



THE INTERNATIONAL EPD® SYSTEM



Environmental Product Declaration

Accordance with ISO 14025 and EN 15804:2012+A2:2019/AC:2021:

EPD Type: Multiple products (average)

■ DUROSTICK D-1 FLEX WHITE & GRAY

Sealing & waterproofing products
for rooftops, walls and clay roofing tiles

An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com.

Programme:

The International EPD® System, www.environdec.com

Programme operator:

EPD International AB

EPD registration number:

S-P-13765

Publication date:

2024-07-05

Valid until:

2029-07-04

UN CPC:

375 Articles of concrete, cement and plaster

General Information

Scope

The goal of this report is the development of an Environmental Product Declaration (EPD) presenting the environmental performance of **D-1 Flex** manufactured by **DUROSTICK S.A.** located in Patima Kororemi during the reporting year 2022.

The intended use of this report as well as EPDs aims to inform construction companies, builders, engineers, concrete users, and end users.



Manufacturer Information

■ **DUROSTICK** was founded in 1988 with its headquarters located in Agioi Anargyroi, Attica, Greece. The vision and goal of the founder, Mr. Nikolaos Choulis, was -and still is- the growth of the business with a leading position in product development and manufacturing, with respect for the environment, workers and end users.

■ It has cutting-edge engineering technology, high-tech facilities, producing 900 tons of adhesives and paints every day. The product range of **DUROSTICK** is divided in 9 categories that cover the entire building spectrum and meet even the most demanding customer needs.

- | | | |
|-----------------|-------------------------------|--------------|
| • Installations | • Waterproofing | • Protection |
| • Reinforcing | • Sealing | • Painting |
| • Repairing | • Energy upgrade of buildings | • Cleaning |



- More than 200 people are employed in the company. The well-equipped chemistry labs are part of the Research & Development (R&D) department, where all are committed to the creation of innovative new products and improve current product range.
- Company's sales present sustainable growth, while its export operations in countries such as United Kingdom, Cyprus, Albania, Romania, the UAE, Libya, Kuwait and Egypt are increasing.
- In addition, **DUROSTICK** made the idea of sustainable development a reality by investing financially and making efforts to incorporate and implement new technology for the protection of the environment. One of the company's primary goals and core beliefs is the concerted effort to improve the working environment for the health and safety of its workers.
- **DUROSTICK** is also committed to building and maintaining meaningful relationships, characterized by integrity and honesty, with its clients and associates. The company focuses on the needs of both the professional and individual consumer of **DUROSTICK** products.
- The company implements an Environmental Management System, according to the standard ISO 14001.
- Production and quality control are ISO 9001 (EN ISO 9001:2015) - certified. All products meet the European Standards and are CE marked, where applicable.





EPD information

The EPD was developed according to the requirements of EN 15804:2012+A2:2019/AC:2021 and EN ISO 14025. Also, the EPD was developed taking into account the principles of Product Category Rules (PCR) 2019:14 “Construction products” (Version 1.3.3) and c-PCR-017 Technical-chemical products (for construction sector).

- The EPD owner has sole ownership, liability, and responsibility for the EPD
- EPDs within the same product category but registered in different EPD programmes, or not compliant with EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

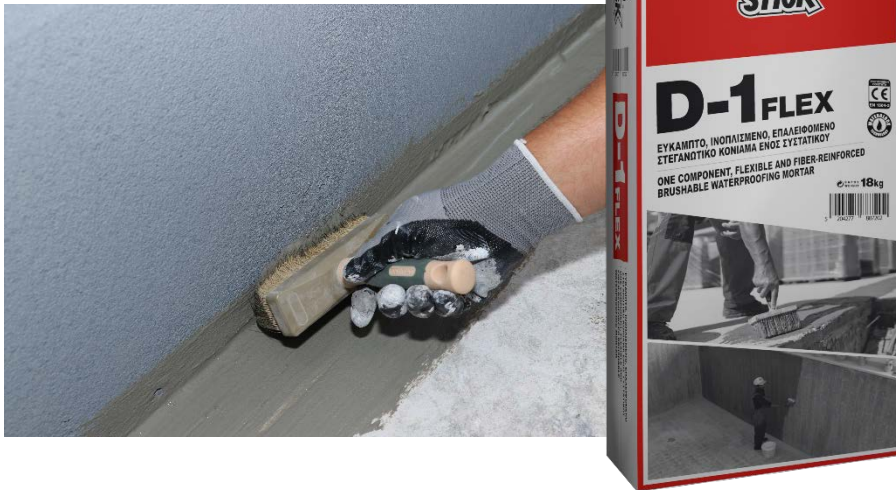
■ Programme	The International EPD® System Valhallavägen 81, SE 11427 Stockholm, Sweden www.environdec.com	
■ Programme Operator	EPD International AB Box 210 60, SE-100 31 Stockholm, Sweden info@environdec.com	
■ Owner of the EPD/ Location of the production site	DUROSTICK S.A. Patima Kororemi 19300 Aspropyrgos Attiki, Greece +30 210 5598350 info@durostick.gr www.durostick.gr	
■ LCA Practitioner	Terra Neutral PC Kaisareias 39, 11527, Athens information@terranneutral.gr www.terranneutral.gr	
■ Product Category Rules (PCR)	CEN standard EN 15804 serves as the Core Product Category Rules (PCR), PCR 2019:14, Version 1.3.3, c-PCR-017 Technical-chemical products (for construction sector)	
■ PCR review was conducted by	The Technical Committee of the International EPD® System. A full list of members available on www.environdec.com . The review panel may be contacted via info@environdec.com .	
■ Independent third-party verification of the declaration and data, according to ISO 14025:2010 via: <input checked="" type="checkbox"/> External EPD verification by accredited certification body <input type="checkbox"/> EPD Process Certification		
■ Third party verification: Business Quality Verification PC (BQV) is an approved certification body accountable for third party verification. The certification body is accredited by Hellenic Accreditation System ESYD with accreditation number 1218		
■ Verifier:	Business Quality Verification PC Konitsis Street 5, 15125, Athens info@bqv.gr www.bqv.gr	

- Procedure for follow-up of data during EPD validity involves third party verifier: Yes No





Product identification



DUROSTICK D-1 FLEX

One-component, flexible and fiber-reinforced brushable waterproofing mortar

CPC CODE 375 Articles of concrete, cement and plaster

Flexible and fiber-reinforced, quartz-based cementitious mortar, that is modified with acrylic, water-repellent polymers and special additives. Apply it to waterproof surfaces made of concrete, plaster, bricks, cement blocks, cement boards, aircrete, etc. It ensures the waterproofing of fountains, swimming pools, inverted roof systems, bathrooms, showers to be lined with tiles, microcement or quartz aggregates QUARTZ DECO, and generally any mineral surface exposed to temporary or permanent moisture. Ideal for any horizontal or vertical mineral surface subjected to vibrations or expansions and contractions, that already have or are expected to develop capillary/hairline cracks.

Suitable for waterproofing foundations and basements, for positive (exterior application/ preventive measure) and negative (interior application/ therapeutic solution) hydrostatic pressure(s), even up to 7 Atm.

Classified as product for surface protection of concrete surfaces (c) per EN 1504-2.

Color: gray, white. **Consumption:** 1.0-1.3kg/m²/mm thick coat.

4kg Gray, White
18kg Gray, White

PACKAGING



Content Information

Components	Average Content, kg/kg
Cement	0.20-0.30
Fillers	0.55-0.65
Additives	0.10-0.15
Minors	<0.01
Packaging Components	Average Content, kg/kg
Paper sack	<0.01
PET	<0.01 – 0.018
Paper box	0.00 – 0.018
Stretch Film – Stretch Hood	<0.01
Pallette	0.020– 0.023

■ The packaging of the products includes wooden pallets that are reused, stretch film, PET and paper packaging. All packaging used is recyclable.

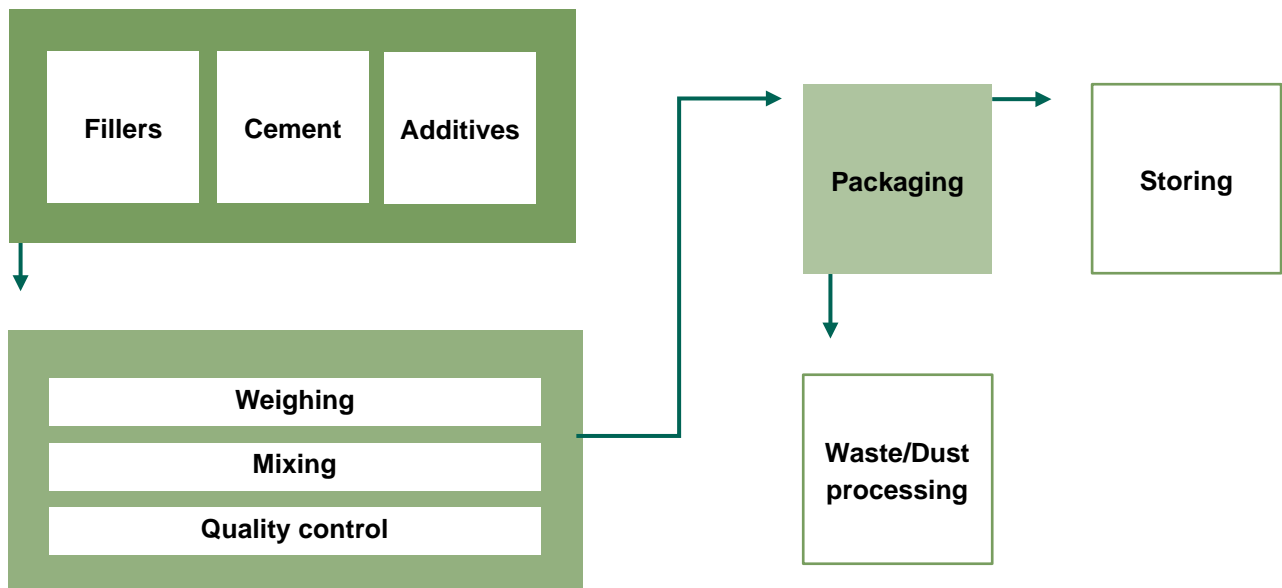
■ No substances included in the Candidate List of Substances of Very High Concern for authorization under REACH Regulations are present in the products above the threshold for registration with the European Chemicals Agency (< 0,1% wt/wt).

For more information please visit:

https://www.durostick.gr/en/sites/default/files/2023-11/tds_D-1_flex_eng.pdf

Manufacturing Process

Production process diagram



System Boundaries

The approach followed is “Cradle to gate with modules C1–C4 and module D (A1-A3, C and D)”, covering the Product stage which is mandatory, the End-of-life stage and the Benefits and loads beyond the system boundary. The following modules were considered:

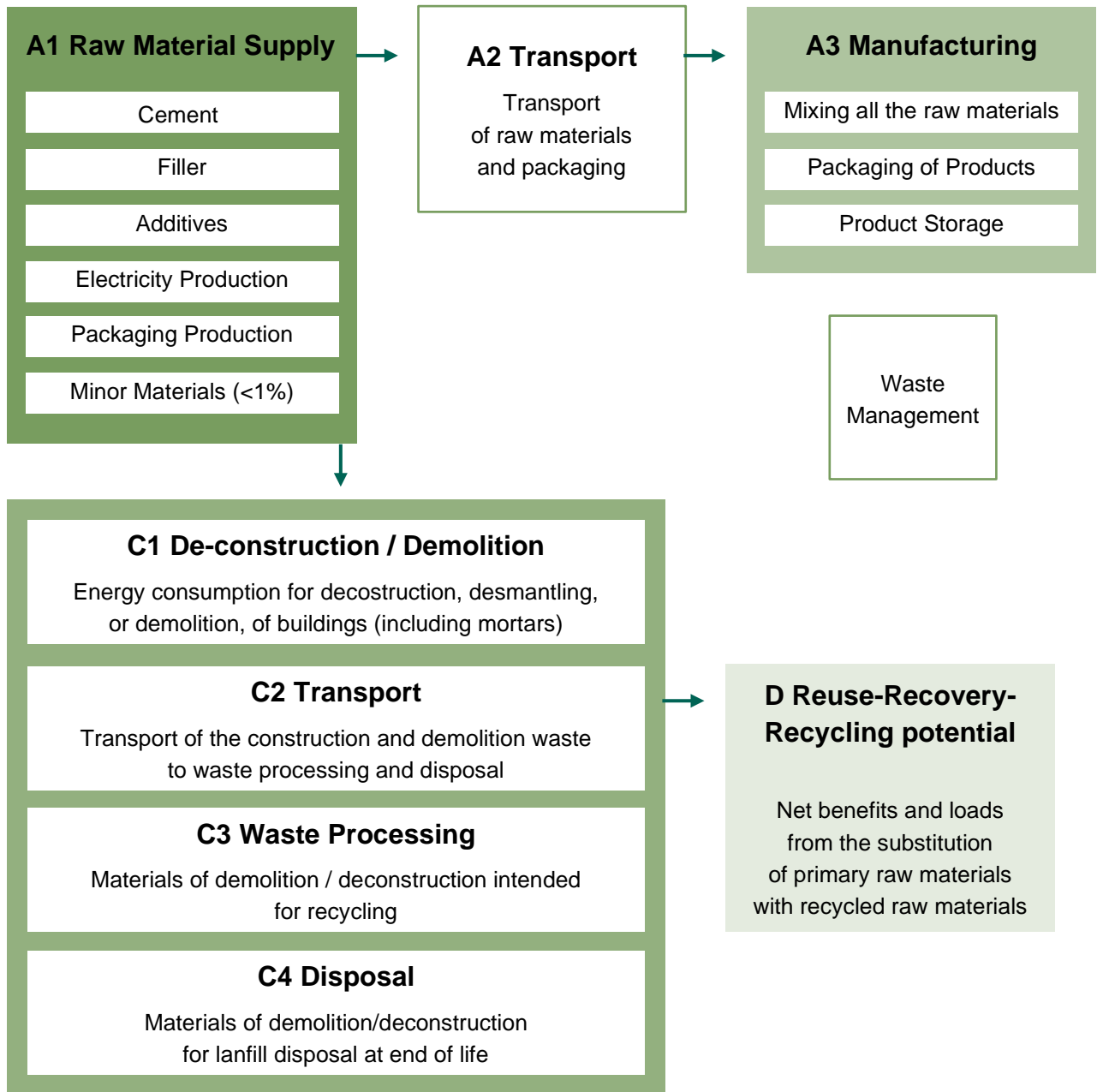
- **A1:** Raw material extraction and processing, processing of secondary material input (includes electricity and packaging production);
- **A2:** Transportation of all raw materials to the manufacturing plant;
- **A3:** Manufacturing process (includes the waste management of the production);
- **C1:** De-construction, demolition;
- **C2:** Transport to waste processing;
- **C3:** Waste processing for reuse, recovery and/or recycling;
- **C4:** Disposal;
- **D:** Reuse, recovery and/or recycling potentials, expressed as net impacts and benefits.

	Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling- potential
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules declared	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	EU	EU	GR	ND	ND	ND							GR		GR	GLO	
Specific data	>95%			-	-												
Variation - products	<10%			-	-												
Variation sites	Manufactured in one site			-	-												

The life cycle stages A4, A5 and B, which are optional, were not included in the LCA study due to the fact that there is significant uncertainty in the construction process stage as well as the use stage.

Description of the modules

Production process diagram





LCA information

Declared unit

The declared unit is 1kg of **D-1 Flex**

Time representativeness

All primary data used in this study is for the reporting year 2022

Databases used

The databases that were used were the following: EN15804 add-on for ecoinvent v3.9.1. The impact assessment method used was the EN15804+A2

Geographical Scope

Worldwide

Cut-off rules and exceptions

All inputs and outputs were included in the calculation of the system process of the production stage. The cut-off criteria were 1% for the total mass input and 1% for the renewable and non-renewable primary energy usage for each process, where the maximum was 5% for energy usage and mass that was included for all processes, according to EN 15804 and PCR 2019:14. The materials that were <1% for the total mass and excluded were minor materials. Wooden pallets are reusable. It is assumed that energy usage for the deconstruction and demolition of mortars at the End-of-life stage (module C1) was <5% because they are not removed from the applying surface during deconstruction and so, were not included in LCA calculations. The manufacturing processes of the capital goods or spare parts, infrastructure for general management, office and headquarters operations as well as people activities (common activities, travel for work, etc.), and waste streams relating to maintenance of equipment have been exempted. Also, the construction process stage (A4-A5) and use stage (B1-B7) were excluded.

Data Quality

All the data used to model the manufacturing process for the specific products covered by this EPD, are specific data and there are no data gaps. Data for raw material supply and transport to the manufacturing plant and production (A1-A3) are based on specific consumption data for the specific production process taking place at the production site in Patima Kororemi for the reference year 2022. Regarding electricity, a data set was modified according to Greece's energy residual mix 2022 provided by DAPEEP. The **GWP-GHG indicator** for electricity has value of **0.6577 kg CO₂eq/KWh**. Generic datasets were used for the upstream processes (production of raw material and transportation) as well as for the End-of-Life stage calculations. For this reason, EN 15804 add-on for Ecoinvent have been used, as these database contain the most extensive and updated information and its scope coincides with the geographical, technological and temporal area of the project. All the datasets used for calculations cover either the area of Greece, Europe or the Rest of the World. The best available datasets are picked each time, as far as geography and date are concerned. Technological coverage is specific or average. The LCA was modelled with OpenLCA 2.1.0





Assumptions

The following assumptions have been made in this EPD:

- This is an EPD of multiple products, based on the average results of the product group. For each indicator in the environmental performance, the average results of the included products are declared.
- LCA study does not include the manufacturing processes of the capital goods or spare parts.
- It does not include equipment maintenance.
- The environmental impact of infrastructure for general management, office and headquarters operations is not included.
- The impact caused by people (common activities, travel for work, office activities) was not considered.
- The environmental impact of external transport has been calculated using lorries from the EN 15804 add-on database, EURO 4. These lorries have been selected to reflect the most realistic scenario possible.
- The scenarios included are currently in use and are representative for one of the most probable alternatives.
- Wooden pallets used are assumed to be 100% reused, recycled or/and sent for repair
- Modules C1-C4 based on scenarios.
- Mortars at the End-of-Life stage are assumed to be collected as mixed construction and demolition waste (C&D waste).
- Concerning module C1, mortars are not removed from the applied material during the deconstruction. Thus, the impacts of deconstruction/demolition of mortars are assumed to be zero.
- For module C2 a distance of 100km and EURO 4 truck is assumed for the transportation of mortars that are included into debris, to waste processing after deconstruction.
- Regarding module C3, the recovery rate of mortars (as mixed construction waste) at the End-of-life, is 46.2% based on ELSTAT report of 2020. The process losses of the waste treatment plant are assumed to be negligible. The remaining 53.8% of mortar waste is assumed to end in landfill (C4). For the carbonation of waste during storage, before the recycling process, a service life of ¼ year under “exposed to rain” exposure conditions was assumed. Also, the carbonation of waste in landfill assumed for a service life of 100 years under “in ground” exposure conditions
- Module D calculates the potential environmental benefits of the recycling or reuse of materials. The recycled content in mortar is assumed to be zero. The recovery rate of C&D waste is 46.2%. The waste aggregates that are produced from this recovery process are used in the production of cement and several other projects of the construction sector.

Allocations

Taking into account that all the products are produced implementing the same production procedure, there is no allocation in different production subsystems (sub-processes). There are no co-products produced using other production procedures.

Regarding the input of raw materials, it was based on the composition of each specific product taking into account the BoM for each product. The material losses from manufacture were lower than 1%.

Electricity was calculated by mass allocation of the total electricity consumption of the industrial unit indicated in the electricity bills for the reference year, divided by the annual production in the manufacturing plant. Also, waste has been divided by the total quantity of products.

Therefore, no allocation method was used (economic or physical) for electricity or raw materials.

Economic allocation was not used in any case.



Environmental Performance

The environmental indicators for **1kg of D-1 Flex** (average product) are presented in the following tables. The estimated impact results are only relative statements which do not indicate the end points of the impact categories, exceeding threshold values, safety margins or risks.

■ Potential environmental impact according to EN 15804 (EF 3.1 reference package)

- Results per declared unit

Indicator	Unit	A1-A3	C1	C2	C3	C4	D	Variation A-C
ADPE	kg Sb eq	2,26E-06	0,00E+00	6,19E-08	1,24E-08	4,63E-09	-1,90E-08	8%
ADPF	MJ (net calorific)	9,98E+00	0,00E+00	2,69E-01	7,22E-02	8,20E-02	-3,22E-02	7%
AP	mol H ⁺ eq	2,05E-03	0,00E+00	7,74E-05	3,33E-05	2,46E-05	-2,05E-05	20%
EPF	kg P eq	8,31E-05	0,00E+00	1,32E-06	9,76E-07	2,72E-07	-1,46E-06	1%
EPM	kg N eq	3,84E-04	0,00E+00	2,95E-05	1,35E-05	9,45E-06	-3,51E-06	37%
EPT	mol N eq	5,35E-03	0,00E+00	3,15E-04	1,45E-04	1,01E-04	-4,63E-05	26%
GWPB	kg CO ₂ eq	6,29E-04	0,00E+00	5,42E-06	6,06E-06	1,29E-06	-5,24E-06	1%
GWPF	kg CO ₂ eq	5,83E-01	0,00E+00	1,87E-02	-5,60E-02	-6,98E-01	-2,89E-03	1%
GWPL	kg CO ₂ eq	3,08E-04	0,00E+00	9,28E-06	2,91E-06	2,01E-06	-3,80E-06	4%
GWPT	kg CO ₂ eq	5,84E-01	0,00E+00	1,87E-02	-5,59E-02	-6,98E-01	-2,90E-03	1%
GWP - GHG	kg CO ₂ eq	5,83E-01	0,00E+00	1,87E-02	-5,59E-02	-6,98E-01	1,80E-03	1%
ODP	kg CFC-11 eq	1,46E-08	0,00E+00	4,09E-10	8,22E-11	9,46E-11	-3,83E-10	58%
POCP	kg NMVOC eq	1,89E-03	0,00E+00	1,13E-04	4,49E-05	3,53E-05	-7,00E-03	17%
WDP	m ³ world eq	1,99E-01	0,00E+00	1,32E-03	5,90E-04	2,55E-04	2,17E-04	5%

■ Use of resources - Results per declared unit

Indicator	Unit	A1-A3	C1	C2	C3	C4	D	Variation A-C
PENRE	MJ	8,64E+00	0,00E+00	2,45E-01	6,70E-02	7,46E-02	2,21E-02	13%
PENRM	MJ	8,82E-01	0,00E+00	2,33E-02	5,28E-03	7,40E-03	-5,62E-02	0%
PENRT	MJ	9,53E+00	0,00E+00	2,69E-01	7,23E-02	8,20E-02	2,11E-02	12%
PERE	MJ	9,22E-01	0,00E+00	4,14E-03	3,82E-03	6,89E-04	9,45E-04	58%
PERM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-5,16E-03	-
PERT	MJ	9,22E-01	0,00E+00	4,14E-03	3,82E-03	6,89E-04	7,80E-04	58%
FW	m ³	5,43E-03	0,00E+00	3,21E-05	3,48E-05	8,47E-05	-1,57E-04	3%
NRSF	MJ	2,24E-02	0,00E+00	1,54E-04	1,33E-04	1,81E-05	-3,53E-05	482%
RSF	MJ	1,32E-02	0,00E+00	7,85E-05	1,16E-04	7,05E-06	-1,77E-04	465%
SM	Kg	1,14E-02	0,00E+00	2,91E-04	2,34E-04	3,62E-05	-2,12E-04	83%

■ **Output flows - Results per declared unit**

Indicator	Unit	A1-A3	C1	C2	C3	C4	D	Variation A-C
CRU	kg	-1,21E-21	0,00E+00	-1,04E-23	0,00E+00	0,00E+00	0,00E+00	0%
EEE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-
EET	MJ	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	-1,48E-04	-
MFR	kg	8,86E-03	0,00E+00	2,64E-04	2,18E-04	2,97E-05	-5,65E-02	1%

■ **Use of resources - Results per declared unit**

Indicator	Unit	A1-A3	C1	C2	C3	C4	D	Variation A-C
HWD	kg	-7,15E-03	0,00E+00	-2,49E-04	7,98E-05	5,63E-05	-7,33E-04	-1%
NHWD	kg	-6,79E-02	0,00E+00	-1,28E-02	8,12E-02	5,37E-01	1,60E-03	-1%
RWD	kg	-4,27E-06	0,00E+00	-8,67E-08	1,16E-07	1,20E-08	1,22E-08	-13%

Disclaimer 1: The indicator GWP-GHG includes all greenhouse gases excluding biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product as defined by IPCC AR 5 (IPCC 2013).

Disclaimer 2: The results of the environmental impact indicators ADPE, ADPF and WDP shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.

Disclaimer 3: If module C is included in the EPD; a disclaimer discouraging the use of the results of modules A1-A3 without considering the results of module C.

References

- **General Programme Instructions** of the International EPD® System Version 4.0
- **ISO 14040:2006** Environmental management Life cycle assessment. Principles and framework
- **ISO 14044:2006** Environmental management. Life cycle assessment. Requirements and guidelines
- **ISO 14020:2000** Environmental labels and declarations - General principles
- **ISO 14025:2010** Environmental labels and declarations - Type III Environmental Declarations - Principles and procedures
- **PCR - 2019:14** Construction products” (Version 1.3.3)
- **c-PCR-017** Technical-chemical products (for construction sector) (c-PCR to PCR 2019:14) (adopted from EPD Norway 2022-07-08, NPCR 009 – Part B for Technical – Chemical products for building and construction industry (Version 2.0))
- **EN 15804:2012+A2:2019/AC:2021** Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
- **Residual Energy Mix 2022** from Renewable Energy Sources Operator & Guarantees of Origin (DAPEEP SA) (dapeep.gr)
- **ELSTAT (2020)** <https://www.statistics.gr/>
- Improving of C&D Waste management framework in Greece (2020), Greek Ministry of the Environment and Energy https://ypen.gov.gr/wp-content/uploads/2021/02/Final-Report-3.1-CDW-management-20200826_final-GR_12.pdf

Abbreviations

ADPE	Environment: Abiotic depletion potential (elements)
ADPF	Environment: Abiotic depletion potential (fossils)
AP	Environment: Acidification potential
EPF	Environment: Eutrophication potential (freshwater)
EPM	Environment: Eutrophication potential (marine)
EPT	Environment: Eutrophication potential (terrestrial)
GWPB	Environment: Global warming potential (biogenic)
GWPF	Environment: Global warming potential (fossil)
GWPL	Environment: Global warming potential (land use)
GWPT	Environment: Global warming potential (total)
GWP - GHG	Environment: Global warming potential (greenhouse gas emissions)
ODP	Environment: Ozone depletion potential
POCP	Environment: Photochemical ozone creation potential
WDP	Environment: Water deprivation potential
PENRE	Primary energy: Non-renewable (energy use)
PENRM	Primary energy: Non-renewable (material use)
PENRT	Primary energy: Non-renewable (total)
PERE	Primary energy: Renewable (energy use)
PERM	Primary energy: Renewable (material use)
PERT	Primary energy: Renewable (total)
FW	Resource: Net use of fresh water
NRSF	Resource: Non-renewable secondary fuels
RSF	Resource: Renewable secondary fuels
SM	Resource: Secondary materials
CRU	Output: Components for reuse
EEE	Output: Exported energy (electrical)
EET	Output: Exported energy (thermal)
MER	Output: Materials for energy recovery
MFR	Output: Materials for recycling
HWD	Waste: Hazardous waste disposed
NHWD	Waste: Non-hazardous waste disposed
RWD	Waste: Radioactive waste disposed