ISOVER
SAINT-GOBAIN

EPD

ENVIRONMENTAL PRODUCT DECLARATION
In accordance with EN 15804 and ISO 14025

ISOVER EPS GreyWall

EPD VERIFIED

ZÚS®

TECHNICKÝ A ZKUŠEBNÍ ÚSTAV STAVEBNÍ PRAHA s.p.
Certifikační orgán č. 3015
ZÚS
Pobočka Plzeň

SAINT-GOBAIN

Manufacturer: Saint-Gobain Construction Products CZ, division ISOVER, Smrčkova 2485/4, 180 00 Praha 8, Česká republika

Manufacturer represented: Český Brod, Průmyslová 231, 282 00 Český Brod, Czech Republic

About company: International company, enterprising in 64 countries, part of Saint-Gobain group, more than 190 000 employees. Subject of enterprise of Isover division is to produce and sell thermal insulation from mineral wool, expanded and extruded polystyrene, their accessories and providing technical support for marketed solutions.

EPD Programme: The International EPD® System

Registration no: 3015-EPD-030055243

Generic PCR review conducted by: Environdec, EPD International Ltd., Box 210 60, SE-100 31 Stockholm, Sweden

Other used standards: Saint-Gobain Methodological Guide for Construction Products 2012

Information for the Environmental Product Declaration based on: General report on ISOVER LCA Castolovice, Paris, France: ISOVER, 2015

EPD range: „From cradle to gate with option“ (details later in EPD)

Date of publication: 1st July 2017

EPD validity: 1st July 2022

Complier EPD: Ing. Petr Vacek, Ph.D., Division ISOVER, Saint-Gobain Construction Products CZ a.s.

Verifier EPD: Technický a zkušební ústav stavební Praha, s.p. - pobočka Plzeň

Tab. 1 – Information about verifier

The norm ČSN EN 15804 prepared CEN serves as a basic PCR[a]
Independent verification of the environmental declaration and data according to standard EN ISO 14025:2010 ☐ Internal ☑ External
The third party verifier:[b] Ing. Lenka Brunátová Lead Assessor, Technický a zkušební ústav stavební Praha, s.p. Prosecká 811/76a, Praha 9, 190 00 Czech Republic
The certification authority for EPD is accredited ČIA, Český akreditační institut under n 277/2017 [a] The rules of product category [b] Optional for communication between companies, required for communication between company and consumer (see ISO 14025:2010, 9.4).

Expanded polystyrene (EPS) is produced by expanding solid beads of expandable polystyrene by the action of saturated water vapour into blocks, which are then cut into respective boards. During this process, the beads increase their volume from twenty to fifty times the original volume and a fine cell structure is formed inside each bead.

Pentane, a common natural gas produced, for example, in the digestive systems of animals or by the decomposition of plant material by micro-organisms, is used for foaming. Neither Styrofoam nor its manufacturing process contains, nor has ever contained, the ozone-depleting substances known as CFCs.

ISOVER EPS GreyWall is used as wall insulation. It is usually a part of contact insulation systems (ETICS), where it is bonded to the wall with cement adhesive and protected from the outside by a system of reinforced levelling plaster and thin layer of finishing plaster.

Fig. 1 – Example of ISOVER EPS GreyWall application

Tab. 2 – Technical data / physical characterictics

Parameter	Value
Product code	39211100
Thermal resistance (100 mm) (EN 12162)	3.20 $K \cdot m^2 \cdot W^{-1}$
Thermal conductivity coefficient λ_D (EN 12667)	0.032 $W \cdot m^{-1} \cdot K^{-1}$
Water vapour transmission (EN 12086)	30–70 [–]
Compressive strength (EN 826)	Not declared
Tensile strength (EN 1607)	100 kPa
Reaction to fire class (EN 13 501-1)	E
Share of external recyclate	0 %

More info: ***http://www.isover.cz/en/declaration-of-performance***

Tab. 3 – Chemical and hazard information

Component	CAS	Concentration	EC number	EC hazards	R-phrases
Polystyrene	9003-53-6	92 %			
Pentane and mixture of isomers	109-66-0 (n-pentant) 78-78-4 (isopentan)	2 %		F	R11
Water	7732-18-5	5,3 %			
Flame retardant*		0,7 %			

*A mixture of retardants, none of which are on the candidate list of substances of very high concern subject to authorization.

More info: ***http://www.isover.cz/en/declaration-of-performance***

Tab. 4 – LCA calculation information

Functional unit	Providing a thermal insulation on 1 m^2 with a thermal resistance of 3.20 $K{\cdot}m^2{\cdot}W^{-1}$
Reference service life (RSL)	50 years
System boundaries	„From cradle to gate with option“
Boundary conditions	Boundary conditions for inputs and primary energy at the process level (1%) and information level (5%); Not included are flows resulting from human activities - transport of employees; Plant construction, machinery manufacture and transport system are not included as the associated flows are assumed to be negligible compared to the production of construction materials, relative to the life cycle;
Allocations	Allocation criteria are based on mass
Local conditions	Český Brod (Czech Republic)
Assessed period	2015
Software used	Ecobilan TEAM 5.2
Characteristic factors	CML IA 4.1

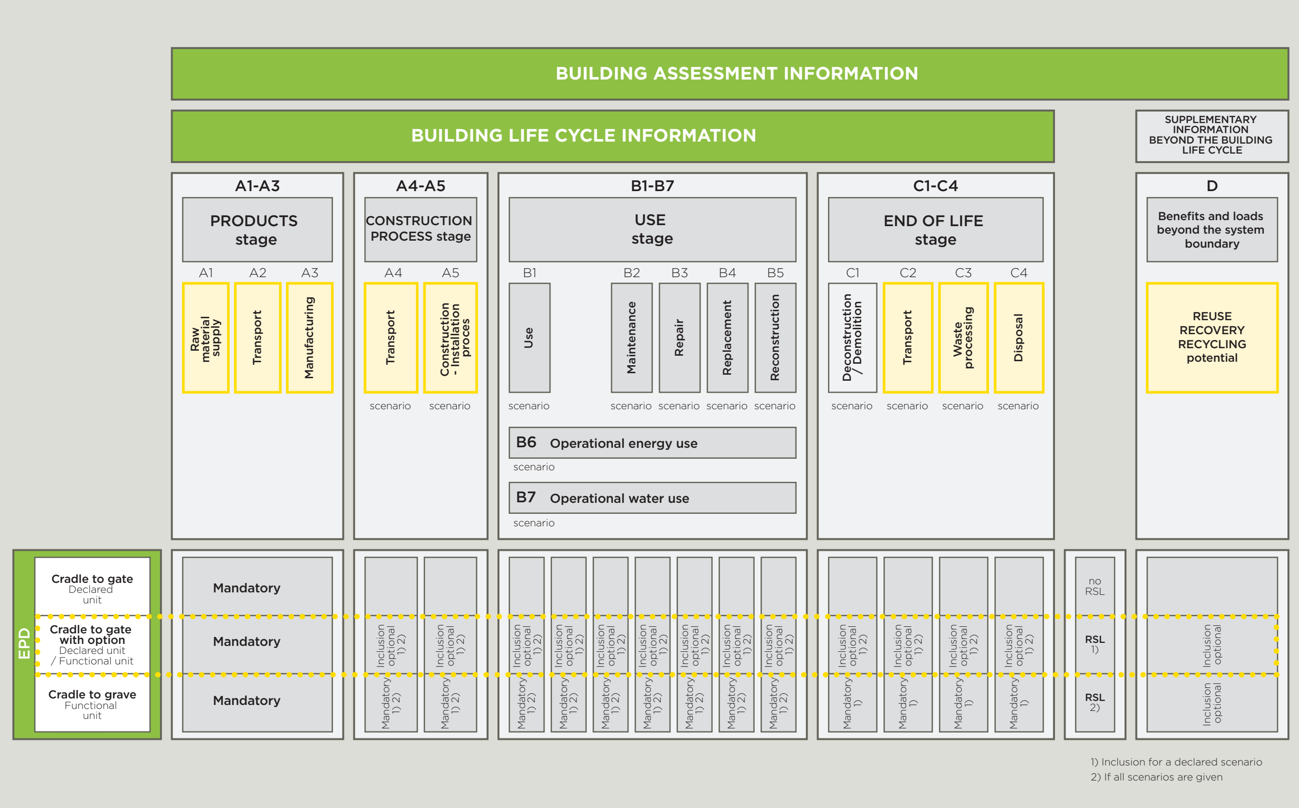

Fig. 2 – Life cycle phases counted (EN 15804 + A1); the effect of the product in stage B1-B7 will be counted at the level of building construction

PRODUCT STAGE, A1-A3

The production stage of expanded polystyrene is divided into 3 modules A1, A2 and A3, i.e. „Raw material supply", „transport" and „production".

According to standard EN 15804+A1 it is possible to merge modules A1, A2 and A3. This rule is applied in this EPD.

A1, Raw material supply

This module includes the mining and processing of all input raw materials and energy required for this process (outside the production plant).

A2, Transport to production

Input raw materials are transported to the production line. In this case, the model includes road transport (average value) for each input material.

A3, Manufacturing

This module includes the production of insulation material from inputs (input raw materials, energy, water, etc.), packaging (PE film).

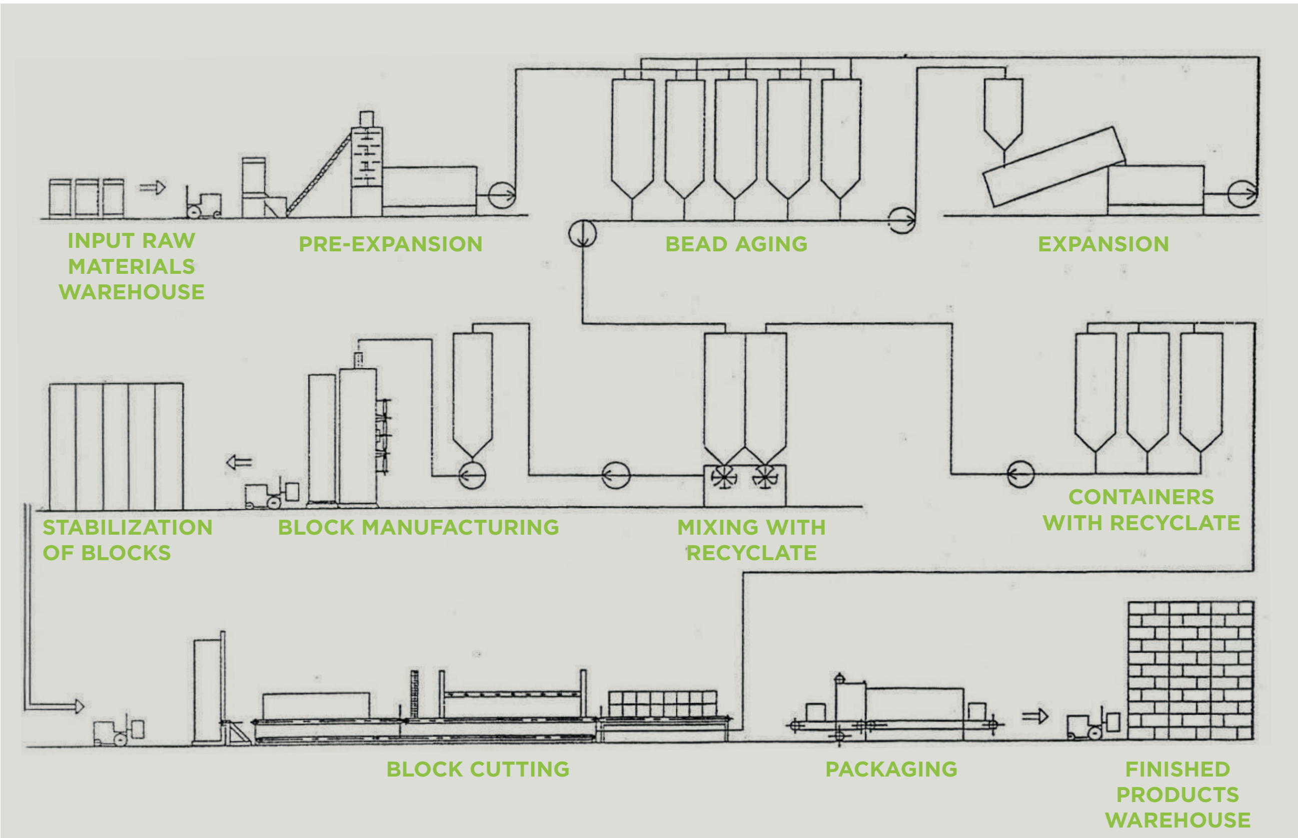

Fig. 3 – Diagram of polystyrene foam production

Fig. 4 – Primary raw material

Fig. 5 – Pre-expansion

Fig. 6 – Aging of beads

Fig. 7 – Adding recyclates

Fig. 8 – Block production

Fig. 9 – Block stabilization

Fig. 10 – Board cutting

Fig. 11 – Cutting detail

Fig. 12 – Packaging

Note:
In the manufacture of ISOVER EPS GreyWall the colour of the primary raw material, as well as the blocks, is grey.

CONSTRUCTION PROCESS STAGE A4–A5

The construction stage is divided into two modules: transport to construction site A4 and installation A5.

A4, Transport to the construction site

This module includes transport from the plant gate to the construction site. Traffic is calculated based on the scenario described in Table 5.

Tab. 5 - Scenario for the calculation of stage A4

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	93 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	14.5 kg/m^3
Volume capacity utilisation factor	1 (by default)

- **A5, Installation in the building**

  For ISOVER EPS GreyWall the bonding of the EPS boards to the walls is included, using cement adhesive for ETICS (3 kg·m^2).

  During this process a certain amount of material is left unprocessed, resulting in so-called pruning and waste.

  How this unprocessed and waste material is further handled is described in Table 6.

Tab. 6 – Scenario for the calculation of stage A5

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 residues are 100% collected and recycled where possible; 60 % of residual EPS is landfilled, 40 % is recycled

THE USAGE STAGE IS DIVIDED INTO THE FOLLOWING MODULES:

- **B1: Use**
- **B2: Maintenance**
- **B3: Repair**
- **B4: Repair**
- **B5: Reconstruction**
- **B6: Operating energy consumption**
- **B7: Operating water consumption**

Once installation of the material is completed no further technical operations are required in connection with the thermal insulation during the use of the building until the end of its service life. For this reason these values are not quantified in the EPD. The thermal savings potential shall be calculated at the building level, i.e. outside the EPD product boundaries.

END-OF-LIFE STAGE C1-C4

This stage includes various end-of-life modules, see below for details.

C1, deconstruction, demolition

The deconstruction and/or removal of the insulation is part of the demolition of the whole building. From a thermal insulation perspective, the environmental impact of this module is very small and therefore not quantified in the EPD.

C2, transport to waste processing

The transport utilisation model described in Table 7 is used.

C3, waste processing for reuse, utilization and/or recycling

EPS has great potential for further processing, recycling. In the considered scenario, a 40% take-back of the products to a production plant or recycling centre is calculated, where it is subsequently recycled into raw material for EPS production, or used in downcycling into polystyrene concrete, compactors or garden substrates.

C4, removal

In the end-of-life scenario, 60% landfilling of waste is considered.

Tab. 7 – Scenario for the calculation of stage C2, C3, C4

Parameter	Value
Collection process specified by type	1 450 g (together with mixed construction waste)
Distance to factory, recycling centre, landfill	25 km
Transport mode under consideration	average truck with trailer - 24t load, 38 l/100 km
Amount of recycling	580 g recycled
Landfilling	870 g landfilled

REUSE/UTILIZATION/RECYCLING POTENTIAL, D

40% of the EPS is reusable, as detailed in the previous chapters. In the future, this figure is expected to increase to 100% (at the expense of landfilling).

A detailed description of the results is shown in the following tables. The environmental values are valid for a thickness of 100 mm. Values valid for other thicknesses can be obtained by linear interpolation. The conversion factor is shown in Table 12.

The A5 module of the construction stage is not interpolated, it applies at flat rate to all product thicknesses.

The environmental impact of the product (Module B1-B7) will only become apparent when the product is accounted for within the structure, the building.

Tab. 8 – Environmental impacts

Parameters	Unit	Product stage	Construction process stage		Use stage	End-of-life stage				Reuse, recovery, recycling
		A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
Global Warming Potential (GWP)[1]	kg CO_2 equiv /FU	4.7 E+00	1.7 E-01	2.8 E+00	MND	MND	4.5 E-02	0	0	4.7 E-01
Ozone Depletion (ODP)[2]	kg CFC 11 equiv /FU	4.0 E-08	1.2 E-07	8.7 E-09	MND	MND	3.1 E-08	0	0	1.4 E-07
Acidification potential (AP)[3]	kg SO_2 equiv /FU	6.4 E-03	1.0 E-03	6.9 E-03	MND	MND	2.7 E-04	0	0	4.5 E-03
Eutrophication potential (EP)[4]	kg PO_4^{3-} equiv /FU	1.1 E-03	2.5 E-04	8.8 E-04	MND	MND	6.6 E-05	0	3.4 E-06	8.8 E-05
Photochemical ozone creation (POPC)[5]	kg C_2H_4 equiv /FU	6.5 E-03	7.4 E-05	8.7 E-04	MND	MND	2.0 E-05	0	0	3.3 E-04
Abiotic depletion potential for non-fossil ressources (ADP-elements)[6]	kg Sb equiv /FU	1.9 E-06	4.3 E-11	1.6 E-07	MND	MND	1.1 E-11	0	0	3.8 E-07
Abiotic depletion potential for fossil ressources (ADP-fossil fuels)[6]	MJ /FU	1.4 E+02	2.1 E+00	2.2 E+01	MND	MND	5.6 E-01	0	0	1.8 E+01

MND = „module not declared“

1 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..

2 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.

3 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.

4 Excessive enrichment of waters and continental surfaces with nutrients, and the associated adverse biological effects.

5 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.

6 Consumption of non-renewable resources, thereby lowering their availability for future generations.

Tab. 9 – Resource use

Parameters	Product stage	Construction process stage		Use stage	End-of-life stage				Reuse, recovery, recycling
	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
Use of renewable primary energy excluding renewable primary energy resources used as raw materials - MJ/FU	1.6 E+00	1.2 E-03	1.5 E+00	MND	MND	3.1 E-04	0	0	2.1 E+00
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	1.6 E+00	1.2 E-03	1.5 E+00	MND	MND	3.1 E-04	0	0	2.1 E+00
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials - MJ/FU	1.4 E+02	2.1 E+00	2.3 E+01	MND	MND	5.6 E-01	0	0	1.8 E+01
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	1.4 E+02	2.1 E+00	2.3 E+01	MND	MND	5.6 E-01	0	0	1.8 E+01
Use of secondary material kg/FU	0	0	2.1 E-01	MND	MND	0	0	0	6.8 E-01
Use of renewable secondary fuels - MJ/FU	-	-	-	-	-	-	-	-	-
Use of non-renewable secondary fuels - MJ/FU	-	-	-	-	-	-	-	-	-
Use of net fresh water - m^3/FU	4.9 E-03	2.0 E-04	4.8 E-03	MND	MND	5.3 E-05	0	0	2.7 E-03

Tab. 10 – Waste categories

Parameters	Unit	Product stage	Construction process stage		Use stage	End-of-life stage				Reuse, recovery, recycling
		A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
Hazardous waste disposed	kg /FU	2.2 E-04	4.8 E-05	3.2 E-04	MND	MND	1.3 E-05	0	0	1.3 E-02
Non-hazardous waste disposed	kg /FU	9.5 E-02	1.8 E-04	2.0 E-01	MND	MND	4.8 E-05	0	8.7 E-01	1.0 E-01
Radioactive waste disposed	kg /FU	9.0 E-04	3.3 E-05	1.3 E-04	MND	MND	8.9 E-06	0	0	5.3 E-05

MND = „module not declared“
The effect of the product in the phase B1-B7 will be count in to the level of the building structure.

Tab. 11 – Other output flows

Parameters	Unit	Product stage	Construction process stage		Use stage	End-of-life stage				D Reuse, recovery, recycling
		A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
Components for re-use	kg /FU	-	-	-	-	-	-	-	-	-
Materials for recycling	kg /FU	-	-	-	-	-	-	-	-	-
Materials for energy recovery	kg /FU	4.3 E-04	8.3 E-07	7.2 E-02	MND	MND	2.2 E-07	5.8 E-01	0	4.5 E-01
Exported energy	MJ /FU	6.1 E-02	0	3.1 E-03	MND	MND	0	0	0	6.0 E+00

MND = „module not declared“
The effect of the product in the phase B1-B7 will be count in to the level of the building structure.

Tab. 12 – Environmental impacts of other thicknesses can be recounted by the design factor (on the material density and thickness base):

Thickness (mm)	20	30	50	80	100	120	140	160	200
Faktor	0.2	0.3	0.5	0.8	1	1.2	1.4	1.6	2

[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.

Fig. 13 – The interpretation of results LCA according to SG PCR

ENVIRONMENTAL POLICY OF SAINT-GOBAIN

The vision of Saint-Gobain in environmental policy is to respect the principles of sustainable development, to reduce environmental impact at all stages of the life cycle, while preserving and improving all useful properties of their products.

The Group has two long-term objectives: zero environmental accidents and continuous reduction of environmental impacts (see Table 13). Long-term objectives are met by medium-term and short-term goals. The Group emphasizes in particular the following environmental areas: feedstock, waste, energy, atmospheric emissions, water, biodiversity and environmental accidents.

Tab. 13 – Long term goals of the group Saint Gobain in the environmental

	Non recovered waste (2010–2025) **Long-therm goal**	-50 % zero non-recovered waste
	Energy consumption (2010–2025) **CO_2 emissions (2010–2025)**	-15 % -20 %
	Water discharge (2010–2025) **Long-therm goal**	-80 % zero industrial water discharge in liquid form
	Target by 2025	promote the preservation of natural areas at Company sites as much as possible
	Target by 2025	EvE2 / site / year < 0.25 (EvE: Environment Event management standard from Saint-Gobain)

More informations CSR (Corporate Sustainability Report) on the website www.saint-gobain.com

The production process in all ISOVER plants in the Czech Republic complies with international standards EN ISO 9001 and EN ISO 14001.


Certifikát

Saint-Gobain Construction Products CZ a.s.

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ČSN EN ISO 9001:2009

Fig. 14 – ISO 9001

Fig. 15 – ISO 14001

The production of building materials has a significant impact on the environment. Building products are an integral part of the overall quality of a building. There is no uniform methodology for the environmental certification of buildings. However, the use of international certification schemes that comprehensively assess buildings for compliance with sustainable building principles is being promoted. The main environmental certification systems for buildings are LEED and BREEAM.

Tab. 14 - Creditable product credits for ISOVER EPS GreyWall

LEED NC 2009	
MRc2	the product is 100% recyclable in the context of construction waste disposal
LEEDv4	
EAc1	significantly reduces the energy consumption of the building
MRc1	environmental data from EPDs can be used at the building level
MRc2	the product has an EPD verified by a third party and a comparison with the industry average
MRc3	corporate Sustainability report is available
MRc4	Health Product Declaration (HPD), EMS process documentation (ISO 14001, CASRN product composition, REACH protocol, and supply chain documentation are available
BREEAM 2016	
MAT 01	EPD can be used for LCA at building level
MAT 03	process documentation according to EMS (ISO 14001)
ENE 01	due to insulation the building has less heating requirements and CO_2 emissions are reduced

More detailed information on the use of EPDs in the LEED and BREEAM certification systems is available in the SG publication for environmental certification of buildings.

A comparison of the environmental performance of the product with the industry average can be supplied on request.

More info at www.isover.cz, or at info@isover.cz

Fig. 16 - SG Catalogue for Environmental Certification of Buildings

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