

ENVIRONMENTAL PRODUCT DECLARATION



in accordance with ISO 14025:2006

Fortedur and Fortedur WET Product Lines – an Averaged Dry Shake Mixture by Fortemix s.r.o.



General Information

This Environmental Product Declaration (EPD) provides a quantitative and verified description of the environmental performance of the dry shake mixtures Fortedur and Fortedur WET, manufactured by Fortemix, s.r.o. The product has been assessed using a Life Cycle Assessment (LCA) approach, considering the product system boundaries from cradle to gate.

EPD Program Operator	National Environmental Labeling Program Ministry of the Environment Vršovická 1442/65 100 10 Prague 10 +420 267 121 111 +420 267 121 111 info@mzp.cz
Reference Documents	- ISO 14025:2006 Environmental Labels and Declarations – Type III Environmental Declarations – Principles and Procedures - Rules of the National Environmental Declaration Program
Product Category Rules (PCR)	- EN 15804+A2 Sustainability of Construction Works – Environmental Product Declarations – Core Rules for the Product Category of Construction Products PCR 2012:01-Sub-PCR-G Sub-PCR-G Concrete and Concrete Elements (EN 16757)
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Independent Verification of the EPD According to EN ISO 14025:2006	internally <input type="checkbox"/> externally <input checked="" type="checkbox"/>
Verification Conducted by	Third-party verification: Technický a zkušební ústav stavební Praha, s.p. is an approved certification body accountable for the third-party verification. 190 00 Praha 9, Prosecká 811/76a, CZ The certification body is accredited by: Českým institutem pro akreditaci, o.p.s., Osvědčení č. 456/2024 Ing. Lenka Vrbová vrbova@tzus.cz  

The EPD owner holds exclusive rights, responsibility, and liability for the EPD. EPDs within the same product category but from different programs may not be comparable. For further information on comparability, refer to ISO 14025.

Product Information

Company Information

Company Identification	Fortemix s.r.o., Kirilova 812, Paskov, 739 21, Czech Republic
Company Description	Fortemix s.r.o. specialises in the production of cement-based industrial flooring systems and PVC flooring for industrial and commercial applications.
Manufacturing Facility Address	Fortemix s.r.o., Kirilova 812, Paskov, 739 21, Czech Republic
Valid Certifications of the Company	ISO 14001, ISO 9001
Contact Person	Ing. Tereza Klečková (kleckova@fortemix.cz)

Product Description and Application

Trade Name of the Product	- Fortedur product line (FD 1010, FD 1015, FD 1020, FD 1025, FD 1027, FD 1030) and. - Fortedur WET product line (FD W1011, FD W1016, FD W1021, FD W1026, FD W1031)
Product Identification	Fortedur and Fortedur WET dry shake mixtures consist of selected hard aggregates, specialised cements, and compatible chemical additives that enhance the mechanical properties and workability of industrial flooring systems (primarily in manufacturing and warehouse facilities, workshops, wholesale outlets, logistics centres, and parking structures).
UN CPC	3744 Portland cement, aluminous cement, slag cement, and hydraulic cements, except in the form of clinkers
Manufacturing Process Description	<p>The pre-production phase includes the receipt and storage of raw materials. Most raw materials are delivered in bulk tankers (i.e., unpackaged) or conveyed into silos from the sorting line of the aggregate preparation section. These inputs are stored for production in large-volume silos. Other inputs are supplied in large-volume bags, while a small proportion is delivered in paper bags or paper boxes with plastic liners.</p> <p>The aggregates used in Fortedur products are then dried, crushed, and sorted.</p> <p>The production of Fortedur dry shake hardeners is fully automated, with raw materials dosed into a central weighing system. Small-volume admixtures, additives, and pigments are manually dosed after pre-weighing in the operational laboratory. After homogenisation in the central mixer, the mixture is packed into 25/30 kg paper bags. These paper bags are semi-automatically stacked onto wooden pallets with cardboard separators, and secured with LDPE film to protect against environmental degradation (such as moisture exposure).</p>

Intended Use of the Product

Fortedur and Fortedur WET dry mixtures are designed for the surface hardening of industrial floors—specifically, monolithic concrete floors—applied using mechanical troweling with mineral dry shake hardeners.

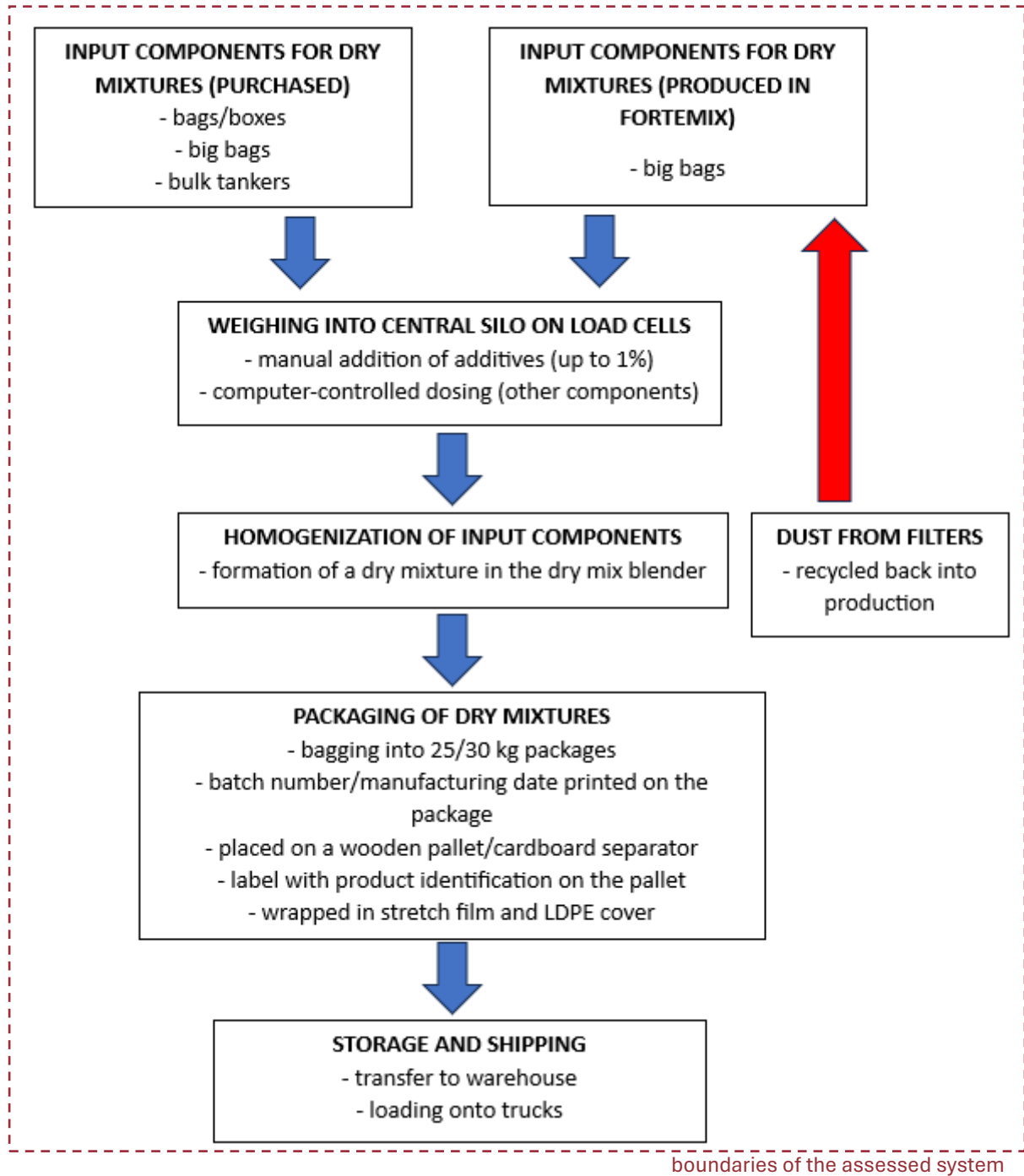


Fig. 1: Production process diagram

Life Cycle Assessment (LCA)

Basic information

Declared Unit	1 kg of dry shake mixture composed of Fortedur and Fortedur WET in a proportional composition produced in 2023 (95% Fortedur, 5% Fortedur WET)
Reference Service Life (RSL)	Not applicable for this product as it is an integral part of other building materials (primarily concrete flooring systems).
Assessment Period	Data collected represent the year 2023 for production and the energy mix in the Czech Republic; raw material data originate from financial records of company for one year - 2023.
Geographical Scope	Global (98% of the total mass of inputs is sourced locally, and only 2% consists of additives imported from distant global sources). Applicable to products manufactured at the Fortemix Paskov (Czech Republic) production facility.
Databases and LCA Software Used	Ecoinvent 3 database, SimaPro 9.1.0.11 software
Environmental Impact Assessment Methodology	Potential environmental impacts were calculated according to EN 15804:2012 +A2:2020. Characterisation models and factors align with the latest EF 3.1 update, referred to as version 2.0.
Allocation	The allocation was carried out based on mass distribution. Production takes place on a separate production line, where consumption was determined based on the standardised consumption defined by the equipment manufacturer. The same approach was applied to heat consumption for material drying and fuel consumption for raw material transportation within the facility. The quantity of raw materials was calculated for individual products in the Fortedur and Fortedur WET product lines. This recalculation was performed based on their proportional composition of individual raw materials. Finally, the total amount of raw materials within each product line was summed up.
Quality of Data Used	The quality assessment of the data was conducted according to the rules of the product's environmental category through an arithmetic weighted average, and the data quality is considered very good.
Comparison of EPD within the Product Category	Since the assessed system scope covers the extraction phase up to the factory gate and does not include product lifespan and quality, the EPDs may not be comparable.
Cutt-off Rule	The product system includes data covering 99% of elementary flows contributing to the declared environmental impact.
System Boundaries	Cradle-to-gate Upstream processes include raw materials and the production of consumables.

	<p>Main processes include raw material transportation, consumables for the plant and production, and energy consumption during product manufacturing. Waste generated during the production process is also part of this study.</p> <p>Subsequent processes are not included in this study due to the broad and time-sensitive variability of subcontractors.</p>
<p>Life Cycle Stages Included in the Calculation</p>	<p>The product meets the requirement for excluding the use phase and the end-of-life phase. According to PCR conditions, these phases can be excluded if the product meets the following conditions outlined in EN 15804:2012 + A2:2020:</p> <ul style="list-style-type: none"> • The product or material is physically integrated with other products during installation in such a way that it cannot be physically separated at the end of its life. • The product or material can no longer be identified at the end of its life cycle due to physical or chemical transformation processes. • The product or material does not contain biogenic carbon. <p>Loose mixtures produced within the Fortedur and Fortedur WET product lines are B-to-B intermediates, whose life cycle and disposal largely depend on further processing.</p>
<p>Inventory Analysis</p>	<p>The results of the inventory analysis were collected according to modules A1-A3: module A1 – raw material consumption, module A2 – transportation, module A3 – production.</p> <p>Due to data confidentiality, specific values for individual inputs are not provided in this document in accordance with EN ISO 14025.</p>

Description of the System Boundaries (x = included in LCA, MNA = module not assessed)

	Production Phase			Construction Phase		Usage Phase							End-of-Life Phase				Additional Information	
	Raw material consumption	Transportation	Production	Transportation	Sales	Usage	Maintenance	Repair	Replacement	Renovation	Energy consumption during use	Water consumption during use	Demolition	Transport	Waste processing	Disposal		
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
Inclusion	x	x	x	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA
Location	GLO	EU	CZ	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 1: System Boundary Description

Content of Materials and Chemical Substances (Declaration of Content)

In accordance with the requirements of the standard, the material composition is declared only for substances classified as hazardous:

Chemical Name of the Product	CAS Number	Average Weight in Product (%)	Classification Regulation 1272/2008	
			Hazard Class, category	Hazard statement
Portland Grey Cement	65997-15-1	28-29%	Skin Irritation cat. 2 Serious eye damage/eye irritation cat 1 Skin Sensitisation cat 1 STOT SE respiratory tract irritation cat 3	H315: Causes skin irritation H318: Causes serious eye damage H317 May causes an allergic skin reaction H335 May cause respiratory irritation

Cement does not meet the criteria for PBT (Persistent, Bioaccumulative, and Toxic) or vPvB (Very Persistent and Very Bioaccumulative) according to Annex XIII of the REACH document (Regulation (EC) No. 1907/2006). It does not contain PBT or vPvB substances.

The author of this study assumes no responsibility for the correct classification of the product; this remains entirely within the competence of Fortemix, s.r.o.

Inclusion of Material and Raw Material Recycling Processes in the Assessed System

During the process, dust emissions from production are captured. The amount of this dust accounts for a maximum of 3% of the total production volume. After separation from the waste gas, it is returned to the production process. Therefore, this process does not require separate allocation.

LCA Analysis Results

Specific data was provided by the plant, while generic data originates from the SimaPro software and Ecoinvent 3 database. All emissions to air, water, and soil, as well as all used materials and energy, were included.

The LCA data results are detailed in the following tables and relate to the declared unit of 1 kg of dry mixture composed of Fortedur and Fortedur WET.

The assessment was conducted in accordance with the requirements of PCR 2012:01 -Sub-PCR-G Sub-PCR-G Concrete and Concrete Elements (EN 16757).

The estimated impact results are relative values and do not indicate final impact category endpoints, threshold exceedances, safety margins, or associated risks.

Impact Category Indicators

Table 2: Basic environmental impact indicators

Impact Category	Unit	A1-A2	A3	A1-A3
Climate change- total	kg CO2 eq	2.61E-01	3.42E-02	2.95E-01
Climate change - Fossil	kg CO2 eq	2.90E-01	3.42E-02	3.25E-01
Climate change - Biogenic *	kg CO2 eq	-3.81E-02	-6.06E-08	-3.81E-02
Climate change - Land use and LU change (luluc)	kg CO2 eq	8.75E-03	1.75E-05	8.77E-03
Ozone depletion	kg CFC11 eq	1.29E-08	3.18E-09	1.61E-08
Acidification	mol H+ eq	8.98E-04	6.16E-05	9.59E-04
Eutrophication, freshwater	kg P eq	1.06E-04	6.56E-06	1.12E-04
Eutrophication, marine	kg N eq	2.29E-04	1.71E-05	2.46E-04
Eutrophication, terrestrial	mol N eq	2.62E-03	1.77E-04	2.79E-03
Photochemical ozone formation	kg NMVOC eq	7.03E-04	5.44E-05	7.57E-04
Resource use, minerals and metals	kg Sb eq	1.15E-06	6.36E-08	1.22E-06
Resource use, fossils	MJ	1.55E+00	5.69E-01	2.12E+00
Water use	m3 depriv.	2.46E-02	2.15E-03	2.68E-02

* according to standard EN 15804:2012 +A2:2019, the amount of carbon contained in packaging should be separately expressed within the category "Climate change - biogenic". **The packagings occur within the A1-A2 phase and the amount of biogenic carbon in these phases is -5.27E-02.**

Table 3: Additional environmental impact indicators

Impact Category	Unit	A1-A2	A3	A1-A3
Particulate matter	disease inc.	6.28E-09	2.38E-10	6.52E-09
Ionising radiation	kBq U-235 eq	5.93E-03	6.07E-03	1.20E-02
Ecotoxicity, freshwater	CTUe	4.71E+00	3.85E-01	5.09E+00
Ecotoxicity, freshwater - organics	CTUe	2.11E-01	1.91E-03	2.13E-01
Ecotoxicity, freshwater - inorganics	CTUe	2.66E-01	6.28E-02	3.28E-01

Ecotoxicity, freshwater - metals	CTUe	4.23E+00	3.20E-01	4.55E+00
Human toxicity, non-carcinogenic effects	CTUh	2.68E-09	1.83E-10	2.86E-09
Human toxicity, carcinogenic effects	CTUh	8.21E-09	7.39E-12	8.21E-09
Human toxicity, non-carcinogenic – organics	CTUh	7.36E-11	8.33E-12	8.20E-11
Human toxicity, non-carcinogenic – inorganics	CTUh	5.72E-10	3.46E-11	6.06E-10
Human toxicity, non-carcinogenic – metals	CTUh	2.04E-09	1.46E-10	2.19E-09
Human toxicity, carcinogenic – organics	CTUh	9.29E-11	3.88E-12	9.68E-11
Human toxicity, carcinogenic – inorganics	CTUh	0.00E+00	0.00E+00	0.00E+00
Human toxicity, carcinogenic – metals	CTUh	8.11E-09	3.50E-12	8.12E-09
Land use	Pt	9.29E-11	3.88E-12	9.68E-11

Table 4: Parameters describing resource consumption

Impact Category	Unit	A1-A2	A3	A1-A3
Use of renewable primary energy excluding renewable primary energy resources used as raw materials (PERE)	MJ	7.43E-01	7.43E-01	1.49E+00
Use of renewable primary energy resources used as raw materials (PERM)	MJ	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials) (PERT)	MJ	7.43E-01	7.43E-01	1.49E+00
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials (PENRE)	MJ	2.14E+00	2.14E+00	4.28E+00
Use of non-renewable primary energy resources used as raw materials (PENRM)	MJ	0.00E+00	0.00E+00	0.00E+00
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials) (PENRT)	MJ	2.14E+00	2.14E+00	4.28E+00
Use of secondary material (SM)	MJ	1.30E-01	0.00E+00	1.30E-01
Use of renewable secondary fuels (RSF)	MJ	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels (NRSF)	MJ	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water	m ³ eq	1.83E-02	2.25E-03	2.05E-02

Table 5: Another environmental category describing waste categories

Impact Category	Unit	A1-A2	A3	A1-A3
Hazardous waste disposed	kg	3.25E-04	2.81E-05	3.53E-04
Non-hazardous waste disposed	kg	1.46E-01	1.19E-03	1.47E-01
Radioactive waste disposed	kg	7.34E-06	1.59E-06	8.94E-06

Table 5: Environmental category describing output flows

Impact Category	Unit	A1-A2	A3	A1-A3
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00
Exported energy (electricity)	MJ	0.00E+00	0.00E+00	0.00E+00
Exported energy (thermal)	MJ	0.00E+00	0.00E+00	0.00E+00

References

- EN ISO 14040:2006 Environmental management - Life cycle assessment - Principles and outline
- EN ISO 14044:2006 Environmental management - Life cycle assessment - Requirements and guidelines
- ISO/TR 14047:2005 Environmental management - Life cycle assessment - Examples of application of ISO 14042
- P ISO TS 14048:2003 Environmental management - Life cycle assessment - Data documentation format
- UNE EN 15804:2012+A2:2020 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction
- PCR 2012:01-Sub-PCR-G Sub-PCR-G Concrete and concrete elements (EN 16757)
- ecoinvent 3 database, software SimaPro 9.1.0.11



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