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ENVIRONMENTAL PRODUCT DECLARATION

In accordance with ISO 14025 and EN 15804+A2

Armacell GmbH
HT/ArmaFlex



armacell DRIVING ENERGY EFFICIENCY

Owner of the declaration
Armacell GmbH
Robert-Bosch-Str. 10
48161 Münster
Germany

Product
HT/ArmaFlex

Declared product / Declared unit
1 m³

This declaration is based on Product Category Rules
EN 15804:2012 + A2:2019,
NPCR Part A:2021 ,
NPCR 012 Part B for Thermal Insulation Products ,
EN 16783:2024

Program operator:
EPD Global
Majorstuen P.O. Box 5250
N-0303 Oslo
Norway

Declaration number
NEPD-12232-12232-2

Registration number
NEPD-12232-12232-2

Issue date
18.09.2026

Valid to
17.09.2031

EPD Software
Emidat Platform v1.0.0

General Information

Product
HT/ArmaFlex

Program Operator
EPD Global
Majorstuen P.O. Box 5250
N-0303 Oslo
Norway
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Email: post@epd-norge.no

Declaration Number
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This declaration is based on Product Category Rules
EN 15804:2012 + A2:2019,
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NPCR 012 Part B for Thermal Insulation Products ,
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Statements
The owner of the declaration shall be liable for the underlying information and evidence. The Norwegian EPD Foundation shall not be liable with respect to manufacturer, life cycle assessment data and evidences.

Declared unit
1 m^3

General information on verification of EPD from EPD tools
Independent verification of data, other environmental information and the declaration according to ISO 14025:2011-10, § 8.1.3 and § 8.1.4. Verification of each EPD is made according to EPD Global's guidelines for verification and approval requiring that tools are i) integrated into the company's environmental management system, ii) the procedures for use of the EPD tool are approved by EPD Global, and iii) the process is reviewed annually by an independent third-party verifier. See Appendix G of EPD Global's General Programme Instructions for further information on EPD tools.

Verification
Independent third-party verification based on the verification of the EPD tool, background data and test-EPD in accordance with EPD Global's procedures and guidelines for verification and approval of EPD tools.
Third-party verifier: Charlotte Merlin, FORCE Technology

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Manufacturer
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Robert-Bosch-Str. 10
48161 Münster, Germany

Place of production
Münster, Germany

Management system
ISO 9001 , ISO 14001 , ISO 50001

Issue date
18.09.2026

Valid to
17.09.2031

Year of study
2024

Comparability
EPDs of construction products may not be comparable if they do not comply with EN 15804 and are not seen in a building context. 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 (including primary and secondary data).

Development and verification of EPD
The declaration was created using the Emidat EPD tool v1.0, developed by Emidat GmbH which is third-party verified and approved as a Reference Flow Tool with internal review under administration and surveillance by EPD Global under provisions stated in general information on verification of EPD from EPD tools.

Developer of EPD: Nasim Mamedov
Reviewer of company-specific input data and EPD: Umut Can Kaya

Approved

Håkon Hauan, The Norwegian EPD Foundation

Product

Product description

HT/ArmaFlex is the professional, highly-flexible, closed-cell elastomeric foam insulation (FEF) for continuous energy saving and condensation control purposes with exceptional resistance to high temperatures and UV radiation. The combination of very low thermal conductivity and extremely high resistance to water vapour transmission prevents longterm energy losses and water vapour ingress and reduces the risk of corrosion under insulation.

Technical data:

Thermal conductivity: 0,042 W/mK at 40 °C for tubes // 0,045 W/mK at 40 °C for sheets

Reaction to fire (EN 13501-1): DL-s3,d0 for tubes // D-s3,d0 for sheets

Water vapour diffusion resistance factor (EN 12086, EN 13469): μ ≥ 4000 for tubes // μ ≥ 3000 for sheets

Maximum service temperature (EN 14706, EN 14707): +150 °C

Minimum service temperature : -50 °C

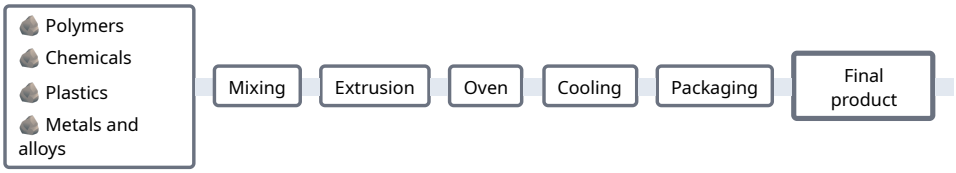
Application description

HT/ArmaFlex is used to insulate pipes, air ducts and vessels including fittings and flanges of industrial installations and building equipment.

- Condensation control, energy saving and noise control in refrigeration and air conditioning equipment and process plants.

- Energy savings and personal protection insulation in solar panels, hot gas lines, steam and dual temperature lines applications.

Production process



Product specification

Name of ingredient	Share of total weight
Chemicals	70 - 90 %
Metals and alloys	0 - 2 %
Plastics	10 - 30 %
Polymers	2 - 10 %

Packaging

Name	Quantity, kg
Cardboard	12.76
Paper	0.07

Technical data

	Unit	Value
Mass	kg	63.94
Thermal conductivity	W / (mK)	0.042

The product is produced according to the product standard EN 14304.

Market
Germany

Recipients
B2B

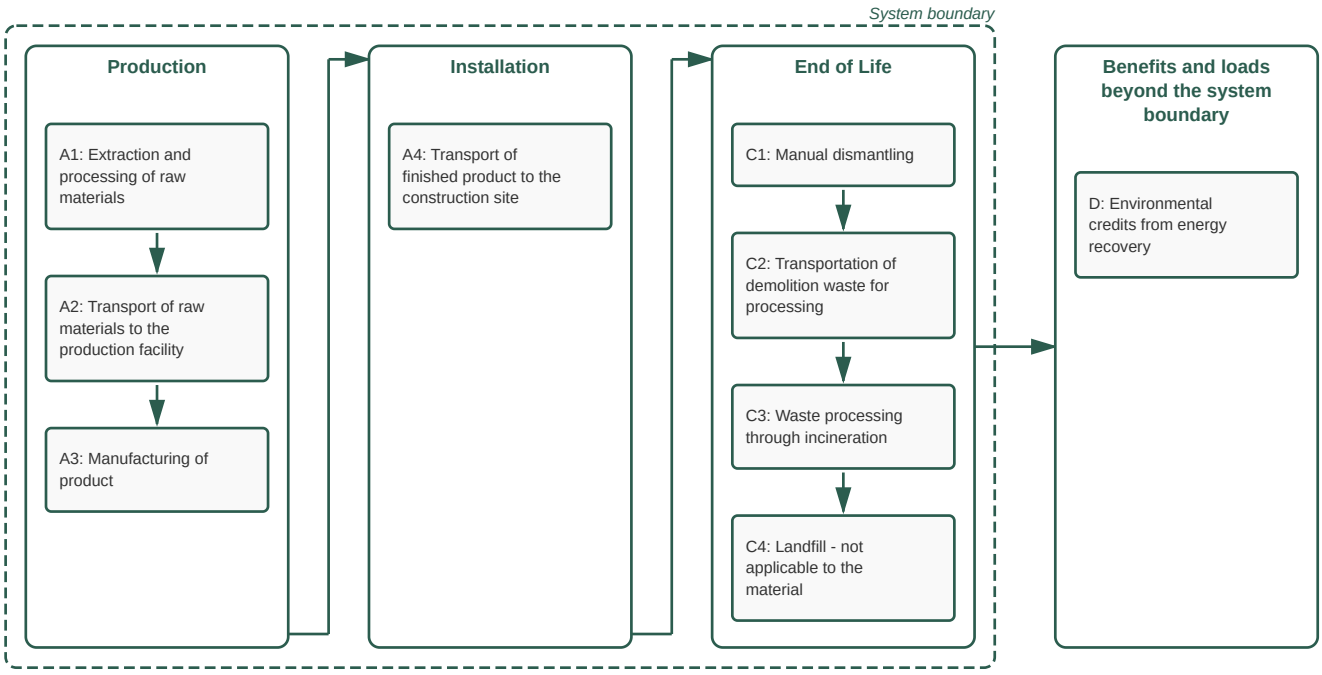
LCA: Calculation rules

Declared unit
1 m^3

Product lifetime
Not declared

Reference service life
Not declared

System boundary



Data quality
The foreground data are based on extensive and detailed data collection at the production site of the manufacturer, covering key processes such as raw material sourcing, formulation, and manufacturing. These foreground data are fully linked with corresponding datasets from the background database (ecoinvent 3.10) or with EN15804+A2-compliant EPDs, ensuring consistency, reliability, and maintaining alignment with the latest industry standards.

The overall data representativeness is rated as good with an overall score of 4.00/5, in accordance with EN 15804+A2 Annex E guidance on data quality assessment, considering geographical, technical, and temporal representativeness.

The following table discloses all processes or activities assessed with very poor or poor data representativeness according to EN 15804+A2, as well as those assessed as fair that contribute more than 30 % to any core impact indicator in A1–A3:

Element	Minimal Representativeness	Source	Year
Chemicals	Very poor	ecoinvent 3.10	2023
Recycling	Very poor	ecoinvent 3.10	2023
Chemicals	Poor	ecoinvent 3.10	2023
Incineration	Poor	ecoinvent 3.10	2023
Landfill	Poor	ecoinvent 3.10	2023
Packaging	Poor	ecoinvent 3.10	2023
Recycling	Poor	ecoinvent 3.10	2023
Chemicals	Fair	ecoinvent 3.10	2023

System boundaries (X=included, MND=module not declared)

	Production			Installation		Use stage							End-of-Life				Next product system
	Raw material supply	Transport	Manufacturing	Transport	Installation Process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational Energy Use	Operational Water Use	Demolition	Transport	Waste Processing	Disposal	Benefits and loads beyond the system boundary
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules declared	x	x	x	x	MND	MND	MND	MND	MND	MND	MND	MND	x	x	x	x	x
Geography			DE	DE	MND	MND	MND	MND	MND	MND	MND	MND	DE	DE	DE	DE	DE

For the geographies modeled in A1 and A2, refer to *Product specification*.

Type of EPD: Cradle to gate with options, modules A4, C1-C4 + D

Stage of Material Production and Construction

Module A1: Extraction and processing of raw materials

Module A2: Transport of raw materials to the production facility

Module A3: Manufacturing of product

Module A4: Transport of finished product to the construction site

Disposal Stage

Module C1: Manual dismantling

Module C2: Transportation of demolition waste for processing

Module C3: Waste processing through incineration

Module C4: Landfill - not applicable to the material

Credits and burdens outside the system boundaries

Module D: Environmental credits from energy recovery

Cut-off criteria

All inputs and outputs related to the declared modules of Flexible elastomeric foam, including raw materials, packaging, transportation, energy usage and ancillary materials, were comprehensively considered in line with EN 15804+A2 and if applicable the product-specific PCR. Furthermore, all known hazardous substances (within the REACH list and the Norwegian Priority List), regulated materials, and significant emissions were declared and are not excluded under the cut-off rules.

The following processes are considered below the EN 15804+A2 cut-off threshold and were excluded:

- Impacts related to the manufacturer's infrastructure and assets
- Manufacturing of means of production, buildings or other capital goods
- Transportation of personnel to the plant
- Transportation of personnel within the plant
- Research and development activities
- Long-term emissions

Allocation

Foreground inventory data (energy and fuels, ancillary materials, emissions and waste) was collected at the production process level. Allocation based on Mass was applied to allocate the total output of the production process in 2024 to the reference product.

Key assumptions and estimates

Production process flows are allocated to the reference product, as described under allocation. The Mass-based allocation assumes a uniform distribution of production impacts across co-products. Foreground inventory data is checked for consistency of production process, to ensure the validity of the allocated results.

LCA: Scenarios and additional technical information

The following information describe the scenarios in the different modules of the EPD. Mass and energy flows are reported per 1 m^3 of product.

Transport to the building site (A4)	Value	Unit
Location of the production site	Germany	
Location of the installation site	Germany	
Transported mass: Product and packaging	76.77	kg
Transport modality: Truck	transport, freight, lorry >32 metric ton, EURO6	-
Distance	300.00	km
Litres of fuel	36.48	l / 100km
Energy demand	1.58	MJ / t*km
Energy demand (km)	0.12	MJ / km
Capacity utilization	53.30	%

Transport of the product and its packaging from the production site to the installation site. Transport distances are based on external sources such as reported market averages, standards or PCRs. Vehicle type, fuel consumption and capacity utilization assumptions stem from the underlying background transport datasets and are stated below.

End-of-life scenario (C1-C4)	Value	Unit
Collection process specified by type		
Collected individually	0	kg
Collected with mixed construction and demolition waste	63.94	kg
Recovery system specified by type		
Destined for reuse	0	kg
Destined for recycling	0	kg
Destined for energy recovery	63.94	kg
Disposal specified by type		
Product or material destined for final disposal	0	kg
Transport		
Distance to incineration	50.00	km
Transport modality: Truck	transport, freight, lorry >32 metric ton, EURO6	-
Energy demand	1.58	MJ / t*km
Energy demand (km)	0.10	MJ / km
Capacity utilization	53.30	%

For the manual deconstruction of the product, no environmental impact is modeled. Module C2 includes the impact of transportation of material after deconstruction, during the End-of-Life stage.

Reuse, recovery and/or recycling potentials (D)	Value	Unit
Amount of secondary material that the system takes in	0.67	kg
Installation (packaging): Material eligible for recycling/reuse credits	0	kg
End-of-life (product): Material eligible for recycling/reuse credits	0	kg
End-of-life (product): Material eligible for incineration credits	63.28	kg
End-of-life (product): Exported energy eligible for credits	734.02	MJ
Substitution of electricity production, grid mix	248.68	MJ
Substitution of heat production from natural gas	485.34	MJ

Calculation of loads and benefits per EN 15804+A2. Exported energy is credited only where it originates from the incineration of primary material; landfilled fractions receive no exported-energy credit and therefore no avoided primary energy consumption. Recycling or reuse benefits are credited when primary material from the product is recovered at end-of-life and replaces virgin material that would otherwise have been produced.

LCA: Results

The following results are based on the market-based electricity approach applied to the foreground system (A3). Further details on electricity data are provided in the Additional Requirements section.

Core environmental impact indicators

Indicator	Unit	A1-A3	A4	C1	C2	C3	C4	D
GWP-total	kg CO_2-eq.	4.16e+02	2.39e+00	0.00e+00	3.31e-01	1.56e+02	0.00e+00	-6.97e+01
GWP-fossil	kg CO_2-eq.	3.98e+02	2.38e+00	0.00e+00	3.31e-01	1.52e+02	0.00e+00	-6.64e+01
GWP-biogenic	kg CO_2-eq.	1.67e+01	1.20e-03	0.00e+00	1.66e-04	3.55e+00	0.00e+00	-3.22e+00
GWP-luluc	kg CO_2-eq.	1.09e+00	8.47e-04	0.00e+00	1.18e-04	9.87e-04	0.00e+00	-6.25e-02
ODP	kg CFC-11-Eq	1.07e-05	4.97e-08	0.00e+00	6.90e-09	5.61e-08	0.00e+00	-1.92e-06
AP	mol H+-Eq	2.06e+00	5.63e-03	0.00e+00	7.82e-04	3.47e-02	0.00e+00	-8.53e-02
EP-freshwater	kg P-Eq	1.16e-01	1.68e-04	0.00e+00	2.33e-05	4.78e-04	0.00e+00	-4.02e-02
EP-marine	kg N-Eq	7.47e-01	1.48e-03	0.00e+00	2.05e-04	1.97e-02	0.00e+00	-2.95e-02
EP-terrestrial	mol N-Eq	4.43e+00	1.60e-02	0.00e+00	2.22e-03	1.68e-01	0.00e+00	-2.36e-01
POCP	kg NMVOC-Eq	1.62e+00	9.78e-03	0.00e+00	1.36e-03	4.23e-02	0.00e+00	-1.10e-01
ADPE	kg Sb-Eq	3.38e-03	6.82e-06	0.00e+00	9.46e-07	1.09e-05	0.00e+00	-6.87e-05
ADPF	MJ, net calorific value	6.46e+03	3.58e+01	0.00e+00	4.97e+00	2.97e+01	0.00e+00	-1.05e+03
WDP	m^3 world Eq deprived	4.63e+02	1.80e-01	0.00e+00	2.50e-02	1.00e+01	0.00e+00	-6.70e+00

GWP-total: Global Warming Potential - total , **GWP-fossil**: Global warming potential - fossil , **GWP-biogenic**: Global Warming Potential - biogenic , **GWP-luluc**: Global Warming Potential - luluc , **ODP**: Depletion potential of the stratospheric ozone layer , **AP**: Acidification potential, Accumulated Exceedance , **EP-freshwater**: Eutrophication potential - freshwater , **EP-marine**: Eutrophication potential - marine , **EP-terrestrial**: Eutrophication potential - terrestrial , **POCP**: Photochemical Ozone Creation Potential , **ADPE**: Abiotic depletion potential - non-fossil resources , **ADPF**: Abiotic depletion potential - fossil resources , **WDP**: Water (user) deprivation potential

Additional indicators

Indicator	Unit	A1-A3	A4	C1	C2	C3	C4	D
PM	disease incidence	1.71e-05	2.32e-07	0.00e+00	3.23e-08	1.79e-07	0.00e+00	-4.54e-07
IRP	kBq U235-Eq	2.83e+01	4.35e-02	0.00e+00	6.04e-03	5.42e-02	0.00e+00	-7.29e+00
ETP-fw	CTUe	1.18e+04	8.48e+00	0.00e+00	1.18e+00	3.06e+02	0.00e+00	-1.31e+02
HTP-c	CTUh	1.64e-06	1.53e-08	0.00e+00	2.12e-09	3.49e-08	0.00e+00	-1.08e-07
HTP-nc	CTUh	3.96e-06	2.36e-08	0.00e+00	3.28e-09	4.56e-07	0.00e+00	-2.54e-07
SQP	dimensionless	1.41e+03	3.60e+01	0.00e+00	5.00e+00	8.35e+00	0.00e+00	-8.39e+01

PM: Potential incidence of disease due to PM emissions , **IRP**: Potential Human exposure efficiency relative to U235 , **ETP-fw**: Potential Comparative Toxic Unit for ecosystems , **HTP-c**: Potential Comparative Toxic Unit for humans - cancer effects , **HTP-nc**: Potential Comparative Toxic Unit for humans - non-cancer effects , **SQP**: Potential Soil quality index . **IRP**: 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. **ETP-fw, HTP-c, HTP-nc, SQP**: 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 these indicators.

Use of resources

Indicator	Unit	A1-A3	A4	C1	C2	C3	C4	D
PERE	MJ	1.54e+02	5.68e-01	0.00e+00	7.88e-02	1.18e+00	0.00e+00	-1.14e+02
PERM	MJ	5.70e+01	0.00e+00	0.00e+00	0.00e+00	-4.88e+01	0.00e+00	0.00e+00
PERT	MJ	2.11e+02	5.68e-01	0.00e+00	7.88e-02	-4.76e+01	0.00e+00	-1.14e+02
PENRE	MJ	5.82e+03	3.58e+01	0.00e+00	4.97e+00	2.97e+01	0.00e+00	-1.05e+03
PENRM	MJ	6.45e+02	0.00e+00	0.00e+00	0.00e+00	-6.45e+02	0.00e+00	0.00e+00
PENRT	MJ	6.47e+03	3.58e+01	0.00e+00	4.97e+00	-6.15e+02	0.00e+00	-1.05e+03
SM	kg	6.69e-01	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
NRSF	MJ	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00
FW	m^3	3.70e+00	5.21e-03	0.00e+00	7.23e-04	1.72e-01	0.00e+00	-2.23e-01

PERE: Primary energy resources - renewable: use as energy carrier , **PERM**: Primary energy resources - renewable: used as raw materials , **PERT**: Primary energy resources - renewable: total , **PENRE**: Primary energy resources - non-renewable: use as energy carrier , **PENRM**: Primary energy resources - non-renewable: used as raw materials , **PENRT**: Primary energy resources - non-renewable: total , **SM**: Use of secondary material , **RSF**: Renewable secondary fuels , **NRSF**: Non-renewable secondary fuels , **FW**: Net use of fresh water

Waste flows

Indicator	Unit	A1-A3	A4	C1	C2	C3	C4	D
HWD	kg	4.71e-01	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00
NHWD	kg	3.28e+00	0.00e+00	0.00e+00	0.00e+00	6.39e+01	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

HWD: Hazardous waste disposed , **NHWD**: Non hazardous waste disposed , **RWD**: Radioactive waste disposed

Output flows

Indicator	Unit	A1-A3	A4	C1	C2	C3	C4	D
CRU	kg	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00
MFR	kg	1.85e+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	0.00e+00	0.00e+00
EEE	MJ	3.74e+00	0.00e+00	0.00e+00	0.00e+00	2.51e+02	0.00e+00	0.00e+00
EET	MJ	1.71e+01	0.00e+00	0.00e+00	0.00e+00	4.90e+02	0.00e+00	0.00e+00

CRU: Components for re-use , **MFR**: Materials for recycling , **MER**: Materials for energy recovery , **EEE**: Exported electrical energy , **EET**: Exported thermal energy

Name	Value	Unit
Biogenic carbon content in product	9.68e-01	kg C
Biogenic carbon content in accompanying packaging	5.34e+00	kg C

Additional requirements

Greenhouse gas emissions from the use of electricity in the manufacturing phase

Electricity consumption in the manufacturing phase is composed from the sources below. This EPD follows the market-based approach.

Approach	Electricity	Quantity [kWh]	Emission Factor [kg CO_2e/kWh]
market-based	ecoinvent: electricity, medium voltage, residual mix (DE)	95.17	0.80
(location-based)	(ecoinvent: market for electricity, medium voltage (DE))	(95.17)	(0.46)

Rows marked with () are provided for reference and not used in the assessment.

Dangerous substances

The product contains no hazardous substances given by the REACH Candidate List or the Norwegian Priority List.

Additional environmental information

Secondary content

The product contains 1.04 % secondary material. Secondary material includes recycled, recovered and by-product content.

Additional environmental impact indicators required in NPCR Part A for construction products

Indicator	Unit	A1-A3	A4	C1	C2	C3	C4	D
GWP-IOBC	kg CO_2-eq.	4.00e+02	2.39e+00	0.00e+00	3.31e-01	1.52e+02	0.00e+00	-6.66e+01

GWP-IOBC: Global Warming Potential - Instantaneous oxidation of biogenic carbon

Bibliography

CEN/TR 15941:2010	Sustainability of construction works - Environmental product declarations - Methodology for selection and use of generic data
EN 15804:2012+A2:2019	Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
EN 15942:2022-04	Sustainability of construction works - Environmental product declarations - Communication format business-to-business
ISO 14025:2011-10	Environmental labels and declarations - Type III environmental declarations - Principles and procedures
ISO 14040:2021-02	Environmental management - Life cycle assessment - Principles and framework
ISO 14044:2021-02	Environmental management - Life cycle assessment - Requirements and guidelines
EF 3.1	Environmental Footprint (EF) Life Cycle Impact Assessment method - Characterisation Factors version 3.1, European Commission, Joint Research Centre (JRC)
ecoinvent 3.10	ecoinvent, Zurich, Switzerland, database version 3.10
NPCR Part A:2021	Construction products and services, Version 2.0. Issue date: 24.03.2021; validity extended to 31.12.2026.
NPCR 012:2022	Product category rules, Part B: Thermal insulation products, Version 2.0. Issue date: 31.03.2022; validity extended to 31.12.2026.
EN 16783:2024	Thermal insulation products – Environmental product declarations (EPD) – Product category rules (PCR) complementary to EN 15804 for factory-made and in-situ formed products.

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