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# Statement of Verification

BREG EN EPD No.: 000066 Issue 02

ECO EPD Ref. No. 000227

This is to verify that the

**Environmental Product Declaration**

provided by:

**Sika Ltd.**

BRE Global Verified EPD

is in accordance with the requirements of:

**EN 15804:2012+A1:2013**

and

**BRE Global Scheme Document SD207**

This declaration is for:

**Sarnafil G410 EL**

## Company Address

Watchmead
Welwyn Garden City
AL7 1BQ

BUILDING TRUST Sika

| Signed for BRE Global Ltd | Emma Baker<br>Operator | 24 September 2020<br>Date of this Issue |
|---|---|---|
| 27 February 2017<br>Date of First Issue | | 23 September 2025<br>Expiry Date |

BRE Global Verified EPD

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# Environmental Product Declaration

## EPD Number: 000066

## General Information

| EPD Programme Operator | Applicable Product Category Rules |
|---|---|
| BRE Global<br>Watford, Herts<br>WD25 9XX<br>United Kingdom<br>www.bre.co.uk | BRE Environmental Profiles 2013 Product Category Rules for Type III environmental product declaration of construction products to EN 15804:2012+A1:2013 |
| **Commissioner of LCA study** | **LCA consultant/Tool** |
| Sika Ltd<br>Watchmead<br>Welwyn Garden City<br>AL7 1BQ<br>United Kingdom | Sika Technology AG<br>Tüffenwies 16<br>8048 Zurich<br>Switzerland<br>www.sika.com/sustainability |
| **Declared/Functional Unit** | **Applicability/Coverage** |
| 1 square metre ($m^2$) of Sarnafil G410 EL | Product Average. |
| **EPD Type** | **Background database** |
| Cradle to Gate with options | Ecoinvent and GaBi |

| Demonstration of Verification |
|---|
| CEN standard EN 15804 serves as the core PCR [a] |
| Independent verification of the declaration and data according to EN ISO 14025:2010<br>☐Internal ☒ External |
| (Where appropriate [b])Third party verifier:<br>Pat Hermon |
| a: Product category rules<br>b: Optional for business-to-business communication; mandatory for business-to-consumer communication (see EN ISO 14025:2010, 9.4) |

| Comparability |
|---|
| Environmental product declarations from different programmes may not be comparable if not compliant with EN 15804:2012+A1:2013. Comparability is further dependent on the specific product category rules, system boundaries and allocations, and background data sources. See Clause 5.3 of EN 15804:2012+A1:2013 for further guidance |

## Information modules covered

| Product | | | Construction | | Use stage | | | | | | | End-of-life | | | | Benefits and loads beyond the system boundary |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Related to the building fabric | | | | | Related to the building | | | | | | |
| A1 | A2 | A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
| Raw materials supply | Transport | Manufacturing | Transport to site | Construction – Installation | Use | Maintenance | Repair | Replacement | Refurbishment | Operational energy use | Operational water use | Deconstruction demolition | Transport | Waste processing | Disposal | Reuse, Recovery and/or Recycling potential |
| ☑ | ☑ | ☑ | ☑ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☑ | ☐ | ☑ | ☑ | ☑ |

Note: Ticks indicate the Information Modules declared.

## Manufacturing site(s)

This environmental product declaration is for 1 square metre ($m^2$) of Sarnafil G410 EL produced by Sika Ltd. at the following manufacturing facilities:

Sika Manufacturing AG
Murtenstrasse 13
3186 Düdingen
Switzerland

# Construction Product:

## Product Description

Sarnafil G410-EL is a multi-layer, synthetic roof waterproofing sheet based on premium-quality polyvinyl chloride (PVC) with inlay of glass non-woven, containing ultraviolet light stabilizers and flame retardant according to EN 13956.

Sarnafil G410-EL is a hot air weldable roof membrane, formulated for direct exposure and designed for use in adhered & also ballasted applications (with appropriate protection). G410-EL is available in various colours and 1.2, 1.5, 1.8 & 2.0 mm thick variants.

The results in this EPD refer to Sarnafil G410-15 EL, with a mass of 1.84 kg/m2.

## Technical Information

| Property | Value, Unit |
|---|---|
| Water tightness to EN 1928 | Pass |
| Joint peel resistance as per EN 12316-2 | ≥ 300 N/50mm |
| Joint shear resistance as per EN 12317-2 | ≥ 600 N/50mm |

| Property | Value, Unit |
|---|---|
| Water vapour transmission properties (μ-value) as per EN 1931 | 15,000 |
| Resistance to static load, soft substrate as per EN 12730 | ≥ 20 kg |
| Resistance to static load, rigid substrate as per EN 12730 | ≥ 20 kg |
| Dimension stability, longitudinal (machine direction) as per EN 1107-2 | ≤ 0.2% |
| Dimension stability, transversal (cross machine direction) as per EN 1107-2 | ≤ 0.1% |
| Foldability at low tempeartre as per EN 495-5 | ≤ -25 °C |
| UV exposure (> 5000 h) as per EN 1297 | Pass |

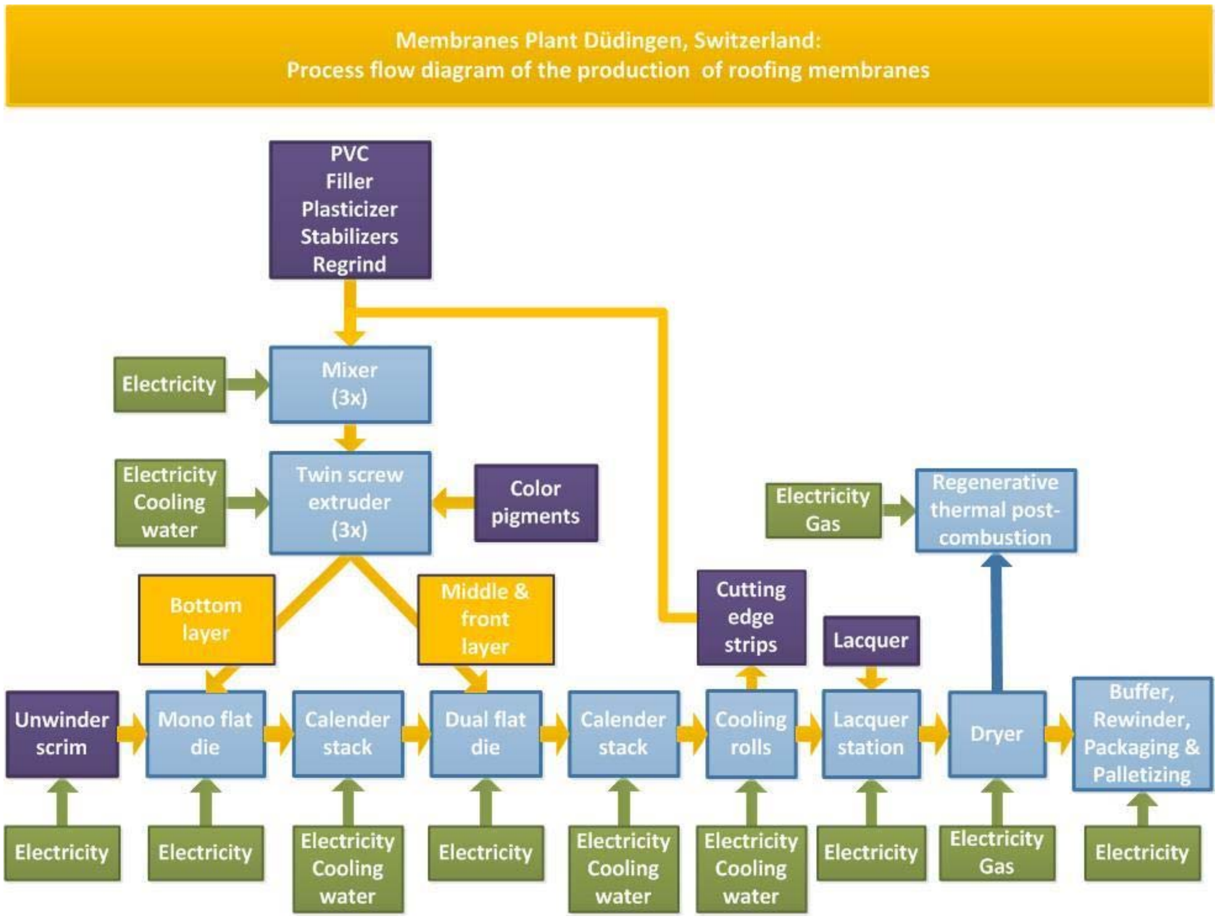
## Main Product Contents

| Material/Chemical Input | % |
|---|---|
| Polyvinyl chloride / PVC | 50 - 55 |
| Plasticiser | 32 - 36 |
| Stabilizers | 7 -12 |
| Lubricants | 0.4 – 1.7 |
| Pigments | 0.01 – 1.0 |
| Flame retardant | 1 - 5 |
| Filler | 0 - 4 |
| Carrier | 2.5 – 7 |

## Manufacturing Process

The Sarnafil PVC membranes are produced in one step from the raw materials directly to membrane master rolls on an extrusion line. This process includes mixing of all raw materials in to a hot dry blend and feeding this dry blend in the same heat in to the corresponding extruders. In the extruders, the dry blend is processed in to a melt and further shaped via flat sheet dies and polishing calenders to a reinforced membrane. Between the second polishing station and the final cooling and winding equipment, the lacquering station is located for finishing of the top layer. The PVC master rolls proceed then for final cutting and packaging to contractor rolls.

## Process flow diagram




## Construction Installation

Adhered: Sarnafil G410-EL membranes are bonded to suitable substrates with Sarnacol adhesives. Roof perimeters are secured using peelstops with a membrane coverstrip.

Ballasted: Sarnafil G410-EL membranes are loose laid. Roof perimeters are secured using a Sarnabar & cord with a membrane coverstrip. Install a Sarnafil protection layer & ballast immediately.

All seam overlaps are joined by hot air welding using manual hot air welding machines and pressure rollers, or automatic welding machines.

## Use Information

Installation works must be carried out only by Registered Sarnafil Contractors, in accordance with Sika Limited instructions and the Sarnafil Project specification.

## End of Life

No input (energy, water) is considered for the dismantling, as it is assumed to be handmade. The membrane can be recycled, or disposed of in incinerator or landfill. As shown in the "Scenarios and Additional Technical Information", for this EPD an incineration scenario was taken.

## Reference Service Life

The reference service life of Sarnafil G410-EL membranes is as stated by the BBA Argement Certificate 08/4531 (Adhered Systems) & 08/4530 (Protected Membranes). Available evidence indicates that the membrane will have a service life in excess of 35 years, although a service life in excess of 40 years can be achieved with periodic maintenance. See BBA for details.

# Life Cycle Assessment Calculation Rules

## Declared / Functional unit description

1 $m^2$ of reinforced PVC membrane for a reference service life of 35 years.

## System boundary

In accordance with the modular approach as defined in EN 15804, this cradle to gate with options EPD includes the product stage (A1-A3), construction process stage (A4-A5), and end-of-life stage (C1-C4, excluding C2). Module D was also modelled.

## Data sources, quality and allocation

The primary data provided by Sika derive from the plant at Duedingen, Switzerland for 2013. Background LCI datasets are taken from the databases of GaBi software and ecoinvent Version 2.2. All datasets are less than 10 years old.

Production waste that was reclaimed and reused internally was simulated as closed-loop recycling in Modules A1-A3.

Benefits from incineration of product and for the disposal of packaging are credited in Module D; this also applies to the reuse of wooden pallets.

## Cut-off criteria

All data was taken into consideration (recipe constituents, thermal energy used, electricity used). Transportation was considered for all inputs and outputs. The manufacturing of the production machines and systems and associated infrastructure were not taken into account in the LCA

## LCA Results

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

| Parameters describing environmental impacts | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | GWP | ODP | AP | EP | POCP | ADPE | ADPF |
| | | | kg $CO_2$ equiv. | kg CFC 11 equiv. | kg $SO_2$ equiv. | kg $(PO_4)^{3-}$ equiv. | kg $C_2H_4$ equiv. | kg Sb equiv. | MJ, net calorific value. |
| Product stage | Raw material supply | A1 | AGG | AGG | AGG | AGG | AGG | AGG | AGG |
| | Transport | A2 | AGG | AGG | AGG | AGG | AGG | AGG | AGG |
| | Manufacturing | A3 | AGG | AGG | AGG | AGG | AGG | AGG | AGG |
| | Total (of product stage) | A1-3 | 4.65 | 6.94E-09 | 0.035 | 0.00143 | 0.00419 | 1.47E-05 | 111 |
| Construction process stage | Transport | A4 | 0.146 | 1.81E-13 | 0.000512 | 0.000139 | 6.28E-05 | 7.56E-09 | 2.00 |
| | Construction | A5 | 0.658 | 6.95E-10 | 0.00373 | 0.000167 | 0.000431 | 1.52E-06 | 11.6 |
| Use stage | Use | B1 | MND | MND | MND | MND | MND | MND | MND |
| | Maintenance | B2 | MND | MND | MND | MND | MND | MND | MND |
| | Repair | B3 | MND | MND | MND | MND | MND | MND | MND |
| | Replacement | B4 | MND | MND | MND | MND | MND | MND | MND |
| | Refurbishment | B5 | MND | MND | MND | MND | MND | MND | MND |
| | Operational energy use | B6 | MND | MND | MND | MND | MND | MND | MND |
| | Operational water use | B7 | MND | MND | MND | MND | MND | MND | MND |
| End of life | Deconstruction, demolition | C1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Transport | C2 | MND | MND | MND | MND | MND | MND | MND |
| | Waste processing | C3 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Disposal | C4 | 5.08 | 4.19E-11 | 0.0069 | 0.00024 | 0.000155 | 2.17E-06 | 8.91 |
| Potential benefits and loads beyond the system boundaries | Reuse, recovery, recycling potential | D | -1.33 | -1.10E-09 | -0.003 | -2.98E-04 | -2.52E-04 | -2.07E-07 | -21 |

GWP = Global Warming Potential;
ODP = Ozone Depletion Potential;
AP = Acidification Potential for Soil and Water;
EP = Eutrophication Potential;
POCP = Formation potential of tropospheric Ozone;
ADPE = Abiotic Depletion Potential – Elements;
ADPF = Abiotic Depletion Potential – Fossil Fuels;

## LCA Results (continued)

| Parameters describing resource use, primary energy | | | PERE | PERM | PERT | PENRE | PENRM | PENRT |
|---|---|---|---|---|---|---|---|---|
| | | | MJ | MJ | MJ | MJ | MJ | MJ |
| Product stage | Raw material supply | A1 | AGG | AGG | AGG | AGG | AGG | AGG |
| | Transport | A2 | AGG | AGG | AGG | AGG | AGG | AGG |
| | Manufacturing | A3 | AGG | AGG | AGG | AGG | AGG | AGG |
| | Total (of product stage) | A1-3 | 6.84 | 1.39 | 8.23 | 78.3 | 42.1 | 120 |
| Construction process stage | Transport | A4 | 0.00 | 0.00 | 0.153 | 0.00 | 0.00 | 2.00 |
| | Construction | A5 | 0.684 | 0.139 | 0.875 | 7.83 | 3.76 | 12.6 |
| Use stage | Use | B1 | MND | MND | MND | MND | MND | MND |
| | Maintenance | B2 | MND | MND | MND | MND | MND | MND |
| | Repair | B3 | MND | MND | MND | MND | MND | MND |
| | Replacement | B4 | MND | MND | MND | MND | MND | MND |
| | Refurbishment | B5 | MND | MND | MND | MND | MND | MND |
| | Operational energy use | B6 | MND | MND | MND | MND | MND | MND |
| | Operational water use | B7 | MND | MND | MND | MND | MND | MND |
| End of life | Deconstruction, demolition | C1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Transport | C2 | MND | MND | MND | MND | MND | MND |
| | Waste processing | C3 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Disposal | C4 | 0.00 | 0.00 | 1.16 | 0.00 | 0.00 | 9.98 |
| Potential benefits and loads beyond the system boundaries | Reuse, recovery, recycling potential | D | 0.00 | 0.00 | -2.74 | 0.00 | 0.00 | -23.9 |

PERE = Use of renewable primary energy excluding renewable primary energy 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 resource

## LCA Results (continued)

| Parameters describing resource use, secondary materials and fuels, use of water | | | SM | RSF | NRSF | FW |
|---|---|---|---|---|---|---|
| | | | kg | MJ net calorific value | MJ net calorific value | $m^3$ |
| Product stage | Raw material supply | A1 | AGG | AGG | AGG | AGG |
| | Transport | A2 | AGG | AGG | AGG | AGG |
| | Manufacturing | A3 | AGG | AGG | AGG | AGG |
| | Total (of product stage) | A1-3 | 0.00 | 0.00 | 0.00 | 0.027 |
| Construction process stage | Transport | A4 | 0.00 | 0.00 | 0.00 | 8.81E-05 |
| | Construction | A5 | 0.00 | 0.00 | 0.00 | 0.00313 |
| Use stage | Use | B1 | MND | MND | MND | MND |
| | Maintenance | B2 | MND | MND | MND | MND |
| | Repair | B3 | MND | MND | MND | MND |
| | Replacement | B4 | MND | MND | MND | MND |
| | Refurbishment | B5 | MND | MND | MND | MND |
| | Operational energy use | B6 | MND | MND | MND | MND |
| | Operational water use | B7 | MND | MND | MND | MND |
| End of life | Deconstruction, demolition | C1 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Transport | C2 | MND | MND | MND | MND |
| | Waste processing | C3 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Disposal | C4 | 0.00 | 0.00 | 0.00 | 0.0105 |
| Potential benefits and loads beyond the system boundaries | Reuse, recovery, recycling potential | D | 0.00 | 0.00 | 0.00 | -0.00311 |

SM = Use of secondary material;
RSF = Use of renewable secondary fuels;

NRSF = Use of non-renewable secondary fuels;
FW = Net use of fresh water

## LCA Results (continued)

| Other environmental information describing waste categories | | | HWD | NHWD | RWD |
|---|---|---|---|---|---|
| | | | kg | kg | kg |
| Product stage | Raw material supply | A1 | AGG | AGG | AGG |
| | Transport | A2 | AGG | AGG | AGG |
| | Manufacturing | A3 | AGG | AGG | AGG |
| | Total (of product stage) | A1-3 | 0.000338 | 0.30 | 0.00324 |
| Construction process stage | Transport | A4 | 1.62E-06 | 0.0005 | 2.66E-06 |
| | Construction | A5 | 3.41E-05 | 0.0941 | 0.000347 |
| Use stage | Use | B1 | MND | MND | MND |
| | Maintenance | B2 | MND | MND | MND |
| | Repair | B3 | MND | MND | MND |
| | Replacement | B4 | MND | MND | MND |
| | Refurbishment | B5 | MND | MND | MND |
| | Operational energy use | B6 | MND | MND | MND |
| | Operational water use | B7 | MND | MND | MND |
| End of life | Deconstruction, demolition | C1 | 0.00 | 0.00 | 0.00 |
| | Transport | C2 | MND | MND | MND |
| | Waste processing | C3 | 0.00 | 0.00 | 0.00 |
| | Disposal | C4 | 4.36E-06 | 3.14 | 0.000426 |
| Potential benefits and loads beyond the system boundaries | Reuse, recovery, recycling potential | D | -4.39E-06 | -0.0066 | -0.00117 |

HWD = Hazardous waste disposed;
NHWD = Non-hazardous waste disposed;
RWD = Radioactive waste disposed

## LCA Results (continued)

| Other environmental information describing output flows – at end of life | | | CRU | MFR | MER | EE |
|---|---|---|---|---|---|---|
| | | | kg | kg | kg | MJ per energy carrier |
| Product stage | Raw material supply | A1 | AGG | AGG | AGG | AGG |
| | Transport | A2 | AGG | AGG | AGG | AGG |
| | Manufacturing | A3 | AGG | AGG | AGG | AGG |
| | Total (of product stage) | A1-3 | 0.00 | 0.00 | 0.00 | 0.00 |
| Construction process stage | Transport | A4 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Construction | A5 | 0.00 | 0.00 | 0.00 | 0.699 |
| Use stage | Use | B1 | MND | MND | MND | MND |
| | Maintenance | B2 | MND | MND | MND | MND |
| | Repair | B3 | MND | MND | MND | MND |
| | Replacement | B4 | MND | MND | MND | MND |
| | Refurbishment | B5 | MND | MND | MND | MND |
| | Operational energy use | B6 | MND | MND | MND | MND |
| | Operational water use | B7 | MND | MND | MND | MND |
| End of life | Deconstruction, demolition | C1 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Transport | C2 | MND | MND | MND | MND |
| | Waste processing | C3 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Disposal | C4 | 0.00 | 0.00 | 0.00 | 15.1 |
| Potential benefits and loads beyond the system boundaries | Reuse, recovery, recycling potential | D | 0.00 | 0.00 | 0.00 | 0.00 |

CRU = Components for reuse;
MFR = Materials for recycling

MER = Materials for energy recovery;
EE = Exported Energy

## Scenarios and additional technical information

| Scenarios and additional technical information | | | |
|---|---|---|---|
| Scenario | Parameter | Units | Results |
| A4 – Transport to the building site | Fuel consumption (diesel) / Vehicle type (truck) | litres/km | 0.000034 |
| | Distance | km | 1345 |
| | Capacity utilisation (incl. empty returns) | % | 85 |
| | Bulk density of transported products | $kg/m^3$ | 1226.67 |
| A5 – Installation in the building | Ancillary materials for installation: Overlap | % | 8 |
| | Energy use: Welding energy | $kWh/m^2$ | 0.016 |
| | Waste materials from installation wastage: Installation losses | % | 2 |
| C1, C3 and C4 – End of life | Waste for final disposal: Membrane incineration | % | 100 |
| | Energy for dismantling | $kWh/m^2$ | 0 |
| D – Reuse/Recovery/Recycling potential | The benefits from incineration of product and waste are credited in Module D, since in modern incineration plants the energy of combustion is used to produce electricity and thermal energy. | | |

## Summary, comments and additional information

### Interpretation

The displayed results apply to Sarnafil G410-15 EL. To calculate results for other thicknesses, please use this formula:
Ix = ((x+0.16)/1.66)*I1.5
[Ix = the unknown parameter value for Sarnafil G410 EL products with a thickness of "x" mm (e.g. 2.0 mm)]

The following chart shows the relative contributions of the different modules to the various environmental impact categories and to primary energy use in a dominance analysis. It is clear that most impacts come from Module A1-3, though the incineration of the membrane (C4) also contributes, especially for AP and GWP, due to its greenhouse gas emissions. For this reason, the Product Stage is examined more closely in the following interpretation.

Energy resource use
Pre-product manufacturing (55%), packaging (28%) and the manufacturing process (17%) account for the total of the use of renewable primary energy resources (PERT). The manufacturing of raw materials (96%) has the greatest impact on the use of non-renewable primary energy resources (PENRT), while the impact of the production process (due to electricity consumption) measures 3.7%.

Environmental impacts
The dominant influence in all impact categories for Module A1-A3 comes from pre-product manufacturing, with at least 93% in each case, except for Ozone Depletion Potential (ODP), with 61%. Within pre-product manufacturing, polymers play an important role regarding Global Warming Potential (GWP), Eutrophication Potential (EP), Photochemical Ozone Creation Potential (POCP), Abiotic Depletion Potential - Elements (ADPE) and Abiotic Depletion Potential - Fossil Fuels (ADPF). The plasticiser has significant impact on GWP, EP, POCP and ADPF. In addition, the stabilisers and the lacquers impact the ODP, while the fire retardant contributes mostly to Acidification Potential for Soil and Water (AP), as well as to EP and POCP. The glass carrier contributes to ADPE, and the impacts from processing aids, pigments and fillers are negligible.

The raw materials with the greatest effect on the impacts also show the greatest percentage by mass of the waterproofing membrane: polymers and plasticiser. The manufacturing process (due to energy use) contributes mostly to ODP (6%) and GWP (4%).

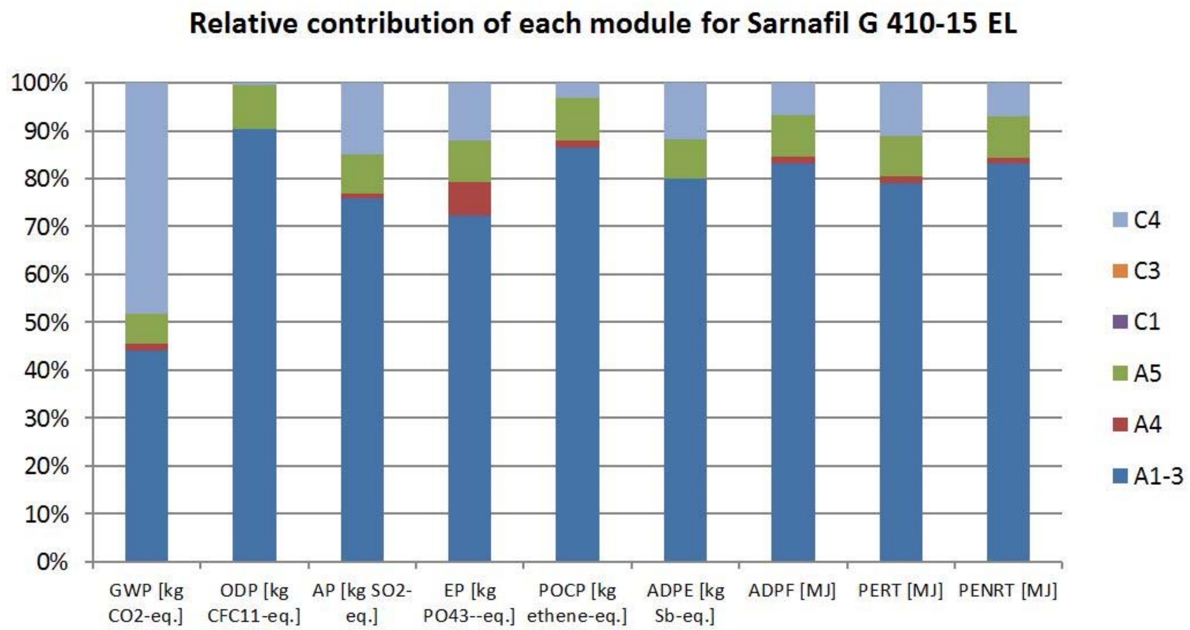



Figure 1

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