

INSULATES THE FUTURE

EPD[®] Environmental
Product
Declaration

THE INTERNATIONAL EPD SYSTEM

The environmental impacts of this product have been assessed over its whole life cycle. Environmental Product Declaration has been verified by an independent third party.

ODE R-Flex Rubber Foam Insulation Materials
in accordance with EN15804 and ISO14025
CPC Code: 3623 Elastomeric Rubber Foam Insulation

Date of Issue: 02.01.2016

Valid Until: 01.01.2021



ECO PLATFORM
EPD
EN 15804 VERIFIED
ECO EPD Ref. No 00000263

Market Coverage: Worldwide
Declaration Number
S-P-00751

Piyale Paşa Blv. Ortadoğu Plaza K.12
34384 Okmeydanı - Şişli / İstanbul

P: +90 212 210 49 06 F: +90 212 210 49 07

ode.com.tr

ODE
INSULATES THE FUTURE

Company Profile

30 Years of Experience in Insulation; ODE

ODE Yalıtım Sanayi ve Ticaret A.Ş. was founded in 1985 to operate as a contractor in construction industry. Becoming an importer in 1990 and a manufacturer in 1996, ODE became a regional power in 2010 with international quality production and widespread dealer network. Today it is among the largest manufacturers of insulation sector with 4 modern production facilities (ODE R-flex Production Facility, ODE Isıpan Production Facility, ODE Membran Production Facility, ODE Starflex Glasswool Production Facility) spread over 120,000 m² outdoor and 35,000 m² indoor area, product range over 4,000 products and expert staff.

Leader in transport and storage with its logistic centre spread over 15,000 m² indoor area, ODE has commissioned its 3rd production base in Eskişehir in 2015, commemorating its 30th year. When the factory, spread over 75 thousand m² area of which 60 thousand m² is indoor area, reaches full capacity it will produce 20 thousand tons of elastomeric rubber foam, 25 million m² membrane and 5 million m² shingle yearly.

Regional Power from Europe to China

The first and only insulation brand to participate TURQUALITY® Support Program, ODE exports to 75 countries on 5 continents ranging from Belgium to Moldova; Australia to Pakistan. With its new facility for elastomeric rubber foam, which will be the largest investment between Europe and Far East, ODE aims to be the largest insulation company of Turkey and the regional powerhouse of Far East-Europe line.

ODE ÇORLU/TEKİRDAĞ PRODUCTION FACILITIES

Indoor Area: 120,000 m²

Outdoor Area: 35,000 m²

Shipping and Storage Area: 15,000 m²

ODE ESKİŞEHİR PRODUCTION FACILITY

3rd Production Area

Total Area: 75,000 m²

Indoor Area: 60,000 m²





INSULATES THE FUTURE

100% Ozone Friendly and Environmentally Responsible Production

Focusing its works towards the goal of a more habitable world and proving its commitment to this concept with solid works, ODE became the first and only insulation company in 2010, to attend the Umbrella project initiated in Turkey in 2009 with the cooperation of T.R. Ministry of Environment and UNIDO. Having its efforts certified in international platforms by receiving grant from United Nations Industrial Development Organization (UNIDO), ODE has completed its 2 year long research and development studies and has switched to 100% OZONE FRIENDLY production.

Focusing especially to “Efficiency” for a sustainable future to exceed far beyond being a manufacturing supplier, ODE continues to support this goal with innovations in its production. Developing “standard” and “premium” product ranges, ODE provides high quality solutions suiting customer demands. Initiating EPD (Environmental Product Declaration) process for all its brands, ODE will be able to present the environmental performance of its products already registered with quality documents such as ISO, CE, TSE, etc. most transparently with EPD documentation.

Extends the Industry with Its Leading Enterprises and Social Responsibility Consciousness

Taking a lead role in foundation of many associations, especially İZODER, ODE signs leading projects aimed at raising public awareness in insulation and energy efficiency. Striving to take place in works that will leave a legacy, ODE changed company motto to “Insulates the future” in early 2014. Acting with global responsibility that comes with being in the global market, ODE continues to take its place in many international activities and successfully represent Turkish insulation industry and Turkey.



Programme Related Information

EPD Programme Holder The International EPD System
www.environdec.com
Valhallavägen 81, 114 27 Stockholm, Sweden

Product Category Rules Insulation Materials 2014:13 Version 1.0 EN 15804:2012 + A1:2013 Sustainability of Construction Works

Generic PCR Review Technical Committee of the International EPD® System

Independent Verification Internal External EPD® Process Certification

Approved and Verified by Mr. Vladimir Koci, PhD
Šárecká 5, 16000 Prague 6,
Czech Republic

EPD Prepared by Metsims Sustainability Consulting
www.metsims.com

Calculation Procedures SimaPro 8.0 LCA Software
(Metsims Sustainability Consulting)

System Boundaries Cradle to Gate Cradle to Gate with options Cradle to Grave

Disclaimer All values provided in this Environmental Product Declaration are a direct result from the use of characterisation factors and calculation rules as defined in the SimaPro software. The environmental indicators used for these calculations are based on CML Baseline V4.2 April 2013. For more information about this Environmental Product Declaration or its contents, contact process owner, Mrs Derya GÜRBÜZ ILGAZ on d.ilgaz@dode.com.tr

Demonstration of Verification

PCR Review was conducted by: Technical Committee of EPD International AB.
Valhallavägen 81, 114 27 Stockholm, Sweden
www.environdec.com info@environdec.com

Independent Verification and data, according to ISO 14025:2006
Internal External

Third Party Verifier:
Mr Vladimir Koci, Phd
Šárecká 5, 16000 Prague 6,
Czech Republic

Statement

The LCA for this EPD is conducted according to the guidelines of ISO 14040/44, the requirements given in the Product Category Rules (PCR) document for Insulation Materials 2014:13 Version 1.0 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 2014 May - 2015 April production figures for R-flex elastomeric rubber foam products from ODE's main production plant is located in Çorlu, Turkey. This LCA was modelled with SimaPro 8.0 LCA software using Ecoinvent version 3.01 database and impact factors.

EPD of thermal insulation materials may not be comparable if they do not comply with EN 15804.

This EPD covers the Cradle to Gate with Options (disposal).

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 R-flex elastomeric rubber foam insulation materials.



R-FLEX SERIES

GENERAL FEATURES

ODE R-FLEX SHEET

It is a flexible duct insulation material manufactured in sheet from elastomeric rubber foam material. ODE R-flex Elastomeric Rubber Foam is the most preferred insulation material in HVAC system with its high thermal conductivity, water vapour resistance and fire performance. It is ideal for insulation pipes, rectangular and circular sections, ventilation ducts. It is produced in different widths and thicknesses.

ODE R-FLEX PIPE

It is completely flexible, prefabricated pipe insulation material, manufactured as pipes from elastomeric rubber foams for the installation pipes in cold and warm lines. It does not contain halogen. It is manufactured in 6-114 mm diameters and 6-32 mm thickness.

| COMPONENTS | AMOUNT, % |
|----------------------|-----------|
| FLAME RETARDANTS | 25-30% |
| PLASTICISERS | 19-22% |
| BLOWING AGENTS | 12-15% |
| RUBBER AND POLYMERS | 33-36% |
| VULCANIZATION AGENTS | <3-4% |
| ACCELARATORS | <1-2% |

Composition of R-flex insulation materials

This product contains Decabromodiphenyloxide and Azodicarbonamide, which are classified as 'Substance of Very High Concern' under the European chemical directive REACH, are considered '(very) Persistent, (very) bio accumulative, toxic (PBT)/vPvB' and 'equivalent level of concern having probable serious effects to human health' respectively.

APPLICATION AREA

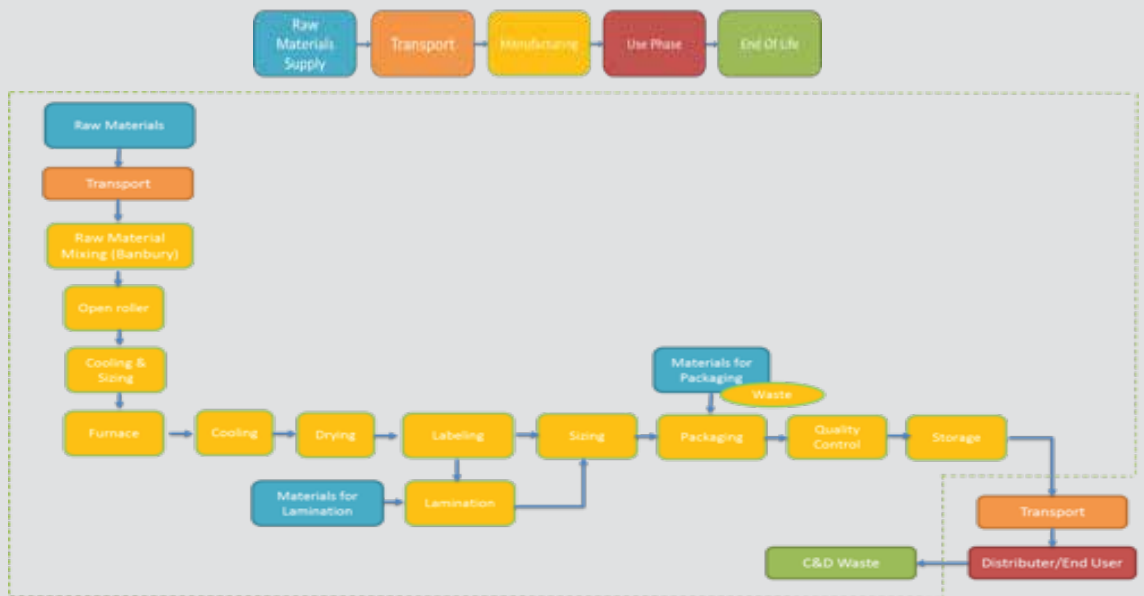
- Installation pipes in cold and warm lines
- Mechanical installations,
- Insulation of large diameter pipes, and rectangular and circular section of ventilation

TECHNICAL SPECIFICATIONS

| PRODUCT | THERMAL CONDUCTIVITY W/MK (10 °C) (EN 12667- EN ISO 8497) | Water Woper (EN826) | REACTION TO FIRE (EN ISO 13501-1) |
|---------------|---|---------------------|-----------------------------------|
| PIPE STD/PRM | 0,039 (25 C) | 5000-7000 | BL-s2,d0 |
| SHEET STD/PRM | 0,034-0,036 (0 C) | | B-s3,d0 |

Technical Specifications of R-flex elastomeric rubber foam insulation materials

Production Process and System Boundary



System Boundary of the LCA study conducted on R-flex elastomeric rubber foam

Upstream Processes (A1: Raw Material Supply)

In this report, for R-flex elastomeric rubber foam insulation materials, production starts with raw materials, mainly provides from other countries where several chemicals are locally sourced. Environmental impacts during the production of all raw materials are reflected in this EPD.

Core Processes (A2:Transportation and A3: Manufacturing)

Transport is relevant for delivery of raw materials to the plant and internal transport within the manufacturing plant for each product group.

The components are combined in a large mixer and the mixture is then put through extruding equipment to form a particular profile or shape, typically either a round tube or a flat sheet. The profile is heated in an oven to a specific temperature, a process that causes the chemical foaming agent to change from a solid to a gas. When this occurs, thousands of tiny air pockets (cells)—all of which are connected—form. Both natural gas and electricity are consumed during the production of R-Flex rubber foam insulation materials. Electricity consumed within the packaging process is also considered in manufacturing stages.

Downstream Processes (C4: Disposal)

All rubber foam products end up at C&D landfill as their final fate and modelled as such in this LCA.

Packaging waste is assumed to end up at packaging recycling streams due to the relevant national law in Turkey in 2014, 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 possible benefits of recycling and re-use were taken into account in the LCA work here.



LCA Calculation Rules

| | |
|----------------------------------|--|
| Functional Unit | The functional unit for R-flex elastomerix rubber foam products is 'the required amount of rubber foam that provides a thermal insulation of R=1 m ² K/W.' |
| Goal and Scope | The EPD evaluates the environmental impacts of elastomeric rubber foam insulation materials with two different type depends on shape of the product (Sheet and pipe). |
| System Boundaries | The system boundary covers A1-A3 product stages reffered as 'Raw Material Supply', 'Transport' and 'Manufacturing' and C4 as Disposal. |
| Estimates and Assumptions | There are no additional product scenerio developed for this EPD. Packaging waste is modelled based on the enforced collection rates in Turkey at the time. |
| Cut-Off Rules | 1% cut-off rule is applied. |
| Background Data | Ecoinvent database were used as generic background data source. |
| Data Quality | Raw materials, electricity, water use and waste data were collected from ODE. |
| Period Under Review | This data is representative of 2014 May - 2015 April production figures for R-flex insulation materials. |
| Allocations | There are no co-products in the production of R-flex products. Hence, there is no need for co-product allocation. Transport is allocated according to tonnages for almost all raw materials bought by ODE. For the manufacturing of rubber foam products no allocation for energy was made as the product specific data was available. Waste and water consumption is allocated according to the production rates of sub product categories. |
| Comperability | A comparison or an evaluation of EPD data is only possible where EN 15804 has been followed, and the same building context and product-specific characteristics of performance are taken into account and the same stages have been included in the system boundary. According to EN 15804, EPD of construction products may not be comperable if they do not comply with the standards. |

| PRODUCT NAME | WEIGHT OF PRODUCT THAT PROVIDES 1M ² K/W THERMAL INSULATION, kg |
|------------------|--|
| ODE R-Flex Sheet | 1.085 |
| ODE R-Flex Pipe | 1.209 |

Weight of product that provides 1 m²K/W thermal insulation

ENVIRONMENTAL IMPACTS

During the modeling, all values are taken into account for 1 kg of elastomeric rubber foam insulation materials and calculated impacts are multiplied with the required amount of R-flex products that gives thermal insulation $R=1\text{m}^2\text{K/W}$. The required amount of rubber foam products for R-Flex Sheet and Pipe are calculated by considering the density and thickness of each product.

| PRODUCT STAGE | | | CONSTRUCTION PROCESS | | | USE STAGE | | | | | | END OF LIFE STAGE | | | BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES | | |
|----------------------|-----------|---------------|-------------------------------------|----------|-----|-------------|--------|-------------|---------------|------------------------|-----------------------|-------------------|-----------|------------------|---|------------------------------------|-----|
| A1 | A2 | A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D | |
| X | X | X | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | X | MND |
| 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 | |

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 the loads beyond the system boundaries (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 methodology, while environmental impacts are calculated with the CML-IA baseline V4.2 within SimaPro.

In this EPD, the environmental impacts of two different types of ODE R-flex products are given; R-flex Sheet and R-flex Pipe. The difference between Sheet and Pipe is the required amount of material that provides the thermal insulation $R=1\text{ m}^2\text{K/W}$.



ENVIRONMENTAL IMPACTS FOR ODE R-FLEX SHEET THAT PROVIDE 1 M²K/W THERMAL INSULATION

| Parameter | Unit | A1-A3 | C4 |
|-----------|--|----------|----------|
| GWP | [kg CO ₂ eq.] | 4.20 | 0.65 |
| ODP | [kg CFC11 eq.] | 4.34E-07 | 4.26E-09 |
| POCP | [kg ethene eq.] | 1.31E-03 | 1.75E-04 |
| AP | [kg SO ₂ eq.] | 2.35E-02 | 2.20E-04 |
| EP | [kg PO ₄ ³⁻ eq.] | 8.15E-03 | 3.73E-03 |
| ADPE | [kg Sb eq.] | 4.18E-04 | 2.85E-08 |
| ADPF | [MJ eq.] | 7.51E+01 | 4.59E-01 |
| 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 ODE R-FLEX SHEET THAT PROVIDE 1 M²K/W THERMAL INSULATION

| Parameter | Unit | A1-A3 | C4 |
|-----------|---|----------|----------|
| PERE | [MJ] | 4.85E+00 | 2.22E-02 |
| PERM | [MJ] | 0 | 0 |
| PERT | [MJ] | 4.85E+00 | 2.22E-02 |
| PENRE | [MJ] | 7.51E+01 | 4.59E-01 |
| PENRM | [MJ] | 0 | 0 |
| PENRT | [MJ] | 7.51E+01 | 4.59E-01 |
| SM | [kg] | 0 | 0 |
| RSF | [MJ] | 0 | 0 |
| NRSF | [MJ] | 0 | 0 |
| FW | [m ³] | 7.08E-02 | 4.03E-04 |
| 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 ODE R-FLEX SHEET THAT PROVIDE 1 M²K/W THERMAL INSULATION

| Parameter | Unit | A1-A3 | C4 |
|-----------|---|----------|----------|
| HWD | [kg] | 2.41E-06 | 0 |
| NHWD | [kg] | 6.99E-06 | 1.08E+00 |
| RWD | [kg] | 0 | 0 |
| CRU | [kg] | 0 | 0 |
| MFR | [kg] | 9.43E-02 | 1.02E-01 |
| MER | [kg] | 0 | 0 |
| EE [Typ] | [MJ] | 0 | 0 |
| 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 | | |

ENVIRONMENTAL IMPACTS FOR ODE R-FLEX PIPE THAT PROVIDE 1 M²K/W THERMAL INSULATION

| Parameter | Unit | A1-A3 | C4 |
|-----------|--|----------|----------|
| GWP | [kg CO ₂ eq.] | 4.69 | 0.725 |
| ODP | [kg CFC11 eq.] | 4.84E-07 | 4.74E-09 |
| POCP | [kg ethene eq.] | 1.45E-03 | 1.95E-04 |
| AP | [kg SO ₂ eq.] | 2.62E-02 | 2.45E-04 |
| EP | [kg PO ₄ ³⁻ eq.] | 9.08E-03 | 3.75E-03 |
| ADPE | [kg Sb eq.] | 4.66E-04 | 3.18E-08 |
| ADPF | [MJ eq.] | 8.37E+01 | 5.11E-01 |
| 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 | | |

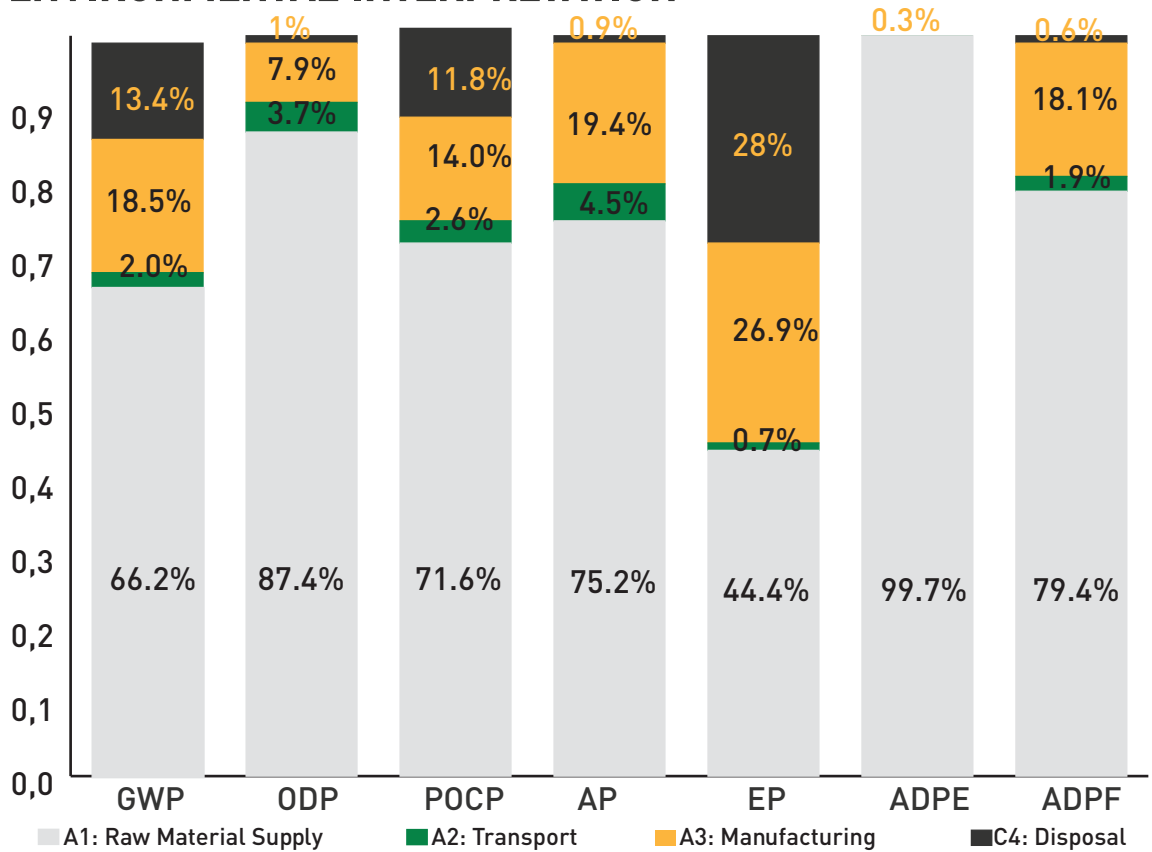
RESOURCE USE FOR ODE R-FLEX PIPE THAT PROVIDE 1 M²K/W THERMAL INSULATION

| Parameter | Unit | A1-A3 | C4 |
|-----------|---|----------|----------|
| PERE | [MJ] | 5.41E+00 | 2.48E-02 |
| PERM | [MJ] | 0 | 0 |
| PERT | [MJ] | 5.41E+00 | 2.48E-02 |
| PENRE | [MJ] | 8.37E+01 | 5.12E-01 |
| PENRM | [MJ] | 0 | 0 |
| PENRT | [MJ] | 8.37E+01 | 5.12E-01 |
| SM | [kg] | 0 | 0 |
| RSF | [MJ] | 0 | 0 |
| NRSF | [MJ] | 0 | 0 |
| FW | [m ³] | 7.89E-02 | 4.50E-04 |
| 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 | | |

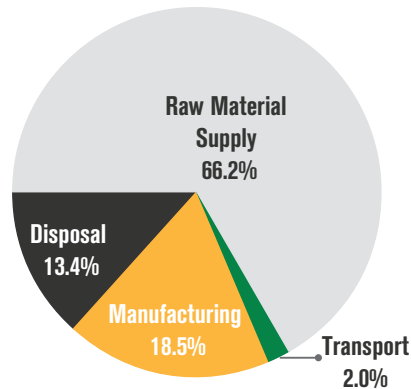
OUTPUT FLOWS AND WASTE CATEGORIES FOR ODE R-FLEX PIPE THAT PROVIDE 1 M²K/W THERMAL INSULATION

| Parameter | Unit | A1-A3 | C4 |
|-----------|---|----------|----------|
| HWD | [kg] | 2.69E-06 | 0 |
| NHWD | [kg] | 7.78E-06 | 1.21E+00 |
| RWD | [kg] | 0 | 0 |
| CRU | [kg] | 0 | 0 |
| MFR | [kg] | 1.05E-01 | 1.14E-01 |
| MER | [kg] | 0 | 0 |
| EE [Typ] | [MJ] | 0 | 0 |
| 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 | | |

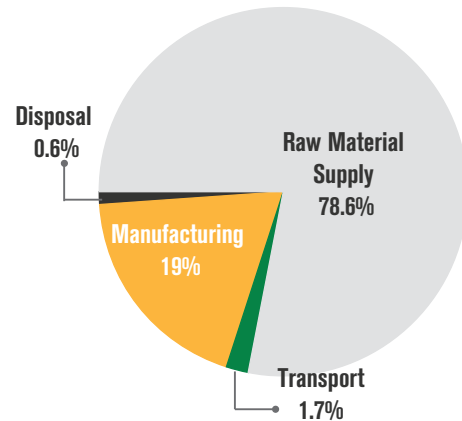
ENVIRONMENTAL INTERPRETATION



Among all impact categories raw material supply (A1) represents the life cycle stage with the biggest impact. The GWP of raw material supply is 66%, while manufacturing has about 16.5% of the total carbon emissions followed by end of life with 13% of the impact. Transport of Elastomeric Rubber Foam products manufactured by ODE Insulation has the lowest impact on GWP among other life cycle stages.



Global Warming Potential (IPCC GWP100a) of ODE R-Flex



Total energy contributions to each life cycle stage for ODE R-Flex

■ A1: Raw Material Supply ■ A2: Transport
■ A3: Manufacturing ■ C4: Disposal



References

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

/EN 826/ Thermal insulating products for building applications. Determination of compression behaviour

/EN 12667/ Thermal performance of building materials and products. Determination of thermal resistance by means of guarded hot plate and heat flow meter methods. Products of high and medium thermal resistance

/EN ISO 8497/ Thermal insulation -- Determination of steady-state thermal transmission properties of thermal insulation for circular pipes

/EN 13501-1/ Fire classification of construction products and building elements – Part 1: Classification using test data from reaction to fire tests

/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)

/ISO 14020/ Environmental labels and declarations -- General principles

/GPI/ General Programme Instructions

/PCR for Insulation Materials, The International EPD System/ Prepared by Life Cycle Engineering srl, 2014:13 Version 1.0, DATE 2014-04-16

/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

Verification & Registration Contacts

Programme Holder



The International EPD System
EPD International AB, Box 210 60
SE- 100 31 Stockholm
Sweden
www.environdec.com

Programme Holder



EPD Turkey
Veko Giz Plaza, Meydan Sok.
No:3 Kat:13 Maslak
İstanbul/Turkey
www.epdturkey.org

Third Party Verifier



LCAstudio
Mr Vladimír Kočí, PhD
Šárecká 5, 16000
Prague 6,
Czech Republic
www.lcastudio.cz

Owner of the Declaration



ODE Industry and Trade Inc.
Piyale Paşa Bulvarı Ortadoğu Plaza
K.12 34384 Okmeydanı
Şişli /İstanbul /Turkey
www.ode.com.tr

LCA Author



Metsims Sustainability Consulting
Elmas Studyo Levent Sanayi mah.
Lalegül sok. No:7/18
4 Levent/İstanbul
www.metsims.com

