1. **PRODUCT NAME**
Belzona® 1321 (Ceramic S-Metal)
Repair system designed for surfacing metals attacked by erosion-corrosion.

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 Manufacturer 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 coating system designed to operate under continuous immersion at operating temperatures up to 140°F (60°C). Suitable for design temperatures up to 194°F (90°C) and steaming out up to 410°F (210°C).

Exhibits excellent erosion-corrosion resistance.

Resistant to a broad range of aqueous solutions, hydrocarbons and process chemicals. (Refer to Product Data M508 for more information).

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

4. **TECHNICAL DATA**

**Base Component**
- Appearance: Paste
- Color: Gray
- Density: 2.60 - 2.80 g/cm³

**Solidifier Component**
- Appearance: Liquid
- Color: Blue or Violet
- Density: 1.00 - 1.08 g/cm³

**Mixed Properties**
- Mixing Ratio by Weight (Base : Solidifier): 11 : 1
- Mixing Ratio by Volume (Base : Solidifier): 4 : 1
- Mixed Form: Liquid
- Peak Exotherm Temperature: 158 - 185°F (70 - 85°C)
- Time to Peak Exotherm: 53 - 63 mins.
- Slump Resistance: nil at 25 mil (625 microns)
- Mixed Density: 2.35 - 2.45 g/cm³

- **Shell Life:** Separate base and solidifier components will 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 30 minutes.

- **Coverage Rate:** Each 1 kg. unit applied at the correct film thickness of 10 - 15 mils. (250 - 375 microns) will cover approximately 11 sq.ft. (1.0 sq.m.).

- **Volume Capacity:** The volume capacity of mixed material is 25.7 cu.ins. (425 cm³) per kilogram.

- **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 following 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) 172 mm³
    - CS17 Wheels (Dry) 55 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 give typical values of:
    - Mild steel: 2,900 psi (204 kg/cm²)
    - Brass: 2,200 psi (155 kg/cm²)
    - Copper: 2,400 psi (168 kg/cm²)
    - Stainless steel: 3,000 psi (211 kg/cm²)
    - Aluminium: 2,000 psi (140 kg/cm²)

- **Pull Off Adhesion:**
  - When tested in accordance with ASTM D4541/ ISO 4624, the pull off strength from grit blasted steel will be typically:
    - 5190 psi (365 kg/cm²) ambient cure

- **Cathodic Disbondment:**
  - When tested in accordance with ASTM G8 a rating Class B is obtained.

<table>
<thead>
<tr>
<th>CURE TIMES</th>
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</thead>
<tbody>
<tr>
<td><strong>TEMPERATURE</strong></td>
</tr>
<tr>
<td>Movement or use involving no loading or immersion</td>
</tr>
<tr>
<td>Machining and/or light loading</td>
</tr>
<tr>
<td>Full mechanical/thermal loading or water immersion</td>
</tr>
<tr>
<td>Chemical contact</td>
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</tbody>
</table>

www.belzona.com
**Belzona**

Belzona 1321 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.

**WARRANTY**

Belzona guarantees this product will meet the performance claims stated herein when material is stored and used as instructed in the 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 recognized 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.

**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.

**HEALTH AND SAFETY**

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

**APPROVALS/ACCEPTANCES**

U.S.D.A.  
ABS  
NATO  
GENERAL MOTORS  
TOYOTA  
FORD  
YORK INTERNATIONAL  
KOREAN REGISTER OF SHIPPING  
RUSSIAN REGISTER OF SHIPPING  
CHINA CLASSIFICATION SOCIETY  
BUREAU VERITAS

**BELZONA**

Belzona International Limited. Belzona® is a registered trademark.

Belzona 1321 – Product Specification Sheet - (2)  
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**Volume Resistivity**

Tested to ASTM D257 is typically 3.3 x 10<sup>13</sup> ohm cm.

**Flexural Strength:**

When tested to ASTM D790, typical values obtained will be 10,000 psi.

**Hardness:**

The hardness of the material when tested to ASTM D2240 is typically 80 Shore D.

**Heat Distortion Temperature:**

Tested to ASTM D648 (264 psi fiber stress), typical values obtained will be 117°F (47°C) when cured at 20°C and 176°F (80°C) when post cured at 100°C.

**Heat Resistance:**

The material is stable under dry conditions to continuous exposure to temperatures up to 392°F (200°C). Designed to operate under continuous immersion at operating temperatures up to 140°F (60°C). Suitable for design temperatures up to 194°F (90°C) and steaming out up to 410°F (210°C).

**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 38.4 ppm/°C.

**VOC:**

When measured in accordance with ASTM D 2369 the VOC content of the mixed product is typically 0.91% (22g/litre).

**SURFACE PREPARATION AND APPLICATION PROCEDURES**

For proper technique, refer to the Instructions For Use Leaflet which is enclosed with each packaged product. Badly eroded surfaces may first be rebuilt with Belzona 1311 (Ceramic R-Metal) prior to application of Belzona 1321.

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**Chemical Resistance:**

- Once fully cured, the material will demonstrate excellent resistance to the following chemicals:
  - carbonic acid
  - 10% hydrobromic acid
  - 20% hydrochloric acid
  - 10% nitric acid
  - 20% nitrous acid
  - 5% phosphoric acid
  - 10% sulfuric acid
  - Citric acid
  - 10% ammonia solution
  - lime water
  - 40% potassium hydroxide
  - 40% sodium hydroxide
  - propanol
  - butanol
  - ethylene glycol
  - diethanolamine
  - methylamine (25% in water)
  - hydrocarbons
  - mineral oils
  - inorganic salts

**For specific chemical resistance data please refer to product data M508.**

**Compressive Strength:**

When tested in accordance with ASTM D695, typical values obtained will be 13,000 psi.

**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 12 at 1000Hz.  
Tested to ASTM D150 is typically 8 at 1MHz.

**Dielectric Strength**

Tested to ASTM D149 is typically 33 volts/mil (1320 volts/mm).

**Dissipation Factor**

Tested to ASTM D150 is typically < 0.0005 at 1000 Hz.  
Tested to ASTM D150 is typically < 0.0005 at 1 MHz.

**Surface Resistivity**

Tested to ASTM D257 is typically 6.7 x 10<sup>13</sup> ohm.

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**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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