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

PRODUCT SPECIFICATION SHEET
BELZONA® 1311

1. PRODUCT NAME
Belzona® 1311
(Ceramic R-Metal)
Repair system designed for rebuilding metals damaged by erosion-corrosion.

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, non-machinable grade material based on a silicon-steel alloy blended within high molecular weight reactive polymers and oligomers. the system is designed for rebuilding metals and offers protection against the effects of erosion-corrosion. Ideally suited to be overcoated with **Belzona® 1321** (Ceramic S-Metal).

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

4. TECHNICAL DATA
Base Component

Appearance	Paste
Color	Very dark gray
Gel strength at 77°F (25°C)	150 - 350 g/cm HF
Density	2.6 - 2.8 g/cm³

Solidifier Component

Appearance	Paste
Color	Gray
Gel strength at 77°F (25°C)	70 - 150 g/cm QY
Density	1.63 - 1.69 g/cm³

Mixed Properties

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	2.36-2.52 g/cm³

• *Shelf Life:*
Separate base and solidifier components shall have a 5 year shelf life 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® 1311** is 25.2 in.³ (413 cm³).

• *Cure Time:*
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. This should be carried out follwoing an initial cure period of 24 hours at ambient temperature.

• *Abrasion Resistance:*
Taber
The Taber abrasion resistance with 1 kg load is typically:
H10 Wheels (Wet) 129 mm³
CS17 Wheels (Dry) 48 mm³
loss per 1000 cycles

• *Adhesion:*
Tensile Shear
When tested in accordance with ASTM D1002, using degreased substrates which have been grit blasted to a 3-4 mil profile, typical values will be,

Mild steel	2,700 psi (190 kgs/cm²)
Brass	2,270 psi (160 kgs/cm²)
Copper	2,200 psi (155 kgs/cm²)
Stainless steel	2,800 psi (196 kgs/cm²)
Aluminium	2,000 psi (140 kgs/cm²)

• *Chemical Resistance:*
Once fully cured, the material will demonstrate excellent resistance to the following chemicals;
carbonic acid
10% hydrobromic acid
10% hydrochloric acid
10% nitric acid
20% nitrous acid
5% phosphoric acid
10% sulfuric acid
20% ammonia solution

Continued . . .

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

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.*

• *Compressive Strength:*

When tested in accordance with ASTM D695, typical values obtained will be 13,000 psi (914 kgs/cm^2).

• *Corrosion Resistance:*

Once fully cured, will show no visible signs of corrosion after 5,000 hours exposure in the ASTM B117-73 salt spray cabinet.

• *Electrical Properties:*

Dielectric Constant
Tested to ASTM D150 is typically 3.29 at 1000Hz

Dielectric Strength
Tested to ASTM D149 is typically 32 volts/mil (1280 volts/mm).

Dissipation Factor
Tested to ASTM D150 is typically < 0.0005 at 1 MHz

Surface Resistivity
Tested to ASTM D257 is typcially 5.76 x 10^{13} ohm.

Volume Resistivity
Tested to ASTM D257 is typcially 1.03 x 10^{15} ohm cm.

• *Flexural Strength:*

When tested to ASTM D790, typical values obtained will be 10,000 psi (703 kgs/cm^2).

• *Hardness:*

The hardness of the material when tested to ASTM D785 is typically Rockwell R104.

• *Heat Distortion Temperature:*

Tested to ASTM D648 (264 psi fiber stress), typical values obtained will be 136°F (58°C).

• *Heat Resistance:*

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

• *Impact Strength:*

Reverse notched impact strength is typically 0.93 ft.lb./in. or 50 J/m.

• *Shrinkage:*

0.0% minimum
0.005% maximum

• *Thermal Expansion:*

Tested to ASTM E228 the coefficient of thermal expansion is typically 35.5 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. Areas rebuilt with **Belzona® 1311** may be overcoated with **Belzona® 1321** (Ceramic S-Metal)

7. 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.

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

U.S.D.A.
ABS
BUREAU VERITAS
CATERPILLAR
NATO
GENERAL MOTORS
TOYOTA
YORK INTERNATIONAL
FORD
RUSSIAN REGISTER OF SHIPPING

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