

ENVIRONMENTAL PRODUCT DECLARATION

in accordance with /ISO 14025/ and /EN 15804+A1/

Owner of the declaration	Pilkington Deutschland AG
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-PIL-20200097-IBC1-EN
Issue date	27.11.2020
Valid to	26.11.2025

Pilkington **Pyrostop**[®] and Pilkington **Pyrodur**[®] monolithic fire-rated glass

Pilkington Deutschland AG

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1. General Information

Pilkington Deutschland AG

Programme holder

IBU – Institut Bauen und Umwelt e.V.
Panoramastrasse 1
10178 Berlin
Germany

Declaration number

EPD-PIL-20200097-IBC1-EN

This declaration is based on the following product category rules:

Float glass in the construction industry, 07/2014 (PCR tested and approved by the independent advisory board (SVR))

Issue date

27.11.2020

Valid to

26.11.2025



Dipl.-Ing Hans Peters
(President of Institut Bauen und Umwelt e.V.)



Dr. Alexander Röder
(Executive Director Institut Bauen und Umwelt e.V.)

Pilkington **Pyrostop**[®] and Pilkington **Pyrodur**[®] monolithic fire-rated glass

Owner of the declaration

Pilkington Deutschland AG
Haydnstrasse 19
45884 Gelsenkirchen

Declared product/declared unit

Pilkington **Pyrostop**[®] and Pilkington **Pyrodur**[®] monolithic fire-rated glass.

The results were standardised on a glass thickness of 1 mm and a glass area of 1 m².

In addition, the results have been converted exemplarily for Pilkington **Pyrostop**[®] 30-10.

Scope

This environmental product declaration relates to Pilkington **Pyrostop**[®] and Pilkington **Pyrodur**[®] monolithic fire-rated glass manufactured in Germany at the production site in Gelsenkirchen.

This lifecycle assessment is based on average production data from the 2018/2019 business year. This was provided by Pilkington Deutschland AG.

The owner of the declaration is liable for the basic information and supporting evidence; any liability of the IBU in relation to manufacturer's information, LCA data and supporting evidence is excluded. This document is a translation from German to English. It is based on the original declaration number EPD-PIL-20200097-IBC1-DE.

This EPD was compiled in accordance with the requirements of */EN 15804+A1/*. This standard is described in simplified form as */EN 15804/* in the following.

Verification

European standard */EN 15804/* serves as the core PCR

Independent verification of the declaration and statements by an independent body in accordance with */ISO 14025:2010/*

internal external



Dr.-Ing. Andreas Ciroth,
Independent verifier appointed by SVR

2. Product

2.1 Product description/Product definition

Pilkington **Pyrostop**[®] is optimised fire-rated glass for structural fire protection for fire resistance classes EI 30 to EI 180 in accordance with */EN 13501-2/* for installation in partition walls, façades, roofs and

openable fire separating elements such as fire-rated doors. It is suitable for vertical, inclined or horizontal installation for both interior and exterior applications. Fire protection systems with Pilkington **Pyrostop**[®] can fulfil the requirements of the respective fire resistance class regardless of the direction of installation.

Pilkington **Pyrostop**[®] consists of several thin float glass panes with intermediate special alkali silicate-based fire protection interlayers. This structure achieves full thermal insulation by providing basic integrity and complying with the insulation criteria when subjected to standard fire exposure conditions. Heat transfer within the protected area is significantly reduced and the supporting constructions are verifiably cooled due to additional foaming of the intermediate interlayer into the glass rebate. As an integral component, a special circumferential edging tape is applied to protect the interlayer structure.

Pilkington **Pyrostop**[®] is /EN 14449/-compliant laminated safety glass. As a monolithic glass, it can be reinforced to achieve resistance class P6B in accordance with /EN 356/ by using additional integrated safety foil.

Pilkington **Pyrodur**[®] is a fire-rated glass optimised for structural fire protection for fire resistance classes E/EW 30 to E/EW 60 in accordance with /EN 13501-2/ for installation in partition walls, façades and roofs. It is suitable for vertical, inclined or horizontal installation for both interior and exterior applications.

Pilkington **Pyrodur**[®] relies on the same generic technology as Pilkington **Pyrostop**[®]. In addition to basic integrity performance, Pilkington **Pyrodur**[®] significantly reduces the transfer of radiant heat to the non-fire side. It offers almost the same variety of combinations as Pilkington **Pyrostop**[®].

EU regulation No. 305/2011 (CPR) dated 9th March 2011 applies for putting the product on the market in the EU/EFTA. The products require a declaration of performance in compliance with the harmonised European standard /EN 14449/ and CE labelling.

2.2 Application

Pilkington **Pyrostop**[®] and Pilkington **Pyrodur**[®] fire-rated and laminated safety glass is used mainly as monolithic glass in interior applications and mainly as insulated glass in exterior industrial, commercial and private applications.

Typical uses include as fire doors, partition walls, façades and roof glazing.

2.3 Technical data

The technical data for the different fire-rated glass types is to be found in the declarations of performance, the papers accompanying the product or the product data sheets (available on request).

Constructional data

As an example, the value range of the constructional data for Pilkington **Pyrostop**[®] and Pilkington **Pyrodur**[®] monolithic fire-rated glass is shown partially below (depending on the glass type and other performance features and additional functions).

Name	Value	Unit
Thermal transmittance in accordance with /EN 673/	3.8 - 5.5	W/(m ² K)
Total solar energy transmittance in accordance with /EN 410/	68 - 80	%
Light transmittance in accordance with /EN 410/	81 - 90	%
Sound reduction index in accordance with /EN 12758/	34 - 46	dB

The performance data of the product corresponds to the declaration of performance with regard to its main characteristics in accordance with /EN 14449:2005/: Glass in building – Laminated glass and laminated safety glass – conformity assessment.

The declarations of performance (DoP) in accordance with /EN 14449/ are available via the following Internet link:

<https://www.pilkington.com/de-de/de/planen-und-bauen/ce-kennzeichnung/product-and-ce-marking-information>

2.4 Delivery status

Pilkington **Pyrostop**[®] and Pilkington **Pyrodur**[®] are supplied as cut sizes in individual dimensions at customer request. Each pane of glass carries a customer label which shows the dimensions, the complete product code with nominal thickness and the weight. An additional sticker gives further instructions on handling fire-rated glass.

2.5 Base materials/ancillary materials

Pilkington **Pyrostop**[®] and Pilkington **Pyrodur**[®] consist of float glass and at least one specific fire protection interlayer. The fire protection interlayer is mainly made of sodium silicate with integrated water. There are products with and without safety foil.

a) Monolithic panes without safety foil

Name	Share [%]	Tolerance [%]
Float glass	77	± 10
Fire protection layer	23	± 8

b) Monolithic panes with safety foil

The share in these types of glass depends on the thickness of the safety foil used. The following table shows an example with an 0.38 mm thick PVB

(polyvinyl butyral) foil as this foil is used in most applications.

Name	Share [%]	Tolerance [%]
Float glass	81	± 10
Fire protection layer	18	± 12
Safety foil	1	± 0.8

All fire-rated glass is circumferentially protected with special adhesive tape. Thicker panes can also feature a fabric tape on top of the special adhesive tape.

The answer to all the following questions regarding the declared product is **no**:

- Does the product contain materials from the ECHA list of materials which are especially problematic for approval: Substances of Very High Concern – (SVHC, Date 07/10/2020) above a mass % of 0.1: **no**.
- Does the product contain Category 1A or 1B CMR materials which are not on the candidate list at a mass % concentration of above 0.1 in at least one partial product: **no**.
- Were biocidal products added to this building product or was it treated with biocidal products (is this therefore a processed product in terms of EU Biocide Product Directive no. 528/2012): **no**.

2.6 Manufacturing

The principal manufacturing process is as follows:

- Drying and laminating
- Sawing or cutting to customer sizes

2.7 Environment and health during use

Pilkington Deutschland AG has an integrated management system for health and safety protection, environmental protection, quality and energy. It is certified to /ISO 9001/, /ISO 14001/ and /ISO 50001/.

The most modern water treatment, recycling and energy management technologies are used during manufacture. Almost all waste material produced during manufacture such as glass waste, which is reused in the float line, is recycled.

2.8 Product processing/installation

Pilkington **Pyrostop**[®] and Pilkington **Pyrodur**[®] fire-rated glass is generally installed by trained metalworking or woodworking companies. Glazing work must be carried out in accordance with the respective fire protection-related certificates and take into account the system manufacturers' respective installation instructions and Pilkington Deutschland AG's respective current glazing guidelines.

2.9 Packaging

Fire-rated glass is generally supplied in wooden crates. The glass is placed on soft boards to protect it during transport.

2.10 Condition of use

With correct installation, no change in material composition is to be expected.

2.11 Environment and health during use

No interrelations between the product, the environment and health are to be expected.

2.12 Reference period of use

The reference period of use for monolithic laminated/laminated safety glass is set at 50 years.

2.13 Extraordinary influences

Fire

Pilkington **Pyrostop**[®] and Pilkington **Pyrodur**[®] fire-rated glass fulfils the reaction to fire tests for construction products in accordance with /EN 13501-1/ with classification depending on the respective fire-rated glass type.

The following table shows examples of reaction to fire tests in accordance with /EN 13501-1/ for monolithic fire-rated glass:

Name	Value
Pilkington Pyrostop [®] 30-10	A2-s1, d0
Pilkington Pyrostop [®] 30-20	B-s1, d0
Pilkington Pyrostop [®] 60-101	A2-s1, d0
Pilkington Pyrostop [®] 60-201	B-s1, d0
Pilkington Pyrostop [®] 90-102	A2-s1, d0
Pilkington Pyrostop [®] 90-201	B-s1, d0
Pilkington Pyrodur [®] 30-200	B-s1, d0
Pilkington Pyrodur [®] 30-203	B-s1, d0

Further details for all products can be found in Pilkington Deutschland AG's respective declarations of performance.

Water

The unforeseen impact of water such as flooding may lead to the partial separation of the fire protection layers. The components would dissolve in water and are classified by the suppliers of the pre-products as slightly hazardous to water in accordance with the Administrative Regulation on Substances Hazardous to Water (/VwVws/) dated 17th May 1999.

Mechanical destruction

No environmental effects are known of in case of possible unforeseen mechanical destruction.

2.14 End-of-life phase

The products can be re-melted in float lines following correct separation.

2.15 Disposal

Pilkington **Pyrostop**[®] and Pilkington **Pyrodur**[®] fire-rated glass can also be added to the smelt in float lines after removal of the edging tape.

The waste code according to the *European Waste Catalogue* is 10 11 12.

2.16 Further information

www.pilkington.com

3. LCA: Calculation rules

3.1 Declared unit

The declared unit relates to a pane of Pilkington **Pyrostop**[®] and Pilkington **Pyrodur**[®] monolithic fire-rated glass with a surface area of 1 m², a thickness of 1 mm and a weight of 2.37 kg. The results are linearly scalable against the thickness.

Name	Value	Unit
Glass surface area declared unit	1	m ²
Conversion factor to 1 kg	0.42	-

Relating to a thickness of 1 mm.

The scaled results are shown for the Pilkington **Pyrostop**[®] 30-10 reference product with a glass thickness of 15 mm and a weight of 35 kg/m².

3.2 System boundary

EPD type: Cradle to gate with options. This LCA includes the lifecycle stages of product manufacture plus the construction stage and end of life. The product stage covers Module A1 (Raw materials provision), A2 (Transport) and A3 (Manufacture). The construction stage covers Module A4 (Transport to the building site) and Module A5 (Disposal of packaging materials). Credits from reuse, recovery and recycling potential outside of the system boundary are shown in Module D in accordance with */EN 15804/*.

3.3 Estimations and assumptions

Disposal in landfill is added for the product's end of life. This is a conservative assumption since, for example, recycling in the container glass industry is possible in certain quantities.

3.4 Cut-off rules

All operational data collected was included in the lifecycle balance, i.e. all raw materials used and recorded, thermal energy use and electricity consumption. No measurements of emissions were taken on-site. The specific emissions which are attributable to the provision of thermal and electrical energy are included in the pre-chains for energy provision. It can be assumed that further emissions which occur during manufacture are extremely low and therefore not relevant. The actual transport distances were used for all inputs and outputs included.

The manufacture of machines, systems and other infrastructure required to produce the monolithic fire-rated glass under consideration was not included in the LCA. No emitted air contaminants which have a damaging effect on the environment were excluded.

3.5 Background data

The */GaBi 9/* software system for integrated lifecycle assessment developed by Sphera Solutions GmbH was used to model the lifecycle for the manufacture and disposal of the declared Pilkington Deutschland AG products. The consistent data in the */GaBi 9/* database is documented and can be viewed online in the */GaBi 9/ documentation*. In order to guarantee the comparability of the results, only the consistent background data in the */GaBi 9/* database was used in the LCA (e.g. records on energy, transport, auxiliary and operating materials). Since the declared fire-rated glass is manufactured in Germany, the reference area of Germany was used for the LCA. European data was used where no specifically German data was available.

Pilkington sources 100 % of its electrical energy from hydro-electric power.

Pilkington Deutschland AG provided specific production data from the production site in Gelsenkirchen and input and output flows and energy and water consumption as annual averages (reference year 2018/2019). The products are manufactured on independent production lines so that the production data is specific to each product.

3.6 Data quality

All background data which is relevant for the LCAs was taken from the */GaBi 9/* database or provided by Pilkington Deutschland AG. The data used was last revised less than 5 years ago.

The data quality for the modelling can be regarded as being good. Corresponding data was present in the */GaBi 9/* database for all relevant pre-products used.

All */GaBi 9/* database data is reproduceable and traceable. The data used is representative in relation to the geographical, temporal and technological coverage area.

3.7 Period under review

Data for the fire-rated glass was collected by Pilkington Deutschland AG at its Gelsenkirchen (Germany) production site for the 2018/2019 business year.

3.8 Allocation

The following allocations were made:

- The glass fragments from production which accrue in the system are returned to the manufacture of float glass up to saturation point (closed loop). The remainder of the glass fragments is credited via an equivalence process. This credit is made in Module D.

- The product-specific quantities of energy used were classified by the manufacturer on the basis of the square metres produced.

3.9 Comparability

In principle, a comparison or the evaluation of EPD data is only possible if all data to be compared was compiled in accordance with /EN 15804/ and the building context or product-specific performance characteristics have been included.

The /GaBi 9/ database was used for this study.

4. LCA: Scenarios and further technical information

Transport to the building site (A4)

Name	Value	Unit
Transport distance	753	km
Capacity utilisation (including empty runs)	85	%

The transport distance is based on an annual average.

Recycling of packaging materials (A5)

Name	Value	Unit
Packaging for energy recovery (timber)	4.74	kg
Packaging for landfill (remainders)	0.04	kg

Reference to a thickness of 1 mm and a surface area of 1 m².

The packaging (normally made of wood) is thermally recycled. The resulting credit is included in Module D.

Reuse, recovery and recycling potential (D), relevant scenario information

Disposal in landfill is added for the product's end of life. This is a conservative assumption since, for example, recycling in the container glass industry is possible in certain quantities.

Name	Value	Unit
As mixed building waste	2.37	kg
To landfill	2.37	kg

Reference to a thickness of 1 mm and a surface area of 1 m².

5. LCA: Results

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE NOT DECLARED; MNR = MODULE NOT RELEVANT)

Production stage			Construction process stage		Use stage							End of life stage				Credits and loads beyond the system boundary
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use/application	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction/demolition	Transport	Waste processing	Disposal	Reuse, recovery or 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	MNR	MNR	MNR	MND	MND	MND	MND	MND	X	X

RESULTS OF THE LCA – ENVIRONMENTAL IMPACT in accordance with /EN 15804+A1/: Pilkington Pyrostop® and Pilkington Pyrodur® monolithic fire-rated glass: 1 m², weight: 2.37 kg, thickness: 1 mm

Parameter	Unit	A1-A3	A4	A5	C4	D
Global warming potential	[kg CO ₂ eq.]	5.44E+0	1.06E-1	4.54E-1	3.52E-2	-1.75E-1
Depletion potential of the stratospheric ozone layer	[kg CFC11 eq.]	1.68E-14	3.60E-17	1.33E-16	2.05E-16	-3.63E-15
Acidification potential of land and water	[kg SO ₂ eq.]	3.26E-2	7.72E-5	5.38E-5	2.11E-4	-1.88E-4
Eutrophication potential	[kg (PO ₄) ³ eq.]	4.36E-3	1.71E-5	1.19E-5	2.40E-5	-3.12E-5
Formation potential for tropospheric ozone photochemical oxidants	[kg Ethene eq.]	-2.90E-3	-7.15E-7	3.64E-6	1.62E-5	-1.69E-5
Abiotic depletion potential for non-fossil resources	[kg Sb eq.]	1.56E-5	9.96E-9	5.46E-9	1.30E-8	-8.76E-8
Abiotic depletion potential for fossil resources	[MJ]	7.57E+1	1.41E+0	9.79E-2	4.94E-1	-2.26E+0

RESULTS OF THE LCA – ENVIRONMENTAL IMPACT in accordance with /EN 15804+A1/: Pilkington Pyrostop® and Pilkington Pyrodur® monolithic fire-rated glass: 1 m², weight: 2.37 kg, thickness: 1 mm

Parameter	Unit	A1-A3	A4	A5	C4	D
Renewable primary energy as energy carrier	[MJ]	1.79E+1	8.60E-2	4.25E+0	6.47E-2	-5.99E-1
Renewable primary energy resources as material utilisation	[MJ]	4.23E+0	0.00E+0	-4.23E+0	0.00E+0	0.00E+0
Total use of renewable primary energy resources	[MJ]	2.21E+1	8.60E-2	2.22E-2	6.47E-2	-5.99E-1
Non-renewable primary energy as energy carrier	[MJ]	7.87E+1	1.41E+0	1.08E-1	5.11E-1	-2.52E+0
Non-renewable primary energy resources as material utilisation	[MJ]	2.00E-4	0.00E+0	-2.00E-4	0.00E+0	0.00E+0
Total use of non-renewable primary energy resources	[MJ]	7.87E+1	1.41E+0	1.08E-1	5.11E-1	-2.52E+0
Use of secondary materials	[kg]	7.65E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Use of renewable secondary fuels	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Use of non-renewable secondary fuels	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Use of net fresh water	[m ³]	3.20E-2	9.86E-5	1.09E-3	1.29E-4	-3.30E-4

RESULTS OF THE LCA: OUTPUT FLOWS AND WASTE CATEGORIES TO /EN 15804+A1/:

Pilkington Pyrostop® and Pilkington Pyrodur® monolithic fire-rated glass: 1 m², weight: 2.37 kg, thickness: 1 mm

Parameter	Unit	A1-A3	A4	A5	C4	D
Hazardous waste disposal	[kg]	1.46E-7	8.05E-8	1.05E-10	8.71E-9	-4.61E-9
Non-hazardous waste disposal	[kg]	4.14E-1	9.48E-5	3.31E-3	2.37E+0	-1.04E-3
Radioactive waste disposal	[kg]	1.19E-3	1.68E-6	3.85E-6	6.85E-6	-1.05E-4
Components for reuse	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Materials for recycling	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Materials for energy recovery	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Exported electrical energy	[MJ]	0.00E+0	0.00E+0	5.51E-1	0.00E+0	0.00E+0
Exported thermal energy	[MJ]	0.00E+0	0.00E+0	1.29E+0	0.00E+0	0.00E+0

Radioactive waste is attributable to the provision of electricity in the raw materials pre-chain. No radioactive waste is produced in the manufacture of the product itself. Hazardous waste is caused by the pre-chains; this also does not accrue during the production phase.

In order to illustrate the use of this data for Pilkington **Pyrostop®** and Pilkington **Pyrodur®** monolithic fire-rated glass, the data has been converted for the Pilkington **Pyrostop®** 30-10 product with a total thickness of 15 mm.

Results of the LCA for the Pilkington Pyrostop® 30-10 reference product
DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE NOT DECLARED; MNR = MODULE NOT RELEVANT)

Production stage			Construction process stage		Use stage							End of life stage			Credits and loads beyond the system boundary	
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use/application	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction/demolition	Transport	Waste processing	Disposal	Reuse, recovery or 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	MNR	MNR	MNR	MND	MND	MND	MND	X	X	X

RESULTS OF THE LCA – ENVIRONMENTAL IMPACT in accordance with /EN 15804+A1/: Pilkington Pyrostop® 30-10 monolithic fire-rated glass: 1 m², weight: 35.0 kg, thickness: 15 mm

Parameter	Unit	A1-A3	A4	A5	C3	C4	D
Global warming potential	[kg CO ₂ eq.]	8.16E+01	1.59E+00	6.81E+00	5.28E-01	-2.63E+00	8.16E+01
Depletion potential of the stratospheric ozone layer	[kg CFC11 eq.]	2.52E-13	5.40E-16	2.00E-15	3.08E-15	-5.45E-14	2.52E-13
Acidification potential of land and water	[kg SO ₂ eq.]	4.89E-01	1.16E-03	8.07E-04	3.17E-03	-2.82E-03	4.89E-01
Eutrophication potential	[kg (PO ₄) ³ -eq.]	6.54E-02	2.57E-04	1.79E-04	3.60E-04	-4.68E-04	6.54E-02
Formation potential for tropospheric ozone photochemical oxidants	[kg Ethene eq.]	-4.35E-02	-1.07E-05	5.46E-05	2.43E-04	-2.54E-04	-4.35E-02
Abiotic depletion potential for non-fossil resources	[kg Sb eq.]	2.34E-04	1.49E-07	8.19E-08	1.95E-07	-1.31E-06	2.34E-04
Abiotic depletion potential for fossil resources	[MJ]	1.14E+03	2.12E+01	1.47E+00	7.41E+00	-3.39E+01	1.14E+03

RESULTS OF THE LCA – ENVIRONMENTAL IMPACT in accordance with /EN 15804+A1/: Pilkington Pyrostop® 30-10 monolithic fire-rated glass: 1 m², weight: 35.0 kg, thickness: 15 mm

Parameter	Unit	A1-A3	A4	A5	C3	C4	D
Renewable primary energy as energy carrier	[MJ]	2.69E+02	1.29E+00	6.38E+01	9.71E-01	-8.99E+00	2.69E+02
Renewable primary energy resources as material utilisation	[MJ]	6.35E+01	0.00E+00	-6.35E+01	0.00E+00	0.00E+00	6.35E+01
Total use of renewable primary energy resources	[MJ]	3.32E+02	1.29E+00	3.33E-01	9.71E-01	-8.99E+00	3.32E+02
Non-renewable primary energy as energy carrier	[MJ]	1.18E+03	2.12E+01	1.62E+00	7.67E+00	-3.78E+01	1.18E+03
Non-renewable primary energy resources as material utilisation	[MJ]	3.00E-03	0.00E+00	-3.00E-03	0.00E+00	0.00E+00	3.00E-03
Total use of non-renewable primary energy resources	[MJ]	1.18E+03	2.12E+01	1.62E+00	7.67E+00	-3.78E+01	1.18E+03
Use of secondary materials	[kg]	1.15E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.15E+01
Use of renewable secondary fuels	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water	[m ³]	4.80E-01	1.48E-03	1.64E-02	1.94E-03	-4.95E-03	4.80E-01

RESULTS OF THE LCA: OUTPUT FLOWS AND WASTE CATEGORIES TO /EN 15804+A1/: Pilkington Pyrostop® 30-10 monolithic fire-rated glass: 1 m², weight: 35.0 kg, thickness: 15 mm

Parameter	Unit	A1-A3	A4	A5	C3	C4	D
Hazardous waste disposal	[kg]	2.19E-06	1.21E-06	1.58E-09	1.31E-07	-6.92E-08	2.19E-06
Non-hazardous waste disposal	[kg]	6.21E+00	1.42E-03	4.97E-02	3.56E+01	-1.56E-02	6.21E+00
Radioactive waste disposal	[kg]	1.79E-02	2.52E-05	5.78E-05	1.03E-04	-1.58E-03	1.79E-02
Components for reuse	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported electrical energy	[MJ]	0.00E+00	0.00E+00	8.27E+00	0.00E+00	0.00E+00	0.00E+00
Exported thermal energy	[MJ]	0.00E+00	0.00E+00	1.94E+01	0.00E+00	0.00E+00	0.00E+00

6. LCA: Interpretation

The LCA is dominated by the production stage. The provision of raw materials and their pre-chains have the greatest relevance. The results for the production stage are explained in the following. Float glass production enjoys the greatest importance in all impact categories (> 50 %). Float glass production makes a negative contribution to the formation potential of tropospheric ozone photochemical oxidants (POCP). The reason for this is nitrogen monoxide (NO) emissions which occur in float glass production during smelting and processing. NO emissions can lead to lower ozone concentrations as ozone can be reduced by NO to NO₂. The CML method takes this process into account by allocating NO emissions a negative characterisation factor for POCP.

In addition to float glass, water glass has a relevant influence in the abiotic (elementary) resource depletion category. In addition to float glass, the contribution of process steam in the global warming potential and abiotic depletion potential for fossil resources categories is extremely important for the overall result of the production stage.

Interpretation based on /ISO 14044/ terminology:

- Greatest importance, significant influence (contribution > 50 %).
- Extremely important relevant influence (contribution 25 % - 50 %).

7. Requisite evidence

No evidence is required according to the PCR.

8. References

/EN 356/

/DIN EN 356:2000-02/: Glass in building - Security glazing - Testing and classification of resistance against manual attack

/EN 410/

/DIN EN 410:2011-04/: Glass in building - Determination of luminous and solar characteristics of glazing

/EN 673/

/DIN EN 673:2011-04/: Glass in building - Determination of thermal transmittance (U value) - Calculation method

/EN 14449/

/DIN EN 14449:2005/: Glass in building - Laminated glass and laminated safety glass - Evaluation of conformity/Product standard

/EN 1279-5/

/DIN EN 1279-5:2018-10/: Glass in building - Insulating glass units - Part 5: Product standard.

/EN 12758/

/DIN EN 12758:2019-12/: Glass in building - Glazing and airborne sound insulation - Product descriptions, determination of properties and extension rules

/EN 13501-1/

/EN 13501-1:2018/: Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests

/EN 13501-2/

/EN 13501-2:2016/: Fire classification of construction products and building elements - Part 2: Classification using data from fire resistance tests, excluding ventilation services

/ISO 14025/

/ISO 14025:2006-07/, Environmental labels and declarations – Type III Environmental declarations – Principles and procedures

/ISO 14040/

/ISO 14040:2006/: Life cycle assessment - Requirements and guidelines

/ISO 14044/

/ISO 14044:2006-07/: Environmental management - Life cycle assessment - Requirements and guidelines

/EN 15804/

/DIN EN 15804:2020-03/: Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products

/ISO 9001/

/EN ISO 9001-11/: Quality management systems - Requirements

/ISO 14001/

/ISO 14001:2015-09/: Environmental management systems - Requirements with guidance for use

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/GaBi 9/ documentation

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Waste Shipments Regulation

The European Parliament and Council's Regulation No. EC 1013/2006 of 14th June 2006 on the shipment of waste

/VwVwS/

General Administrative Regulation on the Classification of Substances Hazardous to Water into Hazard Classes (17th May 1999)

**Publisher**

Institut Bauen und Umwelt e.V.
Panoramastrasse 1
10178 Berlin
Germany

Tel +49 (0)30 3087748- 0
Fax +49 (0)30 3087748- 29
Mail info@ibu-epd.com
Web www.ibu-epd.com

**Programme holder**

Institut Bauen und Umwelt e.V.
Panoramastrasse 1
10178 Berlin
Germany

Tel +49 (0)30 3087748- 0
Fax +49 (0)30 3087748- 29
Mail info@ibu-epd.com
Web www.ibu-epd.com

**Author of the lifecycle assessment**

Sphera Solutions GmbH
Hauptstrasse 111- 113
70771 Leinfelden-Echterdingen
Germany

Tel +49 711 341817-0
Fax +49 711 341817-25
Mail info@sphera.com
Web <http://www.sphera.com>

**Owner of the declaration**

Pilkington Deutschland AG
Haydnstrasse 19
45884 Gelsenkirchen
Germany

Tel +49 (0)209 168 0
Fax +49 (0)209 168 2056
Mail fireprotection@nsg.com
Web www.pilkington.com/fireprotection