alform®

alform® MU SERIES

Thermomechanically rolled steels with excellent cold formability and stamped edges

The steel grades combined in the alform® MU series are microalloyed, thermomechanically rolled and characterized by excellent cold formability of stamped edges. For the alform® MU steels, mechanical-technological properties are guaranteed within narrower limits than for comparable steels pursuant to EN10149-2.

The alform® MU steels have low carbon contents and thus exhibit very good weldability. The optimized production route leads to a good limitation of non metallic inclusions and a fine-grained, homogeneous microstructure. The alform® MU steels have their advantages in particularly challenging forming operations. A good combination of cold formability and damage tolerance on stamped edges ensures increased production reliability. Improved notched bar impact energy is also achieved when compared to conventional microalloyed steels.

Convincing advantages

- Narrow limits for mechanical properties
- Very good cold formability with the narrowest bending radii, even along stamped edges
- High damage tolerance in challenging forming operations such as flanges an collars
- Best weldability resulting from low C equivalent
- Excellent notched bar impact energy

greentec steel

Premium quality
with reduced carbon footprint

alform®
greentec steel

Chemical composition

Ladle analysis in percent by mass and carbon equivalent

alform®	C max.	Si max.	Mn max.	P max.	S max.	Al min.	Cr max.	Ni max.	Mo max.	Cu max.	V max.	Nb max.	Ti max.	B max.	CEV max.
355 MU [1]	0.10	0.10	1.20	0.018	0.005	0.020	0.3	0.3	0.08	0.3	0.05	0.06	0.05	0.003	0.28
380 MU [1]	0.10	0.10	1.20	0.020	0.005	0.020	0.3	0.3	0.08	0.3	0.05	0.06	0.05	0.003	0.30
420 MU [1]	0.10	0.10	1.40	0.020	0.005	0.020	0.3	0.3	0.08	0.3	0.05	0.06	0.05	0.003	0.34
460 MU [1] [2]	0.10	0.10	1.50	0.020	0.005	0.020	0.3	0.3	0.08	0.3	0.07	0.07	0.07	0.003	0.36
500 MU [1]	0.10	0.10	1.60	0.020	0.005	0.020	0.3	0.3	0.08	0.3	0.07	0.07	0.07	0.003	0.38
550 MU [1] [2]	0.12	0.10	1.70	0.020	0.005	0.020	0.3	0.3	0.08	0.3	0.07	0.07	0.15	0.003	0.40

[1] CEV = C + Mn/6 + (Cr+Mo+V)/5 + (Ni+Cu)/15
[2] Upon request

Mechanical properties: Tensile test

Test direction: longitudinal. minimum values for R_{eH} und R_m also apply in cross direction

$R_{p0.2}$ applies for the yield strength in case of missing R_{eH}
A_{80} for thicknesses < 3 mm
A_5 for thicknesses ≥ 3 mm

alform®	Yield strength R_{eH} [MPa]	Tensile strength R_m [MPa]	Total elongation [%] min. A_{80}	A_5
355 MU	355 – 480	430 – 530	20	24
380 MU	380 – 510	450 – 550	20	24
420 MU	420 – 550	480 – 580	18	22
460 MU [1]	460 – 590	520 – 640	16	19
500 MU	500 – 650	550 – 680	15	18
550 MU [1]	≥ 550	600 – 740	14	17

[1] Upon request

Mechanical properties: Notch impact energy, edging radii, bending mandrel diameter

alform®	Notch impact energy [1] KV [Joule] Test temperature -20 °C	Test temperature -40 °C	Bending radii [2] Ri min. at 90° edging s < 3 mm	s 3-6 mm	s > 6 mm	Bending mandrel diameter Bending mandrel min. (transverse test specimens) sheet thickness = s
355 MU	40	27	0.25 s	0.5 s	0.8 s	0 s
380 MU	40	27	0.25 s	0.5 s	0.8 s	0.5 s
420 MU	40	27	0.5 s	1.0 s	1.0 s	0.5 s
460 MU [3]	40	27	0.5 s	1.0 s	1.4 s	1.0 s
500 MU	40	27	0.8 s	1.2 s	1.6 s	1.0 s
550 MU [3]	40	27	0.8 s	1.2 s	1.6 s	1.5 s

[1] KV minimum mean value from three samples (ISO-V. longitudinal) as related to full-size specimen (10 x 10 mm)
[2] Smallest permissible inside radius at 90° edging. Ri min.
[3] Upon request

Notch impact energy can be measured from a plate thickness of 3 mm upon request.
Note: Notch impact energy tests on thicknesses < 6 mm do not comply with respective Euronorm standards.

Example dimensions

Maximum width for given thicknesses

alform®	Thickness [mm] 2.0	2.5	3.0	3.5	4.0	6.0
355 MU	1500	1620	1620	1620	1620	1620
380 MU	1500	1620	1620	1620	1620	1620
420 MU	1360	1620	1620	1620	1620	1620
460 MU	1360	1620	1620	1620	1620	1620
500 MU	1280	1480	1620	1620	1620	1620
550 MU	1280	1480	1620	1620	1620	1620

Additional dimensions upon request.
Depending on the dimensions and strength, we can also supply pickled, oiled or trimmed material

Steel strip		Slit steel strip		Cut-to-length sheets		Cut shapes
Width:	900 - 1620 mm	Strip widths :	beginning at 30 mm	Lengths:	up to 12 m	Upon request

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Hot-rolled steel strip – greentec steel Edition

Max. carbon footprint 1.95 kg CO_2e per kg of steel [1)]

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

All products, dimensions and steel grades listed in each voestalpine supply range are available as greentec steel Edition.

Please find further information and downloadable files at the following link:
www.voestalpine.com/alform

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ONE STEP AHEAD.