PRODUCT SPECIFICATION SHEET
BELZONA 5811 (IMMERSION GRADE)
FN10235

BELZONA®
Repair • Protect • Improve

GENERAL INFORMATION

Product Description:
A two-component and solvent-free coating system for protecting metallic and non-metallic substrates operating under immersion with chemical resistance to a broad range of aqueous solutions, also used as structural adhesive for bonding or for creating irregular load bearing shims with acceptable electrical insulation characteristics, and for use in Original Equipment Manufacturer (OEM) or repair situations

Application Areas:
When mixed and applied as detailed in the Belzona Instructions for Use (IFU), the system is ideally suited for application to the following:

- Cooling tower parts,
- Submersible pumps
- Effluent tanks and channels
- Water inlet screens and boxes
- Chemical containment areas
- Marine buoys
- Storage tanks
- Manholes
- Internal and external piping, pipeline, and pipework
- Buried piping and structures
- Sludge digesters

APPLICATION INFORMATION

Application Methods:
Brush, roller, squeegee, injection, airless spray

Application Temperature:
The application should ideally occur from 10°C to 30°C (50°F to 86°F).

Working Life:
The working life will vary according to application temperature. The usable life of mixed material will typically be 1 hour and 45 minutes at 20°C (68°F). Consult the Belzona IFU for specific details.

Coverage Rate:
Belzona 5811 should be applied in 2 coats to achieve a minimum thickness of 400 microns (16 mils).
The theoretical coverage rate of Belzona 5811 is 2.5 m^2 (27 ft^2)/litre at 400 microns (16 mils).
Refer to the IFU for practical coverage rate guidelines.

Cure Times:
Cure times will vary depending on the ambient conditions. Consult the Belzona IFU for specific details.

Base Component	
Appearance	Viscous liquid
Colour	Beige, or grey
Viscosity at 25°C (77°F)	>100 Poise
Density	1.63 – 1.73 g/cm^3

Solidifier Component	
Appearance	Clear mobile liquid
Colour	Dark brown
Viscosity at 25°C (77°F)	8.0 – 10.0 Poise
Density	1.01 - 1.05 g/cm^3

Mixed Properties	
Mixing Ratio by Weight (Base: Solidifier)	5 : 1
Mixing Ratio by Volume (Base: Solidifier)	3 : 1
Mixed Form	Viscous liquid
Mixed Viscosity at 25°C (77°F)	56.0 – 58.0 Poise
Mixed Density	1.50 – 1.54 g/cm^3
Sag Resistance	>375 microns (15 mil)
VOC Content (ASTM D2369/EPA Ref.24)	1.64% / 24.9 g/L

The above application information serves as introductory guide only. For full application details including the recommended application procedure/technique, refer to the Belzona IFU which is enclosed with each packaged product.

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ADHESION

Cleavage Adhesion
When tested in accordance with ASTM D1062, the cleavage adhesion of Belzona 5811 applied onto grit blasted mild steel and cured under the conditions stated below, will typically be:

140 N/mm (800 pli)	20°C (68°F) for 7 days
170 N/mm (970 pli)	20°C (68°F) for 28 days
180 N/mm (1,020 pli)	100°C (212°F) post cure for 1 hour

Pull Off Adhesion
When tested in accordance with ASTM D4541/ISO 4624, the pull-off adhesion of Belzona 5811 cured under the conditions stated below, will typically be:

Mild Steel

26.3 MPa (3,820 psi)	20°C (68°F) for 7 days
34.8 MPa (5,040 psi)	20°C (68°F) for 28 days
33.6 MPa (4,880 psi)	100°C (212°F) post cure for 1 hour

Concrete

5.6 MPa (810 psi)*	20°C (68°F) for 7 days
5.3 MPa (770 psi)*	20°C (68°F) for 28 days

* Cohesive failure in concrete

Tensile Shear Adhesion
When tested in accordance with ASTM D1002, the tensile shear adhesion of Belzona 5811 applied onto grit blasted metallic substrates and cured under the conditions stated below, will typically be:

Aluminum

14.2 MPa (2,055 psi)	20°C (68°F) for 7 days
15.5 MPa (2,250 psi)	20°C (68°F) for 28 days
15.6 MPa (2,265 psi)	100°C (212°F) post cure for 1 hour

Brass

18.0 MPa (2,610 psi)	20°C (68°F) for 7 days
18.3 MPa (2,660 psi)	20°C (68°F) for 28 days
18.6 MPa (2,700 psi)	100°C (212°F) post cure for 1 hour

Copper

17.2 MPa (2,500 psi)	20°C (68°F) for 7 days
18.6 MPa (2,690 psi)	20°C (68°F) for 28 days
21.2 MPa (3,080 psi)	100°C (212°F) post cure for 1 hour

Mild Steel

21.5 MPa (3,115 psi)	20°C (68°F) for 7 days
22.5 MPa (3,260 psi)	20°C (68°F) for 28 days
24.6 MPa (3,570 psi)	100°C (212°F) post cure for 1 hour

Stainless Steel

17.6 MPa (2,550 psi)	20°C (68°F) for 7 days
19.3 MPa (2,800 psi)	20°C (68°F) for 28 days
22.8 MPa (3,310 psi)	100°C (212°F) post cure for 1 hour

CHEMICAL ANALYSIS

Belzona 5811 has been independently analysed for halogens, heavy metals, and other corrosion-causing impurities in accordance with ASTM E165, ASTM D4327, and ASTM E1479. Typical results are displayed as follows:

Analyte	Total Concentration (ppm)
Fluoride	113
Chloride	587
Bromide	<48
Sulphur	7,635
Nitrite	<7
Nitrate	<10
Arsenic	ND (<5)
Antimony	69
Zinc	5
Bismuth, Cadmium, Gallium, Indium, Lead, Mercury, Silver, Tin	ND (<5)

ND: Not detected

CHEMICAL RESISTANCE

When fully cured, the material will demonstrate excellent resistance to a broad range of chemicals. For a more detailed description of chemical resistance properties, refer to relevant Chemical Resistance chart.

COMPRESSIVE PROPERTIES

When tested in accordance with ASTM D695, the compressive properties of samples cured under the conditions stated below, will typically be:

	Compressive Strength	Proportional Limit	Compressive Modulus
20°C (68°F) for 7 days	64.2 MPa (9,310 psi)	20.9 MPa (3,030 psi)	790 MPa (1.1×10^5 psi)
20°C (68°F) for 28 days	72.2 MPa (10,470 psi)	43.4 MPa (6,300 psi)	1,130 MPa (1.6×10^5 psi)
100°C (212°F) post cure for 1 hour	90.7 MPa (13,160 psi)	41.8 MPa (6,070 psi)	910 MPa (1.3×10^5 psi)

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FLEXURAL PROPERTIES

When tested in accordance with ASTM D790, the flexural properties of samples cured under the conditions stated below, will typically be:

	Flexural Strength	Flexural Modulus
20°C (68°F) for 7 days	28.8 MPa (4,180 psi)	1.6 GPa (2.3 x 10^5 psi)
20°C (68°F) for 28 days	35.7 MPa (5,180 psi)	2.5 GPa (3.6 x 10^5 psi)
100°C (212°F) post cure for 1 hour	43.0 MPa (6,240 psi)	3.1 GPa (4.4 x 10^5 psi)

HARDNESS

Barcol
When tested in accordance with ASTM D2583 and using a Barcol impressor Model No. 935, the hardness of samples cured under the conditions stated below, will typically be:

75	20°C (68°F) for 7 days
83	20°C (68°F) for 28 days
83	100°C (212°F) post cure for 1 hour

König Pendulum
When tested in accordance with ISO 1522, the König damping time of samples cured under the conditions stated below, will typically be:

122 seconds	20°C (68°F) for 7 days
116 seconds	20°C (68°F) for 28 days
158 seconds	100°C (212°F) post cure for 1 hour

Shore D
When tested in accordance with ASTM D2240, the Shore D hardness of samples cured under the conditions stated below, will typically be:

81	20°C (68°F) for 7 days
82	20°C (68°F) for 28 days
81	100°C (212°F) post cure for 1 hour

HEAT RESISTANCE

Glass Transition Temperature (T_g)
When tested in accordance with ISO 11357-2, the T_g of samples cured under the conditions stated below, will typically be:

38°C (100°F)	20°C (68°F) for 7 days
45°C (113°F)	20°C (68°F) for 28 days
44°C (111°F)	100°C (212°F) post cure for 1 hour

Heat Distortion Temperature (HDT)
When tested in accordance with ASTM D648, the heat distortion temperature (HDT) of samples cured under the conditions stated below, will typically be:

36°C (97°F)	20°C (68°F) for 7 days
41°C (106°F)	20°C (68°F) for 28 days
40°C (104°F)	100°C (212°F) post cure for 1 hour

Atlas Cell Cold-Wall Immersion Test
When tested in accordance with NACE TM 0174-Procedure A (with cold wall), the coating will exhibit no rusting (ASTM D610 rating 10) or blistering (ASTM D714 rating 10) after 6 months immersion in deionised water at 40°C (104°F).

Immersion Resistance
For many typical applications the material is suitable for continuous immersion in aqueous solutions up to 50°C (122°F). Please consult Belzona for additional advice where immersed applications will operate close to 50°C (122°F).

Deionised Water Immersion
When tested in accordance with ISO 2812-2 and NACE TM 0174-Procedure B (no cold wall), no blistering, rusting, cracking, or delamination were observed after 6 months immersion in deionised water at 50°C (122°F).

Seawater Immersion
When tested in accordance with ISO 2812-2 and NACE TM 0174-Procedure B (no cold wall), no blistering, rusting, cracking, or delamination were observed after 6 months immersion in seawater at 50°C (122°F).

Dry Heat Resistance
The indicated degradation temperature in air based on Differential Scanning Calorimetry (DSC) operated in accordance with ISO 11357 is typically 185°C (365°F). The material will typically be stable under dry conditions at low temperatures down to -40°C (-40°F).

IMPACT RESISTANCE

Izod Pendulum
When tested in accordance with ASTM D256, the impact (un-notched) resistance of samples cured under the conditions stated below will typically be:

3.3 kJ/m² (1.6 ft-lb/in²)	20°C (68°F) for 7 days
3.9 kJ/m² (1.9 ft-lb/in²)	20°C (68°F) for 28 days
4.6 kJ/m² (2.2 ft-lb/in²)	100°C (212°F) post cure for 1 hour

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TENSILE PROPERTIES

When tested in accordance with ASTM D638, typical values of samples cured and tested at temperatures stated below will be:

	Ultimate Tensile Strength	Young's Modulus	Elongation
20°C (68°F) for 7 days	25.8 MPa (3,735 psi)	3.3 GPa (4.8 x 10^5 psi)	1.50%
20°C (68°F) for 28 days	21.5 MPa (3,110 psi)	3.2 GPa (4.6 x 10^5 psi)	1.06%
100°C (212°F) post cure for 1 hour	25.9 MPa (3,760 psi)	3.6 GPa (5.2 x 10^5 psi)	1.09%

APPROVALS

American Bureau of Shipping

Belzona 5811 holds "Product Type Approval" by ABS under certificate numbers 22-2219786-PDA and 22-2219786-PDA-DUP.

Contact Belzona for more details on these approvals or any other approvals or certifications not stated herein.

SHELF LIFE

Separate base and solidifier components shall have a shelf life of five (5) years from date of manufacture when stored in their original unopened containers between 5°C (41°F) and 30°C (86°F).

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WARRANTY

Belzona guarantees this product will meet the performance claims stated herein when material is stored and used as instructed in the Belzona Information for Use (IFU) leaflet.

Belzona further guarantees that all its products are carefully manufactured to ensure the highest quality possible and tested strictly in accordance with universally recognized standards (ASTM, ANSI, BS, DIN, ISO etc.).

Since Belzona has no control over the use of the product described herein, no warranty for any application can be given.

AVAILABILITY AND COST

Belzona 5811 is available from a network of Belzona Distributors throughout the world for prompt delivery to the application site. For information, consult the Belzona Distributor in your area.

HEALTH AND SAFETY

Prior to using this material, please consult the relevant Safety Data Sheets.

MANUFACTURER/SUPPLIER

Belzona Limited
Claro Road
Harrogate HG1 4DS
United Kingdom

TECHNICAL SERVICE

Complete technical assistance is available and includes fully trained Technical Consultants, technical service personnel and fully staffed research, development, and quality control laboratories.

Belzona products are manufactured under an ISO 9001 registered Quality Management System.