ENVIRONMENTAL PRODUCT DECLARATION

In accordance with EN 15804 and ISO 14025

PROFI 150 mm

Realization data:

2014

Version: 1.2

ISOVER SAINT-GOBAIN

General Information

Manufacturer: Saint-Gobain Isover Yegorievsk
PCR identification: Saint-Gobain Methodological Guide for Construction Products (2012)
Product name and manufacturer represented:
PROFI 150 mm; Saint-Gobain Isover (Russia)
Declaration issued: 09 01 2014, valid until: 09 01 2019

Product description

Product description and description of use:

This Environmental Product Declaration (EPD) describes the environmental impacts of 1 m^2 of mineral wool.

Saint-Gobain Isover Yegorievsk uses natural and abundant raw materials (sand), using fusion and fiberising techniques to produce glass wool. The products obtained come in the form of a «mineral wool mat» consisting of a soft, airy structure.

On Earth, naturally, the best insulator is dry immobile air at 10°C: its thermal conductivity factor, expressed in λ, is 0.025 W/(m.K) (watts per meter Kelvin degree). The thermal conductivity of mineral wool is close to immobile air as its lambda varies from 0.030 W/(m.K) for the most efficient to 0.040 W/(m.K) to the least.

With its entangled structure, mineral wool is a porous material that traps the air, making it one of the best insulating materials. The porous and elastic structure of the wool also absorbs noise in the air, knocks and offers acoustic correction inside premises. Mineral wool containing incombustible materials does not fuel fire or propagate flames.

Mineral wool insulation (glass wool) is used in buildings as well as industrial facilities. It ensures a high level of comfort, lowers energy costs, minimizes carbon dioxide (CO_2) emissions, prevents heat loss through pitched roofs, walls, floors, pipes and boilers, reduces noise pollution and protects homes and industrial facilities from the risk of fire.

Mineral wool products last for the average building's lifetime (which is often set at 50 years as a default), or as long as the insulated building component is part of the building.

Technical product information

TECHNICAL DATA	PHYSICAL CHARACTERISTICS	
The thermal resistance of the product	3,75	$K.m^2.W^{-1}$
The thermal conductivity of the product	0.04	W/(m.K)
Reaction to fire	NC	
Meets the requirements of	GOST 30244-94	
Acoustic properties	-	

Description of the main product components and materials for 1 m² of product:

PARAMETER	VALUE	UNIT
Quantity of wool	2100	g
Thickness of wool	150	mm
Surfacing	None	g
Packaging for the transportation and distribution	Paper for label: 2,1 Wood pallet: 160 Polyethylene: 66 Thermaltransfer ribbon: 1	g
Product used for the Installation:	None	g

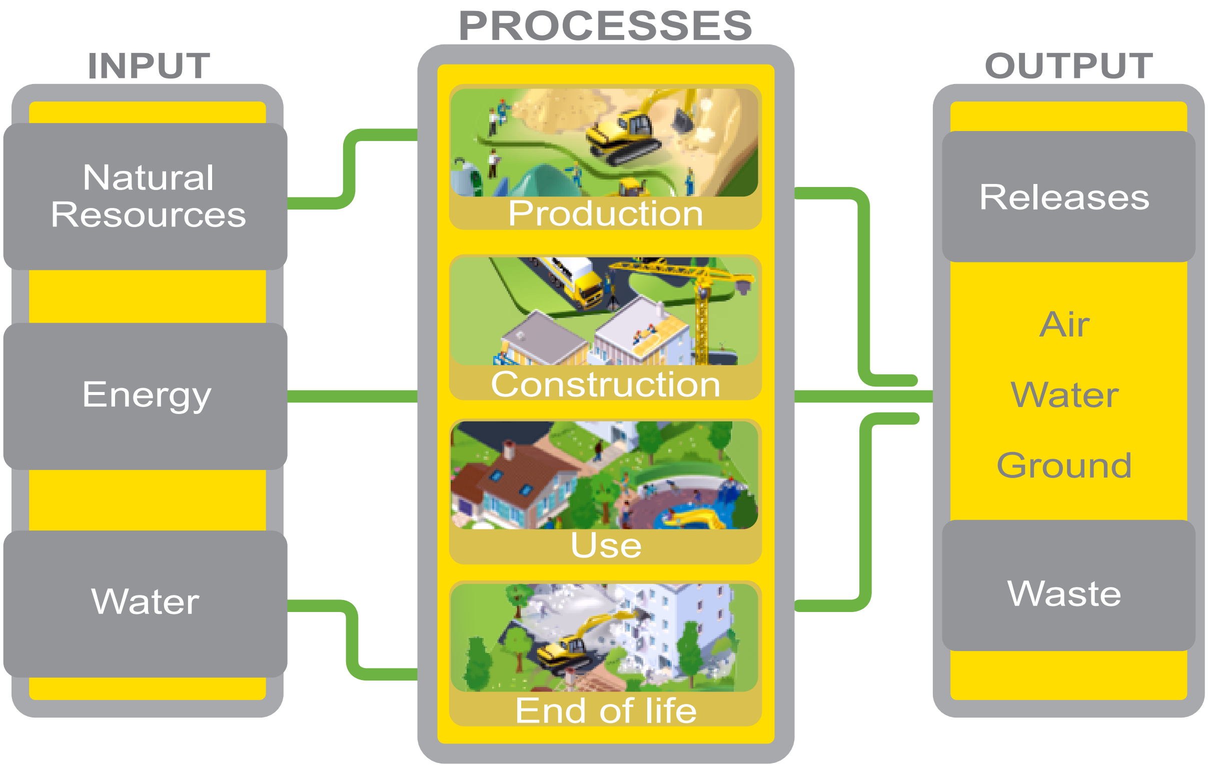
LCA calculation information:

FUNCTIONAL UNIT	Providing a thermal insulation on 1 m² with a thermal resistance of equals 3,75 $K.m^2.W^{-1}$.
SYSTEM BOUNDARIES	Cradle to Grave: Mandatory stages = A1-3, A4-5, B1-7, C1-4 and Optional stage = D
REFERENCE SERVICE LIFE (RSL)	50 years
CUT-OFF RULES	The use of cut-off criterion on mass inputs and primary energy at the unit process level (1%) and at the information module level (5%); Flows related to human activities such as employee transport are excluded The construction of plants, production of machines and transportation systems are excluded since the related flows are supposed to be negligible compared to the production of the building product when compared at these systems lifetime level;
ALLOCATIONS	Allocation criteria are based on mass
GEOGRAPHICAL COVERAGE AND TIME PERIOD	Russia (Yegorievsk) 2012

According to EN 15804, EPD of construction products may not be comparable if they do not comply with this standard. According to ISO 21930, EPD might not be comparable if they are from different programmes.

Life cycle stage

Flow diagram of the Life Cycle

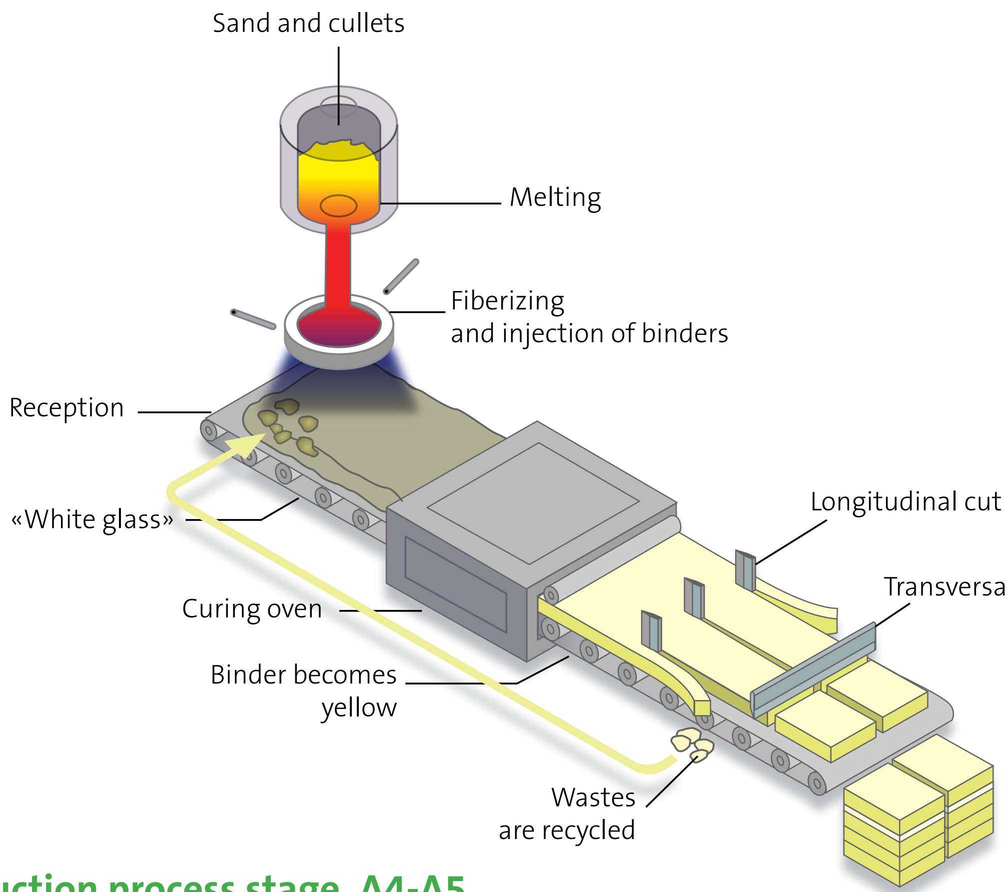


Product stage, A1-A3

- **Description of the stage:**
  The product stage of the mineral wool products is subdivided into 3 modules A1, A2 and A3 respectively «Raw material supply», «transport» and «manufacturing».
  The aggregation of the modules A1, A2 and A3 is a possibility considered by the EN 15 804 standard. This rule is applied in this EPD.
- **A1, Raw material supply:**
  This module takes into account the extraction and processing of all raw materials and energy which occur upstream to the studied manufacturing process.
  Specifically, the raw material supply covers production of binder components and sourcing (quarry) of raw materials for fiber production, e.g. sand and borax for glass wool. Besides these raw materials, recycled materials (glass cullet) are also used as input.
- **A2, transport to the manufacturer:**
  The raw materials are transported to the manufacturing site. In our case, the modeling include: road and train transportations (average values) of each raw material.
- **A3, manufacturing:**
  This module includes manufacturing of products and manufacturing of packaging. Specifically, it covers glass production, binder production, glass wool fabrication (including melting and fiberization see process flow diagram) and packaging.
  The production of packaging material is taking into account at this stage.

Glass wool production

Manufacturing process flow diagram



Construction process stage, A4-A5

- **Description of the stage:**
  The construction process is divided into 2 modules: A4, transport to the building site and A5, installation in the building.
- **Description of scenarios and additional technical information:**

A4, Transport to the building site:
This module includes transport from the production gate to the building site.
Transport is calculated on the basis of a scenario with the parameters described in the following table.

PARAMETER	VALUE
Fuel type and consumption of vehicle or vehicle type used for transport e.g. long distance truck, boat, etc.	Average truck trailer with a 24t payload, diesel consumption 38 liters for 100 km
Distance	830 km by truck 4 600 km by train
Capacity utilisation (including empty returns)	100 % of the capacity in volume 30 % of empty returns
Bulk density of transported products	14 kg/m³
Volume capacity utilisation factor	1

A5, Installation in the building:
This module includes wastage of products during the implementation, the additional production processes to compensate the loss and the waste processing which occur in this stage.

Scenarios used for quantity of product wastage and waste processing are:

PARAMETER	VALUE
Wastage of materials on the building site before waste processing, generated by the product's installation (specified by type)	5%
Output materials (specified by type) as results of waste processing at the building site e.g. of collection for recycling, for energy recovering, disposal (specified by route)	Packaging wastes are 100 % collected and modeled as recovered matter Glass wool losses are landfilled

Use stage (excluding potential savings), B1-B7

- **Description of the stage:**
  The use stage is divided into the following modules:
  - B1: Use
  - B2: Maintenance
  - B3: Repair
  - B4: Replacement
  - B5: Refurbishment
  - B6: Operational energy use
  - B7: Operational water use
- **Description of scenarios and additional technical information:**
  Once installation is complete, no actions or technical operations are required during the use stages until the end of life stage. Therefore mineral wool insulation products have no impact (excluding potential energy savings) on this stage.

End-of-life stage C1-C4

- **Description of the stage:**
  The stage includes the different modules of end-of-life : C1, de-construction, demolition; C2, transport to waste processing; C3, waste processing for reuse, recovery and/or recycling; C4, disposal.
- **Description of scenarios and additional technical information:**

C1, de-construction, demolition:
The de-construction and/or dismantling of insolation products take part of the demolition of the entire building. In our case, the environmental impact is assumed to be very small and can be neglected.

C2, transport to waste processing:
The model use for the transportation (see A4, transportation to the building site) is applied.

C3, waste processing for reuse, recovery and/or recycling:
The product is considered to be landfilled without reuse, recovery or recycling.

C4, disposal:
The glass wool is assumed to be 100% landfilled.

PARAMETER	VALUE / DESCRIPTION
Collection process specified by type	2100 g of glass wool (collected with mixed construction waste)
Recovery system specified by type	No re-use, recycling or energy recovery
Disposal specified by type	2100 g of glass wool are landfilled
Assumptions for scenario development (e.g. transportation)	Average truck trailer with a 24t payload, diesel consumption 38 liters for 100 km 25 km

Reuse/recovery/recycling potential, D

- **Description of scenarios and additional technical information:**
  Packaging wastes from module A5 are reported in this module as recovered matter

LCA Results

LCA model, aggregation of data and environmental impact are calculated from the TEAM™ software 5.1.

Resume of the LCA results detailed on the following tables.

ENVIRONMENTAL IMPACTS															
PARAMETERS	Product Stage	Construction process stage		Use Stage							End-of-life stage				D Reuse, recovery, recy-cling
	A1 A2 A3	A4 Trans-port	A5 Instal-lation	B1 Use	B2 Mainte-nance	B3 Repair	B4 Re-place-ment	B5 Refur-bish-ment	B6 Opera-tional energy use	B7 Opera-tional water use	C1 Decon-struction / Demo-lition	C2 Trans-port	C3 Waste pro-cessing	C4 Dis-posal	
Global warming potential (GWP) kg CO_2 - equiv/FU	3.0E+00	4.3E-01	1.8E-01	0	0	0	0	0	0	0	0	9.2E-03	0	0	0
	The global warming potential of a gas refers to the total contribution to global warming resulting from the emission of one unit of that gas relative to one unit of the reference gas, carbon dioxide, which is assigned a value of 1.														
Ozone depletion (ODP) kg CFC - equiv/FU	9.2E-08	2.2E-07	1.7E-08	0	0	0	0	0	0	0	0	6.4E-09	0	0	0
	Destruction of the stratospheric ozone layer which shields the earth from ultraviolet radiation harmful to life. This destrution of ozone is caused by the breakdown of certain chlorine and/or bromine containing compounds (chlorofluorocarbons or halons), which break down when they reach the strato-sphere and then catalytically destroy ozone molecules.														
Acidification potential (AP) kg SO_2 - equiv/FU	2.2E-02	2.4E-03	1.3E-03	0	0	0	0	0	0	0	0	5.5E-05	0	0	0
	Acid depositions have negative impacts on natural ecosystems and the man-made environment incl, buildings. The main sources for emissions of acidify-ing substances are agriculture and fossil fuel combustion used for electricity production, heating and transport.														
Eutrophication potential (EP) kg $(PO_4)_3$ - equiv/FU	3.7E-03	4.9E-04	2.1E-04	0	0	0	0	0	0	0	0	1.4E-05	0	7.4E-06	0
	Excessive enrichment of waters and continental surfaces with nutrients, and the associated adverse biological effects.														
Photochemical ozone creation (POPC) - Ethene equiv/FU	9.3E-04	9.3E-04	5.5E-05	0	0	0	0	0	0	0	0	1.2E-06	0	0	0
	Chemical reactions brought about by the light energy of the sun. The reaction of nitrogen oxides with hydrocarbons in the presence of sunlight to form ozone is an example of a photochemical reaction.														
Abiotic Depletion Potential for non-fossil ressources (ADP-elements) - kg Sb equiv/FU	6.3E-08	1.0E-09	3.3E-09	0	0	0	0	0	0	0	0	1.6E-12	0	0	0
Abiotic Depletion Potential for fossil ressources (ADP-fossil fuels) - MJ/FU	4.6E+01	5.6E+00	2.7E+00	0	0	0	0	0	0	0	0	1.1E-01	0	0	0
	Consumption of non-renewable resources, thereby lowering their availability for future generations.														

RESOURCE USE															
PARAMETERS	**Product Stage**	**Construction process stage**		**Use Stage**							**End-of-life stage**				D Reuse. recovery, recy-cling
	A1 A2 A3	A4 Trans-port	A5 Instal-lation	B1 Use	B2 Mainte-nance	B3 Repair	B4 Re-place-ment	B5 Refur-bish-ment	B6 Opera-tional energy use	B7 Opera-tional water use	C1 Decon-struction / Demo-lition	C2 Trans-port	C3 Waste pro-cessing	C4 Dis-posal	
Use of renewable primary energy excluding renewable primary energy resources used as raw materials- MJ/FU	4.7E+00	1.5E-01	2.4E-01	0	0	0	0	0	0	0	0	6.0E-05	0	0	0
Use of renewable primary energy used as raw materials MJ/FU	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials) - MJ/FU	4.7E+00	1.5E-01	2.4E-01	0	0	0	0	0	0	0	0	6.0E-05	0	0	0
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials - MJ/FU	5.2E+01	6.0E+00	3.1E+00	0	0	0	0	0	0	0	0	1.1E-01	0	0	0
Use of non-renewable primary energy used as raw materials - MJ/FU	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials) - MJ/FU	5.2E+01	6.0E+00	3.1E+00	0	0	0	0	0	0	0	0	1.1E-01	0	0	0
Use of secondary material - kg/FU	1.0E+00	0	5.1E-02	0	0	0	0	0	0	0	0	0	0	0	1.4E-02
Use of renewable secondary fuels - MJ/FU	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Use of non-renewable secondary fuels - MJ/FU	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Use of net fresh water - m^3/FU	1.1E-02	6.6E-04	6.2E-04	0	0	0	0	0	0	0	0	1.1E-05	0	0	0

WASTE CATEGORIES

PARAMETERS	Product Stage	Construction process stage		Use Stage							End-of-life stage				D Reuse. recovery, recy-cling
	A1 A2 A3	A4 Trans-port	A5 Instal-lation	B1 Use	B2 Mainte-nance	B3 Repair	B4 Re-place-ment	B5 Refur-bish-ment	B6 Opera-tional energy use	B7 Opera-tional water use	C1 Decon-struction / Demo-lition	C2 Trans-port	C3 Waste pro-cessing	C4 Dis-posal	
Hazardous waste disposed kg/FU	1.2E-02	8.7E-05	6.1E-04	0	0	0	0	0	0	0	0	2.6E-06	0	0	0
Non-hazardous waste disposed kg/FU	3.3E-01	1.6E-02	2.1E-01	0	0	0	0	0	0	0	0	1.3E-05	0	1.9E+00	0
Radioactive waste disposed kg/FU	4.1E-05	6.4E-05	5.6E-06	0	0	0	0	0	0	0	0	1.8E-06	0	0	0

OUTPUT FLOWS

PARAMETERS	Product Stage	Construction process stage		Use Stage							End-of-life stage				D Reuse. recovery, recy-cling
	A1 A2 A3	A4 Trans-port	A5 Instal-lation	B1 Use	B2 Mainte-nance	B3 Repair	B4 Re-place-ment	B5 Refur-bish-ment	B6 Opera-tional energy use	B7 Opera-tional water use	C1 Decon-struction / Demo-lition	C2 Trans-port	C3 Waste pro-cessing	C4 Dis-posal	
Components for re-use kg/FU	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Materials for recycling kg/FU	5.3E-02	8.2E-05	1.7E-02	0	0	0	0	0	0	0	0	6.4E-08	0	0	0
Materials for energy recovery kg/FU	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Exported energy MJ / FU	5.1E-02	1.5E-07	2.6E-03	0	0	0	0	0	0	0	0	6.2E-11	0	0	0

LCA interpretation

	Product (A1-A3)	Transport (A4)	Installation (A5)	Use (B)	End-of-Life (C)	Total Environmental impacts of the product	Recycling Positive benefits of recycling (D)
Global Warming (kg CO^2equiv/FU)	3.03	0.43	0.18	0.00	0.01	**3.64** kg CO_2equiv/FU	0.00
Non-renewable resources consumption [1] (MJ/FU)	46.23	5.58	2.73	0.00	0.11	**54.65** MJ/FU	0.00
Energy consumption [2] (MJ/FU)	57.00	6.11	3.31	0.00	0.11	**66.53** MJ/FU	0.00
Water consumption [3] (m^3/FU)	0.01	0.00	0.00	0.00	0.00	**0.01** m^3/FU	0.00
Waste production [4] (kg/FU)	0.35	0.02	0.21	0.00	1.90	**2.47** kg/FU	0.00

[1] This indicator corresponds to the abiotic depletion potential of fossil resources.
[2] This indicator corresponds to the total use of primary energy.
[3] This indicator corresponds to the use of net fresh water.
[4] This indicator corresponds to the sum of hazardous, non-hazardous and radioactive waste disposed.