

Cold Applied Vessel Linings Take the Heat

“In recent years, we see more process vessel linings being specified at the design stage to prevent corrosion. Anecdotal evidence suggests that lining a vessel at the design stage with an epoxy coating in place of using metal cladding is more cost-effective when taking into account the life-cycle costs.” – Jeremie Maillard, Belzona Oil and Gas Industry Manager.

In 2009 Belzona high-temperature linings were used to prevent corrosion in four pressure vessels, which remained in use for three years on P57 FPSO to process oil from the Jubarte field, Brazil. Inspection of the dehydrator in 2013 showed no signs of deterioration in the lining and the customer has commissioned further work to commence in 2014.

About the P57 FPSO project

In February 2008, a major Oil and Gas company signed a contract for the supply of the P57 FPSO with delivery of the unit planned 33 months later. Construction took place in Singapore and Brazil and the contractual requirement of 65% Brazilian content was exceeded. The facility was operated for the first three years of production at the Jubarte field. The FPSO, capable of processing up to 180,000 barrels of oil and 2,000,000 cubic metres of gas per day, facilitated production from 22 interconnected wells.

Internal corrosion protection of the four pressure vessels

Four pressure vessels, two desalters, a dehydrator and a separator, for handling liquid hydrocarbons at extremely high temperatures, V-T6205A, V-T6205B, V-T6204 and V-T6206 respectively required internal corrosion protection. Belzona’s high-temperature solution was chosen and supplied by the Brazilian Belzona Distributor, Hita Comércio e Serviços.

Pressure vessels technical data:

Vessel name	V-T6205A/B	V-T6204	V-T6206
Type	2 Desalters	pre Dehydrator	Separator
Fluid handled	Crude oil	Crude oil	Crude oil

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Design Temperature	160°C	160°C	160°C
Operating Temperature	120°C	120°C	120°C
Design Pressure	1451,3 kPa g	1451,3 kPa g	1451,3 kPa g
Operating Pressure	598,2 kPa g	696,2 kPa g	882,6 kPa g

Diego Hita of Hita Comércio e Serviços carefully evaluated temperature, pressure and chemical resistance requirements before specifying Belzona 1591 (Ceramic XHT), capable of withstanding immersion temperatures of up to 180°C (356°F), to line the vessels. Other areas that commonly suffer from corrosion, such as small bore nozzles and flange faces, were also to be isolated from the environment with the use of Belzona materials. The work was carried out in September 2009 and in February 2013 V-T6205A was opened for inspection. The condition was described as “flawless”; lining, flange faces and nozzles all showed no signs of deterioration.



Application in 2009

Inspection in 2013 - Flawless

How Belzona technology works – internal lining

To achieve excellent results, four elements need to be completed correctly: material specification, surface preparation, lining application and inspection by trained personnel. Lining material specification is influenced by the physical design, process fluids and operating conditions of the vessels, where these are matched with the product spec

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compiled by a manufacturer utilising in-house and external testing data. Field experience of said materials is also taken into account and assists with estimating the lining design life.

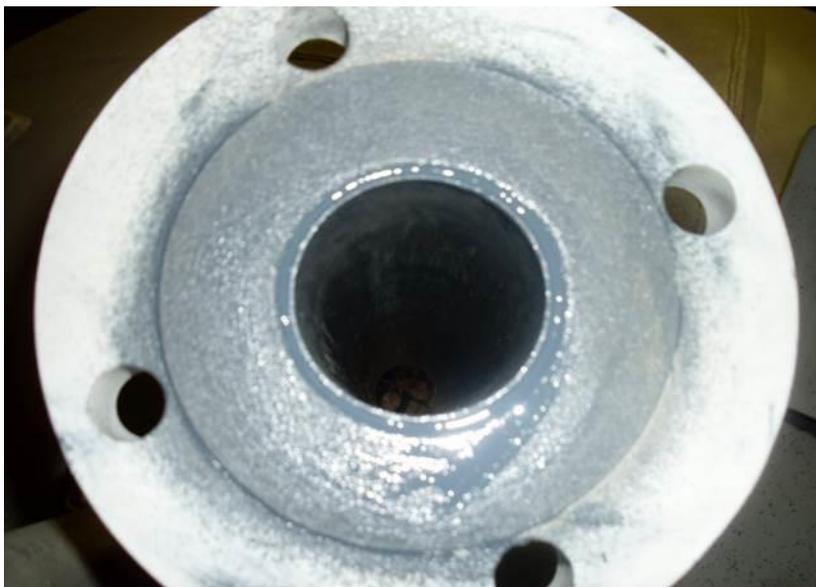
Surface preparation is carried out following the lining manufacturer's guidelines: typically after testing for internal contaminants (e.g. soluble salts) the surface is cleaned, degreased and grit blasted achieving the cleanliness of "near white metal" ISO Sa 2.5 and minimum profile of 75um (3 mils). Application environment is also controlled. The substrate and environmental temperatures as well as humidity are measured and reduced to appropriate levels. To reduce the risk of inadequate application standards, applicators and coating inspectors are trained and validated by the lining manufacturer.

Flange face forming technology

Corrosion of flange faces is a common problem affecting pressure vessels, where the face must be isolated to prevent oxidation. Hita Comércio e Serviços prefabricated formers, which were designed to form Belzona material on the raised flange face.

Small bore nozzle inserts

In order to protect small bore nozzles, a conventional coating would not be sufficient as it would have been difficult to guarantee no pinholes or holidays. This issue is rectified by introducing prefabricated nozzles made from Belzona composites that do not corrode. The inserts and the nozzle are wetted out with a Belzona coating grade material, before being installed and bonded together to ensure corrosion protection.



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Flange face formed and nozzle protected

Belzona presents next generation high-temperature lining system

Introduced in March 2014, Belzona 1593 and Belzona 1523 are based on a pioneering technology where the organic lining is toughened with a rubbery domain that inhibits crack propagation, thus diminishing damage caused by impact, thermal cycling or flexing.

Application is also simplified, as two-coat linings can be applied with no flash blasting necessary between coats within a 24 hour overcoat window. With the ability to prevent corrosion and resist a variety of harsh chemicals at temperatures up to 160°C (320°F) and 140°C (284°F) respectively, Belzona 1593 and Belzona 1523 are set to become the first choice for the corrosion protection of Oil and Gas process vessels.

For more information visit: www.belzona.com

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Notes to Editor;

About Belzona:

- Established in 1952, Belzona has pioneered innovative polymer technology that has revolutionised industrial repair and maintenance procedures.
- Belzona is a leading company in the design and manufacture of polymer repair composites and industrial protective coatings for the repair, protection and improvement of machinery, equipment, buildings and structures.
- At Harrogate, the full Belzona product range is manufactured to stringent quality and environmental control guidelines complying with the requirements of ISO 9001:2008 and ISO 14001:2004.
- Belzona has over 140 Distributors in more than 120 countries ensuring 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.

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- High resolution images, if not supplied with the email, are available on request.
- The article can be altered, lengthened or shortened upon request.
- Can we contribute to the article you are writing? We can provide images, technical data, case studies or an interview with one of our technical service representatives. Please let us know if this would be of interest.
- Do you have an upcoming topic that we could contribute an editorial on? Please let us know the topic, preferable length and the material submission deadline.

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