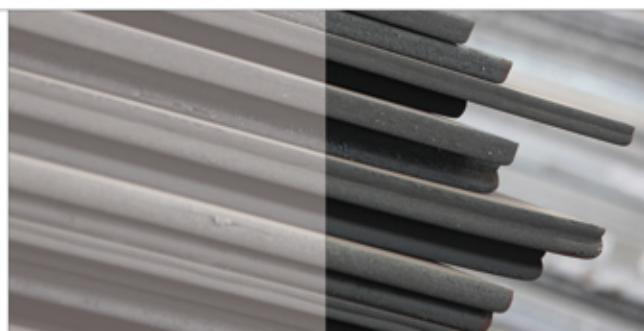




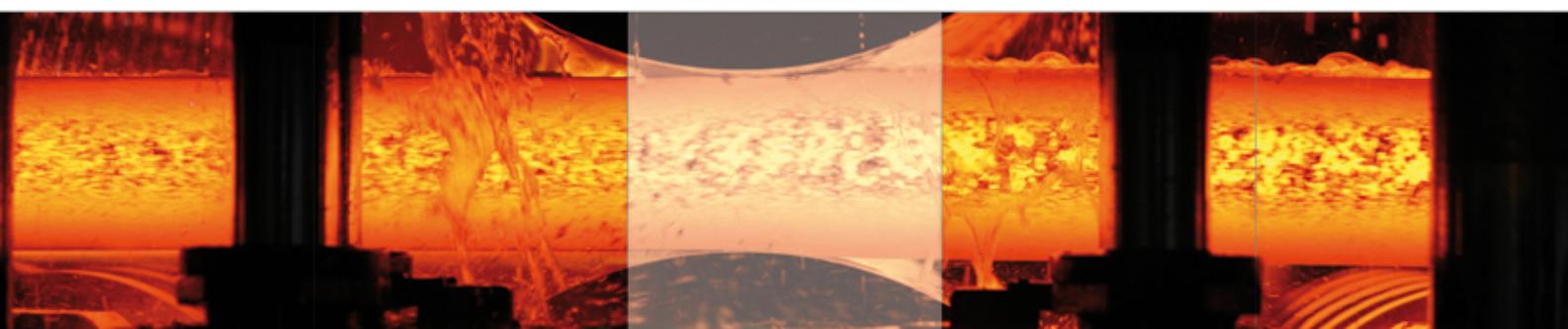
Metinvest Trametal

LOCATION	San Giorgio di Nogaro (UD) Italy				
AREA	150.000 square meters (out of which covered 50.000)				
PRODUCTION	QUARTO STEEL PLATES				
INSTALLED CAPACITY	600.000 Tons per year				
SUPPLY CONDITIONS	As rolled - Normalizing rolling - Thermomechanical rolling - Normalized - Normalized and tempered - Annealed				
PRODUCTION MIX	Thickness	4 - 180			
	Width	3.200 max			
	Length	36.000 max			
	Max weight tons	20 max			
APPLICABLE STANDARDS	Dimension / Flatness	EN 10029 A(SA)20 A(SA)6			
	Surface	EN 10163 A(SA)20 A(SA)6 on request shotblasted			
	Ultrasonic Test	EN 10160 A(SA)435 A(SA)578, other standard by agreement			
	Certificates	EN 10204 A(SA)20 A(SA)6			
	Testing as per	EN ASTM/ASME			
PRODUCT CERTIFICATIONS	Quality management system The Company is ISO 9001:2008 fully qualified by DNV Specific Certifications have been acquired from Shipping Registers: Registro Italiano Navale (RINA), Lloyd's Register of Shipping (LR) Det Norske Veritas (DNV), Germanischer Lloyd (GL), Bureau Veritas (BV) American Bureau of Shipping (ABS), Russian Register (RR) Specific product certifications ADW1 / AD2000W1 (TÜV) 97/23 PED instruction (TÜV) CE marking (EN10025:2004) NF ACIER N° 25/01 dated 06.08.2007 - NF ACIER selon Livret 2.32 SNCF 044/M (FF.SS.) DBS 918002 02 (DB) 08832.STR.MME.STC Rev.08 (Agip) Nace MR0175 – Nace MR0103 Nace TM0284 Hic Test Sol.A MSSP75 API650				
LOGISTIC	Truck - Railway - Vessel				



Ferriera Valsider

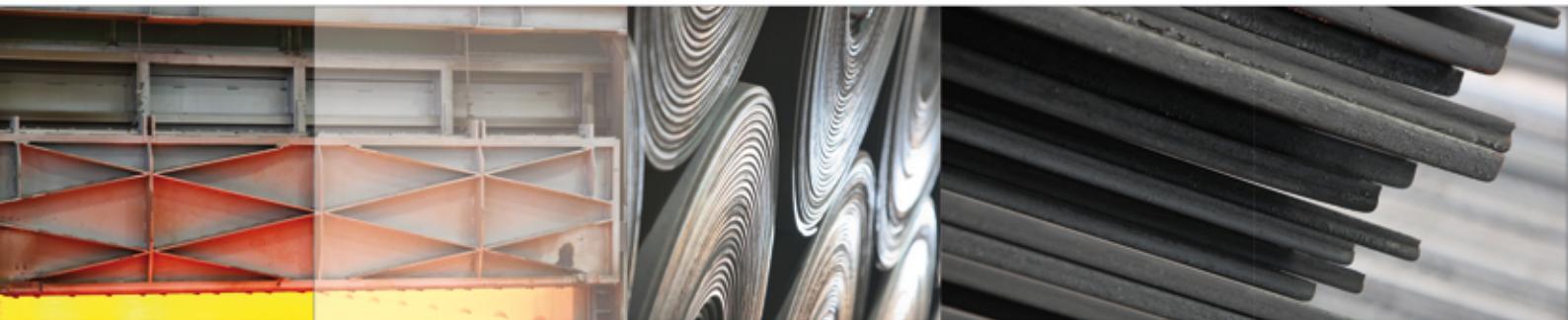
LOCATION	Vallese di Oppeano (VR) – Italy		
AREA	150.000 square meters (out of which covered 40.000)		
PRODUCTION	QUARTO STEEL PLATES		HOT ROLLED COILS
INSTALLED CAPACITY (tons per year)	500.000		750.000
SUPPLY CONDITIONS	As rolled Normalizing rolling Normalized Annealed		As rolled Normalizing rolling Thermomechanical rolling
PRODUCTION MIX	Thickness	8 - 200	1,8 - 25
	Width	3.000 max	1.555 max
	Length	24.000 max	Inside ø 750±20mm
	Max weight tons	35 max	35 max
APPLICABLE STANDARDS	Dimension/Flatness	EN 10029	EN 10051
	Surface	EN 10163	EN 10025/02
	Ultrasonic Test	EN 10160	-
	Certificates	EN 10204	EN 10204
	Testing as per	EN ASTM/ASME	EN ASTM/ASME
PRODUCT CERTIFICATIONS	ISO 9001:2008 DNV CE MARK	ISO 9001:2008 DNV CE MARK	
	97/23 PED instruction (TÜV) DNV SHIPPING REGISTER ADW1 / AD2000W1 (TÜV) ADW1 / AD2000W1 (TÜV)	97/23 PED instruction (TÜV) ADW1 / AD2000W1 (TÜV)	
LOGISTIC	Truck - Railway - Vessel		



Spartan UK

LOCATION	Newcastle upon Tyne - UK				
AREA	100.000 square meters (out of which covered 30.000)				
PRODUCTION	QUARTO STEEL PLATES				
INSTALLED CAPACITY	200.000 Tons per year				
SUPPLY CONDITIONS	As rolled - Normalizing rolling - Normalized - Normalized and tempered - Annealed				
PRODUCTION MIX	Thickness	8 - 150			
	Width	2.100 max			
	Length	20.000 max			
	Max weight tons	22 max			
APPLICABLE STANDARDS	Dimension/Flatness	EN 10029 A(SA)20 A(SA)6			
	Surface	EN 10163 A(SA)20 A(SA)6			
	Ultrasonic Test	EN 10160 A(SA)435 A(SA)578, other standard by agreement			
	Certificates	EN 10204 A(SA)20 A(SA)6			
	Testing as per	EN ASTM/ASME			
PRODUCT CERTIFICATIONS	Quality management system The Company is ISO 9001:2008 fully qualified by TÜV Specific product certifications CE Mark Specific AD2000/W1 (TÜV) PED97/23/EC (TÜV) CPD89/106 (EN 10025 TÜV)				
LOGISTIC	Truck - Vessel				





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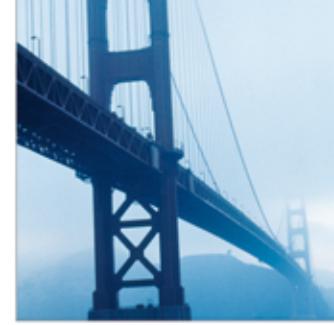
Structural Steels

ASTM/ASME

Metinvest Trametal

Ferriera Valsider

Spartan UK



Cert. 3.1 - 3.2 - ASTM/ASME	Thickness (mm)	Width (mm) ⁽¹⁾	Weight (tons) ⁽²⁾	Delivery condition
A/SA36	4-150	3200 max	3,0-20,0	AR - NR - NF
A/SA283 Gr.A	4-150	3200 max	3,0-20,0	AR - NR - NF
A/SA283 Gr.B	4-150	3200 max	3,0-20,0	AR - NR - NF
A/SA283 Gr.C	4-150	3200 max	3,0-20,0	AR - NR - NF
A/SA283 Gr.D	4-150	3200 max	3,0-20,0	AR - NR - NF
A/SA572 Gr.50type1	4-100	3200 max	3,0-20,0	AR - NR - NF
A/SA572 Gr.55type1	5-50	3200 max	3,0-20,0	AR - NR - NF
A/SA572 Gr.60type3	8-32	3200 max	3,0-20,0	AR - NR - NF
A/SA573 Gr.58	4-40	3200 max	3,0-20,0	AR - NR - NF
A/SA573 Gr.65	4-40	3200 max	3,0-20,0	AR - NR - NF
A/SA573 Gr.70	4-40	3200 max	3,0-20,0	AR - NR - NF
A/SA633 Gr.A	4-100	3200 max	3,0-20,0	NF
A/SA633 Gr.A (+S5)	4-100	3200 max	3,0-20,0	NF
A/SA633 Gr.C	4-100	3200 max	3,0-20,0	NF
A/SA633 Gr.C (+S5)	4-100	3200 max	3,0-20,0	NF
A/SA633 Gr.D	4-100	3200 max	3,0-20,0	NF
A/SA633 Gr.D (+S5)	4-100	3200 max	3,0-20,0	NF
A/SA633 Gr.E	5-60	3200 max	3,0-20,0	NF
A/SA633 Gr.E (+S5)	5-60	3200 max	3,0-20,0	NF
A/SA709 Gr.50type1	4-100	3200 max	3,0-20,0	AR - NR - NF

Structural steels with improved atmospheric corrosion resistance

A/SA588 Gr.A	5-80	3200 max	3,0-20,0	AR - NR - NF
A/SA588 Gr.B	5-80	3200 max	3,0-20,0	AR - NR - NF
A/SA588 Gr.C	5-80	3200 max	3,0-20,0	AR - NR - NF
A/SA709 Gr.50WtypeA	5-80	3200 max	3,0-20,0	AR - NR - NF
A/SA709 Gr.50WtypeB	5-80	3200 max	3,0-20,0	AR - NR - NF
A/SA709 Gr.50WtypeC	5-80	3200 max	3,0-20,0	AR - NR - NF

(1) Width min/max related to thickness and heat treatment

(2) Minimum and maximum tonnage related to thickness and slabs availability

AR As rolled

NR Normalizing rolling

NF Normalized in furnace



Chemical composition of the ladle analysis

Quality	C% max						Mn%		P% max	S% max	Si%		Nb%	Ni%	Cr%	Cu%	V%
	Nominal thickness (mm)										s40	>40					
	s13	>13s40	>40s65	>65s100	>100	s65	>65										
A/SA36	0,25	0,25	0,26	0,27	0,29	0,80-1,20	0,85-1,20	0,040	0,050	0,40max	0,15-0,40						
A/SA283 Gr.A	0,14	0,14	0,14	0,14	0,14	0,90max	0,90max	0,035	0,040	0,40max	0,15-0,40						
A/SA283 Gr.B	0,17	0,17	0,17	0,17	0,17	0,90max	0,90max	0,035	0,040	0,40max	0,15-0,40						
A/SA283 Gr.C	0,24	0,24	0,24	0,24	0,24	0,90max	0,90max	0,035	0,040	0,40max	0,15-0,40						
A/SA283 Gr.D	0,27	0,27	0,27	0,27	0,27	0,90max	0,90max	0,035	0,040	0,40max	0,15-0,40	0,005-0,05					
A/SA572 Gr.50type1	0,23	0,23	0,23	0,23		1,35max	1,35max	0,040	0,050	0,40max	0,15-0,40	0,005-0,05					
A/SA572 Gr.55type1	0,25	0,25	0,25			1,35max		0,040	0,050	0,40max	0,15-0,40	0,005-0,05					
A/SA572 Gr.60type3 ⁽¹⁾	0,26	0,26				1,35max		0,040	0,050	0,40max	0,15-0,40	0,005-0,05					0,01-0,15
A/SA573 Gr.58	0,23	0,23				0,60-0,90		0,035	0,040	0,10-0,35							
A/SA573 Gr.65	0,24	0,26				0,85-1,20		0,035	0,040	0,15-0,40							
A/SA573 Gr.70	0,27	0,28				0,85-1,20		0,035	0,040	0,15-0,40							
A/SA633 Gr.A	0,18	0,18	0,18	0,18		1,00-1,35	1,00-1,35	0,035	0,040	0,15-0,50	0,15-0,50	0,05max					
A/SA633 Gr.C	0,20	0,20	0,20	0,20		1,15-1,50	1,15-1,50	0,035	0,040	0,15-0,50	0,15-0,50	0,01-0,05					
A/SA633 Gr.D ^{(2) (3)}	0,20	0,20	0,20	0,20		0,70-1,35	0,70-1,35	0,035	0,040	0,15-0,50	0,15-0,50						
A/SA633 Gr.E ⁽⁴⁾	0,22	0,22	0,22			1,15-1,50	1,15-1,50	0,035	0,040	0,15-0,50	0,15-0,50	0,05max					0,04-0,11
A/SA709 Gr.50type 1	0,23	0,23	0,23	0,23		1,35max	1,35max	0,040	0,050	0,40 max	0,15-0,40	0,005-0,05					
A/SA588 Gr.A	0,19	0,19	0,19	0,19		0,80-1,25	0,80-1,25	0,040	0,050	0,30-0,65	0,30-0,65	0,40max	0,40-0,65	0,25-0,40	0,02-0,10		
A/SA588 Gr.B	0,20	0,20	0,20	0,20		0,75-1,35	0,75-1,35	0,040	0,050	0,15-0,50	0,15-0,50	0,50max	0,40-0,70	0,20-0,40	0,01-0,10		
A/SA588 Gr.C	0,15	0,15	0,15	0,15		0,80-1,35	0,80-1,35	0,040	0,050	0,15-0,40	0,15-0,40	0,25-0,50	0,30-0,50	0,20-0,50	0,01-0,10		
A/SA709 Gr.50WtypeA	0,19	0,19	0,19	0,19		0,80-1,25	0,80-1,25	0,040	0,050	0,30-0,65	0,30-0,65	0,40max	0,40-0,65	0,25-0,40	0,02-0,10		
A/SA709 Gr.50WtypeB	0,20	0,20	0,20	0,20		0,75-1,35	0,75-1,35	0,040	0,050	0,15-0,50	0,15-0,50	0,50max	0,40-0,70	0,20-0,40	0,01-0,10		
A/SA709 Gr.50WtypeC	0,15	0,15	0,15	0,15		0,80-1,35	0,80-1,35	0,040	0,050	0,15-0,40	0,15-0,40	0,25-0,50	0,30-0,50	0,20-0,50	0,01-0,10		

(1) Nb+V% 0,02-0,15 (2) Thickness over 40 mm. Mn 1,00 1,60 max (3) Mo% 0,08max (4) Ni% 0,03max

Mechanical properties (1)

Quality	R _p 0,2% min (N/mm ²)		RM (N/mm ²)	A% min	
	Lo 2"	Lo 8"		Lo 2"	Lo 8"
A/SA36	250		400±550	21	19
A/SA283 Gr.A	165		310±415	28	25
A/SA283 Gr.B	185		345±450	26	23
A/SA283 Gr.C	205		380±515	23	20
A/SA283 Gr.D	230		415±550	21	18
A/SA572 Gr.50type1	345		450min	19	16
A/SA572 Gr.55type1	380		485min	18	15
A/SA572 Gr.60type3	415		520min	16	14
A/SA573 Gr.58	220		400±490	22	19
A/SA573 Gr.65	240		450±530	21	18
A/SA573 Gr.70	290		485±620	19	16
A/SA633 Gr.A	290		430±570	21	16
A/SA633 Gr.C ⁽²⁾	345		485±620	21	16
A/SA633 Gr.D ⁽²⁾	345		485±620	21	16
A/SA633 Gr.E	415		550±690	21	16
A/SA709 Gr.50type1	345		450min	19	16
A/SA588 Gr.A	345		485min	19	16
A/SA588 Gr.B	345		485min	19	16
A/SA588 Gr.C	345		485min	19	16
A/SA709 Gr.50WtypeA	345		485min	19	16
A/SA709 Gr.50WtypeB	345		485min	19	16
A/SA709 Gr.50WtypeC	345		485min	19	16

(1) Tensile test (transverse). Impact tests can be agreed at order. (2) Thickness >65 R_p=315, RM=450±590



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Structural steels with improved atmospheric corrosion resistance

EN10025-5: 2004



Cert. 3.1 - 3.2 - NF ACIER - CE	Thickness (mm)	Width (mm) ⁽¹⁾	Weight (tons) ⁽²⁾	Delivery condition
S355JOW + AR	5-50	3200 max	3,0-20,0	AR
S355JOW + N	5-100	3200 max	3,0-20,0	NR - NF
S355J2W + N	5-100	3200 max	3,0-20,0	NR - NF
S355K2W + N	5-100	3200 max	3,0-20,0	NR - NF

(1) Width min/max related to thickness and heat treatment

(2) Minimum and maximum tonnage related to thickness and slabs availability

AR As rolled

NR Normalizing rolling

NF Normalized in furnace

Grades J2 and K2 can be supplied with improved properties through thickness direction (Option 4)

If specified at order all the plates with delivery condition NF can be supplied suitable for flangeability (max thickness 20mm)



Chemical composition of the ladle analysis

Quality	C% max	Mn%	Si% max	S% max	P% max	Ni% max	Cr%	Cu%	CEV max INW formula
S355JOW	0,16	0,50-1,50	0,50	0,035	0,035	0,65	0,40-0,80	0,25-0,55	0,52
S355J2W	0,16	0,50-1,50	0,50	0,030	0,030	0,65	0,40-0,80	0,25-0,55	0,52
S355K2W	0,16	0,50-1,50	0,50	0,030	0,030	0,65	0,40-0,80	0,25-0,55	0,52

Mechanical properties

Quality	TENSILE TEST (transverse)									IMPACT TEST (longitudinal)	
	RE _H (N/mm ²) min					RM (N/mm ²)	A% min - Lo=5,65vS ₀			Temp. C°	Medium value Joule
	Nominal thickness (mm)				Nominal thickness (mm)		Nominal thickness (mm)				
s16	>16≤40	>40≤63	>63≤80	>80≤100	≤100	≤40	>40≤63	>63≤100			
S355JOW	355	345	335	325	315	470≤630	20	19	18	0	27
S355J2W	355	345	335	325	315	470≤630	20	19	18	-20	27
S355K2W	355	345	335	325	315	470≤630	20	19	18	-20	40



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Non-alloy structural steels

EN10025-2:2004

Metinvest Trametal

Ferriera Valsider

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Cert. 3.1 - 3.2 - CE - NF ACIER - ADW1	Thickness (mm)	Width (mm) ⁽¹⁾	Weight (tons) ⁽²⁾	Delivery condition
S185+AR	4 - 120	3200 max	3,0 - 20,0	AR
S235JR+AR	4 - 120	3200 max	3,0 - 20,0	AR
S235JR+N	8 - 180	3200 max	3,0 - 20,0	NR - NF
S235JRC+N	4 - 30	3200 max	3,0 - 20,0	NF
S235J0+AR	4 - 120	3200 max	3,0 - 20,0	AR
S235J0+N	8 - 180	3200 max	3,0 - 20,0	NR - NF
S235J0C+N	4 - 30	3200 max	3,0 - 20,0	NF
S235J2+N	4 - 180	3200 max	3,0 - 20,0	NR - NF
S235J2C+N	4 - 30	3200 max	3,0 - 20,0	NF
S275JR+AR	4 - 120	3200 max	3,0 - 20,0	AR
S275JR+N	8 - 180	3200 max	3,0 - 20,0	NR - NF
S275JRC+N	4 - 30	3200 max	3,0 - 20,0	NF
S275J0+AR	4 - 120	3200 max	3,0 - 20,0	AR
S275J0+N	8 - 180	3200 max	3,0 - 20,0	NR - NF
S275J0C+N	4 - 30	3200 max	3,0 - 20,0	NF
S275J2+N	4 - 180	3200 max	3,0 - 20,0	NR - NF
S275J2C+N	4 - 30	3200 max	3,0 - 20,0	NF
S355JR+AR	4 - 120	3200 max	3,0 - 20,0	AR
S355JR+N	8 - 180	3200 max	3,0 - 20,0	NR - NF
S355JRC+N	4 - 30	3200 max	3,0 - 20,0	NF
S355J0+AR	4 - 120	3200 max	3,0 - 20,0	AR - NR - NF
S355J0+N	8 - 180	3200 max	3,0 - 20,0	NR - NF
S355J0C+N	4 - 30	3200 max	3,0 - 20,0	NF
S355J2+N	4 - 180	3200 max	3,0 - 20,0	NR - NF
S355J2C+N	4 - 30	3200 max	3,0 - 20,0	NF
S355K2+N	4 - 180	3200 max	3,0 - 20,0	NR - NF
S355K2C+N	4 - 30	3200 max	3,0 - 20,0	NF
E295+AR	5 - 120	3200 max	3,0 - 20,0	AR
E295+N	8 - 180	3200 max	3,0 - 20,0	NR - NF

(1) Width min/max related to thickness and heat treatment

(2) Minimum and maximum tonnage related to thickness and slabs availability

AR As rolled

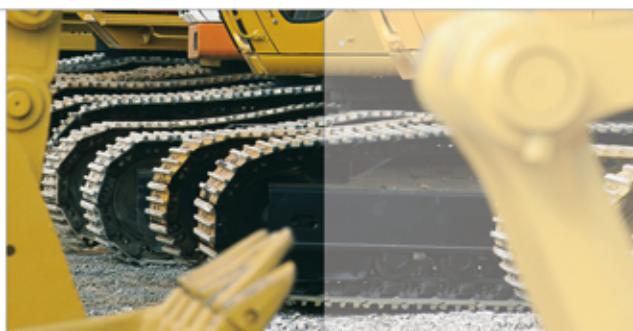
NR Normalizing rolling

NF Normalized in furnace

Grades J2 and K2 can be supplied with improved properties through thickness direction (Option 4)

Grades NF can be supplied suitable for flangeability for thickness ≤30mm and for roll forming for thickness ≤8mm

All the plates can be supplied with suitability for hot-dip zinc-coating in class 2 and 3, for S355 quality in all grades also in class 1 (max thickness 35mm)



Chemical composition of the ladle analysis

Quality	C% max			Mn% max	Si% max	S% max	P% max	N% max	Cu% max	CEV max IIW Formula									
	Nominal thickness (mm)																		
	≤16	>16≤40	>40																
S185										≤30	>30≤40	>40≤150	>150						
S235JR	0,17	0,17	0,20	1,40		0,035	0,035	0,012	0,55	0,35	0,35	0,38	0,40						
S235J0	0,17	0,17	0,17	1,40		0,030	0,030	0,012	0,55	0,35	0,35	0,38	0,40						
S235J2	0,17	0,17	0,17	1,40		0,025	0,025		0,55	0,35	0,35	0,38	0,40						
S275JR	0,21	0,21	0,22	1,50		0,035	0,035	0,012	0,55	0,40	0,40	0,42	0,44						
S275J0	0,18	0,18	0,18	1,50		0,030	0,030	0,012	0,55	0,40	0,40	0,42	0,44						
S275J2	0,18	0,18	0,18	1,50		0,025	0,025		0,55	0,40	0,40	0,42	0,44						
S355JR	0,24	0,24	0,24	1,60	0,55	0,035	0,035	0,012	0,55	0,45	0,47	0,47	0,49						
S355J0	0,20	0,20	0,22	1,60	0,55	0,030	0,030	0,012	0,55	0,45	0,47	0,47	0,49						
S355J2	0,20	0,20	0,22	1,60	0,55	0,025	0,025		0,55	0,45	0,47	0,47	0,49						
S355K2	0,20	0,20	0,22	1,60	0,55	0,025	0,025		0,55	0,45	0,47	0,47	0,49						
E295						0,045	0,045	0,012											

Mechanical properties

Quality	TENSILE TEST (transverse)										IMPACT TEST (longitudinal)						
	RE _U (N/mm ²) min						RM (N/mm ²)			A% min - Lo=5,65vS ₀			Temp.	Medium value			
	Nominal thickness (mm)						Nominal thickness (mm)			Nominal thickness (mm)			C°	Joule			
≤16	>16≤40	>40≤63	>63≤80	>80≤100	>100≤150	>150	>3≤100	>100≤150	>150	≥3≤40	>40≤63	>63≤100	>100≤150	>150			
S185	185	175	175	175	175	165	290≤510	280≤500	16	15	14	13		≤150			
S235JR	235	225	215	215	215	195	185	360≤510	350≤500	340≤490	24	23	22	21	20	27	
S235J0	235	225	215	215	215	195	185	360≤510	350≤500	340≤490	24	23	22	21	0	27	
S235J2	235	225	215	215	215	195	185	360≤510	350≤500	340≤490	24	23	22	21	-20	27	
S275JR	275	265	255	245	235	225	215	410≤560	400≤540	380≤540	21	20	19	19	18	27	
S275J0	275	265	255	245	235	225	215	410≤560	400≤540	380≤540	21	20	19	19	18	0	27
S275J2	275	265	255	245	235	225	215	410≤560	400≤540	380≤540	21	20	19	19	18	-20	27
S355JR	355	345	335	325	315	295	285	470≤630	450≤600	450≤600	20	19	18	18	17	20	27
S355J0	355	345	335	325	315	295	285	470≤630	450≤600	450≤600	20	19	18	18	17	0	27
S355J2	355	345	335	325	315	295	285	470≤630	450≤600	450≤600	20	19	18	18	17	-20	27
S355K2 (1)	355	345	335	325	315	295	285	470≤630	450≤600	450≤600	20	19	18	18	17	-20	40
E295	295	285	275	265	255	245	235	470≤610	450≤610	440≤610	18	17	16	15	14		

(1) For thickness >150mm medium value is 33J



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Boiler and pressure vessel steels

ASTM/ASME



Cert. 3.1 - 3.2 - ASTM/ASME - PED	Thickness (mm)	Width (mm) ⁽¹⁾	Weight (tons) ⁽²⁾	Delivery condition
A/SA203 Gr.D	8-60	3200 max	3,0-20,0	NF - T
A/SA203 Gr.D (+S5)	8-60	3200 max	3,0-20,0	NF - T
A/SA203 Gr.E	8-60	3200 max	3,0-20,0	NF - T
A/SA203 Gr.E (+S5)	8-60	3200 max	3,0-20,0	NF - T
A/SA204 Gr.A	6-80	3200 max	3,0-20,0	NF
A/SA204 Gr.B	6-80	3200 max	3,0-20,0	NF
A/SA204 Gr.C	6-80	3200 max	3,0-20,0	NF
A/SA285 Gr.A	4-50	3200 max	3,0-20,0	AR - NR
A/SA285 Gr.A (+S5)	4-50	3200 max	3,0-20,0	NF
A/SA285 Gr.B	4-50	3200 max	3,0-20,0	AR - NR
A/SA285 Gr.B (+S5)	4-50	3200 max	3,0-20,0	NF
A/SA285 Gr.C	4-50	3200 max	3,0-20,0	AR - NR
A/SA285 Gr.C (+S5)	4-50	3200 max	3,0-20,0	NF
A/SA299 Gr.A	5-50	3200 max	3,0-20,0	NF
A/SA299 Gr.A (+S5)	5-50	3200 max	3,0-20,0	NF
A/SA516 Gr.55	4-95	3200 max	3,0-20,0	AR - NR - NF
A/SA516 Gr.55 (+S5)	4-95	3200 max	3,0-20,0	NF
A/SA516 Gr.60	4-95	3200 max	3,0-20,0	AR - NR - NF
A/SA516 Gr.60 (+S5)	4-95	3200 max	3,0-20,0	NF
A/SA516 Gr.65	4-95	3200 max	3,0-20,0	AR - NR - NF
A/SA516 Gr.65 (+S5)	4-95	3200 max	3,0-20,0	NF
A/SA516 Gr.70	4-95	3200 max	3,0-20,0	AR - NR - NF
A/SA516 Gr.70 (+S5)	4-95	3200 max	3,0-20,0	NF
A/SA387 Gr.11 cl.1	8-80	3200 max	3,0-20,0	A
A/SA387 Gr.11 cl.2	8-80	3200 max	3,0-20,0	T
A/SA387 Gr.12 cl.1	8-80	3200 max	3,0-20,0	A
A/SA387 Gr.12 cl.2	8-80	3200 max	3,0-20,0	T
A/SA537 cl.1	4-95	3200 max	3,0-20,0	NF
A/SA537 cl.1 (+S5)	4-95	3200 max	3,0-20,0	NF
A/SA662 Gr.A	4-50	3200 max	3,0-20,0	AR - NR
A/SA662 Gr.A (+S5)	4-50	3200 max	3,0-20,0	NF
A/SA662 Gr.B	4-50	3200 max	3,0-20,0	AR - NR
A/SA662 Gr.B (+S5)	4-50	3200 max	3,0-20,0	NF
A/SA662 Gr.C	4-50	3200 max	3,0-20,0	AR - NR
A/SA662 Gr.C (+S5)	4-50	3200 max	3,0-20,0	NF
A/SA737 Gr.B	4-95	3200 max	3,0-20,0	NF
A/SA737 Gr.C	8-60	3200 max	3,0-20,0	NF
A/SA738 Gr.A	4-50	3200 max	3,0-20,0	NF

(1) Width min/max related to thickness and heat treatment

(2) Minimum and maximum tonnage related to thickness and slabs availability

AR As rolled

NR Normalizing rolling

NF Normalized in furnace

T Normalized and tempered

A Annealed



Chemical composition of the ladle analysis

Quality	C%		Mn%		Si%	P% max	S% max	Mo%	Cu% max	Ni%	Cr%	Nb%	V%	N% max	Nb+V%
	Nominal thickness (mm)														
	s25	>25≤50	>50	s25	>25										
A/SA203 Gr.D ⁽¹⁾	0,17max	0,17max	0,20max	0,70max	0,70max	0,15-0,40	0,035	0,035			3,25-3,75				
A/SA203 Gr.E ⁽¹⁾	0,20max	0,20max	0,23max	0,70max	0,70max	0,15-0,40	0,035	0,035			3,25-3,75				
A/SA204 Gr.A	0,18max	0,21max	0,23max	0,90max	0,90max	0,15-0,40	0,035	0,035	0,45-0,60						
A/SA204 Gr.B	0,20max	0,23max	0,25max	0,90max	0,90max	0,15-0,40	0,035	0,035	0,45-0,60						
A/SA204 Gr.C	0,23max	0,26max	0,28max	0,90max	0,90max	0,15-0,40	0,035	0,035	0,45-0,60						
A/SA285 Gr.A	0,17max	0,17max	0,17max	0,90max	0,90max		0,035	0,035							
A/SA285 Gr.B	0,22max	0,22max	0,22max	0,90max	0,90max		0,035	0,035							
A/SA285 Gr.C	0,28max	0,28max	0,28max	0,90max	0,90max		0,035	0,035							
A/SA299 Gr.A	0,26max	0,28max	0,28max	0,90-1,40	0,90-1,50	0,15-0,40	0,035	0,035							
A/SA516 Gr.55 ⁽²⁾	0,18max	0,20max	0,22max	0,60-0,90	0,60-1,20	0,15-0,40	0,035	0,035							
A/SA516 Gr.60 ⁽²⁾	0,21max	0,23max	0,25max	0,60-1,20	0,85-1,20	0,15-0,40	0,035	0,035							
A/SA516 Gr.65 ⁽²⁾	0,19max	0,21max	0,23max	0,85-1,20	0,85-1,50	0,15-0,40	0,035	0,035							
A/SA516 Gr.70 ⁽²⁾	0,22max	0,23max	0,25max	0,85-1,50	0,85-1,50	0,15-0,40	0,035	0,035							
A/SA387 Gr.11 cl.1	0,05-0,17	0,05-0,17	0,05-0,17	0,40-0,65	0,40-0,65	0,50-0,80	0,035	0,035	0,45-0,65		1,00-1,50				
A/SA387 Gr.11 cl.2	0,05-0,17	0,05-0,17	0,05-0,17	0,40-0,65	0,40-0,65	0,50-0,80	0,035	0,035	0,45-0,65		1,00-1,50				
A/SA387 Gr.12 cl.1	0,05-0,17	0,05-0,17	0,05-0,17	0,40-0,65	0,40-0,65	0,15-0,40	0,035	0,035	0,45-0,60		0,80-1,15				
A/SA387 Gr.12 cl.2	0,05-0,17	0,05-0,17	0,05-0,17	0,40-0,65	0,40-0,65	0,15-0,40	0,035	0,035	0,45-0,60		0,80-1,15				
A/SA537 cl.1 ⁽³⁾	0,24max	0,24max	0,24max	0,70-1,60	1,00-1,60	0,15-0,50	0,035	0,035	0,08max	0,35	0,50max	0,25 max			
A/SA662 Gr.A	0,14max	0,14max	0,14max	0,90-1,35	0,90-1,35	0,15-0,40	0,035	0,035							
A/SA662 Gr.B	0,19max	0,19max	0,19max	0,85-1,50	0,85-1,50	0,15-0,40	0,035	0,035							
A/SA662 Gr.C	0,20max	0,20max	0,20max	1,00-1,60	1,00-1,60	0,15-0,50	0,035	0,035							
A/SA737 Gr.B	0,18max	0,18max	0,18max	1,15-1,60	1,15-1,60	0,15-0,50	0,035	0,030				0,05max			
A/SA737 Gr.C	0,22max	0,22max	0,22max	1,15-1,50	1,15-1,50	0,15-0,50	0,035	0,030				0,05max			
A/SA738 Gr.A ⁽⁴⁾	0,24max	0,24max	0,24max	1,50 max	1,50 max	0,15-0,50	0,035	0,035	0,08 max	0,35	0,50max	0,25 max	0,04max	0,07max	0,08max

(1) Thickness >50 mm. Mn 0,80 max (2) The thickness range that differentiates the value is: for C% ≤12,5mm and >12,5≤50mm - for Mn% ≤12,5mm and >12,5≤100mm

(3) Thickness >65 mm. Mn 1,60 max CEV max IIW formula =0,57 (4) Thickness >65 mm. Mn 1,60 max

Mechanical properties

Quality	TENSILE TEST (transverse)			
	Rp, 0,2% min (N/mm²)		RM (N/mm²)	A% min
	s25	>25	≤100	Lo=2"
A/SA203 Gr.D	255	255	450-585	23
A/SA203 Gr.E	275	275	485-620	21
A/SA204 Gr.A	255	255	450-585	23
A/SA204 Gr.B	275	275	485-620	21
A/SA204 Gr.C	295	295	515-655	20
A/SA285 Gr.A	165	165	310-450	30
A/SA285 Gr.B	185	185	345-485	28
A/SA285 Gr.C	205	205	380-515	27
A/SA299 Gr.A	290	275	515-655	19
A/SA16 Gr.55	205	205	380-515	27
A/SA16 Gr.60	220	220	415-550	25
A/SA16 Gr.65	240	240	450-585	23
A/SA16 Gr.70	260	260	485-620	21
A/SA387 Gr.11 cl.1	240	240	415-585	22
A/SA387 Gr.11 cl.2	310	310	515-690	22
A/SA387 Gr.12 cl.1	230	230	380-550	22
A/SA387 Gr.12 cl.2	275	275	450-585	22
A/SA537 cl.1 ⁽¹⁾	345	345	485-620	22
A/SA662 Gr.A	275	275	400-540	23
A/SA662 Gr.B	275	275	450-585	23
A/SA662 Gr.C	295	295	485-620	22
A/SA737 Gr.B	345	345	485-620	23
A/SA737 Gr.C	415	415	550-690	23
A/SA738 Gr.A	310	310	515-655	20

(1) Thickness >65mm Rp=310, RM=450-585 - For temperature values (+55) impact test KV according to ASTM/ASME A/SA20



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Boiler and pressure vessel steels

EN10028-2:2009



Cert. 3.1 - 3.2 - PED - ADW1

	Thickness (mm)	Width (mm) ⁽¹⁾	Weight (tons) ⁽²⁾	Delivery condition
P235GH	4-120	3200 max	3,0-20,0	NR-NF
P265GH	4-120	3200 max	3,0-20,0	NR-NF
P295GH	4-120	3200 max	3,0-20,0	NR-NF
P355GH	4-120	3200 max	3,0-20,0	NR-NF
16Mo3	5-80	3200 max	3,0-20,0	NF
13CrMo4-5	7-80	3200 max	3,0-20,0	T

(1) Width min/max related to thickness and heat treatment

(2) Minimum and maximum tonnage related to thickness and slabs availability

NR Normalizing rolling

NF Normalized in furnace

T Normalized and Tempered

All grades can be supplied with improved properties through thickness direction



Chemical composition of the ladle analysis

Quality	C%	Mn%	Si% max	P% max	S% max	Al% min	Nb% max	N% max	Cr%	Cu% max	Mo%	Ni% max	Ti% max	V% max	Cr+Cu+Mo+N% ⁽¹⁾
P235GH	0,16 max	0,60-1,20	0,35	0,025	0,010	0,020	0,02	0,012 ⁽¹⁾	0,30 max	0,30	0,08 max	0,30	0,03	0,02	0,70 max
P265GH	0,20 max	0,80-1,40	0,40	0,025	0,010	0,020	0,02	0,012 ⁽¹⁾	0,30 max	0,30	0,08 max	0,30	0,03	0,02	0,70 max
P295GH	0,08-0,20	0,90-1,50	0,40	0,025	0,010	0,020	0,02	0,012 ⁽¹⁾	0,30 max	0,30	0,08 max	0,30	0,03	0,02	0,70 max
P355GH	0,10-0,22	1,10-1,70	0,60	0,025	0,010	0,020	0,04	0,012 ⁽¹⁾	0,30 max	0,30	0,08 max	0,30	0,03	0,02	0,70 max
16Mo3	0,12-0,20	0,40-0,90	0,35	0,025	0,010			0,012	0,30 max	0,30	0,25-0,35	0,30			
13CrMo4-5	0,08-0,18	0,40-1,00	0,35	0,025	0,010			0,012	0,70-1,15	0,30	0,40-0,60				

(1) Al%≥2N%

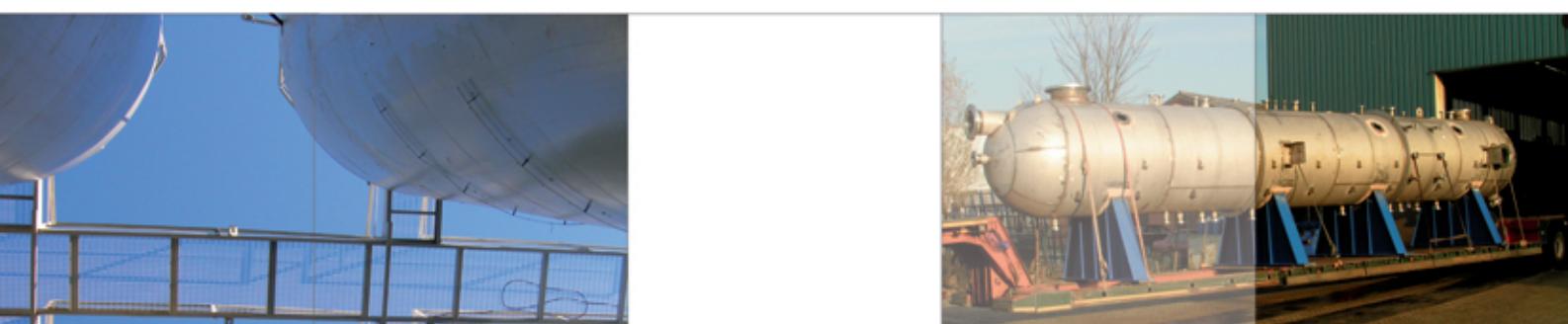
Mechanical properties

Quality	TENSILE TEST (transverse)						IMPACT TEST (transverse)			
	RE _H (N/mm ²) min		RM (N/mm ²)		A% min - Lo=5,65vS ₀		Temp.	Medium value		
	≤16	>16≤40	>40≤60	>60≤100	>100≤150	≤100	>100≤150		°C	Joule
P235GH	235	225	215	200	185	360±480	350±480	24	-20	27
P265GH	265	255	245	215	200	410±530	400±530	22	-20	27
P295GH	295	290	285	260	235	460±580	440±570	21	-20	27
P355GH ⁽¹⁾	355	345	335	315	295	510±650	480±630	20	-20	27
16Mo3 ⁽²⁾	275	270	260	240		440±590		22	20	31
13CrMo4-5 ⁽³⁾	300	290	290	270		450±600		19	20	31

(1) Thickness >60≤100 mm RM=490±630

(2) Thickness >60≤100 mm RM=430±580

(3) Thickness >60≤100 mm RM=440±590, medium value=27J



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Boiler and pressure vessel steels

EN10028-3:2009



Cert. 3.1 - 3.2 - PED - ADW1	Thickness (mm)	Width (mm) ⁽¹⁾	Weight (tons) ⁽²⁾	Delivery condition
P275NH	4-120	3200 max	3,0-20,0	NR - NF
P275NL1	4-120	3200 max	3,0-20,0	NF
P275NL2	4-120	3200 max	3,0-20,0	NF
P355N	4-120	3200 max	3,0-20,0	NR - NF
P355NH	4-120	3200 max	3,0-20,0	NR - NF
P355NL1	4-120	3200 max	3,0-20,0	NF
P355NL2	4-120	3200 max	3,0-20,0	NF
P460NH	8-100	3200 max	3,0-20,0	NF
P460NL1	8-100	3200 max	3,0-20,0	NF
P460NL2	8-100	3200 max	3,0-20,0	NF

(1) Width min/max related to thickness and heat treatment

(2) Minimum and maximum tonnage related to thickness and slabs availability

NR Normalizing rolling

NF Normalized in furnace



Chemical composition of the ladle analysis

Quality	C% max	Mn%	Si% max	P% max	S% max	Al% min	N% max	Cr% max	Cu% max	Mo% max	Nb% max	Ni% max	Ti% max	V% max	Nb+Ti+V% max	Cr+Cu+Mo% max
P275NH	0,16	0,80-1,50	0,40	0,025	0,010	0,020	0,012	0,30	0,30	0,08	0,05	0,50	0,03	0,05	0,05	0,45
P275NL1	0,16	0,80-1,50	0,40	0,025	0,008	0,020	0,012	0,30	0,30	0,08	0,05	0,50	0,03	0,05	0,05	0,45
P275NL2	0,16	0,80-1,50	0,40	0,020	0,005	0,020	0,012	0,30	0,30	0,08	0,05	0,50	0,03	0,05	0,05	0,45
P355N	0,18	1,10-1,70	0,50	0,025	0,010	0,020	0,012	0,30	0,30	0,08	0,05	0,50	0,03	0,10	0,12	0,45
P355NH	0,18	1,10-1,70	0,50	0,025	0,010	0,020	0,012	0,30	0,30	0,08	0,05	0,50	0,03	0,10	0,12	0,45
P355NL1	0,18	1,10-1,70	0,50	0,025	0,008	0,020	0,012	0,30	0,30	0,08	0,05	0,50	0,03	0,10	0,12	0,45
P355NL2	0,18	1,10-1,70	0,50	0,020	0,005	0,020	0,012	0,30	0,30	0,08	0,05	0,50	0,03	0,10	0,12	0,45
P460NH	0,20	1,10-1,70	0,60	0,025	0,010	0,020	0,025	0,30	0,70	0,10	0,05	0,80	0,03	0,20	0,22	
P460NL1	0,20	1,10-1,70	0,60	0,025	0,008	0,020	0,025	0,30	0,70	0,10	0,05	0,80	0,03	0,20	0,22	
P460NL2	0,20	1,10-1,70	0,60	0,020	0,005	0,020	0,025	0,30	0,70	0,10	0,05	0,80	0,03	0,20	0,22	

Mechanical properties

Quality	TENSILE TEST (transverse)								IMPACT TEST (transverse)		
	RE _H (N/mm ²) min					RM (N/mm ²)			A% min - Lo=5,65S ₀		Temp.
	Nominal thickness (mm)					Nominal thickness (mm)			Nominal thickness (mm)		Medium value
	≤16	>16≤40	>40≤60	>60≤100	>100	≤60	>60≤100	>100	≤60	>60	
P275NH	275	265	255	235	225	390±510	370±490	360±480	24	23	-20 30
P275NL1	275	265	255	235	225	390±510	370±490	360±480	24	23	-40 27
P275NL2	275	265	255	235	225	390±510	370±490	360±480	24	23	-50 27
P355N	355	345	335	315	305	490±630	470±610	460±600	22	21	-20 30
P355NH	355	345	335	315	305	490±630	470±610	460±600	22	21	-20 30
P355NL1	355	345	335	315	305	490±630	470±610	460±600	22	21	-40 27
P355NL2	355	345	335	315	305	490±630	470±610	460±600	22	21	-50 27
P460NH ⁽¹⁾	460	445	430	400		570±720	540±710		17	17	-20 30
P460NL1 ⁽¹⁾	460	445	430	400		570±720	540±710		17	17	-40 27
P460NL2 ⁽¹⁾	460	445	430	400		570±720	540±710		17	17	-50 27

(1) Thickness ≤16mm RM=570÷730



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Boiler and pressure vessel steels

EN10028-4:2009 NF A36-215:1997



Nickel alloy steels with specified properties at low temperature EN10028-4: 2009

Cert. 3.1 - 3.2 PED - 3.2 R.I.N.A.	Thickness (mm)	Width (mm) ⁽¹⁾	Weight (tons) ⁽²⁾	Delivery condition
13 MnNi 6-3 ⁽³⁾	8-40	3200 max	3,0-20,0	NF
12 Ni 14	8-50	3200 max	3,0-20,0	NF

(1) Width min/max related to thickness and heat treatment

(2) Minimum and maximum tonnage related to thickness and slabs availability

(3) This steel is certified from R.I.N.A. Shipping Register as 510LF for thickness 8-35mm

NF Normalized in furnace

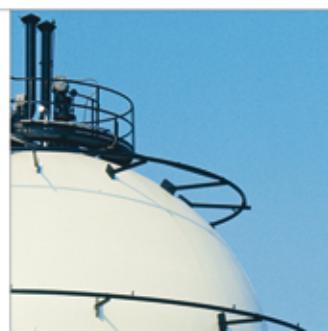
Chemical composition of the ladle analysis

Quality	C% max	Si% max	Mn%	P% max	S% max	Al% min	Nb% max	Ni%	V% max
13 MnNi 6-3	0,16	0,50	0,85-1,70	0,025	0,010	0,20	0,05	0,15-0,85	0,05
12 Ni 14	0,15	0,35	0,30-0,80	0,020	0,005			3,25-3,75	0,05

Mechanical properties (1)

Quality	RE _H (N/mm ²) min		RM (N/mm ²)	A% min	IMPACT TEST KV			
	Nominal thickness (mm)				Lo=5,65vS ₀	Temp.		
	≤30	>30≤50						
13 MnNi 6-3	355	345	490-610	22	-60	27		
12 Ni 14	355	345	490-640	22	-100	27		

(1) Test samples taken transversally to rolling direction



Weldable fine grain steels for dangerous products transport

NF A36-215: 1997

Cert. 3.1 - 3.2 PED

	Thickness (mm)	Width (mm) ⁽¹⁾	Weight (tons) ⁽²⁾	Delivery condition
P440NJ4	8-20	3200 max	3,0-20,0	NF
P460NJ2	8-16	3200 max	3,0-20,0	NF

(1) Width min/max related to thickness and heat treatment

(2) Minimum and maximum tonnage related to thickness and slabs availability

NF Normalized in furnace

Chemical composition of the ladle analysis

Quality	C% max	Si% max	Mn% max	P% max	S% max	Al% min	C% max	Cu% max	Mo% max	Nb% max	Ni% max	V%	CEV max IIW Formula
P440NJ4	0,20	0,50	1,70	0,020	0,010	0,005	0,15	0,18	0,10	0,05	0,50	0,02-0,15	0,52
P460NJ2	0,20	0,50	1,70	0,020	0,010	0,005	0,15	0,18	0,10	0,05	0,50	0,02-0,15	0,52

Mechanical properties (1)

Quality	Rp 0,2% min (N/mm ²)	RM (N/mm ²)	A% min		Rp 0,2/RM max	RmxA% min	Raggio di piega 180°		IMPACT TEST KV			
			Lo=5,65vS ₀						Temp.	Medium value		
			≤12	>12≤20					C°	Joule		
P440NJ4 ⁽²⁾	440	630-725	16	20	0,85	10000	4xthickness	-40	27			
P460NJ2	460	640-725	20	20	0,85	10000	4xthickness	-20	27			

(1) Test samples taken transversally to rolling direction

(2) Mechanical properties after P.W.H.T. at 545° C



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Shipbuilding steels

According to Shipping Registers: R.I.N.A. - A.B.S - B.V. - G.L. - D.N.V. - L.R.S. - R.R.

According to: ASTM/ASME - A/SA131



Shipping registers	ASTM/ASME - A/SA131	Thickness (mm)	Width (mm) ⁽¹⁾	Weight (tons) ⁽²⁾	Delivery condition
Cert. 3.2	Cert. 3.1 - 3.2				
A	A	4-100	3200 max	3,0-20,0	AR - NR - NF
B	B	4-100	3200 max	3,0-20,0	AR - NR - NF
D	D	5-100	3200 max	3,0-20,0	NR - NF
D+Z		15-50	3200 max	3,0-20,0	NF
E	E	5-100	3200 max	3,0-20,0	NF
E+Z		15-60	3200 max	3,0-20,0	NF
CS		5-100	3200 max	3,0-20,0	NF
AH27S		4-100	3200 max	3,0-20,0	AR - NR - NF
DH27S		4-100	3200 max	3,0-20,0	NF
EH27S		4-100	3200 max	3,0-20,0	NF
AH32	AH32	4-100	3200 max	3,0-20,0	AR - NR - NF
DH32	DH32	5-100	3200 max	3,0-20,0	NR - NF
DH32+Z		15-50	3200 max	3,0-20,0	NF
EH32	EH32	5-100	3200 max	3,0-20,0	NF
EH32+Z		15-50	3200 max	3,0-20,0	NF
FH32 ⁽³⁾	FH32	4-100	3200 max	3,0-20,0	NF
AH36	AH36	4-100	3200 max	3,0-20,0	AR - NR - NF
DH36	DH36	5-100	3200 max	3,0-20,0	NR - NF
DH36+Z		15-50	3200 max	3,0-20,0	NF
EH36	EH36	5-100	3200 max	3,0-20,0	NF
EH36+Z		15-60	3200 max	3,0-20,0	NF
FH36 ⁽³⁾	FH36	4-100	3200 max	3,0-20,0	NF

(1) Width min/max related to thickness and heat treatment

(2) Minimum and maximum tonnage related to thickness and slabs availability

(3) Only according R.I.N.A.

AR As rolled

NR Normalizing rolling

NF Normalized in furnace



Naval Grade Plates

		Gr. A			Gr. B			Gr. D			Gr. D + Z			Gr. E			
		AR	CR	N	AR	CR	N	AR	CR	N	AR	CR	N	AR	CR	N	
Italian Register	RINA	4-35	8-40	4-60	4-35	8-40	4-60	8-40	4-60			15-50 ⁽¹⁾			4-50		
Lloyd's Register	LRS	4-35		4-60	4-35		4-60		4-60					4-60		4-60	
Germanischer Lloyd	GL	4-35	8-40	4-60	4-35	8-40	4-60	8-40	4-60			15-50 ⁽¹⁾			4-60		
Det Norske Veritas	DNV	4-35		4-60	4-35		4-60		4-60							4-50	
Bureau Veritas	BV	4-35	8-40	4-60	4-35	8-40	4-60	8-40	4-60							4-50	
American Bureau of Shipping	ABS	4-35	8-40	4-60	4-35	8-40	4-60	8-40	4-60							4-50	
Russian Register	RR	4-35	8-40	4-60	4-35	8-40	4-60	8-40	4-60							4-5	
		Gr. E +Z			AH27S			DH27S			EH27S			AH32			
		AR	CR	N	AR	CR	N	AR	CR	N	AR	CR	N	AR	CR	N	
Italian Register	RINA			15-50 ⁽¹⁾										4-25	8-40	4-60	
Lloyd's Register	LRS			15-60 ⁽¹⁾	4-25		4-60							4-25	8-40	4-60	
Germanischer Lloyd	GL			15-60 ⁽¹⁾										4-25	8-40	4-60	
Det Norske Veritas	DNV				4-35									4-25	8-40	4-60	
Bureau Veritas	BV			15-50 ⁽¹⁾										4-25	8-40	4-60	
American Bureau of Shipping	ABS			15-50 ⁽¹⁾										4-25	8-40	4-60	
Russian Register	RR			15-50 ⁽¹⁾										4-25	8-40	4-60	
		DH32			DH32 + Z			FH32			FH36						
		AR	CR	N	AR	CR	N	AR	CR	N	AR	CR	N	AR	CR	N	
Italian Register	RINA		8-40	4-60			15-50 ⁽¹⁾					5-35			5-35		
Lloyd's Register	LRS			4-60													
Germanischer Lloyd	GL		8-40	4-60													
Det Norske Veritas	DNV			4-60													
Bureau Veritas	BV		8-40	4-60													
American Bureau of Shipping	ABS		8-40	4-60													
Russian Register	RR		8-40	4-60													
		EH32			EH32 + Z			AH36			DH36						
		AR	CR	N	AR	CR	N	AR	CR	N	AR	CR	N	AR	CR	N	
Italian Register	RINA			4-50			15-50 ⁽¹⁾	4-25	8-40	4-60				8-40	4-60		
Lloyd's Register	LRS			4-60				4-25		4-60				8-40	4-60		
Germanischer Lloyd	GL			4-60				4-25	8-40	4-60				8-40	4-60		
Det Norske Veritas	DNV			4-50			15-50 ⁽¹⁾	4-25		4-60				8-40	4-60		
Bureau Veritas	BV			4-50				4-25	8-40	4-60				8-40	4-60		
American Bureau of Shipping	ABS			4-50				4-25	8-40	4-60				8-40	4-60		
Russian Register	RR			4-50				4-25	8-40	4-60				8-40	4-60		
		DH36 + Z			EH36			EH36 + Z			510 LF						
		AR	CR	N	AR	CR	N	AR	CR	N	AR	CR	N	AR	CR	N	
Italian Register	RINA			15-50 ⁽¹⁾				4-50		15-50 ⁽¹⁾					8-35		
Lloyd's Register	LRS							4-60		15-60 ⁽¹⁾							
Germanischer Lloyd	GL							4-60		15-60 ⁽¹⁾							
Det Norske Veritas	DNV			15-50 ⁽¹⁾				4-50		15-50 ⁽¹⁾							
Bureau Veritas	BV							4-50		15-50 ⁽¹⁾							
American Bureau of Shipping	ABS							4-50		15-50 ⁽¹⁾							
Russian Register	RR							4-50		15-50 ⁽¹⁾							

(1) Z test available only for thickness over 16 mm - under 16 mm Z test are guaranteed but not accomplished

AR As rolled

CR Control rolling

N Normalized in furnace



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Quenched and tempered and case hardened steels

EN10083 EN10084



Non alloy steels for quenching and tempering

Cert. 3.1 only with ladle analysis

	Thickness (mm)	Width (mm) ⁽¹⁾	Weight (tons) ⁽²⁾	Delivery condition
C40	8-120	3200 max	3,0-20,0	AR
C40+A	8-150	3200 max	3,0-20,0	A
C40+N	8-150	3200 max	3,0-20,0	NF
C40+S	8-150	3200 max	3,0-20,0	NF
C40E	8-120	3200 max	3,0-20,0	AR
C40E+A	8-150	3200 max	3,0-20,0	A
C40E+N	8-150	3200 max	3,0-20,0	NF
C40E+S	8-150	3200 max	3,0-20,0	NF
C45	8-120	3200 max	3,0-20,0	AR
C45+A	8-150	3200 max	3,0-20,0	A
C45+N	8-150	3200 max	3,0-20,0	NF
C45+S	8-150	3200 max	3,0-20,0	NF
C45E	8-120	3200 max	3,0-20,0	AR
C45E+A	8-150	3200 max	3,0-20,0	A
C45E+N	8-150	3200 max	3,0-20,0	NF
C45E+S	8-150	3200 max	3,0-20,0	NF
C50E	8-120	3200 max	3,0-20,0	AR
C50E+A	8-150	3200 max	3,0-20,0	A
C50E+N	8-150	3200 max	3,0-20,0	NF
C50E+S	8-150	3200 max	3,0-20,0	NF

Alloy steels for quenching and tempering EN10083-3:2006

Cert. 3.1 only with ladle analysis

34CrMo4	7-50	3200 max	3,0-20,0	AR - NF
42CrMo4	8-150	3200 max	3,0-20,0	AR - NF
42CrMo4+A	8-150	3200 max	3,0-20,0	A
42CrMo4+S	8-150	3200 max	3,0-20,0	NF

Boron steels for quenching and tempering EN10083-3:2006

Cert. 3.1 only with ladle analysis

20MnB5	6-60	3200 max	3,0-20,0	AR - NF
27MnCrB5-2	6-60	3200 max	3,0-20,0	AR - NF
30MnB5	6-60	3200 max	3,0-20,0	AR - NF

Case hardened steels EN10084:2008

Cert. 3.1 only with ladle analysis

16MnCr5	8-150	3200 max	3,0-20,0	AR - NF
16MnCr5+A	8-150	3200 max	3,0-20,0	A
20MnCr5	8-150	3200 max	3,0-20,0	AR - NF
20MnCr5+A	8-150	3200 max	3,0-20,0	A
20MnCr5+S	8-150	3200 max	3,0-20,0	NF

(1) Width min/max related to thickness and heat treatment

(2) Minimum and maximum tonnage related to thickness and slabs availability

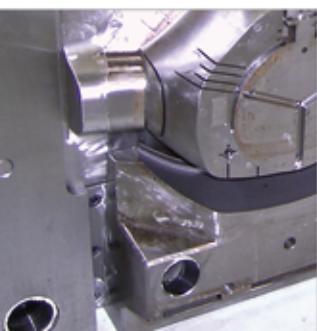
AR As rolled

NF Normalized in furnace

A Annealed

All grades +A and +S are supplied with 3.1 certificate only with ladle analysis and maximum hardness

All grades +N are supplied with 3.1 certificate with ladle analysis and mechanical properties



Chemical composition of the ladle analysis

Quality	C%	Mn%	Si% max	P% max	S% max	C%	Mo%	Ni% max	B%	Cr+Mo+Ni% max
C40	0,37-0,44	0,50-0,80	0,40	0,045	0,045	0,40 max	0,10 max	0,40		0,63
C40E	0,37-0,44	0,50-0,80	0,40	0,030	0,035	0,40 max	0,10 max	0,40		0,63
C45	0,42-0,50	0,50-0,80	0,40	0,045	0,045	0,40 max	0,10 max	0,40		0,63
C45E	0,42-0,50	0,50-0,80	0,40	0,030	0,035	0,40 max	0,10 max	0,40		0,63
C50E	0,47-0,55	0,60-0,90	0,40	0,030	0,035	0,40 max	0,10 max	0,40		0,63
34CrMo4	0,30-0,37	0,60-0,90	0,40	0,025	0,035	0,90-1,20	0,15-0,30			
42CrMo4	0,38-0,45	0,60-0,90	0,40	0,025	0,035	0,90-1,20	0,15-0,30			
20MnB5	0,17-0,23	1,10-1,40	0,40	0,025	0,035				0,0008-0,005	
27MnCr5-2	0,24-0,30	1,10-1,40	0,40	0,025	0,035	0,30-0,60			0,0008-0,005	
30MnB5	0,27-0,33	1,15-1,45	0,40	0,025	0,035				0,0008-0,005	
16MnCr5	0,14-0,19	1,00-1,30	0,40	0,035	0,035	0,80-1,10				
20MnCr5	0,17-0,22	1,10-1,40	0,40	0,035	0,035	1,00-1,30				

Mechanical properties

Quality	Brinell Hardness HBW max	RE _U (N/mm ²) min			RM (N/mm ²)			A% min - Lo=5,65v/S ₀		
		Nominal thickness (mm)			Nominal thickness (mm)			Nominal thickness (mm)		
		≤16	>16≤100	>100	≤16	>16≤100	>100	≤16	>16≤100	>100
C40+N		320	290	260	580min	550min	530min	16	17	17
C40E+N		320	290	260	580min	550min	530min	16	17	17
C45+N		340	305	275	620min	580min	560min	14	16	16
C45+A	207									
C45+S	255									
C45E+N		340	305	275	620min	580min	560min	14	16	16
C45E+A	207									
C45E+S	255									
C50E+N		355	320	290	650min	610min	590min	13	14	14
C50E+A	217									
C50E+S	255									
42CrMo4+A	241									
42CrMo4+S	255									
16MnCr5+A	207									
20MnCr5+A	217									
20MnCr5+S	255									



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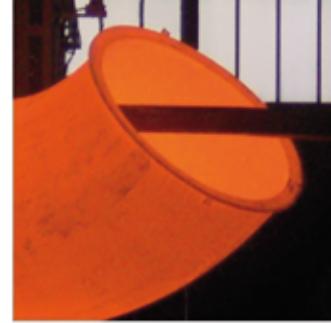
Pipe fitting steels

EN10208-2:2009

Metinvest Trametal

Ferriera Valsider

Spartan UK



Cert. 3.1 - 3.2	API 5L	MSS SP75	ASTM A860	Thickness (mm)	Width (mm) ⁽¹⁾	Weight (tons) ⁽²⁾	Delivery condition
	Cert. 3.1	Cert. 3.1	Cert. 3.1				
L245NB	B			4-100	3200 max	3,0-20,0	AR+N - NF
L290NB	X42	WPHY 42	WPHY 42	4-100	3200 max	3,0-20,0	AR+N - NF
	X46	WPHY 46	WPHY 46	4-100	3200 max	3,0-20,0	AR+N - NF
L360NB	X52	WPHY 52	WPHY 52	4-100	3200 max	3,0-20,0	AR+N - NF
L415NB	X60	WPHY 60	WPHY 60	8-50	3200 max	3,0-20,0	AR+N - NF
L415QB	X60	WPHY 60	WPHY 60	8-80	3200 max	3,0-20,0	AR+Q - NF+Q
L450QB	X65	WPHY 65	WPHY 65	8-70	3200 max	3,0-20,0	AR+Q - NF+Q
L485QB	X70		WPHY 70	8-60	3200 max	3,0-20,0	AR+Q - NF+Q

(1) Width min/max related to thickness and heat treatment

(2) Minimum and maximum tonnage related to thickness and slabs availability

AR As rolled

NF Normalized in furnace

N Mechanical test on normalized samples

Q Mechanical test on quenched and tempered samples

For chemical analysis and mechanical test see product standards





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Weldable fine grain steels, normalized

EN10025-3: 2004

Cert. 3.1 - 3.2 - NF ACIER - CE	Thickness (mm)	Width (mm) ⁽¹⁾	Weight (tons) ⁽²⁾	Delivery condition
S275N	4-150	3200 max	3,0-20,0	NR - NF
S275NL	4-120	3200 max	3,0-20,0	NF
S355N	4-150	3200 max	3,0-20,0	NR - NF
S355NL	4-120	3200 max	3,0-20,0	NF
S420N	8-100	3200 max	3,0-20,0	NF
S420NL	8-100	3200 max	3,0-20,0	NF
S460N	8-100	3200 max	3,0-20,0	NF
S460NL	8-100	3200 max	3,0-20,0	NF

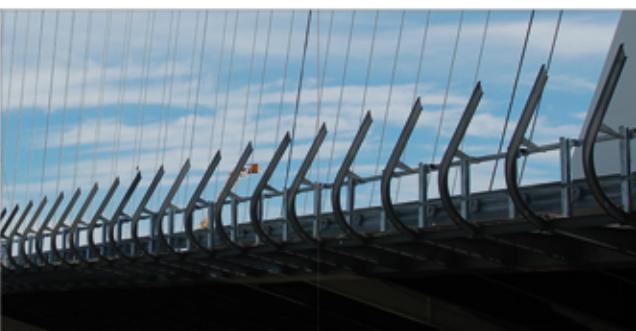
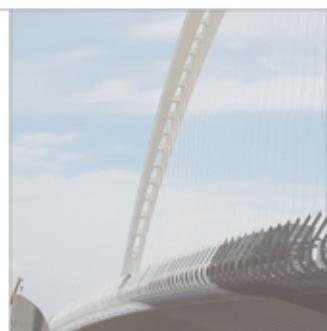
(1) Width min/max related to thickness and heat treatment

(2) Minimum and maximum tonnage related to thickness and slabs availability

NR Normalizing rolling

NF Normalized in furnace

All grades can be supplied with improved properties through thickness direction (Option 4)

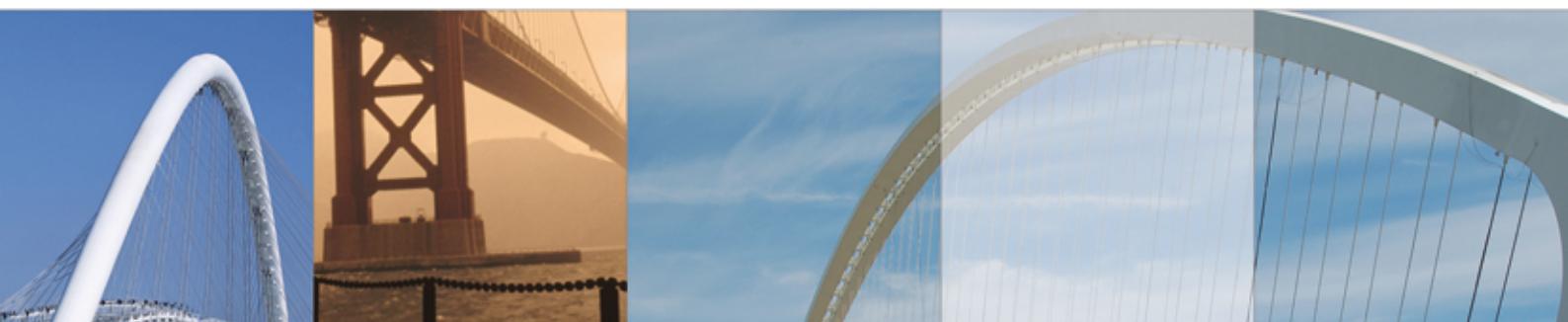


Chemical composition of the ladle analysis

Quality	C% max	Mn%	S% max	P% max	S% min	Al% min	Nb% max	V% max	Ti% max	C% max	Ni% max	Mo% max	Cu% max	N% max	CEV max IIW formula		
															≤63	>63≤100	>100
S275N	0,18	0,50-1,50	0,40	0,030	0,025	0,020	0,05	0,05	0,05	0,30	0,30	0,10	0,55	0,015	0,40	0,40	0,42
S275NL	0,16	0,50-1,50	0,40	0,025	0,020	0,020	0,05	0,05	0,05	0,30	0,30	0,10	0,55	0,015	0,40	0,40	0,42
S355N	0,20	0,90-1,65	0,50	0,030	0,025	0,020	0,05	0,12	0,05	0,30	0,50	0,10	0,55	0,015	0,43	0,45	0,45
S355NL	0,18	0,90-1,65	0,50	0,025	0,020	0,020	0,05	0,12	0,05	0,30	0,50	0,10	0,55	0,015	0,43	0,45	0,45
S420N	0,20	1,00-1,70	0,60	0,030	0,025	0,020	0,05	0,20	0,05	0,30	0,80	0,10	0,55	0,025	0,48	0,50	
S420NL	0,20	1,00-1,70	0,60	0,025	0,020	0,020	0,05	0,20	0,05	0,30	0,80	0,10	0,55	0,025	0,48	0,50	
S460N	0,20	1,00-1,70	0,60	0,030	0,025	0,020	0,05	0,20	0,05	0,30	0,80	0,10	0,55	0,025	0,53	0,54	
S460NL	0,20	1,00-1,70	0,60	0,025	0,020	0,020	0,05	0,20	0,05	0,30	0,80	0,10	0,55	0,025	0,53	0,54	

Mechanical properties

Quality	TENSILE TEST (transverse)								IMPACT TEST (longitudinal)			
	RE _U (N/mm ²) min						RM (N/mm ²)		A% min - Lo=5,65√S ₀		Temp.	Medium value
	Nominal thickness (mm)						Nominal thickness (mm)		Nominal thickness (mm)		C°	Joule
	≤16	>16≤40	>40≤63	>63≤80	>80≤100	>100≤150	≤100	>100≤150	≤63	>63		
S275N	275	265	255	245	235	225	370±510	350±480	24	23	-20	40
S275NL	275	265	255	245	235	225	370±510	350±480	24	23	-50	27
S355N	355	345	335	325	315	295	470±630	450±600	22	21	-20	40
S355NL	355	345	335	325	315	295	470±630	450±600	22	21	-50	27
S420N	420	400	390	370	360		520±680		19	18	-20	40
S420NL	420	400	390	370	360		520±680		19	18	-50	27
S460N	460	440	430	410	400		540±720		17	17	-20	40
S460NL	460	440	430	410	400		540±720		17	17	-50	27



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Steels for Offshore structures

EN10225:2009 API 2H

EN10225: 2009

Cert. 3.1 - 3.2	Thickness (mm)	Width (mm) ⁽¹⁾	Weight (tons) ⁽²⁾	Delivery condition
S355G2+N	5-20	3200 max	3,0-20,0	NF
S355G3+N	5-40	3200 max	3,0-20,0	NF

API 2H

Cert. 3.1 - 3.2

Cert. 3.1 - 3.2	Thickness (mm)	Width (mm) ⁽¹⁾	Weight (tons) ⁽²⁾	Delivery condition
API2H Gr.42	5-100	3200 max	3,0-20,0	NF
API2H Gr.50	5-100	3200 max	3,0-20,0	NF

(1) Width min/max related to thickness and heat treatment

(2) Minimum and maximum tonnage related to thickness and slabs availability

NF Normalized in furnace

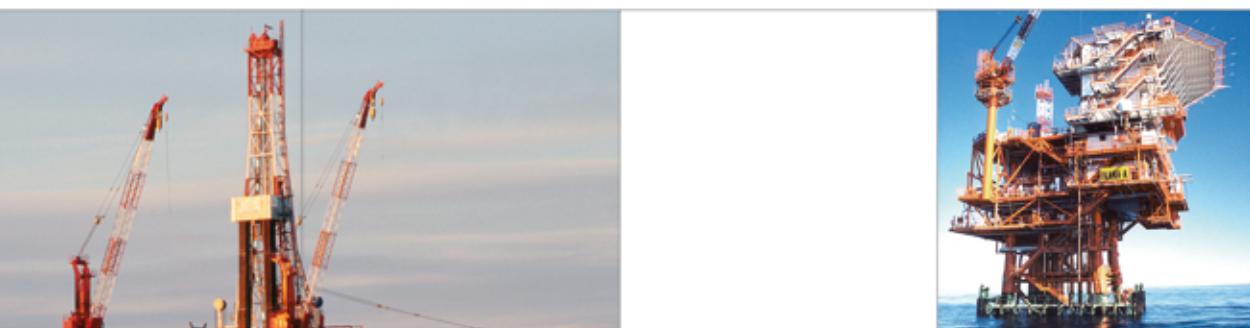


Chemical composition of the ladle analysis

Quality	C% max	Mn%	Si%	P% max	S% max	Nb%	Ti% max	Al%	N% max	C% max	Mo% max	Ni% max	Cu% max	V% max	CEV max	IIN Formula
S355G2+N	0,20	0,90-1,65	0,50 max	0,035	0,030	0,06 max	0,03	0,020min	0,015	0,30	0,10	0,50	0,35	0,12	0,43	
S355G3+N	0,18	0,90-1,65	0,50 max	0,030	0,025	0,06 max	0,03	0,020min	0,015	0,30	0,10	0,50	0,35	0,12	0,43	
API2H Gr.42	0,18	0,90-1,35	0,05-0,40	0,030	0,010	0,04 max	0,02	0,020-0,060	0,012						0,43	
API2H Gr.50	0,18	1,15-1,60	0,05-0,40	0,030	0,010	0,01-0,04	0,02	0,020-0,060	0,012						0,43	

Mechanical properties

Quality	TENSILE TEST (transverse)						IMPACT TEST (longitudinal)	
	RE _U (N/mm ²) min			RM (N/mm ²)	A% min			Medium value
	Nominal thickness (mm)		Lo=2"		Lo=8"	Lo=5,65√S ₀		
s16	>16≤25	>25		470-630			22	-20 50
S355G2+N	355	345		470-630			22	-40 50
S355G3+N	355	345	345	470-630				
API2H Gr.42	289	289	289	427-565	24	20		-40 27
API2H Gr.50	345	345	345	483-620	23	18		-40 34



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Hot rolled coils

EN10025-2:2004 EN10025-5:2004 EN10083-2 EN10083-3



Non-alloy structural steels EN10025-2:2004

	Thickness (mm) ⁽¹⁾	Width (mm) ⁽²⁾	Weight (tons) ⁽³⁾	Weight/Width (KG/mm)	Delivery condition
S235JR	2-20	1555 max	11,5 - 28,0	7,0 - 18,2	AR + N
S235J0	2-20	1555 max	11,5 - 28,0	7,0 - 18,2	AR + N
S235J2	2-20	1555 max	11,5 - 28,0	7,0 - 18,2	AR + N
S275JR	2,5-20	1555 max	11,5 - 28,0	8,7 - 18,2	AR + N
S275J0	2,5-20	1555 max	11,5 - 28,0	8,7 - 18,2	AR + N
S275J2	2,5-20	1555 max	11,5 - 28,0	8,7 - 18,2	AR + N
S355JR	2,5-20	1555 max	11,5 - 28,0	8,7 - 18,2	AR + N
S355J0	2,5-20	1555 max	11,5 - 28,0	8,7 - 18,2	AR + N
S355J2	2,5-20	1555 max	11,5 - 28,0	8,7 - 18,2	AR + N
S355K2	2,5-20	1555 max	11,5 - 28,0	8,7 - 18,2	AR + N

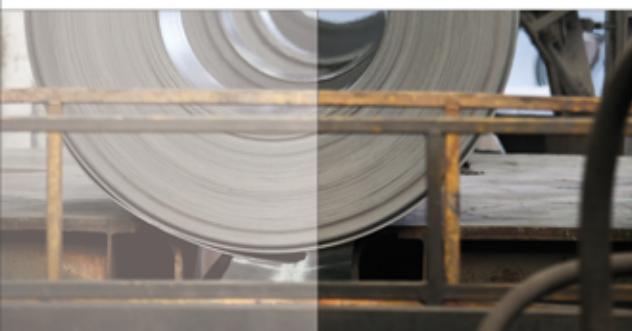
(1) Thicknesses from 2 to 2,5 mm have to be agreed with production/quality department

(2) Width min/max related to thickness and heat treatment

(3) Minimum and maximum tonnage related to thickness and slabs availability

AR As rolled

N Normalizing rolling



Chemical composition of the ladle analysis

Quality	C% max		Si% max	Mn% max	P% max	S% max	N% max	Cu% max
	Nominal Thickness (mm)							
	<16	>16≤20						
S235JR	0,17	0,17		1,40	0,035	0,035	0,012	0,55
S235J0	0,17	0,17		1,40	0,030	0,030	0,012	0,55
S235J2	0,17	0,17		1,40	0,025	0,025		0,55
S275JR	0,21	0,21		1,50	0,035	0,035	0,012	0,55
S275J0	0,18	0,18		1,50	0,030	0,030	0,012	0,55
S275J2	0,18	0,18		1,50	0,025	0,025		0,55
S355JR	0,24	0,24	0,55	1,60	0,035	0,035	0,012	0,55
S355J0	0,20	0,20	0,55	1,60	0,030	0,030	0,012	0,55
S355J2	0,20	0,20	0,55	1,60	0,025	0,025		0,55
S355K2	0,20	0,20	0,55	1,60	0,025	0,025		0,55

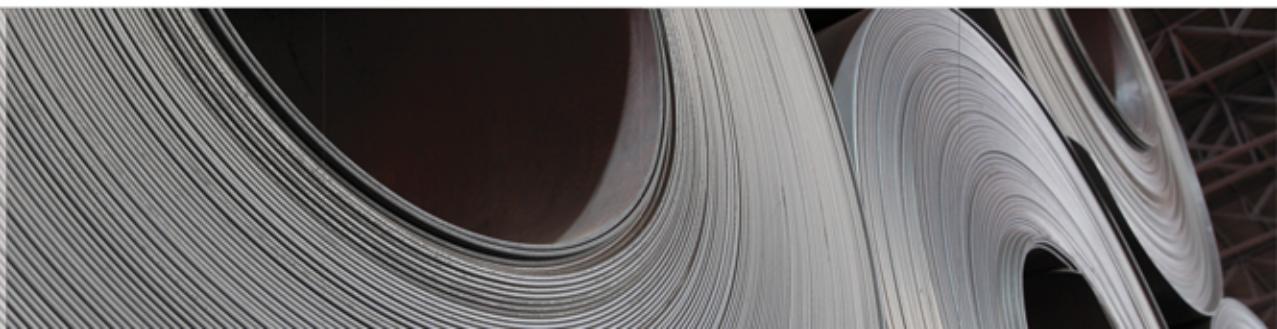
Mechanical properties

Quality	TENSILE TEST								IMPACT TEST	
	RE _U (N/mm ²) min		RM (N/mm ²)		A% min - Lo=80mm			Lo=5,65vS ₀	Temp.	Medium value
	Nominal thickness (mm)		Nominal thickness (mm)		Nominal thickness (mm)					
	≤16	>16≤20	<3	≥3≤21	2	>2≤5	≥3≤20			≥6≤20
S235JR ⁽¹⁾	235	225	360≤510	360≤510	19	20	21	26	20	27
S235J0	235	225	360≤510	360≤510					0	27
S235J2 ⁽²⁾	235	225	360≤510	360≤510	17	18	19	24	-20	27
S275JR ⁽¹⁾	275	265	430≤580	410≤560		18	19	23	20	27
S275J0	275	265	430≤580	410≤560					0	27
S275J2 ⁽²⁾	275	265	430≤580	410≤560		16	17	21	-20	27
S355JR ⁽¹⁾	355	345	510≤680	470≤630		17	18	22	20	27
S355J0	355	345	510≤680	470≤630					0	27
S355J2	355	345	510≤680	470≤630					-20	27
S355K2 ⁽²⁾	355	345	510≤680	470≤630	15	16	20	-20	40 ⁽³⁾	

(1) Test samples taken transversally to rolling direction

(2) Test samples taken longitudinally to rolling direction

(3) This value corresponds to 27J at -30°C



Atmospheric corrosion resistant steels EN10025-5:2004

	Thickness (mm) ⁽¹⁾	Width (mm) ⁽²⁾	Weight (tons) ⁽³⁾	Weight/Width (KG/mm)	Delivery condition
S355J0WP	3-12	1555 max	11,5 - 28,0	8,7 - 18,2	AR + N
S355J2WP	3-12	1555 max	11,5 - 28,0	8,7 - 18,2	AR + N
S355J0W	3-20	1555 max	11,5 - 28,0	8,7 - 18,2	AR + N
S355J2W	3-20	1555 max	11,5 - 28,0	8,7 - 18,2	AR + N
S355K2W	3-20	1555 max	11,5 - 28,0	8,7 - 18,2	AR + N

(1) Thicknesses from 3 to 5 mm have to be agreed with production/quality department

(2) Width min/max related to thickness and heat treatment

(3) Minimum and maximum tonnage related to thickness and slabs availability

AR As rolled

N Normalizing rolling

Chemical composition of the ladle analysis

Quality	C% max	Si% max	Mn%	P%	S% max	N% max	Cr% max	Cu% max
S355J0WP ⁽¹⁾	0,12	0,75	1,00 max	0,06-0,15	0,035	0,009	0,30-1,25	0,25-0,55
S355J2WP ⁽¹⁾	0,12	0,75	1,00 max	0,06-0,15	0,030		0,30-1,25	0,25-0,55
S355J0W	0,16	0,50	0,50-1,50	0,035 max	0,035	0,009	0,40-0,80	0,25-0,55
S355J2W	0,16	0,50	0,50-1,50	0,030 max	0,030		0,40-0,80	0,25-0,55
S355K2W	0,16	0,50	0,50-1,50	0,030 max	0,030		0,40-0,80	0,25-0,55

(1) It is necessary to agree the chemical composition for the thicknesses >12 mm, as the standard reads this is the max producible thickness for S355WP steel

Mechanical properties

Quality	TENSILE TEST					IMPACT TEST		
	RE _U (N/mm ²) min		RM (N/mm ²)		A% min - Lo=5,65vS ₀	A% min - Lo=80mm	Temp.	Medium value
	Nominal thickness (mm)	Nominal thickness (mm)	Nominal thickness (mm)	Nominal thickness (mm)	C°	Joule		
≤16	>16≤20	≥3≤20	≥3≤20	≥3≤20			≤20	
S355J0WP ⁽¹⁾⁽⁴⁾	355	345	470-630	22	18	0	27	
S355J2WP ⁽²⁾⁽⁴⁾	355	345	470-630	20	16	-20	27	
S355J0W ⁽¹⁾	355	345	470-630	22	18	0	27	
S355J2W	355	345	470-630			-20	27	
S355K2W ⁽¹⁾	355	345	470-630	20	16	-20	40 ⁽³⁾	

(1) Test samples taken longitudinally to rolling direction

(2) Test samples taken transversally to rolling direction

(3) This value corresponds to 27J at -30°C

(4) It is necessary to agree the mechanical properties for the thicknesses >12 mm, as the standard reads this is the max producible thickness for S355WP steel



Non alloy steels for quenching and tempering EN10083-2

	Thickness (mm) ⁽¹⁾	Width (mm) ⁽²⁾	Weight (tons) ⁽³⁾	Weight/Width (KG/mm)	Delivery condition
C35	3-20	1555 max	11,5 - 28,0	8,7 - 18,2	AR
C35E	3-20	1555 max	11,5 - 28,0	8,7 - 18,2	AR
C40	3-20	1555 max	11,5 - 28,0	8,7 - 18,2	AR
C40E	3-20	1555 max	11,5 - 28,0	8,7 - 18,2	AR
C45	3-20	1555 max	11,5 - 28,0	8,7 - 18,2	AR
C45E	3-20	1555 max	11,5 - 28,0	8,7 - 18,2	AR
C45+Cr	3-20	1555 max	11,5 - 28,0	8,7 - 18,2	AR
28Mn6	3-20	1555 max	11,5 - 28,0	8,7 - 18,2	AR

Boron steels for quenching and tempering EN10083-3

	Thickness (mm) ⁽¹⁾	Width (mm) ⁽²⁾	Weight (tons) ⁽³⁾	Weight/Width (KG/mm)	Delivery condition
20MnB5	3-20	1555 max	11,5 - 28,0	7,0 - 18,2	AR
27MnCrB5-2	3-20	1555 max	11,5 - 28,0	7,0 - 18,2	AR
30MnB5	3-20	1555 max	11,5 - 28,0	7,0 - 18,2	AR
33MnCrB5-2	3-20	1555 max	11,5 - 28,0	7,0 - 18,2	AR
34CrMo4	3-20	1555 max	11,5 - 28,0	7,0 - 18,2	AR

(1) Thicknesses from 3 to 5 mm have to be agreed with production/quality department

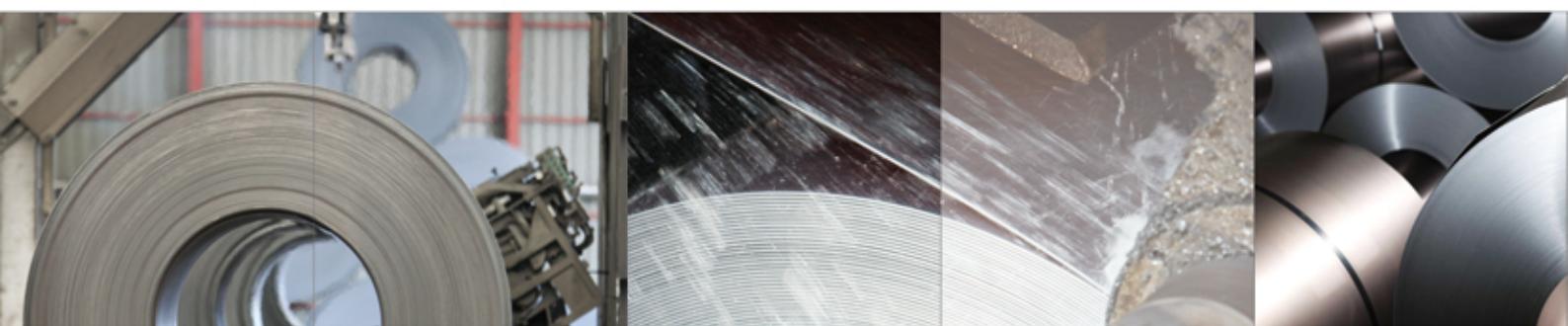
(2) Width min/max related to thickness and heat treatment

(3) Minimum and maximum tonnage related to thickness and slabs availability

AR As rolled

Chemical composition of the ladle analysis

Quality	C%	Si% max	Mn%	P% max	S% max	C%	Mo% max	Ni% max	B%	Cr+Mo+Ni% max
C35	0,32-0,39	0,40	0,50-0,80	0,045	0,045	0,40 max	0,10	0,40		0,63
C35E	0,32-0,39	0,40	0,50-0,80	0,030	0,035	0,40 max	0,10	0,40		0,63
C40	0,37-0,44	0,40	0,50-0,80	0,045	0,045	0,40 max	0,10	0,40		0,63
C40E	0,37-0,44	0,40	0,50-0,80	0,030	0,035	0,40 max	0,10	0,40		0,63
C45	0,42-0,50	0,40	0,50-0,80	0,045	0,045	0,40 max	0,10	0,40		0,63
C45E	0,42-0,50	0,40	0,50-0,80	0,030	0,035	0,40 max	0,10	0,40		0,63
C45+Cr	0,42-0,50	0,40	0,50-0,80	0,045	0,045	0,15-0,35	0,10	0,40		0,63
28Mn6	0,25-0,32	0,40	1,30-1,65	0,030	0,035	0,40 max	0,10	0,40		0,63
20MnB5	0,17-0,23	0,40	1,10-1,40	0,025	0,035				0,0008-0,0050	
27MnCrB5-2	0,24-0,30	0,40	1,10-1,40	0,025	0,035	0,30-0,60			0,0008-0,0050	
30MnB5	0,27-0,33	0,40	1,15-1,45	0,025	0,035				0,0008-0,0050	
33MnCrB5-2	0,30-0,36	0,40	1,20-1,50	0,025	0,035	0,30-0,60			0,0008-0,0050	
34CrMo4	0,30-0,37	0,40	0,60-0,90	0,025	0,035	0,90-1,20	0,15 - 0,30			



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