toughcore®

F550 TMCP toughcore

Cost reduction and increased safety for offshore LCO_2 and LPG tank manufacturing

Qualified by the renowned classification societies, F550 TMCP toughcore offers excellent toughness properties and highest uniform elongation values to increase safety for LCO_2 or LPG offshore tank manufacturing.

The outstanding CTOD properties and the remarkable fracture arrest behavior of the base material of F550 TMCP toughcore offers a safety margin which guarantees fracture mechanic performance at design temperature in the heat affected zone.

Even in the unlikely event of full depressurization of your tank, stable toughness values are achived even in mid thickness down to a temperatur of -80 °C.

Compared to conventional steel grades, suitable for LCO_2 or LPG tank manufacturing, F550 TMCP toughcore offers essential cost savings due to its reduced nickel content.

As a consequence of the sustainable alloying concept, even the CO_2 footprint of your project can be improved.

Convincing advantages

- Reduced nickel content of < 0.5%
- Cost reduction
- Best weldability with CE max. 0.48
- Higher safety margin with 280 J @ -80 °C
- Short delivery time
- Reduced CO_2 footprint

greentec steel

Premium quality
with reduced carbon footprint

toughcore®
greentec steel

voestalpine Grobblech GmbH
www.voestalpine.com/grobblech

voestalpine
ONE STEP AHEAD.

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.	Nb max.	Ti max.	CE [1] max.	PCM max.
F550 TMCP toughcore	≤ 60	0.08	0.5	1.6	0.01	0.005	0.035	0.2	0.43	0.55	0.03	0.015	0.48	0.22

[1] Max. 0.50 for WT exceeding 50 mm

Mechanical properties: Notch impact energy [2]

Values in as-delivered condition acc. standard

Steel grade	Test temperature [°C]	Test location [mm]	Notch impact energy Testing direction transversal A_v min. [J]	Notch impact energy Testing direction transversal A min. [J]
F550 TMCP toughcore	-80	¼ thickness	55	37
	-60 [3]	½ thickness		

[2] Testing will be carried out in transverse direction acc. to DNVGL Rules for Classification – Ships, Part 2 respectively DNVGL OS-B101.
Additional testing in the simulated stress relieved condition can be agreed at a temperature of max. 580 °C.
[3] Lower test temperatures upon request.

Mechanical properties: Tensile test [4]

Values in as-delivered condition acc. standard

Steel grade	Yield strength $R_{p0.2}$ [MPa] min.	Tensile strength R_m [MPa]			Fracture elongation A5 $L_0 = 5.65 \sqrt{S_0}$ [%] min.	Uniform elongation [%] min.	Ratio max.
	t = 20 ≤ 60 mm	t = ≤ 42 mm	t > 42 ≤ 50 mm	t > 50 ≤ 60 mm	t = 20 ≤ 60 mm	t = 20 ≤ 60 mm	
F550 TMCP toughcore	550	670 – 820	660 – 820	650 – 820	19	7	0.9

[4] Testing will be carried out in transverse direction acc. to DNVGL Rules for Classification – Ships, Part 2 respectively DNVGL OS-B101.
Additional testing in the simulated stress relieved condition can be agreed at a temperature of max. 580 °C.

Welding Pre-Qualification [5]

Pre-Qualification	Welding process	Test location	Test temperature [°C]
CTOD	SAW 1.5 & 2.5 kJ/mm	FL / FL + 1 mm	min. 0.2 mm / -40
CVN			-60
CTOD	SAW 5.0 kJ/mm		min. 0.2 mm / -10
CVN			-60

[5] Additional testing in the simulated stress relieved condition can be agreed at a temperature of max. 580 °C.

Available dimensions

Steel grade	Plate thickness [mm]	Max. width [mm]	Max. length [mm]	Max. weight [t]	As-delivered condition
F550 TMCP toughcore	≤ 60	3,850	18,000	21.5	TMCP toughcore

Additional dimensions upon request.

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

toughcore®

greentec steel

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

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voestalpine
ONE STEP AHEAD.