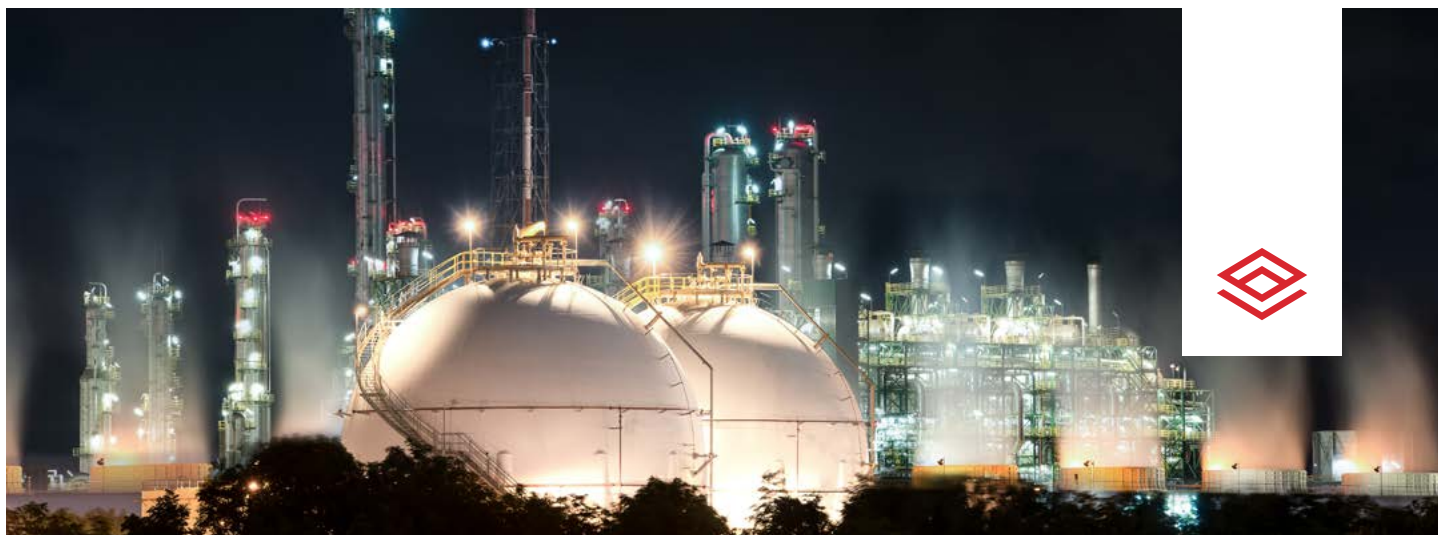




DetaClad® Titanium Clad for Chemical Process Equipment

ABOUT DETCLAD® TITANIUM CLAD PLATES

NobelClad uses DetaClad®, its proprietary explosion welding process, to manufacture titanium clad plates used for the production of reactors, columns, heat exchangers and other chemical process equipment. Titanium cladding is often used when corrosion properties are required that cannot be achieved with other lower cost alloys. DetaClad® Titanium clad is used for pressure vessels in the production of purified terephthalic acid (PTA), chlorinated polyvinyl chloride (CPVC), polyphenylene sulphide (PPS), ethylene dichloride (EDC), adipic acid, nitric acid and other highly corrosive chemical processes.

ADVANTAGES OF DETACLAD®

- Cold welding process maintains corrosion properties of the clad materials.
- World's largest plate sizes to minimize the seam welds required for large pressure vessels.
- Clad plates can be produced up to 5m wide x 15m long and up to 30 sqm depending on the grade of titanium selected.
- Titanium can be clad up to 25mm thick to any thickness of backer material.
- Ability to clad commercially pure (CP) grades of titanium, including Ti Grades 1, 2, 7, 11, 12, 16, 17 and other titanium grades/alloys, to carbon steels, alloy steels, stainless steels, aluminum alloys, copper alloys and other backing materials.
- NobelClad's technology allows for the production of large volumes of identical plates for the biggest projects as well as custom sized plates in small quantities for special needs.

SPECIFYING TITANIUM CLADDING FOR CHEMICAL PROCESS EQUIPMENT

Although titanium cladding is often specified using the least restrictive criteria in ASTM B898, higher levels of clad quality are indeed needed for many types of chemical process equipment. NobelClad's titanium clad plates, manufactured under the tradename Detaclad® are regarded as the world standard in quality, reliability and performance.

Whether specified as DetaClad® or not, the following items should be required to ensure the explosion bonded Titanium plates have high bond strength and excellent bond quality. Failure to consider these requirements can put your most important projects at risk. High bond strength and good bond quality allow for subsequent fabrication; including forming, rolling and welding to be performed without the danger of disbonding. Key requirements to specify for your mission critical titanium clad plates include:

- **Bond Shear Strength:** A minimum shear strength of 200 MPa (29 ksi) should be required and shall be verified after all clad processing is completed, including a simulated post weld heat treatment (SPWHT). In some cases, even higher shear strengths are required. Please consult with NobelClad for details. Shear test samples are to be taken from each plate at the location(s) furthest from the explosion initiation point.
- **Ultrasonic Testing (UT):** A 100% machine-controlled scan of all plates shall be performed according to Class A criteria in ASTM B898. Spot checking or using a grid is not a sufficient method to analyze the quality of a bonded plate.
- **Clad Layer Thickness:** A 9-point thickness inspection shall be used to verify that minimum clad layer thickness has been achieved on each plate. Clad thickness measurements shall be performed after all final surface grinding/polishing is completed. Using titanium that only meets the minimum thickness before bonding will generally result in clad layers below specification after the cladding and finishing is completed.
- **Post-cladding Surface Finish:** Many chemical processes demand a high quality surface finish. NobelClad offers DetaClad® Titanium at 3.2 micron Ra.



Ultrasonic testing at Mt. Braddock manufacturing facility.