YAPI KİMYASALLARI

ENVIRONMENTAL PRODUCT DECLARATION

In Accordance with ISO14025 and EN15804 for Adhesive Mortars

The environmental impacts of this product have been assessed from cradle to gate with options.
Environmental Product Declaration has been verified by an independent third party.

CPC Code / 37510

Declaration No / S-P-00835

ECO EPD Reg. No / 00000476

Date of Issue / 17.01.2017

Valid Until / 16.01.2022

Market Coverage / Worldwide

TURKEY EPD®
ENVIRONMENTAL PRODUCT DECLARATIONS

ECO PLATFORM EPD EN 15804 VERIFIED

INFORMATION

The LCA for this EPD is conducted according to the guidelines of ISO 14040/44 and the requirements given in the Product Category Rules (PCR) document for Construction Products and CPC 54 Construction Services (Version 2.01, 2016 03 09) with reference to EN 15804 and the general program guidelines by The International EPD System in accordance with ISO 14025 standards.

The inventory for the LCA study is based on the 2015 production figures for adhesive mortars manufactured by KYK Yapı Kimyasalları San. ve Tic. A.Ş. (KYK) in their production plants located in Eskişehir, Adana, Diyarbakır and Samsun, Turkey.

This LCA was modelled with SimaPro 8.2 LCA software using the impact factors and the latest version of the Ecoinvent database (V3.2) for secondary data and Turkish Life Cycle Inventory Database (TLCID) developed by Turkish Centre for Sustainable Production Research and Design (SÜRATAM) for local data.

EPD Programme	The International EPD® System www.environdec.com
EPD Programme Operator	EPD Turkey, Istanbul - Turkey www.epdturkey.org
EPD Owner	KYK Yapı Kimyasalları San. ve Tic. A.Ş., Eskişehir - Turkey www.kyk.com.tr
Declared Unit	1 kg powder adhesive mortar for Standard Adhesives, Advanced Adhesives and Technical Adhesives. 1 kg powder adhesive mortar + 0.240 kg polymer solution for High Performance Adhesives
EPD Based on Product Category Rules (PCR)	The CEN standard EN 15804 serves as the core PCR The International EPD® System's PCR 2012:01 Construction products and Construction services, Version 2.01, 2016-03-09
PCR Review Conducted by	Technical Committee of the International EPD® System www.environdec.com info@environdec.com
Independent Verification and data, according to ISO 14025:2006	☐ Internal ☑ External ☐ EPD® Process Certification
System Boundaries	☐ Cradle to Gate ☑ Cradle to Gate with Option ☐ Cradle to Grave
Approved and Verified by	**Third Party Verifier** Vladimír Kočí, PhD Prague ,Czech Republic
EPD Prepared by	Metsims Sustainability Consulting, Istanbul - Turkey www.metsims.com

EPDs within the same product category but from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804 Norm.

The EPD certificate, its background data and the results will be used for business-to-business communications and is expected to be a reliable document for green building designers, architectures, manufacturers of construction products and the other stakeholders in the construction sector to understand the potential environmental impacts caused by adhesive mortar products.

For more information about this Environmental Product Declaration or its contents, contact process owner Yasemin Balk, yaseminb@kyk.com.tr.

COMPANY PROFILE

KYK is one of the leading construction chemical companies in Turkey.
The company, with 100% domestic capital, was established in Eskişehir in the year 2001. Presently, the company has 600 000 tons of production capacity and operates in production facilities located in Eskişehir (the headquarter), Samsun, Adana and Diyarbakır in Turkey employing 180 people.

The Company exports its products ranging from adhesives, joint fillers, waterproofing materials, heat insulation materials, repair mortar, flooring materials to plasters, primers, additives, supplements and exterior surface paints to 20 countries.

KYK closely observes the developments and requirements in the sector, adds fuel to the R&D studies and increases product variety on a continuous basis to quickly respond to the market needs and meet customer expectations.

KYK continues to grow on the basis of its production and new investments, where it has adopted EFQM Excellency Model to manage for the management to be able to achieve sustainable excellence in all stages of its operations. Thanks to the work and studies oriented to achieve stakeholder satisfaction, the company has received "EFQM Excellence in Competency 5 Stars" certificate. KYK has been the first construction chemicals company receiving this certificate.

The emphasis of KYK on the quality of work, human capital and environment proven with the award of national and international standards such as EN 9001:2008, ISO 14001:2004, ISO 27001, ISO 10002 and OHSAS 18001.

KYK continues to grow and be a strong supplier in the construction sector thanks to its technical solution products, technical team, and product and service quality.

Eskişehir Plant

Adana Plant

Diyarbakır Plant

Samsun Plant

PRODUCT INFORMATION

Adhesive mortars are construction chemicals manufactured according to EN 12004 standard and used for various applications from floor covering, panel fixing to tile fixing in all construction projects for the adhesion of coating materials on hard surfaces. These products are used widely for their qualities such as strong bonding capacity, good waterproofing, weatherproofing etc.

In adhesive mortar manufacturing, production starts with the transport of raw materials to the production plant. Raw materials are then mixed according to related formula for each product and packaged.

Raw Materials for Adhesive Mortars

Raw Materials	Composition, %
Cement	20 - 50
Fillers	50 - 80
Additives	1 - 10

No substances included in the Candidate List of Substances of Very High Concern for authorisation under the REACH Regulations are present in the adhesive mortars manufactured by KYK, either above the threshold for registration with the European Chemicals Agency or above 0.1% (wt/wt).

Production Process for Adhesive Mortars

Raw Materials → Mixing → Packaging

KYK manufactures various adhesive products with specifications for different applications.
The products and relative product groups within the scope of this EPD are:

- **STANDARD ADHESIVES:** MegaFix Y101, MegaFix K Y106, MegaBlok Y192, ARTEFIX, BRUFIX
- **ADVANCED ADHESIVES:** MegaGranit Y102, MegaFlex Y103, MegaPro Rapid Y112
- **TECHNICAL ADHESIVES:** MegaFlex Maxi Y104, MegaPool Y105, MegaPro RapidFlex Y113
- **HIGH PERFORMANCE ADHESIVES:** MegaPro Facade Y111

Technical Specifications & Areas of Use

STANDARD ADHESIVES	MegaFix Y101 & MegaFix K Y106	MegaBlok Y192	ARTEFIX & BRUFIX
Product Description & Areas of Use	Cement based ceramic tile adhesive mortar with reduced slippage and extended retention time. The product is used for the adhesion of coating materials in wall dimensions up to 25x40 cm and ceramic tile dimensions up to 33x33 cm horizontally and vertically in indoor spaces and horizontally in outdoor spaces and also for the adhesion of glass bricks in indoors spaces.	Cement based, practical, manually applied gas concrete masonry mortar, containing workability enhancing chemical additives. The product is used for the adhesion of construction elements such as gas concrete and brick on vertical surfaces of indoor and outdoor spaces.	Cement based ceramic adhesive mortar with reduced slippage. The product is used for the adhesion of coating materials in wall dimensions up to 25x40 cm and ceramic tile dimensions up to 33x33 cm horizontally and vertically in indoor spaces and horizontally in outdoor spaces.
			
Dry Density	1.30 ± 0.05 gr/cm³	1.50 ± 0.1 gr/cm³	1.40 ± 0.05 gr/cm³
Mortar Density	1.85 ± 0.05 gr/cm³	1.75 ± 0.1 gr/cm³	1.85 ± 0.05 gr/cm³
Grain Size	≤ 600 µm	≤ 600 µm	≤ 600 µm
Color	Gray, white	Gray	Gray
Temperature Resistance	-15°C to +80°C	-	-15°C to +80°C

ADVANCED ADHESIVES	MegaGranit Y102	MegaFlex Y103	MegaPro Rapid Y112
Product Description & Areas of Use	Cement based, elastic adhesive with reduced slippage and high adherence for large size coating applications such as ceramic, granite ceramic, marble, natural rock and porcelain. Resistant to temperature changes, water and frost.	Cement based, elastic adhesive with reduced slippage, high adherence and elongated workable time for large size coating applications such as ceramic, granite ceramic, marble, natural rock and porcelain. Resistant to temperature changes, water and frost.	Cement based, rapidly hardening ceramic tile adhesive mortar with reduced slippage. The product is preferable especially for renovation applications required to be rapidly opened for pedestrian traffic and floors exposed to busy pedestrian traffic.
			
Dry Density	1.35 ± 0.05 gr/cm³	1.35 ± 0.05 gr/cm³	1.35 ± 0.05 gr/cm³
Mortar Density	1.80 ± 0.05 gr/cm³	1.75 ± 0.05 gr/cm³	1.80 ± 0.05 gr/cm³
Grain Size	≤ 600 µm	≤ 600 µm	≤ 600 µm
Color	White, gray	White, gray	White, gray
Temperature Resistance	-15°C to +80°C	-15°C to +80°C	-15°C to +80°C

TECHNICAL ADHESIVES	MegaFlex Maxi Y104	MegaPool Y105	MegaPro Rapid Flex Y113
Product Description & Areas of Use	Cement based, elastic adhesive with reduced slippage, high adherence and elongated workable time for large size coating applications such as ceramic, granite ceramic, marble, natural rock and porcelain, which is resistant to temperature changes, water and frost.	Enhanced cement based, highly elastic adhesive with reduced slippage, high adherence and extended workable time for pool and wet space applications. Resistant to temperature changes, water and frost.	Cement based, elastic, rapidly freezing/ hardening adhesive with reduced slippage, high adherence for large size coating materials such as cement based ceramic, granite ceramic, granite, marble, natural rock and porcelain. Resistant to temperature changes, water and frost.
			
Dry Density	1.35 ± 0.05 gr/cm³	1.35 ± 0.05 gr/cm³	1.35 ± 0.05 gr/ cm³
Mortar Density	1.74 ± 0.05 gr/cm³	1.75 ± 0.05 gr/ cm³	1.80 ± 0.05 gr/ cm³
Grain Size	≤ 600 µm	≤ 600 µm	≤ 600 µm
Color	Gray, white	Gray, white	Gray, white
Temperature Resistance	-15°C to +80°C	-15°C to +80°C	-15°C to +80°C

HIGH PERFORMANCE ADHESIVES	MegaPro Facade Y111
Product Description & Areas of Use	Cement and polymer emulsion based, double component elastic adhesive with reduced slippage, high adherence and elongated workable time for large size coating applications such as ceramic, granite ceramic, marble, natural rock and porcelain. Resistant to temperature changes, water and frost.
	
Dry Density	1.35 ± 0.05 gr/cm³
Mortar Density	1.75 ± 0.05 gr/cm³
Grain Size	≤ 600 µm
Color	Gray
Temperature Resistance	-15°C to +80°C

SYSTEM BOUNDARY

Upstream Process (A1: Raw Material Supply)

Production starts with raw materials mainly locally sourced but some transported from other parts of the world. ‘Raw material supply’ includes raw material extraction and pre-treatment processes before production.

Core Process (A2:Transportation and A3:Manufacturing)

Transport is relevant for delivery of raw materials to the plants and the transport of materials within the plants.

‘Manufacturing’ starts with the mixing of raw materials according to product formulation. The end products are then packaged in kraft bags to be sold. The polymer solution for High Performance Adhesives are sold in drums. Electric energy is consumed during manufacturing stage.

Downstream Processes (C4: Disposal)

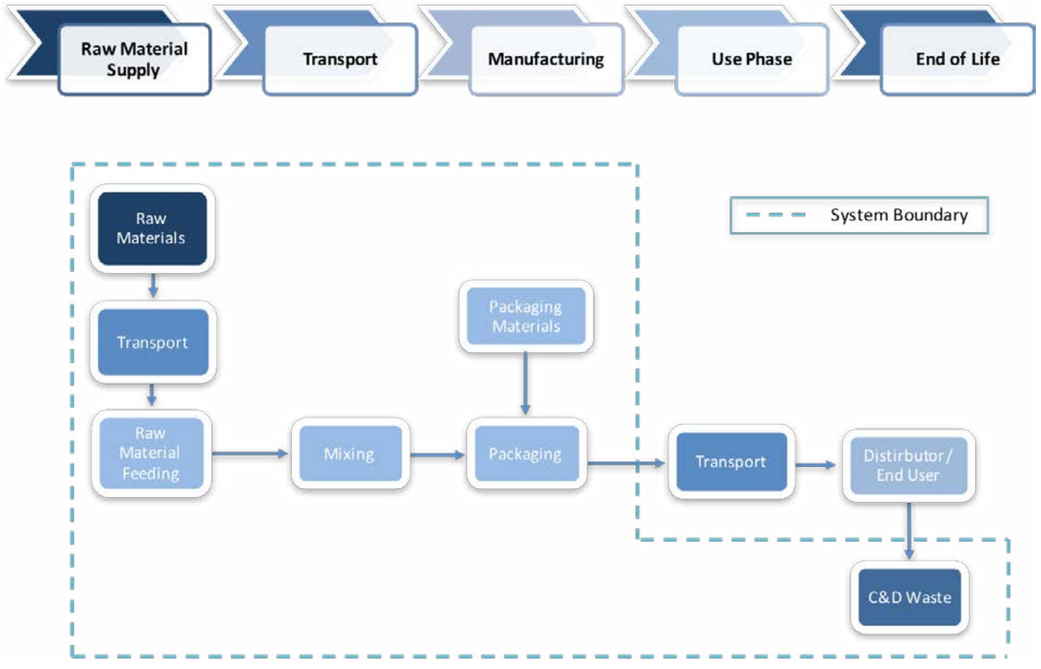
All adhesives end up at construction and demolition waste landfills as their final fate and modelled as such in the LCA (C4).

Packaging waste is assumed to end up at packaging recycling streams due to the relevant national law in Turkey in 2015, which requires manufacturers to have certain percentage of their packaging waste to be recovered (C4).

Benefits and loads beyond the product system boundary in information Module D

No potential benefits of recycling and re-use were taken into account in the current LCA report.

System Boundary of the LCA Study



ENVIRONMENTAL PERFORMANCE RELATED INFORMATION

Functional Unit/ Declared Unit	The declared unit is the production of 1 kg of powder adhesive mortar for Standard Adhesives, Advanced Adhesives and Technical Adhesives. For High Performance Adhesives, the declared unit is 1 kg of powder adhesive mortar + 0.240 kg polymer solution.
Goal and Scope	This EPD evaluates the environmental impacts of 1 kg of adhesive mortar from cradle to gate with option (Disposal).
System Boundary	The system boundary covers A1 - A3 product stages referred as ‘Raw material supply’, ‘Transport’ and ‘Manufacturing’ and C4 as Disposal.
Estimates and Assumptions	There are no additional product scenarios developed for this EPD. However, packaging waste for plasters are modelled based on the collection rates enforced by the relevant regulations in Turkey.
Cut-Off Rules	For this LCA study, cut-off criteria was not applied.
Background Data	For local data specific for Turkey, Turkish Life Cycle Inventory Database (TLCID) developed by Turkish Centre for Sustainable Production Research and Design (SÜRATAM) was used. For any other background data the Ecoinvent database (V3.2) was used.
Data Quality	Raw materials, energy and water consumption and waste data is collected from KYK. Localized data especially on energy and other relevant processes were taken from TLCID.
Period Under Review	All primary data collected from KYK is for the period year of 2015.
Allocations	There are no co-products in the production of adhesive mortars manufactured by KYK. Hence, there was no need for co-product allocation. The Company sources raw materials from different locations across Turkey and other parts of the world and by different means of transport (truck and ship). For this reason, transport was allocated according to raw material tonnages. KYK manufactures various adhesive mortars with specifications for different applications in four different manufacturing plants located in Eskişehir, Adana, Diyarbakır and Samsun. The products that are part of this study and related product groups are: Standard Adhesives (MegaFix Y101, MegaFix K Y106, MegaBlok Y192, ARTEFIX and BRUFIX), Advanced Adhesives (MegaGranit Y102, MegaFlex Y103 and MegaPro Rapid Y112), Technical Adhesives (MegaFlex Maxi Y104, MegaPool Y105 and MegaPro RapidFlex Y113) and High Performance Adhesives (MegaPro Facade Y111). Raw materials, transport, energy consumption during manufacturing, packaging and waste data were allocated using data from KYK’s four plants.

All the waste resulting from the main production and related processes of KYK is managed in accordance with valid legal requirements.

PRODUCT STAGE			CONSTRUCTION PROCESS		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw Materials Supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction	Transport	Waste processing	Disposal	Reuse-Recycling-Recovery Potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	X	MNA

Description of the system boundary (X = Included in LCA, MNA= Module Not Assessed)

The results of the LCA with the indicators as per EPD requirement are given in the following tables for product manufacture (A1, A2, A3) and disposal (C4). The system boundaries in tabular form for all modules are shown in the table above.

All energy calculations were obtained using Cumulative Energy Demand V1.09 methodology, while environmental impacts are calculated with the CML-IA baseline V4.2 within SimaPro LCA Software. The net fresh water use reflect the water consumption during manufacturing processes.

Environmental Indicators

STANDARD ADHESIVES

ENVIRONMENTAL IMPACTS FOR 1 KG POWDER			
Parameter	**Unit**	**A1-A3**	**C4**
GWP	[kg CO_2 eq.]	0.306	0.0123
ODP	[kg CFC11 eq.]	14.7×10^{-9}	2.73×10^{-9}
AP	[kg SO_2 eq.]	30.1×10^{-6}	$3.84x\ 10^{-6}$
EP	[kg PO_4^{3-} eq.]	700×10^{-6}	72.7×10^{-6}
POCP	[kg ethene eq.]	194×10^{-6}	27.8×10^{-6}
ADPE	[kg Sb eq.]	218×10^{-9}	14.2×10^{-9}
ADPF	[MJ]	1.67	0.264
Legend	GWP: Global Warming Potential, ODP: Ozone Depletion Potential, AP: Acidification Potential, EP: Eutrophication Potential, POCP: Formation potential of tropospheric ozone photochemical oxidants ADPE: Abiotic depletion potential for non-fossil resources, ADPF: Abiotic depletion potential for fossil resources		

RESOURCE USE FOR 1 KG POWDER			
Parameter	**Unit**	**A1-A3**	**C4**
PERE	[MJ]	0.441	0.008
PERM	[MJ]	0.00	0.00
PERT	[MJ]	0.441	0.008
PENRE	[MJ]	1.68	0.264
PENRM	[MJ]	0.00	0.00
PENRT	[MJ]	1.68	0.264
SM	[kg]	0.00	0.00
RSF	[MJ]	0.00	0.00
NRSF	[MJ]	0.00	0.00
FW	[m³]	0.00	-
Legend	PERE: Use of renewable primary energy excluding resources used as raw materials, PERM: Use of renewable primary energy resources used as raw materials, PERT: Total use of renewable primary energy resources, PENRE: Use of non-renewable primary energy excluding resources used as raw materials, PENRM: Use of non-renewable primary energy resources used as raw materials, PENRT: Total use of non-renewable primary energy resources, SM: Use of secondary material, RSF: Use of renewable secondary fuels, NRSF: Use of non-renewable secondary fuels, FW: Use of net fresh water		

OUTPUT FLOWS AND WASTE CATEGORIES FOR 1 KG POWDER			
Parameter	**Unit**	**A1-A3**	**C4**
HWD	[kg]	0.000217	-
NHWD	[kg]	0.00344	1.01
RWD	[kg]	0.00	-
CRU	[kg]	-	-
MFR	[kg]	-	0.0108
MER	[kg]	-	-
EE [Typ]	[MJ]	-	-
Legend	HWD: Hazardous waste disposed, NHWD: Non-hazardous waste disposed, RWD: Radioactive waste disposed, CRU: Components for re-use, MFR: Materials for recycling, MER: Materials for energy recovery, EE: Exported Energy		

ADVANCED ADHESIVES

ENVIRONMENTAL IMPACTS FOR 1 KG POWDER			
Parameter	**Unit**	**A1-A3**	**C4**
GWP	[kg CO_2 eq.]	0.355	0.0123
ODP	[kg CFC11 eq.]	19.3 x 10^{-9}	2.73 x 10^{-9}
AP	[kg SO_2 eq.]	55.9 x 10^{-6}	3.86 x 10^{-6}
EP	[kg PO_4^{3-} eq.]	885 x 10^{-6}	72.7 x 10^{-6}
POCP	[kg ethene eq.]	249 x 10^{-6}	27.9 x 10^{-6}
ADPE	[kg Sb eq.]	628 x 10^{-9}	14.3 x 10^{-9}
ADPF	[MJ]	2.49	0.264
Legend	GWP: Global Warming Potential, ODP: Ozone Depletion Potential, AP: Acidification Potential, EP: Eutrophication Potential, POCP: Formation potential of tropospheric ozone photochemical oxidants ADPE: Abiotic depletion potential for non-fossil resources, ADPF: Abiotic depletion potential for fossil resources		

RESOURCE USE FOR 1 KG POWDER			
Parameter	**Unit**	**A1-A3**	**C4**
PERE	[MJ]	0.488	0.008
PERM	[MJ]	0.00	0.00
PERT	[MJ]	0.488	0.008
PENRE	[MJ]	2.49	0.265
PENRM	[MJ]	0.00	0.00
PENRT	[MJ]	2.49	0.265
SM	[kg]	0.00	0.00
RSF	[MJ]	0.00	0.00
NRSF	[MJ]	0.00	0.00
FW	[m³]	0.00	-
Legend	PERE: Use of renewable primary energy excluding resources used as raw materials, PERM: Use of renewable primary energy resources used as raw materials, PERT: Total use of renewable primary energy resources, PENRE: Use of non-renewable primary energy excluding resources used as raw materials, PENRM: Use of non-renewable primary energy resources used as raw materials, PENRT: Total use of non-renewable primary energy resources, SM: Use of secondary material, RSF: Use of renewable secondary fuels, NRSF: Use of non-renewable secondary fuels, FW: Use of net fresh water		

OUTPUT FLOWS AND WASTE CATEGORIES FOR 1 KG POWDER			
Parameter	**Unit**	**A1-A3**	**C4**
HWD	[kg]	0.000355	-
NHWD	[kg]	0.00581	1.01
RWD	[kg]	0.00	-
CRU	[kg]	-	-
MFR	[kg]	-	0.0108
MER	[kg]	-	-
EE [Typ]	[MJ]	-	-
Legend	HWD: Hazardous waste disposed, NHWD: Non-hazardous waste disposed, RWD: Radioactive waste disposed, CRU: Components for re-use, MFR: Materials for recycling, MER: Materials for energy recovery, EE: Exported Energy		

TECHNICAL ADHESIVES

ENVIRONMENTAL IMPACTS FOR 1 KG POWDER			
Parameter	**Unit**	**A1-A3**	**C4**
GWP	[kg CO_2 eq.]	0.471	0.0135
ODP	[kg CFC11 eq.]	28.7 x 10^{-9}	2.93 x 10^{-9}
AP	[kg SO_2 eq.]	94.1 x 10^{-6}	4.21 x 10^{-6}
EP	[kg PO_4^{3-} eq.]	1 281 x 10^{-6}	78.1 x 10^{-6}
POCP	[kg ethene eq.]	354 x 10^{-6}	30.8 x 10^{-6}
ADPE	[kg Sb eq.]	968 x 10^{-9}	15.3 x 10^{-9}
ADPF	[MJ]	3.86	0.284
Legend	GWP: Global Warming Potential, ODP: Ozone Depletion Potential, AP: Acidification Potential, EP: Eutrophication Potential, POCP: Formation potential of tropospheric ozone photochemical oxidants ADPE: Abiotic depletion potential for non-fossil resources, ADPF: Abiotic depletion potential for fossil resources		

RESOURCE USE FOR 1 KG POWDER			
Parameter	**Unit**	**A1-A3**	**C4**
PERE	[MJ]	0.620	0.008
PERM	[MJ]	0.00	0.00
PERT	[MJ]	0.620	0.008
PENRE	[MJ]	3.86	0.284
PENRM	[MJ]	0.00	0.00
PENRT	[MJ]	3.86	0.284
SM	[kg]	0.00	0.00
RSF	[MJ]	0.00	0.00
NRSF	[MJ]	0.00	0.00
FW	[m³]	0.00	-
Legend	PERE: Use of renewable primary energy excluding resources used as raw materials, PERM: Use of renewable primary energy resources used as raw materials, PERT: Total use of renewable primary energy resources, PENRE: Use of non-renewable primary energy excluding resources used as raw materials, PENRM: Use of non-renewable primary energy resources used as raw materials, PENRT: Total use of non-renewable primary energy resources, SM: Use of secondary material, RSF: Use of renewable secondary fuels, NRSF: Use of non-renewable secondary fuels, FW: Use of net fresh water		

OUTPUT FLOWS AND WASTE CATEGORIES FOR 1 KG POWDER			
Parameter	**Unit**	**A1-A3**	**C4**
HWD	[kg]	0.000395	-
NHWD	[kg]	0.00661	1.00
RWD	[kg]	0.000	-
CRU	[kg]	-	-
MFR	[kg]	-	0.003
MER	[kg]	-	-
EE [Typ]	[MJ]	-	-
Legend	HWD: Hazardous waste disposed, NHWD: Non-hazardous waste disposed, RWD: Radioactive waste disposed, CRU: Components for re-use, MFR: Materials for recycling, MER: Materials for energy recovery, EE: Exported Energy		

HIGH PERFORMANCE ADHESIVES

ENVIRONMENTAL IMPACTS FOR 1 KG POWDER + 0.240 KG POLYMER SOLUTION			
Parameter	**Unit**	**A1-A3**	**C4**
GWP	[kg CO_2 eq.]	0.451	0.0152
ODP	[kg CFC11 eq.]	24.9 x 10^{-9}	3.40 x 10^{-9}
AP	[kg SO_2 eq.]	112 x 10^{-6}	4.71 x 10^{-6}
EP	[kg PO_4^{3-} eq.]	1 432 x 10^{-6}	90.4 x 10^{-6}
POCP	[kg ethene eq.]	559 x 10^{-6}	62.6 x 10^{-6}
ADPE	[kg Sb eq.]	507 x 10^{-9}	17.7 x 10^{-9}
ADPF	[MJ]	5.42	0.329
Legend	GWP: Global Warming Potential, ODP: Ozone Depletion Potential, AP: Acidification Potential, EP: Eutrophication Potential, POCP: Formation potential of tropospheric ozone photochemical oxidants ADPE: Abiotic depletion potential for non-fossil resources, ADPF: Abiotic depletion potential for fossil resources		

RESOURCE USE FOR 1 KG POWDER + 0.240 KG POLYMER SOLUTION			
Parameter	**Unit**	**A1-A3**	**C4**
PERE	[MJ]	0.564	0.00964
PERM	[MJ]	0.00	0.00
PERT	[MJ]	0.564	0.00964
PENRE	[MJ]	5.43	0.329
PENRM	[MJ]	0.00	0.00
PENRT	[MJ]	5.43	0.329
SM	[kg]	0.00	0.00
RSF	[MJ]	0.00	0.00
NRSF	[MJ]	0.00	0.00
FW	[m³]	0.182	-
Legend	PERE: Use of renewable primary energy excluding resources used as raw materials, PERM: Use of renewable primary energy resources used as raw materials, PERT: Total use of renewable primary energy resources, PENRE: Use of non-renewable primary energy excluding resources used as raw materials, PENRM: Use of non-renewable primary energy resources used as raw materials, PENRT: Total use of non-renewable primary energy resources, SM: Use of secondary material, RSF: Use of renewable secondary fuels, NRSF: Use of non-renewable secondary fuels, FW: Use of net fresh water		

OUTPUT FLOWS AND WASTE CATEGORIES FOR 1 KG POWDER + 0.240 KG POLYMER SOLUTION			
Parameter	**Unit**	**A1-A3**	**C4**
HWD	[kg]	0.000701	-
NHWD	[kg]	0.0118	1.25
RWD	[kg]	0.00	-
CRU	[kg]	-	-
MFR	[kg]	-	0.00734
MER	[kg]	-	-
EE [Typ]	[MJ]	-	-
Legend	HWD: Hazardous waste disposed, NHWD: Non-hazardous waste disposed, RWD: Radioactive waste disposed, CRU: Components for re-use, MFR: Materials for recycling, MER: Materials for energy recovery, EE: Exported Energy		

REFERENCES

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/ISO 14001:2004/ Environmental management systems - Requirements with guidance for use

/OHSAS 18001:2007/ Occupational Health and Safety Management

/ISO 27001/ Information technology - Security techniques - Information security management systems - Requirements

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/EN 15804/ EN 15804:2012+A1:2013, Sustainability of construction works - Environmental Product Declarations — Core rules for the product category of construction products

/ISO 14025/ DIN EN ISO 14025:2009-11: Environmental labels and declarations - Type III environmental declarations — Principles and procedures

/ISO 14040/44/ DIN EN ISO 14040:2006-10, Environmental management - Life cycle assessment - Principles and framework (ISO 14040:2006) and Requirements and guidelines (ISO 14044:2006)

/PCR for Construction Products and CPC 54 Construction Services/ Prepared by IVL Swedish Environmental Research Institute, Swedish Environmental Protection Agency, SP Trä, Swedish Wood Preservation Institute, Swedisol, SCDA, Svenskt Limträ AB, SSAB, The International EPD System, 2012:01 Version 2.0, DATE 2015-03-03

/The International EPD® System/ The International EPD® System is a programme for type III environmental declarations, maintaining a system to verify and register EPD®s as well as keeping a library of EPD®s and PCRs in accordance with ISO 14025.www.environdec.com

/Ecoinvent / Ecoinvent Centre, www.Eco-invent.org

/SimaPro/ SimaPro LCA Software, Pré Consultants, the Netherlands, www.pre-sustainability.com

/TLCID/ Turkish Life Cycle Inventory Database, Turkish Center for Sustainable Production Research and Design (SÜRATAM), www.surdurulebiliruretimmerkezi.org

VERIFICATION & REGISTRATION

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