



alform[®] strip

Hot-rolled
Steel Strip

voestalpine

ONE STEP AHEAD.

alform[®] strip

by voestalpine

Excellent cold-forming characteristics.

Excellent welding qualities.

Highly suitable for cutting and punching.

High-quality surface.

The steel grades of the alform[®] series are thermomechanically or normalized hot-rolled steels with excellent cold formability even in the high-strength and ultra-high-strength range. Minimum yield strengths of 180 up to 900 MPa are offered.

The alform[®] Series of voestalpine Stahl GmbH is Characterized by

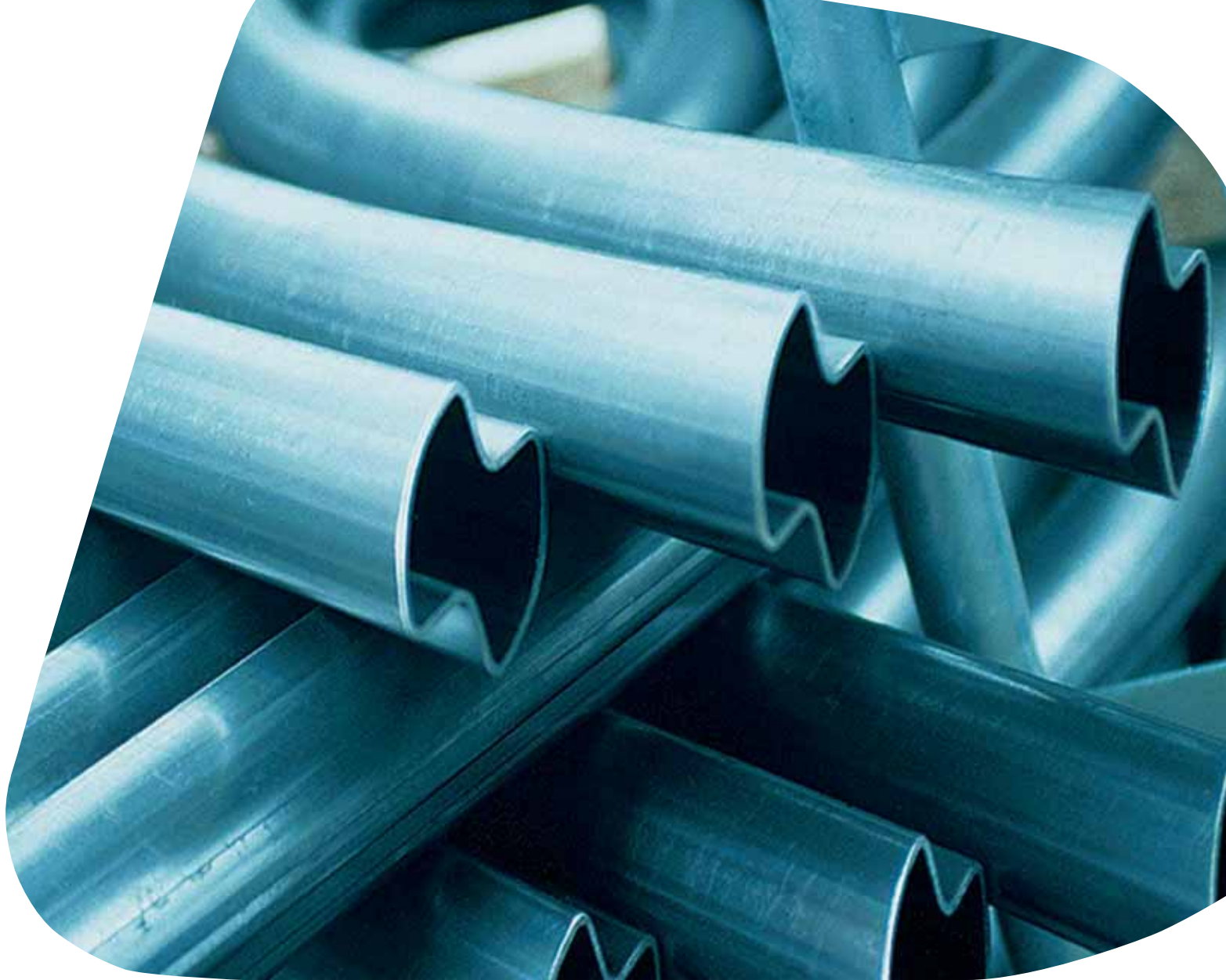
- Excellent forming and toughness properties due to the low phosphorus and sulphur contents
- Best weldability due to a low carbon equivalent, particularly a low carbon content (thermomechanically rolled series)
- Optimum suitability for cutting and punching due to the fine-grain, low-pearlite or bainitic microstructure

These properties are especially achieved through thermomechanical rolling, addition of

micro-alloying elements (Nb, V, Ti) and exact adjustment of the rolling parameters.

The use of alform[®] steels has proven successful in fields requiring good formability and where high strength and weight reduction play an important role:

- Crane construction
- Vehicle construction
- Agricultural machines
- Container construction
- Steel structural engineering
- Pipe and section production



The Advantages

Excellent Cold Forming Characteristics

As a result of the high degree of purity and the fine-grain microstructure, alform® steels allow up to 75% smaller edging radii compared with conventional structural steels and heat-treatable steels of the same strength.

Highly Suitable for Cutting and Punching

alform® steels are suitable both for any thermal cutting processes (laser, plasma and oxygen cutting) and for mechanical cutting and punching.

Uniform Mechanical Properties

The high constancy of the mechanical properties of alform® steels guarantees trouble-free processing.

Weight Reduction due to Higher Strength

Up to 60% higher strength compared with conventional structural steels of the same sheet thickness, or corresponding weight reduction with the strength remaining unchanged

Excellent Welding Qualities

- Large range of welding parameters
- Low tendency to excessive hardening
- Cold cracking resistance without preheating
- Optimum mechanical-technological properties
- Equivalent to the base material of the welds
- Excellent formability of the welds
- Higher tempering resistance than heat-treatable steels

Specification

alform® steels are supplied both in normalized and thermomechanically rolled condition. In the event that further processing requires a heat treatment exceeding 580 °C, this would lead to a decrease in the minimum yield strength for thermomechanically rolled steels (M series).

In such a case normalized rolled steels (N series) could be offered, but only up to a minimum yield strength of 380 MPa (However, flame straightening up to 800 °C is possible also for thermomechanically rolled steels).

Dimensions (Unpickled Hot-rolled Strip)

Minimum width: 900 mm

Maximum width in mm for alform® steels

alform® Sheet Thickness [mm]	180 N	200 N 240 N	280 N	355 N 380 N	280 M 315 M 340 M	355 M 380 M	420 M 460 M	500 M	550 M	600 M	650 M 700 M	900 M
1.50 - 1.74	1,100	1,250	1,125	–	1,000	1,000	–	–	–	–	–	–
1.75 - 1.99	1,185	1,360	1,240	–	1,115	1,050	–	–	–	–	–	–
2.00 - 2.24	1,320	1,500	1,375	1,120	1,265	1,165	1,040	1,010	1,010	–	–	–
2.25 - 2.49	1,505	1,600	1,560	1,175	1,460	1,340	1,150	1,130	1,130	–	–	–
2.50 - 2.74	1,600	1,600	1,600	1,235	1,600	1,600	1,315	1,240	1,240	–	–	–
2.75 - 2.99	1,600	1,600	1,600	1,290	1,600	1,600	1,540	1,355	1,355	–	–	–
3.00 - 3.24	1,600	1,600	1,600	1,350	1,600	1,600	1,600	1,530	1,530	1,400	1,400	–
3.25 - 3.49	1,600	1,600	1,600	1,410	1,600	1,600	1,600	1,600	1,600	1,480	1,480	–
3.50 - 3.74	1,600	1,600	1,600	1,475	1,600	1,600	1,600	1,600	1,600	1,530	1,530	1,300
3.75 - 4.50	1,600	1,600	1,600	1,535	1,600	1,600	1,600	1,600	1,600	1,530	1,530	1,375
4.51 - 8.00	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,530	1,530	1,420
8.01 - 12.00	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,530	1,530	–

Different dimensions only upon request.

The current dimensions for pickled alform® steels can be found online in the Steel Product Configurator at <http://stahl-produktkonfigurator.voestalpine.com>.

Depending on their application, alform® steels can be supplied with pickled or unpickled surface.

Upon request, pickled alform® steels can also be supplied with oiled surface. For pickled strip there is the additional possibility to apply a passivation layer.



Chemical Composition

Guaranteed values of heat analysis in %

Steel Grade	C max.	Si max.	Mn max.	P max.	S max.	Al min.	Nb ¹⁾ max.	V ¹⁾ max.	Ti ¹⁾ max.	Mo max.	B max.
alform 180 N	0.08	0.05 ²⁾	0.35	0.025 ²⁾	0.020	0.020	–	–	–	–	–
alform 200 N	0.10	0.05 ²⁾	0.45	0.025 ²⁾	0.020	0.020	–	–	–	–	–
alform 240 N	0.16	0.05 ²⁾	0.70	0.025 ²⁾	0.020	0.020	–	–	–	–	–
alform 280 N	0.16	0.05 ²⁾	1.20	0.025 ²⁾	0.015	0.020	0.05	0.05	0.05	–	–
alform 355 N	0.18	0.30	1.60	0.025	0.012	0.015	0.05	0.05	0.05	–	–
alform 380 N	0.18	0.30	1.60	0.025	0.012	0.015	0.05	0.05	0.05	–	–
alform 280 M	0.10	0.05 ²⁾	0.70	0.020 ²⁾	0.010	0.020	0.05	0.05	0.05	–	–
alform 315 M	0.10	0.05 ²⁾	0.90	0.020 ²⁾	0.010	0.020	0.05	0.05	0.05	–	–
alform 340 M	0.10	0.05 ²⁾	1.20	0.020 ²⁾	0.010	0.020	0.05	0.05	0.05	–	–
alform 355 M	0.10	0.05 ²⁾	1.20	0.020 ²⁾	0.010	0.020	0.05	0.05	0.05	–	–
alform 380 M	0.10	0.05 ²⁾	1.20	0.020 ²⁾	0.010	0.020	0.05	0.05	0.05	–	–
alform 420 M	0.10	0.05 ²⁾	1.40	0.020 ²⁾	0.010	0.020	0.05	0.05	0.05	–	–
alform 460 M	0.10	0.05 ²⁾	1.50	0.020 ²⁾	0.008	0.020	0.07	0.07	0.07	–	–
alform 500 M	0.10	0.05 ²⁾	1.60	0.020 ²⁾	0.008	0.020	0.07	0.07	0.07	–	–
alform 550 M	0.12	0.05 ²⁾	1.70	0.020 ²⁾	0.008	0.020	0.07	0.07	0.15	–	–
alform 600 M	0.12	0.50	1.90	0.020 ²⁾	0.008	0.020	0.07	0.07	0.15	0.3	0.005
alform 650 M	0.12	0.50	2.00	0.020	0.008	0.020	0.07	0.07	0.15	0.3	0.005
alform 700 M	0.12	0.50	2.10	0.020	0.008	0.020	0.08	0.15	0.20	0.3	0.005
alform 900 M ³⁾	0.18	0.50	2.10	0.020	0.008	0.020	0.08	0.15	0.24	0.8	0.005

¹⁾ The total content of Nb, V and Ti may not exceed 0.22% (not applicable to alform 900 M).

²⁾ If these grades are ordered for possible galvanizing, Si max. 0.03% and P max. 0.018% is applicable.

³⁾ Cr, Ni and Cu are permitted as alloying elements.

Mechanical Properties

Steel Grade	Testing Direction Tensile Test	Yield Strength [MPa] ReH ¹⁾	Tensile Strength [MPa] Rm	Fracture Elongation [%] min.		Bending Test 180° Transv. s = Thickness DornØ	Admissible Minimum Inner Radius for 90° Edging and Thickness s			Notch Impact Energy ³⁾ ISO-V / -20°C [J] min
				A80	A5		s < 3	s = 3 - 6	s > 6	
alform 180 N	transverse	180 - 290	280 - 360	28	34	0.0 s	0.25 s	0.5 s	1.0 s	⁵⁾
alform 200 N	transverse	200 - 320	320 - 400	26	32	0.0 s	0.25 s	0.5 s	1.0 s	⁵⁾
alform 240 N	transverse	240 - 360	360 - 470	23	28	0.0 s	0.25 s	0.5 s	1.0 s	27
alform 280 N	transverse	280 - 420	430 - 530	21	26	0.0 s	0.25 s	0.5 s	1.0 s	27
alform 355 N	transverse	355 - 500	470 - 580	20	25	0.0 s	0.25 s	0.5 s	1.0 s	40 ⁴⁾
alform 380 N	transverse	380 - 520	510 - 610	19	24	0.0 s	0.25 s	0.5 s	1.0 s	40 ⁴⁾
alform 280 M	longitudinal	280 - 400	370 - 470	24	28	0.0 s	0.25 s	0.5 s	0.8 s	40
alform 315 M	longitudinal	315 - 440	390 - 490	22	26	0.0 s	0.25 s	0.5 s	0.8 s	40
alform 340 M	longitudinal	340 - 470	420 - 520	20	24	0.0 s	0.25 s	0.5 s	0.8 s	40
alform 355 M	longitudinal	355 - 480	430 - 530	20	24	0.0 s	0.25 s	0.5 s	0.8 s	40
alform 380 M	longitudinal	380 - 510	450 - 550	20	24	0.5 s	0.25 s	0.5 s	0.8 s	40
alform 420 M	longitudinal	420 - 550	480 - 580	18	22	0.5 s	0.50 s	1.0 s	1.0 s	40
alform 460 M	longitudinal	460 - 590	520 - 640	16	19	1.0 s	0.50 s	1.0 s	1.4 s	40
alform 500 M	longitudinal	500 - 650	550 - 680	15	18	1.0 s	1.00 s	1.2 s	1.6 s	40
alform 550 M	longitudinal	min. 550	600 - 740	14	17	1.5 s	1.00 s	1.2 s	1.8 s	40
alform 600 M	longitudinal	min. 600	650 - 800	13	16	1.5 s	1.00 s	1.5 s	1.8 s	40
alform 650 M	longitudinal	min. 650 ²⁾	700 - 850	12	15	2.0 s	1.00 s	1.5 s	2.0 s	40
alform 700 M	longitudinal	min. 700 ²⁾	750 - 930	11	14	2.0 s	1.20 s	1.5 s	2.0 s	40
alform 900 M	ransverse	min. 900 ²⁾	930 - 1.100	–	10	3.0 s	–	2.5 s	3.0 s	27

¹⁾ A yield strength of Rp02 applies for non-distinct arbitrary cases.

²⁾ Yield strength values may be 20 MPa lower for thicknesses higher than 8 mm.

³⁾ Upon agreement, notch impact energy is determined for thicknesses of 6 mm and higher. The value indicated is the mean value of three samples of 10 x 10 mm.

⁴⁾ A minimum value of 27 J is guaranteed for thicknesses higher than 8 mm.

⁵⁾ No guarantee.

Technically More Advanced. Successful Together. voestalpine – The Partner You Can Trust.

High-quality materials are the basis for our products. We strive to be the best partner for our customers and want to provide them with the best-possible solution. We focus our expertise on two aspects: personal contact with dedicated, competent employees and high-quality technically sound methods, products and services.

The companies in the voestalpine Steel Division pledge the following:

- Understanding for the business of our customers
- Dedication to professionalism
- Reliability
- Partnerships based on trust
- Responsibility for satisfactory project completion

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