UN CPC CODE: 389
REGISTRATION NUMBER
EPDItaly: EPDITALY0076
ECO Platform: 00000974
REGISTRATION DATE
05/07/2019
REVISION DATE
05/07/2019 (V. 4)
REFERENCE YEAR
2017
VALID UNTIL
04/07/2024

FLAGON® TPO
Environmental Product Declaration in accordance with ISO 14025
GENERAL INFORMATION

EPD OWNER
Soprema s.r.l., Via industriale dell’Isola 3, 24040 Chignolo d’Isola (BG), Italy

PROGRAMME OPERATOR
EPDItaly, Via Gaetano De Castillia, 10 20124 - MILANO

REFERENCE DOCUMENT

PRODUCT CATEGORY RULES (PRCs)
• PCR ICMQ-001/15 – rev. 2.1

FUNCTIONAL UNIT
The functional unit is 1 m² of installed membrane (namely 1 m² produced multiplied by the membrane installation overlapping factor 1.12 (mechanically-fixed), 1.08 (fully-adhered and loose-laid)) for all waterproofing systems with flexible sheets for roofing, divided by the reference building service lifetime (90 years).

CONTACTS

For additional information relative to the activities of the Soprema s.r.l. or in regards to this environmental declaration, please contact: Roberto Baronio – rbaronio@soprema.it

TECHNICAL SUPPORT
by Life Cycle Engineering (www.lcengineering.eu)
Independent verification of the declaration and data, according to ISO 14025:2006

EPD process certification for EPD verification

Third party verifier: ICMQ

Accredited or approved by: ACCREDIA

EPDs within the same product category but from different programmes may not be comparable

EPD of construction products may not be comparable if they do not comply with EN 15804

G.L. Baldo, M. Marino, S. Rossi; “Analisi del ciclo di vita LCA – Nuova edizione aggiornata”; Edizioni Ambiente; 2008

Regolamento del programma EPDItaly, v. 4.0 (03/06/2019)

PCR ICMQ-001/15 – rev. 2.1 “Prodotti da costruzione e servizi per costruzioni”

PCR 2014:12 v 1.0 “Flexible sheets for waterproofing - bitumen , plastic or rubber sheets for roof waterproofing”

Product Category Rules PCR 2007:08 v 3.1 “Electricity, steam and hot/cold water generation and distribution”

EN15804:2012 + A1:2013

ISO 14040:2006

ISO 14044:2017

ISO 14025:2010
Soprema is an independent group established in 1908 and now present in 90 countries worldwide. Thanks to its 59 production plants, Soprema successfully satisfies the construction sector needs, providing a wide range of waterproofing and insulation products. At present, Soprema is waterproofing membranes world leader.

Soprema is present in Italy since 2007. Here, under the brand of FLAG, it produces synthetic waterproofing membranes in PVC or TPO. Such products are ready to be employed in most residential and domestic sectors: roofing, underground and hydraulic works, both for internal and external purposes.

Since the beginnings in 1963, FLAG had a central role in the waterproofing membranes sector, becoming over the years a key player in the European market. Being part of Soprema Group allowed FLAG to penetrate the worldwide market.

On the basis of the end-use applications, many different waterproofing membranes typologies are available. Firstly, those products can be divided as reinforced and homogeneous membranes. The former, reinforced either with glass wool or polyester fleeces, is chiefly employed for industrial or domestic roofing. The latter instead are mainly used for hydraulic works and civil engineering.

Secondly, membranes can be either PVC- or TPO-based, with the former being the standard material for synthetic membranes and the latter (namely Thermoplastic PolyOlefins) being introduced only since late ‘90s. In both cases, over the years Soprema achieved the experience to ensure the high standards of quality and laying time requested by modern constructions and works.

Recently, FLAG changed name Soprema s.r.l.
## SCOPE AND TYPE OF EPD

<table>
<thead>
<tr>
<th>PRODUCT STAGE</th>
<th>CONSTRUCTION PROCESS STAGE</th>
<th>USE STAGE</th>
<th>END OF LIFE STAGE</th>
<th>BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw material supply</td>
<td>Transport</td>
<td>Manufacturing</td>
<td>Transport from the gate to the site</td>
<td>Assembly</td>
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</table>

<table>
<thead>
<tr>
<th>A1</th>
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<tr>
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</tr>
</tbody>
</table>

**GEOGRAPHICAL SCOPE**
- Global

**SOFTWARE**
- Simapro 9

**DATABASE**
- Ecoinvent 3.5, Plastics Europe

**FUNCTIONAL UNIT**
- 1 m² roof waterproofing installed with flexible sheets for roofing, with a reference roof service life of 90 years. The membrane is supposed to be renewed every 30 years. Moreover, the former sheet is replaced with the new one, which goes on to the End of Life phase. However, both roof and membrane service life values are provided by PCR 2014:12 and used exclusively for calculations. They may not be representative of the actual service lifetimes. Service lifetime is also influenced by design and use conditions and regular maintenance according to the manufacturer’s indications.

The LCA study includes all the processes (“cradle to grave” approach) according to EN15804 as presented in the table above.
PRODUCTS

Object of this EPD® are the following membranes, that differ in the installation method, thus in the end-use:

(AVERAGE BETWEEN TWO PRODUCT FAMILIES)

REINFORCED WITH POLYESTER NET AND COUPLED WITH A POLYESTER NON-WOVEN FABRIC (EP/PR-F), UV-RESISTANT.

![Mechanically-Fixed](image)

**INSTALLATION PROCESS**
Suitable for flat or sloped roofing. The waterproofing system is mechanically fixed to the support, in order to prevent the wind from removing or damaging it. Such system must resist to atmospheric agents and UV rays, as well as to a moderate pedestrian use due to maintenance.

**FLAGON® TPO EP/PV-F**
REINFORCED WITH GLASS WOOL AND COUPLED WITH POLYESTER NON-WOVEN FABRIC, UV-RESISTANT.

![Fully-Adhered](image)

**INSTALLATION PROCESS**
Suitable for non-covered flat or sloped roofing. The waterproofing system adheres completely to the support, in order to prevent the wind from removing or damaging it. Such system must resist to atmospheric agents and UV rays, as well as to a moderate pedestrian use due to maintenance. A proper layer of glue is put on the surface before the membrane is installed.

**FLAGON® TPO EP/PV**
REINFORCED WITH GLASS WOOL. UV-RESISTANT

![Loose-Laid with Gravel](image)

**INSTALLATION PROCESS**
Suitable for sub-flat (max 5% slope) roofing. On the basis of their final use (pedestrian zones, hanging gardens, parking lots, etc), the membranes are fixed with different materials. In any case, they must be protected from any potential damage their final use can cause them.

FLAGON® TPO membranes were initially used for hydraulic works. However, their range of applicability expanded considerably over time, serving now also as waterproofing membranes for roofing, both for external and internal uses.

General features of FLAGON® TPO are excellent weldability, high degradation and atmospheric conditions resistance, high mechanical resistance, flexibility at low temperatures. In addition, they are rotproof, insensible to hot-cold cycles, compatible with most of thermal insulators and resistant to roots growing and microorganisms attacks.

However, there are products which are characterised by some peculiar features, being for instance UV-resistant or fireproof.

FLAGON® TPO membranes durability is remarkable: at present, 15-years-old installed membranes does not show any sign of degradation. Indeed, laboratory tests (FLAG & LyondellBasell) foresee a lifetime beyond 25 years. Currently, FLAGON® TPO waterproofing membranes are recognised as the most flexible, easy-to-handle and easily-weldable.

Moreover, for a give width, FLAGON® TPO membranes weigh 25% less than PVC ones. This feature makes them particularly suitable when compliance with HQE (High Quality Environmental) standars are required.
In the table, components used for the membranes production are shown. Among the wide range of thicknesses each Flagon® membrane is produced, only membranes 1.5 mm-thick are studied in this work. In addition, since each membrane is available in a wide range of colours, the study was performed on an average-colour membrane.

Part of the TPO used comes from the plant production scraps recycling. In the case of Flagon® EP/PR – EP/PR-F it accounts for around 6% of total TPO used, around 8% for Flagon® EP/PV-F and EP/PV.

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>TPO</td>
<td>65%</td>
<td>56%</td>
<td>62%</td>
</tr>
<tr>
<td>Additives and charges</td>
<td>31%</td>
<td>34%</td>
<td>36%</td>
</tr>
<tr>
<td>Reinforcing material</td>
<td>4%</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>Polyester non-woven fabric</td>
<td>&lt;1%</td>
<td>9%</td>
<td>&lt;1%</td>
</tr>
</tbody>
</table>

PRODUCTION PROCESS

Chignolo d’Isola’s plant Line 3 is entirely devoted to FLAGON® TPO membranes manufacturing. This production line has been operating since 2009.

The scheme below shows the synthetic membrane manufacturing process. The exclusive production method created by FLAG allows the direct co-extrusion on both reinforcing material sides.

In such way it is possible to achieve the complete reinforcing material embedment, which is a peculiar feature of all FLAGON® TPO membranes.

All FLAGON® TPO membranes are realised by means of a co-extrusion process in a two-tone version, adopting a “signal-layer” system that allows the production of monolayer membranes with different chemical-physical properties on the two sides.

In addition, this system permits the immediate recognition of potential membrane damages (holes or lacerations), since the underlying dark colour would appear.

EXTRUSION CHAMBER LOADING

EACH CHAMBER LOADED WITH THE RAW MATERIALS MIXTURE, BY MEANS OF A HOPPER

CO-EXTRUSION

MIXTURE HEATED AND COMPRESSED BY SCREW, THEN FORCED TO A CO-EXTRUSION DIE, WHERE THE EXTRUDERS CONVERGE

LAMINATING

USING A CALENDER, THE DESIRED THICKNESS IS OBTAINED
## ENVIRONMENTAL IMPACT

<table>
<thead>
<tr>
<th>IMPACT CATEGORY</th>
<th>UNIT</th>
<th>A1</th>
<th>A2</th>
<th>A3</th>
<th>A4</th>
<th>A5</th>
<th>B4</th>
<th>C2</th>
<th>C3</th>
<th>D</th>
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<tbody>
<tr>
<td>GWP</td>
<td>kg CO₂ eq</td>
<td>4.50E-02</td>
<td>1.44E-03</td>
<td>3.92E-03</td>
<td>2.41E-03</td>
<td>2.59E-03</td>
<td>1.11E-01</td>
<td>5.30E-04</td>
<td>3.26E-02</td>
<td>-3.06E-02</td>
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<tr>
<td>ODP</td>
<td>kg CFC-11 eq</td>
<td>1.17E-08</td>
<td>2.71E-10</td>
<td>4.47E-11</td>
<td>4.52E-10</td>
<td>1.89E-11</td>
<td>2.49E-08</td>
<td>9.93E-11</td>
<td>4.18E-12</td>
<td>-3.04E-09</td>
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<tr>
<td>AP</td>
<td>kg SO₂ eq</td>
<td>1.49E-04</td>
<td>6.25E-06</td>
<td>8.89E-06</td>
<td>1.15E-05</td>
<td>1.38E-06</td>
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<tr>
<td>EP</td>
<td>kg PO₄³⁻ eq</td>
<td>4.42E-05</td>
<td>1.27E-06</td>
<td>8.16E-07</td>
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<td>1.73E-07</td>
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<td>POCO</td>
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<td>7.58E-08</td>
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<tr>
<td>ADPe</td>
<td>kg Sb eq</td>
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<td>1.66E-09</td>
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<td>-1.42E-10</td>
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<tr>
<td>ADPF</td>
<td>MJ</td>
<td>1.21E+00</td>
<td>2.04E-02</td>
<td>6.15E-02</td>
<td>3.43E-02</td>
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<td>2.66E+00</td>
<td>7.50E-03</td>
<td>-4.98E-05</td>
<td>-4.61E-01</td>
</tr>
</tbody>
</table>

### CAPTION:

GWP: 1E+01 is equal to 1 x 10¹ = 1 x 10 = 10 kg CO₂ eq/m²/year.

- **GWP**: Global Warming Potential
- **ODP**: Ozone Depletion Potential
- **AP**: Acidification Potential
- **EP**: Eutrophication Potential
- **POCP**: Photochemical Ozone Creation Potential
- **ADPe**: Abiotic Depletion Potential - Non fossil resources (elements)
- **ADPF**: Abiotic Depletion Potential - Fossil fuels
## USE OF RESOURCES

<table>
<thead>
<tr>
<th>IMPACT CATEGORY</th>
<th>UNIT</th>
<th>PRODUCT STAGE</th>
<th>CONSTRUCTION PROCESS STAGE</th>
<th>USE STAGE</th>
<th>END OF LIFE STAGE</th>
<th>BENEFITS AND LOADS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>A1</td>
<td>A2</td>
<td>A3</td>
<td>A4</td>
<td>A5</td>
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<tr>
<td>PERE</td>
<td>MJ</td>
<td>4.68E-02</td>
<td>5.37E-05</td>
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<td>PERM</td>
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<tr>
<td>PERT</td>
<td>MJ</td>
<td>4.68E-02</td>
<td>5.37E-05</td>
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<td>8.95E-05</td>
<td>3.03E-04</td>
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<tr>
<td>PENRE</td>
<td>MJ</td>
<td>6.11E-01</td>
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<td>PENRM</td>
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<tr>
<td>PENRT</td>
<td>MJ</td>
<td>1.32E+00</td>
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<td>6.91E-02</td>
<td>3.44E-02</td>
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<tr>
<td>SM</td>
<td>kg</td>
<td>8.14E-04</td>
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<td>RSF</td>
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<tr>
<td>FW</td>
<td>m³</td>
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<td>1.64E-06</td>
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</tbody>
</table>

- **PERE**: Renewable energy (carrier)
- **PERM**: Renewable energy (feedstock)
- **PERT**: Renewable energy (total)
- **PENRE**: Non-renewable energy (carrier)
- **PENRM**: Non-renewable energy (feedstock)
- **PENRT**: Non-renewable energy (total)
- **SM**: Use of secondary materials
- **RSF**: Use of renewable secondary fuels
- **NSRF**: Use of non-renewable secondary fuels
- **FW**: Use of Net Fresh Water
## OUTPUT FLOWS AND WASTE PRODUCTION

<table>
<thead>
<tr>
<th>IMPACT CATEGORY</th>
<th>UNIT</th>
<th>PRODUCT STAGE</th>
<th>CONSTRUCTION PROCESS STAGE</th>
<th>USE STAGE</th>
<th>END OF LIFE STAGE</th>
<th>BENEFITS AND LOADS</th>
</tr>
</thead>
<tbody>
<tr>
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<td>0.00E+00</td>
<td>0.00E+00</td>
<td>0.00E+00</td>
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<tr>
<td>MFR</td>
<td>kg</td>
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<td>0.00E+00</td>
<td>0.00E+00</td>
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<td>EE*</td>
<td>MJ</td>
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<td>0.00E+00</td>
<td>0.00E+00</td>
<td>0.00E+00</td>
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</tr>
</tbody>
</table>

*Since EE is equal to zero there is no need to specify thermal and electrical energy.

<table>
<thead>
<tr>
<th>IMPACT CATEGORY</th>
<th>UNIT</th>
<th>PRODUCT STAGE</th>
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<th>BENEFITS AND LOADS</th>
</tr>
</thead>
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<tr>
<td>HWV</td>
<td>kg</td>
<td>2.37E-09</td>
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<td>0.00E+00</td>
<td>0.00E+00</td>
<td>0.00E+00</td>
</tr>
<tr>
<td>NHWD</td>
<td>kg</td>
<td>5.23E-04</td>
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<td>0.00E+00</td>
<td>-2.01E-03</td>
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<tr>
<td>RWD</td>
<td>kg</td>
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<td>0.00E+00</td>
<td>0.00E+00</td>
<td>0.00E+00</td>
<td>-9.46E-06</td>
</tr>
</tbody>
</table>

CRU  Components For Re-Use  
MFR  Material For Recycling  
MER  Materials For Energy Recovery  
EE  Exported Energy  
HWV  Hazardous Waste Disposed  
NHWD  Non-Hazardous Waste Disposed  
RWD  Radioactive Waste Disposed
## FLAGON® EP/PV-F

### ENVIRONMENTAL IMPACT

<table>
<thead>
<tr>
<th>IMPACT CATEGORY</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>A1</td>
<td>A2</td>
<td>A3</td>
<td>A4</td>
</tr>
<tr>
<td>GWP</td>
<td>kg CO₂ eq</td>
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<td>1.83E-03</td>
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<td>1.06E-02</td>
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<td>ODP</td>
<td>kg CFC-11</td>
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<td>1.98E-09</td>
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<tr>
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<td>7.43E-06</td>
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<tr>
<td>POCP</td>
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<tr>
<td>ADPe</td>
<td>kg Sb eq</td>
<td>3.48E-09</td>
<td>3.65E-12</td>
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<tr>
<td>ADPF</td>
<td>MJ</td>
<td>1.51E+00</td>
<td>2.60E-02</td>
<td>5.93E-02</td>
<td>1.50E-01</td>
</tr>
</tbody>
</table>

**CAPTION:**

GWP: 1E+01 is equal to $1 \times 10^1 = 1 \times 10 = 10$ kg CO₂eq/m²/year

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# USE OF RESOURCES

<table>
<thead>
<tr>
<th>IMPACT CATEGORY</th>
<th>UNIT</th>
<th>A1</th>
<th>A2</th>
<th>A3</th>
<th>A4</th>
<th>A5</th>
<th>B4</th>
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<th>C4</th>
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</table>

**PERE** Renewable energy (carrier)

**PERM** Renewable energy (feedstock)

**PERT** Renewable energy (total)

**PENRE** Non-renewable energy (carrier)

**PENRM** Non-renewable energy (feedstock)

**PENRT** Non-renewable energy (total)

**SM** Use of secondary materials

**RSF** Use of renewable secondary fuels

**NRSF** Use of non-renewable secondary fuels

**FW** Use of Net Fresh Water
# FLAGON® EP/PV-F

## OUTPUT FLOWS AND WASTE PRODUCTION

<table>
<thead>
<tr>
<th>IMPACT CATEGORY</th>
<th>UNIT</th>
<th>A1</th>
<th>A2</th>
<th>A3</th>
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<th>A5</th>
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<td>0.00E+00</td>
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<td>MFR</td>
<td>kg</td>
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*Since EE is equal to zero there is no need to specify thermal and electrical energy*

<table>
<thead>
<tr>
<th>IMPACT CATEGORY</th>
<th>UNIT</th>
<th>A1</th>
<th>A2</th>
<th>A3</th>
<th>A4</th>
<th>A5</th>
<th>B4</th>
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**CRU**  Components For Re-Use  
**MFR**  Material For Recycling  
**MER**  Materials For Energy Recovery  
**EE**  Exported Energy  

**HWD**  Hazardous Waste Disposed  
**NHWD**  Non-Hazardous Waste Disposed  
**RWD**  Radioactive Waste Disposed
# ENVIRONMENTAL IMPACT

<table>
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<tr>
<th>IMPACT CATEGORY</th>
<th>UNIT</th>
<th>A1</th>
<th>A2</th>
<th>A3</th>
<th>A4</th>
<th>A5</th>
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<tr>
<td>AP</td>
<td>kg SO₂ eq</td>
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**CAPTION:**
GWP: 1E+01 is equal to 1 x 10^1 = 1 x 10 = 10 kg CO₂eq/m²/year

**Abbreviations:**
- **GWP**: Global Warming Potential
- **ODP**: Ozone Depletion Potential
- **AP**: Acidification Potential
- **EP**: Eutrophication Potential
- **POCP**: Photochemical Ozone Creation Potential
- **ADPe**: Abiotic Depletion Potential - Non fossil resources (elements)
- **ADPF**: Abiotic Depletion Potential - Fossil fuels
## USE OF RESOURCES

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<th>A5</th>
<th>B4</th>
<th>C2</th>
<th>C3</th>
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**Impact categories and units**

- **PERE**: Renewable energy (carrier)
- **PERM**: Renewable energy (feedstock)
- **PERT**: Renewable energy (total)
- **PENRE**: Non-renewable energy (carrier)
- **PENRM**: Non-renewable energy (feedstock)
- **PENRT**: Non-renewable energy (total)
- **SM**: Use of secondary materials
- **RSF**: Use of renewable secondary fuels
- **NSRF**: Use of non-renewable secondary fuels
- **FW**: Use of Net Fresh Water
## FLAGON® EP/PV

### OUTPUT FLOWS AND WASTE PRODUCTION

<table>
<thead>
<tr>
<th>IMPACT CATEGORY</th>
<th>UNIT</th>
<th>A1</th>
<th>A2</th>
<th>A3</th>
<th>A4</th>
<th>A5</th>
<th>B4</th>
<th>C2</th>
<th>C3</th>
<th>D</th>
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</thead>
<tbody>
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*Since EE is equal to zero there is no need to specify thermal and electrical energy.

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<thead>
<tr>
<th>IMPACT CATEGORY</th>
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<th>A1</th>
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<th>A3</th>
<th>A4</th>
<th>A5</th>
<th>B4</th>
<th>C2</th>
<th>C3</th>
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</tbody>
</table>

**CRU** Components For Re-Use  
**MFR** Material For Recycling  
**MER** Materials For Energy Recovery  
**EE** Exported Energy  

**HWV** Hazardous Waste Disposed  
**NHWD** Non-Hazardous Waste Disposed  
**RWD** Radioactive Waste Disposed
LCA METHODOLOGY

CUT-OFF RULES

LCA model has been processed considering all main input/output associated with core process in accordance with the threshold valued stated in PCR ICMQ-001/15 – rev. 2.1 (ch. 6.3.5), namely the sum of the excluded material flows to the core module shall not exceed 1% of mass and energy.

Hence, the following aspects were considered negligible:
- Production of packaging for the raw materials input process, except for PE packaging film;
- Drill electricity consumption related to mechanical installation;
- Water emissions from core process.
**ALLOCATION**

Allocation occurs anytime a system is producing more than a single output. In this case it is necessary to choose a technique to properly split the environmental burdens among the output flows; international standards ISO 14044 and PCR ICMQ-001/15 – rev. 2.1 provide guidelines about how to deal with this issue, that have been implemented in this project as well.

Soprema produces several product types that are not object of the study. Therefore, it is important to establish an allocation method based on physical variables to split input and output flows to the multi-products: allocation by square-metre of membrane produced has been chosen as most representative tool for the system understudy.

**TRANSPORTATIONS**

Impacts calculations related to transports in SimaPro are performed according to the EcolInvent model.

All the transports is assumed by truck or by ship.

For Module A2, since no specific data are available, 500 km is used as average value (provided by Soprema) for raw materials transportation from suppliers to the plant. For module A4, specific information are provided, such as quantity transported and destination per each trip.
CALCULATION RULES

CHIGNOLO D’ISOLA POWER PLANT (CHP SYSTEM)

According to the diagnoses and data-gatherings performed by Soprema on Chignolo d’Isola plant, one kWh of electricity per square meter of final product is modelled as 66% supplied by national grid (considered in A1 module) and 34% produced internally by the CHP system (considered in A3 module).

Soprema Power Plant is based on a combined cycle technology (electricity and thermal). The most relevant issue concerning CHP technology is how to allocate the environmental impact due to fuel combustion, since a multi-output is present. The approach suggested by PCR 2007:08 was chosen for this project. A dedicated emission factor is computed for both heat and power, according to the amount of produced energy for each class. The result of CHP modelling is a specific emission factor for both electrical and thermal energy, namely the quantity of methane to be burned to produce 1 kWh of energy carrier. This latter parameter is strictly related to CHP system efficiency.
A4
MEMBRANES TRANSPORTATION TO END USERS, BY TRUCK AND/OR SHIP

FLAGON® EP/PR - EP/PR-F
812 KM

FLAGON® EP/PV-F
798 KM

FLAGON® EP/PV
561 KM

308 KM
313 KM
-

The distances mentioned above are average values, weighted on the quantity transported.
CALCULATION RULES

A1
UPSTREAM
Process

A2+A3
CORE
Process

A4
TRANSPORT
to end users

CONSTRUCTION PROCESS STAGE

A5

EACH INSTALLATION METHOD IS
CHARACTERISED BY SPECIFIC MATERIAL
CONSUMPTIONS, SHOWED IN TABLES BELOW.
HOWEVER, THEY SHARE THE WELDING
MACHINE ELECTRIC CONSUMPTION
OF 0.020 kWh/m².
FLAGON® TPO | ENVIRONMENTAL PRODUCT DECLARATION

A5 INSTALLATION
Process

B4 USE
Stage

C2+C3+C4 END OF LIFE
Stage

FLAGON® EP/PR - EP/PR-F
MECHANICAL FIXING

0.0075 kg/m²
NAILS

120 mm
OVERLAP

0.02 kWh/m²
ELECTRICITY

FLAGON® EP/PV-F
FULL ADHESION

0.2 kg/m²
POLYURETHANE GLUE

80 mm
OVERLAP

0.02 kWh/m²
ELECTRICITY

FLAGON® EP/PV
LOOSE LAYING

82 kg/m²
GRAVEL

80 mm
OVERLAP

0.02 kWh/m²
ELECTRICITY
CALCULATION RULES

USE STAGE

B4

ACCORDING TO PCR2014:12 RULES, TWO REPLACEMENTS ARE CONSIDERED IN THIS STUDY. (REPLACEMENT MODULE INCLUDES ALL THE PREVIOUS STAGES DOUBLED (A1,A2,A3,A4 AND A5))
END OF LIFE STAGE

C2+C3+C4
OUT-OF-SERVICE MEMBRANES
TRANSPORTATION TO TREATMENT SITES
(50 KM BY TRUCK)

END-OF-LIFE TREATMENT SCENARIOS

FLAGON® EP/PR - EP/PR-F
70% RECYCLING*

FLAGON® EP/PV

FLAGON® EP/PV-F
100% SANITARY LANDFILL**

30% INCINERATION WITH ENERGY RECOVERY

*The only environmental impact due to recycling process is the waste transportation to the recycling site
**This scenario does not mean as an instruction how to treat the Flagon® EP/PV-F product family at the end of life, but a worst case analysis based on a precautionary choice.