

COMPOSITE SOLUTIONS

*Wrap and Plate Bonding
Technology for New Build and
Maintenance Situations*



Belzona Solutions for Composite Solutions



The information in this brochure is accurate as of the time of printing. For the most up-to-date details on Belzona products and services, please contact your local Belzona representative.

Belzona provides the answer to a variety of industrial problems, complicated or simple. We specialize in the development of epoxy-based industrial coatings and repair composites for equipment and structures.



Mission Statement

**Polymeric solutions for
a sustainable future.**

Company Values

Integrity

We operate from a place of integrity and adopt a “right-first-time” culture, holding ourselves accountable in everything we do.

Investment

We are committed to investing across all business areas - Corporate, Distributors, Consultants, Customers, and Contractors, providing the best service and support for our network.

Innovation

We are committed to being a technology leader striving for continual improvement and constantly adapting to the changing industrial needs.

Product Plus

Belzona is more than just a product - via Belzona Head Offices and Global Distributor network, Belzona offers **value-added services** to meet the diverse needs of our industrial market.

Contact your Belzona Distributor to learn more about Product Plus services.



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Belzona provides high-strength, corrosion-resistant adhesive and composite solutions for equipment installation, offering a safe, durable alternative to welding without the need for hot work.



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



Plate bonding



Asset installation

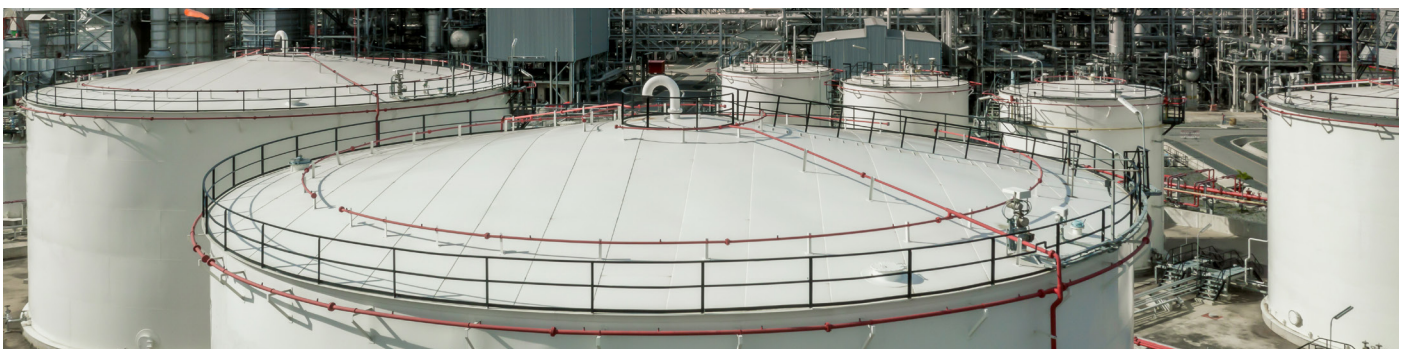


Composite wraps

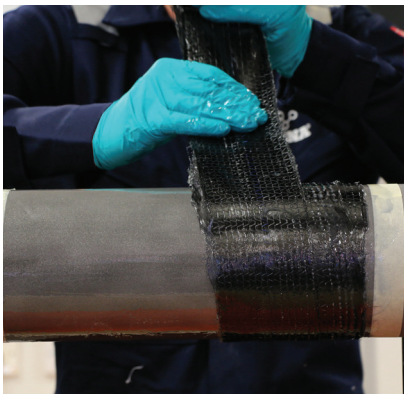


Composite patches and pads

Our 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, ISO and NACE, as well as by independent 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 the specific design and operating conditions of the asset. Dedicated Belzona trained specialists 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

Application standards, including surface preparation, are integral to the success and longevity of the repair solution. Belzona recognises the need to set and monitor global standards for the application of our materials. 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.

Belzona Composite Solutions



Problems We Solve

Belzona specialises in delivering engineered composite systems for repair and new build situations, which vary in size and complexity.

We Address Issues Such as:

- **Metal loss caused by external and internal corrosion**
- **Live leaks and through-wall defects**
- **Damage to large metal structures, such as decks, tanks, roofs and floors**
- **Damage to complex geometries in vessels and pipework, including bends, tees and flanges**
- **Equipment installation and upgrade by using 100% solids polymeric systems and avoiding the need for hot work**

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.

Why Belzona?

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:

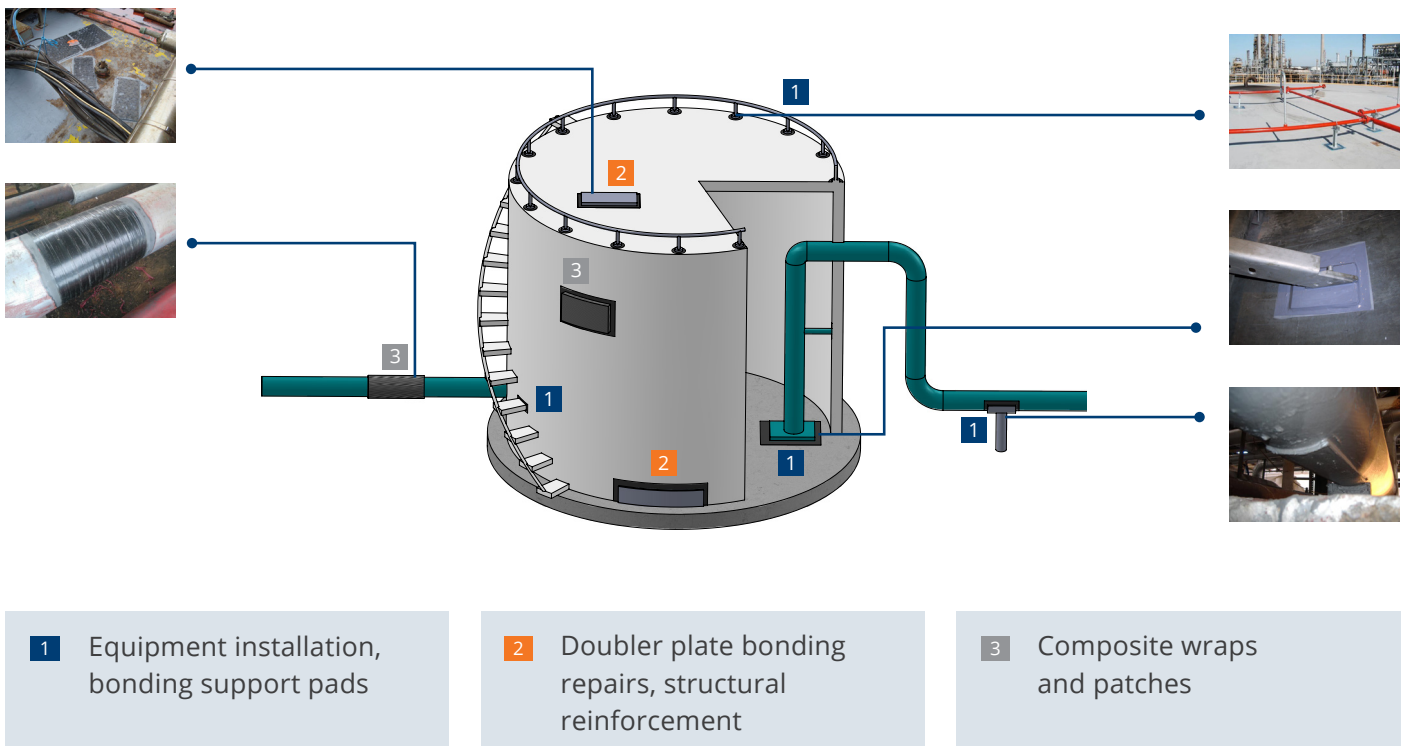
- **Operating temperatures and pressures are elevated**
- **Aggressive acids and alkalis are stored or processed**
- **Water, oil and other contamination is present at all times**
- **Erosion and abrasion occur externally or internally**

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



**For further information and advice please contact your local Belzona representative.*

Thin-and Through-Wall Defect Repairs

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**



Before



Belzona Materials

Belzona has developed a wide range of 100% solids paste and fluid grade systems to ensure the right solution is available for every application situation and in-service performance requirement. To ensure the right material and methodology are selected for the application, please consult your local Belzona representative.

Key Technical Data		Belzona 1111	Belzona 1121	Belzona 1161	Belzona 1212	Belzona 1251	Belzona 1311	Belzona 1511	Belzona 1321	Belzona 5811
Application	Rapid cure for a quick back to service time				•	•				
	Slow cure for large area applications		•							
	High temperature service							•		
	Tolerant to water, oil and manually prepared surfaces			•	•	•				
	Cures at low temperatures, down to 5°C/41°F	•	•	•	•		•		•	
	Application onto hot surfaces - heat activated material					•				
	Paste grade consistency	•	•	•	•	•	•	•		
	Fluid grade consistency for injection and large area applications								•	•

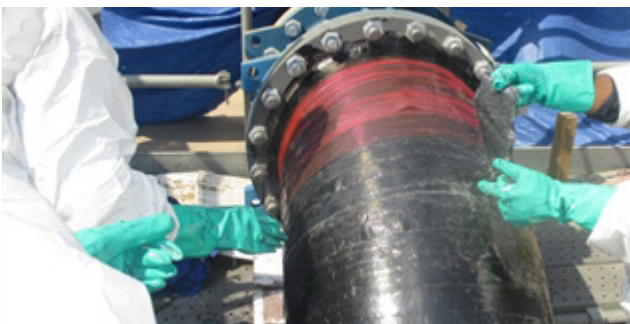


Non-Metallic Repairs



For repairs that need to be completed in accordance with the ASME PCC-2 or ISO 24817 standards, or where a non-metallic solution is required, we have developed Belzona SuperWrap II. This system is one of the strongest composite wrap, patch and wear pad 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.



- **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.**



Belzona SuperWrap II can be designed and applied in accordance with ISO 24817/ASME PCC-2 standards

Belzona SuperWrap II Application



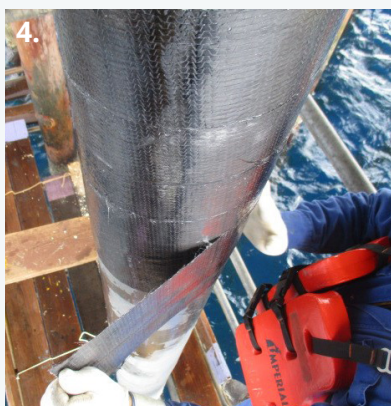
Design and Resin Selection



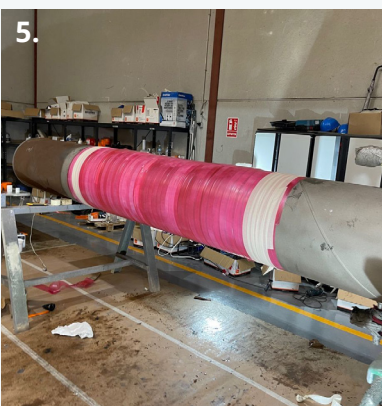
Surface Preparation



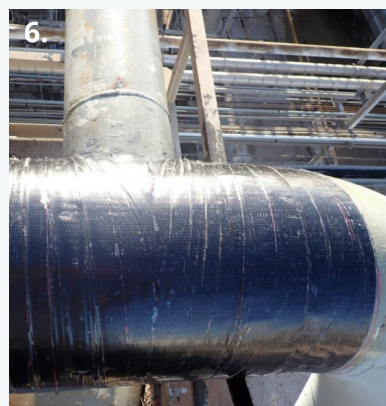
Rebuild and Repair



Application



Consolidation and Cure



Inspection and Full Service

Belzona SuperWrap II Selection Guide	Belzona 1981 Winter Grade 	Belzona 1982 Tropical Grade 	Belzona 1983 High Temperature Grade 	Belzona 1984 Surface Tolerant Grade 
Application Temperature Range	5°C - 20°C (41°F - 68°F)	20°C - 40°C (68°F - 104°F)	5°C - 40°C (41°F - 104°F)	5°C - 40°C (41°F - 104°F)
Minimum Service Temperature	-60°C (-76°F)	-60°C (-76°F)	-60°C (-76°F)	-60°C (-76°F)
Maximum Service Temperature	60°C (140°F)	80°C (176°F)	150°C (302°F)	50°C (122°F)
Surface Preparation Requirements (● Grit Blast – ISO 8501-1/SSPC SP 10) (○ Power-Tool – SSPC SP 11)				
Surface Cleanliness	Clean/Dry	Clean/Dry	Clean/Dry	Damp/Wet/ Underwater
ISO/ASME Compliant	✓	✓	✓	✓



Bonding of pipe support pads preventing galvanic corrosion

New Build Projects

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 18,980psi/130.8MPa, pull off adhesion of up to 3,240 psi/22.3MPa and flexural strength of up to 14,300 psi/98.6MPa, 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 Germanischer 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**



Load bearing fixings cold bonded

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:

Up to:

Heat resistance range (dry)	-40°C/40°F – 200°C/392°F
Heat resistance range (immersed)	-40°C/40°F – 160°C/320°F
Compressive strength	18,980 psi/130.8MPa
Pull off adhesion	3,240 psi/22.3MPa
Cleavage adhesion	1770 pli/315 N/mm
Erosion resistance (dry), ASTM D4060, CS17 wheels	12.8mm ³ loss per 1000 cycles
Erosion resistance (wet), ASTM D4060, H10 wheels	591mm ³ loss per 1000 cycles
Chemical resistance	A broad range of acids and alkalis
Corrosion resistance, ASTM B117	No signs of corrosion after 5000 hours exposure in salt spray cabinet



*Belzona Is a Global Manufacturer of Repair
Composite Materials & Industrial Coatings.*

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