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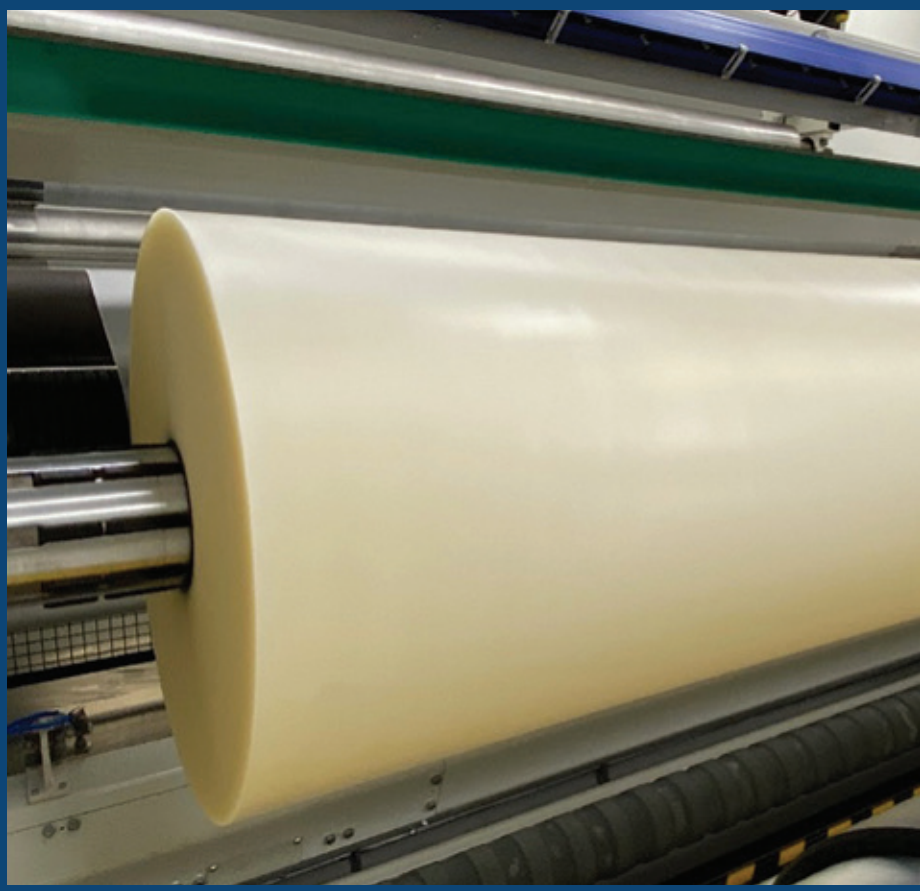
Environmental Product Declaration

In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021 for Saflex™ LiteCarbon™ Clear based on RB41L and including RB11L from Solutia Europe BV a subsidiary of Eastman Chemical Company

EPD of multiple products, based on a representative product

Programme:	The International EPD® System, www.environdec.com
Programme operator:	EPD International AB
EPD registration number:	EPD-IES-0016826
Version date:	2025-12-15
Validity date:	2030-12-15

*An EPD may be updated or depublished if conditions change. To find the latest version of the EPD and to confirm its validity, see **www.environdec.com**. Saflex LiteCarbon Clear RB41L and RB11L are recent to the market. Results of this EPD shall be used with care, as the LCI data for this product is not yet based on one year of production, which may result in increased uncertainty.*



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EPD®
THE INTERNATIONAL EPD® SYSTEM

General information

Programme information

Programme	The International EPD® System
Address	EPD International AB, Box 210 60, SE-100 31 Stockholm, Sweden
Website	www.environdec.com
Email	support@environdec.com

Accountability for PCR, LCA and independent third-party verification

Product category rules (PCR)

CEN standard EN 15804 serves as the core PCR.

PCR: Construction products, 2019:14. Version 2.0.1

Multipurpose films, UN CPC 36330 plastics: plates, sheets, film, foil and strip, of plastics, not self-adhesive, non-cellular and not reinforced, laminated, supported or similarly combined with other materials. Version 1.0.3

PCR review was conducted by the Technical Committee of the International EPD System. A full list of members is available on www.environdec.com. Review chair: Rob Rouwette. The review panel may be contacted via support@environdec.com.

Life cycle assessment (LCA)

LCA accountability: Bart De Bruycker, Eastman

Third-party verification

Independent, third-party verification of the declaration and data, according to ISO 14025:2006, via:

☒ Individual EPD verification without a pre-verified LCA/EPD tool

Third-party verifier: Matthias Schulz,
Schulz Sustainability Consulting,
matthias@schulz-sustainability-consulting.de

M. Schulz

Approved by The International EPD® System

Procedure for follow-up of data during EPD validity involves third-party verifier:

☐ Yes ☒ No

The EPD owner has the sole ownership, liability and responsibility for the EPD.

EPDs within the same product category but published in different EPD programmes, may not be comparable. For two EPDs to be comparable, they shall be based on the same PCR (including the same first-digit version number) or be based on fully aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have identical scope in terms of included life-cycle stages (unless the excluded life-cycle stage is demonstrated to be insignificant); apply identical impact assessment methods (including the same version of characterisation factors); and be valid at the time of comparison.

Information of EPD Owner

Owner of the EPD	Solutia Europe bv, a subsidiary of Eastman Chemical Company
Address	Ottergemsesteenweg Zuid 707, 9000 Ghent, Belgium
Contact	Kristin Smith Kristin.Smith@eastman.com

Description of the organisation

Eastman is a global specialty materials company that produces a broad range of products found in items people use every day. Eastman works with customers to deliver innovative products and solutions while maintaining a commitment to safety and sustainability. The company's innovation-driven growth model takes advantage of world-class technology platforms and differentiated application development to grow its leading positions in attractive end markets such as transportation, building and construction, and consumables. Eastman employs approximately 14,000 people around the world and serves customers in more than 100 countries. The company is headquartered in Kingsport, Tennessee, USA.

Solutia Europe BV is a subsidiary of Eastman covering the advanced interlayers business and branding name Saflex. Since 1937, glass fabricators and automotive engineers have counted on Saflex polyvinyl butyral (PVB) interlayers for high-quality products, reliable service and expert advice to help deliver world class technology for laminated glass. Eastman glazing products include Saflex PVB interlayers for glass lamination and Vanceva™ color PVB interlayers. Architects and engineers take advantage of our products' structural performance, variety of colors, acoustic sound reduction, and solar UV protection that provides the added benefits of safety, security and weight reduction inherent to the PVB when laminated between two or more pieces of glass.

Product-related or management system-related certifications: ISO 9001, ISO 14001, ISO 50001, IATF

Name and location of production site: Solutia Europe, Ottergemsesteenweg Zuid 707, 9000 Ghent, Belgium

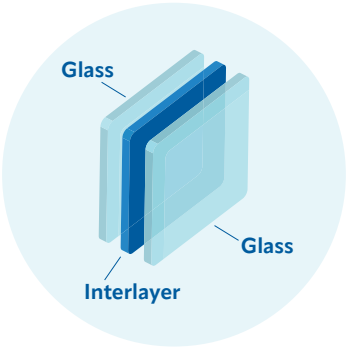
Product information

Product name: Saflex LiteCarbon Clear

Product identification and application

The products in scope are RB41L, which serves as the representative product in this EPD of multiple products and RB11L a thinner version within the Saflex LiteCarbon Clear product group. Saflex interlayers are plasticized polyvinyl butyral (PVB) sheeting produced by Eastman and its affiliates. These interlayers are bonded through a heat and pressure process to two or more pieces of glazing to produce laminates with impact and glass containment properties (see Figure 1). Laminated glasses with the properly selected type of Saflex interlayers are capable of being classified as safety glass in accordance with, but not limited to, various regulations such as ANSI Z97.1, AS/NZS 2208, CAN/CGSB 12.1, CNS 1183, CPSC 16 CFR 1201, EN 12600 and ISO 29584. Saflex interlayers were specifically formulated to provide exceptional durability when exposed to natural weathering. A more detailed list of Saflex formulations can be found at saflex-vanceva.eastman.com or by contacting your local Eastman representative.

Figure 1.



Visual representation of the interlayer product and its final application which is laminated glass.

Saflex interlayers should be stored inside the moisture barrier bag that the roll is shipped in and maintained within the temperatures recommended in the Saflex laminating guide. It is recommended that the interlayer be used within a three-year period from purchase to minimize roll blocking.

Saflex LiteCarbon Clear PVB interlayer should be processed in the same manner as Saflex Clear. Consult the laminating guide or your Saflex representative for more information.

Construction relevant parameters for Saflex™ LiteCarbon™ Clear PVB

Property	Test method	Unit	Conditions	Saflex value
Thickness	Eastman	mm	0.76 mm (RB41L); 0.38 mm (RB11L)	± 0.025 mm
Density	ASTM D792	g/cm^3	23°C	1.07
Thermal conductivity	ASTM D5930	W/m*K	65°C	0.2
Refractive index	ASTM D542		23°C	1.479
Visible transmittance	LBNL WINDOW 7.0 NFRC 100	%		89
Specific heat	ASTM E1269	J/kg-K	54°C	2107
Solar heat gain coefficient	NFRC 300	SHGC | g value		0.81 (RB41L); 0.83 (RB11L)
Elongation at failure	ISO 527-3	%	50 mm/min 23°C 50% RH	270
Tensile strength	ISO 527-3	MPa	50 mm/min 23°C 50% RH	23

More product performance data are available on request.

Composition/information on ingredients

Components	Concentration (% w/w)
PVB resin	70%–80%
Plasticizer	21%–30%
Additives	< 1%

Saflex ingredients are thoroughly screened based on substance of concern regulations. Saflex is SVHC and REACH compliant. Furthermore, it does not contain any biocides or PFAS. A full list of declarations can be found in the "Additional environmental information" chapter. Concerning the indoor air quality, laminated glass with a Saflex PVB interlayer is an inert material that doesn't release inorganic or organic compounds.

As Saflex interlayers are an intermediate of the final laminated glass application, a reference service life is therefore provided by the glass application.

Product description

This Environmental Product Declaration of multiple products, based on a representative product, presents the environmental impact of 1 m^2 Saflex LiteCarbon Clear RB41L. Developed from a holistic approach to sustainability, Saflex LiteCarbon Clear is Eastman's first-generation, reduced-carbon-footprint PVB interlayer. Saflex LiteCarbon Clear is the result of a comprehensive sustainability strategy that uses various approaches, including pre-consumer recycled content (ISO 14021), manufacturing energy efficiency, an optimized supply chain and operational excellence.

Compared to our baseline Saflex LCA performance, Saflex LiteCarbon Clear enables reduction of laminated glass embodied carbon and supports glass professionals' scope 3 reduction goals. Using Saflex LiteCarbon Clear contributes to LEED and BREEAM green building certification credits. The product provides unaltered aesthetics of laminated glass where safety, security and acoustic attributes are identical to conventional laminated Saflex products and are processable and compatible like any standard Saflex PVB interlayer.

Eastman conducted an attributional life cycle assessment (LCA) to evaluate the environmental profile of Saflex LiteCarbon Clear PVB interlayer. These condensed EPD results are based on a full LCA base report that meets ISO 14040/14044 rules and guidelines and has undergone a successful, third-party review.

Content declaration

Product components *(applicable for all products in the product group)*	**Wt%**	**Post-consumer material, wt%**	**Biogenic material, wt% and kg C/kg**
Resin/polyvinyl butyral (CAS 63148-65-2)	70%–80%	0%	0%
Plasticizer/TEG-2EH (CAS 94-28-0)	21%–30%	0%	0%
Additives	< 1%	0%	0%
Total	**100%**	**0%**	**0%**
Packaging materials	**Weight, kg/ declared unit**	**Wt% (vs. the product)**	**Weight biogenic carbon, kg C/declared unit**
Wooden crate	1.03E-02	1.26	4.26E-03
Wooden pallet	5.69E-03	0.70	2.36E-03
Metal crate	2.01E-03	0.25	0
Metal pallet	1.22E-04	0.02	0
Plastic pallet	5.03E-05	0.01	0
Polypropylene (core + plug)	3.53E-03	0.43	0
ABS core	5.21E-04	0.06	0
Aluminium bag	4.95E-04	0.06	0
Corrugated cardboard	1.27E-03	0.16	5.14E-04
Total	**2.40E-02 kg**	**2.95%**	**7.14E-03**[1]

[1]*The amount of corresponding CO_2 for packaging is 0.026 kg CO_2 eq/declared unit.*

Description of system boundaries

Cradle-to-gate with options: modules C1–C4, module D and modules A4–A5.

As Saflex PVB interlayer is an intermediate product of a final glazing application, the main data is centred in the cradle-to-gate boundary A1-A3 and A4-A5. The use stage (module B) will be part of the glazing EPD. For compliance with EN 15804, C modules are provided with default scenarios because they are not controlled by Eastman.

LCA information

Declared unit	1 square meter (m^2) of Saflex LiteCarbon Clear RB41L
UN CPC code	36330
Geographical scope	Saflex™ LiteCarbon™ Clear PVB interlayer is produced in Ghent, Belgium. The EPD results serve as a global proxy.
Time representativeness	Data collected in 2023. The Saflex LiteCarbon data collection period is driven on a campaign-based volume which provides a reliable basis aligned with the forecasted market needs for the first commercial year and offers insight into early trends beyond that period. This means that this volume covers the year-to-date production data. Therefore, this life cycle inventory (LCI) data has been proven to be representative/conservative for one year's worth of data.
Database(s) and LCA software used	LCA for Experts (LCAfE) formerly known as GaBi, version 10.7.1.28, was used to model the system, and the results presented use the 2023.2 LCA for Experts database produced and maintained by Sphera and EcoInvent version 3.8.
Cutoff rules	Any inputs less than 0.5% of total input mass or energy or any inputs which are deemed to have less than 1% contribution to relevant impact indicators (per engineering judgment).
Allocation procedure	Pre-consumer recycled content originating from outside the manufacturing site classified according to ISO 14021 enters the system boundary through the cut-off approach. This means it enters from a burden-free status. From that point impacts of recycling, transport and processing are added into the LCA.
Product variation	Variation between the products' GWP-GHG indicator is determined by the thickness depending conversion factor, which in this case is 50%.

Conversion to kg

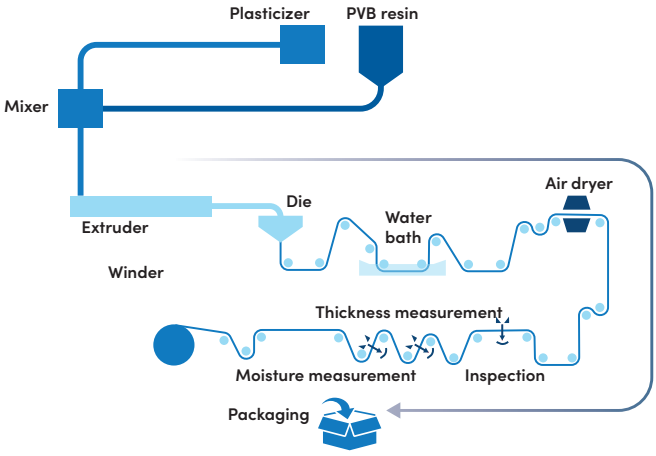
Declared unit	1 m^2
Weight	0.813 kg/m^2
Density	1070 kg/m^3
Thickness representative product (RB41L)	0.00076 m
Thickness added product (RB11L)	0.00038 m

Modules declared, geographical scope, share of specific data (in GWP-GHG results) and data variation (in GWP-GHG results): (X = declared; ND = module not declared)

	Product stage			Construction process stage		Use stage							End-of-life stage				Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction demolition	Transport	Waste processing	Disposal	Reuse-recovery-recycling potential
Module	**A1**	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Modules declared	X	X	X	X	X	ND							X	X	X	X	X
Geography	Belgium (EU)			EU		ND							EU				EU

Share of primary data — Primarily based on the utilization of primary data modelled in LCA for experts. Consequently, generic datasets for polyvinyl alcohol in the resin and TEG in the plasticizer are excluded from this calculation, leading to a primary data share of 68%. The share of primary data is calculated based on GWP-GHG results. It is a simplified indicator for data quality that supports the use of more primary data, to increase the representativeness of and comparability between EPDs. Note that the indicator does not capture all relevant aspects of data quality and is not comparable across product categories. Data quality rating was performed using the EcoInvent pedigree matrix, which scored an average of 1.7. Correlating with Annex E data quality scoring in EN15804: 1.7 relates to good, which is the second-highest ranking out of five.

Module description and technical information



Cooled storage/ warehousing | Transportation | Installation | End of life | Recovery

A1–A3	A4	A5	C1–C4	D

Included	Excluded
• Raw material production and transportation (A1) • Transport of chemicals/intermediates to resin and plasticizer manufacturing and transport to Ghent site (A2) • Saflex production (A3) • Packaging • Refrigerated storage and transport to central warehouse and/or customer (A4) • Impacts from outbound packaging waste treatment; end of life of wooden and corrugated cardboard (A5) • End-of-life stage (C1–C4) • Resource recovery stage (D)	• Use stage (B1–B7) • Corporate overhead, buildings, employee travel, maintenance of capital goods and infrastructure • Supplier transport of packaging materials • Transport of take-back programs • Warehouse utilities linked to packaging handling • Occasional PE stretch foil and roll stability cushions; pallet straps • Cooled packaging for occasional long-distance transport • End of life for metal and plastic crates/pallets, cores and plugs (going to external mechanical recycling) • Influence of refrigerant/coolant leakage for cooled warehouse/transport (refrigerant type used does not lead to direct GHG emissions and is assumed to be closed loop; influence of transport coolant is also excluded) • Emissions to air during resin and sheet production are determined to be below the cut-off rules • Wastewater treatment during the resin production is excluded and is determined to be below the cut-off rules. • Impacts related to additives are proven to be way below the cut-off rules and are excluded. However, every material is thoroughly checked on its REACH and SVHC compliancy. • PVB product waste treatment during lamination (A5), as it is used as pre-consumer recycled material.

A1–A3, product stage

Production of Saflex LiteCarbon Clear, including raw material acquisition (virgin: resin and plasticizer; secondary: pre-consumer recycled content according to ISO 14021), operations and waste treatment, energy supply, resource extraction, shipment, and final packaging

The majority of the upstream raw material production is under Eastman's control, ensuring quantitative primary data. Plasticizer and PVB resin are supplied to the sheet production plant. Upstream transportation is modeled into the LCA. Virgin raw materials are unloaded from their silos and follow a gravimetrical path from the top of the production plant. Attribution of pre-consumer recycled content according ISO 14021 is based on physical addition (controlled blending). A high-temperature melt is pushed through the dye tank to form the sheet, which then begins a gradual cool-down process through water baths to control shrinkage. The sheet continues along its path through dryers, with online thickness and moisture measurements, toward the winding process. Here, rolls are wound onto a polypropylene or ABS plastic core from full width into a variety of cuts and lengths. Samples are taken for quality control before the roll is packed.

Energy source behind the electricity used in the manufacturing process (A3) and related climate impact: Belgium Residual grid mix from the Sphera database in LCAfE with reference year 2022: 0.162 kg CO_2eq./kWh according to the GHG-GWP indicator.

A4, transport and warehousing

PVB interlayers are thermoplastics which means they get sticky above 10°–12°C. Therefore, PVB interlayers need to be stored in a cooled warehouse and transported with refrigerated trucks to the customers. Module A4 holds a weighted average refrigerated transport and warehouse model for Saflex LiteCarbon Clear from gate to customer.

A4 information	Unit per declared unit
Fuel type and consumption of vehicle or vehicle type used for transport, e.g., long distance truck, boat, etc.	• Container ship (EN 15804 A4) Sphera • Transport incl. fuel, Euro 0–6 mix, 40 t total weight, 27 t max payload • 0.0373 kWh/m^2 refrigerated warehouse and transport
Distance	• 1185 km by sea container • 880 km by road transport
Capacity utilisation	72.5%
Bulk density of transported products	1070 kg/m^3

A5, installation in the building

Installation/construction and associated waste — specific focus on the packaging waste treatment displayed in module A5, which will be linked to avoided energy generation declared in module D.

A5 information	Unit per declared unit
Output materials (specified by type) as result of waste processing at the building site, e.g., of collection for recycling, for energy recovery, disposal (specified by route)	• Cardboard: 1.27E-03 kg • Wood: 1.6E-02 kg • A PVB product waste rate of 0% is assumed as the impacts related to reuse in Saflex™ LiteCarbon™ Clear are included in modules A1–A3

C1–C4, end of life

This stage includes the next modules:

- C1 — deconstruction, demolition: Currently the most common practice is a manual deconstruction of the laminated glazing unit without environmental impacts.
- C2 — transport to waste processing: a 50 km transportation to the landfill site
- C3 — waste processing for reuse, recovery and/or recycling: 100% landfill so there is no reuse, recovery or recycling considered
- C4 — disposal considered 100% landfill. The product reaches its end-of-waste state after landfilling.

C1–C4 information	Unit per declared unit
Collection process specified by type	Assumed collected with mixed construction waste (laminated glass)
Recovery system specified by type	No recovery
Disposal specified by type	0.813 kg
Assumptions for scenario development	50 km transport to landfill site

Disclaimer: The results of the end-of-life stage (modules C1-C4) should be considered when using the results of the product stage (modules A1-A3). The C-module deviates from the default criteria proposed in the PCR. This stems from our practice of adopting the parameter values reported in the laminated-glazing EPDs of the majority of our customers, which we treat as the default values.

D, resource recovery stage

In module A5, the thermal and electrical energy generated from the incineration of cardboard and wooden packaging waste has been evaluated. The avoided burdens have been calculated by reversing the electricity grid mix and thermal energy from natural gas using European datasets.

Environmental Performance

The EN15804+A2 reference package LCIA methodology provided by JRC is used. These impact indicators are based on EF3.1. Primary data has been provided for every manufacturing plant. Secondary (generic) data are used from LCAfE software, Sphera and EcoInvent databases. The impact results are only relative statements, which do not indicate the end points of the impact categories, exceeding threshold values, safety margins and/or risks.

A factor can be applied to convert the declared results of a product group to specific products within the group. This applies to the thinner Saflex LiteCarbon Clear RB11L/0.00038 m variant and is detailed in the Additional Environmental Information section.

Mandatory impact category indicators according to EN 15804

Results per declared unit: 1 m^2 Saflex LiteCarbon Clear RB41L									
Indicator	**Unit**	**A1–A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-fossil	kg CO_2 eq.	2.43E+00	7.13E–02	6.34E–03	0	3.13E–03	0	2.39E–02	-1.07E–02
GWP-biogenic	kg CO_2 eq.	-1.21E–03	0	2.21E–02	0	0	0	0	-8.97E-06
GWP-luluc	kg CO_2 eq.	3.92E–04	9.33E–04	1.46E-07	0	5.29E–05	0	8.80E–05	1.01E-06
GWP-total	kg CO_2 eq.	2.42E+00	7.17E–02	2.84E-02	0	3.16E–03	0	2.39E-02	-1.07E–02
ODP	kg CFC 11 eq.	1.18E–09	4.86E–13	3.88E-15	0	3.17E–16	0	7.88E-14	-5.15E–14
AP	mol H^+ eq.	4.92E–03	5.26E–04	1.43E-05	0	1.88E–05	0	1.43E-04	-1.38E–05
EP-freshwater	kg P eq.	7.84E-06	2.49E–07	7.83E-10	0	1.34E–08	0	1.37E-05	-2.79E-09
EP-marine	kg N eq.	1.27E-03	2.44E-04	6.58E-06	0	9.20E–06	0	3.08E-05	-3.13E–06
EP-terrestrial	mol N eq.	1.38E-02	2.70E–03	7.80E-05	0	1.02E–04	0	3.38E-04	-3.40E–05
POCP	kg NMVOC eq.	5.42E-03	5.37E-04	1.69E-05	0	1.76E–05	0	9.86E-05	-9.47E–06
ADP-minerals and metals[1]	kg Sb eq.	3.68E-07	6.74E–09	3.85E-11	0	2.68E–10	0	1.59E-09	-3.53E–10
ADP-fossil[1]	MJ	7.01E+01	1.15E+00	8.77E-03	0	4.11E–02	0	4.04E-01	-1.82E–01
WDP[1]	m^3	9.62E-01	1.01E-03	3.13E-03	0	4.69E–05	0	3.09E-03	-2.74E–04
Acronyms	GWP-fossil = global warming potential, fossil fuels; GWP-biogenic = global warming potential, biogenic; GWP-luluc = global warming potential, land use and land use change; ODP = depletion potential of the stratospheric ozone layer; AP = acidification potential, accumulated exceedance; EP-freshwater = eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = eutrophication potential, accumulated exceedance; POCP = formation potential of tropospheric ozone; ADP-minerals and metals = abiotic depletion potential for non-fossil resources; ADP-fossil = abiotic depletion for fossil resources potential; WDP = water (user) deprivation potential, deprivation-weighted water consumption								

[1]*The results of this environmental impact indicator shall be used with care because the uncertainties of these results are high or there is limited experience with the indicator.*

Additional mandatory and voluntary impact category indicators

Results per declared unit: 1 m^2 Saflex LiteCarbon Clear RB41L									
Indicator	**Unit**	**A1–A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-GHG[1]	kg CO_2 eq.	2.43E+00	7.24E-02	6.34E-03	0	3.19E-03	0	2.41E-02	-1.07E-02
PM	Disease incidence	4.25E-08	7.19E-09	4.54E-11	0	1.20E-10	0	1.48E-09	-1.24E-10
IRP[2]	kBq U235 eq.	1.48E-01	5.40E-03	4.62E-05	0	7.42E-06	0	7.81E-04	-1.67E-03
ETP-fw[3]	CTUe	2.41E+01	6.32E-01	2.56E-03	0	3.03E-02	0	8.75E-01	-9.99E-03
HTP-c[3]	CTUh	1.12E-09	1.33E-11	4.10E-13	0	6.08E-13	0	1.30E-11	-1.16E-12
HTP-nc[3]	CTUh	2.09E-08	5.44E-10	2.85E-11	0	2.71E-11	0	2.72E-10	-4.38E-11
SQP[3]	dimensionless	2.95E+00	4.09E-01	2.54E-03	0	2.04E-02	0	6.86E-02	-8.49E-03
Acronyms	GWP-GHG = global warming potential-greenhouse gas; PM = particulate matter emissions; IRP = ionizing radiation, human health; ETP-fw = eco-toxicity – freshwater; HTP-c = human toxicity, cancer effect; HTP-nc = human toxicity, non-cancer effects; SQP = land use related impacts/soil quality								

[1]*This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. The indicator is identical to GWP-total except that the CF for biogenic CO_2 is set to zero.*
[2]*This impact category deals mainly with the eventual impact of low-dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure or radioactive waste disposal in underground facilities. Potential ionising radiation from the soil, from radon and from some construction materials is also not measured by this indicator.*
[3]*The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.*

Resource use indicators[1]

Results per declared unit: 1 m² Saflex LiteCarbon Clear RB41L									
Indicator	**Unit**	**A1–A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	2.88E+00	1.42E-01	2.68E-01	0	3.48E-03	0	6.10E-02	-1.25E-02
PERM	MJ	2.66E–01	0	-2.66E–01	0	0	0	0	0
PERT	MJ	3.15E+00	1.42E–01	1.83E-03	0	3.48E–03	0	6.10E–02	-1.25E–02
PENRE	MJ	4.57E+01	1.15E+00	8.77E–03	0	4.11E–02	0	2.58E+01	-1.82E–01
PENRM	MJ	2.54E+01	0	0	0	0	0	-2.54E+01	0
PENRT	MJ	7.11E+01	1.15E+00	8.77E–03	0	4.11E–02	0	4.04E–01	-1.82E–01
SM	kg	2.10E–01	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0
FW	m^3	3.54E–02	1.23E–04	7.36E–05	0	3.90E–06	0	9.23E–05	-1.77E–05
Acronyms	PERE = use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = use of renewable primary energy resources used as raw materials; PERT = total use of renewable primary energy resources; PENRE = use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = use of non-renewable primary energy resources used as raw materials; PENRT = total use of non-renewable primary energy re-sources; SM = use of secondary material; RSF = use of renewable secondary fuels; NRSF = use of non-renewable secondary fuels; FW = use of net fresh water								

[1] *The primary energy use indicators are calculated through option A according to Annex 3 in PCR2019:14.*

Waste indicators

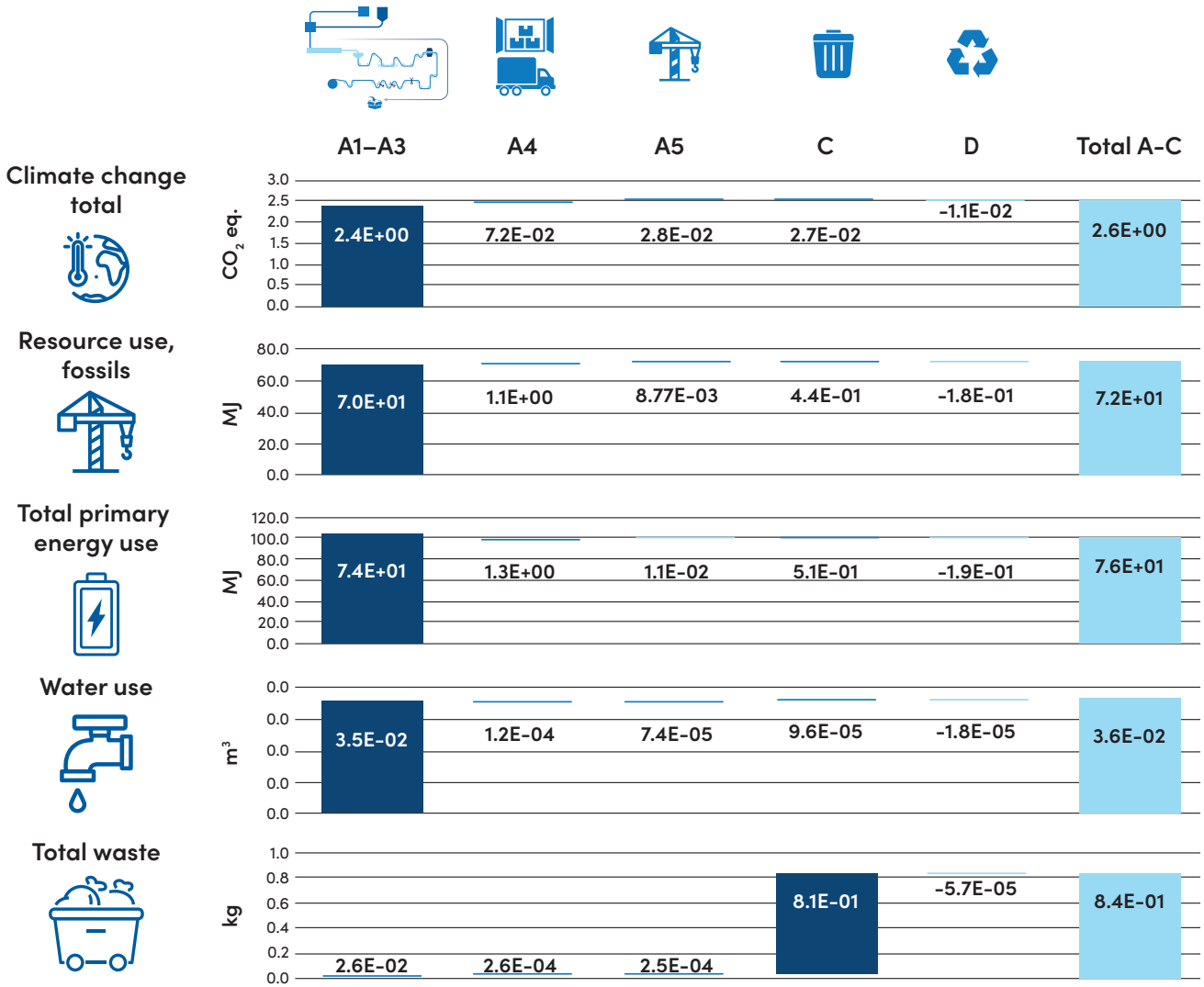
Results per declared unit: 1 m² Saflex LiteCarbon Clear RB41L									
Indicator	**Unit**	**A1–A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
HWD	kg	3.59E–03	7.72E–11	3.49E–12	0	1.33E–12	0	9.98E–11	-1.40E–11
NHWD	kg	2.15E–02	1.88E–04	2.50E–04	0	6.40E-06	0	8.10E–01	-4.62E–05
RWD	kg	1.31E–03	7.67E–05	4.94E–07	0	5.32E-08	0	5.70E–06	-1.12E-05
Acronyms	HWD = hazardous waste disposed; NHWD = nonhazardous waste disposed; RWD = radioactive waste disposed								

Output flow indicators

Results per declared unit: 1 m² Saflex LiteCarbon Clear RB41L									
Indicator	**Unit**	**A1–A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
CRU	kg	0	0	0	0	0	0	0	0
MFR	kg	0	0	0	0	0	0	0	0
MER	kg	0	0	0	0	0	0	0	0
EEE	MJ	0	0	3.36E-02	0	0	0	0	0
EET	MJ	0	0	8.61E-02	0	0	0	0	0
Acronyms	HWD = hazardous waste disposed; NHWD = nonhazardous waste disposed; RWD = radioactive waste disposed								

EPD interpretation

Figure 2



NOTE: Interpretation and hotspot analysis of the EPD results per square meter Saflex LiteCarbon Clear RB41L. Selection of impact indicators for review contribution along the life cycle modules: resource use, fossils = ADP fossil; total primary energy use = sum of PERT and PENRT; water use = use of net fresh water; total waste = sum of hazardous, nonhazardous and radioactive waste disposed.

In alignment with certain glazing EPDs, we emphasize a selection of impact indicators crucial to our downstream value chain (see Figure 2). Particular attention is given to the global warming potential (GWP) total (climate change) impact indicator, which serves as a fundamental requirement for the downstream value chain. This focus allows for the refinement of sustainability road maps and the replacement of generic PVB interlayer LCA data in the glazing EPD with high-quality, verified data.

The selection of impact indicators highlighted in Figure 2 demonstrates that the majority of the environmental impact for Saflex LiteCarbon Clear occurs in the cradle-to-gate A1-A3 module, accounting for 96% of the GWP. Only 3% of the GWP is attributed to the final sheet production. Additionally, the GWP impact from gate-to-customer transport (A4) and packaging treatment (A5) is relatively low, at 3% and 1% respectively. The landfill scenario in module C also holds a relatively low share.

For the other impact indicators and some aggregated ones, a similar trend is observed. The bulk of the impacts are concentrated in the cradle-to-gate A1-A3 modules. The only exception is the waste impact indicator, which is predominantly associated with module C, as expected.

Additional environmental information

Conversion factor — Saflex LiteCarbon Clear is defined as the product group for clear type "R-series" PVB interlayer that holds the intrinsic lower sustainable impact feature resulting from a comprehensive sustainability strategy. This EPD is based on the declared unit of 1 square meter 0.00076 m clear product (RB41L) where a conversion factor can be applied to cover EPD data results for the thinner gauged 0.00038 m LiteCarbon Clear version (RB11L). All used ingredients and utilities are equivalent to the EPD declared unit, but only half of the thickness is being produced. One square meter of 0.00038 m Saflex LiteCarbon Clear has a weight of 0.407 kg and holds the same density of 1070 kg/m^3. The addition of this thinner gauge Saflex LiteCarbon Clear enables users to document and apply specific and up to date EPD data.

A conversion factor or multiplying factor of 0.5 can be applied to the 0.00076 m LiteCarbon Clear version results as exactly half of the thickness is extruded compared to the 0.00038 m variant. The conversion factor applies to all declared modules and all declared indicators.

Scenario for stacking Saflex LiteCarbon Clear — As a function of performance or processing requirements, it is standard practice to stack multiple PVB layers to achieve the required thickness. To calculate the environmental performance of such stack, the verified results for the constituent individual Saflex LiteCarbon Clear layers, as reported in this EPD, may be added to represent the stack. This addition is valid only for the Saflex LiteCarbon Clear data explicitly covered by this EPD. For example, if a configuration requires a total thickness of 0.00152 m achieved by stacking two layers of 0.00076 m each, the environmental performance results provided in this EPD should be obtained by adding the results of the individual two layers to represent the total assembly accurately. Be aware that Saflex LiteCarbon Clear PVB interlayer should be processed in the same manner as Saflex Clear. Consult the laminating guide or your Saflex representative for more information.

Sustainability is integral to our strategy, driven by innovation and focused always on people. Eastman has the responsibility and opportunity to lead with others to address climate change, mainstream circularity as an economic model, and an economic model and build a better world for all.

Mitigating climate change — At the moment, this is perhaps the single greatest challenge to the quality of life on our planet. In response, Eastman is committing to carbon neutrality by 2050. Our focus on four sustainable practices — energy efficiency, process transformation, renewable energy and technology breakthroughs — will get us there.

Mainstreaming circularity — Eastman is making circularity a mainstream concept because the future of our planet depends on it. Our growing world needs more sustainable materials that address the plastic waste crisis while lowering carbon footprints. Creating a circular economy will require collaboration across the full value chain, so we're working with our partners to implement circularity on a global scale.

Caring for society — Eastman is more than a materials company. We exist to make people's lives better in meaningful, measurable ways. Through our products, as a corporate citizen and as a global employer, we strive to make a positive social and environmental impact.

Corporate social responsibility — We believe it is critical that our employees are engaged and that we invest in our global communities to have a positive social impact.

Learn more at eastman.com and saflex-vanceva.eastman.com

Regulations and declarations for substances of concern

Subject products are classified under REACH as articles and are governed by the REACH "guidance on requirements of substances in articles." The following statements apply to the subject products: Regulation (EC) No. 1907/2006 on the Registration, Evaluation and Authorisation of Chemicals (REACH) – Substances of Very High Concern	With reference to the SVHC Candidate List, as amended up to and including the 27 June 2024 update, the subject products placed on the market in the European Union are not known to contain any substances listed on the candidate list of Substances of Very High Concern (SVHC) in concentrations greater than or equal to 0.1% or those otherwise established under paragraph 6(b) of Article 56. Therefore, the subject products also would not contain substances included in Annex XIV.
REACH Annex XVII: Registration, Evaluation and Authorisation of Chemicals (REACH) Annex XVII — Substances restricted under REACH	With reference to the list of substances restricted under REACH Annex XVII, this product placed on the market in the European Union is not known to contain any substances listed in Annex XVII.
Directive 2011/65/EU (Restrictions of Hazardous Substances - RoHS), as amended by Commission Delegated Directive (EU) 2015/863	Eastman Chemical Company has not analyzed the subject product(s) for the substances restricted by this regulation. However, we do not expect that these substances would be present in this product above the specified limits: cadmium (Cd): 0.01%; mercury: 0.1% (Hg); lead (Pb): 0.1%; hexavalent chromium (Cr6+): 0.1%; polybrominated biphenyls (PBB): 0.1 %; polybrominated diphenyl ethers (PBDE): 0.1 %; bis (2-ethylhexyl) phthalate (DEHP): 0.1%; benzyl butyl phthalate (BBP): 0.1%; dibutyl phthalate (DBP): 0.1%; diisobutyl phthalate (DIBP): 0.1%.
Regulation (EU) 2019/1021 on persistent organic pollutants (POPs regulation; previously Regulation (EU) 850/2004)	Eastman has not analyzed the subject product(s) for the presence of the substances listed on this regulation. Based on our knowledge of the raw materials and manufacturing processes, we have no reason to expect any of these substances to be present in the final product or to be formed during manufacturing or under normal handling, storage and use conditions

Regulations and declarations for substances of concern

Substances of concern — carcinogenic, mutagenic, reprotoxic (CMR) substances	Substances classified as carcinogenic, mutagenic and reprotoxic substances (CMR) class 1 (1A/1B) and class 2 are required to be disclosed on the safety data sheet (SDS) of a chemical substance or mixture if present above the reportable limit. The subject products do not contain any CMR class 1A/1B and 2 substances above the reportable limits. Please review the latest SDS for full details.
Substances of concern (e.g., PFAS)	Eastman Chemical Company has not analysed this product for the presence of the substances listed below. Based on our knowledge of the raw materials and manufacturing processes as supplied by Eastman Chemical Company, these substances are not intentionally added to the subject products, and we have no reason to believe these substance(s) to be present. • PFAS (per- and poly-fluoroalkyl) substances, including PFHxS, PFCAs, and PFHxA • PFOS (perfluorooctanesulfonic acid) • PFOA (perfluorooctanoic acid)
Regulation (EU) No. 528/2012 on Biocidal Products (repealed and replaced Directive 98/8/EC)	The subject product(s) does not contain biocide and is therefore not subject to the provisions of this regulation.

Other chemicals and/or compounds of interest

The following substances have not been intentionally added to subject products:

- Alkylphenols
- Asbestos
- Bisphenol A (BPA) (CAS 80-05-7)
- Cadmium (Cd) and Cd compounds
- Chlorinated polyethylene chlorosulfonated polyethylene
- Chlorofluorocarbons (CFCs) or hydrochlorofluorocarbons (HCFCs)
- Chorobenzenes
- Chlorinated polyvinyl chloride (CPVC)
- Chromium VI and (Cr+6) compounds
- Formaldehyde (added)
- Halogenated flame retardants (HFRs)
- Lead (Pb) and Pb compounds
- Mercury and Hg compounds
- Ozone-depleting chemicals (ODCs)
- Polychlorinated biphenyls (PCBs)
- Perfluorinated biphenyls (PCBs)
- Phthalates
- Polycyclic aromatic hydrocarbons (PAHs)
- Polyvinyl chloride (PVC)
- Short-chain chlorinated paraffins
- Wood treatments containing creosote, arsenic or pentachlorophenol

It is the responsibility of our customers to determine that their use of our product(s) is safe, lawful and technically suitable in their intended applications. Because of possible changes in the law and in regulations, as well as possible changes in our products, we cannot guarantee that the status of this product will remain unchanged. We, therefore, recommend that customers continuing to use this product verify its status periodically.

Version history

Original version published 2024-10-21 Version 1.1, 2025-12-15, changes in this update relate to the following:

- Converted original EPD from single product to multiple product EPD based on a representative product
- Update from PCR Construction products, 2019:14. Version 1.3.4 to Version 2.0.1
- Addition of conversion factor for a thinner gauged product within the product group in the "Additional environmental information section"
- Additional information for converting the results to results per mass
- Added disclaimer for products recently on the market (cover) and approach in the "LCA information section"

References

EPD International (2025): General Programme Instructions for the International EPD System. Version 5.0.1. www.environdec.com.

EPD International (2025): Product Category Rules (PCR): Construction products, 2019:14 version 2.0.1, EPD International.

PCR 205:05. *Multipurpose films, UN CPC 36330 plastics: plates, sheets, film, foil and strip, of plastics, not self-adhesive, non-cellular and not reinforced, laminated, supported or similarly combined with other materials. Version 1.0.3*

Sustainability of construction works — Environmental product declarations — Core rules for the product category of construction products; Dutch version EN 15804:2012+A2:2019 + AC:2021

Andreasi Bassi, S., Biganzoli, F., Ferrara, N., Amadei, A., Valente, A., Sala, S., Ardente, F. (2023). Updated characterisation and normalisation factors for the Environmental Footprint 3.1 method. *JRC Technical Report doi:10.2760/798894*

ISO 14021, 2016. Environmental labels and declarations — Self-declared environmental claims (Type II environmental labelling). ISO 14021:2016(E).

ISO 14025, 2006. Environmental labels and declarations — Type III environmental declarations — Principles and procedures.

ISO 14040:2006. Environmental Management. Life Cycle Assessment — Principles and Framework. ISO *Environmental Management, Switzerland*.

ISO 14044:2006. Environmental Management. Life Cycle Assessment – Requirements and Guidelines. ISO *Environmental Management, Switzerland*.

European Chemical Agency, Candidate List of Substances of Very High Concern for Authorization.

Abbreviations

ISO	International Organization for Standardization
TM	Trademark
EPD	Environmental Product Declaration
EN	European norm
BV	Private limited company
IES	International EPD System
PCR	Product Category Rules
UN CPC	Central Product Classification
CEN	European Committee for Standardization
LCA	Life Cycle Assessment
PVB	Polyvinyl butyral
IATF	International Automotive Task Force
ANSI	American National Standards Institute
AS/NZS	Australian/New Zealand Standard(s)
CAN/CGSB	Canadian General Standards Board
CNS	Chinese National Standards
CPSC	U.S. Consumer Product Safety Commission
CFR	Code of Federal Regulations
mm	millimeters
m	meters
m^3	cubic meters
%w/w	percent weight by weight
SVHC	Substances of Very High Concern
REACH	Registration, Evaluation, Authorization and Restriction of Chemicals
PFAS	per- and polyfluoroalkyl substances
CPR	Construction Products Regulation
ESPR	Ecodesign for Sustainable Products Regulation
EPBD	Energy Performance of Buildings Directive
CSRD	Corporate Sustainability Reporting Directive
LCAfE	LCA for Experts software (GaBi)
GWP-GHG	Global Warming Potential Greenhouse Gas
CAS	Chemical Abstracts Service
TEG-2EH	plasticizer Triethylene Glycol Bis(2-Ethylhexanoate)
C	Carbon
CO_2	Carbon Dioxide
ABS	Acrylonitrile Butadiene Styrene
ND	not declared
EU	Europe
PE	polyethylene
Kg	kilogram
T	ton
kWh	kilowatt-hour
km	kilometer
EF	Environmental Footprint
JRC	Joint Research Center

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