PRODUCT SPECIFICATION SHEET
BELZONA 4311
FN10195

BELZONA®
Repair • Protect • Improve

GENERAL INFORMATION

Product Description:
A high performance, two-component barrier coating with outstanding resistance to a broad range of chemicals, especially acids and alkalis.

Application Areas:
When mixed and applied as detailed in the Belzona Instructions for Use (IFU), the system, which isolates concrete and metal substrates from deteriorating chemical environments, is ideally suited for application to:

- Acid retaining walls
- Chemical drains and channels
- Chemical transfer and holding areas
- Pump bases
- Pump casings
- Tank pads
- Walkways (with non-slip aggregate incorporated)
- Tanks

APPLICATION INFORMATION

Cure Time
Allow to solidify for the times shown in the Belzona IFU before subjecting it to the conditions indicated.

Note: Below 59°F (15°C), solidification times will be significantly extended and the resultant chemical resistance capability of the **Belzona 4311** will be reduced.

For optimum results, **Belzona 4311** should be forced cured at 176°F (80°C) for 4 hours. This will ensure the very best chemical resistance.

Coverage Rate
Theoretical coverage rate of a 1.5L unit is 64.6 sq.ft. (6.0 m^2) at the recommended thickness of 10 mils (250 micron) per coat. Theoretical coverage rate of a 10L unit is 430 sq.ft. (40 m^2) at the recommended thickness of 10 mils (250 micron) per coat.

Application to rough or irregular surfaces may reduce this coverage by 20-25%.

Base Component

Appearance	Thixotropic liquid
Colour	Red or Grey
Gel Strength	77-83 g/cm^3
Density	2.14 g/cm^3

Solidifier Component

Appearance	Liquid
Colour	Black
Viscosity	3 - 4 Poise at 77°F (25°C)
Density	1.07 g/cm^3

Mixed Properties

Mixing Ratio by Weight (Base : Solidifier)	6 : 1
Mixing ratio by Volume (Base : Solidifier)	3 : 1
Density	1.87 g/cm^3
Sag Resistance	>20 mils/>500 microns
Viscosity	47.5 Poise at 77°F (25°C)
Time to Peak Exotherm at 68°F (20°C)	37-52 minutes
Peak Exotherm Temperature	212-266°F (100-130°C)
Useable Life at 68°F (20°C)	20 minutes

Resistance to 98% Sulfuric Acid, percent weight loss, of cured coupon after 7 days immersion at 68°F (20°C) is < 0.2.

VOC content (ASTM D2369 / EPA ref. 24): 0.28% (5g/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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ABRASION

Taber
The Taber abrasion resistance determined in accordance with ASTM D4060 with 1 kg load is typically:

CS17 Wheels (Dry)	75 mm^3 loss per 1000 cycles

ADHESION

Tensile Shear
When tested in accordance with ASTM D1002, the adhesion to grit blasted steel will typically be:

	Cure temperature
2990 psi (20.6 MPa)	68°F (20°C)

Pull Off Adhesion
When tested in accordance with ASTM D 4541/ ISO 4624, the pull off strength will typically be:

Steel

4710 psi (32.5 MPa)	68°F (20°C)
5460 psi (37.7 MPa)	212°F (100°C)

Concrete (using Belzona 4911 Conditioner)

770 psi (5.3 MPa) *	68°F (20°C)
815 psi (5.6 MPa) *	212°F (100°C)

* Cohesive failure in concrete

CHEMICAL ANALYSIS

The mixed **Belzona 4311** 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	12
Chloride	669
Bromide	ND (<10)
Sulphur	725
Nitrite	<1
Nitrate	<4
Zinc	ND (<5)
Antimony, Arsenic, Bismuth, Cadmium, Lead, Tin, Silver, Mercury, Gallium and Indium	ND (<5)

ND : Not Detected

CHEMICAL RESISTANCE

This material offers excellent resistance to a broad range of chemicals particularly acids and alkali's.

Note: Chemical resistance ratings are assigned based on the ability of a Belzona product to resist chemical attack and/or protect the underlying substrate. Belzona cannot guarantee the purity of the chemical, appearance or colour stability following contact.

* *For a more detailed description of chemical resistance properties, determined in accordance with ISO 2812-1, please refer to relevant Chemical Resistance chart.*

COMPRESSIVE PROPERTIES

Compressive Strength
The compressive yield strength of the material when tested to ASTM D695 is typically:

Compressive Strength	**Cure temperature**
8570 psi (59.1 MPa).	68°F (20°C)

Compressive Modulus	
1.63 x 10^5 psi (1144 MPa)	68°F (20°C)

ELECTRICAL PROPERTIES

The Dielectric Strength when tested in accordance with ASTM D149 Method A is typically 6.7kV/mm when tested at 250V/s.

ELONGATION & TENSILE PROPERTIES

When determined in accordance with ASTM D638, typical values will be:

	Cure temperature
Tensile Strength	
6,717 psi (46.31 MPa)	68°F (20°C)
6,730 psi (46.40 MPa)	212°F (100°C)
Elongation	
0.76%	68°F (20°C)
0.91%	212°F (100°C)
Young's Modulus	
1.29x10^6 psi (8,920 MPa)	68°F (20°C)
9.88x10^5 psi (6,811 MPa)	212°F (100°C)

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FLEXURAL PROPERTIES

When determined in accordance with ASTM D790, typical values will be:

Flexural Strength	**Cure temperature**
7420 psi (51.2 MPa).	68°F (20°C)

Flexural Modulus	
7.02 x 10^5 psi (4840 MPa)	68°F (20°C)

HARDNESS

Shore D
When determined in accordance with ASTM D2240, typical value will be:

	Cure temperature
83	68°F (20°C)

Barcol Hardness
The Barcol hardness, when determined in accordance with and ASTM D2583, will typically be:

	Ambient cure (68°F/20°C)	Post cure (212°F/100°C)
Barcol 934-1	22	33
Barcol 935	77	81

HEAT RESISTANCE

Heat Distortion Temperature (HDT)
The heat distortion temperature (HDT) of the material when tested in accordance with ASTM D648, under 264 psi fibre stress will typically be:

HDT Values	**Cure Schedule**
118°F (48°C)	7 days @ 68°F (20°C)
172°F (78°C)	7 days @ 212°F (100°C)

Glass Transition Temperature (Tg)
When measured in accordance with ISO 11357 part 2 typical Tg values will be:

Tg	**Cure temperature**
131°F (55°C)	7 days @ 68°F(20°C)
203°F (95°C)	7 days @ 212°F (100°C)

Atlas Cell Immersion Test
When tested in accordance with NACE TM 0174 procedure A, the coating will exhibit no blistering (ASTM D714 rating 10) or rusting (ASTM D610 rating 10) after 6 months immersion in deionized water at 140°F (60°C).

Dry Heat Resistance
The indicated degradation temperature in air based on Differential Scanning Calorimetry (DSC) operated in accordance with ISO11357 is typically 423°F (217°C).
For many applications the product is suitable down to -40°F (-40°C).

Wet Heat Resistance
For many typical applications, the material is suitable for service at temperatures up to 140°F (60°C). Refer to chemical resistance data for chemical contact limitations.

IMPACT RESISTANCE

Izod Impact
The impact strength when tested in accordance with ASTM D256 is typically:

0.73 ft.lb./in. (39.2J/m). (Reverse notched) 7 days @ 68°F (20°C)

WEATHERING RESISTANCE

Barrier properties retained following 10,000 hours accelerated weathering exposure in accordance with ISO 11341. Note: a loss of gloss and change in appearance will be observed.

SHELF LIFE

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

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WARRANTY

This product will meet the performance claims stated herein when material is stored and used as instructed in the Belzona Information For Use leaflet. Belzona ensures that all its products are carefully manufactured to ensure the highest quality possible and are 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 4311 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, UK

Belzona Inc.
14300 NW 60th Ave,
Miami Lakes, FL, 33014, USA

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