



NobelClad partners with VDM Metals to source high-quality, reliable corrosion resistant alloys.



VDM Metals
A company of ACERINOX

Mastering Large N 825 Clad Plates with Corrosion & Mechanical Properties Intact – Capturing the Value of Quality Large Plates

We started this series exploring the financial benefits of seamless hemispherical heads, made from large N 825 clad plates, for upstream and downstream drilling operations in harsh conditions. Our second article highlighted NobelClad's partnership with steel producer Dillinger Hütte (Dillinger) and tests which prove steel's mechanical properties can survive cladding, head forming, and vessel manufacturing.

Today, in this article, we review a series of tests that prove Alloy 825's corrosion-resistant properties do withstand all manufacturing steps in heating and cooling operations associated with steel requirements.

A Long Term Partnership: NobelClad & VDM Metals

Like Dillinger, NobelClad partners with leading nickel alloy manufacturer VDM Metals to source high-quality, reliable, and proven corrosion resistant alloys (CRA), including VDM® Alloy 825 plates.

VDM® Alloy 825 is a titanium-stabilized, fully austenitic nickel-iron-chromium alloy with added copper and molybdenum. The alloy is highly resistant to chloride-induced stress corrosion and moderately resistant to chloride-induced pitting and crevice corrosion and oxidizing and non-oxidizing hot acids. In continuous operation at temperatures up to 550°C, VDM® Alloy 825 maintains toughness, which is why the alloy is VdTÜV and ASME approved for pressure vessels.

Beyond pressure vessel equipment, many industries rely on VDM® Alloy 825's versatility to construct reliable, safe applications. The alloy is used to build pipes, tubes, fittings, heat exchangers, evaporators and scrubbers in oil and gas production. In chemical processing, you can find VDM® Alloy 825 in sulfuric acid pickling and phosphoric acid manufacturing operations.

Together, NobelClad and VDM Metals conducted a series of tests and building a case for N 825 clad plates as a high-quality, reliable clad for highly corrosive pressure vessel environments. The companies set out to prove CRA properties can withstand cladding, head forming, and vessel manufacturing.

N 825 Clad Plate from NobelClad & VDM: Predictive Corrosion Properties

After setting the right parameters for steel, it was important for NobelClad's end-to-end supply chain partners to consider how best to maintain Alloy 825's corrosion-resistant properties at the main manufacturing stages.

VDM Metals manufactured the plates for cladding in Germany. The production process included melting, secondary metallurgical treatment, hot rolling, annealing and surfacing the material. Plates made by VDM Metals pass through stringent quality control protocols. In-process checks and inspections are conducted onsite to ensure full compliance with the required product properties. For this reason, VDM Metals operates its own laboratories to test the exact chemical composition of each alloy, including the alloy's mechanical properties and corrosion behavior.

ASTM G28 Meth A is the most appropriate corrosion test for Alloy 825. After carrying out heat treatments following manufacturing requirements, VDM cut production plate coupons and conducted the ASTM G28 Meth A tests. Three main manufacturing stages—and the related heat treatments—were considered for coupon preparation:

- Delivery condition
- Head heat treatment simulation
 - Head forming at 1035°C cooling air
 - Normalizing plus accelerating cooling at 900°C + water
 - Tempering at 650°C cooling air
 - Simulated Post-weld Heat Treatment (SPWHT) 3.5 hours at 610°C x 3
- Shell heat treatment simulation
 - SPWHT 3.5 hour at 610°C x 3

Upon completion, the corrosion test results confirmed heat treatment settings in vessel manufacturing produced perfect matches to customers' requirements. The simulated post-welding heat treatment slightly increased corrosion rates but the rates remain far below 0.9 mm/yr. The ratio is similar between annealed condition and after head heat treatment simulation.

These statistically reliable results confirm the benefit of an end-to-end supply chain in which high-quality suppliers work together to manufacture critical equipment using stringent backed by stringent quality control protocols.

Tested Plates Today: High-Quality Metal, Reliable Clad Now, Cost Savings for End Users Later

Quality manufacturing does not have to mean higher costs—in fact, it often means fewer unplanned downtime events and reduced lifetime equipment costs. The key is identifying quality clad partners, both supply chain and raw material partners.

For NobelClad, the strength of our global footprint is our organizational and production structure. Managing a supply chain, sales and technical engineers in place is necessary to ensure mechanical properties of the metal and the corrosion properties from clad will achieve a common goal for end users.

Between ensuring standard supply chain reliability, on-time delivery, and negotiating pricing, we spend a lot of time with our employees and suppliers defining requirements for metals, explosion clad welding process and fabrication requirements. You won't find this expertise and coordination with all clad suppliers. The next article in this series will focus on NobelClad and VDM Metal corrosion test results.

Transform Pressure Vessel Design into Reliable Solutions

NobelClad offers a variety of services and products, from free specification reviews to information about the latest large clad plate innovations and applications. Visit www.nobelclad.com to learn more about our trusted, high-quality operations and our 260 compatible and non-compatible metal combinations.

VDM Metals based in Werdohl, Germany, is part of the Acerinox S.A. Group. The company develops and manufactures nickel, cobalt and zirconium alloys as well as special stainless steels. For more than 90 years, VDM Metals has been supplying sheets, strips, rods, wires, welding consumables and powders to customers in the chemical process, power generation, oil and gas, electrical engineering and electronics, automotive and aerospace industries. VDM Metals employs approx. 2,000 people worldwide. www.vdm-metals.com

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