



HOT-ROLLED STEEL STRIP

Range of supply
April 2018

STRUCTURAL STEELS

Steel grade	Standards and specifications	Yield strength R_{eH} transverse min. [MPa]		Tensile strength R_m transverse [MPa]		Total elongation transverse min. [%]					Notch impact energy A_v ¹⁾	
		≤ 16 mm	> 16 mm	< 3 mm	≥ 3 mm	A_{80}			A_5	Test temperature [°C]	A_v [Joule]	
		≤ 1.50 mm	1.51 - 2.00 mm	2.01 - 2.50 mm	2.51 - 2.99 mm	≥ 3 mm						
Unalloyed structural steels												
EN 10025-2		≤ 16 mm	> 16 mm	< 3 mm	≥ 3 mm	≤ 1.50 mm	1.51 - 2.00 mm	2.01 - 2.50 mm	2.51 - 2.99 mm	≥ 3 mm	Test temperature [°C]	A_v [Joule]
S185	EN 10025-2	185	175	310 - 540	290 - 510	9	10	11	12	16	-	-
S235JR	EN 10025-2	235	225	360 - 510	360 - 510	16	17	18	19	24	20	27
S235JO	EN 10025-2	235	225	360 - 510	360 - 510	16	17	18	19	24	0	27
S235J2	EN 10025-2	235	225	360 - 510	360 - 510	16	17	18	19	24	-20	27
S275JR	EN 10025-2	275	265	430 - 580	410 - 560	14	15	16	17	21	20	27
S275JO	EN 10025-2	275	265	430 - 580	410 - 560	14	15	16	17	21	0	27
S275J2	EN 10025-2	275	265	430 - 580	410 - 560	14	15	16	17	21	-20	27
S355JR	EN 10025-2	355	345	510 - 680	470 - 630	13	14	15	16	20	20	27
S355JO	EN 10025-2	355	345	510 - 680	470 - 630	13	14	15	16	20	0	27
S355J2	EN 10025-2	355	345	510 - 680	470 - 630	13	14	15	16	20	-20	27
S355K2	EN 10025-2	355	345	510 - 680	470 - 630	13	14	15	16	20	-20	40
E295	EN 10025-2	295	285	490 - 660	470 - 610	11	12	13	14	18	-	-
E335	EN 10025-2	335	325	590 - 770	570 - 710	7	8	9	10	14	-	-
E360	EN 10025-2	360	355	690 - 900	670 - 830	4	5	6	7	10	-	-
Edging grades												
EN 10025-2		≤ 16 mm	> 16 mm	< 3 mm	≥ 3 mm	≤ 1.50 mm	1.51 - 2.00 mm	2.01 - 2.50 mm	2.51 - 2.99 mm	≥ 3 mm	Test temperature [°C]	A_v [Joule]
S235JRC	EN 10025-2	235	225	360 - 510	360 - 510	16	17	18	19	24	20	27
S235J0C	EN 10025-2	235	225	360 - 510	360 - 510	16	17	18	19	24	0	27
S235J2C	EN 10025-2	235	225	360 - 510	360 - 510	16	17	18	19	24	-20	27
S275JRC	EN 10025-2	275	265	430 - 580	410 - 560	14	15	16	17	21	20	27
S275J0C	EN 10025-2	275	265	430 - 580	410 - 560	14	15	16	17	21	0	27
S275J2C	EN 10025-2	275	265	430 - 580	410 - 560	14	15	16	17	21	-20	27
S355JRC	EN 10025-2	355	345	510 - 680	470 - 630	13	14	15	16	20	20	27
S355J0C	EN 10025-2	355	345	510 - 680	470 - 630	13	14	15	16	20	0	27
S355J2C	EN 10025-2	355	345	510 - 680	470 - 630	13	14	15	16	20	-20	27
S355K2C	EN 10025-2	355	345	510 - 680	470 - 630	13	14	15	16	20	-20	40
Weather-resistant structural steels												
EN 10025-5		≤ 16 mm	> 16 mm	< 3 mm	≥ 3 mm	≤ 1.50 mm	1.51 - 2.00 mm	2.01 - 2.50 mm	2.51 - 2.99 mm	≥ 3 mm	Test temperature [°C]	A_v [Joule]
S355J2WC+N	EN 10025-5	355	345	510 - 680	470 - 630	-	14	15	16	20	-20	27
S355J0W	EN 10025-5	355	345	510 - 680	470 - 630	-	14	15	16	20	0	27

¹⁾ A_v , minimum mean value from three samples (ISO-V, longitudinal), full samples (10 x 10 mm)

MILD STEELS

Steel grade	Standards and specifications	Thickness [mm]	Yield strength $R_{p0.2}$ transverse [MPa]	Tensile strength R_m transverse max. [MPa]	Total elongation transverse min. [%]		Bending test transverse Bending mandrel Angle = 180° Sheet thickness = s	Period of validity
					A_{80}	A_5		
Mild unalloyed steels for cold forming								
EN 10111		Thickness	$R_{p0.2}$	R_m	A_{80}	A_5	Mandrel diameter	Months
DD11	EN 10111	1.5 < 2.0 2.0 < 3.0 ≥ 3.0	170 - 360 170 - 340 170 - 340	440	23 24 -	- 28	1 s	-
DD12	EN 10111	1.5 < 2.0 2.0 < 3.0 ≥ 3.0	170 - 340 170 - 320 170 - 320	420	25 26 -	- 30	0 s	6 months
DD13	EN 10111	1.5 < 2.0 2.0 < 3.0 ≥ 3.0	170 - 330 170 - 310 170 - 310	400	28 29 -	- 33	0 s	6 months
DD14	EN 10111	1.5 < 2.0 2 < 3.0 ≥ 3.0	170 - 310 170 - 290 170 - 290	380	31 32 -	- 36	0 s	6 months
Unalloyed special steels for cold forming								
Special voestalpine grade		Thickness	$R_{p0.2}$	R_m	A_{80}	A_5	Mandrel diameter	Months
DD11mod.H	voestalpine	< 3.0 ≥ 3.0	250 - 340 235 - 325	360 - 420 350 - 410	28 -	- 32	0 s	-
DD12mod.H	voestalpine	< 3.0 ≥ 3.0	250 - 340 235 - 325	360 - 420 350 - 410	30 -	- 34	0 s	-
DD13mod.H	voestalpine	< 3.0 ≥ 3.0	240 - 320 230 - 310	350 - 420 350 - 410	32 -	- 36	0 s	-
S235JRmod.H	voestalpine	< 3.0 ≥ 3.0	275 - 365 260 - 350	400 - 460 390 - 450	25 -	- 28	0 s	-

CARBON STEELS

Steel grade	Standards and specifications	As-rolled condition (standard value)		Soft-annealed (maximum value/standard value)
		Yield strength $R_{p0.2}$ [MPa]	Tensile strength R_m [MPa]	Tensile strength R_m [MPa]
Case-hardening steels				
EN 10084		$R_{p0.2}$	R_m	R_m
C10E	EN 10084	300	400	380
C15E	EN 10084	330	470	450
16MnCr5	EN 10084	400	600	480
Heat-treatable steels				
EN 10083-2 and EN 10132-4 (chemistry)		$R_{p0.2}$	R_m	R_m
C22E	EN 10083-2	350	490	480
C35E	EN 10083-2	450	680	500
C45E	EN 10083-2	460	750	600
C50E	EN 10083-2	490	830	600
C55E	EN 10083-2	500	840	600
C60E	EN 10083-2	520	860	650
C67S	EN 10132-4 (chemistry)	550	950	660
C75S	EN 10132-4 (chemistry)	550	950	680
Alloyed heat-treatable steels				
EN 10083-3 and voestalpine special grades		$R_{p0.2}$	R_m	R_m
25CrMo4	EN 10083-3	650	850	550
34CrMo4	EN 10083-3	770	970	650
42CrMo4	EN 10083-3	790	990	660
51CrV4	EN 10083-3	850	1050	680
58CrV4	voestalpine	870	1070	680
Alloyed heat-treatable steels and special steels				
EN 10132-4 (chemistry)		$R_{p0.2}$	R_m	R_m
63NiNb4	-	700	1000	680
68NiCrMo3	-	700	1000	680
72NiCrMo4-2	-	700	1000	680
74NiCr2	-	-	900	-
74NiCr2So	-	-	900	-
75CrNiMo	-	840	1140	680
75Cr1	-	700	1000	680
75Ni8	EN 10132-4 (chemistry)	740	1100	680
80CrV2	EN 10132-4 (chemistry)	990	1300	720
D6A	-	900	1250	750

CARBON STEELS

Steel grade	Standards and specifications	As-rolled condition (standard value)		Soft-annealed (maximum value/standard value)			
		Yield strength $R_{p0.2}$ [MPa]	Tensile strength R_m [MPa]	Tensile strength R_m [MPa]	Tensile strength R_m [MPa]		
Boron-containing heat-treatable steels							
EN 10083-3 and voestalpine special grades		$R_{p0.2}$	R_m	R_m			
durostat B2	voestalpine	400	650	-			
durostat B4	voestalpine	420	700	-			
20MnB5	EN 10083-3	430	600	-			
22MnB5	EN 10083-3	430	600	-			
26MnB5	-	450	650	600			
34MnB5	-	470	700	620			
Steel grade	Standards and specifications	Standard values			Edging radii R_i min. at 90° edging (Sheet thickness = s) Location of bending edge in direction of rolling		
		Hardness [HB]	Yield strength $R_{p0.2}$ [MPa]	Tensile strength R_m [MPa]	Fracture elongation A_5 [%]	Long.	Trans.
Wear-resistant steel grades							
voestalpine special grades		HB	$R_{p0.2}$	R_m	A_5	Long.	Trans.
durostat 400	voestalpine	400	1150	1350	10	4 s	3 s
durostat 450	voestalpine	450	1250	1450	9	5 s	4 s
durostat 500	voestalpine	500	1200	1550	8	5 s	4 s

MICRO-ALLOYED STRUCTURAL STEELS

Steel grade	Standards and specifications	Test direction	Yield strength R_{eH} [MPa]	Tensile strength R_m [MPa]	Total elongation min. [%]		Notch impact energy A_v ¹⁾ [Joule]		Edging radii R_i min. at 90° edging Sheet thickness = s			Mandrel diameter B_{gD} min. (transverse test specimens) Sheet thickness = s
					A_{80}	A_5	Test temperature -20 °C	Test temperature -40 °C	< 3 mm	3 - 6 mm	> 6 mm	
Normalized rolled steels ²⁾												
voestalpine special grades												
			R_{eH}	R_m	A_{80}	A_5	-20 °C / N	-40 °C / NE	< 3 mm	3 - 6 mm	> 6 mm	Mandrel diameter
alform 180 N	voestalpine	Transverse	180 - 290	280 - 360	28	34	-	-	0.25 s	0.5 s	1 s	0 s
alform 200 N	voestalpine	Transverse	200 - 320	320 - 400	26	32	-	-	0.25 s	0.5 s	1 s	0 s
alform 240 N	voestalpine	Transverse	240 - 360	360 - 470	23	28	27	-	0.25 s	0.5 s	1 s	0 s
alform 280 N	voestalpine	Transverse	280 - 420	430 - 530	21	26	40	-	0.25 s	0.5 s	1 s	0 s
alform 340 N/NE	voestalpine	Transverse	340 - 485	460 - 470	20	25	40	27	0.25 s	0.5 s	1 s	0 s
alform 355 N/NE	voestalpine	Transverse	355 - 500	470 - 580	20	25	40	27	0.25 s	0.5 s	1 s	0 s
alform 380 N/NE	voestalpine	Transverse	380 - 520	510 - 610	19	24	40	27	0.25 s	0.5 s	1 s	0 s
Thermomechanically rolled steels ³⁾												
voestalpine special grades												
			R_{eH}	R_m	A_{80}	A_5	-20 °C / M	-40 °C / ME	< 3 mm	3 - 6 mm	> 6 mm	Mandrel diameter
alform 280 M	voestalpine	Longitudinal	280 - 400	370 - 470	24	28	40	-	0.25 s	0.5 s	0.8 s	0 s
alform 315 M	voestalpine	Longitudinal	315 - 440	390 - 490	22	26	40	-	0.25 s	0.5 s	0.8 s	0 s
alform 340 M	voestalpine	Longitudinal	340 - 470	420 - 520	20	24	40	-	0.25 s	0.5 s	0.8 s	0 s
alform 355 M/ME	voestalpine	Longitudinal	355 - 480	430 - 530	20	24	40	27	0.25 s	0.5 s	0.8 s	0 s
alform 380 M/ME	voestalpine	Longitudinal	380 - 510	450 - 550	20	24	40	27	0.25 s	0.5 s	0.8 s	0.5 s
alform 420 M/ME	voestalpine	Longitudinal	420 - 550	480 - 580	18	22	40	27	0.5 s	1.0 s	1.0 s	0.5 s
alform 460 M/ME	voestalpine	Longitudinal	460 - 590	520 - 640	16	19	40	27	0.5 s	1.0 s	1.4 s	1.0 s
alform 500 M/ME	voestalpine	Longitudinal	500 - 650	550 - 680	15	18	40	27	0.8 s	1.2 s	1.6 s	1.0 s
alform 550 M/ME	voestalpine	Longitudinal	≥ 550	600 - 740	14	17	40	27	0.8 s	1.2 s	1.6 s	1.5 s
alform 600 M/ME	voestalpine	Longitudinal	≥ 600	650 - 800	13	16	40	27	0.8 s	1.2 s	1.6 s	1.5 s
alform 650 M/ME	voestalpine	Longitudinal	≥ 650	700 - 850	12	15	40	27	0.8 s	1.2 s	1.6 s	1.5 s
alform 700 M/ME	voestalpine	Longitudinal	≥ 700	750 - 930	11	14	40	27	0.8 s	1.2 s	1.6 s	1.5 s

¹⁾ A_v minimum mean value from three samples (ISO-V, longitudinal), full samples (10 x 10 mm)

²⁾ These steel grades comply with all requirements of comparable steels pursuant to EN 10025-2.

³⁾ These steel grades comply with all requirements of comparable steels pursuant to EN 10149-2.

MICRO-ALLOYED STRUCTURAL STEELS

Steel grade	Standards and specifications	Yield strength R_{eH} [MPa]	Tensile strength R_m [MPa]	Total elongation min. [%]		Notch impact energy A_v ¹⁾ [Joule] MU Test temperature -20 °C	Edging radii R_i min. at 90° edging Sheet thickness = s			Mandrel diameter B_gD min. (transverse test specimens) Sheet thickness = s
				A_{80}	A_5		< 3 mm	3 - 6 mm	> 6 mm	
Thermomechanically rolled steels with improved formability										
voestalpine special grades		R_{eH}	R_m	A_{80}	A_5	-20 °C	< 3 mm	3 - 6 mm	> 6 mm	Mandrel diameter
alform 355 MU	voestalpine	355 - 480	430 - 530	20	24	40	0.25 s	0.5 s	0.8 s	0 s
alform 420 MU	voestalpine	420 - 500	480 - 560	18	22	40	0.5 s	1.0 s	1.0 s	0.5 s
alform 500 MU	voestalpine	500 - 650	550 - 680	15	18	40	0.8 s	1.2 s	1.6 s	1.0 s
alform 550 MU	voestalpine	≥ 550	600 - 740	14	17	40	0.8 s	1.2 s	1.6 s	1.5 s

¹⁾ A_v minimum mean value from three samples (ISO-V, longitudinal), full samples (10 x 10 mm)

Steel grade	Standards and specifications	Yield strength R_{eH} [MPa]	Tensile strength R_m [MPa]	Total elongation min. [%]		Notch impact energy A_v ¹⁾ [Joule]			Edging radii R_i min. at 90° edging (transverse test specimens) Sheet thickness = s		
				A_{80}	A_5	Longitudinal Test temperature -20 °C	Transverse Test temperature -20 °C	Longitudinal Test temperature -40 °C	< 3 mm	3 - 6 mm	> 6 mm
Ultra-high-strength thermomechanically rolled steels ²⁾											
voestalpine special grades		R_{eH}	R_m	A_{80}	A_5	-20 °C	-20 °C	-40 °C	< 3 mm	3 - 6 mm	> 6 mm
alform 900 x-treme	voestalpine	≥ 900	940 - 1100	-	10	40	30	30	-	2.5 s	3.0 s
alform 960 x-treme	voestalpine	≥ 960	980 - 1150	-	10	40	30	30	-	2.5 s	3.0 s
alform 1100 x-treme	voestalpine	≥ 1100	1160 - 1350	-	8	27	27	27	-	3.5 s	5.0 s

¹⁾ A_v minimum mean value from three samples (ISO-V, longitudinal), full samples (10 x 10 mm)

²⁾ The analysis limits, yield strengths and tensile strengths of the respective steel grades comply with EN 10025-6. These steel grades comply with all requirements of comparable steels pursuant to EN 10149-2.

POLE SHEETS

Steel grade	Standards and specifications	Test direction	Yield strength R _{p0.2} min. [MPa]	Tensile strength R _m min. [MPa]	Total elongation min. [%]		Magnetic polarization [Tesla] Minimum value at field intensity	
					A ₈₀	A ₅	5000 [A/m]	15000 [A/m]
Pole sheets								
EN 10265:1995			R_{p0.2}	R_m	A₈₀	A₅	5000 [A/m]	15000 [A/m]
250-TG-180	EN 10265:1995	Transverse	250	350	22	26	1.60	1.80
300-TG-180	EN 10265:1995	Transverse	300	400	20	24	1.60	1.80
350-TG-179	EN 10265:1995	Transverse	350	450	18	22	1.55	1.79
400-TG-179	EN 10265:1995	Transverse	400	500	16	19	1.55	1.79
450-TG-179	EN 10265:1995	Transverse	450	550	14	17	1.54	1.79
500-TG-179	EN 10265:1995	Transverse	500	600	12	14	1.53	1.79
550-TG-178	EN 10265:1995	Transverse	550	650	12	14	1.52	1.78
600-TG-178	EN 10265:1995	Transverse	600	700	10	12	1.50	1.78
650-TG-178	EN 10265:1995	Transverse	650	750	10	12	1.48	1.78
700-TG-178	EN 10265:1995	Transverse	700	800	10	12	1.46	1.78
Ultra-high-strength pole sheets								
voestalpine special grades			R_{p0.2}	R_m	A₈₀	A₅	5000 [A/m]	15000 [A/m]
750-VA-175	voestalpine	Long. + Trans.	750	800	10	12	1.46	1.75
900-VA-175	voestalpine	Long. + Trans.	900	940	-	10	1.46	1.75

ENAMELING STEELS

Steel grade	Standards and specifications	Standard data in as-delivered condition				Minimum values according to simulation annealing at 830 °C			
		Yield strength R _{p0.2} min. [MPa]	Tensile strength R _m [MPa]	Total elongation min. [%]		Yield strength R _{p0.2} min. [MPa]	Tensile strength R _m min. [MPa]	Total elongation min. [%]	
				A ₈₀	A ₅			A ₈₀	A ₅
Enameling steels									
EN 10025		R_{p0.2}	R_m	A₈₀	A₅	R_{p0.2}	R_m	A₈₀	A₅
DD11CCE	EN 10025	200 - 300	300 - 400	25	30	170	250	25	30
DD15CCE	EN 10025	140 - 240	260 - 360	28	33	100	250	28	33
S240CCE	EN 10025	240 - 360	360 - 450	22	27	240	360	22	27
S300CCE	EN 10025	300 - 420	380 - 490	20	25	280	360	20	25
S355CCE	EN 10025	600 - 770	650 - 800	-	14	355	500	-	16
S380CCE	EN 10025	620 - 790	670 - 820	-	12	380	550	-	15

SURFACES AND SERVICES

Surface					
Product variant	Uncoiled	Slightly oiled	Oiled	Oiled edges	Heavily oiled
Pickled (+ skin-passed)	✓	✓	✓	✓	✓
Unpickled	Unpickled material is only supplied in uncoiled condition				

» Types of oil: Corrosion protection oil, rolling oil

Selected services			
Special coil labeling	Customer-specific special steels	Narrowest thickness tolerances	Test certificate pursuant to EN 10204

System solutions: alform® welding system

alform® welding system is the world's first custom-matched system of steels and consumables and allows optimized utilization of material potential.

DIMENSIONS

Available dimensions: wide strip (coil)			
Thickness [mm]	Width max. [mm]	Outside diameter max. [mm]	Inside diameter [mm]
1.50 - 20.00	900 - 1750	2200	500, 600, 720 - 780

» Non-slit in coils, with mill edge or cut edge

Available dimensions: slit (slit strip)			
Thickness [mm]	Strip width [mm]	Outside diameter [mm]	Inside diameter [mm]
1.50 - 8.00	50 - 1650	900 - 2020	500 ¹⁾ / 600 / 760

» Longitudinally slit in coils with cut edge

¹⁾ Only up to 7 mm in thickness

Available dimensions: cut-to-length (sheet)			
Thickness [mm]	Width [mm]	Length [mm]	Package weight max. [t]
2.0 - 20.00	900 - 1750	1250 - 18000	10

» Cut-to-length sheet with mill edge or cut edge

Indicated references are standard values. The available combinations of widths and thicknesses and supply forms vary depending on the steel grade. Limitations are possible depending on thickness. Cut-to-length sheets in < 3.0 mm thickness and slit strip in < 4.5 mm thickness can be preprocessed upon request in the slitting and cut-to-length lines for cold-rolled materials.

This document provides an overview of the hot-rolled steel strip products supplied by the voestalpine Steel Division. Other grades are available upon request. Please find further information and downloads under the following link: www.voestalpine.com/Produktinformationsportal

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