A 645 Gr A / A 645 Gr B

Cost reduction and increased safety for ethylene and LNG tank manufacturing

With the revision of API Standard 620 – "Design and Construction of Large, Welded, Low-Pressure Storage Tanks" in 2018, the material choice for building welded low-pressure gas storage land tanks was remarkably diversified.

With this latest issue, it is now possible to utilize the ASTM grades A 645 Gr A and Gr B for building gas storage tanks for e.g. ethylene, LPG or LNG. With the experience of the first executed projects, voestalpine Grobblech is again pioneering this field of application.

Using our state of the art production route, voestalpine Grobblech GmbH is able to deliver both A 645 Gr A and Gr B in addition to the traditional 5% and 9% standard nickel steel grades.

Choosing ASTM A 645 Gr A for ethylene tank manufacturing, you will benefit from approx. 15% higher material strength and an additional safety margin due to a lower CVN test temperature of -140 °C instead of -120 °C, compared to the conventional 5% nickel steel. Utilizing the higher strength and safety margin, you will be able to safe material costs by reducing the overall wall thickness of your land tanks.

Meeting your existing LNG gas storage requirements with the ASTM A 645 Gr B instead of using the conventional 9% nickel steel, the reduction of the nickel content by approx. 30% beneficially affects the material investment when building all types of LNG tanks for onshore and offshore as well as fuel tank application.

Convincing advantages of A 645 Gr A compared to a conventional 5% Ni steel grade

- Reduced wall thickness and costs
- Higher material strength
- Lower test temperature
- Higher safety margin

Convincing advantages of A 645 Gr B compared to a conventional 9% Ni steel grade

- Essential costs reduction
- Similar mechanical properties
- Sustainable use of Ni-resources

Processing

Same workability like cutting, bending and edge preparation as for traditional material.
Proven weldability with our sister company voestalpine Böhler Welding.

Further information upon request.

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 A	> 5 ≤ 50	0.13	0.40	0.6	0.025	0.025	0.12	-	0.35	5.2	0.02
A 645 Gr B	> 5 ≤ 50	0.13	0.30	1.5	0.020	0.010	0.05	1.0	0.30	6.0	0.01

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 Av [J] min.	Notch impact energy Testing direction longitudinal A [J] min.	Notch impact energy Testing direction transversal Av [J] min.	Notch impact energy Testing direction transversal Av [J] min.
A 645 Gr A	-140	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
A 645 Gr B	-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 A	450	655 – 795	20
A 645 Gr B	590	690 – 830	20

[2)] Tensile test in accordance with ASTM A 20M

Available dimensions

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

[3)] I ... Intermediate heat treatment

Additional dimensions upon request.

Please find further information and downloadable files at
www.voestalpine.com/Nickel-plates

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ONE STEP AHEAD.