ENVIRONMENTAL PRODUCT DECLARATION

In accordance with EN 15804 and ISO 14025

Isover FireProtect 150,
60 mm calc.

Date of calculation : May 2014
Version : 1.3

ISOVER
SAINT-GOBAIN

General information

Manufacturer: Saint-Gobain Construction Products CZ a.s., Isover division
Počernická 272/96, 108 03 Prague 10, Czech Republic
PCR identification: Saint-Gobain Methodological Guide for Construction Products (2012), EN15804
Product name and manufacturer represented: Isover FireProtect 150;
Saint-Gobain Construction Products CZ a.s, Isover division, factory Castolovice
Factory address: Masarykova 197, 517 50 Častolovice, Czech Republic
Declaration issued: 15 06 2016**, valid until:** 15 06 2019

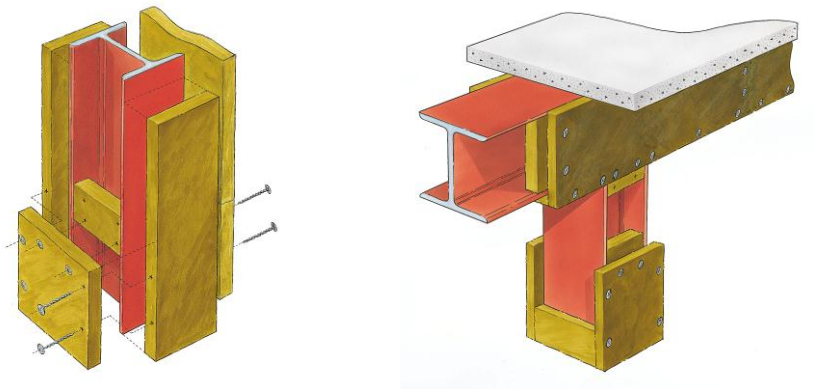
Product description

Product description and description of use:

This EPD describes the environmental impacts of 1 m² of mineral wool.

Production process uses natural and abundant raw materials (volcanic rock), blast-furnace slag, recycled contend (briquettes), fusion and fiberising techniques to produce stone wool. The products obtained come in the form of a "mineral wool mat" consisting of a soft, airy structure. It is made of hydrophilic mineral wool, so it has special parameters unlike to standard mineral wool. (see *Manufacturing process flow diagram on page 4*)

Slabs Isover FireProtect 150 are used for several applications. They are part of certified ISOVER FireProtect system which provides efficient protection of structural steelwork. The system contains few components and can be installed without using complex and expensive equipment. The system is tested according to ENV 13381-4 and approved by Norwegian lab SINTEF NBL. It is also used as a semi-product for additional processing. Exceptional thickness tolerance ±1 mm at a production of FireProtect slabs is ideal for a production of fire doors. Slabs are also used for fire-stopping solutions when pipes, cables, etc. penetrate fire separation walls.



Example of use Isover FireProtect 150

Description of the main product components and or materials:

PARAMETER	VALUE
Thickness of wool	60 mm (thickness range 20-100mm)
Surfacing	None
Packaging for the distribution and transportation	Polyethylene: 27 g/m²
Product used for the Installation:	None

Completive material info available here: http://www.isover.cz/en/isover-fireprotect-150

Chemical info and composition available here: http://www.isover.cz/data/files/suis-stonewool-bi-new-en-829.pdf

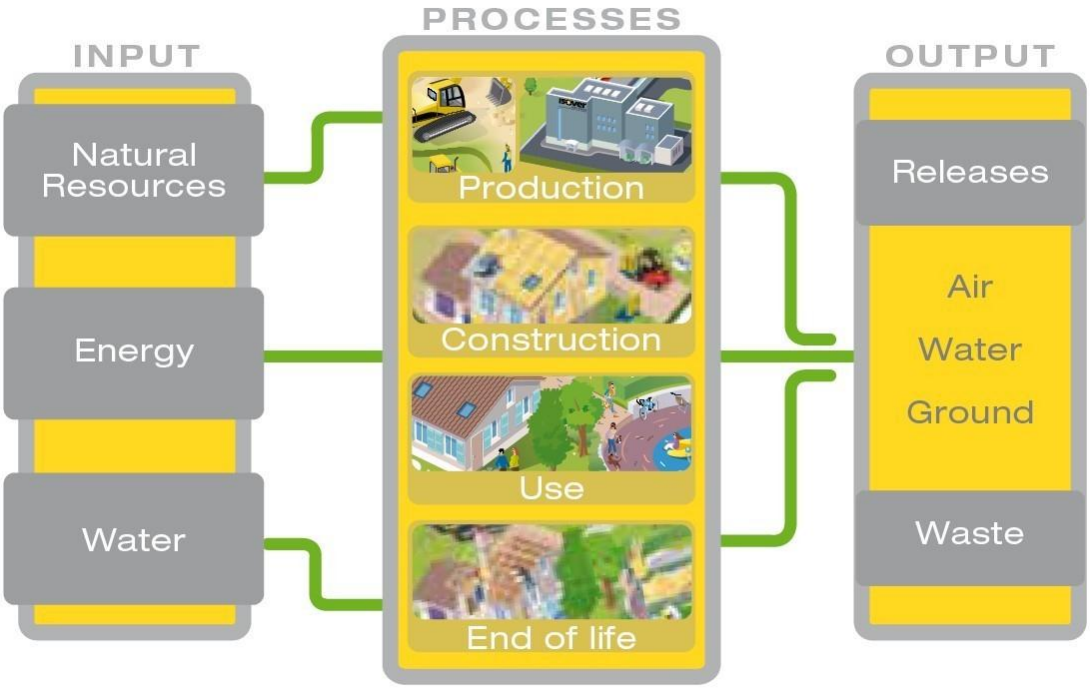
LCA calculation information

FUNCTIONAL UNIT	1 m²
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 is 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	Castolovice (Czech Republic) 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 stages

Flow diagram of the Life Cycle



Life cycle phases illustration

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.

Description of scenarios and additional technical information:

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 binder components and sourcing (quarry) of raw materials for fiber production, e.g. basalt and slag for stone wool. Besides these raw materials, recycled materials (briquettes) 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 transportations (average values) of each raw material.

A3, manufacturing
This module includes process taking place on the manufacturing site. Specifically, it covers stone wool fabrication including melting and fiberization see process flow diagram and packaging.
The production of packaging material is taking into account at this stage.

Manufacturing process schema

Construction process stage, A4-A5

Description of the stage: The construction process is divided into 2 modules: transport to the building site A4 and installation A5.

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	120 km (for further distances could be A4 criteria linearly adjusted)
Capacity utilisation (including empty returns)	100 % of the capacity in volume 30 % of empty returns
Bulk density of transported products	150 kg/m^3
Volume capacity utilisation factor	1 (by default)

A5, Installation in the building: This module includes

- Wastage of products: see following table 5 %. These losses are landfilled (landfill model for stone wool see chapter end of life),
- Additional production processes to compensate for the loss,
- Processing of packaging wastes: they are 100 % collected and modeled as recovered matter.

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 Stone 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 detailed below.

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 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 stone wool is assumed to be 100% landfilled.

Description of scenarios and additional technical information: See below
End-of-life:

PARAMETER	VALUE/DESCRIPTION
Collection process specified by type	9 000 g (collected with mixed construction waste)
Recovery system specified by type	No re-use, recycling or energy recovery
Disposal specified by type	9 000 g 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 the stage: 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 tabs:

ENVIRONMENTAL IMPACTS

Parameters	Product stage	Construction process stage		Use stage							End-of-life stage				D Reuse, recovery, recycling
	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	
Global Warming Potential (GWP) - *kg CO2 equiv/FU*	1,3E+01	1,0E-01	6,6E-01	0	0	0	0	0	0	0	0	2,9E-02	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 11 equiv/FU*	3,4E-07	7,2E-08	2,1E-08	0	0	0	0	0	0	0	0	2,0E-08	0	0	0
	Destruction of the stratospheric ozone layer which shields the earth from ultraviolet radiation harmful to life. This destruction 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 stratosphere and then catalytically destroy ozone molecules.														
Acidification potential (AP) *kg SO2 equiv/FU*	5,1E-02	6,2E-04	2,6E-03	0	0	0	0	0	0	0	0	1,8E-04	0	0	0
	Acid depositions have negative impacts on natural ecosystems and the man-made environment incl, buildings. The main sources for emissions of acidifying substances are agriculture and fossil fuel combustion used for electricity production, heating and transport.														
Eutrophication potential (EP) *kg (PO4)3- equiv/FU*	3,7E-03	1,5E-04	2,0E-04	0	0	0	0	0	0	0	0	4,3E-05	0	3,6E-05	0
	Excessive enrichment of waters and continental surfaces with nutrients, and the associated adverse biological effects.														
Photochemical ozone creation (POPC) *Ethene equiv/FU*	6,6E-03	1,4E-05	3,3E-04	0	0	0	0	0	0	0	0	3,9E-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*	2,4E-06	1,5E-11	1,2E-07	0	0	0	0	0	0	0	0	4,3E-12	0	0	0
Abiotic depletion potential for fossil ressources (ADP-fossil fuels) - *MJ/FU*	1,9E+02	1,3E+00	9,4E+00	0	0	0	0	0	0	0	0	3,6E-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, recycling
	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	
Use of renewable primary energy excluding renewable primary energy resources used as raw materials - *MJ/FU*	2,2E+01	7,2E-04	1,1E+00	0	0	0	0	0	0	0	0	2,0E-04	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*	2,2E+01	7,2E-04	1,1E+00	0	0	0	0	0	0	0	0	2,0E-04	0	0	0
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials - *MJ/FU*	1,7E+02	1,3E+00	8,4E+00	0	0	0	0	0	0	0	0	3,6E-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 energy resources used as raw materials) - MJ/FU and primary	1,7E+02	1,3E+00	8,4E+00	0	0	0	0	0	0	0	0	3,6E-01	0	0	0
Use of secondary material *kg/FU*	2,2E+00	0	1,1E-01	0	0	0	0	0	0	0	0	0	0	0	1,1E-01
Use of renewable secondary fuels- *MJ/FU*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Use of non-renewable secondary fuels - *MJ/FU*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Use of net fresh water - *m3/FU*	4,1E-02	1,2E-04	2,1E-03	0	0	0	0	0	0	0	0	3,5E-05	0	0	0

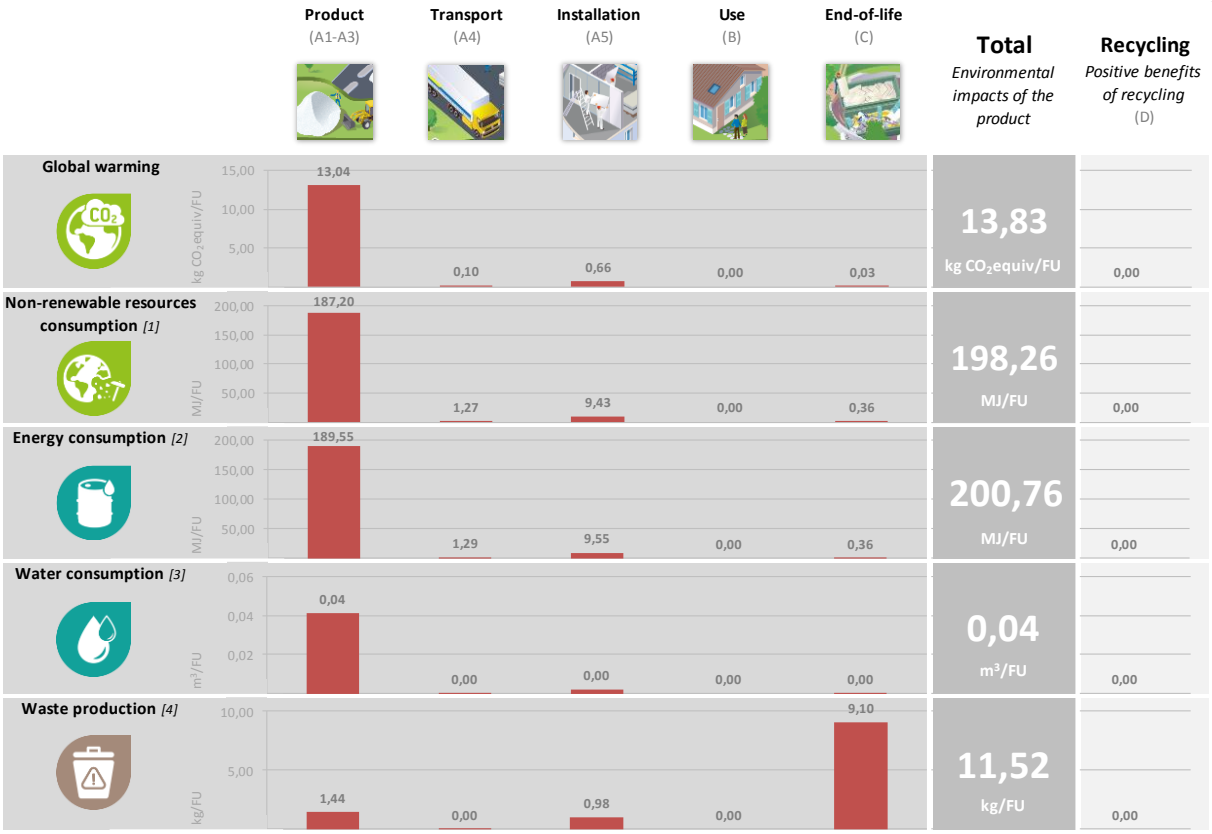
WASTE CATEGORIES

Parameters	Product stage	Construction process stage		Use stage							End-of-life stage				D Reuse, recovery, recycling
	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	
Hazardous waste disposed *kg/FU*	1,4E-02	3,0E-05	6,9E-04	0	0	0	0	0	0	0	0	8,3E-06	0	0	0
Non-hazardous waste disposed *kg/FU*	1,4E+00	1,1E-04	9,8E-01	0	0	0	0	0	0	0	0	3,1E-05	0	9,1E+00	0
Radioactive waste disposed *kg/FU*	2,9E-04	2,1E-05	1,6E-05	0	0	0	0	0	0	0	0	5,8E-06	0	0	0

OUTPUT FLOWS

Parameters	Product stage	Construction process stage		Use stage							End-of-life stage				D Reuse, recovery, recycling
	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	
Components for re-use *kg/FU*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Materials for recycling *kg/FU*	2,7E+00	5,2E-07	2,4E-01	0	0	0	0	0	0	0	0	1,5E-07	0	0	0
Materials for energy recovery *kg/FU*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exported energy *MJ/FU*	4,1E-02	0	2,0E-03	0	0	0	0	0	0	0	0	0	0	0	0

LCA interpretation



[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.