

DELTAMETAL

acero inoxidable, aluminio & aleaciones de níquel



Aceros Inoxidables Deltametal, S.L.

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EQUIVALENCIAS ENTRE TIPOS DE ACERO

Europe			Germany	France	Italy	Belgium	Sweden	U.K.	Canada	India	Japan		International	USA
EN10025(93)	EN10025(90)	EN10113-2	DIN 17100	NFA 35-501	UNI7070	NBN21-101	MNC810E	BS4360	CSAG40-21	IS	JIS3101	JIS 3106	ISO 630	ASTM
S185	Fe 310-0		St 33	A 33	Fe 320	A 320	SS13,00,00				SS 330		FE 310	A283 A,B,C,D
S235JR(G2)	Fe E360B(FN)		RSt 37-2	E24-2	Fe 360 B	AE235B	SS 13.11.00	40(A)B	230 G	IS226	SS400	SM 400A	Fe 360 B	
S235 J0	Fe E 360 C		St37-3U	E 24-3	Fe 360 C	AE235 C	SS 13,12,00	40C		Fe 410-S		SM400B	Fe 360C	A284 gr, C, D
S235J2G3	Fe E 360 D1		St 37-3 N	E24-4	Fe 360 D	AE 235 D		40D				SM400C	Fe 360 D	
S235J2G4	FeE360 D2							40 EE						A 36
						AE 255 A,B,C,D								
S275 JR	Fe430 B		ST 44-2	E 28-2	Fe430B	AE295 B	SS14,12,00	43(A)B	260W,WT	IS2062			Fe 430B	A529
S 275 JO	Fe 430 C		St44-3U	E 28-3	Fe 430 C	AE 295C		43 C		Fe410 WA			Fe 430C	GR 42,50
S275 J2G3	Fe430 D1	S 275N	St 44-3N	E 28-4	Fe 430D	AE 295 D	SS14,14,00	43 D		Fe 410 WB			Fe 430D	A572
S275 J2G4	Fe430 D2	S 275NL				AE 295 DD	SS14,14,01	43EE		Fe 410 WC				gr,42,50
							SS26,32,00		300W.WT					
							SS26,34,11							
							SS21,72,00							A 573 gr,58,65, 70
							SS21,74,01							

S 355 JR	Fe510 B			E 36-2	Fe 510 B	AE 355 B	SS21,32,01	50 B	350 W, WT	IS 961	SS490	SM 490A	FE 510 B	A633 gr
S 355 JO	Fe 510 C		St 52-3 U	E 36-3	Fe 510C	AE 335 C	SS21,34,01	50 C		Fe 570 HT		SS490B	Fe 510 C	A,C,D
S 355 J2G3	Fe 510 D1 Fe 510 D2	S 355 N	St 52-3 N		Fe 510D	AE 355 D	SS 21,35,01	50 D		Fe 540 WHT		SS 490 C	Fe 510D	
S 335J2G4	Fe 510 D D1	S 355 NL					SS 26,42,00					SS 490 YA	A 656	
S 335K2G3				E 36 -4	Fe 510 DD	AE355DD	SS26,44,11	50 DD				SS490 YB		A656 gr, 50
S 335K2G4	Fe 510 D D2							50 EE				SM 520 B		
												SM 520 C		A 709 gr.36,50,50 W
														A 808

ACEROS PARA CALDERAS

Material #2	EN 10028-	DIN 17155	NFA 36-205	UNI 5869	BS 1501	UNE 36087	ASTM	JIS G3115
1.0345	P235GH	HI	A 37 CP	Fe 360 - 1KW	161 Gr. 360 / 164 Gr. 360	A 37 RCI	A 285 Gr. C-A 414 Gr. C / A 516 Gr. 55	SPV 24
1.0425	P265GH	HI	A 42 CP	Fe 410 - 1KW	161 Gr. 400 / 164 Gr. 400 / 224 Gr. 400	A 42 RCI	A 414 Gr. E / A 516 Gr. 60	
1.0481	P295GH	17 Mn 4	A 48 CP	Fe 460 - 1KW	224 Gr. 490	A 47 RCI	A 414 Gr. F / A 516 Gr. 65	SPV 32
1.0473	P355GH	19 Mn 6	A 52 CP	Fe 510 - 1KW		A 52 RCI	A 414 Gr. G	SPV 36
1.5415	16Mo3	15 Mo 3	15 D3	15 Mo 3	1503 - 243 B	16 Mo 3	A 204 Gr. B	
1.7335	13CrMo4-5	13CrMo 4 4	15 CD 4-05	14 CrMo 4.5	620 Gr. 27	14 CrMo 4.5	A 387 Gr. 12	
1.738	10CrMo9-10	10CrMo 9 10	10 CD 9.10		622 Gr. 31		A 387 Gr. 22	
1.7383	11CrMo9-10			12 CrMO 9.10		12 CrMo 9.10		

ACEROS ESTRUCTURALES DE GRANO FINO, TRATADOS TERMICAMENTE

Material #3	EN 10113-	SEW 083	NFA 36-201	UNI 7382	BS 4360	UNE	ASTM	JIS
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1.8818	S275M	StE 275 TM		Fe E 275 KGTM			
1.8819	S275ML	TStE 275 TM		Fe E 275 KTTM			
1.8823	S355M	StE 355 TM	E 355 R	Fe E 355 KGTM			A 572 Gr. C
1.8834	S355ML	TStE 355 TM	E 355 FP	Fe E 355 KTTM	50 EE		A 633 Gr. C
1.8825	S420M	StE 420 TM	E 420 R				A 572 Gr. 60
1.8836	S420ML	TStE 420 TM	E 420 FP				A 633 Gr. E
1.8827	S460M	StE 460 TM	E 460 R	Fe E 460 KGTM			A 572 Gr. 65
1.8838	S460ML	TStE 460 TM	E 460 FP	Fe E 460 KGTM	55 EE		A 572 Gr. 65

ACEROS ESTRUCTURALES DE GRANO FINO, NORMALIZADOS

Material #	EN 10113-3	SEW 083	NFA 36-201	UNI 7382	BS 4360	UNE	ASTM	JIS
1.049	S275N	StE 285		Fe E 275 KGN			A 572 Gr. 42	
1.0491	S275NL	TStE 285		Fe E 275 KTN	43 EE		A 633 Gr. A	
1.0545	S355N	StE 355	E 355 R	Fe E 355 KGN	50 E	AE 355 KG	A 572 Gr. 50	
1.0546	S355NL	TStE 355	E 355 FP	Fe E 355 KTN	50 EE	AE 355 KT	A 633 Gr. C, D / A 537 Cl. 1	
1.8902	S420N	StE 420	E 420 R	Fe E 420 KGN		AE 420 KG	A 255 Gr. D	SM 490 A
1.8912	S420NL	TStE 420	E 420 FP		50 F		A 633 Gr. E / A 572 Gr. 60 / A 738 Gr. C	

ACEROS DE

CONSTRUCCION

Europe		Belgium	Germany	France	Sweden	International	Italy	Japan
EN 10025(93)	EN 10025 (90)	NBNA21201	DIN 17100	NFA35501	MNC 850 E	ISO 1052	UNI 7070	JISG
		A 330-1,2						
		A-360 1,2,3						
		A-410 1,2,3						
E 295	Fe 490-2	A 490-1,2	St 50-2	A 60-2	SIS 15,50,00	Fe E 490	Fe 490	SS 500
					SIS 15,50,01	5		
E 335	Fe 590-2	A 590-1,2	St 60-2	A 60-2	SIS 16,50,00	Fe E 690	Fe 590	
					SIS 16,50,01			
E 360	Fe 690-2	A 690-1,2	St 70-2	A 70-2	SIS 16,55,00	Fe E 690	Fe 690	
					SIS 16,65,01			

ACEROS ESTRUCTURALES DE USO GENERAL

Material #	EN 10025	DIN 17100	NFA 35-501	UNI 7070	BS 4360	UNE 36.080	ASTM	JIS G3101
1.0035	S185	St 33	A 33	Fe 320		A 310-0	A 283 B - A 569 CQ	SS 330
1.0037	S235JR	St 37-2	E 24-2	Fe 360 B	40 A		A 283 C - A 570 Gr. 33	
1.0038	S235JRG2	RSt 37-2	E 24-2 NE		40 B	AE 235 B-FN		
1.0116	S235J2G3	St 37-3 N	E 24-4	Fe 360 D	40 D	AE 235 D		
1.0117	S235J2G4							
1.0044	S275JR	St 44-2	E 28-2	Fe 430 B	43 B	AE 275 B	A 283 D - A 36	SS 400

1.0143	S275JO	St 44-3 U	E 28-3	Fe 430 C	43 C	AE 275 C	A 578 Gr. 70	
1.0144	S275J2G3	St 44-3 N	E 28-4	Fe 430 D	43 D	AE 275 D	A 633 Gr. A	
1.0145	S275J2G4							
1.0045	S355JR		E 36-2	Fe 510 B	50 B	AE 355 B	A 572 Gr. 50 - A 678 Gr. A	SS 490
1.0553	S355JO	St 52-3 U	E 36-3	Fe 510 C	50 C	AE 355 C	A 441	
1.057	S355J2G3	St 52-3 N		Fe 510 D	50 D	AE 355 D		
1.0577	S355J2G4							
1.0595	S355K2G3		E 36-4		50 DD			
1.0596	S355K2G4							
1.005	E295	St 50-2	A 50-2	Fe 490		A 490		SS 500
1.006	E335	St 60-2	A 60-2	Fe 590		A 590		
1.007	E360	St 70-2	A 70-2	Fe 690		A 690		

ACEROS ALTO CARBONO

Material #	EN 10083-2	DIN 17200	NFA 33-101	UNI 7846	BS 970	UNE 36011	SAE J 403- AISI	JIS G 4051
1.0501	C35	C 35	AF55-C35	C 35	070 M 36	C 35 k	1035	S 35 C
1.0511	C40	C 40	AF60-C45	C 40	070 M 40		1038 / 1040	S 40 C
1.0503	C45	C 45	AF65-C45	C 45	070 M 46	C 45 k	1042 / 1045	S 45 C
1.054	C50	C 50			070 M 50		1049 / 1050	S 50 C
1.0535	C55	C 55	AF70-C55	C 55	070 M 55	C 55 k	1055	S 55 C
1.0601	C60	C 60			070 M 60		1060	S 58 C
1.0603	1 C 67	C 67	XC 68	C 67	080A67		1070	
1.0605	1 C 75	C 75	XC 75	C 75	080A72		1074	

ACEROS DE ALTA RESISTENCIA, PARA CONFORMACIÓN EN FRÍO, NORMALIZADOSd

Material #	EN 10149-3	SEW 092	NFA	UNI	BS 1149	UNE	ASTM	JIS
1.0971	S260NC	QStE 260 N						

1.0112	P235S	SPH 235	A 37 AP	Fe 360-2KW	164-360B LT20	AE 235 C		
1.013	P265S	SPH 265	A 42 AP	Fe 410-2KW	164-400B LT20	SPH 265		
1.11	P275SL	SPH 275						

ACEROS PARA ESTAMPACION Y TRABAJO EN FRÍO

Material #	EN 10111	DIN 1614/2	NFA 36-301	UNI 5867	BS 1449	UNE 36.093	ASTM - SAE	JIS G3131
1.0332	DD11	StW 22	1 C	FeP 11	HR 3	AP 11	A 621 CQ - SAE 1010	SPHD
1.0398	DD12	RRStW 23					A 621 DQ - SAE 1008	SPHE
1.0335	DD13	StW 24	3 C	FeP 13	HR 1	AP 13	A 622 DQ - SAE 1006 AK	SPHE AK
1.0389	DD14		3 CT					

ACEROS PARA CALDERAS Y RECIPIENTES A PRESIÓN

Europe			Belgium		Germany			France			Italy	Sweden	India	Japan		
EN 10028-2	EN 10028-3	EU 113	NBN629	NBN630	DIN 17135	DIN17165	DIN17102	NFA36201	NFA36205	NFA36207	UNI5859	MNC830E	IS 2002	JIS G 3115	JIS G 3103	BS 15
P235 GH		Fe E255	D 37 1,2	E37 1,2	A St 35	HI	St E 255				Fe 360 1 KW	SS 13,30,01	Grade 1	SPV 235	SB 410	151
		KG KW,KT					W St E 255		A 37 CP, AP,FP		Fe 360 2 KW	SS 13,31,01				gr.36
							T St E 255				Fe 360 1 KG					
							E St E 255				Fe 360 2 KG		grade 2A			161
P 295 GH	P 275 N	Fe E285	D 42-1,2	E 42-1,2	A St 41	HI	St E 285		A 42 CP,AP,FP		Fe 410-1-KW	SS 14,30,01				gr.36

	P 275 NH	KG,KW,KT					W St 285				Fe 410-2-KW	SS 14,31,01	grade 2B			
	P 275 NL 1						T St E 285				Fe 410-1-KG	SS 14,32,01				154
	P 275 NL 2						E St E 285				Fe 410-2-KG					gr.36
P296 GH		Fe E315	D 47-1,2	E47-1,2	A St 45	17 Mn 4	St E 315				Fe 460-1-KW	SS 21.01.01		SPV 315	SB450	164
		KG,KW,KT					W St E 315		A 48 CP,AP,FP		Fe 460-2-KW	SS 21,02,01				gr.36
							T St E 315				Fe 460-1-KG	SS SS,21,03,01				223
							E St E 315				Fe 460-2-KG	SS 29,12,01				gr.46
P 355 GH	P 355 N	Fe E 355	D52-1,2	E52-1,2	A St 52	19 Mn 8	St E 355	E 355 R		A 510 AP,FP	Fe 510-1-KW	SS 21,06,01		SPV 355	SB 480	224
	P 355 NH	KG,KW,KT					W St E 355	E 355 FP	A 52 CP,AP,FP		Fe 510-2-KW	SS 21,07,01				gr.40
	P 355 NL1						T St E 355				Fe 510-1-KG					225
	P 355 NL2						E St E 355				Fe 510-2--KG					grade
										A 530 AP,FP		SS 21,16,01				
												SS 21,17,01				

ACEROS PARA CILINDROS DE GAS T RECIPIENTS PARA GASES

Material #	EN 10120	DIN 17155	NFA 36-211	UNI 7355	BS 5045	UNE 36129	ASTM	JIS G3116
1.0111	P245NB	H I	BS 1	Fe E 24 KR	Type A	AE 235 KR		SG 255
1.0243	P265NB	H II	BS 2	Fe E 27 KR	Type B	AE 265 KR		SG 295
1.0437	P310NB	17 Mn 4	BS 3	Fe E 31 KR	Type C	AE 345 KR		SG 325
1.0557	P355NB	19 Mn 6	BS 4	Fe E 35 KR	Type E			SG 365

ACEROS PARA TUBOS DE GRAN DIÁMETRO

Material #	EN 10208-2	DIN 17172	NFA	UNI	BS	UNE	API 5L	JIS
1.0457	L 245NB	StE 240.7					Gr. B	
1.0484	L 290NB	StE 290.7					X 42	
1.0582	L 360NB	StE 360.7					X 52	
1.8972	L 415NB	StE 415.7					X 60	
1.0418	L 245MB	StE 240.7 TM					Gr. B	
1.0429	L 290MB	StE 290.7 TM					X 42	
1.0578	L 360MB	StE 360.7 TM					X 52	
1.8973	L 415MB	StE 415.7 TM					X 60	
1.8975	L 450MB	StE 445.7 TM					X 65	
1.8977	L 485MB	StE 480.7 TM					X 70	
1.8978	L 555MB						X 80	

ACEROS PARA CONSTRUCCIÓN NAVAL

Lloyds	Norske Veritas	Germanischer Lloyds	Bureau Veritas	American Bureau of Shipping	USSR Register	Nippon Kaigi Kyoka
A	A	A	A	A	A	A
B	B	B	B	B	B	B
D	D	D	D	SS	D	D
E	E	E	E	E	E	E
				CD/DS		

	NV A 27 S					
	NV D 27 S					
	NV D 27 S					
AH 32	NV A 32	A 32	AH32	AH 32	A32	
DH 32	NV 32	D 32	DH 32	DH 32	D 32	
EH 32	NV E 32	E 32	EH 32	EH 32	E 32	
AH 34 S						
DH 34 S						
EH 34 S						
AH 35	NV A 36	A 36	AH 36	AH 36	A 36	
DH 36	NV D 36	D 36	DH 36	DH 36	D 36	
EH 36	NV E 36	E 36	EH 36	EH 36	E 36	
	NVA 40					
	NVD 40					
	NVE 40					
	NVA 420					
	NVD 420					
	NVE 420					

ACERO PARA TUBOS SOLDADOS

Germany	U.S.A	EN
DIN 17,172	API 4L, 5L	
St E 210.7	A	
St E 240.7	B	
St E 290, 7 (TM)	X 42	
St E 320, 7 (TM)	X 48	
St E 360, 7 (TM)	X 52	
St E 385, 7 (TM)	X 56	
St E 415, 7 (TM)	X 60	
St E 445, 7 (TM)	X 65	
St E 480, 7 (TM)	X 70	

ACEROS RESISTENTES A LA CORROSIÓN ATMOSFÉRICA

Europe	UNI	Germany	France	U.K.	Canada	U.S.A	International	JIS
EN 10155	EU 155	WBL 087	NFA 35502	BS 4360	CSA G 4021	ASTM	ISO 4952	
		WSt 37.2	E 24W 2				Fe 235W	
S 235 JOW	Fe 360 CK1		E 24 W 3					
S 235 J2W	Fe 360 DK1	W St 37.3	E 24 W 4					
S 355 JOW	Fe 510 C2K1		E 36 WB 3	WR 50 B	gr 350 -A AT	A242 gr1	Fe 355 W	
S 355 J2G 1W	Fe 510 D2K1	W St 52.3	E 36 WB 4	WR 50 C	gr 400-A AT	A 600 A,B,C		
S 355 J2G2W								
S 355 K2G1W								
S 366K2G2W								

ACEROS AL CROMO, MOLIBDENO, y CROMO- MOLIBDENO

Europe	Germany	France	Italy	Sweden	Japan	U.K.	U.S.A
EN 10028- 2	DIN 17155	AFNOR 36206	UNI 5869	MNC830E	JIS 3103	BS 1501 part 2	ASTM
16 Mo 3	16 Mo 3	15 D 3	16 Mo 3				
		18 MD 4.05	16 Mo 6	22.16.04	450M	271	A202 gr. A,B
		15 MDV 4.05		22.18.04	490 M		A 204 gr.A,B,C
		15 CD 2.05					
14 Cr Mo 45	13 Cr Mo 44	15 CD 4.05	14 Cr Mo 46			620	
						gr.27,31	A 302 gr.A,B
						621 gr. A,B	A 387 gr.2,11,12
						622 gr.31	

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ACEROS ESTRUCTURALES CON RESISTENCIA A LA CORROSIÓN ATMOSFÉRICA

Material #	EN 10155	SEW 087	NFA 35-502	UNI	BS 4360	UNE	ASTM	JIS G3114
1.8961	S235J2W	WTSSt 37-3	E 24 W 4	Fe 360 DK 1				
1.8945	S355J0WP		E 36 WA 3	Fe 510 C1K1	WR 50 A			
1.8946	S355J2WP		E 36 WA 4	Fe 510 D1K1			A 242 Type 1	
1.8959	S355J0W		E 36 WB 3	Fe 510 C2K1	WR 50 B		A 588 - A 242 Gr. 1	SMA 50 AW
1.8963	S355J2G1W	WTSSt 52-3		Fe 510 D2K1	WR 50 C		A 588 Gr. A	to
1.8965	S355J2G2W							SMA 50 CP
1.8966	S355K2G1W		E 36 WB 4				A 709 Gr. 50 W	
1.8967	S355K2G2W							

ACEROS NORMALIZADOS DE GRANO FINO PARA RECIPIENTES

Material #	EN 10028-3	DIN 17102	NFA 36-207	UNI 7382	BS 1501	UNE 36081	ASTM	JIS
1.0486	P275N	StE 285			224 Gr. 400			
1.0487	P275NH	WStE 285			224 Gr. 430		A 516 Gr. 60	
1.0488	P275NL1	TStE 285					A 662 Gr. A	
1.1104	P275NL2	EStE 285						
1.0562	P355N	StE 355	A 510 AP	Fe E 355 KG	223 Gr. 490	AE 355 KG	A 537 CL 1	

1.0565	P355NH	WStE 355	A 510 AP	Fe E 355-2	224 Gr. 490		A 662 Gr. C	
1.0566	P355NL1	TStE 355	A 510 FP 1	Fe E 355-3	224 Gr. 490		A 737 Gr. B	
1.1106	P355NL2	ESStE 355						

EQUIVALENCIA ENTRE European Steel Standards y EURONORM

EURONORM	Corresponding National Standards in				
	Germany	France	United Kingdom	Spain	Italy
17	DIN 59110	NF A 45-051	---	UNE 36-089	UNI 5598
18	---	NF A 03-111	BS 4360	UNE 36-300	UNI-EU 18
				UNE 36-400	
19	DIN 1025 T5	NF A 45-205	---	UNE 36-526	UNI 5398
24	DIN 1025 T1	NF A 45-210	BS 4	UNE 36-521	UNI 5679
	DIN 1026			UNE 36-522	UNI 5680
53	DIN 1025 T2	NF A 45-201	BS 4	UNE 36-527	UNI 5397
	DIN 1025 T3			UNE 36-528	
	DIN 1025 T4			UNE 36-529	
54	DIN 1026	NF A 45-007	BS 4	UNE 36-525	UNI-EU 54
56	DIN 1028	NF A 45-009 ¹⁾	BS 4848	UNE 36-531	UNI-EU 56
57	DIN 1029	NF A 45-010 ¹⁾	BS 4848	UNE 36-532	UNI-EU 57
58	DIN 1017 T1	NF A 45-005 ¹⁾	BS 4360	UNE 36-543	UNI-EU 58
59	DIN 1014 T1	NF A 45-004 ¹⁾	BS 4360	UNE 36-542	UNI-EU 59

60	DIN 1013 T1	NF A 45- 003 ¹⁾	BS 4360	UNE 36- 541	UNI-EU 60
61	DIN 1015	NF A 45- 006 ¹⁾	BS 970	UNE 36- 547	UNI 7061
65	DIN 59 130	NF A 45- 075 ¹⁾	BS 3111	UNE 36- 546	UNI 7356
66	DIN 1018	---	---	---	UNI 6630
91	DIN 59 200	NF A 46- 012	BS 4360	---	UNI-EU 91
103	DIN 50 601	NF A 04- 102	BS 4490	UNE 7- 280	---
162	DIN 17 118	NF A 37- 101	BS 2994	UNE 36- 570	UNI 7344
	DIN 59 413				
168	---	NF A 03- 116	BS 4360	UNE 36- 800	UNI-EU 168
CECA IC 2	SEW 088	NF A 36- 000	BS 5135	---	---
¹⁾ To add NF A 45-001 and NF A 45-101 for the tolerances.					

EURONORM	Corresponding National Standards in				
	Belgium	Portugal	Sweden	Austria	Norway
17	NBN 524	NP 330	---	---	---
18	NBN A 03- 001	NP 2451	SS 11 01 20	---	NS 10 005
			SS 11 01 05		
19	NBN 533	NP 2116	SS 21 27 40	M 3262	
24	NBN 632- 01	---	SS 21 27 25	M 3261	NS 911

			SS 21 27 35		
53	NBN 633	NP 2117	SS 21 27 50	---	NS 1907
			SS 21 27 51		NS 1908
			SS 21 27 52		
54	NBN A 24- 204	NP 338	---	M 3260	---
56	NBN A 24- 201	NP 335	SS 21 27 11	M 3246	NS 1903
57	NBN A 24- 202	NP 336	SS 21 27 11	M 3247	NS 1904
58	NBN A 34- 201	---	SS 21 21 50	M 3230	NS 1902
59	NBN A 34- 202	NP 333	SS 21 27 25	M 3226	NS 1901
		NP 334			
60	NBN A 34- 203	NP 331	SS 21 25 02	M 3221	NS 1900
61	NBN A 34- 204	---	---	M 3227	---
65	NBN A 24- 206	---	---	M 3223	---
66	---	---	---	---	---
91	NBN A 43- 301	---	SS 21 21 50	M 3221	---
103	NBN A 43- 301	---	SS 21 21 50	M 3221	---
162	NBN A 14- 101	NP 1787	---	---	---
168	---	---	SS 11 00 12	---	---
CECA IC 2	---	---	SS 06 40	---	---

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Designation		Corresponding old designations in										
According to EN 10027-1 and ECISS IC 10	According to EN 10027-2	According to EN 10025:1990	Germany	France	United Kingdom	Spain	Italy	Belgium	Sweden	Portugal	Austria	Norway
S185	1.0035	Fe 310-0	St 33	A 33		A 310-0	Fe 320	A 320	13 00-00	Fe 310-0	St 320	
S235JR	1.0037	Fe 360 B	St 37-2	E 24-2			Fe 360 B	AE 235-B	13 11-00	Fe 360-B		NS 12 120
S235JRG1	1.0036	Fe 360 BFU	USt 37-2	- - -		AE 235 B-FU					USt 360 B	NS 12 122
S235JRG2	1.0038	Fe 360 BFN	RSt 37-2	- - -	40 B	AE 235 B-FN			13-12-00		RSt 360 B	NS 12 123
S235J0	1.0114	Fe 360 C	St 37-3 U	E 24-3	40 C	AE 235 C	Fe 360 C	AE 235-C		Fe 360 C	St 360 C	NS 12 124
											St 360 CE	
S235J2G3	1.0116	Fe 360 D1	St 37-3 N	E 24-4	40 D	AE 235 D	Fe 360 D	AE 235-D		Fe 360 D	St 360 D	NS 12 124
S235J2G4	1.0117	Fe 360 D2	- - -									
S275JR	1.0044	Fe 430 B	St 44-2	E 28-2	43 B	AE 275 B	Fe 430B	AE 255-B	14 12-00	Fe 430 B	St 430 B	NS 12 142
S275J0	1.0143	Fe 430 C	St 44-3 U	E 28-3	43 C	AE 275 C	Fe 430 C	AE 255-C		Fe 430C	St 430 C	NS 12 143
											St 430 CE	
S275J2G3	1.0144	Fe 430 D1	St 44-3N	E 28-4	43 D	AE 275 D	Fe 430 D	AE 255-D	14 14-00	Fe 430 D	St 430 D	NS 12 143
S275J2G4	1.0145	Fe 430 D2	- - -						14 14-01			
S355JR	1.0045	Fe 510 B	- - -	E 36-2	50 B	AE 355	Fe 510	AE 355-		Fe 510 B		

						D	B	B				
S355J0	1.0553	Fe 510 C	St 52-3 U	E 36-3	50 C	AE 355 C	Fe 510 C	AE 355- C		Fe 510 C	St 510 C	NS 12 153
S355J2G3	1.057	Fe 510 D1	St 52-3 N		50 D	AE 355 D	Fe 510 D	AE 355- D		Fe 510 D	St 510 D	NS 12 153
S355J2G4	1.0577	Fe 510 D2	- - -									
S355K2G3	1.0595	Fe 510 DD1	- - -	E 36-4	50 DD			AE 355- DD		Fe 510 DD		
S355K2G4	1.0596	Fe 510 DD2	- - -		- - -							
E295	1.005	Fe 490-2	St 50-2	A 50-2		A 490	Fe 480	A 490-2	15 50- 00	Fe 490-2	St 490	
									15 50- 01			
E335	1.006	Fe 590-2	St 60-2	A 60-2		A 590	Fe 580	A 590-2	16-50- 00	Fe 590-2	St 590	
									16 50- 01			
E360	1.070	Fe 690-2	St 70-2	A 70-2		A 690	Fe 680	A 690-2	16 55- 00	Fe 690-2	St 690	
									16 55- 01			

ACEROS PARA ESTRUCTURAS OSHORE

SGrade 355 / API 2H and 2W - composiciones químicas

Grade	Thickness [mm]	Delivery condition	C	P	S	Ni	Mo	Nb	CE _(IIW)	Pcm	Standard
S355G2+N	≤ 25	N	≤ 0.20	≤ 0.035	≤ 0.030	≤ 0.50	≤ 0.10	≤ 0.060	≤ 0.43	–	EN 10225
S355G3+N	≤ 40	N	≤ 0.18	≤ 0.030	≤ 0.025	"	"	"	"	–	"
S355G5+M	≤ 25	TMCP	≤ 0.14	≤ 0.035	≤ 0.030	≤ 0.30	≤ 0.20	≤ 0.060	≤ 0.43	–	"
S355G6+M	≤ 40	TMCP	"	≤ 0.030	≤ 0.025	"	"	"	"	–	"
S355G7+N	≤ 150	N	≤ 0.14	≤ 0.030	≤ 0.010	≤ 0.50	≤ 0.08	≤ 0.040	≤ 0.43	≤ 0.24	"
S355G7+M	≤ 100	TMCP	"	"	"	"	"	"	"	"	"
S355G8+N	≤ 150	N	≤ 0.14	≤ 0.030	≤ 0.007 ^{*)}	≤ 0.50	≤ 0.08	≤ 0.040	≤ 0.43	≤ 0.24	"
S355G8+M	≤ 100	TMCP	"	"	"	"	"	"	"	"	"
S355G9+N	≤ 40	N	≤ 0.12	≤ 0.030	≤ 0.010	≤ 0.70	≤ 0.08	≤ 0.040	≤ 0.43	≤ 0.22	"
	> 40 ≤ 150	"	"	"	"	> 0.30 ≤ 0.70	"	"	"	"	"
S355G9+M	≤ 40	TMCP	≤ 0.12	≤ 0.030	≤ 0.010	≤ 0.70	≤ 0.08	≤ 0.030	≤ 0.41	≤ 0.21	"
	> 40 ≤ 75	"	"	"	"	> 0.30 ≤ 0.70	"	"	"	"	"
	> 75 ≤ 100	"	"	"	"	"	≤ 0.20	"	≤ 0.42	≤ 0.22	"
S355G10+N	≤ 40	N	≤ 0.12	≤ 0.015	≤ 0.005 ^{*)}	≤ 0.70	≤ 0.08	≤ 0.040	≤ 0.43	≤ 0.22	"
	> 40 ≤ 150	"	"	"	"	"	"	"	"	"	"
S355G10+M	≤ 40	TMCP	≤ 0.12	≤ 0.015	≤ 0.005 ^{*)}	≤ 0.70	≤ 0.08	≤ 0.040	≤ 0.41	≤ 0.21	"
	> 40 ≤ 75	"	"	"	"	> 0.30 ≤ 0.70	"	"	"	"	"
	> 75 ≤ 100	"	"	"	"	"	≤ 0.20	"	≤ 0.42	≤ 0.22	"

API 2H-50(T)	≤ 50.8	N	≤ 0.18	≤ 0.030	≤ 0.010	–	–	0.005-0.05	≤ 0.43	–	API 2H
	> 50.8 ≤ 101.6	”	”	”	”	–	–	”	≤ 0.45	–	”
API 2W-50(T)	≤ 38.1	TMCP	≤ 0.16	≤ 0.030	≤ 0.010	≤ 0.75	≤ 0.08	≤ 0.030	≤ 0.39	≤ 0.23	API 2W
	> 38.1 ≤ 88.9	”	”	”	”	”	”	”	≤ 0.41	”	”
	> 88.9 ≤ 152.6	”	”	”	”	”	”	”	≤ 0.43	≤ 0.24	”
355EM	≤ 40	N/TMCP	≤ 0.15	≤ 0.025	≤ 0.015	≤ 0.45	≤ 0.08	≤ 0.040	≤ 0.43	–	BS7191
	> 40 ≤ 75	”	”	”	”	”	”	”	≤ 0.44	–	”
	> 75 ≤ 150	”	”	”	”	”	”	”	≤ 0.45	–	”
355EMZ	≤ 40	N/TMCP	≤ 0.15	≤ 0.025	≤ 0.005 ^{*)}	≤ 0.45	≤ 0.08	≤ 0.040	≤ 0.43	–	BS7191
	> 40 ≤ 75	”	”	”	”	”	”	”	≤ 0.44	–	”
	> 75 ≤ 150	”	”	”	”	”	”	”	≤ 0.45	–	”
E36 / EH36 (max. 100mm)	≤ 50	N/TMCP	≤ 0.18	≤ 0.025	≤ 0.025	≤ 0.40	≤ 0.08	0.02–0.05	≤ 0.38 ^{**)}	–	ship, NV-rules
	> 50 ≤ 100	”	”	”	”	”	”	”	≤ 0.40 ^{**)}	–	mobile offsh. units
	> 100 ≤ 150	”	”	”	”	”	”	”	≤ 0.41 ^{**)}	–	”

^{*)} Low sulphur content, in order to fulfil the requirements on tensile test in through thickness direction. Verification, if corresponding option is required (EN 10225, option 13 or BS 7191, option B24)

^{**) for TMCP only}

Grade 355N – comparación entre resistencia mecánica, límite elástico y dureza.

	BS7191	EN 10225 / NORSOK		API 2H	Shipbuilding rules LR / GL / NV etc.
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355 N	355EM / EMZ	S355G2+N	S355G3+N	S355G7+N S355G8+N S355G9+N S355G10+N	API 2H-50	e. g. E 36 / EH 36
Thick. [mm]	Tensile strength Rm [MPa]					
≤25	460 – 620	470 –	470 –	470 – 630	483 –	90 – 620

		630	630		620	
> 25 ≤40	"	"	"	"	"	"
> 40 ≤100	"	-	"	"	"	"
> 100 ≤150	"	-	-	"	"	"
Thick. [mm]	Yield Strength ReH [MPa]					
≤16	≥355	≥355	≥355	≥355	≥355*)	≥355
> 16 ≤20	"	≥345	≥345	"	"	"
> 20 ≤25	"	"	"	"	"	"
> 25 ≤40	≥345	-	"	≥345	"	"
> 40 ≤63	≥340	-	-	≥335	"	"
> 63 ≤80	≥325	-	-	≥325	≥325*)	"
> 80 ≤100	≥325	-	-	"	"	"
> 100 ≤120	≥315	-	-	"	"	"
> 120 ≤150	≥305	-	-	≥320	"	"

- R_{p0.2}

	BS7191	EN 10225 / NORSOK		API 2H	Shipbuilding rules LR / GL / NV
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355 N	355EM / EMZ	S355G2+N	S355G3+N	S355G7+N S355G8+N S355G9+N S355G10+N	API 2H-50	e. g. E 36 / EH 36
Minimum Impact Energy Av [Joule] - transverse (average/single) - at a test temperature of						
	-40 °C	-40 °C	-40 °C	-40 °C	-40 °C	-40 °C

Surface						
All thickness	50 / 35	50 / 35	50 / 35	50 / 35	-	-
< 40 mm	-	-	-	-	41/34	-
< 50 mm	-	-	-	-	-	24/17
Quarter thick.						
>40	-	-	-	-	41/34	-
> 50 < 70	-	-	-	-	-	27 /19
> 70 < 150	-	-	-	-	-	34 / 24
Mid-thickness						
All thicknesses	-	-	-	-	-	-
> 40 mm	50 / 35	-	-	50 / 35	-	-

Grade 355 TMCP – comparación entre resistencia mecánica, límite elástico y dureza.

	BS 7191	EN 10225 / NORSOK			API 2W	Shipbuilding rules LR / GL / NV etc.
355 TMCP	355EM / EMZ	S355G5+M	S355G6+M	S355G7+M S355G8+M S355G9+M S355G10+M	API 2W-50	e. g. E 36 / EH 36
Thick. [mm]	Tensile strength R_m [MPa]					
≤ 25	460 – 620	470 – 610	470 – 610	470 – 630	≥ 483	490 – 620
> 25 ≤ 40	"	–	"	"	"	"
> 40 ≤ 100	"	–	–	"	"	"
> 100 ≤ 150	"	–	–	–	"	–
Thick. [mm]	Yield strength R_{eH} [MPa]					
≤ 16	≥ 355	≥ 355	≥ 355	≥ 355	345 – 551 *)	≥ 355
> 16 ≤ 20	"	≥ 345	≥ 345	"	"	"
> 20 ≤ 25	"	"	"	"	"	"
> 25 ≤ 40	≥ 345	–	"	≥ 345	345 – 517 *)	"
> 40 ≤ 63	≥ 340	–	–	≥ 335	"	"
> 63 ≤ 80	≥ 325	–	–	≥ 325	"	"
> 80 ≤ 100	≥ 325	–	–	"	"	"
> 100 ≤ 120	≥ 315	–	–	"	"	"
> 120 ≤ 150	≥ 305	–	–	–	"	(DNV: ≤ 150 mm)

*) $R_{p0.2}$

	BS 7191	EN 10225 / NORSOK			API 2W	Shipbuilding rules LR / GL / NV
355 TMCP	355EM / EMZ	S355G5+M	S355G6+M	S355G7+M S355G8+M S355G9+M S355G10+M	API 2W-50	e. g. E 36 / EH 36
	Minimum Impact Energy A _v [Joule] – transverse (average/single) – at a test temperature of					
	- 40 °C	- 40 °C	- 40 °C	- 40 °C	- 40 °C	- 40 °C
Surface						
All thicknesses	50 / 35	50 / 35	50 / 35	50 / 35	–	–
≤ 40 mm	–	–	–	–	41 / 34	–
≤ 50 mm	–	–	–	–	–	24 / 17
Quarter thick.						
> 40	–	–	–	–	41 / 34	–
> 50 ≤ 70	–	–	–	–	–	27 / 19
> 70 ≤ 150	–	–	–	–	–	34 / 24
Mid-thickness						
All thicknesses	–	–	–	–	–	–
> 40 mm	50 / 35	–	–	50 / 35	–	–

Grade 355N y TMCP – comparación entre resistencia mecánica y límite elástico.

	BS 7191	EN 10225 / NORSOK			API	Shipbuilding rules LR / GL / NV etc.
355 N	355EM / EMZ	S355G2+N	S355G3+N	S355G7+N S355G8+N S355G9+N S355G10+N	API 2H-50	e. g. E 36 / EH 36
Thick. [mm]	Yield to Tensile strength ratios					
≤ 16	info	0.87	0.87	0.87	–	–
> 16	”	0.85	0.85	0.85	–	–
355 TMCP	355EM / EMZ	S355G5+M	S355G6+M	S355G7+M S355G8+M S355G9+M S355G10+M	API 2W-50	e. g. 36 / EH 36
Thick. [mm]	Yield to Tensile strength ratios					
≤ 16	info	0.93 *)	0.93 *)	0.93 *)	–	–
> 16	”	0.90	0.90	0.90	–	–

*) for plates max. 10 mm, alternative yield to tensile strength ratio may be agreed

420/450/460 – composiciones químicas

Grade	Thickness [mm]	Delivery condition	C	P	S	Ni	Mo	Nb	CE _(mws)	Pcm	Standard
S420G1+Q	≤ 15	QT	≤ 0.14	≤ 0.020	≤ 0.010	≤ 0.70	≤ 0.25	≤ 0.040	≤ 0.42	≤ 0.23	EN 10225
	> 15 ≤ 100	"	"	"	"	"	"	"	"	≤ 0.22	"
S420G1+M	≤ 15	TMCP	≤ 0.14	≤ 0.020	≤ 0.010	≤ 0.70	≤ 0.25	≤ 0.040	≤ 0.42	≤ 0.23	"
	> 15 ≤ 100	"	"	"	"	"	"	"	"	≤ 0.22	"
S420G2+Q	≤ 15	QT	≤ 0.14	≤ 0.020	≤ 0.007 ^{*)}	≤ 0.70	≤ 0.25	≤ 0.040	≤ 0.42	≤ 0.23	"
	> 15 ≤ 100	"	"	"	"	"	"	"	"	≤ 0.22	"
S420G2+M	≤ 15	TMCP	≤ 0.14	≤ 0.020	≤ 0.007 ^{*)}	≤ 0.70	≤ 0.25	≤ 0.040	≤ 0.42	≤ 0.23	"
	> 15 ≤ 100	"	"	"	"	"	"	"	"	≤ 0.22	"
S460G1+Q	≤ 15	QT	≤ 0.15	≤ 0.020	≤ 0.010	≤ 0.70	≤ 0.25	≤ 0.040	≤ 0.43	≤ 0.23	"
	> 15 ≤ 100	"	≤ 0.14	"	"	"	"	"	"	≤ 0.22	"
S460G1+M	≤ 15	TMCP	≤ 0.15	≤ 0.020	≤ 0.010	≤ 0.70	≤ 0.25	≤ 0.040	≤ 0.43	≤ 0.23	"
	> 15 ≤ 100	"	≤ 0.14	"	"	"	"	"	"	≤ 0.22	"
S460G2+Q	≤ 15	QT	≤ 0.15	≤ 0.020	≤ 0.007 ^{*)}	≤ 0.70	≤ 0.25	≤ 0.040	≤ 0.43	≤ 0.23	"
	> 15 ≤ 100	"	≤ 0.14	"	"	"	"	"	"	≤ 0.22	"
S460G2+M	≤ 15	TMCP	≤ 0.15	≤ 0.020	≤ 0.007 ^{*)}	≤ 0.70	≤ 0.25	≤ 0.040	≤ 0.43	≤ 0.23	"
	> 15 ≤ 100	"	≤ 0.14	"	"	"	"	"	"	≤ 0.22	"
450EM	≤ 75	QT	≤ 0.16	≤ 0.025	≤ 0.015	≤ 0.45	≤ 0.25	≤ 0.030	≤ 0.43	–	BS 7191
450EMZ	≤ 75	"	≤ 0.16	≤ 0.025	≤ 0.008 ^{*)}	≤ 0.45	≤ 0.25	≤ 0.030	≤ 0.43	–	"
450EM	≤ 75	TMCP	≤ 0.16	≤ 0.025	≤ 0.015	≤ 0.45	≤ 0.25	≤ 0.030	≤ 0.43	–	"
450EMZ	≤ 75	"	≤ 0.16	≤ 0.025	≤ 0.008 ^{*)}	≤ 0.45	≤ 0.25	≤ 0.030	≤ 0.43	–	"
API 2W-60	≤ 38.1	TMCP	≤ 0.16	≤ 0.030	≤ 0.010	≤ 1.0	≤ 0.15	≤ 0.030	≤ 0.42	≤ 0.23	API 2Y
	> 38.1 ≤ 101.6	"	"	"	"	"	"	"	≤ 0.45	≤ 0.25	"
API 2Y-60	≤ 38.1	Q + T	≤ 0.16	≤ 0.030	≤ 0.010	≤ 1.0	≤ 0.15	≤ 0.030	≤ 0.42	≤ 0.23	API 2W
	> 38.1 ≤ 101.6	"	"	"	"	"	"	"	≤ 0.45	≤ 0.25	"
A40 to E40	≤ 50	N, Q+T	≤ 0.18	≤ 0.025	≤ 0.025	≤ 0.40	≤ 0.08	0.02 – 0.05	–	–	shipbuilding rules (NV) mobile offshore units
	≤ 50	TMCP	"	"	"	"	"	"	≤ 0.40	–	
D420 to E420	≤ 150	N, Q+T	≤ 0.20	≤ 0.030	≤ 0.030	**)	**)	0.02 – 0.05	–	–	
	≤ 150	TMCP	"	"	"	"	"	"	–	–	
D460 to E460	≤ 150	Q + T	"	"	"	**)	**)	0.02 – 0.05	–	–	

^{*)} Low sulphur content, in order to fulfil the requirements on tensile test in through thickness direction. Verification, if corresponding option is required (EN 10225, option 13 or BS 7191, option B24)

^{**)} to be fixed in an approved specification.

420 / 450 / 460 TMCP – comparación entre resistencia mecánica, límite elástico y dureza.

	BS 7191	EN 10225		NORSOK (EN 10225)		API 2W	Shipbuilding rules (e.g. NV) mobile offshore units		
TMCP	450EM/EMZ	S420G1/G2+M	S460G1/G2+M	S420G1/G2+M	S460G1/G2+M	API 2W-60	E 40	E 420	E 460
Thick. [mm]	Tensile strength R_m [MPa]								
≤ 16	550 – 620	500 – 660	540 – 700	500 – 660	550 – 700	≥ 518	510 – 650	530 – 680	570 – 620
> 16 ≤ 20	''	''	530 – 690	''	''	''	''	''	''
> 20 ≤ 25	''	''	''	''	''	''	''	''	''
> 25 ≤ 40	''	''	520 – 680	''	''	''	''	''	''
> 40 ≤ 63	''	480 – 640	515 – 675	''	''	''	(≤ 50 mm)	''	''
> 63 ≤ 75	''	''	505 – 665	''	''	''	–	''	''
> 75 ≤ 80	–	''	''	''	''	''	–	''	''
> 80 ≤ 100	–	''	500 – 660	''	''	''	–	''	''

420 / 450 / 460 TMCP – comparison of yield strength

	BS 7191	EN 10225		NORSOK (EN 10225)		API 2W	Shipbuilding rules (e.g. NV) mobile offshore units		
TMCP	450EM/EMZ	S420G1/G2+M	S460G1/G2+M	S420G1/G2+M	S460G1/G2+M	API 2W-60	E 40	E 420	E 460
Thick. [mm]	Yield strength R_{eH} [MPa]								
≤ 16	≥ 450	≥ 420	≥ 460	≥ 420	≥ 460	414 – 620 ^{*)}	≥ 390	≥ 420	≥ 460
> 16 ≤ 20	≥ 430	≥ 400	≥ 440	“	“	“	“	“	“
> 20 ≤ 25	“	“	“	“	“	“	“	“	“
> 25 ≤ 40	≥ 415	“	≥ 420	“	“	414 – 586 ^{*)}	“	“	“
> 40 ≤ 63	“	≥ 390	≥ 415	“	“	“	(≤50mm)	“	“
> 63 ≤ 75	“	≥ 380	≥ 405	“	“	“	–	“	“
> 75 ≤ 80	–	“	“	“	“	“	–	“	“
> 80 ≤ 100	–	“	≥ 400	“	“	“	–	“	“

^{*)} $R_{p0.2}$

	BS 7191	EN 10225		NORSOK (EN 10225)		API 2W	Shipbuilding rules (NV) mobile offshore units		
TMCP	450EM/EMZ	S420G1/G2+M	S460G1/G2+M	S420G1/G2+M	S460G1/G2+M	API 2W-60	E 40	E 420	E 460
	Minimum Impact Energy A, [Joule] – transverse (average/single) – at a test temperature of								
	– 40 °C	– 40 °C	– 40 °C	– 40 °C	– 40 °C	– 40 °C	– 40 °C	– 40 °C	– 40 °C
Surface									
All thicknesses ≤ 50 mm	60 / 42	60 / 42	60 / 42	60 / 42	60 / 42	–	–	–	–
	–	–	–	–	–	–	27 / 19	28 / 20	31 / 22
Quarter thickn.									
> 50 mm	–	–	–	–	–	–	27 / 19	28 / 20	31 / 22
Mid-thickness									
All thicknesses > 40 mm	–	–	–	–	–	41 / 34	–	–	–
	60 / 42	60 / 42	60 / 42	60 / 42	60 / 42	–	–	–	–

420 / 450 / 460 Q+T – comparación entre resistencia mecánica, límite elástico y dureza.

	BS 7191	EN 10225		NORSOK (EN 10225)		API 2Y	Shipbuilding rules (e.g. NV) mobile offshore units		
Q+T	450EM/EMZ	S420G1/G2+Q	S460G1/G2+Q	S420G1/G2+Q	S460G1/G2+Q	API 2Y-60	E 40	E 420	E 460
Thick. [mm]	Tensile strength R_m [MPa]								
≤ 16	550 – 620	500 – 660	540 – 700	500 – 660	550 – 700	≥ 518	510 – 650	530 – 680	570 – 620
> 16 ≤ 20	''	''	530 – 690	''	''	''	''	''	''
> 20 ≤ 25	''	''	''	''	''	''	''	''	''
> 25 ≤ 40	''	''	520 – 680	''	''	''	''	''	''
> 40 ≤ 63	''	480 – 640	515 – 675	''	''	''	''	''	''
> 63 ≤ 75	''	''	505 – 665	''	''	''	''	''	''
> 75 ≤ 80	–	''	''	''	''	''	''	''	''
> 80 ≤ 100	–	''	500 – 660	''	''	''	''	''	''

	BS 7191	EN 10225		NORSOK (EN 10225)		API 2Y	Shipbuilding rules (e.g. NV) mobile offshore units		
Q+T	450EM/EMZ	S420G1/G2+Q	S460G1/G2+Q	S420G1/G2+Q	S460G1/G2+Q	API 2Y-60	E 40	E 420	E 460
Thick. [mm]	Yield strength R_{eH} [MPa]								
≤ 16	≥ 450	≥ 420	≥ 460	≥ 420	≥ 460	414 – 620 *)	≥ 390	≥ 420	≥ 460
> 16 ≤ 20	≥ 430	≥ 400	≥ 440	"	"	"	"	"	"
> 20 ≤ 25	"	"	"	"	"	"	"	"	"
> 25 ≤ 40	≥ 415	"	≥ 420	"	"	414 – 586 *)	"	"	"
> 40 ≤ 63	"	≥ 390	≥ 415	"	"	"	"	"	"
> 63 ≤ 75	"	≥ 380	≥ 405	"	"	"	"	"	"
> 75 ≤ 80	–	"	"	"	"	"	"	"	"
> 80 ≤ 100	–	"	≥ 400	"	"	"	"	"	"

*) $R_{p0.2}$

	BS 7191	EN 10225		NORSOK (EN 10225)		API 2Y	Shipbuilding rules (NV) mobile offshore units		
Q+T	450EM/EMZ	S420G1/G2+Q	S460G1/G2+Q	S420G1/G2+Q	S460G1/G2+Q	API 2Y-60	E 40	E 420	E 460
	Minimum Impact Energy A, [Joule] – transverse (average/single) – at a test temperature of								
	– 40 °C	– 40 °C	– 40 °C	– 40 °C	– 40 °C	– 40 °C	– 40 °C	– 40 °C	– 40 °C
Surface									
All thicknesses	60 / 42	60 / 42	60 / 42	60 / 42	60 / 42	–	–	–	–
≤ 50 mm	–	–	–	–	–	–	27 / 19	28 / 20	31 / 22
Quarter thickn.									
> 50 mm	–	–	–	–	–	–	27 / 19	28 / 20	31 / 22
Mid-thickness									
All thicknesses	–	–	–	–	–	41 / 34	–	–	–
> 40 mm	60 / 42	60 / 42	60 / 42	60 / 42	60 / 42	–	–	–	–

420 / 450 / 460 TMCP and Q+T – comparación entre resistencia mecánica, límite elástico y

dureza.

	BS 7191	EN 10225		NORSOK (EN 10225)		API	Shipbuilding rules (e.g. NV) mobile offshore units		
TMCP	450EM / EMZ	S420G1/G2+M	S420G1/G2+M	S420G1/G2+M	S420G1/G2+M	API 2W-60	E 40	E 420	E 460
Thick. [mm]	Yield to Tensile strength ratios								
≤ 16	info	0.93	0.93	0.93	0.93	–	–	–	–
> 16	”	0.90	0.90	0.90	0.90	–	–	–	–
Q+T	450EM / EMZ	S420G1/G2+Q	S420G1/G2+Q	S420G1/G2+Q	S420G1/G2+Q	API 2Y-60	E 40	E 420	E 460
Thick. [mm]	Yield to Tensile strength ratios								
≤ 16	info	0.93	0.93	0.93	0.93	–	–	–	–
> 16	”	0.90	0.90	0.90	0.90	–	–	–	–