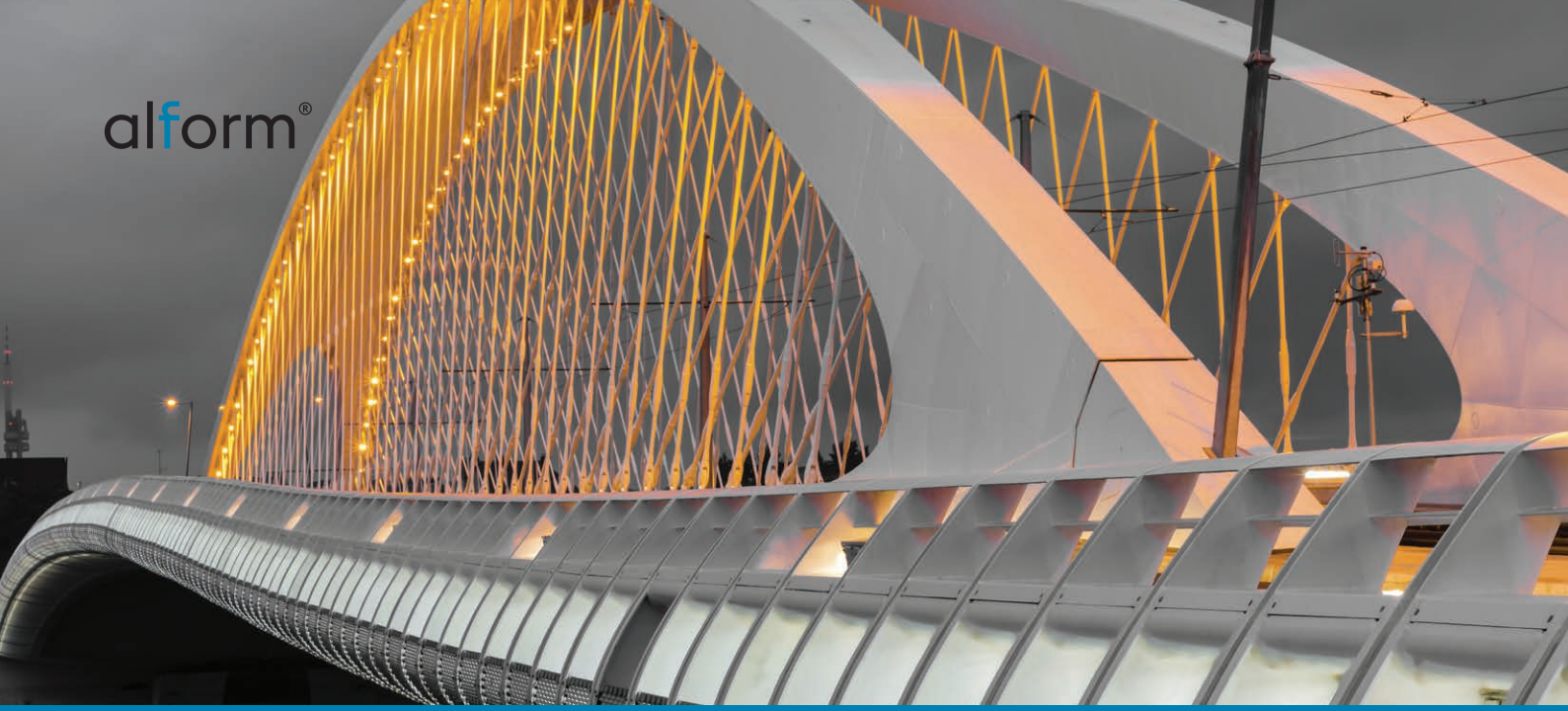

alform®

Thermomechanically rolled fine-grained steels

The steel grades of the alform® series are thermomechanically rolled, weldable and bendable fine-grained structural steels. Plates made of these steels combine the good toughness properties of the thermomechanically rolled fine-grained steels according to EN 10025-4 with the excellent cold forming properties of the cold forming steels according to EN 10149-2.

The alloying concept provides very low carbon contents and low carbon equivalents, which aims in very good weldability. In particular, the high-strength grades (alform plate 500 M and alform plate 550 M) provide special advantages in areas, where weight savings are of great importance. The steel grades of the alform® series are used in steel construction, bridge building and the manufacture of penstocks, vehicles and cranes. alform® steels are produced via LD-route and are cast as fully killed steel.

Convincing advantages

- Very good weldability
- Excellent cold formability
- Excellent toughness
- Best surface

greentec steel

Premium quality
with reduced carbon footprint

alform®
greentec steel

voestalpine Grobblech GmbH
www.voestalpine.com/grobblech

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ONE STEP AHEAD.

Chemical composition

Heat analysis in mass %

alform®	C max.	Si max.	Mn max.	P [1] max.	S [1] max.	Nb [2] max.	V [2] max.	Ti [2] max.	Cr max.	Ni max.	Cu max.	Mo max.
plate 355 M	0.10	0.40	1.60	0.012	0.003	0.05	0.08	0.02	0.30	0.30	0.30	0.10
plate 420 M	0.10	0.40	1.70	0.012	0.003	0.05	0.10	0.02	0.30	0.30	0.30	0.20
plate 460 M	0.10	0.40	1.70	0.012	0.003	0.05	0.10	0.02	0.30	0.70	0.30	0.20
plate 500 M	0.10	0.40	2.00	0.012	0.003	0.06	0.12	0.02	0.30	0.80	0.30	0.50
plate 550 M	0.10	0.40	2.00	0.012	0.003	0.09	0.12	0.02	0.30	0.80	0.30	0.50

[1] The standard EN 10025-4 would permit significantly higher values: P max. 0.025; S max. 0.020
[2] The total of Nb, V and Ti must not exceed 0.22 %.
Different elements are not alloyed.

Carbon equivalent

Standard values for carbon content and carbon equivalent

alform®	Plate thickness [mm]	C [%]	CEV [3] [%]	CET [4] [%]	PCM [5] [%]
plate 355 M	20	0.04	0.33	0.20	0.13
plate 420 M	20	0.04	0.33	0.20	0.13
plate 460 M	20	0.04	0.37	0.22	0.15
plate 500 M	20	0.05	0.43	0.26	0.17
plate 550 M	20	0.05	0.45	0.29	0.20

[3] CEV = C + Mn/6 + (Cr + Mo + V)/5 + (Ni + Cu)/15, according to IIW
[4] CET = C + (Mn + Mo)/10 + (Cr + Cu)/20 + Ni/40, according to SEW 088
[5] PCM = C + Si/30 + (Mn + Cu + Cr)/20 + Ni/60 + Mo/15 + V/10 + 5*B, according to API 5L

Mechanical properties: Tensile test

alform®	Plate thickness [6] [mm]	Yield strength R_{eH} [7] [MPa] min.	Tensile strength R_m [7] [MPa]	Fracture elongation A_5 [7] [%] min.
plate 355 M	8 ≤ 16	355	470 - 630	22
	> 16 ≤ 40	345	470 - 630	22
	> 40 ≤ 63	335	450 - 610	22
	> 63 ≤ 80	325	440 - 600	22
	> 80 ≤ 100	325	440 - 600	22
plate 420 M	8 ≤ 16	420	520 - 680	19
	> 16 ≤ 40	400	520 - 680	19
	> 40 ≤ 63	390	500 - 660	19
	> 63 ≤ 80	380	480 - 650	19
	> 80 ≤ 100	380	470 - 630	19
plate 460 M	8 ≤ 16	460	540 - 720	17
	> 16 ≤ 40	440	540 - 720	17
	> 40 ≤ 63	430	530 - 710	17
	> 63 ≤ 80	410	510 - 690	17
	> 80 ≤ 100	410	500 - 680	17
plate 500 M	8 ≤ 16	500	580 - 760	16
	> 16 ≤ 40	480	580 - 760	16
	> 40 ≤ 63	460	580 - 760	16
	> 63 ≤ 80	450	580 - 760	16
plate 550 M	8 ≤ 50	550	600 - 760	16

[6] Larger thicknesses on request.
[7] Tensile test in accordance with EN ISO 6892-1 on transverse samples.

Mechanical properties: Notch impact energy/Edging radii

alform®	Plate thickness [mm]	Notch impact energy [8] Av [Joule] min. Testing direction Longitudinal Test temperature -50 °C	Notch impact energy [8] Av [Joule] min. Testing direction Transverse Test temperature -50 °C	Edging radii Ri min. at 90° edging (s = plate thickness) Position of the bending edge to the rolling direction Longitudinal	Edging radii Ri min. at 90° edging (s = plate thickness) Position of the bending edge to the rolling direction Transverse
plate 355 M	8 ≤ 100	27	16	1.5 s	1.0 s
plate 420 M	8 ≤ 100	27	16	2.0 s	1.5 s
plate 460 M	8 ≤ 100	27	16	2.0 s	1.5 s
plate 500 M	8 ≤ 80	27	16	3.0 s	2.0 s
plate 550 M	8 ≤ 50	27	16	3.0 s	2.0 s

[8] Notch impact bending test in accordance with EN ISO 148-1 on Charpy-V longitudinal samples at –50 °C.
The mean value from 3 individual samples must reach the specified requirements. No individual value may be below 70% of the guaranteed mean value. For thicknesses < 12 mm, subsize-specimen with dimensions of 10 x 7.5 mm are tested. The guaranteed value is reduced in proportion to the sample cross-section.

Available dimensions

Maximum width per thickness; minimum width 1,500 mm

alform®	Plate thickness [9] [mm]	Max. width [mm]	Max. length [mm]	As-delivered condition [10]
plate 355 M	8 ≤ 100	3,800	18,700	TM + ACC
plate 420 M	8 ≤ 100	3,800	18,700	TM + ACC
plate 460 M	8 ≤ 100	3,800	18,700	TM + ACC
plate 500 M	8 ≤ 80	3,800	18,700	TM + ACC
plate 550 M	8 ≤ 50	3,800	18,700	TM + ACC

[9] The maximum length is 17,000 mm for thicknesses of 8 < 9 mm and widths of ≥ 3,450 - 3,800 mm.
The maximum length is 17,000 mm for thicknesses of 9 < 10 mm and widths of > 3,650 - 3,800 mm.
[10] TM ... thermomechanically rolled; ACC ... accelerated cooled

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

alform®

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

Please find further information and downloadable files at
www.voestalpine.com/alform/en

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