BELZONA COMPOSITE SOLUTIONS

Wrap and Plate Bonding Technology for New Build and Maintenance Situations
NOVEL SOLUTIONS TO AGE-OLD PROBLEMS

By utilising Belzona composite solutions, asset owners and operators can install newly built equipment avoiding the use of bolts or welding. Structural repairs on components that have been damaged in service can also be performed using Belzona 100% solids polymeric systems. Numerous companies choose Belzona because it helps them to:

- Reduce capital expenditure
- Lower maintenance costs
- Improve efficiency and safety
- Reduce downtime
- Simplify maintenance procedures
- Extend machinery and equipment life

Our 140 Distributors in more than 120 countries ensure not only the availability of Belzona materials, but also specification support, project management, application and supervision services. Distributorships and their teams are supported by Belzona Corporate offices in Europe, North America and Asia.
GLOBAL APPLICATION STANDARDS

PREQUALIFICATION

Belzona materials are subject to stringent independent and in-house testing, documented in the product specification sheets and chemical resistance charts. Testing is performed in our ISO 9001 audited laboratory to recognised standards, including ASTM and ISO, as well as by independant organisations. Belzona products are approved by classification societies and companies from all around the world, including Lloyds Register, DNV GL, ABS, CCS, RS, KR, WRAS, Bureau Veritas, NSF and Nato, among others.

SPECIFICATION

Optimum materials and application procedures are selected to meet specific design and operating conditions of the asset. Dedicated project engineers coupled with round the clock head office technical support allow for the correct material and application procedure to be specified. We also maintain a comprehensive database accessible by the Global Belzona Distributor network, which facilitates sharing of information and experience, improving specification and application standards.

APPLICATION

Belzona recognises the need to set and monitor global application standards. Applications are carried out by experienced and trained personnel. Belzona runs training programmes with theoretical and practical courses, including validated training. Combined with method statements, quality control procedures and daily inspection reports, we strive to ensure application standards are maintained around the world.

INSPECTION

Inspection can be carried out by certified inspectors (e.g. NACE) prior to, during and upon completion of the application to ensure Belzona systems are applied in accordance with our standards and the client’s requirements. Upon nearing the end of the system’s expected service life, the asset should be inspected again and appropriate action recommended, which may involve minor repair work or no action, as the Belzona systems tend to outlast projected service life.
100% solids systems for the repair of damage caused by external and internal corrosion, as well as through-wall defects

Cold applied systems avoid distortion or alteration of the equipment while providing excellent corrosion protection

Belzona composite repairs can reinstate a significant portion of even full structural integrity of the equipment

Bespoke systems facilitate applications in hot temperatures, on wet/oily substrates and in abrasive environments

We supply Belzona SuperWrap II, one of the strongest composite repair systems on the market, designed for pressurised and safety critical equipment
Belzona has been supplying composite solutions to various industries for over six decades. Years of research, development and customer feedback have resulted in systems that are unique and bespoke, which offer solutions in areas where:

- Operating temperatures and pressures are elevated
- Aggressive acids and alkalis are stored or processed
- Water, oil and other contamination is present at all times
- Erosion and abrasion occur externally or internally

Belzona paste grade polymeric adhesives and resins can be used in conjunction with doubler plates or reinforcement sheets to repair, protect and improve assets providing:

- Quick and easy application using hand tools
- Minimum downtime due to their ambient cure
- Ensure longevity and increase asset life

**NEW BUILD AND REPAIR APPLICATIONS**

1. Equipment installation, bonding support pads
2. Doubler plate bonding repairs, structural reinforcement
3. Composite wraps and patches

*For further information and advice please contact your local Belzona representative.*
We repair and strengthen assets suffering from internal or external erosion and corrosion with the use of doubler plates or composite wraps.

Various assets and geometries can be repaired with Belzona. From small patches on storage tanks to reviving the whole deck on an oil platform, we have a solution for numerous service conditions:

- Temperatures up to 160°C/320°F in immersion or 200°C/392°F in dry conditions
- Pressures in excess of 120 Bar/1,740psi
- Immersion in highly concentrated acids and alkalis, resisting up to 98% sulphuric acid

Live leaks can be stopped and sealed promptly without the need to shut down the process. Leaks can also be prevented by strengthening and reinforcing the thinning metal.

Our composite repair solutions are:

- Easy and safe to apply with no specialist tools or hot work permits required
- Durable and perform well in various service conditions
- Proven with thousands of applications across the globe delivered each year since 1952

We take pride in our success stories and share numerous case studies on [khia.belzona.com](http://khia.belzona.com).
Belzona materials are used for repairing leaking tanks, platform decks, and T-section pipes.

## Key Technical Data

<table>
<thead>
<tr>
<th>APPLICATION</th>
<th>Belzona 1111</th>
<th>Belzona 1121</th>
<th>Belzona 1161</th>
<th>Belzona 1212</th>
<th>Belzona 1251</th>
<th>Belzona 1311</th>
<th>Belzona 1511</th>
<th>Belzona 1321</th>
<th>Belzona 5811</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rapid cure for a quick back to service time</td>
<td></td>
<td>●</td>
<td></td>
<td>●</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slow cure for large area applications</td>
<td></td>
<td>●</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High temperature service</td>
<td></td>
<td></td>
<td>●</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>●</td>
</tr>
<tr>
<td>Tolerant to water, oil and manually prepared surfaces</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cures at low temperatures, down to 5°C/41°F</td>
<td></td>
<td></td>
<td></td>
<td>●</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Application onto hot surfaces - heat activated material</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>●</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paste grade consistency</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Fluid grade consistency for injection and large area applications</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>
Belzona SuperWrap II is suitable for the repair of thin- and through-wall defects on pipes and vessels, including complex geometries.

Full training is provided to the Designers, Installers and Supervisors, enabling cost- and time-efficient applications anywhere across the globe.

Belzona SuperWrap II has been applied on numerous projects and its success is assured by the application validation.

For repairs that need to be completed in accordance with the ASME PCC-2 or ISO 24817 standards, we have developed Belzona SuperWrap II. This system is one of the strongest composite wrap and patch repair systems on the market and its tensile shear adhesion actually increases in service.

A unique combination of a 100% solids resin, a carbon and glass fibre reinforcement sheet, and a compression film ensures a quick and simple application that can remain maintenance-free for up to 20 years.
ISO/ASME COMPLIANT REPAIR SYSTEM APPLICATION

Preparation
Repair any thin- or through-wall defects prior to application.

Wetting Out
The substrate and the reinforcement sheet are wetted out with resin.

Wrapping
Wrap or patch is applied according to design.

Tightening
Release film is used to compress and tighten the wrap.

Inspection
Once cured, release film is removed and the wrap is visually inspected.

THREE GRADES OF BELZONA SUPERWRAP II

WINTER GRADE
Designed for colder climates with temperatures dipping close to zero, Belzona 1981 can be applied at 5°C - 20°C/41°F - 68°F. Once cured it resists temperatures up to 60°C/140°F.

TROPICAL GRADE
For applications in higher ambient temperatures, 20°C - 40°C/68°F - 104°F, Belzona 1982 resin was designed. Once cured it resists temperatures up to 80°C/176°F.

HIGH TEMPERATURE GRADE
For assets operating in high temperature service, up to 150°C/302°F, Belzona 1983 resin was formulated. It can be applied at 5°C - 40°C/41°F - 104°F.

Testing Data/Key Features:

<table>
<thead>
<tr>
<th>Property</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tensile shear adhesion (after 1000 hours in immersion)</td>
<td>19MPa/2,748psi</td>
</tr>
<tr>
<td>Tensile strength (hoop)</td>
<td>524MPa/75.98 x 10³ psi</td>
</tr>
<tr>
<td>Tensile strength (axial)</td>
<td>126MPa/18.27 x 10³ psi</td>
</tr>
<tr>
<td>Maximum design temperature for thin-wall and through-wall defects</td>
<td>150°C/302°F</td>
</tr>
<tr>
<td>Application temperature range</td>
<td>5°C - 40°C/41°F - 104°F</td>
</tr>
<tr>
<td>Minimum back to service time</td>
<td>24 hours</td>
</tr>
</tbody>
</table>
Belzona was first used as an adhesive in the late 1950s to attach equipment ID tags. Over the years, Belzona materials have been enhanced to resist higher pressures and temperatures as well as demonstrate significantly higher adhesion and compressive strength.

Belzona can facilitate equipment installation quickly and without the need for hot work. With compressive strength of up to 18,980 psi/130.8 MPa, pull off adhesion of up to 3,240 psi/22.3 MPa and flexural strength of up to 14,300 psi/98.6 MPa, equipment, framework and supports can be bonded permanently and safely.

In addition, we offer a bespoke composite solution to bearing installation. After a shipping application in 1979, Belzona was accepted as a permanent installation on new and used Germanisher Lloyd classed vessels.

**WHY BELZONA?**

Polymeric composite materials offer a unique benefit in new construction situations. Once cured, these cold applied systems provide a durable bond with outstanding physical properties. Unlike metals, Belzona will not corrode and presents the following advantages over welding:

- **No hot work needed, eliminating heat affected zones and Health and Safety concerns**
- **Full contact between the plate and the substrate**
- **Galvanic corrosion is eliminated due to electrical insulation properties**
Belzona composite solutions have been continuously used for applications including:

- Bonding equipment to marine decks and offshore platforms, such as winches, accommodation blocks and cable trays
- Installing handrail supports on tanks
- Bonding internal furniture in high temperature and high pressure process vessels
- Bonding pipe supports, preventing galvanic corrosion
- Installing bushings and bearings including riser and rudder bearings

**Key Features of Belzona Materials:**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Up to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heat resistance range (dry)</td>
<td>-40°C/40°F - 200°C/392°F</td>
</tr>
<tr>
<td>Heat resistance range (immersed)</td>
<td>-40°C/40°F - 160°C/320°F</td>
</tr>
<tr>
<td>Compressive strength</td>
<td>18,980 psi/130.8MPa</td>
</tr>
<tr>
<td>Pull off adhesion</td>
<td>3,240 psi/22.3MPa</td>
</tr>
<tr>
<td>Cleavage adhesion</td>
<td>1770 pli/315 N/mm</td>
</tr>
<tr>
<td>Erosion resistance (dry), ASTM D4060, CS17 wheels</td>
<td>12.8mm³ loss per 1000 cycles</td>
</tr>
<tr>
<td>Erosion resistance (wet), ASTM D4060, H10 wheels</td>
<td>591mm³ loss per 1000 cycles</td>
</tr>
<tr>
<td>Chemical resistance</td>
<td>A broad range of acids and alkalis</td>
</tr>
<tr>
<td>Corrosion resistance, ASTM B117</td>
<td>No signs of corrosion after 5000 hours exposure in salt spray cabinet</td>
</tr>
</tbody>
</table>
The Belzona App
Product and application information at your fingertips

Once installed, access materials offline:
• Product information
• Industry solutions
• Technical documentation
• Instructions for use
• Chemical resistance charts
• Videos

Download now
www.belzona.com/app