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 35 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^3)/kg.

Coverage Rate
At operating temperatures up to 212°F (100°C) the **Belzona 1391** should be applied at a thickness of 24-30 mils (600-750 microns). To achieve the correct film thickness a practical coverage rate of 5.6 sq.ft. (0.52 m^2)/kg should be obtained.

At operating temperatures between 212 and 248°F (100-120°C) the **Belzona 1391** should be applied at a thickness of 32-40 mils (800-1000 microns) and to achieve this thickness a practical coverage rate of 4.2 sq.ft. (0.39 m^2)/kg should be obtained.

Base Component	
Appearance	Paste
Color	Gray
Density	2.48 - 2.68 g/cm^3

Solidifier Component	
Appearance	Liquid
Color	Blue
Density	0.99 - 1.03 g/cm^3

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^3

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.

PRODUCT SPECIFICATION SHEET
BELZONA 1391
FN10032

ABRASION

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

550mm^3 loss/1000 cycles	68°F (20°C) cure
39 mm^3 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 (12.41MPa)

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^3/hr	68°F (20°C) cure
2.0 mm^3/hr	212°F (100°C) cure

CHEMICAL ANALYSIS

The mixed **Belzona 1391** has been independently analyzed 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)
Sulfur	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 10^5 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

CORROSION PROTECTION

Cathodic Disbondment
When tested in accordance with ASTM G42 at 194°F (90°C) the disbondment diameter is typically 0.24 inch (6 mm).

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.

PRODUCT SPECIFICATION SHEET
BELZONA 1391
FN10032

FLEXURAL PROPERTIES

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

Flexural Modulus
8.03 x 10^5 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
When determined in accordance with ASTM D2583, using Model No.935, typical values will be:

91	68°F (20°C) cure
95	212°F (100°C) cure

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 fiber 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).

PRODUCT SPECIFICATION SHEET
BELZONA 1391
FN10032

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).

APPROVALS/ACCEPTANCES

The material has received recognition from organizations worldwide including:
U.S.D.A.
NUCLEAR POWER INDUSTRY
(DBA Tested)

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 32°F (0°C) and 86°F (30°C).

WARRANTY

Belzona guarantees 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 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, 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

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

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

HEALTH AND SAFETY

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

Belzona products are manufactured under an ISO 9001 Registered Quality Management System