MND	MND	MND	MND	MND	MND	4,39E-4	1,24E-3	0E0	0E0	-3,16E0
Non-hazardous waste	kg	8,45E-1	5,6E0	7,04E-1	7,15E0	1,26E0	MND	MND	MND	MND	MND	MND	MND	MND	4,7E-3	1,37E-1	0E0	0E0	-5,82E1
Radioactive waste	kg	3,3E-4	3,71E-4	1,29E-5	7,15E-4	8,03E-5	MND	MND	MND	MND	MND	MND	MND	MND	2,86E-6	8,73E-6	0E0	0E0	-1,28E-4

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Components for re-use	kg	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Materials for recycling	kg	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Materials for energy rec	kg	0E0	0E0	2.32E-1	2.32E-1	0E0	MND	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	18	0E0	0E0
Exported energy	MJ	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0

KEY INFORMATION TABLE – KEY INFORMATION PER KG OF PRODUCT

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP – total	kg CO_2e	4,41E1	3,51E0	4,39E-1	4,8E1	7,46E-1	MND	MND	MND	MND	MND	MND	MND	MND	2,97E-2	8,19E-2	6,32E1	0E0	-2,4E1
ADP-minerals & metals	kg Sbe	2,34E-5	5,8E-5	4,03E-6	8,54E-5	1,28E-5	MND	MND	MND	MND	MND	MND	MND	MND	4,53E-8	1,4E-6	8,38E-5	0E0	-1,42E-5
ADP-fossil	MJ	1,53E3	5,4E1	1,15E1	1,6E3	1,17E1	MND	MND	MND	MND	MND	MND	MND	MND	4,08E-1	1,27E0	6,77E1	0E0	-2,54E2
Water use	m^3e depr.	7,84E0	1,97E-1	1,45E0	9,49E0	4,35E-2	MND	MND	MND	MND	MND	MND	MND	MND	7,62E-4	4,73E-3	1,49E0	0E0	-3,71E0
Secondary materials	kg	7,32E-5	0E0	2,05E-3	2,13E-3	0E0	MND	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0

Biog. C in product	kg C	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	MND	N/A	N/A	N/A	N/A	N/A
Biog. C in packaging	kg C	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	MND	N/A	N/A	N/A	N/A	N/A

MND=Modules Not declared, N/A=Not applied, Biog. C in product = Biogenic carbon content in product

SCENARIO DOCUMENTATION

Energy

Scenario parameter	Value
Electricity data source and quality	Electricity production, hydro, reservoir, non-alpine region (Reference product: electricity, high voltage), Finland, Ecoinvent 3.6, 2019
Electricity kg CO2e / kWh	0,0487 kg CO2e / kWh
Electricity data source and quality	Electricity production, wind, >3mw turbine, onshore (Reference product: electricity, high voltage), Finland, Ecoinvent 3.6, 2019
Electricity kg CO2e / kWh	0.0288 kg CO2e / kWh
Electricity data source and quality	Electricity production, photovoltaic, 570kwp open ground installation, multi-si (Reference product: electricity, low voltage), Sweden, Ecoinvent 3.6, 2019
Electricity kg CO2e / kWh	0.0784 kg CO2e / kWh
Electricity data source and quality	Electricity, high voltage, biofuels, import from germany (Reference product: electricity, high voltage), Switzerland, Ecoinvent 3.6, 2019
Electricity kg CO2e / kWh	0.0646 kg CO2e / kWh
Electricity data source and quality	Electricity production, deep geothermal (Reference product: electricity, high voltage), Switzerland, Ecoinvent 3.6, 2019
Electricity kg CO2e / kWh	0.0253 kg CO2e / kWh
Steam data source and quality	Steam production, in chemical industry (Reference product: steam, in chemical industry), Europe, Ecoinvent 3.6, 2019
Steam kg CO2e / kg	0.29
Liquefied petroleum gas data source and quality	Market for liquefied petroleum gas (Reference product: liquefied petroleum gas), Europe, Ecoinvent 3.6, 2019
Liquefied petroleum gas kg CO2e / kg	0.65

Transport

Scenario parameter	Value		
Specific transport CO2e emissions, kg CO2e / tkm (Lorry)	0.0909	Market for transport, freight, lorry >32 metric ton, euro5, ecoinvent 3.6)	ecoinvent 3.6
Average transport distance, km	460	Average distance	
Capacity utilization (including empty return) %	100	Average distance	
Bulk density of transported products	<32 t		
Volume capacity utilization factor	1		

End of life

Scenario parameter	Value
Collection process – kg collected separately	18
Collection process – kg collected with mixed waste	0
Recovery process – kg for re-use	0
Recovery process – kg for recycling / sorting	0
Recovery process – kg for energy recovery	18
Disposal (total) – kg for final deposition	0
Scenario assumptions e.g., transportation	50 km

BIBLIOGRAPHY

ISO 14025:2010 Environmental labels and declarations – Type III environmental declarations Principles and procedures.

ISO 14040:2006 Environmental management. Life cycle assessment. Principles and frameworks.

ISO 14044:2006 Environmental management. Life cycle assessment. Requirements and guidelines.

SFS-EN 15804:2012+A2:2019 Sustainability in construction works – Environmental product declarations – Core rules for the product category of construction products.

Erlandsson, M., & Peterson, D. (2015). Klimatpåverkan för byggnader med olika energiprestanda. *Underlagsrapport till kontrollstation*.

RTS PCR EN 15804:2019 RTS PCR in line with EN 15804+A2. Published by the Building Information Foundation RTS 26.8.2020.

INORA EPS LCA background report 9.8.2023.

ANNEX 1 – SCALING FACTORS

Product name	Density	Unit	Scaling Factor
Inora EPS 60	15	kg/m^3	0.8333
Inora EPS 80	16.5	kg/m^3	0.9167
Inora EPS 100	18	kg/m^3	1
Inora EPS 120	20.5	kg/m^3	1.1389
Inora EPS 150	24	kg/m^3	1.3333
Inora EPS 200	28	kg/m^3	1.5556
Inora EPS 300	36	kg/m^3	2
Askeläänieriste	14	kg/m^3	0.7778