

# IN FOCUS: HVAC Maintenance



## REPAIR AND PROTECTION SOLUTIONS FOR HVAC

Heating, Ventilation and Air Conditioning (HVAC) is essential in many industrial situations and vital for maintaining a satisfactory environment in large commercial facilities, sporting and entertainment stadia, theatres, hospitals and other public locations.

Corrosion is a major issue for building owners and managers to maintain the integrity of a HVAC unit. If corrosion is left untreated, the overall efficiency and longevity of the equipment can be affected, leading to an increase in operating costs and expensive replacement in the event of equipment failure. Repair and, most importantly, prevention of corrosion problems is critical to avoid premature removal and replacement. In particular, cooling towers and air handlers are often a neglected and vulnerable part of the system, frequently located on roofs, therefore difficult to access and maintain.

Corrosion resistant polymeric coatings and cold-applied metal repair composites offer a welcome alternative to costly replacement of HVAC parts. These materials, engineered for the harsh conditions inside HVAC systems, avoid hot work and minimise disruption, improving safety and protecting assets against corrosion for the long term. Belzona paste grade composites rebuild the damaged substrate and prevent leaks, while the coatings provide corrosion and chemical protection. This method completely stops corrosion and ensures long-term equipment protection. Additionally, Belzona polymer technology provides a beneficial alternative to traditional methods, increasing asset life and efficiency performance.

### Repair and protection of condenser water systems

Large office buildings, hospitals and schools typically use one or more cooling towers as part of their air conditioning systems. Unlike the large concrete cooling towers at power stations, these smaller cooling towers are commonly constructed from galvanized steel and over time suffer from corrosion. The combination of air, water, chemicals and heat in cooling towers creates a severe corrosive environment; therefore it is common to find perforations and holes and severe metal loss on units in service, resulting in leaks at panel joints that affects the unit's efficiency.

In addition, cooling tower fan blades usually suffer from erosion of the leading edge, as well as cracks and flaking on trailing edges, reducing the overall efficiency of the cooling system. Poor maintenance such as lack of bearing lubrication, loose pulleys or fan hubs results in scored and worn shafts.

Belzona's range of polymeric solutions for cooling towers can deal with numerous common maintenance problems, including protection of internal surfaces against corrosion, leaks in pipework, fan blade erosion, protection of thermal insulation and weatherproofing and waterproofing of roof locations and service voids. All these applications can be carried out quickly, in-situ and, most importantly, with minimal disruption to the normal operations on site.

Belzona solutions can be used to repair damaged units, or applied to new equipment to significantly extend its life in service. ▶▶

Issue 113

## Contents



### Repair and Protection of HVAC Systems 1

Corrosion, a major issue to maintain the integrity of HVAC units



### Range of Solutions for HVAC Units 2

Cooling towers, chillers, ductwork



### Belzona Stands the Test of Time 3

Belzona repairs and protects 35 year old chiller



### Belzona Flexible Solutions to the Rescue 4

Belzona seals extraction ductwork

## RANGE OF MATERIALS FOR HVAC

### Belzona 1000 Series for Metal Repair and Protection

**Belzona 1100 Series**  
Rebuilding of metal surfaces and repairing of fan shafts and other metallic components

**Belzona 1200 Series**  
Rapid cure materials for emergency metal repair and rebuilding scenarios

**Belzona 1300 Series**  
Erosion-corrosion resistant coatings and repair composites for repair and protection of chiller tube sheets, pump casings and impellers, fan blades and other components



### Belzona 3000 Series for Sealing and Encapsulation

**Belzona 3100 and 3200 Series**  
Liquid-applied membranes for internal and external sealing of joints, seals and roof penetrations, as well as encapsulation of insulated pipework and ductwork



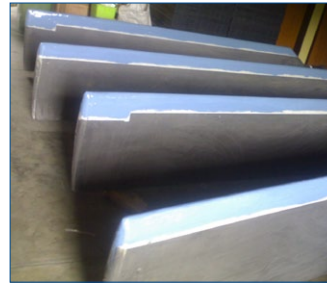
### Belzona 5000 Series for Environmental Protection

**Belzona 5800 Series**  
polymeric coatings for corrosion protection of collection basins and other internal surfaces of cooling systems

## Fan blade leading edge repair and protection



Damaged blades

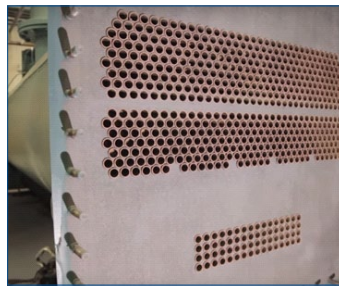


Leading edge coating

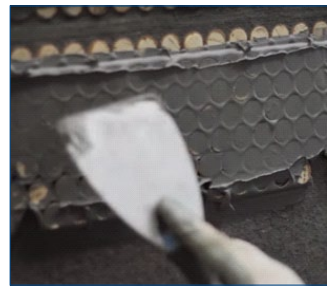


Completed application

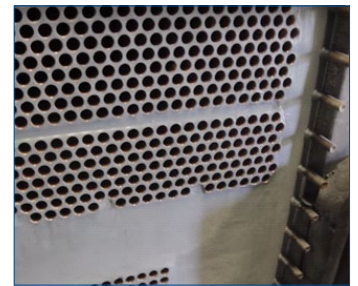
## Chiller tube sheet repair and protection



Grit blasted tube sheet



Corks inserted and rebuilding in progress



Completed repair and protection

▶▶ Belzona solutions for cooling towers include:

- Rebuilding of metal loss and corrosion pitting
- Cold plate bonding on cooling tower structure
- Coating of internal surfaces for long-term corrosion and chemical protection
- Sealing of internal and external joints
- Live leak sealing
- In-situ fan shaft repair using forming techniques
- Repair and erosion-corrosion protection of fan blades

### Solutions for chilled water systems

Shell and tube heat exchangers, also referred to as chillers, are a vital part of any heating or air conditioning system. Failure to protect these units quickly allows galvanic corrosion to take place, leading to significant metal loss on the tube sheet around the coolant tubes, a common problem encountered. Left untreated, the loss of metal will allow leakage of the coolant and contamination of the chilled water. Corrosion is not restricted to the tube sheet, as the water box and end covers are also susceptible to severe corrosion. In particular, corrosion of division bars and seal faces can cause leakage and bypassing on multi-pass systems, leading to loss of efficiency.

Belzona 1100 Series rebuilding materials can be used to rapidly repair and rebuild damaged tube sheets, water boxes and end covers in situ and without the need for hot work prior to the application of a long-lasting protective coating.

In order to prevent galvanic corrosion, chillers can be protected with a Belzona 1300 Series

coating, which will isolate the dissimilar metals and eliminate corrosion. The Belzona solution not only restores the original tube profile but also creates a smooth tube sheet face flush with the tube ends, reducing turbulence and increasing efficiency.

### Air and water ingress into ductwork

Thin gauge metal ducting commonly used in HVAC installations can suffer leakage at the joints, resulting in reduced efficiency. Ductwork, whether through active operation or natural convection, can develop rust due to water content in the air. Condensation, not to mention live water leaks, weakens and corrodes the metal of the ducts, which can lead to a breakdown in the structure and subsequent structural and operational failure. Rust buildup can also lead to secondary problems such as mould growth and the introduction of harmful particulates into the ventilation system.

Belzona solutions for ductwork include:

- Repair of corroded ductwork using cold-applied repair materials
- Joint and seam sealing using liquid-applied flexible polymer membranes
- Encapsulation of ductwork insulation, providing seamless protection of elbows, T-pieces and complex contours
- Ductwork internal and external protection using corrosion resistant coatings ■



Use your smartphone to watch the chiller repair and protection application video



# BELZONA STANDS THE TEST OF TIME

## Belzona repairs and protects 35 year old chiller

A university facility in Israel had a chiller unit that was in its 35th year of service. The tube sheet was badly corroded and gas leaks were occurring, significantly decreasing the efficiency of the system. The university required a long-term solution to rebuild and protect the tube sheet with minimal downtime and disruption.

A combination of Belzona materials consisting of [Belzona 1311 \(Ceramic R-Metal\)](#) and [Belzona 1341 \(Supermetalglide\)](#) was chosen to provide a cold-applied and cold-curing solution. Belzona 1311 is a ceramic filled epoxy based composite for metal repair, erosion and corrosion protection that is well known for its excellent adhesion to almost any rigid surface. Belzona 1341 was selected as not only does this epoxy coating provides outstanding erosion and corrosion protection, but it has been proven to improve the efficiency of fluid handling equipment due to its extra smooth finish and hydrophobic properties.

Prior to the application, all dezincified tube sheet material was removed so a solid metallic surface could be exposed, followed by grit

blasting. After completion of blasting, the area was washed with Belzona 9111 (Cleaner Degreaser) to remove all residual blasting debris.

All tubes were blocked off with corks to avoid contamination before Belzona 1311 was applied to recover the metal loss, commencing at the centre of the tube sheet and progressing to the extremities. A thin film of Belzona 1311 was applied in the seal area around a former to restore the original seal groove dimensions. Once the repair material had cured, the tube sheet was coated with Belzona 1341 to provide additional corrosion protection.

The end covers were also protected. After application of the coating, the corks were removed to reveal the completed repair and protection solution. The standard Belzona repair techniques sealed the gas leaks on the tube sheet and provided corrosion protection to allow the unit to continue in service for many more years. ■



The York chiller unit



Tube sheet before application



Completed coating of the tube sheet



Close-up of the coated tube sheet

### RISK OF LEGIONELLA BACTERIA ON COOLING TOWERS

A major problem that cooling towers can cause is the spread of Legionella bacteria, the cause of Legionnaires' disease, a potentially deadly infectious disease.



These bacteria can thrive in the warm and wet conditions found in cooling towers. Leaks at the construction joints not only affect the efficiency of the cooling process but could lead to the distribution of the dangerous legionella bacteria. Poorly maintained cooling towers are the main cause of outbreaks of Legionnaires' disease.

Heat rejection cooling towers are a major potential for spreading legionella bacteria and are subject to various codes of practice to prevent the spread of the bacteria from such equipment.

Belzona 5811DW2, a corrosion and chemical resistant coating designed to operate in the wet and warm environments present in cooling towers, can be used to prevent corrosion and the creation of through-wall defects. This coating provides a smooth and easy to clean surface for routine maintenance and cleaning of the tower.

UK guidelines recommend avoiding the use of materials that could encourage the growth of legionella. Recommended materials by the Water Regulations Advisory Scheme (WRAS) are listed in the Water Fittings and Materials Directory and several Belzona products including, Belzona 5811DW2, are included in this directory, making them suitable for use in such equipment.

**BELZONA SOLUTIONS FOR THE INDUSTRY**

Since 1952, Belzona has been providing lasting repair solutions for the following industries among others:

- » Power
- » Mining
- » Marine
- » Water and Wastewater
- » Oil, Gas and Petrochemical
- » Pulp and Paper
- » Manufacturing
- » Metal Processing

Visit [Belzona.com](http://Belzona.com) to find out more about turnkey maintenance solutions for machinery, equipment, buildings and structures.

Belzona materials help minimise downtime and extend maintenance-free periods. Belzona strives to provide a complete supply and apply package through its Global Distribution network, created to provide clients with direct access to materials, specialist application services, supervision and inspection services. It is Belzona's mission to meet specialist repair and maintenance needs in its target industries and markets worldwide.



## BELZONA FLEXIBLE MEMBRANE TO THE RESCUE

### Belzona seals extraction ductwork on roof over production area

A manufacturer in the United Kingdom had an issue with their extraction outlets on its roof over the production area. The effects of weather and UV had caused the rubber seals around the ductwork penetrations to degrade, allowing rainwater to leak directly into the production area and creating disruption in production and safety issues. The company required a durable, waterproof and weatherproof repair solution that would not only seal the leaking areas, but also continue to protect the substrate against any future damage.

Following an inspection by a Belzona representative, a liquid-applied coating for long-term roof protection, [Belzona 3111 \(Flexible Membrane\)](#), was specified to seal the problem areas. The Belzona 3111 system consists of a single component, solvent-free, microporous coating, used in combination with conditioning and a reinforcement sheet to create a tough but flexible membrane. This versatile material provides outstanding weatherproofing and waterproofing properties, with excellent

protection against UV radiation, and lends itself to application onto complex contours.

The application was carried out in accordance with the Belzona procedure. Firstly, the surface was grit blasted in order to remove all loose debris before the substrate was prepared with a conditioner to maximise adhesion of the Belzona materials. The joints were first resealed with a Belzona Elastomer, [Belzona 2211 \(MP High-Build Elastomer\)](#), a polyurethane resin system designed for the repair, coating and sealing of rubber and metal components. A fully reinforced Belzona 3111 system was applied incorporating Belzona 9311 (Reinforcement Sheet) using soft bristled brushes, encapsulating the sealing areas.

The Belzona system was applied in two days without disruption to the manufacturer's operations, sealing and protecting the ductwork penetration area against weather and further environmental effects. ■



Deteriorated joint



Belzona 2211 applied to seal gap



All joints sealed with Belzona 2211



Completed sealing and protection



113

Issue No.



Click here to find your local Belzona Representative

