

# PRODUCT SPECIFICATION SHEET

## BELZONA 1111

FN10132



### GENERAL INFORMATION

#### Product Description:

A two component paste grade system for repairing and rebuilding machinery and equipment. Based on a silicon steel alloy blended with high molecular weight reactive polymers and oligomers. When cured, the material is durable yet fully machinable. 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:

- Shafts
- Hydraulic rams
- Bearing housings
- Keyways
- Engine blocks
- Casings
- Pipes
- Tanks
- Flange faces

### 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

Cure times will vary depending on the ambient conditions and will be reduced for thicker sections and extended for thinner applications. Consult the Belzona IFU for specific details.

#### Volume Capacity

24.3 in<sup>3</sup> (398 cm<sup>3</sup>)/kg.

#### Base Component

Appearance Paste  
Color Dark gray  
Gel strength at 77°F (25°C) >150 g/cm HF  
Density 2.70 - 2.90 g/cm<sup>3</sup>

#### Solidifier Component

Appearance Paste  
Color Light gray  
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 203 - 232°F (95 - 111°C)  
Time to Peak Exotherm 33 - 41 mins.  
Slump Resistance nil at 0.5 inch (1.27 cm)  
Mixed Density 2.41-2.61 g/cm<sup>3</sup>

*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:

H10 Wheels (Wet) 852 mm<sup>3</sup> loss per 1000 cycles  
 CS17 Wheels (Dry) 24 mm<sup>3</sup> loss per 1000 cycles

### ADHESION

#### Tensile Shear

When tested in accordance with ASTM D1002, using degreased strips, grit blasted to a 3-4 mil profile, typical values will be:

Mild steel 2,790 psi (19.2 MPa)  
 Brass 1,650 psi (11.4 MPa)  
 Copper 2,060 psi (14.2 MPa)  
 Stainless steel 2,960 psi (20.4 MPa)  
 Aluminium 1,950 psi (13.4 MPa)

#### Pull Off Adhesion

When tested in accordance with ASTM D 4541/ ISO 4624, the pull off strength from grit blasted steel will be typically:

3240 psi (22.3 MPa) 68°F (20°C) cure  
 2980 psi (20.5 MPa) 212°F (100°C) cure

#### Cleavage strength

When tested in accordance with ASTM D 1062, the cleavage strength to grit blasted steel will be typically:

1199 pli 68°F (20°C) cure

### CHEMICAL ANALYSIS

The mixed **Belzona 1111** has been independently analyzed for halogens, heavy metals, and other corrosion-causing impurities, with the following typical results:

Analyte	Total Concentration (ppm)
Fluoride	224
Chloride	398
Bromide	ND (<12)
Sulfur	1019
Nitrite	ND (<6)
Nitrate	4
Zinc	3.4
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>	
12525 psi (86.4 MPa)	68°F (20°C)
16645 psi (114.8 MPa)	212°F (100°C)
<b>Compressive Strength (Yield)</b>	
9620 psi (66.3 MPa)	68°F (20°C)
10955 psi (75.6 MPa)	212°F (100°C)
<b>Compressive Modulus</b>	
1.77 x 10 <sup>5</sup> psi (1217 MPa)	68°F (20°C)
1.75 x 10 <sup>5</sup> psi (1205 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)	13095 psi (90.3 MPa)	68°F (20°C)
	16450 psi (113.4 MPa)	212°F (100°C)
0.12 in (3.0 mm)	14855 psi (102.5 MPa)	68°F (20°C)
	18980 psi (130.9 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)	19910 psi (137.3 MPa)	68°F (20°C)
	23840 psi (164.4 MPa)	212°F (100°C)

### CORROSION PROTECTION

#### Corrosion Resistance

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

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### ELECTRICAL PROPERTIES

**Dielectric Constant (Relative Permittivity)**

Tested to ASTM D150 is typically 8.0 when tested at 1V & 10 kHz.

**Dielectric Strength**

Tested to ASTM D149 is typically 2.2 kV/mm when tested at 2000V/s.

**Dissipation Factor (Tan Delta/Dielectric Loss)**

Tested to ASTM D150 is typically 0.09 when tested at 1V & 10 kHz.

**Surface Resistivity**

Tested to ASTM D257 is typically  $2.28 \times 10^{10}$  Mohm when tested at 500V for 1 minute.

**Volume Resistivity**

Tested to ASTM D257 is typically  $2.6 \times 10^9$  Mohm mm when tested at 500V for 1 minute.

### ELONGATION & TENSILE PROPERTIES

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

**Tensile Strength**

4975 psi / 34.3 MPa  
6686 psi / 46.1 MPa

**Cure temperature**

68°F (20°C)  
212°F (100°C)

**Elongation**

0.49 %  
0.58 %

68°F (20°C)  
212°F (100°C)

**Young's Modulus**

$12.6 \times 10^5$  psi / 8681 MPa  
 $12.3 \times 10^5$  psi / 8468 MPa

68°F (20°C)  
212°F (100°C)

The Tensile fatigue strength in accordance with ASTM D3166 at ambient temperature and 30% applied static tensile stress is >1,000,000 cycles.

### FLEXURAL PROPERTIES

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

**Flexural Strength**

9,140 psi (63.0 MPa)  
11,820 psi (81.5 MPa)

**Cure temperature**

68°F (20°C)  
212°F (100°C)

**Flexural Modulus**

$10.44 \times 10^5$  psi (7199 MPa)  
 $10.15 \times 10^5$  psi (6995 MPa)

**Cure temperature**

68°F (20°C)  
212°F (100°C)

### HARDNESS

**Shore D**

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

84

**Barcol**

When determined in accordance with ASTM D2583, using Model No.935, typical values will be:

85  
92

**Cure temperature**

68°F (20°C)  
212°F (100°C)

### HEAT RESISTANCE

**Heat Distortion Temperature (HDT)**

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

127°F (53°C)  
195°F (91°C)

**Cure temperature**

68°F (20°C)  
212°F (100°C)

**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).

For many applications the product is suitable down to -40°F (-40°C).

### IMPACT RESISTANCE

**Impact Strength**

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

0.69 ft.lb./in., 37 J/m  
0.73 ft.lb./in., 39 J/m

**Cure temperature**

68°F (20°C)  
212°F (100°C)

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### POTABLE WATER APPROVAL

#### KC

Listed in Barrier Materials as epoxy resin-based waterproof and anticorrosion material, which has passed full test of sanitation and safety.



#### WRAS

Listed in the UK Water Fittings Directory under "Materials which have passed full tests of effect on water quality".



#### NSF

**Belzona 1111** is listed for contact with drinking water subject to the following restriction: Certified for a maximum of 10% of pipe greater than or equal to 1/2", and 10% of tanks greater than or equal to 5 gallons.



### 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 32°F (0°C) and 86°F (30°C).

### APPROVALS/ACCEPTANCES

The material has received recognition from organizations worldwide including:  
AMERICAN BUREAU OF SHIPPING  
U.S.D.A.  
RUSSIAN REGISTER OF SHIPPING  
KOREAN REGISTER OF SHIPPING  
CHINA CLASSIFICATION SOCIETY  
LLOYDS REGISTER  
UK WRAS  
BUREAU VERITAS  
NSF  
KOREAN WATER AND WASTEWATER WORKS ASSOCIATION

### 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 1111** 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

Belzona Polymerics Ltd.  
Claro Road, Harrogate,  
HG1 4DS, UK

Belzona Inc.  
2000 N.W. 88<sup>th</sup> Court,  
Miami, Florida, USA, 33172

### HEALTH AND SAFETY

Prior to using this material, please consult the relevant Material 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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