Hydraulic road binder TEFRA 25

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EPD program operator:

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Manufacturer

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Basic information

This declaration is the type III Environmental Product Declaration (EPD) based on EN 15804 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 (see point 5.3 of the standard).

Life cycle analysis (LCA): A1-A3 modules in accordance with EN 15804 (Cradle to Gate)
The year of preparing the EPD: 2017
Declared durability: Under normal conditions, hydraulic road binder has reference service life (RSL) up to 30 years
Product standard: EN 13828-1:2013 Hydraulic road binders – Part 1: Rapid hardening hydraulic road binders – Composition, specification and conformity criteria
PCR: PCR A (PCR based on EN 15804)
Declared unit: 1 tone of the declared product TEFRA 25
Reasons for performing LCA: B2B
Representativeness: Polish product

Manufacturer and Product Information

EKOTECH Inżynieria Popiołów Sp. z o.o. produces and trades building materials such as road binders/adhesives, various road surfaces mixtures and fly ash aggregates for concrete.

The TEFRA 25 binding adhesive is design to improve the subgrade in civil engineering. The material is dedicated to stabilize and modify fine-grained land primarily consisting in improving geotechnical properties in order to increase their usefulness in civil engineering, and in particular in earthworks and improved surface.

TEFRA 25 binder provides:

- reduction of the degree of plasticity,
- drying of land,
- land compaction,
- increase in load capacity,
- resistance to water and frost.

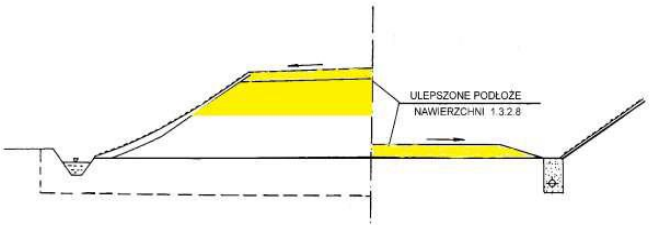

Fig. 1. The scheme illustrating an application of TEFRA 25

Beside, TEFRA 25 can be used as an enhancing material in grading land and aggregates as well as to stabilize the subsoil (Fig. 1.) with the strength requirements (Rm 1.5 or 2.5 MPa), the layer of binder-stabilized material should obtain sufficient compressive strength and the required rate of frost resistance.

In addition TEFRA 25 influences on:

- increase in the compressive strength of road layers,
- reduction in material costs of the investment,
- improvement of land capacity factor.

The properties of the TEFRA 25 product are listed in Table 1.

Table 1 The properties of the TEFRA 25 product.

No	Features	Properties	Harmonised standard
1.	Compressive strength after 7 and 28 days	after 7 days ≥ 5,0 MPa after 28 days ≥ 12,5 ≤ 32,5 MPa	PN-EN 13282-1:2013
2.	Degree of grinding, 90 μm	≤ 15%	
3.	Bindling time: beginning of the binding	≥ 90 min	
4.	Stability of the volume	≤ 10 mm	
5.	Content of the sulfur	< 4%	
6.	Composition of the binder	tolerance ± 10% (m/m)* tolerance ± 5% (m/m)**	

*) - for the main component whose weight in the binder is over 20%
**) - for the main component, the weight share in the binder is between 10 and 20%

The TEFRA 25 road bundle hydraulic group consists of 7 product types that differ in formulation, mainly ash content (minimum 60%).

LIFE CYCLE ASSESSMENT (LCA) – general rules applied

Allocation

The allocation rules used for this EPD are based on general ITB-PCR A and PN-EN 13828-1:2013. Hydraulic road binder TEFRA 25 is produced in a linear process at the plant located in Konin (Poland). The allocation was based on product mass basis.

All impacts from raw materials extraction are allocated in A1 module of EPD. 100% 100% environmental impacts from the production line were analyzed and allocated to the production of hydraulic road binders - TEFRA 25. Municipal waste and sewage from the whole plant were allocated to module A3. Electricity was inventoried for the whole production process. Emissions in EKOTECH Inżynieria Procesów Sp. z o. o are not measured, because this type of production is not obliged to measure these indicators, hence emission impacts come from energy carrier characterization factors, and are presented in A3 module The allocation of the products produced at the plant is allocated to the allocation of mass. The principles of economic allocation in accordance with EN 15804 apply to the allocation of ash inputs used in production and electricity.

System limits

The life cycle analysis of the declared products covers “Product Stage”, A1-A3 modules (Cradle to Gate) in accordance with EN 15804+A1 and ITB-PCR A document. The details of systems limits are provided in product technical report. All materials and energy consumption inventoried in factory were included in calculation. Office impacts were also taken into consideration. In the assessment, all significant parameters from gathered production data are considered, i.e. all material used per formulation, utilised thermal energy, internal fuel and electric power consumption, direct production waste. It can be assumed that the total sum of omitted processes does not exceed 1% of all impact categories. In accordance with EN 15804, machines and facilities (capital goods) required for and during production are excluded, as is transportation of employees.

A1 and A2 Modules: Raw materials supply and transport

Raw materials for the hydraulic road binder TEFRA 25 production come from local suppliers, Zespół Elektrowni Pątnów - Adamów - Konin SA and cement CEM I 42,5 production site located 217km from Konin. The raw material is fly ash (waste from the generation of electricity), which is the main product of hydraulic road binder TEFRA 25 and CEM I 42,5. Data on transport of the different products to the manufacturing plants is collected and modelled for factory by assessor. Means of transport include road trucks and conveyors to mixers and tanks.

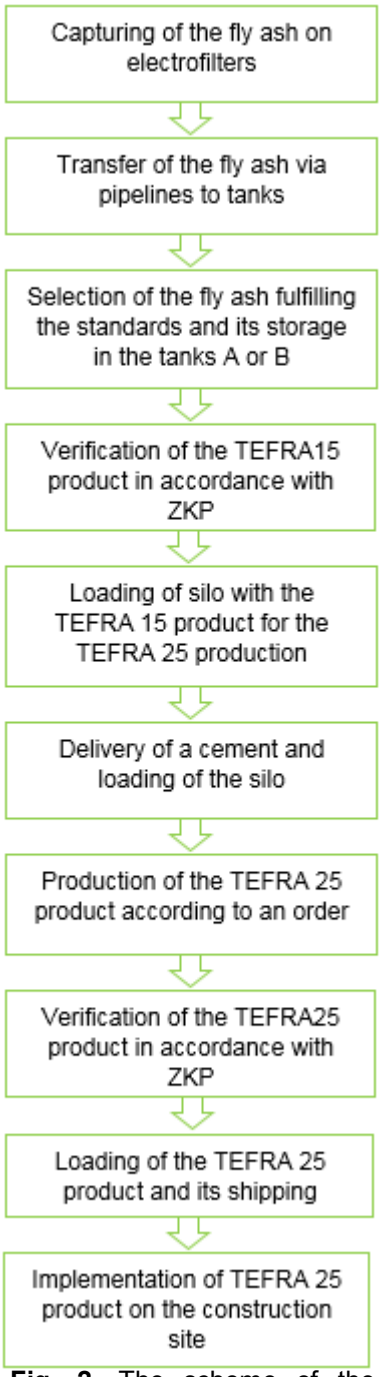

Fig. 2. The scheme of the production process of TEFRA 25 in the factory in Konin (Poland)

A3: Production

The Fig. 2 shows the production process of TEFRA 25 in the factory in Konin. The raw materials in the form of fly ashes are captured on electrofilters and are transferred via pipelines to tanks. In the next step, fly ashes fulfilling the applicable standards are selected and are passed to the tanks A or B for storage. Then, a TEFRA 15 product is verified in accordance with the internal standards (ZKP) and loaded into a silo for production of the TEFRA 25 product by addition of CEM I 42,5 into the recipe. The production of the TEFRA 25 product is conducted in accordance with an order and the

product is verified using the internal standards (ZKP).

Data collection period

The data for manufacture of the declared products refer to period between January–December 2015. The life cycle assessments were prepared for Poland as reference area.

Data quality

The values determined to calculate the LCA originate from verified EKOTECH Inżynieria Popiołów Sp. z o. o. inventory data and specific data calculated for energetic and non-energetic products (Zespół Elektrowni Pątnów-Adamów-Konin).

Assumptions and estimates

The impacts of the representative TEFRA 25 were aggregated using weighted average.

Calculation rules

LCA was done in accordance with PCR A document.

Fig. 3. The view of the tanks A and B in the factory in Konin (Poland)

Databases

The data for the processes come from the following sources: Ecoinvent, ITB-Data. Specific data quality analysis was a part of external ISO 14001 audit. Characterization factors are CML ver. 4.2 based on EN 15804:2013+A1 version. (PN EN 15804+A1:2014-04).

LIFE CYCLE ASSESSMENT (LCA) - Results

Declared unit

The declaration refers to functional unit (FU) - 1 tone of hydraulic road binder TEFRA 25

Table 2. System boundaries for environmental characteristic for hydraulic road binder TEFRA 25

Environmental assessment information (MNA – Module not assessed, MD – Module 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	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA

Hydraulic road binder TEFRA 25 (25-10)

Environmental impacts: (FU) 1 tone					
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**
Global warming potential	[kg CO_2 eq.] (100 years)	379,39	16,88	5,24	401,51
Depletion potential of the stratospheric ozone layer	[kg CFC 11 eq.]	5,10E-09	0,0	0,0	5,10E-09
Acidification potential of soil and water	[kg SO_2 eq.]	4,67E-01	1,23E-01	1,45E-02	6,05E-01
Formation potential of tropospheric ozone	[kg Ethylene eq.]	1,01E-01	8,98E-03	0,00E+00	1,10E-01
Eutrophication potential	[kg $(PO_4)^{3-}$ eq.]	4,24E-02	2,17E-02	8,59E-04	6,49E-02
Abiotic depletion potential (ADP-elements) for non-fossil resources	[kg Sb eq.]	6,56E-04	0,00E+00	1,94E-05	6,75E-04
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	[MJ]	1521,77	1,35	0,56	1523,68
Environmental aspects on resource use: (FU) 1 tone					
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	[MJ]	1,58E+02	1,44E-02	4,29E-02	1,59E+02
Use of renewable primary energy resources used as raw materials	[MJ]	0,0	0,0	0,0	0,0
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	[MJ]	1,58E+02	1,44E-02	4,29E-02	1,59E+02
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	[MJ]	1704,09	0,0	0,62	1704,71
Use of non-renewable primary energy resources used as raw materials	[MJ]	0,0	0,0	0,0	0,0
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	[MJ]	1704,09	0,0	0,62	1704,71
Use of secondary material	[kg]	0,90	0,0	0,0	0,90
Use of renewable secondary fuels	[MJ]	123,40	0,0	0,0	123,40
Use of non-renewable secondary fuels	[MJ]	308,12	0,0	0,0	308,12
Net use of fresh water	[dm^3]	0,38	0,13	0,06	0,56
Other environmental information describing waste categories: (FU) 1 tone					
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**
Hazardous waste disposed	[kg]	2,71E-03	0,0	4,30E-04	3,14E-03
Non-hazardous waste disposed	[kg]	1,29E+01	0,0	4,02E-02	1,29E+01
Radioactive waste disposed	[kg]	7,06E-02	0,0	0,0	7,06E-02
Components for re-use	[kg]	3,14E-03	0,0	0,0	3,14E-03
Materials for recycling	[kg]	5,60E-02	0,0	3,33E-03	5,93E-02
Materials for energy recover	[kg]	0,0	0,0	0,0	0,0
Exported energy	[MJ]	0,0	0,0	0,0	0,0

Hydraulic road binder TEFRA 25 (25-11)

Environmental impacts: (FU) 1 tone					
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**
Global warming potential	[kg CO_2 eq.] (100 years)	337,48	16,88	5,24	359,60
Depletion potential of the stratospheric ozone layer	[kg CFC 11 eq.]	4,54E-09	0,0	0,0	4,54E-09
Acidification potential of soil and water	[kg SO_2 eq.]	4,15E-01	1,23E-01	1,45E-02	5,53E-01
Formation potential of tropospheric ozone	[kg Ethylene eq.]	8,98E-02	8,98E-03	0,00E+00	9,88E-02
Eutrophication potential	[kg $(PO_4)^{3-}$ eq.]	3,77E-02	2,17E-02	8,59E-04	6,03E-02
Abiotic depletion potential (ADP-elements) for non-fossil resources	[kg Sb eq.]	5,83E-04	0,00E+00	1,94E-05	6,03E-04
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	[MJ]	1353,67	1,35	0,56	1355,58
Environmental aspects on resource use: (FU) 1 tone					
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	[MJ]	1,41E+02	1,44E-02	4,29E-02	1,41E+02
Use of renewable primary energy resources used as raw materials	[MJ]	0,0	0,0	0,0	0,0
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	[MJ]	1,41E+02	1,44E-02	4,29E-02	1,41E+02
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	[MJ]	1515,85	0,0	0,62	1516,47
Use of non-renewable primary energy resources used as raw materials	[MJ]	0,0	0,0	0,0	0,0
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	[MJ]	1515,85	0,0	0,62	1516,47
Use of secondary material	[kg]	0,80	0,0	0,0	0,80
Use of renewable secondary fuels	[MJ]	107,98	0,0	0,0	107,98
Use of non-renewable secondary fuels	[MJ]	269,61	0,0	0,0	269,61
Net use of fresh water	[dm^3]	0,34	0,13	0,06	0,52
Other environmental information describing waste categories: (FU) 1 tone					
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**
Hazardous waste disposed	[kg]	2,37E-03	0,0	4,30E-04	2,80E-03
Non-hazardous waste disposed	[kg]	1,13E+01	0,0	4,02E-02	1,13E+01
Radioactive waste disposed	[kg]	6,17E-02	0,0	0,0	6,17E-02
Components for re-use	[kg]	3,40E-03	0,0	0,0	3,40E-03
Materials for recycling	[kg]	4,90E-02	0,0	3,33E-03	5,23E-02
Materials for energy recover	[kg]	0,0	0,0	0,0	0,0
Exported energy	[MJ]	0,0	0,0	0,0	0,0

Hydraulic road binder TEFRA 25 (25-13)

Environmental impacts: (FU) 1 tone					
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**
Global warming potential	[kg CO_2 eq.] (100 years)	262,04	16,88	5,24	284,16
Depletion potential of the stratospheric ozone layer	[kg CFC 11 eq.]	3,53E-09	0,0	0,0	3,53E-09
Acidification potential of soil and water	[kg SO_2 eq.]	3,23E-01	1,23E-01	1,45E-02	4,60E-01
Formation potential of tropospheric ozone	[kg Ethylene eq.]	6,97E-02	8,98E-03	0,00E+00	7,87E-02
Eutrophication potential	[kg $(PO_4)^{3-}$ eq.]	2,93E-02	2,17E-02	8,59E-04	5,18E-02
Abiotic depletion potential (ADP-elements) for non-fossil resources	[kg Sb eq.]	4,53E-04	0,00E+00	1,94E-05	4,72E-04
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	[MJ]	1051,08	1,35	0,56	1052,99
Environmental aspects on resource use: (FU) 1 tone					
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	[MJ]	1,09E+02	1,44E-02	4,29E-02	1,10E+02
Use of renewable primary energy resources used as raw materials	[MJ]	0,0	0,0	0,0	0,0
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	[MJ]	1,09E+02	1,44E-02	4,29E-02	1,10E+02
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	[MJ]	1177,01	0,0	0,62	1177,63
Use of non-renewable primary energy resources used as raw materials	[MJ]	0,0	0,0	0,0	0,0
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	[MJ]	1177,01	0,0	0,62	1177,63
Use of secondary material	[kg]	0,62	0,0	0,0	0,62
Use of renewable secondary fuels	[MJ]	80,21	0,0	0,0	80,21
Use of non-renewable secondary fuels	[MJ]	200,28	0,0	0,0	200,28
Net use of fresh water	[dm^3]	0,26	0,13	0,06	0,45
Other environmental information describing waste categories: (FU) 1 tone					
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**
Hazardous waste disposed	[kg]	1,76E-03	0,0	4,30E-04	2,19E-03
Non-hazardous waste disposed	[kg]	8,37E+00	0,0	4,02E-02	8,41E+00
Radioactive waste disposed	[kg]	4,59E-02	0,0	0,0	4,59E-02
Components for re-use	[kg]	3,87E-03	0,0	0,0	3,87E-03
Materials for recycling	[kg]	3,64E-02	0,0	3,33E-03	3,97E-02
Materials for energy recover	[kg]	0,0	0,0	0,0	0,0
Exported energy	[MJ]	0,0	0,0	0,0	0,0

Hydraulic road binder TEFRA 25 (25-14)

Environmental impacts: (FU) 1 tone					
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**
Global warming potential	[kg CO_2 eq.] (100 years)	354,24	16,88	5,24	376,36
Depletion potential of the stratospheric ozone layer	[kg CFC 11 eq.]	4,77E-09	0,0	0,0	4,77E-09
Acidification potential of soil and water	[kg SO_2 eq.]	4,36E-01	1,23E-01	1,45E-02	5,74E-01
Formation potential of tropospheric ozone	[kg Ethylene eq.]	9,42E-02	8,98E-03	0,00E+00	1,03E-01
Eutrophication potential	[kg $(PO_4)^{3-}$ eq.]	3,96E-02	2,17E-02	8,59E-04	6,21E-02
Abiotic depletion potential (ADP-elements) for non-fossil resources	[kg Sb eq.]	6,12E-04	0,00E+00	1,94E-05	6,32E-04
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	[MJ]	1420,91	1,35	0,56	1422,82
Environmental aspects on resource use: (FU) 1 tone					
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	[MJ]	1,48E+02	1,44E-02	4,29E-02	1,48E+02
Use of renewable primary energy resources used as raw materials	[MJ]	0,0	0,0	0,0	0,0
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	[MJ]	1,48E+02	1,44E-02	4,29E-02	1,48E+02
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	[MJ]	1591,14	0,0	0,62	1591,77
Use of non-renewable primary energy resources used as raw materials	[MJ]	0,0	0,0	0,0	0,0
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	[MJ]	1591,14	0,0	0,62	1591,77
Use of secondary material	[kg]	0,84	0,0	0,0	0,84
Use of renewable secondary fuels	[MJ]	114,15	0,0	0,0	114,15
Use of non-renewable secondary fuels	[MJ]	285,01	0,0	0,0	285,01
Net use of fresh water	[dm^3]	0,35	0,13	0,06	0,54
Other environmental information describing waste categories: (FU) 1 tone					
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**
Hazardous waste disposed	[kg]	2,50E-03	0,0	4,30E-04	2,93E-03
Non-hazardous waste disposed	[kg]	1,19E+01	0,0	4,02E-02	1,20E+01
Radioactive waste disposed	[kg]	6,53E-02	0,0	0,0	6,53E-02
Components for re-use	[kg]	3,29E-03	0,0	0,0	3,29E-03
Materials for recycling	[kg]	5,18E-02	0,0	3,33E-03	5,51E-02
Materials for energy recover	[kg]	0,0	0,0	0,0	0,0
Exported energy	[MJ]	0,0	0,0	0,0	0,0

Hydraulic road binder TEFRA 25 (25-5)

Environmental impacts: (FU) 1 tone					
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**
Global warming potential	[kg CO_2 eq.] (100 years)	253,66	16,88	5,24	275,78
Depletion potential of the stratospheric ozone layer	[kg CFC 11 eq.]	3,41E-09	0,0	0,0	3,41E-09
Acidification potential of soil and water	[kg SO_2 eq.]	3,12E-01	1,23E-01	1,45E-02	4,50E-01
Formation potential of tropospheric ozone	[kg Ethylene eq.]	6,75E-02	8,98E-03	0,00E+00	7,65E-02
Eutrophication potential	[kg $(PO_4)^{3-}$ eq.]	2,83E-02	2,17E-02	8,59E-04	5,09E-02
Abiotic depletion potential (ADP-elements) for non-fossil resources	[kg Sb eq.]	4,39E-04	0,0	1,94E-05	4,58E-04
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	[MJ]	1017,46	1,35	0,56	1019,37
Environmental aspects on resource use: (FU) 1 tone					
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	[MJ]	1,06E+02	1,44E-02	4,29E-02	1,06E+02
Use of renewable primary energy resources used as raw materials	[MJ]	0,0	0,0	0,0	0,0
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	[MJ]	1,06E+02	1,44E-02	4,29E-02	1,06E+02
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	[MJ]	1139,36	0,0	0,62	1139,99
Use of non-renewable primary energy resources used as raw materials	[MJ]	0,0	0,0	0,0	0,0
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	[MJ]	1139,36	0,0	0,62	1139,99
Use of secondary material	[kg]	0,60	0,0	0,0	0,60
Use of renewable secondary fuels	[MJ]	77,13	0,0	0,0	77,13
Use of non-renewable secondary fuels	[MJ]	192,58	0,0	0,0	192,58
Net use of fresh water	[dm^3]	0,25	0,13	0,06	0,44
Other environmental information describing waste categories: (FU) 1 tone					
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**
Hazardous waste disposed	[kg]	1,69E-03	0,0	4,30E-04	2,12E-03
Non-hazardous waste disposed	[kg]	8,05E+00	0,0	4,02E-02	8,09E+00
Radioactive waste disposed	[kg]	4,41E-02	0,0	0,0	4,41E-02
Components for re-use	[kg]	3,92E-03	0,0	0,0	3,92E-03
Materials for recycling	[kg]	3,50E-02	0,0	3,33E-03	3,83E-02
Materials for energy recover	[kg]	0,0	0,0	0,0	0,0
Exported energy	[MJ]	0,0	0,0	0,0	0,0

Hydraulic road binder TEFRA 25 (25-6)

Environmental impacts: (FU) 1 tone					
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**
Global warming potential	[kg CO_2 eq.] (100 years)	270,42	16,88	5,24	292,54
Depletion potential of the stratospheric ozone layer	[kg CFC 11 eq.]	3,64E-09	0,0	0,0	3,64E-09
Acidification potential of soil and water	[kg SO_2 eq.]	3,33E-01	1,23E-01	1,45E-02	4,71E-01
Formation potential of tropospheric ozone	[kg Ethylene eq.]	7,19E-02	8,98E-03	0,00E+00	8,09E-02
Eutrophication potential	[kg $(PO_4)^{3-}$ eq.]	3,02E-02	2,17E-02	8,59E-04	5,28E-02
Abiotic depletion potential (ADP-elements) for non-fossil resources	[kg Sb eq.]	4,68E-04	0,0	1,94E-05	4,87E-04
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	[MJ]	1084,70	1,35	0,56	1086,61
Environmental aspects on resource use: (FU) 1 tone					
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	[MJ]	1,13E+02	1,44E-02	4,29E-02	1,13E+02
Use of renewable primary energy resources used as raw materials	[MJ]	0,0	0,0	0,0	0,0
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	[MJ]	1,13E+02	1,44E-02	4,29E-02	1,13E+02
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	[MJ]	1214,66	0,0	0,62	1215,28
Use of non-renewable primary energy resources used as raw materials	[MJ]	0,0	0,0	0,0	0,0
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	[MJ]	1214,66	0,0	0,62	1215,28
Use of secondary material	[kg]	0,64	0,0	0,0	0,64
Use of renewable secondary fuels	[MJ]	83,30	0,0	0,0	83,30
Use of non-renewable secondary fuels	[MJ]	207,98	0,0	0,0	207,98
Net use of fresh water	[dm^3]	0,27	0,13	0,06	0,46
Other environmental information describing waste categories: (FU) 1 tone					
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**
Hazardous waste disposed	[kg]	1,83E-03	0,0	4,30E-04	2,26E-03
Non-hazardous waste disposed	[kg]	8,69E+00	0,0	4,02E-02	8,73E+00
Radioactive waste disposed	[kg]	4,76E-02	0,0	0,0	4,76E-02
Components for re-use	[kg]	3,82E-03	0,0	0,0	3,82E-03
Materials for recycling	[kg]	3,78E-02	0,0	3,33E-03	4,11E-02
Materials for energy recover	[kg]	0,0	0,0	0,0	0,0
Exported energy	[MJ]	0,0	0,0	0,0	0,0

Hydraulic road binder TEFRA 25 (25-7)

Environmental impacts: (FU) 1 tone					
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**
Global warming potential	[kg CO_2 eq.] (100 years)	295,57	16,88	5,24	317,69
Depletion potential of the stratospheric ozone layer	[kg CFC 11 eq.]	3,98E-09	0,0	0,0	3,98E-09
Acidification potential of soil and water	[kg SO_2 eq.]	3,64E-01	1,23E-01	1,45E-02	5,02E-01
Formation potential of tropospheric ozone	[kg Ethylene eq.]	7,86E-02	8,98E-03	0,00E+00	8,76E-02
Eutrophication potential	[kg $(PO_4)^{3-}$ eq.]	3,30E-02	2,17E-02	8,59E-04	5,56E-02
Abiotic depletion potential (ADP-elements) for non-fossil resources	[kg Sb eq.]	5,11E-04	0,0	1,94E-05	5,30E-04
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	[MJ]	1185,57	1,35	0,56	1187,47
Environmental aspects on resource use: (FU) 1 tone					
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	[MJ]	1,23E+02	1,44E-02	4,29E-02	1,24E+02
Use of renewable primary energy resources used as raw materials	[MJ]	0,0	0,0	0,0	0,0
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	[MJ]	1,23E+02	1,44E-02	4,29E-02	1,24E+02
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	[MJ]	1327,61	0,0	0,62	1328,23
Use of non-renewable primary energy resources used as raw materials	[MJ]	0,0	0,0	0,0	0,0
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	[MJ]	1327,61	0,0	0,62	1328,23
Use of secondary material	[kg]	0,70	0,0	0,0	0,70
Use of renewable secondary fuels	[MJ]	92,55	0,0	0,0	92,55
Use of non-renewable secondary fuels	[MJ]	231,09	0,0	0,0	231,09
Net use of fresh water	[dm^3]	0,29	0,13	0,06	0,48
Other environmental information describing waste categories: (FU) 1 tone					
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**
Hazardous waste disposed	[kg]	2,03E-03	0,0	4,30E-04	2,46E-03
Non-hazardous waste disposed	[kg]	9,66E+00	0,0	4,02E-02	9,70E+00
Radioactive waste disposed	[kg]	5,29E-02	0,0	0,0	5,29E-02
Components for re-use	[kg]	3,66E-03	0,0	0,0	3,66E-03
Materials for recycling	[kg]	4,20E-02	0,0	3,33E-03	4,53E-02
Materials for energy recover	[kg]	0,0	0,0	0,0	0,0
Exported energy	[MJ]	0,0	0,0	0,0	0,0

Verification

The process of verification of this EPD is in accordance with EN 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 and ITB PCR A
Independent verification corresponding to ISO 14025 & 8.3.1. ☒ external ☐ internal
External verification of EPD: PhD. Eng. Halina Prejzner LCA, LCI audit and input data verification: M.Sc. Eng. Dominik Bekierski, d.bekierski@itb.pl M.Sc. Eng. Justyna Tomaszewska Verification of LCA: PhD Eng. Michał Piasecki, m.piasecki@itb.pl

Normative references

- ITB PCR A- General Product Category Rules for Construction Products
- EN 15860 - Plastics. Thermoplastic semi-finished products for machining. Requirements and test methods,
- EN ISO 9054:2001 - Cellular plastics, rigid - Test methods for self-skinned, high-density materials
- ISO 14025:2006, Environmental management – Type III environmental declarations – Principles and procedure
- ISO 21930:2007, Sustainability in building and construction – Environmental declaration of building products
- ISO 14044:2006, Environmental management – Life cycle assessment – Requirements and guidelines
- ISO 15686-1:2000, Buildings and constructed assets — Service life planning — Part 1: General principles
- ISO 15686-8:2008, Buildings and constructed assets – Service life planning – Part 8: Reference service life
- EN 15804:2012+A1:2013, Sustainability in construction works – Environmental product declarations – Core rules for the product category of construction products.
- EN15942:2011, Sustainability of construction works - Environmental product declarations. Communication format business-to-business
- Deklaracja właściwości użytkowych Nr1487-CPR-165-01

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02-656 Warsaw, Ksawerów 21

CERTIFICATE № 061/2017
of TYPE III ENVIRONMENTAL DECLARATION

Product:

TEFRA 25 hydraulic binding

Manufacturer:

Ekotech Inżynieria Popiołów Sp. z o.o.

03-982 Warsaw, Gen. S. Skalskiego 1/U16

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

PN-EN 15804+A1:2014-04

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

This certificate, issued for the first time on 9th February 2017 is valid for 5 years
or until amendment of mentioned Environmental Declaration

Head of the Thermal Physic, Acoustics and Environment Department
Michał Piasecki, PhD

INSTYTUT TECHNIKI BUDOWLANEJ

Deputy Director for Research and Innovation
Krzysztof Kuczyński, PhD

Warsaw, February 2017