cryofit offshore heavy plates

Cost efficient and sustainable steel for offshore LNG tank manufacturing

cryofit heavy plates are excellently suited to applications exposed to extremely low temperatures. While the traditional material for the construction of LNG fuel or cargo tanks is a 9% nickel steel, it is also possible to use a specially heat-treated 5.5% nickel steel based on the IGC/IGF code with roughly 1/3rd less nickel.

voestalpine is ready to offer the highly advanced cryofit offshore heavy plates at an approx. 20% lower price compared to the 9% Ni material but providing the same mechanical properties and thermal expansion behavior.

The substantial saving of resources reduces the costs and CO_2-footprint of your LNG fuel or cargo tank. Your project is less depending on the volatile nickel price. Compared to high manganese steel grades, cryofit shows its advantages in regard to health, safety and environmental issues during flame cutting and welding.

Using voestalpine Böhler Welding Group's most advanced welding process and consumables you can further realize a remarkable cost reduction when manufacturing tanks out of cryofit heavy plates instead of conventional 9% Ni.

Convincing advantages

- Essential cost reduction
- Sustainable use of Ni-resources
- No health threat
- Reduced CO_2 footprint of your application
- High level of strength in combination with excellent toughness at low temperature

Processing

- Same workability like cutting, bending and edge preparation as for traditional material
- Böhler Welding Group will offer you a complete range of consumables for all welding processes and will support you in optimizing your onsite welding operations

greentec steel

PREMIUM QUALITY
WITH REDUCED
CARBON FOOTPRINT

voestalpine Grobblech GmbH
www.voestalpine.com/grobblech

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Chemical composition

Heat analysis in mass % acc. standard

Steel grade	Plate thickness [mm]	C max.	Si max.	Mn max.	P max.	S max.	Al max.	Cr max.	Mo max.	Ni max.	N max.
A 645 Gr. B cryofit offshore	> 5 ≤ 50	0.13	0.30	1.50	0.020	0.010	0.050	1.00	0.30	6.00	0.01

Differing from the normative definitions and based on our state of the art production process, voestalpine is able to offer lowest phosphorus and sulfur contents (P_{max}=0.008%, S_{max}=0.001%).

Mechanical properties: Notch impact energy [1)]

Values in as-delivered condition acc. standard

Steel grade	Test temperature [°C]	Size of specimen [mm]	Notch impact energy Testing direction longitudinal A_v min. [J]	Notch impact energy Testing direction longitudinal A min. [J]	Notch impact energy Testing direction transversal A_v min. [J]	Notch impact energy Testing direction transversal A min. [J]
A 645 Gr. B cryofit offshore	-196	10 x 10	34	27	27	22
		10 x 7.5	26	22	20	16
		10 x 6.67	23	18	18	14
		10 x 5.0	18	14	14	11

[1)] Each specimen shall have a lateral expansion opposite the notch of not less than 0.38 mm
Notch impact bending test in accordance with ASTM A 20M

Mechanical properties: Tensile test [2)]

Values in as-delivered condition acc. standard

Steel grade	Yield strength $R_{p0.2}$ [MPa] min.	Tensile strength R_m [MPa]	Fracture elongation A5 $L_0 = 5.65 \sqrt{S_0}$ [%]
A 645 Gr. B cryofit offshore	590	690 – 830	20

[2)] Tensile test in accordance with ASTM A 20M
On request, additional or more restrictive requirements (e.g. a higher minimum tensile strength) can be offered, which can be beneficial for a variety of applications.

Available dimensions

Steel grade	Plate thickness [mm]	Max. width [mm]	Max. length [mm]	As-delivered condition [3)]
A 645 Gr. B cryofit offshore	5 – 50	3,800	12,700	Q + I + T

[3)] I ... Intermediate heat treatment

Additional dimensions upon request.

Welding Consumables

Welding process	Product name	AWS classification	EN ISO classification	Notch impact energy [J] / -196 °C	UTS [MPa]	YS [MPa]
SMAW	Böhler Thermanit 620	ENiCrMo-6	E Ni 6620	80	700	430
FCAW	Böhler FOXcore 625-T1	ENiCrMo3T1-4	Ni 6625 P M21 2	72	750	475
SAW wire	Böhler NiMo C276	ERNiCrMo-4	SNi6276	110	720	450
SAW flux	Böhler Marathon 104	-	SA FB 2 AC	-	-	-

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OUR PATH TO A GREENER FUTURE

Premium products in the greentec steel Edition

With greentec steel, voestalpine is pursuing an ambitious step-by-step plan in the long-term decarbonization of steel production. The declared objective is to achieve carbon-neutral production by 2050, and the initial steps have already been taken. Process-optimized production operations already prevent up to 10% of the direct CO_2 emissions at the Linz site. The material and processing properties of the steel are not affected in any way in this production route. Each voestalpine heavy plate product is available in premium quality in the greentec steel Edition with a reduced carbon footprint and unique benefits.

greentec steel

Premium quality with reduced carbon footprint

Heavy plates (excl. heads and clad plates) – greentec steel Edition
Max. carbon footprint 2.21 kg CO_2e per kg of steel [1)]

[1)] per EN 15804+A2 (EPD methodology) cradle to gate

voestalpine Grobblech GmbH
voestalpine-Straße 3
4020 Linz, Austria
grobblech@voestalpine.com
www.voestalpine.com/grobblech

voestalpine
ONE STEP AHEAD.