

PUMP SYSTEMS

*Belzona Engineering Composites
and Protective Coatings*



Belzona Solutions for Pump Systems



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.



Table of Contents

06 *Introduction*

Industrial pumps are expensive, so keeping them efficient and reliable is key. With over 60 years of experience, Belzona provides proven products that help reduce downtime, cut costs, and extend equipment life.

07 *Global Application Standards*

Belzona ensures high-performance, long-lasting solutions through strict testing, global approvals, expert application, and certified inspections.

08 *Belzona Solutions for Pumps*

Pumping causes wear and damage to equipment. Belzona repairs and protects pumps, reducing downtime, energy use, and costs.

10 *Pump Repair and Rebuilding*

Belzona's cold-applied composites repair common pump damage and protect against corrosion, erosion, chemicals, and heat-related risks from welding.

12 *Erosion-Corrosion Protection and Efficiency Enhancement*

Belzona's polymeric coatings protect pump components from erosion and corrosion, improving efficiency, extending service life, and reducing maintenance. They also offer resistance to chemicals, high temperatures, and cavitation.

14 *Cavitation, Abrasion and Chemical Attack Protection*

Belzona provides tailored solutions for protecting pumps in challenging environments. Its materials offer strong resistance to high temperatures, acids, cavitation, and abrasive wear.

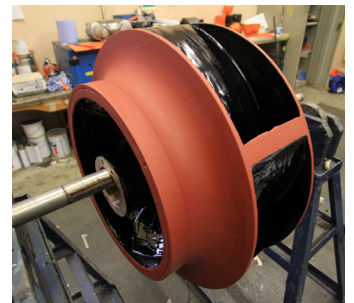


Novel Solutions to Age-Old Problems

Management of industrial pumps often requires significant capital investment and therefore it is important to extend their working lives and ensure that they run as efficiently and reliably as possible. Based on over 60 years of know-how, Belzona's high performance, polymeric repair composites and protective coatings are proven to helping asset owners to:



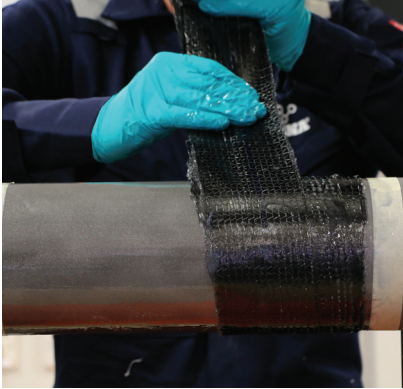
- Reduce downtime
- Simplify maintenance procedures
- Lower maintenance costs
- Improve efficiency and safety
- Extend equipment and asset life
- Reduce capital expenditure



Our unique solutions are engineered to withstand the most aggressive environments and operating conditions, such as erosion, corrosion, chemical attack and mechanical damage. We take pride in the quality of our materials as well as the comprehensive training and field support we provide to ensure the highest possible application standards.



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 Solutions for Pumps



Causes of Reduction in Pump Performance

The process of pumping fluids and slurries puts equipment under constant strain and can result in several deterioration mechanisms including erosion, corrosion, abrasion and cavitation.

These issues are some of the main causes of pump deterioration and wear, leading to efficiency losses, increased power consumption and overall higher asset lifetime running costs. If not addressed in time, the integrity of the component may be jeopardised, ultimately leading to equipment failure.

While replacement might be an obvious solution, it is usually associated with high cost and extended lead times.

Cold-Applied Polymer Technology

Belzona repair composite systems can rebuild metal loss and restore the original profile of the pump components, protecting them from future damage, while ensuring that equipment is quickly back in service.

Our ceramic filled, paste-grade composites are widely used to rebuild areas damaged by corrosion, erosion, cavitation or wear, eliminating hot work which can cause further weaknesses to the already vulnerable metal and prolong the threat of galvanic corrosion.

High performance polymeric coatings provide a protective layer against future deterioration. They are proven to reduce energy consumption, provide excellent chemical resistance and lower maintenance costs.

Why Belzona?

Belzona polymeric coatings and composite repair systems are commonly used on a wide variety of pump types and components such as vacuum, diffuser, end suction and split casing to minimise deterioration, lower operating costs and optimise performance, reliability and service life.

Our versatile product range provides varied working times, cure times, temperature ranges, chemical resistance and operating conditions.

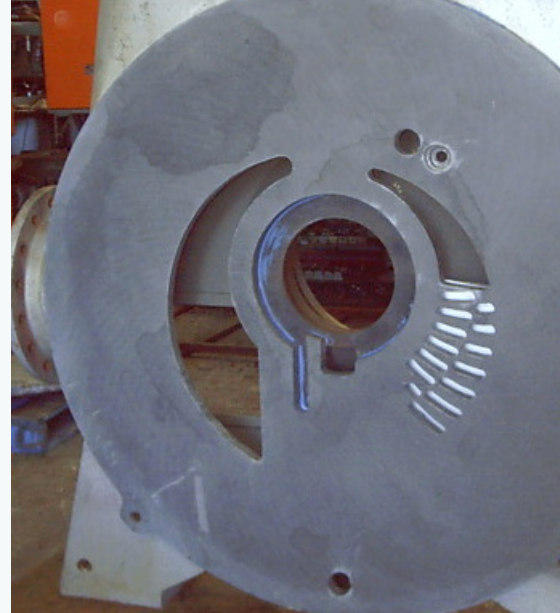
Belzona's pioneering technology offers a combination of application and in-service performance benefits rarely found in alternative solutions:

- **Cold-applied and cold-curing**
- **Solvent-free**
- **Simple application procedure**
- **Minimal downtime**

Areas of Application

Our commitment to research, development and customer service has resulted in systems that will exceed maintenance expectations in areas such as:

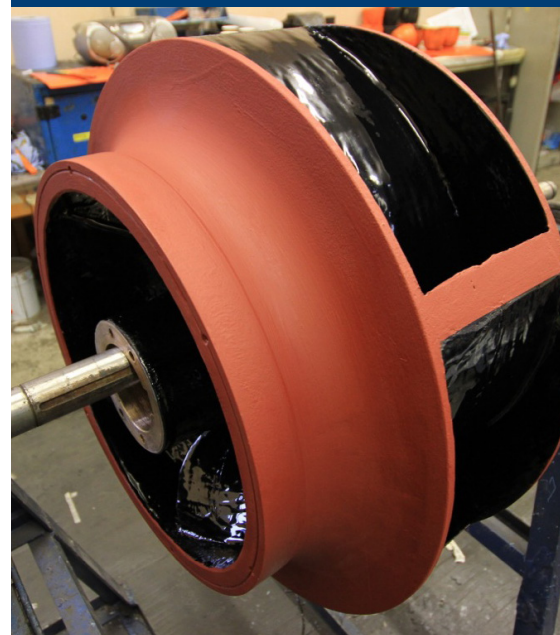
- **Restoring metal loss of cutwaters, flow straighteners, diffuser vanes, rotor vanes, impellers and casings**
- **Rebuilding and reforming wear ring seats, bushings and bearings**
- **Reinstating holded or cracked casings**
- **Protecting pumps from erosion, corrosion, abrasion, cavitation and chemical attack**
- **Casting lobe pump rotors, bushings and bearings**
- **External corrosion and chemical protection**
- **Precise equipment alignment**



Metal repair and rebuilding composites



Erosion-corrosion protection and efficiency enhancement



Protection against cavitation, abrasion and chemical attack



Before

Pump Repair and Rebuilding

Pitting, worn wear ring clearances, eroded cutwater profiles and water ring seals on end casings, as well as thin- and through-wall casing defects, are issues commonly addressed by Belzona's range of cold-applied paste grade composites, which will:

- **Stop galvanic and uniform corrosion**
- **Significantly slow down the effects of erosion and cavitation**
- **Provide protection against harsh chemicals**
- **Eliminate the risk of heat-affected zones (HAZ) that can arise with high temperature repair alternatives such as welding**

Belzona Materials

Belzona 1100 Series

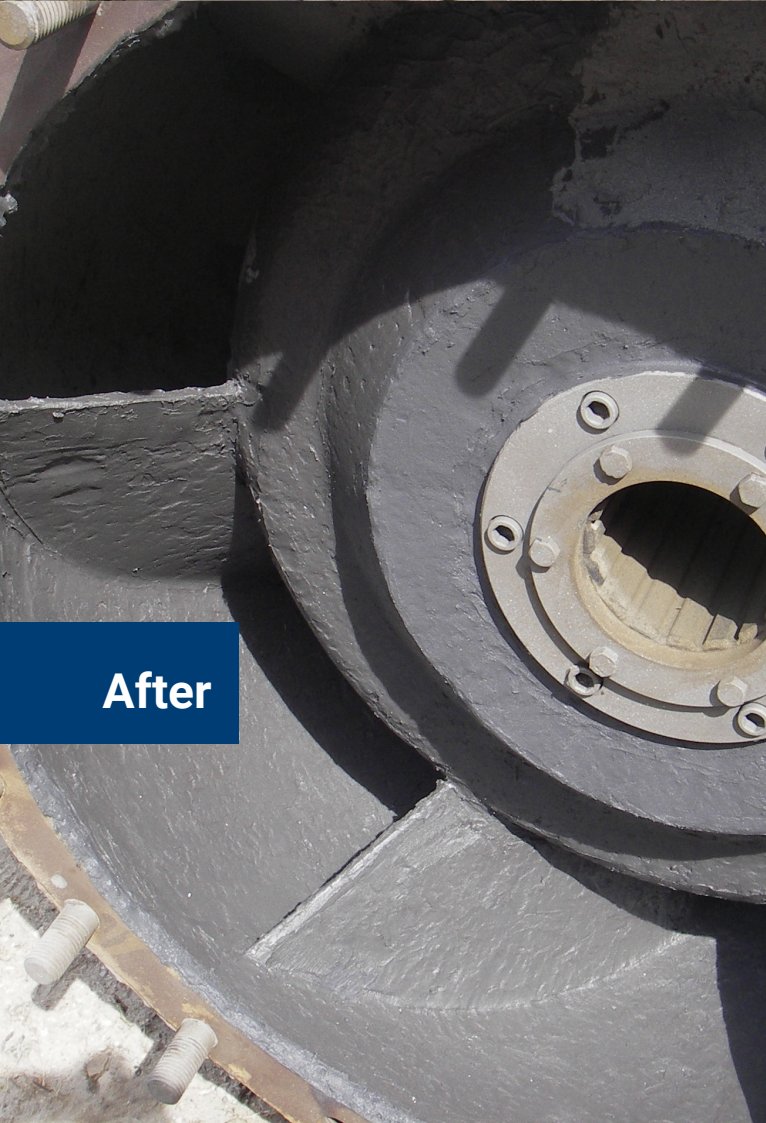
Paste-grade rebuilding and resurfacing composites providing excellent adhesion to any metal substrate. These 100% solids systems will not shrink, expand or distort during application or curing.

Belzona 1200 Series

Fast-curing, emergency, paste-grade rebuilding and resurfacing materials for in-situ repairs on oil contaminated or wet surfaces.

Belzona 1300 Series

High performance rebuilding and resurfacing materials to repair substrates affected by severe erosion-corrosion, providing a long-term solution in demanding operation conditions.



After

Belzona Solutions

Rebuilding Pump Cutwaters, Flow Straighteners, Diffusers, Impellers and Rotor Vanes

Rapid metal losses can be experienced due to impingement or erosion from the pumped fluid. Mechanical damage can also occur due to entrained solids, which leads to severe loss of efficiency.

Eroded components can be rebuilt and re-profiled with Belzona cold-applied materials. Our systems provide outstanding resistance to future erosion-corrosion, without inducing bi-metallic corrosion.

Repair of General Erosion-Corrosion Damage

The elevated turbulence caused by pitting on the internal surfaces of a pump results in rapidly increasing erosion rates and a significant loss in pumping efficiency due to accelerated friction.

Our repair systems are used to restore the original profiles prior to the application of a coating to prevent the problem re-occurring. Pitted surfaces are rapidly rebuilt without any risk of distortion or heat damage.

Reforming/Reseating Wear Rings, Bushes and Bearings Glands

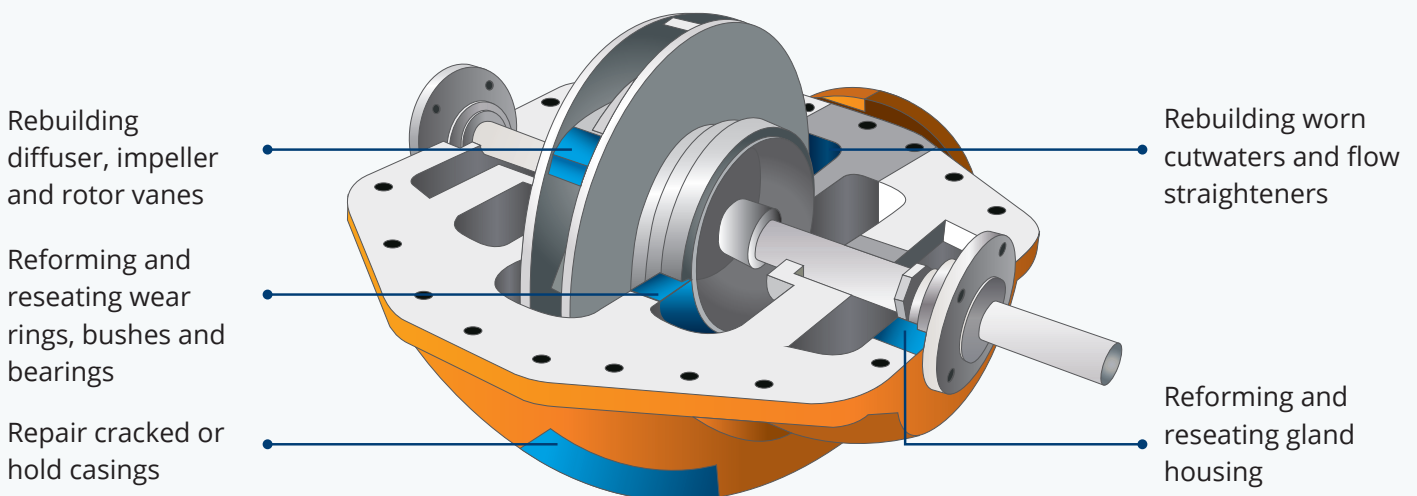
Solid particles entrained in the pumping fluid lead to rapid erosion of water ring seal areas of end covers and wear plates. Maintaining component clearances is critical to pump performance and a common problem in some pumps.

Forming or machining techniques with Belzona repair composites allow for the simple repair and restoration of ring or bush locations. This eliminates hot work and the need for welding repairs.

Repair of Casing Defects, Holes and Cracks

Whether caused by severe localised erosion or mechanical impact, a holed or cracked casing will allow loss of fluid and environmental contamination. If neglected, loss of structural integrity can lead to complete failure.

Cracks and holes in casings can be permanently repaired using Belzona systems. Reinforced repairs are achieved by firmly bonding metal reinforcement plates with Belzona materials.



Erosion-Corrosion Protection and Efficiency Enhancement



Before

Polymeric Coatings for Long-Term Protection

The physical and mechanical problems that affect fluid handling equipment are directly linked to poor efficiency or performance. In fluid flow situations, isolating the metal surface from its environment is the only way to significantly reduce the effects of erosion-corrosion.

This can be achieved by the application of a protective coating to the pump internal components. Protecting pumping systems with erosion-corrosion resistant coatings helps to reduce the loss of performance, significantly extend maintenance free periods and prolong the pump's service life.

By protecting components with a Belzona polymeric coating, it is possible to restore flow rates and even increase efficiency levels beyond the original specification.

Similar to our repair composite materials, our coatings are cold-applied and solvent free, which reduces health and safety risks associated with alternative repair and protection methods.

Belzona high performance coatings offer benefits which include:

- **Long-term erosion and corrosion protection**
- **Improved operating efficiency**
- **Extended equipment life**
- **Good cavitation resistance**
- **High temperature resistance up to 180°C/356°F**
- **Excellent chemical resistance even under immersion**

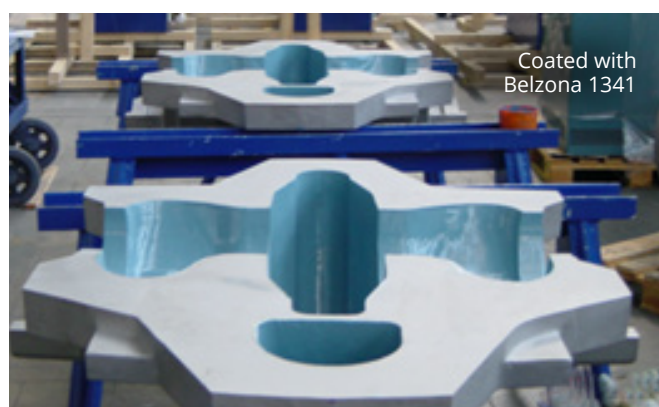
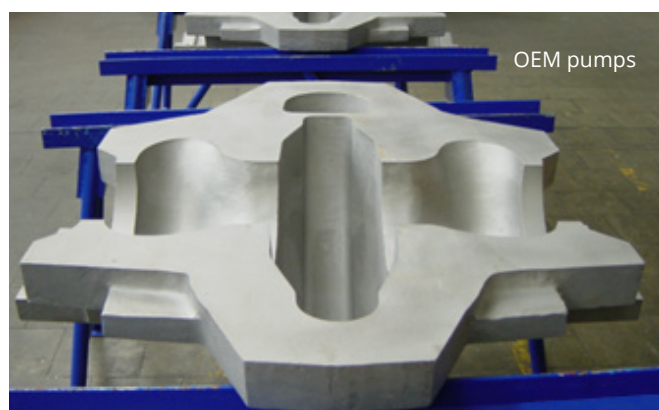
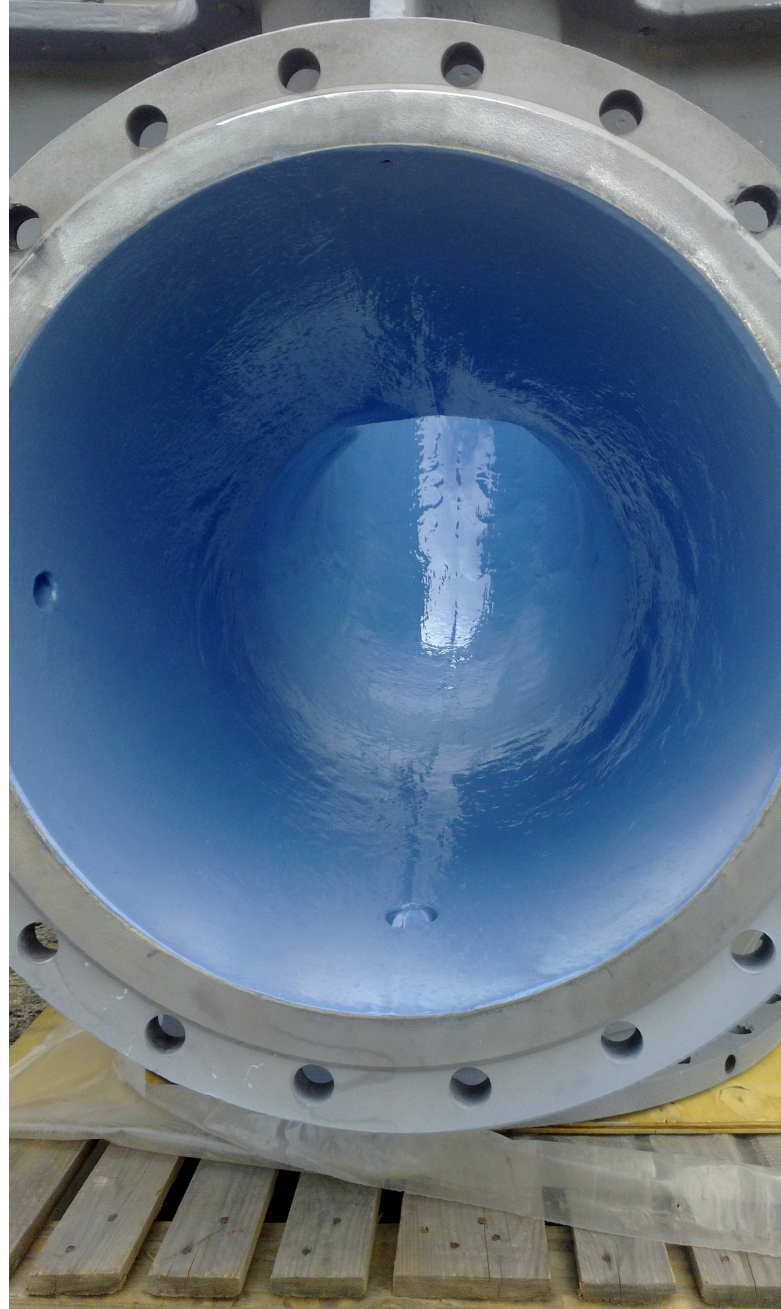
Efficiency Improvement Solutions

The Belzona range of durable protective coatings is complemented by Belzona 1341 (Supermetalgilde), our high-performance coating system providing pump efficiency improvement.

Due to its ultra-smooth, hydrophobic surface, 15 times smoother than polished stainless steel, it has been proven in independent tests to reduce turbulence and surface tension. At the same time, the coating will protect against future erosion-corrosion, meaning the immediate effects on performance will be maintained over a long period, reducing power consumption and saving operating costs.

Belzona 1341 (Supermetalgilde) is also increasingly used in OEM situations to prolong service life and save on energy costs. It is also common practice to coat new equipment with Belzona 1341 to avoid lengthy fine machining and polishing time when the construction does not meet the original design efficiency specification.

Pumping efficiency can be restored and enhanced with the use of this hydrophobic smooth lining. Belzona 1341 has demonstrated efficiency increases of up to 7% on new equipment and up to 20% on refurbished assets.



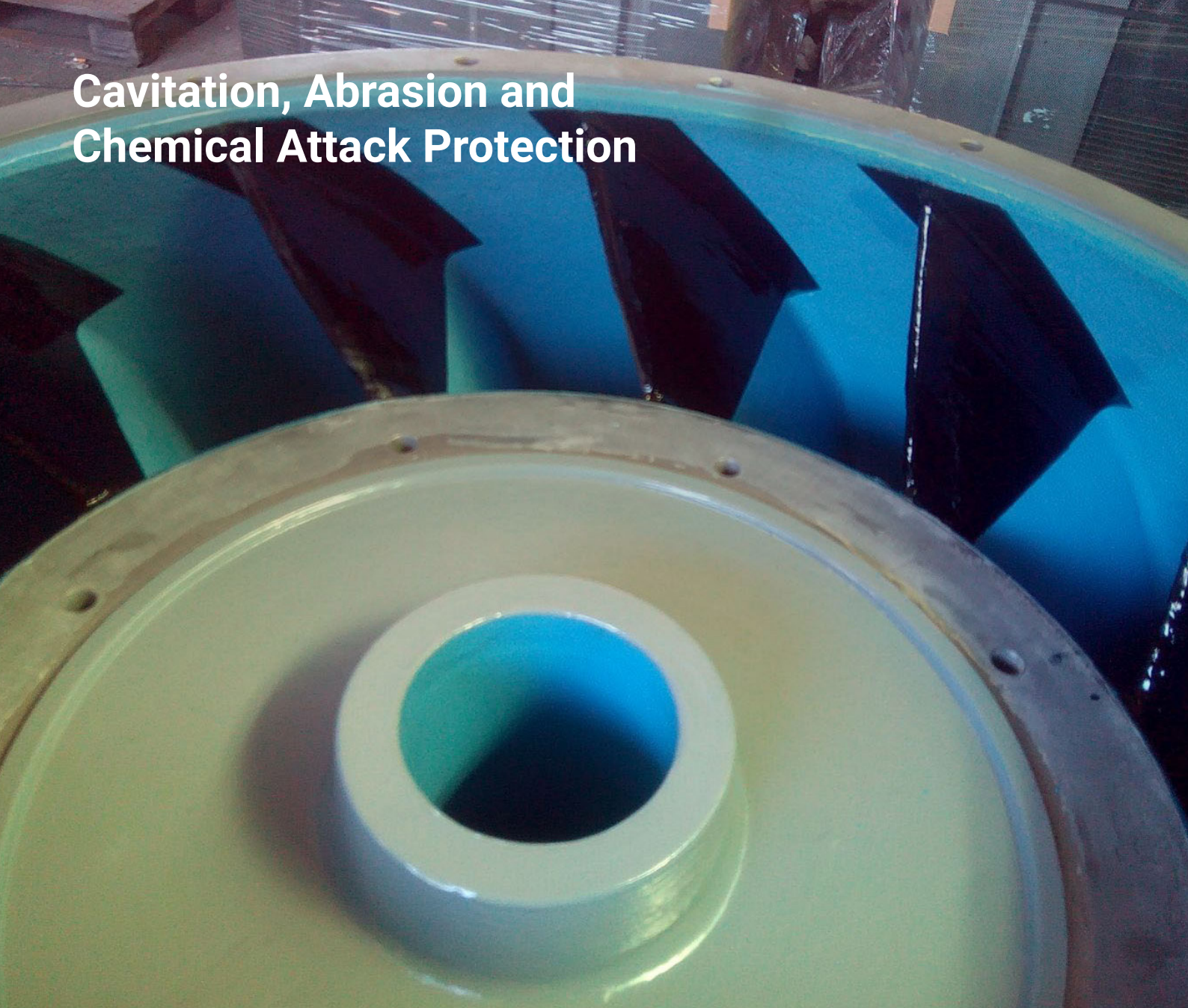
Approvals

Remaining at the forefront of innovation and advancement of industrial repair, protection and maintenance solutions, Belzona is proud to adhere to internationally recognised quality standards and environmental requirements.

In fact, Belzona has taken a proactive approach to ensuring our materials comply with strict standards and procedures imposed by international industry accreditation standards.

Belzona 1341 (Supermetalgilde) is suitable for contact with potable water as it is certified to NSF/ANSI Standard 61 and WRAS.





Cavitation, Abrasion and Chemical Attack Protection

Versatile Solutions for Pump Protection

The vast quantity of pump types, configurations, applications and service conditions make the selection of a repair and protection system a complex task.

Drawing on over six decades of experience and know-how in the field of erosion and corrosion management, Belzona has developed a variety of specialist materials, with benefits suited to some of the more arduous operating conditions, including:

- **High temperature resistance**
- **Resistance to hot organic acids**
- **High cavitation resistance**
- **Protection against highly abrasive particles**

Belzona Materials

Belzona 1800 Series Abrasion Resistant Coatings

Tough composite materials which incorporate abrasion resistant ceramic aggregates for the repair and protection of equipment suffering from abrasion.

Belzona 2100 Series Abrasion and Cavitation Resistant Elastomers

Flexible polyurethane elastomers for coating of extremely localised high pressure areas where abrasion, cavitation, erosion and corrosion resistance are required.

Belzona 4300 Series Chemical Resistant Coatings

Chemical resistant coatings for long-term protection against a wide range of aggressive chemicals.

Belzona Solutions



Cavitation Protection

Pumps handling high velocity fluids can suffer from cavitation. If left untreated, cavitation can cause:

- Failure of the pump housing
- Destruction of the impeller
- Excessive vibration
- Higher power Consumption
- Decreased flow and/or pressure

Belzona offers a combination of ceramic coatings and resilient polyurethane coatings that provide outstanding corrosion and cavitation protection.

Our ceramic coatings will increase efficiency in fluid flow situations, stop corrosion and significantly slow down erosion, while our polyurethane coatings absorb and disperse the cavitation energy, resisting its effects.

Abrasion Resistance

Low-stress abrasion and erosion-corrosion can be successfully mitigated with the use of sacrificial lining technology.

If left unprotected, equipment operating in heavy wear situations, such as sludge, slurry or sewage pumps could incur costly repairs or replacement, even after just a few months in service.

Belzona 1800 Series

linings offer outstanding resistance against severe abrasion to pump casings and impellers.

Our ceramic filled abrasion resistant linings incorporate extremely hard fillers to provide maximum protection, providing benefits including prolonged equipment life, reduced maintenance costs and reduced downtime.

Chemical Resistance

Pumps handling corrosive chemicals, acids and alkalis are prone to damage.

Such degradation can cause deterioration of the pumps efficiency and lead to a number of costly implications including poor performance, high operating costs, shorter service life and frequent maintenance expense.

For protection against the effects of chemical attack at various concentrations, Belzona 4300 series coatings are VOC-free, which reduces health and safety risks during application.

Our coatings isolate metal surfaces from chemicals to provide seamless protection and eliminate the risks of undetected delamination and corrosion of the underlying substrate.



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

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