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^3 (398 cm^3)/kg.

Base Component	
Appearance	Paste
Colour	Dark grey
Gel strength at 77°F (25°C)	>150 g/cm HF
Density	2.70 - 2.90 g/cm^3

Solidifier Component	
Appearance	Paste
Colour	Light grey
Gel strength at 77°F (25°C)	40 - 150 g/cm QV
Density	1.64 - 1.70 g/cm^3

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^3
VOC content (ASTM D2369 / EPA ref. 24)	0.05% / 1.22 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.

PRODUCT SPECIFICATION SHEET
BELZONA 1111
FN10132

ABRASION

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

H10 Wheels (Wet)	852 mm^3 loss per 1000 cycles
CS17 Wheels (Dry)	24 mm^3 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)

Tensile shear fatigue
The Tensile shear fatigue in accordance with ASTM D3166 at ambient temperature and 653 psi (4.5MPa) applied static tensile stress is >1,000,000 cycles.

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 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	48
Chloride	404
Bromide	ND (<11)
Sulphur	817
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
Compressive Strength (Maximum)	
12525 psi (86.4 MPa)	68°F (20°C)
16645 psi (114.8 MPa)	212°F (100°C)
Compressive Strength (Yield)	
9620 psi (66.3 MPa)	68°F (20°C)
10955 psi (75.6 MPa)	212°F (100°C)
Compressive Modulus	
1.77 x 10^5 psi (1217 MPa)	68°F (20°C)
1.75 x 10^5 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) 16450 psi (113.4 MPa)	68°F (20°C) 212°F (100°C)
0.12 in (3.0 mm)	14855 psi (102.5 MPa) 18980 psi (130.9 MPa)	68°F (20°C) 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) 23840 psi (164.4 MPa)	68°F (20°C) 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.

PRODUCT SPECIFICATION SHEET
BELZONA 1111
FN10132

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 x 10^{10} Mohm when tested at 500V for 1 minute.

Volume Resistivity
Tested to ASTM D257 is typically 2.6 x 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	**Cure temperature**
5,604 psi / 38.64 MPa	68°F (20°C)
6,144 psi / 42.36 MPa	212°F (100°C)

Elongation	
0.55 %	68°F (20°C)
0.69 %	212°F (100°C)

Young's Modulus	
13.8 x 10^{5} psi / 9,526 MPa	68°F (20°C)
12.1 x 10^{5} psi / 8,350 MPa	212°F (100°C)

FLEXURAL PROPERTIES

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

Flexural Strength	**Cure temperature**
9,140 psi (63.0 MPa)	68°F (20°C)
11,820 psi (81.5 MPa)	212°F (100°C)

Flexural Modulus	**Cure temperature**
10.44 x 10^{5} psi (7199 MPa)	68°F (20°C)
10.15 x 10^{5} psi (6995 MPa)	212°F (100°C)

FOOD CONTACT

Incidental Food Contact (USDA)
USDA compliant as an Incidental food contact surface.

Direct Food Contact (FDA)
Meets extraction requirements as set out in 21 CFR 175.300 (paragraph c) for a broad range of food types in Conditions of Use D, E and F (paragraph d).
Please contact Belzona for more comprehensive data.

HARDNESS

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

84	68°F (20°C)

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

	Ambient cure (68°F/20°C)	Post cure (212°F/100°C)
Barcol 934-1	11	28
Barcol 935	85	92

HEAT RESISTANCE

Heat Distortion Temperature (HDT)
Tested to ASTM D648 (264 psi fibre stress), typical values obtained will be:

	Cure temperature
127°F (53°C)	68°F (20°C)
195°F (91°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).

PRODUCT SPECIFICATION SHEET
BELZONA 1111
FN10132

IMPACT RESISTANCE

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

	Cure temperature
0.69 ft.lb./in., 37 J/m	68°F (20°C)
0.73 ft.lb./in., 39 J/m	212°F (100°C)

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/ANSI/CAN 61
Tested and certified by WQA against NSF/ANSI/CAN 61.

Note: **Belzona 1111** has been found to meet the extraction limits of NSF/ANSI/CAN 600. For product use restrictions, visit www.wqa.org

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:
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/ANSI/CAN 61
KOREAN WATER AND WASTEWATER WORKS ASSOCIATION

PRODUCT SPECIFICATION SHEET
BELZONA 1111
FN10132

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.

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.

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.

Nothing in the foregoing statement shall exclude or limit any liability of Belzona to the extent such liability cannot by law be excluded or limited.

Copyright © 2023 Belzona International Limited. Belzona® is a registered trademark.

Belzona products are manufactured under an ISO 9001 Registered Quality Management System