

# PRODUCT SPECIFICATION SHEET

## BELZONA 1391

FN10032



### GENERAL INFORMATION

#### Product Description:

A two component high temperature coating system designed to operate in immersion at operating temperatures up to 248°F (120°C) and suitable for steaming out up to 410°F (210°C). Exhibits excellent erosion-corrosion resistance at elevated temperatures. Resistant to a broad range of aqueous solutions, hydrocarbons and process chemicals. 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:

- Condensate extraction pumps
- Heat exchanger barrels
- Scrubber units
- Condensate return tanks
- Oil/gas and oil/water separators
- Calorifiers
- Evaporators
- Autoclaves
- Distillation units

### APPLICATION INFORMATION

#### Working Life

Will vary according to temperature. At 68°F (20°C) the usable life of mixed material is 40 minutes.

#### Cure Time

Allow the applied material to solidify for the times specified in the Belzona IFU before subjecting it to the conditions indicated. In certain instances, it may be advantageous to post cure material prior to putting into service where chemical contact is involved. Refer to Belzona for specific recommendations.

#### Volume Capacity

26.1 cu.in. (431 cm<sup>3</sup>)/kg.

#### Coverage Rate

At operating temperatures up to 212°F (100°C) the **Belzona 1391** should be applied at a minimum thickness of 24 mils (600 microns).

At operating temperatures between 212 and 248°F (100-120°C) the **Belzona 1391** should be applied at a minimum thickness of 32 mils (800 microns).

See Belzona IFU for recommended coverage rates to achieve required film thickness.

#### Base Component

Appearance Paste  
Colour Grey  
Density 2.48 - 2.68 g/cm<sup>3</sup>

#### Solidifier Component

Appearance Liquid  
Colour Blue  
Density 0.99 - 1.03 g/cm<sup>3</sup>

#### Mixed Properties

Mixing Ratio by Weight (Base : Solidifier) 13 : 1  
Mixing Ratio by Volume (Base : Solidifier) 5 : 1  
Mixed Form Liquid  
Sag Resistance nil at 50 mil (1.25 mm)  
Mixed Density 2.24 - 2.41 g/cm<sup>3</sup>

*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.*

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### ABRASION

#### Taber

The Taber abrasion resistance determined in accordance with ASTM D4060 with 1 kg load H10 wheels, wet, is typically:

550mm<sup>3</sup> loss/1000 cycles                      68°F (20°C) cure  
39 mm<sup>3</sup> loss/1000 cycles                      212°F (100°C) cure

### 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:

	68°F (20°C) cure	212°F (100°C) cure
Mild steel	3,200 psi (22.06 MPa)	3,100 psi (21.37 MPa)
Stainless steel	2,800 psi (19.31 MPa)	2,700 psi (18.61 MPa)
Copper	2,200 psi (15.17 MPa)	2,300 psi (15.86 MPa)
Aluminum	1,600 psi (11.03 MPa)	1,800 psi (12.41 MPa)

When tested on mild steel at 265°F (130°C) the tensile shear adhesion of the post cured material is typically 1750 psi (12.07 MPa).

#### Pull Off Adhesion

When tested in accordance with ASTM D 4541/ ISO 4624, the pull off strength from grit blasted steel will be typically:

6030 psi (41.58 MPa)                      68°F (20°C) cure  
4490 psi (30.96 MPa)                      212°F (100°C) cure

### CAVITATION RESISTANCE

The cavitation resistance of the product when tested to a modified version of ASTM G32 using stationary specimens at 20 KHz frequency and 50 microns amplitude, typical average volume loss is:

3.3 mm<sup>3</sup>/hr                      68°F (20°C) cure  
2.0 mm<sup>3</sup>/hr                      212°F (100°C) cure

### CHEMICAL ANALYSIS

The mixed **Belzona 1391** has been independently analysed for halogens, heavy metals, and other corrosion-causing impurities, with the following typical results:

Analyte	Total Concentration (ppm)
Fluoride	98
Chloride	471
Bromide	ND (<11)
Sulphur	190
Nitrite	ND (<8)
Nitrate	ND (<8)
Zinc	6.3
Antimony	3.2
Tin	21.9
Arsenic, Bismuth, Cadmium, Lead, Silver, Mercury, Gallium and Indium	ND (<3.0)

ND : Not Detected

### CHEMICAL RESISTANCE

The material will demonstrate excellent resistance to a broad range of 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, typical values will be:

**Compressive Modulus**  
1.33 x 10<sup>5</sup> psi (917 MPa)

**Compressive Strength**  
11,400 psi (78.6 MPa)                      68°F (20°C) cure  
14,400 psi (99.28 MPa)                      212°F (100°C) cure

### EXPLOSIVE DECOMPRESSION

When tested to NACE TM 0185, using a seawater/hydrocarbon test fluid, the coating will exhibit no breakdown after a 21 day immersion period at 100°C and 100 bar pressure followed by decompression over 15 minutes.

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### FLEXURAL PROPERTIES

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

**Flexural Modulus**

8.03 x 10<sup>5</sup> psi (5536 MPa)

**Flexural Strength**

8,500 psi (58.6 MPa) under ambient or post cure conditions

### HARDNESS

**Shore D**

When determined in accordance with ASTM D2240, typical values will be:

84 68°F (20°C) cure  
87 212°F (100°C) cure

**Cure and test temperature**

87 212°F (100°C)  
85 284°F (140°C)  
82 356°F (180°C)  
78 392°F (200°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)
<b>Barcol 934-1</b>	8	28
<b>Barcol 935</b>	91	95

**Koenig Pendulum**

When tested to ISO 1522 the Koenig damping time of the ambient cured coating will typically be: 148 seconds.

### HEAT RESISTANCE

**Heat Distortion Temperature (HDT)**

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

118°F (48°C) 68°F (20°C) cure  
253°F (123°C) post cured for 2 hours at 212°F (100°C)  
293°F (145°C) when fully post cured for 7 days at 212°F (100°C)

**Wet Heat Resistance**

The material will resist water and hydrocarbons at temperatures up to 248°F (120°C). Above 212°F (100°C) a coating thickness of 32-40 mils (800 1000 microns) is recommended along with insulation of the outer surface of the coated item where practical.

**Atlas Cell Cold Wall Immersion Test**

When tested in accordance with NACE TM 0174 procedure A, the coating will exhibit no blistering or rusting (ASTM D714 rating 10; ASTM D610 rating 10) after 6 months immersion in de-ionized water at 203°F (95°C). Please consult Belzona TKL for additional advice for applications operating between 212- 248°F (100-120°C).

**Steam-out Resistance**

Once fully cured the coating will exhibit no blistering, cracking or delamination after 96 hours exposure to pressurised steam at 410°F (210°C).

**Dry Heat Resistance**

The indicated degradation temperature in air based on Differential Scanning Calorimetry (DSC) operated in accordance with ISO11357 is typically 446°F (230°C). For many applications the product is suitable down to -40°F (-40°C).

### IMPACT RESISTANCE

**Impact Strength**

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

0.85 ft.lb./in (46 J/m) 68°F (20°C) cure  
1.13 ft.lb./in (61 J/m) 212°F (100°C) cure

### THERMAL PROPERTIES

**Low Temperature Thermal Shock**

Coated steel panels will exhibit no blistering, cracking or delamination after multiple cycles of rapid cooling from 212°F (100°C) to -76°F (-60°C).

**Thermal Cycling**

When tested in accordance with section 9 of NACE TM0304 the coating passed after 252 cycles between +140°F and -22°F (+60°C and -30°C).

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### THICK FILM CRACKING

#### Thick Film Cracking

When tested in accordance with Section 12 of NACE TM0104, the coating at three times recommended thickness, exhibited no cracking after 12 weeks immersion in seawater at 104°F (40°C).

### SHELF LIFE

Separate base and solidifier components shall have a shelf life of 3 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:  
U.S.D.A.  
NUCLEAR POWER INDUSTRY  
(DBA Tested)

### 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 1391** 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.

### MANUFACTURER / SUPPLIER

Belzona Polymeric Ltd.  
Claro Road, Harrogate,  
HG1 4DS, UK

Belzona Inc.  
14300 NW 60<sup>th</sup> Ave,  
Miami Lakes, FL, 33014, USA

### HEALTH AND SAFETY

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

### 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.

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