

# PRODUCT SPECIFICATION SHEET

## BELZONA 1311

FN10133



### GENERAL INFORMATION

#### Product Description:

A two-component paste grade system designed for rebuilding metals damaged by erosion-corrosion. Based on a silicon-steel alloy and ceramic particles blended within high molecular weight reactive polymers and oligomers. Specifically designed to be used with Belzona erosion-corrosion resistant coatings. Also used as a high strength structural adhesive for bonding or for creation of irregular load bearing shims with good electrical insulation characteristics. For use in Original Equipment Manufacture 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:

- Centrifugal and turbine pumps
- Propellers
- Bow thrusters
- T-pieces
- Heat exchangers, water box ends, division bars and tube sheets
- Butterfly and gate valves
- Kort nozzles
- Pipe elbows

### APPLICATION INFORMATION

#### Working Life

Will vary according to temperature. At 77°F (25°C) the usable life of mixed material is 15 minutes.

#### Cure Time

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

#### Volume Capacity

25.3 in<sup>3</sup> (415 cm<sup>3</sup>)/kg.  
50.6 in<sup>3</sup> (830 cm<sup>3</sup>)/2 kg unit.

#### Base Component

Appearance	Paste
Colour	Very dark grey
Gel strength at 77°F (25°C)	150 - 350 g/cm HF
Density	2.6 - 2.8 g/cm <sup>3</sup>

#### Solidifier Component

Appearance	Paste
Colour	Grey
Gel strength at 77°F (25°C)	40 - 150 g/cm QV
Density	1.64 - 1.70 g/cm <sup>3</sup>

#### Mixed Properties

Mixing Ratio by Weight (Base : Solidifier)	5 : 1
Mixing Ratio by Volume (Base : Solidifier)	3 : 1
Mixed Form	Paste
Peak Exotherm Temperature	210 - 230°F (99 -110°C)
Time to Peak Exotherm	33 - 41 mins.
Slump Resistance	nil at 0.5 inch (1.27 cm)
Mixed Density	2.36-2.52 g/cm <sup>3</sup>
VOC content (ASTM D2369 / EPA ref. 24)	0.08% / 1.93 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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FN10133



### ABRASION

#### Taber

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

H10 Wheels (Wet)	194 mm <sup>3</sup> loss per 1000 cycles
CS17 Wheels (Dry)	25 mm <sup>3</sup> loss per 1000 cycles

### ADHESION

#### Tensile Shear

When tested in accordance with ASTM D1002, to grit blasted substrate with 3-4 mil (75-100 micron) profile, typical values will be:

Mild steel	3,000 psi (20.7 MPa)
Brass	2,320 psi (16.0 MPa)
Copper	2,300 psi (15.9 MPa)
Stainless steel	2,760 psi (19.0 MPa)
Aluminium	1,780 psi (12.3 MPa)

#### Pull Off Adhesion

When tested in accordance with ASTM D 4541/ISO 4624, typical value will be:

Mild steel	3000 psi (20.7 MPa)
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### CHEMICAL ANALYSIS

The mixed **Belzona 1311** 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	165
Chloride	409
Bromide	ND (<10)
Sulphur	996
Nitrite	ND (<9)
Nitrate	6
Zinc	3.9
Antimony, Arsenic, Bismuth, Cadmium, Lead, Tin, Silver, Mercury, Gallium and Indium	ND (<3.0)

ND : Not Detected

### CHEMICAL RESISTANCE

Once fully cured, the material will demonstrate excellent resistance to most commonly found inorganic acids and alkalis at concentrations up to 20%.

The material is also resistant to hydro-carbons, mineral oils, lubricating oils and many other commonly found chemicals.

\* For a more detailed description of chemical resistance properties, refer to relevant Chemical Resistance chart.

### COMPRESSIVE PROPERTIES

When determined in accordance with ASTM D695 (1.0in/25.4mm thick test pieces), typical values will be:

	Cure temperature
<b>Compressive Strength (Maximum)</b>	
12235 psi (84.4 MPa)	68°F (20°C)
17250 psi (119.0 MPa)	212°F (100°C)
<b>Compressive Strength (Yield)</b>	
8235 psi (56.8 MPa)	68°F (20°C)
11190 psi (77.2 MPa)	212°F (100°C)
<b>Compressive Modulus</b>	
1.85x10 <sup>5</sup> psi (1277 MPa)	68°F (20°C)
1.76x10 <sup>5</sup> psi (1213 MPa)	212°F (100°C)

When determined using a modified version of ASTM D695, at thickness more representative of in service application, typical values will be:

Thickness	Compressive Strength (Yield)	Cure Temperature
0.24 in (6.0 mm)	12320 psi (84.9 MPa)	68°F (20°C)
	17380 psi (119.9 MPa)	212°F (100°C)
0.12 in (3.0 mm)	15900 psi (109.6 MPa)	68°F (20°C)
	20835 psi (143.7 MPa)	212°F (100°C)
Bonded to grit blasted mild steel (single side)		
Thickness	Compressive Strength (Yield)	Cure Temperature
0.12 in (3.0 mm)	20890 psi (144.0 MPa)	68°F (20°C)
	24440 psi (168.5 MPa)	212°F (100°C)

### CORROSION PROTECTION

#### Corrosion Resistance

Once fully cured, will show no visible signs of corrosion after 5,000 hours exposure in the ASTM B117 salt spray cabinet.

# PRODUCT SPECIFICATION SHEET

## BELZONA 1311

FN10133



### ELONGATION & TENSILE PROPERTIES

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

	Cure temperature
<b>Tensile Strength</b>	
6,002 psi (41.38 MPa)	68°F (20°C)
7,366 psi (50.79 MPa)	212°F (100°C)
<b>Elongation</b>	
0.59%	68°F (20°C)
0.79%	212°F (100°C)
<b>Young's Modulus</b>	
1.58x10 <sup>6</sup> psi (10,872 MPa)	68°F (20°C)
1.57x10 <sup>6</sup> psi (10,825 MPa)	212°F (100°C)

### FLEXURAL PROPERTIES

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

	Cure temperature
10,000 psi (68.9 MPa)	68°F(20°C)
15,500 psi (106.9 MPa)	212°F(100°C)

### HARDNESS

#### Shore D & Barcol Hardness

The Shore D and Barcol hardness, when determined in accordance with ASTM D2240 and ASTM D2583, will typically be:

	Ambient cure (68°F/20°C)	Post cure (212°F/100°C)
<b>Shore D</b>	88	89
<b>Barcol 934-1</b>	20	35
<b>Barcol 935</b>	87	92

### HEAT RESISTANCE

#### Heat Distortion Temperature (HDT)

Tested to ASTM D648 (264 psi fibre stress), typical values will be:

	Cure temperature
124°F (51°C)	68°F(20°C)
192°F (89°C)	212°F(100°C)

#### Service Temperature Limits

For many typical applications, the product will be suitable for use at the following service temperatures:

Type of Service	Temperature
Lower temperature limit	-40 °C (-40 °F)
Upper temperature limit (dry)	80 °C (176 °F)
Upper temperature limit (wet)	60 °C (140 °F)

#### Dry Heat Resistance

The indicated degradation temperature in air based on Differential Scanning Calorimetry (DSC) operated in accordance with ISO11357 is typically 392°F (200°C).

### IMPACT RESISTANCE

#### Impact Strength

The impact strength (reverse notched) when tested to ASTM D256 or ISO 180 is typically:

	Cure temperature
0.53 ft.lb./in., 29 J/m	68°F(20°C)
0.75 ft.lb./in., 40 J/m	212°F(100°C)

### 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).

### APPROVALS/ACCEPTANCES

The material has received recognition from organizations worldwide including:

- U.S.D.A.
- ABS
- CATERPILLAR
- NATO
- YORK INTERNATIONAL
- RUSSIAN REGISTER OF SHIPPING
- KOREAN REGISTER OF SHIPPING
- CHINA CLASSIFICATION SOCIETY
- BUREAU VERITAS

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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 1311** 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.

### MANUFACTURER / SUPPLIER

Belzona Limited,  
Claro Road, Harrogate,  
HG1 4DS, UK

Belzona Inc.  
14300 NW 60<sup>th</sup> Ave,  
Miami Lakes, FL, 33014, USA

### HEALTH AND SAFETY

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

### 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.

The technical data contained herein is based on the results of long term tests carried out in our laboratories and to the best of our knowledge is true and accurate on the date of publication. It is however subject to change without prior notice and the user should contact Belzona to verify the technical data is correct before specifying or ordering. No guarantee of accuracy is given or implied. We assume no responsibility for rates of coverage, performance or injury resulting from use. Liability, if any, is limited to the replacement of products. No other warranty or guarantee of any kind is made by Belzona, express or implied, whether statutory, by operation of law or otherwise, including merchantability or fitness for a particular purpose.

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