

HEKiM YAPI
ENDÜSTRİSİ SAN. VE TİC. A.Ş.

ENVIRONMENTAL PRODUCT DECLARATION

In accordance with ISO14025 and EN15804 for

HEKiMBOARD
Fibercement Board

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

CPC Code / 3752

Declaration Number / S-P-00870

ECO Platform Reg. Number / 00000527

Publication Date / 23.06.2017

Validity Date / 22.06.2022

Market Coverage / Worldwide

TURKEY EPD®
ENVIRONMENTAL PRODUCT DECLARATIONS

ECO PLATFORM EPD EN 15804 VERIFIED



HEKiMBOARD
PRODUCT RANGE

HEKiMBOARD
Smooth Board

HEKiMBOARD
Cedar Textured Board



HEKiMBOARD
Walnut Textured Board



HEKiMBOARD
Natural Stone Textured Board



HEKiMBOARD
Stone Masonry Textured Board



HEKiMBOARD
Mixed Stone Textured Board



HEKiMBOARD
Grooved Smooth Board



HEKiMBOARD
Grooved Cedar or Walnut Textured Board



HEKiMBOARD
Grooved Natural Stone Textured Board



HEKiMBOARD
Brick Textured Board



TURKSIDING
Fibercement Siding



FIBERCEMENTLAM
PET Laminated Fibercement Board

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 2.2, 2017 05 30) with reference to EN 15804 and the general program guidelines by The International EPD System in accordance with ISO 14025 standards.

INFORMATION

The inventory for the LCA study is based on the 2016 production figures for fibercement boards manufactured by Hekim Yapı Endüstrisi San. Ve Tic. A.Ş. (Hekim Yapı) in their production plant located in Sakarya, Turkey.

The LCA was modelled with SimaPro 8.3 LCA software using the impact factors and the latest version of the Ecoinvent database (V3.3) for secondary data and Turkish Life Cycle Inventory Database (TLCID) developed by Turkish Centre for Sustainable Production Research and Design (SÜRATAM) for local data.

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 fibercement boards.

For more information about this Environmental Product Declaration or it's contents,
please contact info@hekimyapi.com

EPD Programme	The International EPD® System www.environdec.com
EPD Programme Operator	EPD Turkey, Istanbul - Turkey www.epdturkey.org
EPD Owner	Hekim Yapı Endüstrisi San. Ve Tic. A.Ş., Adapazarı - Turkey www.hekimyapi.com
Declared Unit	1 ton of fibercement board
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 2.2, 2017-05-30
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 Options ☐ 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

ABOUT
HEKiM YAPI



Hekim Yapı A.Ş., is the first company producing autoclaved fibercement boards with the formulation of all natural materials. Hekim Yapı A.Ş., established on 111 000 m^2 production area in 2nd Organized Industrial Zone of Hendek-Sakarya, has 125 000 m^3 of fibercement board production capacity annually in total with three production plants under the brand name of "Hekimboard".

In consequence of investments realized by Hekim Yapı A.Ş. in 2001, the fibercement products are grouped as; Smooth or textured flat boards under HekimBoard and Boardia brands, fibercement siding planks under TurkSiding brand, Laminated fibercement boards under FibercementLam brand and flexible fibercement boards under HekimBoard Flexia brand. All of the fibercement products produced by Hekim Yapı are safely and widely used for interior and exterior facade cladding applications since 2004.

Hekim Yapı A.Ş. has realized an investment of EPS (Expandable Polystyrene Foam) production plant in 2010. The facility has an annual 500 000m^3 production capacity of high quality white and graphite enhanced EPS insulation products as well as injection products for various application areas such as ceiling planks and packing materials.

Hekim Yapı A.Ş has realized two new investments in 2011. One of these investments was the production plant for EPS and rock wool insulated sandwich panels with an annual 2 000 000 m^2 production capacity. Roof and wall panels of different types and dimensions up to 1.25 m width and 16 m length under HekimPanel brand are produced in this plant. A polyurethane insulated sandwich panel production line was established in 2016. The annual production capacity with this new line has reached 4 000 000 m^2 completing all product range as polyurethane, EPS and rock wool filled sandwich panels. Second investment of Hekim Yapı A.Ş., in 2011 was the production plant of polyethylene terephthalate (PET) foils as a PET roll-machine.

Investment of Hekim Yapı A.Ş. in 2014 was the production line of ready-to-use wall panels with EPS insulation. The panels are produced under HekimPan brand.

Hekim Yapı Endüstrisi Sanayi ve Ticaret A.Ş. established completely with its own capital will continue to be one of companies undertaking significant role to carry our country forward with the mission of being leader in latest technologies and to work uninterruptedly to ensure our country to take its place among developed countries thanks to strong infrastructure, experienced and self confident personnel.

Hekim Yapı aims to become the leader in the sector, aspires to respond to the customer needs and make a difference with high quality products in wide range. With this comprehension, the company obtained the certificates of ISO 9001:2008 Quality Management System and ISO 14000 Environmental Management System.

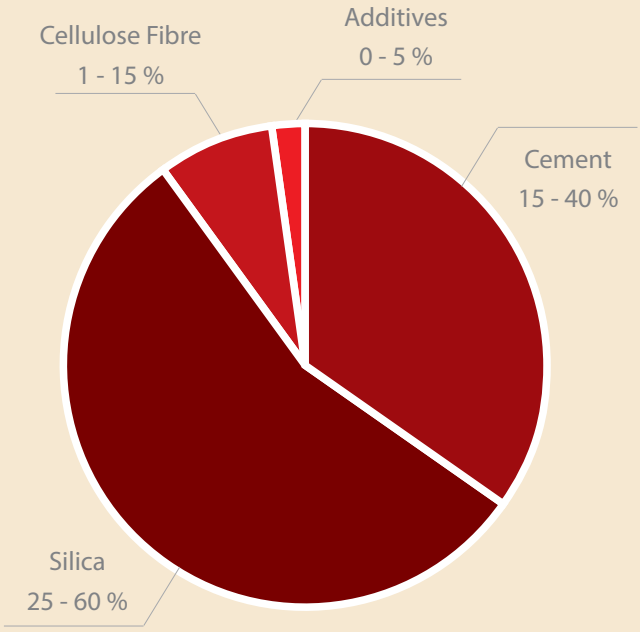
And now, with the aim of getting this EPD, Hekim Yapı will further strengthen their environmental awareness, while fulfilling the market requirements by declaring the environmental impacts of their products for fibercement board.

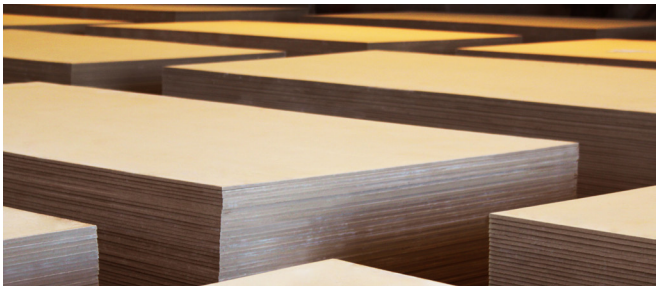
PRODUCT INFORMATION



Fibercement boards are construction elements manufactured according to EN 12467 standard and extensively used in residential, institutional, commercial and industrial buildings as ceiling, internal lining, floor, partition, wall system, wall cladding, fencing, eaves & soffit lining, gable end, external siding, roof sarking, permanent formwork, water tank underlay elements etc. Common feature of these boards is having organic or inorganic (or both) fibres in their structures as reinforcement elements and Portland cement as a bonding member.

HekimBoard fibercement boards are autoclaved under high temperature and pressure to be extremely durable against the toughest athmospheric conditions. They can be used confidently in extreme weather conditions, from the heat of the desert to cold of the Arctic. HekimBoard fibercement boards can be produced with either smooth or textured surface such as natural stone, cedar or walnut tree, stone masonry or brick patterns with a very special production process and this feature allows for an unlimited number of aesthetic solutions.

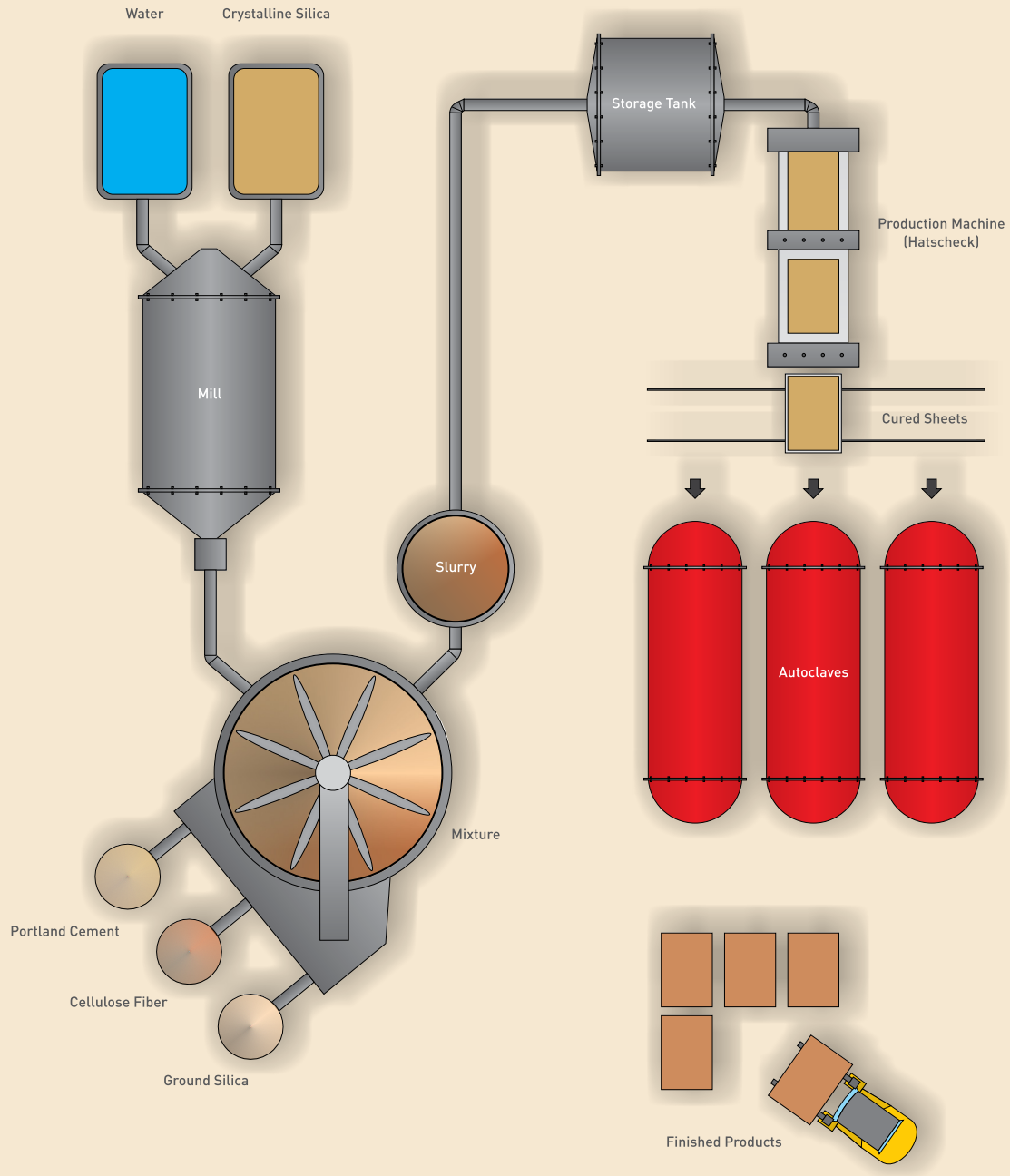




No substances included in the Candidate List of Substances of Very High Concern for authorisation under the REACH Regulations are present in the fibercement boards manufactured by Hekim Yapı, either above the threshold for registration with the European Chemicals Agency or above 0.1% (wt/wt).

MANUFACTURING PROCESS

The fibercement production process starts with sand milling. Milled sand, water, cement, cellulose fibres and additives are mixed in a cone mixer to prepare a slurry. The slurry is then processed by use of vats, agitators and rotating sieve cylinders in Hatschek process. The rotation of the sieve cylinders allows the slurry to be deposited on sieve mesh. It is then transferred to the travelling felt.The green sheets are trimmed and stacked and are allowed to pre-cure before being sent to autoclave for the final curing stage. The pre-cured product is then cured inside the autoclave with high steam pressure and the end products are packaged to be sold.



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

TECHNICAL SPECIFICATIONS

TECHNICAL SPECIFICATION	DESCRIPTION
Standard Sizes	Smooth and Textured: 1 250 x 2 500 mm, 1 250 x 3 000 mm
Thickness	Smooth: 6 ~ 20 mm – Textured: 8 ~ 12 mm
Length / Width Tolerance	± 5 mm / ± 3.75 mm
Thickness Tolerance (e: board thickness)	Smooth: ± 10% e, Textured: – 10% e / + 15% e
Squareness of Edges	± 2 mm/m
Straightness of Edges (a : side length)	± 0.1% a
Surface Wiew	Smooth or textured
Density	~ 1 350±50 kg/m^3
Vapor Diffusion Resistance	μ = 250
Porosity	~ 30%
Bending Strength (Minimum)	~ 14.0 N/mm^2 (lenght); ~ 9.0 N/mm^2 (width)
Freezing Strength	Resistant to freezing according to TS EN 12467
Waterproofing	Waterproof to TS EN 12467
Fire Reaction Class	Non-combustible, A1 class construction material according to EN 13501-1
Asbestos Content	Non-Asbestos (NT type product)
Other Hazardous Material Emission	Has no hazardous material or gas emission
Thermal Expansion Coefficient	αt = 0.005 mm/mK
Thermal Conductivity	λ = 0.20 W/mK
Modulus of Elasticity	8 000 N/mm^2 (length), 6 000 N/mm^2 (width)
Water Absorption	<30%
Stock Sheet Moisture	<10% (depending on the atmospheric humidity)
Hygrical Movement	0.5 mm/m (full saturation)
Bending Radius (By Thickness)	8 mm.. 8 000 mm; 10 mm.. 12 000 mm; 12 mm.. 24 000 mm; 16 mm.. 50 000 mm

SYSTEM BOUNDARY

Upstream Process (A1: Raw Material Supply)

Production starts with mainly locally sourced but some transported from other parts of the world raw materials. '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 plant and the transport of materials within the plant.

'Manufacturing' starts with sand milling. Milled sand, water, cement, cellulose fibres and additives are mixed to prepare a slurry. The slurry is then processed in boarding machine to form green sheets. The green sheets are trimmed, stacked and to pre-cured before being sent to autoclave for the final curing stage. The product is then cured inside the autoclave with high steam pressure and the end products are packaged to be sold. Electricity and energy from hard coal and lignite are consumed during manufacturing.

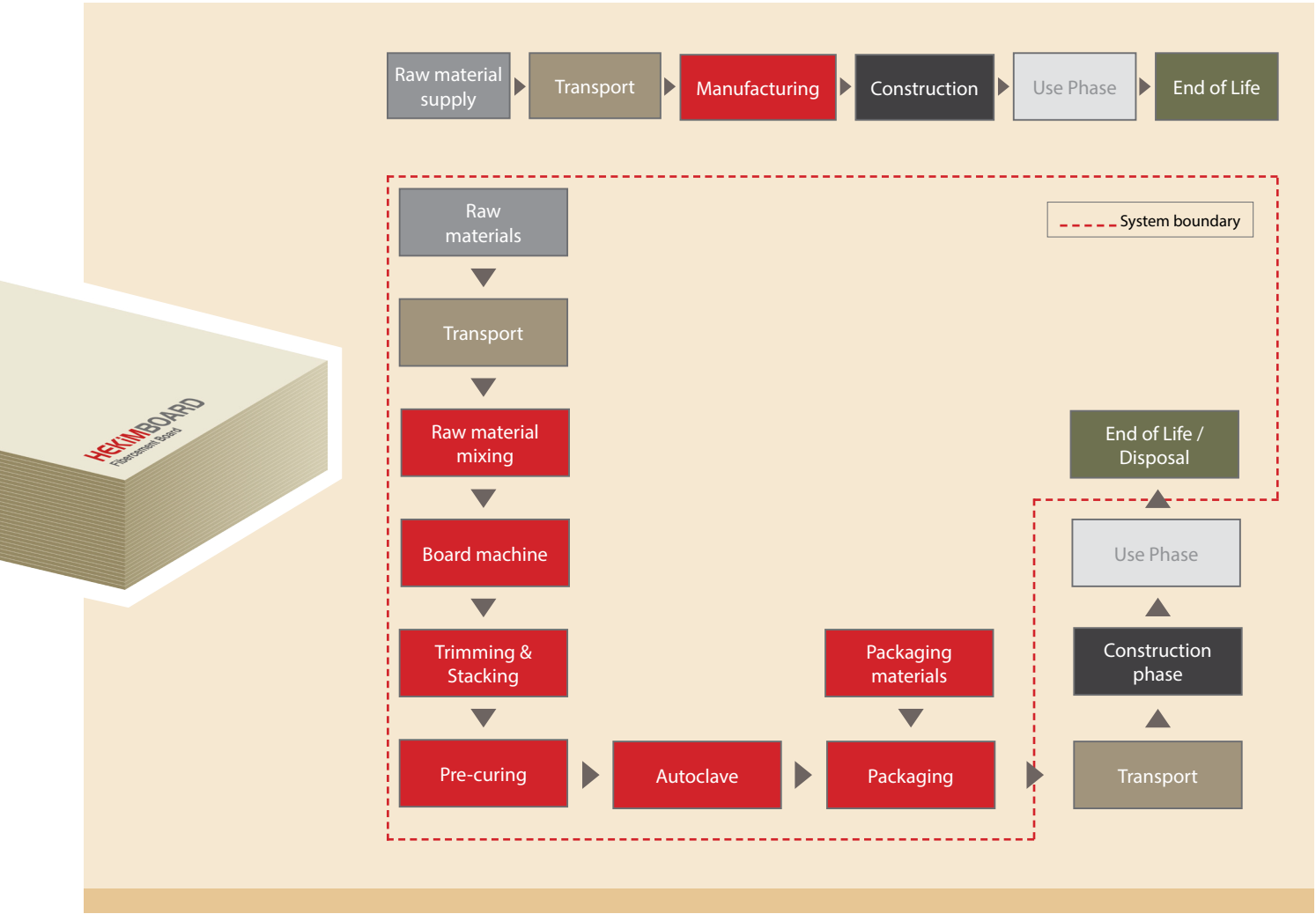
Downstream Processes (C4: Disposal)

All fibercement board products end up at construction and demolition waste landfills as their final fate and modelled as such in the LCA.

Packaging waste is assumed to end up at packaging recycling streams due to the relevant national law in Turkey in 2016, which requires manufacturers to have certain percentage of their packaging waste to be recovered.

Benefits and loads beyond the product system boundary (Module D)

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



ENVIRONMENTAL PERFORMANCE RELATED INFORMATION

Functional Unit/ Declared Unit	The declared unit is the production of 1 ton fibercement board (1 350 kg/m^3).
Goal and Scope	This EPD evaluates the environmental impacts of 1 ton fibercement board from cradle to gate with disposal option life cycle perspective.
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 fibercement boards are modelled based on the collection rates enforced by the relevant regulations in Turkey. At the end of life, the products end up at construction and demolition waste landfills as their final fate (C4).
Cut-Off Rules	For this LCA study, 1% (w/w) cut-off criteria was applied.
Background Data	For local data specific for Turkey, TLCID developed by SÜRATAM was used. For any other background data the Ecoinvent database (V3.3) was used.
Data Quality	Raw materials, energy and water consumption and waste data is collected from Hekim Yapı. Localized data especially on energy and other relevant processes were taken from TLCID.
Period Under Review	All primary data collected from Hekim Yapı is for the period year of 2016.
Allocations	There are no co-products in the production of fibercement boards manufactured by Hekim Yapı. 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 by different means of transport (truck and ship). For this reason, transport was allocated according to raw material tonnages. Raw material production and transport to the gate, energy consumption during manufacturing, packaging and waste data were allocated for an average declared product according to fibercement board production tonnages by Hekim Yapı in 2016. Hekim Yapı manufactures various fibercement boards under different brand names with specifications for different applications. The products that are part of this EPD are sold in market under the following brand names; HekimBoard, Boardia, CementBoard and CementPan.

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		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
A^1	A^2	A^3	A^4	A^5	B^1	B^2	B^3	B^4	B^5	B^6	B^7	C^1	C^2	C^3	C^4	D
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	X	MND

Description of the system boundary (X = Included in LCA, MND= Module Not Declared)

The results of the LCA with the indicators as per EPD requirement are given in the following tables for product product stage (A1 - 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.

LCA RESULTS

ENVIRONMENTAL IMPACTS FOR 1 TON				
Parameter	Unit	PRODUCT STAGE	DISPOSAL	TOTAL
		A1-A3	C4	
GWP	[kg CO_2 eq·]	774	5.04	779
ODP	[kg CFC[11] eq·]	2.68 x 10^{-5}	0.087 x 10^{-5}	2.77 x 10^{-5}
AP	[kg SO_2 eq·]	0.384	0.001	0.385
EP	[kg PO_4^{3-} eq·]	2.86	0.032	2.89
POCP	[kg C_2H_4 eq·]	2.48	0.010	2.49
ADPE	[kg Sb eq·]	0.0823	2.12 x 10^{-8}	0.0823
ADPF	[MJ]	6 410	74.3	6 485
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 TON				
PERE	[MJ]	783	0.462	783
PERM	[MJ]	0	0	0
PERT	[MJ]	783	0.462	783
PENRE	[MJ]	6 414	74.3	6 488
PENRM	[MJ]	0	0	0
PENRT	[MJ]	6 414	74.3	6 488
SM	[kg]	0	0	0
RSF	[MJ]	0	0	0
NRSF	[MJ]	0	0	0
FW	[m^3]	2.77	-	2.77
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 TON				
HWD	[kg]	0.470	-	0.470
NHWD	[kg]	4.21	1 055	1 059
RWD	[kg]	-	-	-
CRU	[kg]	-	11.8	11.8
MFR	[kg]	-	0.593	0.593
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			

GLOSSARY OF TERMS

Global Warming Potential, GWP	Global warming is a concept expressing warming of the atmosphere leading to climate change. One of the human activities which has the greatest effect on global warming is the burning of fossil fuels such as petroleum, coal and natural gas. In LCA, global warming is expressed in terms of the equivalent weight of carbon dioxide (CO_2) emitted.
Ozone Depletion Potential, ODP	Ozone layer depletion is a concept expressing the reduction of ozone in the stratosphere and depletion of the ozone layer (the 'ozone hole') as a consequence of emissions of man-made resources such as CFCs, HCFCs, chlorine, bromine, etc. Damage to the ozone layer reduces its ability to prevent UV light entering the earth's atmosphere, increasing the amount of carcinogenic UVB light hitting the earth's surface. In LCA, ozone layer depletion is expressed in terms of the equivalent weight of CFC-11 emitted.
Acidification Potential, AP	Acidification is an impact category expressing the toxic impact that acidifying substances have on soil, underground water-courses, ground water, organisms, ecosystems and materials. Reaction of acidic gases with water in the atmosphere creates 'acid rain'. The formation of acid rains causes a reduction in biodiversity. In LCA, acidification is expressed in terms of the equivalent weight of sulphur dioxide (SO_2) emitted.
Eutrophication Potential, EP	It is an abnormal proliferation of vegetation in the aquatic ecosystems caused by the addition of nutrients into rivers, lakes or ocean which determinates a lack of oxygen. The eutrophication potential is mainly influenced by emission into water of phosphates and nitrates. Its occurrence can lead to damage to ecosystems, increasing mortality of aquatic fauna and flora and to loss of species that are dependent on low-nutrient environments. In LCA, EP is expressed in mass of PO_4^{3-} eq.
Formation potential of tropospheric ozone photochemical oxidants, POCP	POCP is the formation of reactive substances (mainly ozone) which are injurious to human health and ecosystems and which also may damage crops. This problem is also indicated with "summer smog". In LCA, POCP is expressed in kg C_2H_4 eq.
Abiotic Depletion Potential, ADP	In LCA, resource depletion is one of the impact categories expressing how much of the world's natural resources (petroleum, iron ore, etc.) are used up. It has global, regional and local aspects of impact and expresses the amount of mineral/ fossil fuel used. In LCA, fossil and non-fossil resource depletion are expressed in terms of the MJ and Sb eq. respectively.

REFERENCES

Quality management systems - Requirements	/ISO 9001:2008/
Fibre-cement flat sheets. Product specification and test methods	/EN 12476/
Fire classification of construction products and building elements. Classification using test data from reaction to fire tests	/EN 13501-1/
EN 15804:2012+A1:2013, Sustainability of construction works - Environmental Product Declarations — Core rules for the product category of construction products	/EN 15804/
DIN EN ISO 14025:2009-11: Environmental labels and declarations - Type III environmental declarations — Principles and procedures	/ISO 14025/
DIN EN ISO 14040:2006-10, Environmental management - Life cycle assessment - Principles and framework (ISO 14040:2006) and Requirements and guidelines (ISO 14044:2006)	/ISO 14040/44/
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 2.2, DATE 2017-05-30	/PCR for Construction Products and CPC 54 Construction Services/
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	/The International EPD® System/
Ecoinvent Centre, www.Eco-invent.org	/Ecoinvent /
SimaPro LCA Software, Pré Consultants, the Netherlands, www.pre-sustainability.com	/SimaPro/
Turkish Life Cycle Inventory Database, Turkish Center for Sustainable Production Research and Design (SÜRATAM), www.surdurulebiliruretimmerkezi.org	/TLCID/

VERIFICATION & REGISTRATION

Programme Holder EPD TURKEY THE INTERNATIONAL EPD® SYSTEM	EPD Turkey Veko Giz Plaza, Meydan Sok. No 3 Kat 13 Maslak, Istanbul - TURKEY www.epdturkey.org
Programme Holder EPD THE INTERNATIONAL EPD® SYSTEM	The International EPD System EPD International AB, Box 210 60 SE- 100 31 Stockholm - SWEDEN www.environdec.com
Third Party Verifier LCA studio	LCA studio Vladimír Kočí, PhD Šárecká 5,16000 Prague 6 - CZECH REPUBLIC www.lcastudio.cz
Owner Of The Declaration and EPD Design HEKiM YAPI ENDÜSTRİSİ SAN. VE TİC. A.Ş.	Hekim Yapı Endüstrisi San. Ve Tic. A.Ş. Sakarya 2. Organize Sanayi Bölgesi, Hendek Sakarya - TURKEY www.hekimyapi.com
LCA Author metsims Sustainability Consulting	Metsims Sustainability Consulting Elmas Studio Levent Lalegul Sok. No:7/18 34415 4.Levent, Istanbul - TURKEY www.metsims.com



New Goals, Superior Technologies...

HEKiM YAPI

Head Office Güzelyalı Mh. İstasyon Cd. Egemen Sk. No: 11/2 Pendik / İstanbul / Turkey
T. +90 216 493 0 493 T. +90 850 201 0 493 F. +90 216 494 28 22

Ankara Office Filistin Sokak No:26/4 Gaziosmanpaşa - Çankaya / Ankara / Turkey
T. +90 312 448 11 12 F. +90 312 448 22 77

www.hekimyapi.com info@hekimyapi.com

Contact Center
+90 850 20 10 493

HEKiM HOLDiNG