

# Environmental Product Declaration



In accordance with ISO 14025 and EN 15804:2012+A2:2019 for:

# Rebar Mill

from

## Tosyalı Filmaşın ve İnşaat Demiri



#### PROGRAMME

The International EPD® System  
www.environdec.com

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EPD International AB

#### LOCAL OPERATOR

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# Programme Information

## Programme Information

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### Information about verification and reference PCR:

CEN standard EN 15804 serves as the Core Product Category Rules (PCR)

#### Product category rules (PCR)

PCR 2019:14 Version 1.11, Construction products (EN 15804:A2) Version 1.1

#### PCR review was conducted by

The Technical Committee of the International EPD® System. See [www.environdec.com/TC](http://www.environdec.com/TC) for a list of members.

Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat [www.environdec.com/contact](http://www.environdec.com/contact)

Independent verification of the declaration and data, according to ISO 14025:2006:

EPD process verification

EPD verification

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#### Approved by

The International EPD® System Technical Committee, supported by the Secretariat

Procedure for follow-up of data during EPD validity involves third party verifier:

Yes

No

### LCA Study & EPD Design Conducted by

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# Company Information

## Owner of the EPD

### **Tosyalı Filmaşın ve İnşaat Demiri A.Ş.**

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**As one of the world's giants in the iron and steel industry with 25 manufacturing sites on three different continents, Tosyalı Holding dates back to 1952, when Şerif Tosyalı, the father, began manufacturing hand-work stove-pipes and boiler-buckets with his three sons in a 9-meter-squared shop in İskenderun.** In 1988 these three young and hardworking brothers, Fuat, Ayhan and Fatih Tosyalı learned this profession from their father, sweating blood while taming the hammer, and took over the workshop and founded Tosyalı Metal Trade. 1993 marked a milestone for the three brothers who followed the same path with their father in trade.

Strengthening their presence in the market the same year, the Tosyalı brothers rolled up their sleeves to turn the Tosyalı Demir Çelik Industry Inc.'s investment idea into reality. Building the first factory of the group on the İskenderun Organized Industrial Site took a year and it commenced production in 1994. Steel manufacturing in the factory's rolling plant had begun, and after a year angle iron was also included in the manufacturing portfolio.

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In 2011, the Company ranked 25th in the ISO 500 list with its exports made under the Tosçelik brand. With its investments made with the motto 'Turkey's global steelmaker' and export volume increasing every year, the Company continues to rank among the top 20 companies in every edition of ISO-500 list, climbing up steadily. In 2012 the pipe and profile plant started production in Osmaniye Organized Industrial Zone. The plant is Turkey's largest and Europe's second largest manufacturer of ERW pipes and has the largest indoor space under a single roof, in Europe. In 2013, the plant joined the Turquality Brand Incentive Program, the first and only branding program in the world, under the brand of Tosçelik. The company is in its second 5th year under the Turquality program and maintains efforts to keep Tosçelik among the world's leading brands. In 2014, Tosçelik became one of the main suppliers for the Trans-Anatolian Natural Gas Pipeline Project (TANAP), one of the world's leading projects. In the TANAP Project, Tosçelik supplied approximately 470 km of the 1850 km long line,







which is approximately one third of the total need. ERW pipe and profile plant was commissioned in 2016 in Dilovası / Gebze. In 2016, Tosçelik ranked 90th out of the top 1000 companies among 61,000 exporters and was awarded 'the Company with the Largest Export Breakthrough' at the TIM's (Exporters Council of Turkey) 'Export Champions' ceremony. Tosçelik opened its R&D Center in Osmaniye in 2017, making a difference in the sector since the very first day it was founded with an aim to produce strongly innovative, value-added products, As the first in its region, the R&D Center is also the home base of the research and development activities in all production facilities of the Group.

With awareness of its responsibilities in terms of sustainability and energy efficiency, Tosçelik established a solar power plant in 2017 on the roof of the Tosçelik pipe and profile facility in Osmaniye Organized Region. Through this investment, it has the potential to become the ERW pipe manufacturer with world's lowest carbon footprint. With a rooftop area spanning 200,000 m<sup>2</sup>, the plant has become one of the top five roof-type solar power plants in

Europe and the largest in the world.

Exporting products to 135 countries, Tosçelik continues its activities that shape the industry, and its local and international investments that will contribute to the country, people, and nature.

Tosyalı Filmaşın is a member of Tosyalı Holding having facilities in Turkey, Algeria and Montenegro, which is operating in several scope of iron and steel industry manufacturing various kind of steel materials, such as hot rolled steel coils, billets, wire rods, spiral SAW pipes, longitudinal ERW-HFI pipes, hollow sections, steel profiles and granules.

## Production Site

**Tosyalı Filmaşın ve İnşaat Demiri Üretim Tesisleri**  
Büyük Tüysüz Mahallesi Kudamatsu Caddesi No:2,  
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# Product Information



## Product Name: Rebar Mill

Tosyalı Filmaşın rolling mills are able to produce rebar from 8 mm diameter up to 32 mm diameter. Production can be made at national and international standards. Capacity is 720.000 m/ton per year.

Rebar mill are used especially in stirrup reinforcement, bored pile cage and structural component of buildings such as building construction, site construction etc. The rebar mill are used in many areas of different sizes.

### Intended Use of Product

Rebar mill is used especially in stirrup reinforcement, bored pile cage and structural component of buildings such as building construction, site construction etc. The rebar mill is used in many areas of different sizes.

### Production

In the rebar mill production plant, firstly, billet are heated in the furnace up to 1,250 °C. Then it passes through the rotating rollers and is formed by hot forming. These materials, especially made by hot shaping, gain a more durable structure due to the homogeneous reduction of grain sizes.

End of the processes the rebar mill is ready and packaged to be delivered to the customer.

## Technical Specifications

Product	Production Standards	Description
Rebar Mill	ISO 4967	Steel – Determination of content of nonmetallic inclusions – micrographic method using standard diagrams
	DIN 50602	Metallographic test method
	JIS G 0555	Microscopic testing method for the non-metallic inclusions in steel
	EN 10247	Micrographic examination of the non-metallic inclusion content of steels using standard
	ASTM A247	Standard Test Method for Evaluating the Microstructure of Graphite in Iron Castings
	ASTM B487	Standard Test Method for Measurement of Metal and Oxide Coating Thickness by Microscopical Examination of Cross Section
	ASTM E112/1382	Standard Test Methods for Determining Average Grain Size
	ASTM E1245	Standard Practice for Determining the Inclusion or Second-Phase Constituent Content of Metals by Automatic Image Analysis
	ASTM E1268	Standard Practice for Assessing the Degree of Banding or Orientation of Microstructures
	ASTM E562	Standard Test Method for Determining Volume Fraction by Systematic Manual Point Count
	DIN 17230	Ball and Roller Bearing Steels Technical Conditions of Delivery
	ISO 945	Microstructure of cast irons — Part 1: Graphite classification by visual analysis
	ASTM E45-11	Standard Test Method for Determining the Inclusion of Steel
	BS 4449	Steel for the reinforcement of concrete. Weldable reinforcing steel. Bar, coil and decoiled product. Specification
	BS 4482	Steel wire for the reinforcement of concrete products. Specification
TS 708	Steel for the reinforcement of concrete - Reinforcing steel	
SI 4466	Steel for the reinforcement of concrete - Ribbed bars	



# LCA Information

## Declared unit

1000 kg of Rebar Mill manufactured in Osmaniye facility (TR).

## Reference service life

Not applicable

## Time representativeness

The inventory for the LCA study is based on the period of 27<sup>th</sup> January 2020 and 27<sup>th</sup> May 2020

## Database(s) and LCA software used

SimaPro LCA v9.2.0.2 software with Ecoinvent v3.7.1

## Description of system boundaries

Cradle to gate with options, modules, C1-C4, D (A1–A3 + C + D)

## Data quality and data collection

Data collection for this LCA study has been carried out in accordance with data requirement stated in ISO 14040-44, ISO 14025, ISO 14020, and the requirements given in the General Program Instructions v3.01; PCR Construction products 2019:14, version 1.11 by The International EPD® System and EN 15804:2012+A2:2019.

There are two different data classifications has been used as primary (specific) and secondary (selected generic) data. All primary data has been collected from the manufacturing plant. For secondary data Ecoinvent v3.7.1 database has been used.

Upstream data, raw materials production, transportation, fossil fuels and electricity mix data have been obtained from Ecoinvent v3.7.1 as secondary data. All manufacturing data in core processes has been gathered from the manufacturing plant. The manufacturing data are collected based on a mass balance. Rebar mill data in this LCA study represents the period of 27<sup>th</sup> January 2020 and 27<sup>th</sup> May 2020.

Mileage and tonnage figures for transport data to the core processes were provided by Tosyalı's other plant procurement department specifically per origin of departures, however roadway upstream data per ton per kilometres were taken from Ecoinvent v3.7.1.

## Allocation

Mass allocation applied for waste generated during the production of the Wire Rod, Ribbed Wire Rod and Rebar Mill. The waste data has been allocated to wire rod, ribbed wire rod and rebar mill taking into account the total production in the relevant time period.

All wastes are divided equally and included in the calculation in the relevant product section.

## Cut-off rules

Life Cycle Inventory data for a minimum of 99 % of total inflows to the three life cycle stages have been included and a cut-off rule of 1% regarding energy, mass, and environmental relevance was applied.



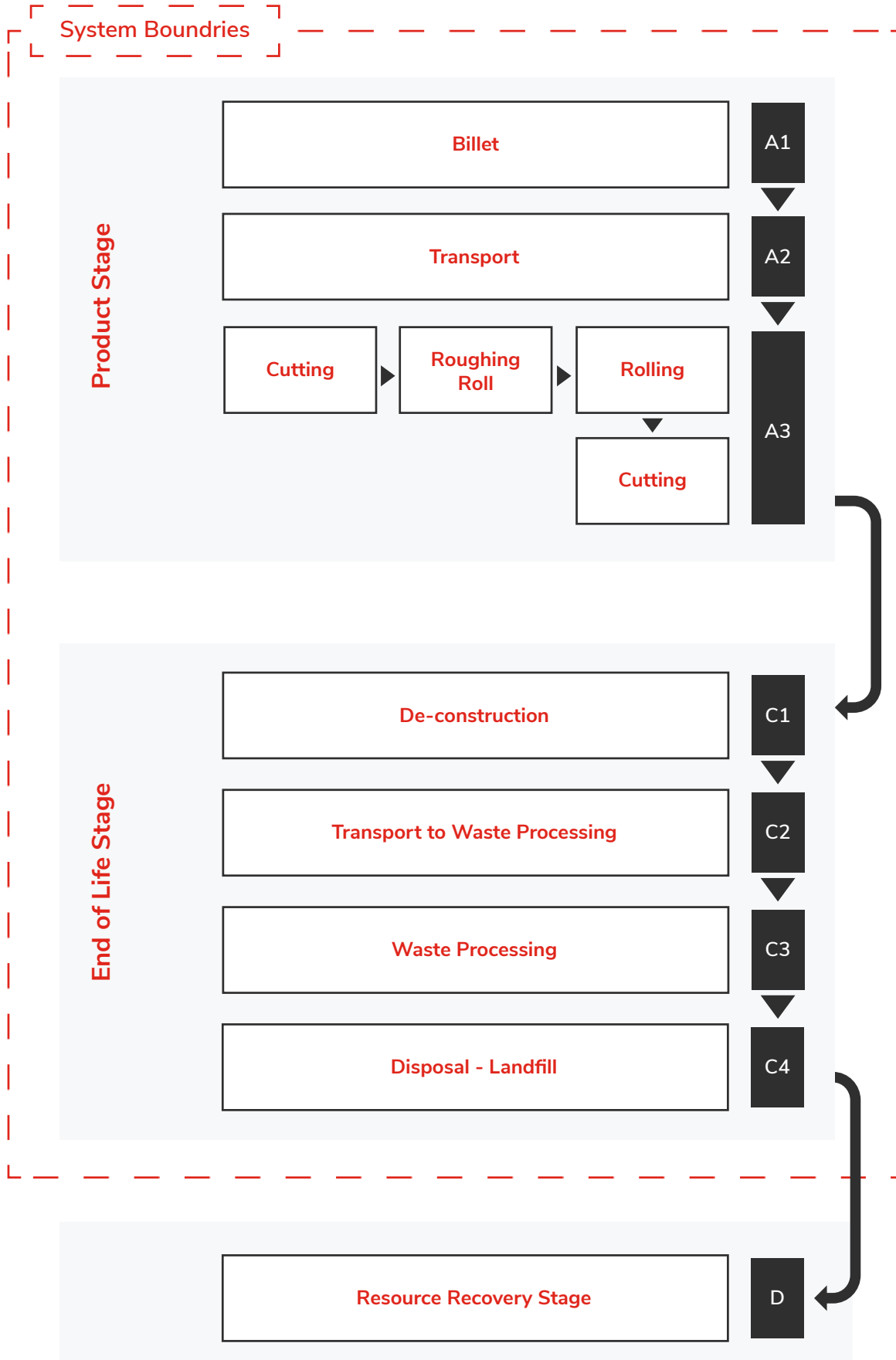
## Modules declared, geographical scope, share of specific data (in GWP-GHG indicator) and data variation

	PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				RESOURCE RECOVERY STAGE
	Raw material 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 - Recovery - Recycling Potential
MODULES	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Module declared	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	GLO	GLO	TR	-	-	-	-	-	-	-	-	-	GLO	GLO	GLO	GLO	GLO
Specific data used	>99%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation-products	Not Relevant			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation-sites	Not Relevant			-	-	-	-	-	-	-	-	-	-	-	-	-	-

X: Declared; ND: Not Declared



# System Diagram



## Description of declared modules

### A1 - Raw Materials Supply

This module takes into account raw material extraction, processing and energy used in the production process.

### A2 - Transport to the Manufacturer

This module includes transportation of the raw materials from supplier to factory gate. Transportation types are considered as roadway.

### A3 - Manufacturing

This stage includes energy and water consumption during the manufacturing process. Additionally, packaging materials are covered in this module. The processing of any waste arising from this stage is also included.

### C1 - De-construction

The de-construction and demolition of modules C1 are assumed to be carried out by diesel-powered machinery using a fuel cost of 0.01 kWh / kg of material at the end of their lifecycle.

### C2 - Transport to Waste Processing

An average distance of 100 km has been assumed for the transport to sorting facility. Transport is calculated on the basis of a scenario with the parameters described in the attached table.

Parameters C2 Module	
Transport by road*	Lorry, 16-32 metric ton
Distance (km)	100
Database	Ecoinvent v3.7.1

\*Technology is Euro 6

### C3 - Waste Processing for Reuse, Recovery and/or Recycling

During the pre-recycling process of recycling materials, they are separated so that they can then be effectively recycled. As a result of this processing stage, there are negligible impacts. Material that is intended for reuse does not undergo any processing prior to reusing it in another construction site, hence the zero environmental impact.

### C4 - Final Disposal

100% of end-of-life products will be collected and recycled into the production system. Rebar mill products are recycled. A total of 95% of end-of-life products are recycled and reused in construction projects or construction material production processes. 5% of the products are sent to the landfill.

### D - Reuse, Recovery or Recycling Potential

Rebar mill inputs to the production stage are subtracted from the construction to be recycled at end-of-life in order to obtain the rebar mill from the product system. This remaining net rebar mill is then sent to recycling. Module D reports the environmental aspects of recycled scrap generated at the end of life minus that used at the production stage.

### Information on which life cycle stages are not considered

This EPD only cover the Cradle to Gate with options A1-3 and C1-4 and D stages because other stages are very dependent on particular scenarios and are better developed for specific building or construction works.





## Content Declaration

Content declaration of 1000kg of rebar mill	
Material	Share
Scrap iron	99.0-99.9%
Alliage	0.1-1%
Renewable material	0%
Biogenic carbon	0%

# Environmental Performance

## Potential Environmental Impact Mandatory Indicators According to EN 15804

Results for 1000 kg of rebar mill							
Indicator	Unit	A1:A3	C1	C2	C3	C4	D
GWP-fossil	kg CO <sub>2</sub> eq	674	3.29	8.67	0	0.262	-13.8
GWP-biogenic	kg CO <sub>2</sub> eq	3.18	0.003	0.019	0	0.001	-0.225
GWP-luluc	kg CO <sub>2</sub> eq	2.30	2.62E-04	0.003	0	7.12E-05	-0.043
GWP-total	kg CO <sub>2</sub> eq	680	3.29	8.70	0	0.263	-14.0
ODP	kg CFC 11eq	3.59E-05	7.10E-07	2.13E-06	0	1.08E-07	-1.27E-06
AP	mol H <sup>+</sup> eq	3.67	0.034	0.027	0	0.002	-0.103
EP-Freshwater	kg PO <sub>43-</sub> eq	0.337	0.005	0.003	0	3.32E-04	-0.013
EP-Aquatic Freshwater	kg P eq	0.034	1.09E-05	6.50E-05	0	2.76E-06	-0.001
EP-Marine	kg N eq	0.656	0.015	0.006	0	0.001	-0.025
EP-Terrestrial	kg N eq	7.30	0.167	0.068	0	0.009	-0.283
POCP	kg NMVOC eq	2.06	0.046	0.027	0	0.003	-0.097
ADP-minerals & metals*	kg Sb eq	0.001	1.33E-06	2.12E-05	0	5.87E-07	-1.07E-04
ADP-fossil*	MJ	6397	45.2	141	0	7.35	-246
WDP	m <sup>3</sup>	139	0.065	0.466	0	0.330	-5.17

**GWP-fossil** = Global Warming Potential fossil fuels; **GWP-biogenic** = Global Warming Potential biogenic; **GWP-luluc** = Global Warming Potential land use and land use change; **ODP** = Depletion potential of the stratospheric ozone layer; **AP** = Acidification potential, Accumulated Exceedance; **EP-freshwater** = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; **EP-aquatic freshwater** = Eutrophication potential, fraction of nutrients reaching aquatic freshwater end compartment; **EP-marine** = Eutrophication potential, fraction of nutrients reaching marine end compartment; **EP-terrestrial** = Eutrophication potential, Accumulated Exceedance; **POCP** = Formation potential of tropospheric ozone; **ADP-minerals&metals** = Abiotic depletion potential for non-fossil resources; **ADP-fossil** = Abiotic depletion for fossil resources potential; **WDP** = Water (user) deprivation potential, deprivation-weighted water consumption

\* Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.



## Potential Environmental Impact *Additional Mandatory and Voluntary Indicators*

Results according to PCR2019:14 for 1000 kg of rebar mill							
Indicator	Unit	A1:A3	C1	C2	C3	C4	D
GWP-GHG <sup>1</sup>	kg CO <sub>2</sub> eq	673	3.28	8.63	0	0.261	-13.3
Results according to EN 15804+A2 for 1000 kg of rebar mill							
PM	[disease inc.]	2.62E-05	9.10E-07	7.57E-07	0	4.84E-08	-1.25E-05
IRP	[kBq U235 eq]	7.91	0.195	0.620	0	0.030	-1.47
ET-freshwater	[CTUe]	5531	25.8	108	0	4.62	-566
HT-cancer	[CTUh]	1.57E-06	1.27E-09	3.31E-09	0	1.38E-10	-5.21E-07
HT-non-cancer	[CTUh]	3.67E-06	1.84E-08	1.12E-07	0	2.88E-09	-1.90E-07
SQP	[pt]	910	5.87	162	0	15.45	-104

**GWP-GHG** = Global Warming Potential total excl. biogenic carbon following IPCC AR5 methodology; **IRP** = Ionizing radiation, human health; **ET-freshwater** = Eco-toxicity (freshwater); **HT-cancer** = Human toxicity, cancer effects; **HT-non-cancer** = Human toxicity, non-cancer effects; **SQP** = Potential soil quality index (SQP)

<sup>1</sup> The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.

## Use of Resources

Results for 1000 kg of rebar mill							
Indicator	Unit	A1:A3	C1	C2	C3	C4	D
PERE	MJ	777	0.234	1.723	0	0.059	-59.4
PERM	MJ	0	0	0	0	0	0
PERT	MJ	777	0.234	1.72	0	0.059	-59.4
PENRE	MJ	6969	48.1	150	0	7.81	-260
PENRM	MJ	0	0	0	0	0	0
PENRT	MJ	6969	48.1	150	0	7.81	-260
SM	kg	1053	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0
FW	m <sup>3</sup>	23.6	0.023	0.129	0	0.012	-1.46

**PERE** = Use of renewable primary energy excluding renewable primary energy 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 non-renewable primary energy 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 re-sources; **SM** = Use of secondary material; **RSF** = Use of renewable secondary fuels; **NRSF** = Use of non-renewable secondary fuels; **FW** = Use of net fresh water



## Waste Production

Results for 1000 kg of rebar mill							
Indicator	Unit	A1:A3	C1	C2	C3	C4	D
Hazardous waste disposed	kg	60.1	0	0	0	0	0
Non-hazardous waste disposed	kg	0	0	0	0	50.0	0
Radioactive waste disposed	kg	0	0	0	0	0	0

## Output Flows

Results for 1000 kg of rebar mill							
Indicator	Unit	A1:A3	C1	C2	C3	C4	D
Components for re-use	kg	0	0	0	0	0	0
Materials for recycling	kg	29.0	0	0	0	0	950
Materials for energy recycling	kg	0	0	0	0	0	0
Exported energy, electricity	MJ	0	0	0	0	0	0
Exported energy, thermal	MJ	215,996	0	0	0	0	0

# References

- **ISO 14040 2006** Environmental management - Life cycle assessment - Principles and framework
- **ISO 14044 2006** Environmental management - Life cycle assessment - Requirements and guidelines
- **ISO 14025 2006** Environmental labels and declarations - Type III environmental declarations Principles and procedures
- **ISO 14020 2000** Environmental labels and declarations - General principles
- **EN 15804:2012+A2:2019** Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
- **The International EPD®System** [www.environdec.com](http://www.environdec.com)
- **The International EPD® System The General Programme Instructions v3.01**
- **The International EPD®System PCR 2029:14 Construction products v1.1 (EN 15804:A2)**
- **Ecoinvent 3.7.1** [www.ecoinvent.org](http://www.ecoinvent.org)
- **SimaPro LCA Software** [www.simapro.com](http://www.simapro.com)
- **Tosyalı Filmaşın ve İnşaat Demiri** [www.tosyalifilmasin.com.tr](http://www.tosyalifilmasin.com.tr)

# Contact

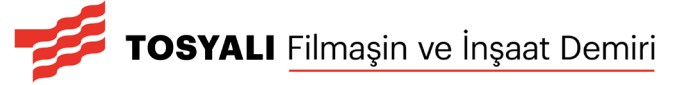
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