

1. PRODUCT NAME

Belzona® 1111 (Super Metal)
Engineering grade repair system for repairing and rebuilding machinery and equipment.

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.

2. MANUFACTURER

Belzona Inc.,
2000 N.W. 88th Court
Miami, Florida 33172

Belzona Polymerics Ltd.

Claro Road, Harrogate,
HG1 4DS, England.

3. PRODUCT DESCRIPTION

A two component paste grade system based on a silicon steel alloy blended with high molecular weight reactive polymers and oligomers. When cured, the material is durable yet fully machinable.

Applications

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

4. TECHNICAL DATA

Base Component

Appearance Paste
Color Dark gray
Gel strength at 77°F (25°C) >150 g/cm HF
Density 2.70 - 2.90 g/cm³

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/cm³

Mixed Properties at 68°F (20°C)

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 2.5 g/cm³

• Shelf Life:

Separate base and solidifier components shall have a shelf life of at least 5 years when stored between 32°F (0°C) and 86°F (30°C).

• Working Life:

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

• Volume Capacity:

The volume capacity of a 1 kg. unit of mixed **Belzona® 1111** is 24.3 in³ (398 cm³).

• Cure Time:

Will be reduced for thicker sections and extended for thinner applications. At a thickness of approximately ¼ in. (6 mm), allow to solidify for the times shown in the chart below before subjecting it to the conditions indicated.

5. PHYSICAL/MECHANICAL PROPERTIES

Determined after 7 days cure at 77°F (25°C). Post curing the material with heat results in a more highly cross-linked polymer.

For enhanced performance this material may be post-cured by heating to 212°F (100°C) for a period of up to 24 hours.

• Abrasion Resistance:

Taber

The Taber abrasion resistance with 1 kg load is typically:
H10 Wheels (Wet) 852 mm³
CS17 Wheels (Dry) 24 mm³ 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 2,270 psi (159 kg/cm²)

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 (228kg/cm²) ambient cure
2980 psi (210kg/cm²) post cure

• 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 hydrocarbons, mineral oils, lubricating oils and many other commonly found chemicals.

For specific chemical resistance data please refer to product data M503/2.

CURE TIMES

TEMPERATURE	41°F (5°C)	50°F (10°C)	59°F (15°C)	68°F (20°C)	77°F (25°C)	86°F (30°C)
Movement or use involving no loading or immersion	4 hrs	3 hrs	2¼ hrs	1¾ hrs	1 hr	¾ hr
Machining and/or light loading	6 hrs	4 hrs	3 hrs	2 hrs	1½ hrs	1 hr
Full electrical, mechanical or thermal loading	4 days	2 days	1½ day	1 day	20 hrs	16 hrs
Immersion in chemicals	5 days	4 days	3 days	2 days	1½ days	1 day

• **Compressive Strength:**

When tested in accordance with ASTM D695, typical values obtained will be:
12,900 psi (907 kg/cm²) ambient cure
16,500 psi (1160 kg/cm²) post cure

• **Corrosion Resistance:**

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

• **Electrical Properties:**

Dielectric Strength

Tested to ASTM D149 is typically 84 volts/mil (3360 volts/mm)

Dielectric Constant

Tested to ASTM D150 is typically 10 at 1000Hz
6 at 1 MHz

Dissipation Factor

Tested to ASTM D150 is typically <0.0005 at 1 MHz
0.0120 at 1000 HZ

Volume Resistivity

Tested to ASTM D257 is typically 5.3 x 10¹² ohm cm.

Surface Resistivity

Tested to ASTM D257 is typically 4.7 x 10¹³ ohm.

• **Flexural Strength:**

When tested to ASTM D790, typical values obtained will be:
9,400 psi (661 kg/cm²) ambient cure
14,300 psi (1006 kg/cm²) post cure

• **Hardness:**

The hardness of the material when tested to ASTM D2240 is typically 84 Shore D.

• **Heat Distortion**

Temperature:

Tested to ASTM D648 (264 psi fiber stress), typical values obtained will be:
127°F (53°C) ambient cure
189°F (87°C) post cure

• **Heat Resistance:**

For many typical applications, the product is thermally stable up to 392°F (200°C) dry and 200°F (93°C) wet, and down to -40°F (-40°C)

• **Impact Strength:**

The impact strength when tested to ASTM D256 is typically:
0.69 ft.lb./in., 37 J/m (reverse notched)

• **Thermal Expansion:**

Tested to ASTM E228 the coefficient of thermal expansion is typically 31.7 ppm/°C.

6. SURFACE PREPARATION AND APPLICATION PROCEDURES

For proper technique, refer to the Belzona® Instructions For Use leaflet which is enclosed with each packaged product.

7. 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.

8. WARRANTY

Belzona® guarantees this product will meet the performance claims stated herein when material is stored and used as instructed in the Belzona® Instructions For Use leaflet. Belzona® further guarantees that all its products are carefully manufactured to ensure the highest quality possible and tested strictly in accordance with universally recognised standards (ASTM, ANSI, BS, DIN, etc.). Since Belzona® has no control over the use of the product described herein, no warranty for any application can be given.

9. TECHNICAL SERVICES

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

10. HEALTH AND SAFETY

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

11. 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 UK WRAS

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ISO 9001:2008
Q 09335
ISO 14001:2004
EMS 509612

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