

# FLAGON BSL

TECHNICAL DATA SHEET

ANZ-TDS-27-FLAGON BSL



WATERPROOFING

APPLICATIONS

CIVIL WORKS

FOUNDATIONS

## DESCRIPTION

FLAGON BSL is a synthetic membrane of plasticised PVC with natural self-extinguishing properties manufactured by coextrusion which enables the production of a single layer membrane, each of the two surfaces being a different colour.

The upper surface has a thin colored layer (light green) that allows a quick visual check of any damage occurred on the membrane during the installation. The layer is called "signal layer".

The underside of FLAGON BSL (dark grey) is highly resistant to puncture and perforation by roots.

FLAGON BSL is not UV resistant.

Excellent weldability

Includes a signal layer

High resistance to micro-organisms

Root resistant

Can be used in the Flag Vacuum system

## FIELD OF APPLICATION

FLAGON BSL is used as a waterproofing layer for foundations and below ground structures, such as:

- Tunnels and buried galleries
- Cut and cover
- Coverings of buried structures

## APPLICATION METHOD

FLAGON BSL membrane can be used as part of a single layer waterproofing system, compartmentalised or not, and in Flag Vacuum-system.

FLAGON BSL membranes are welded together by applying hot air or using hot wedge, with manual or automatic welder. The welding can be made either with a track that with double track. The double track allow to perform a pneumatic test with air.

## INSTALLATION PROCEDURE

### SUBSTRATE

- Concrete substrate must be fully cured before application of the membrane
- No work should be started until all surfaces are smoothed with a shotcrete layer or other compacting products. The laying surface obtained should be smooth, free from debris and any roughness that could punch and damage the waterproofing membrane. Where necessary to achieve the desired profile/surface, apply a fine sprayed concrete layer on the shotcrete surface with a minimum thickness of 3 to 5 cm and aggregate diameter not exceeding 8 mm. The minimum thickness, anyway, should not be lower than 20 mm. As soon as the thickness has been defined, the minimum thickness should never be lower than 2/3 of the average thickness previously defined. The relation between height and width of irregular areas, should be lower than 1:10. The minimum curving ray of irregularities (swellings or recesses) should be 20 cm.
- The metal false-works must be completely covered by shotcrete
- Commencement of installation shall be taken as acceptance of the substrate by the Applicator

### INSTALLATION

- Unroll FLAGON BSL onto the GEOLAND PP FR or SOPRADRAIN and weld FLAGON BSL onto FLAGON PVC DISC gradually.
- The edge of the FLAGON BSL must overlap by at least 100-150 mm with double track welding using the Flag Saldamax equipped with double track welding with test channel or Leister double track automatic welder or manual welding with Leister manual welding machine for finishing.
- Control tests of the welds should be proceed with Welding tester, Pneumatic welding test and test of triple points with vacuum cap.
- All penetrations and upturn details should be waterproof as per SOPREMA Installation Guides and detail drawings.

FOR COMPLETE INFORMATION ON PRODUCT INSTALLATION, PLEASE CONSULT YOUR SOPREMA REPRESENTATIVE.



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## PACKAGING

| SPECIFICATIONS   | FLAGON BSL                                   |
|------------------|----------------------------------------------|
| Thickness        | 2.0 mm                                       |
| Colour           | Light green (surface)/ Dark Grey (underface) |
| Roll dimensions  | 20 m x 2.10 m                                |
| Roll weight      | 110 kg                                       |
| Rolls per pallet | 14                                           |

## PROPERTIES

| PROPERTIES                                                                                                | STANDARDS                    | FLAGON BSL                                                                                                                    |
|-----------------------------------------------------------------------------------------------------------|------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                           |                              | 2.0 mm                                                                                                                        |
| Weight (kg/m <sup>2</sup> )                                                                               | EN 1849-2                    | 2.60                                                                                                                          |
| Thickness with signal layer (mm)                                                                          | EN 1849-2                    | ≥ 2.00                                                                                                                        |
| Appearance                                                                                                | EN 1850-2                    | The signal layer is coextruded and homogeneous with the bottom layer.<br>The product is free from blisters, cracks and holes. |
| Straightness (mm)<br>Flatness (mm)                                                                        | EN 1848-2                    | ≤ 50<br>≤ 10                                                                                                                  |
| Static puncture test (CBR method) (kN)                                                                    | EN ISO 12236                 | > 2.5                                                                                                                         |
| Burst strength (%)                                                                                        | EN 14151 (D=1m)              | ≥ 50                                                                                                                          |
| Behaviour under hydrostatic pressure:<br>- 5 bar/72 hours or 10 bar/24 hours                              | EN 1928 meth. B              | No leakage                                                                                                                    |
| Impact resistance on rigid support (mm)                                                                   | EN 12691 meth.A / B          | ≥ 900 / ≥ 750                                                                                                                 |
| Compression resistance for 48 h (N/mm <sup>2</sup> )                                                      | SIA V 280 - 14               | ≥ 7.0                                                                                                                         |
| Cold bending/low temperature behaviour                                                                    | EN 495-5                     | Without cracks at -20°C                                                                                                       |
| Dimensional stability (6h at 80°C) (%)                                                                    | EN 1107-2                    | ≤ 2.0 Without bubbles or blisters                                                                                             |
| Resistance to roots                                                                                       | CEN TS 14416                 | Resistant                                                                                                                     |
| Reaction to fire (class)                                                                                  | EN ISO 11925-2<br>EN 13501-1 | E                                                                                                                             |
| Smoke class                                                                                               | SIA 272                      | Class 2                                                                                                                       |
| Execution of welding joints                                                                               | DVS 2225-5                   | Perfect, break outside seam                                                                                                   |
| Shear resistance of joints (N/mm <sup>2</sup> )<br>Breaking factor fz<br>Peel resistance of joints (N/mm) | EN 12317-2<br>EN 12316-2     | >10.5 (Breaking outside of the joint)<br>≥ 0.6<br>≥ 6.0                                                                       |
| Recycled material<br>DEHP (DOP) content<br>Lead and cadmium content                                       | -                            | Absent<br>Absent<br>Absent                                                                                                    |



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NOTE : All products manufactured by SOPREMA Inc. comply with the description and properties indicated in the technical data sheet that was current at the date of manufacture.

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## PROPERTIES

| PROPERTIES                                                                                                                                                                                                           | STANDARDS                                    | FLAGON BSL                                       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|--------------------------------------------------|
|                                                                                                                                                                                                                      |                                              | 2.0 mm                                           |
| Resistance to micro-organisms:<br>- change of tensile strength (%)<br>- change of elongation at break (%)                                                                                                            | EN ISO 527/3-5                               | ≤ 10<br>≤ 10                                     |
| Tensile strength (N/mm <sup>2</sup> )<br>Longitudinal<br>Trasversal<br>Elongation at break (%)<br>Longitudinal<br>Trasversal<br>Elastic modulus (N/mm <sup>2</sup> )                                                 | EN ISO 527-1<br>EN ISO 527-3<br>EN ISO 527-5 | ≥ 15<br>≥ 14<br>≥ 300<br>≥ 280<br>≤ 20           |
| Variation after long term exposure to elevated temperature (70 d at 70°C):<br>- change of weight (%)<br>- tensile strength (%)<br>- elongation at break (%)<br>- cold bending                                        | EN 1296<br>EN 14575                          | ≤ 2.0<br>≤ 20<br>≤ 20<br>Without cracks at -20°C |
| Variation after long term oxidation to elevated temperature (90 d at 85°C):<br>- tensile strength (%)<br>- elongation at break (%)                                                                                   | EN 14575                                     | ≤ 20<br>≤ 20                                     |
| Variation after thermal ageing in water (8 months at 50°C):<br>- tensile strength (%)<br>- elongation at break (%)<br>- change of weight (%)<br>- cold bending                                                       | SIA V 280-13<br>EN 14415                     | ≤ 20<br>≤ 20<br>≤ 4.0<br>Without cracks at -20°C |
| Exposure to liquid chemicals, variation after immersion in saturated solution of Ca(OH) <sub>2</sub> (28 d at 23°C):<br>- tensile strength (%)<br>- elongation at break (%)<br>- cold bending                        | EN 1847                                      | ≤ 15<br>≤ 15<br>Without cracks at -20°C          |
| Exposure to liquid chemicals, variation after immersion in solution of 5/6% sulphurous acid, H <sub>2</sub> SO <sub>3</sub> (28 d at 23°C):<br>- tensile strength (%)<br>- elongation at break (%)<br>- cold bending | EN 1847                                      | ≤ 15<br>≤ 15<br>Without cracks at -20°C          |
| Exposure to liquid chemicals, variation after immersion in NaCl solution at 10% (28 d at 23°C):<br>- tensile strength (%)<br>- elongation at break (%)<br>- cold bending                                             | EN 1847                                      | ≤ 15<br>≤ 15<br>Without cracks at -20°C          |
| Joint strength (N/50mm)                                                                                                                                                                                              | EN 12317-2                                   | ≥ 20                                             |
| Tear strength (N)<br>(N/mm)                                                                                                                                                                                          | EN 12310-2<br>ISO 34 sample fig.2            | >150<br>≥ 45                                     |

(All values are nominal)



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## PROPERTIES

| PROPERTIES                                                         | STANDARDS          | FLAGON BSL                    |
|--------------------------------------------------------------------|--------------------|-------------------------------|
|                                                                    |                    | 2.0 mm                        |
| Durability<br>After thermal ageing<br>After immersion in chemicals | EN 1296<br>EN 1847 | Watertight at 2kPa and 60 kPa |
| Resistance to oxidation<br>variation in tensile strength (%)       | EN 14575           | ≤ 25                          |

(All values are nominal)

## ANNEX 1: 408.922 FLAG Thermal Analysis

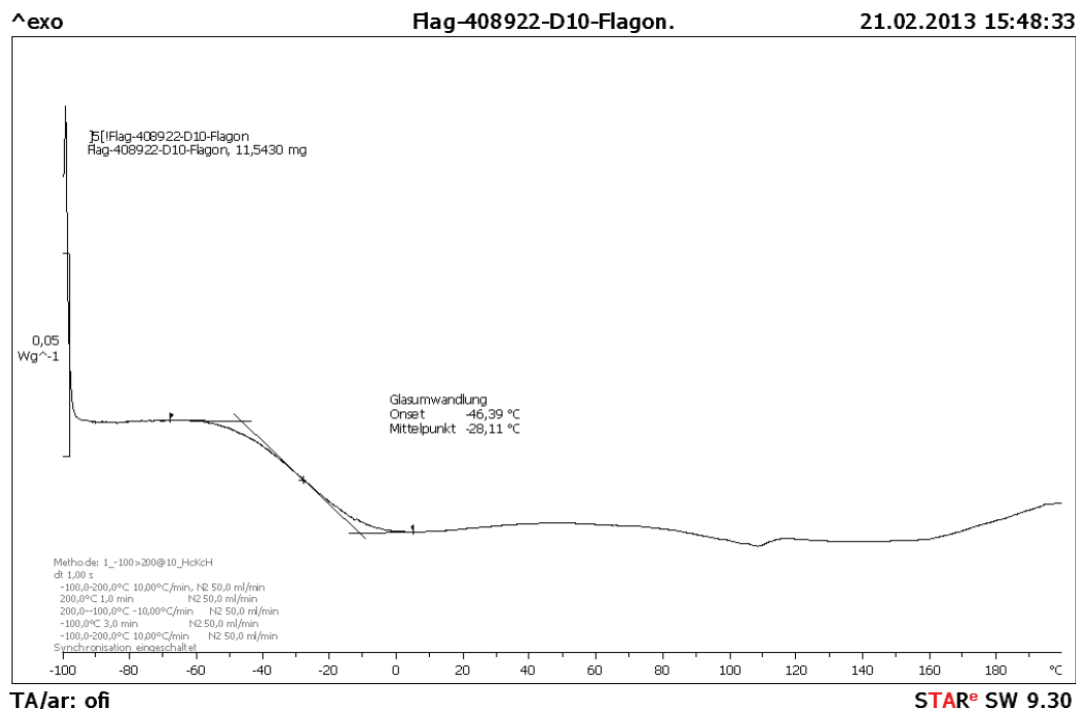
Identification: PVC-P membrane „Flagon BSL“ Date: 2013-02-21

Test: Differential Scanning Calorimetry

DSC (Differential Scanning Calorimetry)

The differential calorimetric examination was carried out on a type-scanning differential scanning calorimeter DSC1, Mettler Toledo, Thermoanalyse Excellence series, STARe system according to ISO 11357-2 (accredited test procedure) taking into account the internal SOP 112.017 in the temperature range from -100 °C to 200 °C in nitrogen atmosphere in a combined test by Heating - Cooling - Heating at 10 K / min in the aluminum crucible, evaluation at the 2nd heating-up process (see enclosed Thermogram).

Glass transition (step center) at -28 °C



## STATEMENT OF RESPONSIBILITY

The technical information and application advice given in this publication is based on the present state of our best knowledge. As the information herein is of a general nature, no assumption can be made as to a product's suitability for a particular use or application and no warranty as to its accuracy, reliability or completeness either expressed or implied is given other than those required by Commonwealth or State Legislation. The owner, their representative and/or the contractor are responsible for checking the suitability of products for their intended use.



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