BELZONA 1591 Product Specification Sheet

1. PRODUCT NAME

Belzona® 1591 (Ceramic XHT)
Coating system for high temperature equipment handling water, aqueous solutions and hydrocarbons.

2. MANUFACTURER

Belzona Inc.
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Miami, Florida 33172

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

3. PRODUCT DESCRIPTION

A two-component high temperature coating system designed to resist water, aqueous solutions and hydrocarbons up to a temperature of 356°F(180°C) and to exhibit excellent erosion-corrosion resistance at elevated temperatures.

When mixed and applied as detailed in the Instructions for Use leaflet the system is ideally suited for application to:

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

4. TECHNICAL DATA

Base Component	
Appearance	Paste
Color	Brown
Density	2.01 - 2.11 g/cm³

Solidifier Component	
Appearance	Liquid
Color	Clear
Density	0.93 - 0.95 g/cm³

Mixed Properties	
Mixing Ratio by Weight (Base : Solidifier)	23 : 1
Mixing Ratio by Volume (Base : Solidifier)	10.5 : 1
Mixed Form	Liquid
Sag resistance	nil at 50 mil (1.25 mm)
Mixed Density	1.86 - 2.06 g/cm³

• Limitations of Use:
Belzona® 1591 should not be applied at temperatures below 65°F (18°C). Surface temperature should be above 65°F (18°C) throughout the curing period.

• Shelf Life:
Separate Base and Solidifier components will have a minimum shelf life of 3 years when stored in their original unopened containers between 32°F (0°C) and 86°F (30°C).

• Working Life:
Will vary according to temperature. At 68°F (20°C) the usable life of a 1 kg unit of mixed material is 50 minutes.

• Coverage Rate:
The **Belzona® 1591** should be applied at a thickness of 26-34 mils (650 - 850 microns) but not exceeding 40 mils (1000 microns) and to achieve this thickness a practical coverage rate of 6.35 sq.ft. (0.59 m²) per kilogram unit should be obtained.

See Belzona® Instructions For Use leaflet for details of application as a 2 coat system.

• Volume Capacity:
The volume capacity of mixed material is 31.1 cu.ins. (510 cm³) per kilogram.

• Cure Time:
Allow the applied material to solidify for the times shown in the chart below 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.

5. PHYSICAL/MECHANICAL PROPERTIES

Post curing the material results in a more highly cross linked polymer. The material is designed to post cure in service under immersion conditions following cure at temperatures above 18°C. See IFU for more specific detail.

• Abrasion Resistance:
Taber
The sliding abrasion resistance of the material when tested in accordance with ASTM D4060 under wet conditions using the Taber Abraser fitted with H10 grinding wheels and 1 kg load is typically:
193 mm³ loss/1000 cycles -
212°F(100°C) post cure

• Adhesion:
Tensile Shear
When tested in accordance with ASTM D1002 on grit blasted mild steel, typical values, after curing at the temperature indicated, will be:

Temperature	Adhesion
212°F (100°C)	1500 psi (10.34 MPa)
248°F (120°C)	1230 psi (8.48 MPa)
356°F (180°C)	1070 psi (7.38 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:

4600 psi (31.71 MPa)	ambient cure
5500 psi (37.92 MPa)	post cure

• Chemical Resistance:
The material will demonstrate excellent resistance to a broad range of chemicals.
For more specific information refer to Product Data M516 or contact Belzona®.

CURE TIMES

TEMPERATURE	68°F (20°C)	86°F (30°C)	104°F (40°C)
Time until inspection	16 hrs	4 hrs	2½ hrs
Time until full service	5 days	20 hrs	5½ hrs
Time until dry post cure	16 hrs	4 hrs	2½ hrs
Time until wet post cure	48 hrs	8 hrs	4 hrs

• ***Compressive Strength:***
When tested in accordance with ASTM D695, typical values obtained will be:

Temperature	Compressive Strength
212°F(100°C)	11550 psi (79.63 MPa)
248°F(120°C)	10240 psi (70.60 MPa)
356°F(180°C)	9320 psi (64.26 MPa)

• ***Elongation:***
When determined in accordance with ASTM D638, typical values will be:
0.197%

• ***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 248°F (120°C) and 70 bar pressure followed by decompression over 15 minutes.

• ***Flexural Strength:***
When tested to ASTM D790, typical values obtained will be

Temperature	Flexural Strength
212°F (100°C)	6650 psi (45.85 MPa)
248°F (120°C)	6900 psi (47.57 MPa)
356°F (180°C)	4520 psi (31.16 MPa)

• ***Hardness:***
Shore
When tested in accordance with ASTM D2240 at elevated temperatures the Shore D hardness of the post cured material is typically as follows:

87	212°F (100°C)
88	248°F (120°C)
89	356°F (180°C)

Koenig Pendulum
When tested to ISO 1522 the Koenig damping time of the ambient cured coating will typically be 126 seconds.

Barcol
Tested to ASTM D2583 the Barcol hardness will be typically:

93	68°F(20°C)
96	212°F(100°C)
98	302°F(150°C)

• ***Heat Distortion Temperature:***
Tested to ASTM D648 (264 psi fiber stress) after 7 days cure at temperature indicated, typical values obtained will be:

Temperature	HDT
68°F (20°C)	131°F (55°C)
140°F (60°C)	214°F (101°C)
212°F (100°C)	322°F (161°C)
248°F (120°C)	406°F (208°C)
356°F (180°C)	513°F (267°C)

• ***Heat Resistance:***
Immersion resistance
The material will resist water and hydrocarbons at temperatures up to 180°C. Cold wall effects should be minimised and above 150°C external surfaces should be insulated. The material is not recommended for dry applications at elevated temperatures

Atlas Cell
When tested in accordance with NACE TM 0174 the coating will exhibit no rusting (ASTM D610 rating 10) or blistering (ASTM D714 rating 10) after 6 months immersion in de-ionized water at 203°F (95°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).

• ***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).

• ***Tensile Strength:***
When determined in accordance with ASTM D638, typical values will be:
2070 psi (14.28 MPa) at yield
2273 psi (15.67 MPa) at break

• ***Young's Modulus:***
When determined in accordance with ASTM D638, typical values will be:
1.11×10^6 psi (7686 MPa)

• ***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).

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® 1591 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 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.

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.

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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