

PRODUCT SPECIFICATION SHEET

BELZONA 1391S

FN10033



GENERAL INFORMATION

Product Description:

A two component spray applied high temperature coating system designed to operate under continuous immersion at operating temperatures up to 230°F (110°C). Applied by heated airless spray. Suitable for steaming out up to 410°F (210°C). Exhibits excellent corrosion resistance at elevated temperatures. Resistant to a broad range of aqueous solutions, hydrocarbons and process chemicals. (Refer to Belzona TKL for specific recommendations). 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 return tanks
- Oil/gas and oil/water separators
- Calorifiers
- Evaporators
- Autoclaves
- Distillation units
- Heat exchanger barrels
- Scrubber units

APPLICATION INFORMATION

Working Life

Will vary according to temperature. At 68°F (20°C) the usable life of mixed material is 45 minutes.

Cure Time

Allow the applied material to solidify for the times shown 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.*

Limitations of Use

Belzona 1391S should not be applied at temperatures below 50°F (10°C).

Coverage Rate

The **Belzona 1391S** shall be applied in 2 coats to achieve a minimum thickness of 20 mils (500 microns). The theoretical coverage rate at 20 mils (500 microns) is 21.5 sq.ft. (2m²)/litre.

Base Component

Appearance Liquid
Colour Grey
Density 1.75 - 1.95 g/cm³

Solidifier Component

Appearance Liquid
Colour Blue or Violet
Density 0.97 - 1.01 g/cm³

Mixed Properties

Mixing Ratio by Weight (Base : Solidifier) 7.5 : 1
Mixing Ratio by Volume (Base : Solidifier) 4 : 1
Mixed Form Liquid
Sag Resistance Nil at 30 mil (0.75 mm)
Mixed Density 1.60 - 1.76 g/cm³
VOC content (ASTM D2369 / EPA ref. 24) 1.25% / 21.08 g/L

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

Dry sliding abrasion resistance, when determined in accordance with ASTM D4060 using CS17 wheels, will typically result in:
24 mm³ loss per 1000 cycles 194°F (90°C) cure

Wet sliding abrasion resistance, when determined in accordance with ASTM D4060 using H10 wheels, will typically result in:
940 mm³ loss per 1000 cycles 68°F (20°C) cure

ADHESION

Tensile Shear

The tensile shear adhesion to grit blasted steel, when tested in accordance with ASTM D1002, is typically:

2,600 psi (17.92 MPa)	Cure temperature
2,000 psi (13.79 MPa)	68°F (20°C)
	212°F (100°C)

1270 psi (8.76 MPa)	Cure/test temperature
	212°F (100°C)

Pull Off Adhesion

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

5070 psi (34.96 MPa)	Cure temperature
3520 psi (24.27 MPa)	68°F (20°C)
	212°F (100°C)

CHEMICAL ANALYSIS

The mixed **Belzona 1391S** has been independently analysed for halogens, heavy metals, and other corrosion-causing impurities in accordance with ASTM E165, ASTM D4327 and ASTM E1479. Typical results are displayed as follows:

Analyte	Total Concentration (ppm)
Fluoride	36
Chloride	477
Bromide	ND (<10)
Sulphur	267
Nitrite	ND (<9)
Nitrate	ND (<9)
Tin	4.4
Antimony, Arsenic, Bismuth, Cadmium, Lead, Silver, Mercury, Gallium, Zinc and Indium	ND (<3.0)
	ND : Not Detected

CHEMICAL RESISTANCE

Once fully cured, the material will demonstrate excellent resistance to a wide range of chemicals.

* For a more detailed description of chemical resistance properties, determined in accordance with ISO 2812-1, please refer to relevant Chemical Resistance chart.

COMPRESSIVE PROPERTIES

The compressive strength, when determined in accordance with ASTM D695, will typically be:

11,200 psi (77.22 MPa)	Cure temperature
18,600 psi (128.24 MPa)	68°F (20°C)
	212°F (100°C)

CORROSION PROTECTION

Cathodic Disbondment

When tested in accordance with ASTM G42 the disbondment diameter is typically:

0.358 in. (9.2 mm) at 176°F (80°C).
0.476 in. (12.1 mm) at 194°F (90°C).

ELECTRICAL PROPERTIES

When tested in accordance with ASTM D149, method A, with voltage rise of 2kV/s, typical value will be:
Dielectric strength 21.9 kV/mm

ELONGATION & TENSILE PROPERTIES

When determined in accordance with ASTM D638, typical values will be:

Tensile Strength	Cure temperature
4,653 psi (32.08 MPa)	68°F (20°C)
Elongation	
0.50%	68°F (20°C)
Young's Modulus	
9.76x10 ⁵ psi (6,732 MPa)	68°F (20°C)

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EXPLOSIVE DECOMPRESSION

No coating breakdown was exhibited upon inspecting after the following testing:

Explosive Decompression (NACE TM0185)

	Test 1	Test 2
Test duration	21 days	21 days
Temperature	158°F (70°C)	212°F (100°C)
Pressure	3,000 psi (207 bar)	1,450 psi (100 bar)
Gas Phase	200 ppm H ₂ S, 1% CO ₂ , balance CH ₄	100% CO ₂
Hydrocarbon Phase	1:1 (toluene: kerosene)	Crude Oil
Aqueous Phase	Saltwater (ASTM D1141)	Saltwater (ASTM D1141)
Decompression Rate	58 psi/min (4 bar/min)	97 psi/min (6.7 bar/min)

FLEXURAL PROPERTIES

The flexural strength when determined in accordance with ASTM D790, will typically be:

6,400 psi (44.12 MPa)	Cure temperature 68°F (20°C)
5,500 psi (37.92 MPa)	212°F (100°C)

FOOD CONTACT

Direct Food Contact (FDA)

Meets extraction requirements as set out in 21 CFR 175.300 (paragraph c) for a broad range of food types in Conditions of Use B, C, and D (paragraph d).
Please contact Belzona for more comprehensive data.

Incidental Food Contact (USDA)

USDA compliant as an Incidental food contact surface.

HARDNESS

Shore D

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

84	Cure temperature 68°F (20°C)
86	212°F (100°C)

83	Cure/test temperature 212°F(100°C)
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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)
Barcol 934-1	23	49
Barcol 935	91	97

Koenig Pendulum

When tested in accordance with ISO 1522 the Koenig damping time of the coating will typically be:

168 seconds	68°F (20°C)
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HEAT RESISTANCE

Heat Distortion Temperature (HDT)

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

131°F (55°C)	Cure temperature 68°F (20°C)
306°F (152°C)	212°F (100°C)

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 water at 230°F (110°C).

Immersion Resistance

Suitable for service at temperatures up to 230°F (110°C) but refer to chemical resistance data for chemical contact limitations.

Steam-out Resistance

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

In addition, the coating was independently tested for 5-week pressurized steam exposure at 365°F (185°C) and deemed a pass when assessed to the requirements of ASTM D 1654.

Dry Heat Resistance

The indicated degradation temperature in air based on Differential Scanning Calorimetry (DSC) operated in accordance with ISO11357 is typically 482°F (250°C).

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IMPACT RESISTANCE

Impact Strength

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

1.02 ft.lbs./in (55 J/m)
0.67 ft.lbs./in (36 J/m)

Cure temperature
68°F (20°C)
212°F (100°C)

THERMAL PROPERTIES

Thermal Conductivity

When tested in accordance with ASTM E1461-13 at a temperature of 100°C (212°F), the thermal conductivity will typically be 0.394 W/m·K.

Low Temperature Thermal Shock

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

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).

WATER ABSORPTION & PERMEABILITY

Water Absorption

When tested in accordance with ASTM D570 at 185°F(85°C) water absorption will typically be 51g/m² after 30 days.

Water Vapor Transmission

When tested in accordance with ASTM D1653 (method B) average water vapor transmission through the coating at 185°F (85°C) was 26.8g/m²/24hrs.

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).

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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 1391S 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 Limited,
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HG1 4DS, UK

Belzona Inc.
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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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