BELZONA® World leaders in the conservation of man-made resources and the environment

PRODUCT SPECIFICATION SHEET BELZONA® 1111

1. PRODUCT NAME

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

2. MANUFACTURER

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

Belzona Polymerics Ltd.
Claro Road, Harrogate,
HG1 4AY, 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)	>70 g/cm QV
Density	1.63 - 1.69 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	239 - 284°F (115 - 140°C)
Time to Peak Exotherm	25 - 42 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 in.³ (398 cm³).

• *Cure Time:*

Will be reduced for thicker sections and extended for thinner applications. At a thickness of approximately 1/4 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) 889 mm³
CS17 Wheels (Dry) 56 mm³
loss per 1000 cycles

• *Adhesion:*

Cleavage
When tested to ASTM D1062 typical values will be:
Mild steel 1400 lbs./in. (25 kgs/mm)

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

Aluminum	1,800 psi (126 kgs/cm²)
Brass	1,670 psi (117 kgs/cm²)
Copper	1,900 psi (133 kgs/cm²)
Formica	>500 psi (35 kgs/cm²)*
Mild steel	2,700 psi (190 kgs/cm²)
Polyester/glass fiber	>700 psi (49 kgs/cm²)*
Stainless steel	2,800 psi (197 kgs/cm²)

** breakdown of substrate*

• *Chemical Resistance:*

Once fully cured, the material will demonstrate excellent resistance to the following chemicals;
carbonic acid
10% hydrochloric acid
10% nitric acid
5% phosphoric acid
10% sulfuric acid
20% ammonia solution
lime water
20% potassium hydroxide
20% sodium hydroxide
propanol
butanol
ethylene glycol
diethanolamine
methylamine (25% in water)
hydrocarbons
mineral oils
inorganic salts

** For a more detailed description of chemical resistance properties, refer to Product Data M501.*

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:
13,000 psi (914 kgs/cm^2) ambient cure
15,000 psi (1055 kgs/cm^2) post cure

• *Compressive Modulus:*

When tested in accordance with ASTM D695, typical values obtained will be:
ambient cure 2.7 x 10^5 psi (1.9 x10^4 kgs/cm^2)
post cure 3.7 x 10^5 psi (2.6 x10^4 kgs/cm^2)

• *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 10^{12} ohm cm.

Surface Resistivity
Tested to ASTM D257 is typically 4.7 x 10^{13} ohm.

• *Flexural Strength:*

When tested to ASTM D790, typical values obtained will be:
9,000 psi (633 kgs/cm^2) ambient cure
13,000 psi (914 kgs/cm^2) post cure

• *Flexural Modulus:*

When tested in accordance with ASTM D790, typical values obtained will be:
ambient cure 10.6 x 10^5 psi (7.45 x10^4 kgs/cm^2)
post cure 9.1 x 10^5 psi (6.4 x10^4 kgs/cm^2)

• *Hardness:*

The hardness of the material when tested to ASTM D2240 is typically 89 Shore D.

• *Heat Distortion Temperature:*

Tested to ASTM D648 (264 psi fiber stress), typical values obtained will be:
136°F (58°C) ambient cure
216°F (102°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:
1.3 ft.lb./in., 70 J/m (un-notched) or
0.65 ft.lb./in., 35 J/m (reverse notched)

• *Shrinkage:*

Shrinkage is typically <0.025% when tested in accordance with DOD-C-24176A method 4.6.12.

• *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 organisations worldwide including:

AMERICAN BUREAU OF SHIPPING
BUREAU VERITAS
U.S. DEPARTMENT OF NAVY
GAZ DE FRANCE
RJB MINING
AIR B.P.
NATO
NUCLEAR INDUSTRY (DBA TESTED)
U.S.D.A.
GENERAL MOTORS
TOYOTA
NIPPON KAIJI KYOKI
RUSSIAN REGISTER OF SHIPPING

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