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The Norwegian EPD Foundation

ENVIRONMENTAL PRODUCT DECLARATION

in accordance with ISO 14025, ISO 21930 and EN 15804

Owner of the declaration:	Glasopor AS
Program operator:	The Norwegian EPD Foundation
Publisher:	The Norwegian EPD Foundation
Declaration number:	NEPD-2012-889-EN
Registration number:	NEPD-2012-889-EN
ECO Platform reference number:	-
Issue date:	16.01.2020
Valid to:	16.01.2025

Glasopor® 10-60mm

Glasopor AS

www.epd-norge.no

General information

Product:
Glasopor® 10-60mm

Owner of the declaration:
Glasopor AS
Contact person: Svend Aage Larsen
Phone: +47 906 46 147
e-mail: svend.aage.larsen@glasopor.no

Program operator:
The Norwegian EPD Foundation
Pb. 5250 Majorstuen, 0303 Oslo
Phone: +47 977 22 020
e-mail: post@epd-norge.no

Manufacturer:
Glasopor AS

Declaration number:
NEPD-2012-889-EN

Place of production:
Onsøy stasjon 15, 1615 Fredrikstad, Norway

ECO Platform reference number:

Management system:
TI certificate no 482: NS-ISO 9001, NS-ISO 14001, NS-ISO 50001, OHSAS 18001

This declaration is based on Product Category Rules:
CEN Standard EN 15804 serves as core PCR
Requirements on the EPD PCR part A: Construction Products and services from The Norwegian EPD Foundation and PCR Part B: Lightweight aggregates / Bulk granulate, v. 04.12.2017 from www.ibu-epd.com (IBU)

Organisation no:
No 884 344 662

Statement of liability:
The owner of the declaration shall be liable for the underlying information and evidence. EPD Norway shall not be liable with respect to manufacturerinformation, life cycle assessment data and evidences.

Issue date:
16.01.2020

Valid to:
16.01.2025

Declared unit:
1 m^3 of Glasopor® 10-60 mm, bulk (180 kg/m^3),

Year of study:
2019

Declared unit with option:
A1-A3, A4 and A5

Comparability:
EPD of construction products may not be comparable if they not comply with EN 15804 and seen in a building context.

Functional unit:

The EPD has been worked out by:

Kjersti Prestrud

Østfoldforskning

Verification:
The CEN Norm EN 15804 serves as the core PCR. Independent verification of the declaration and data, according to ISO14025:2010

☐ internal ☒ external

Third party verifier:

Ole Magnus Kålås Iversen
(Independent verifier approved by EPD Norway)

Approved

Håkon Hauan
Managing Director of EPD-Norway

Product

Product description:

Glasopor is a cellular glass aggregate made from recycled glass containers collected from households in Norway. After going through a glass sorting facility, the glass is milled to glass powder. After milling and mixing the glass is expanded 7-8 times in a kiln at temperatures of 900oC. The output of the kiln breaks by cooling into a granular material of 10-60 mm with dry bulk density of 180 kg/m3. The product can be used as thermal insulation and draining layer. It can also be used as light weight filling material.

Technical data:

Typical property	*Test method*	*Typical value*
Loose bulk density	NS-EN 1097-3	180 kg/m^3
Particle density	NS-EN 1097-6	380 kg/m^3
Thermal conductivity (dry)	NS-EN 12667	0,097 W/mK
Thermal conductivity (wet)	NS-EN 12667	0,107 W/mK

Product specification:

Glasopor is produced from the waste fraction sorted from the recycled, used glass containers.

Materials	kg	%
Recycled glass	176.4	98.00 %
Recycled silicone carbide	3.6	2.00 %
Total for product	180	100 %

See www.glasopor.no for more information

Market:

Norway

Reference service life:

Limited by the service life of the construction were the product is used.

Indication of intended use:

The product is intended to be used as a thermal insulation and draining layer and lightweight filling material below roads or railroads”

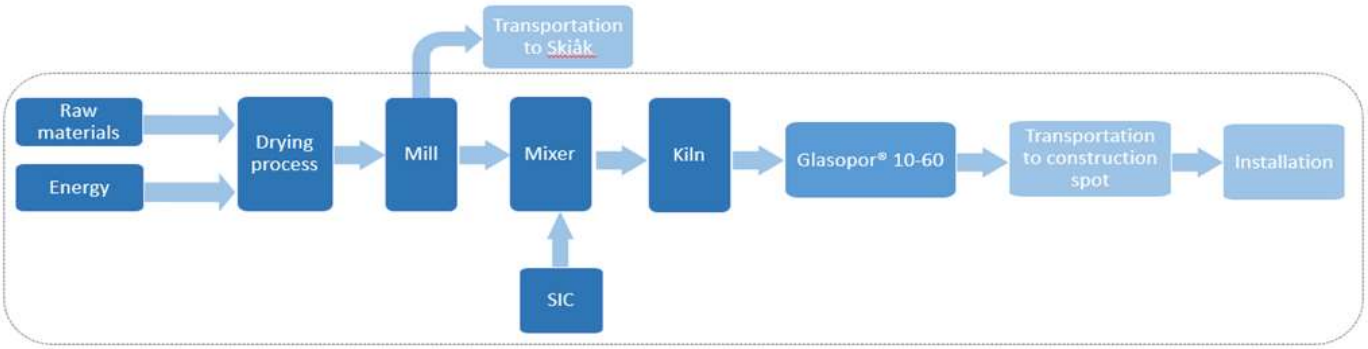
LCA: Calculation rules

Declared unit:

1 m3 of Glasopor® 10-60 mm, bulk (180 kg/m3),

System boundary:

The system boundary of the EPD follows the modular structure in line with EN 15804. Flow chart for the complete life cycle (A1-A5) with system boundaries are shown in the figure below. Outside the system boundary, but given in the flowchart, is the amount of milled glass that is sent to another production site.



Data quality:

Raw material	Data quality	Data Source and description	Age of data
Recycled glass	Specific data	Waste fraction from glass recycling, Impacts are allocated to recycled glass.	2018
Recycled silicone carbide	Specific data	Waste fraction from silicone production. Impacts are allocated to the silicone	2018
Energy			
Use	Specific data	Glasopor AS, Onsøy	2018
Extraction and combustion	Database	EcoInvent 3.5	
Transport			
Fuel consumption	Specific data	Glasopor AS, Onsøy	2018
Extraction and combustion	Database	EcoInvent 3.5	

Other data are from ecoinvent v3.5, released in 2018, with some changes to improve the representativeness.

Allocation:

The allocation is made in accordance with the provisions of EN 15804. Effects of primary production of recycled materials are allocated to the main product in which the material was used. The recycling process and transportation of the material is allocated to this analysis.

Cut-off criteria:

All major raw materials and all the essential energy is included. The production process for raw materials and energy flows that are included with very small amounts (<1%) are not included. This cut-off rule does not apply for hazardous materials and substances.

LCA: Scenarios and additional technical information

The following information describes the scenarios in the different modules of the EPD.

Additional technical information
Glasopor is a supplier of insulation and ground fillngs for all types of constructions. The products are made of the waste fraction from recycled glass. The material has an indefinite service life and require no maintenance during use. This product can be excavated and used as filling for new contruction's service life.

Transport from production site to user (A4)
All produced Glasopor is sent directly to the construction site, there is no central storage. A scenario where 50 km large lorry to the construction site is included. The transport is limited by volume.

Type	Capacity utilisation (incl. return) %	Type of vehicle	Distance km	Fuel/Energy	Unit
Truck	90.00 %	EURO6, 24 ton, diesel	50	0.018	l/tkm

Assembly (A5)
There is a negligible wastage of the product during the installation, and there is a diesel consumption of 4,1 MJ per declared unit. This diesel is used in a construction machine placing and installing the Glasopor.

	Unit	Value
Auxiliary	kg	0
Water consumption	m^3	0
Electricity consumption	MJ	0
Other energy carriers	MJ	4.1
Material loss	kg	0
Output materials from waste treatment	kg	0
Dust in the air	kg	0

LCA: Results

The results reflect the declared unit from cradle to factory gate (A-1 to A3), as well as transportation to construction site (A4) and installation of the product (A5).

System boundaries (X=included, MND= module not declared, MNR=module not relevant)

Product stage			Assemby stage		Use stage							End of life stage				Beyond the system boundaries
Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

Environmental impact

Parameter	Unit	A1-A3	A4	A5					
GWP	kg CO_2-eqv	3.85E+01	5.81E-04	3.71E-01					
ODP	kg CFC11-eqv	5.95E-06	1.12E-10	6.73E-08					
POCP	kg C_2H_4-eqv	1.07E-02	1.00E-07	7.41E-05					
AP	kg SO_2-eqv	9.68E-02	1.78E-06	2.82E-03					
EP	kg PO_4^{3-}-eqv	2.06E-02	5.70E-07	6.56E-04					
ADPM	kg Sb-eqv	2.80E-05	1.85E-09	1.25E-07					
ADPE	MJ	4.89E+02	9.35E-03	5.38E+00					

GWP Global warming potential; ODP Depletion potential of the stratospheric ozone layer; POCP Formation potential of tropospheric photochemical oxidants; AP Acidification potential of land and water; EP Eutrophication potential; ADPM Abiotic depletion potential for non fossil resources; ADPE Abiotic depletion potential for fossil resources

Resource use

Parameter	Unit	A1-A3	A4	A5					
RPEE	MJ	6.87E+01	5.99E-04	3.10E-02					
RPEM	MJ	9.38E+00	0.00E+00	2.40E-02					
TPE	MJ	7.81E+01	5.99E-04	3.77E-05					
NRPE	MJ	5.05E+02	9.55E-03	0.00E+00					
NRPM	MJ	0.00E+00	0.00E+00	0.00E+00					
TRPE	MJ	5.05E+02	9.55E-03	0.00E+00					
SM	kg	1.80E+02	0.00E+00	0.00E+00					
RSF	MJ	0.00E+00	0.00E+00	0.00E+00					
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00					
W	m^3	6.72E-02	3.65E-06	0.00E+00					

RPEE Renewable primary energy resources used as energy carrier; RPEM Renewable primary energy resources used as raw materials; TPE Total use of renewable primary energy resources; NRPE Non renewable primary energy resources used as energy carrier; NRPM Non renewable primary energy resources used as materials; TRPE Total use of non renewable primary energy resources; SM Use of secondary materials; RSF Use of renewable secondary fuels; NRSF Use of non renewable secondary fuels; W Use of net fresh water.

End of life - Waste

Parameter	Unit	A1-A3	A4	A5					
HW	kg	2.76E-04	7.54E-09	2.42E-06					
NHW	kg	4.42E+00	9.22E-04	2.40E-02					
RW	kg	3.29E-03	6.26E-08	3.77E-05					

HW Hazardous waste disposed; NHW Non hazardous waste disposed; RW Radioactive waste disposed

End of life - Output flow

Parameter	Unit	A1-A3	A4	A5					
CR	kg	0.00E+00	0.00E+00	0.00E+00					
MR	kg	1.48E-02	0.00E+00	0.00E+00					
MER	kg	0.00E+00	0.00E+00	0.00E+00					
EEE	MJ	8.99E-01	0.00E+00	0.00E+00					
ETE	MJ	9.89E+00	0.00E+00	0.00E+00					

CR Components for reuse; MR Materials for recycling; MER Materials for energy recovery; EEE Exported electric energy; ETE Exported thermal energy.

Reading example: 9,0 E-03 = $9{,}0*10^{-3}$ = 0,009

Additional Norwegian requirements

Greenhous gas emission from the use of electricity in the manufacturing phase
National consumption mix with import on low woltage (production of transmission lines, in addition to direct emissions and losses in grid) are applied electricity for the manufacturing prosess (A3).

Data source	Amount	Unit
Ecoinvent v3.5 (2018)	31.7	CO_2-eqv/kWh

Dangerous substances

- ☒ The product contains no substances given by the REACH Candidate list or the Norwegian priority list
- ☐ The product contains substances given by the REACH Candidate list or the Norwegian priority list that are less than 0,1 % by weight.
- ☐ The product contains dangerous substances, more than 0,1% by weight, given by the REACH Candidate List or the Norwegian Priority list, see table.
- ☐ The product contains no substances given by the REACH Candidate list or the Norwegian priority list. The product is classified as hazardous waste (Avfallsforskiften, Annex III), see table.

Transport

There is no central warehouse for Glasopor.

Indoor environment

The product is for outdooruse and the effect on indoor environment is not relevant.

Carbon footprint

Carbon footprint has not been worked out for the product.

Bibliography

ISO 14025:2010	*Environmental labels and declarations - Type III environmental declarations - Principles and procedures*
ISO 14044:2006	*Environmental management - Life cycle assessment - Requirements and guidelines*
EN 15804:2012+A1:2013	*Sustainability of construction works - Environmental product declaration - Core rules for the product category of construction products*
ISO 21930:2007	*Sustainability in building construction - Environmental declaration of building products*
Ecoinvent v3.5	*Swiss Centre of Life Cycle Inventories. www.ecoinvent.ch*
IBU (2017)	PCR Guidance texts for Building-Related Products and Services. Part B: Requirements on the EPD for Lightweight aggregates / Bulk granulate.
Prestrud (2019)	*LCA-report for Glasopor AS. Report OR.XX.19 from Østfoldforskning, Kråkerøy, Norway.*
Raadal et al. (2009).	*Raadal, H. L., Modahl, I. S. & Lyng, K-A. (2009). Klimaregnskap for avfallshåndtering, Fase I og II. Oppdragsrapport nr 18.09 fra Østfoldforskning, Norge*
The Norwegian EPD foundation (2017)	Product Category Rules. Part A: Construction products and services. EPD-Norge.

epd-norge.no The Norwegian EPD Foundation	**Publisher** The Norwegian EPD Foundation Post Box 5250 Majorstuen, 0303 Oslo Norway	Phone: e-mail: web	+47 97722020 post@epd-norge.no www.epd-norge.no
Glasopor	**Owner of the declaration** Glasopor AS Onsøy Stasjon 15 1615 Fredrikstad, Norway	Phone: e-mail: web	+47 906 46 147 svend.aage.larsen@sirkel.no www.glasopor.no
Østfoldforskning	**Author of the Life Cycle Assessment** Kjersti Prestrud Ostfold Research Stadion 4, 1671 Kråkerøy, Norway	Phone: Fax e-mail: web	+47 69 35 11 00 +47 69 34 24 94 post@ostfoldforskning.no www.ostfoldforskning.no