

Boiler steels

Material #	EN 10028-2	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	HI1	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		

Fine-grain structural steels, thermo mechanically rolled

Material #	EN 10113-3	SEW 083	NFA 36-201	UNI 7382	BS 4360	UNE	ASTM
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

Fine-grain structural steels, normalised rolled

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	

General purpose structural steels

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		

High carbon Steel

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	

High strength steels for cold-forming, normalised

Material #	EN 10149-3	SEW 092	NFA	UNI	BS 1149
1.0971	S260NC	QStE 260 N			
					HR 40/30
1.0973	S315NC				
					HR 43/35
1.0977	S355NC				
					HR 46/40
1.0981	S420NC	QStE 420 N			
					HR 50/45

High yield strength cold forming steels

Material #	EN 10149-2	SEW 092	NFA 36-231	UNI 8890	BS 1449	UNE	A 517 / A 607 / J 1392	JIS
1.0972	S315MC		E 315 D		HR 43F35		045 XLK	
1.0974		QStE 340 TM					Gr. 50 / Gr. 50	
1.0976	S355MC		E 355 D	Fe E 355 TM			050 XLK	
1.0978		QStE 380 TM					Gr. 55	
1.098	S420MC	QStE 420 TM	E 420 D	Fe E 420 TM	HR 50F45		Gr. 60 / Gr. 60 / 060 XLK	
1.0982	S460MC	QStE 460 TM					Gr. 65	
1.0984	S500MC	QStE 500 TM	E 490 D	Fe E 490 TM			Gr. 70 / Gr. 70 / 070 XLK	
1.0986	S550MC	QStE 550 TM	E 560 D	Fe E 560 TM			/ Gr. 80 / 080 XLK	
1.8969	S600MC		E 620 D		HR 68F62			
1.8976	S650MC							
1.8974	S700MC	QStE 690 TM	E 690 D				ASTM A514	

Simple pressure vessels steel

Material #	EN 10207	DIN EN 10207	NFA 36-205	UNI 5869	BS 1501	UNE 36080	ASTM	JIS
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						

Stamping and cold forming steels

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					

Steel for Boilers and Pressure Vessels

Europe			Belgium		Germany			France			Italy	Sweden	India	Japan		U.K	USA
EN	EN 10028-3		NBN 629	NBN 630	DIN 17135	DIN 17165	DIN 17102	NFA 36201	NFA 36205	NFA 36207	UNI 5859	MNC 830E	IS 2002	JIS G 3115	JIS G 3103	BS 1501	ASTM
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	A 285
		KG KW,KT					W St E 255		A 37 CP, AP,FP		Fe 360 2 KW	SS 13,31,01				gr.3 60, 400, 430	gr.A,B ,C
							T St E 255				Fe 360 1 KG						A299
							E St E 255				Fe 360 2 KG		grade 2A			161	A441
P 295 GH	P 275 N	Fe E285	D 42-1,2	E 42-1,2	A St 41	HI	St E 285				Fe 410-1- KW	SS 14,30,01				gr.3 60,4 00,4 30	A442
	P 275 NH	KG,KW, KT					W St 285		A 42 CP,AP, FP		Fe 410-2- KW	SS 14,31,01	grade 2B				gr.55, 60
	P 275 NL 1						T St E 285				Fe 410-1- KG	SS 14,32,01				154	A455
	P 275 NL 2						E St E 285				Fe 410-2- KG					gr.3 60A, 400 A,43 0A	
P296		Fe E315	D 47-1,2	E47-1,2	A St 45	17 Mn	St E 315		A 48		Fe	SS		SPV	SB450	164	A515

GH						4			CP,AP,FP	460-1-KW	21.01.01		315				
		KG,KW,KT					W St E 315			Fe 460-2-KW	SS 21,02,01				gr.3 60,400	gr.55, 60,65, 70	
							T St E 315			Fe 460-1-KG	SS,21,03,01				223	A 516	
							E St E 315			Fe 460-2-KG	SS 29,12,01				gr.4 60,490	gr.55, 60,65, 70	
P 355 GH	P 355 N	Fe E 355				19 Mn 8	E 355 St E 355 R		A 510 AP,FP	Fe 510-1-KW	SS 21,06,01		SPV 355	SB 480	224	A 537	
	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.4 00,430,460,490	class 1	
	P 355 NL1						T St E 355			Fe 510-1-KG					225	A 612	
	P 355 NL2						E St E 355			Fe 510-2--KG					grade 490	A 622	
									A 530 AP,FP		SS 21,16,01					gr.A,B,C	
											SS 21,17,01					A737	
																gr.B,C 7	

Steel for gas cylinders and gas vessels

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

Steel for large diameter pipes

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	

Steel For Ship Building

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					

Steel for Welded Tube

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	

Steel Resistant to Atmospherical Corrosion

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								

Steel with Cr., Mo., Cr-Mo.

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		
		15 CD 2.05					A 204 gr.A,B,C
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	

Structural steels with enhanced resistance to atmosphere corrosion

Material #	EN 10155	SEW 087	NFA 35-502	UNI	BS 4360	UNE	ASTM	JIS G3114
1.8961	S235J2W	WTSt 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	WTSt 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							

Weldable normalized fine grained pressure vessel steels

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	EStE 355						

List of national European Steel Standards corresponding to EURONORM

	Corresponding National Standards				
EURONORM	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.

	Corresponding National Standards in				
EURONORM	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 25	---	---

		Corresponding old designations in										
According to EN 10027-2	According to EN 10025:1990	Germany	France	United Kingdom	Spain	Italy	Belgium	Sweden	Portugal	Austria	Norway	
1.0035	Fe 310-0	St 33	A 33		A 310-0	Fe 320	A 320	13 00-00	Fe 310-0	St 320		
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	
1.0036	Fe 360 BFU	USt 37-2	- - -		AE 235 B-FU					USt 360 B	NS 12	
1.0038	Fe 360 BFN	RSt 37-2	- - -	40 B	AE 235 B-FN			13-12-00		RSt 360 B	NS 12	
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	
										St 360 CE		
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	
1.0117	Fe 360 D2	- - -										
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	
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	
										St 430 CE		
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	
1.0145	Fe 430 D2	- - -						14 14-01				
1.0045	Fe 510 B	- - -	E 36-2	50 B	AE 355 D	Fe 510 B	AE 355-B		Fe 510 B			
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	
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	
1.0577	Fe 510 D2	- - -										
1.0595	Fe 510 DD1	- - -	E 36-4	50 DD			AE 355-DD		Fe 510 DD			
1.0596	Fe 510 DD2	- - -		- - -								
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				
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				
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				

Steel For offshore structures, Standards Comparison

Introduction: The requirements on structural steel plates for offshore structures differ because of the varying fields of application and location. Today, there are four major standards existing, beside of the shipbuilding standards, which describe the severe requirements on structural steel plates for offshore constructions. The standards prEN 10225, BS 7191 and the material data sheets of NORSOK (Norwegian standard) are primarily applicable in Europe (North Sea).

The API-standard is mainly applied in American and Asian areas. However, the different standards may also be used in other areas. In some parts, the standards correspond to each other. So, the Norsok standard refers to the prEN 10225 which itself is based on the BS 7191. The more the standards approach each other, the easier it will be for the steel fabricator to develop together with the engineering companies improved steel grades in an economic way.

Here you will find a comparison of the steel grade 355 in the delivery conditions normalized (N) and thermo mechanically rolled (TMCP) and also of the steel grades 420, 450 and 460 in the delivery conditions thermo- mechanically rolled and quenched and tempered (Q+T). The comparison is based on the latest revisions of the mentioned standards at the date of this issue. *) Furthermore, you will find all weldability qualifications of Dillinger Hütte for offshore grades and all approvals for ship-building grades.

*) Remark: In order to ease the use of this document the supplementary requirements of the different standards are not listed.

[Grade 355 / API 2H and 2W - Chemical Compositions.](#)

[Grade 355 N - Comparison of Tensile Strength, Yield Strength and Toughness](#)

[Grade 355 TMCP - Comparison of Tensile Strength, Yield Strength and Toughness.](#)

[355 N and TMCP - Comparison of Yield to Tensile Strength.](#)

[420 / 450 / 460 - Chemical Compositions](#)

[420 / 450 / 460 TMCP - Comparison of Tensile Strength, Yield Strength and Toughness.](#)

[420 / 450 / 460 Q+T - Comparison of Tensile Strength, Yield Strength and Toughness.](#)

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Grade 355 / API 2H and 2W - chemical compositions

Grade	Thickness [mm]	Delivery condition	C	P	S	Ni	Mo	Nb	CE _(ITW)
S355G2+N	≤ 25	N	≤ 0.20	≤ 0.035	≤ 0.030	≤ 0.50	≤ 0.10	≤ 0.060	≤ 0.43
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
S355G7+M	≤ 100	TMCP	"	"	"	"	"	"	"
S355G8+N	≤ 150	N	≤ 0.14	≤ 0.030	≤ 0.007 ^{*)}	≤ 0.50	≤ 0.08	≤ 0.040	≤ 0.43
S355G8+M	≤ 100	TMCP	"	"	"	"	"	"	"
S355G9+N	≤ 40	N	≤ 0.12	≤ 0.030	≤ 0.010	≤ 0.70	≤ 0.08	≤ 0.040	≤ 0.43
	> 40 ≤ 150	"	"	"	"	> 0.30 ≤ 0.70	"	"	"
S355G9+M	≤ 40	TMCP	≤ 0.12	≤ 0.030	≤ 0.010	≤ 0.70	≤ 0.08	≤ 0.030	≤ 0.41
	> 40 ≤ 75	"	"	"	"	> 0.30 ≤ 0.70	"	"	"
	> 75 ≤ 100	"	"	"	"	"	≤ 0.20	"	≤ 0.42
S355G10+N	≤ 40	N	≤ 0.12	≤ 0.015	≤ 0.005 ^{*)}	≤ 0.70	≤ 0.08	≤ 0.040	≤ 0.43
	> 40 ≤ 150	"	"	"	"	"	"	"	"
S355G10+M	≤ 40	TMCP	≤ 0.12	≤ 0.015	≤ 0.005 ^{*)}	≤ 0.70	≤ 0.08	≤ 0.040	≤ 0.41
	> 40 ≤ 75	"	"	"	"	> 0.30 ≤ 0.70	"	"	"
	> 75 ≤ 100	"	"	"	"	"	≤ 0.20	"	≤ 0.42
API 2H-50(T)	≤ 50.8	N	≤ 0.18	≤ 0.030	≤ 0.010	–	–	0.005-0.05	≤ 0.43
	> 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
	> 38.1 ≤ 88.9	"	"	"	"	"	"	"	≤ 0.41
	> 88.9 ≤ 152.6	"	"	"	"	"	"	"	≤ 0.43
355EM	≤ 40	N/TMCP	≤ 0.15	≤ 0.025	≤ 0.015	≤ 0.45	≤ 0.08	≤ 0.040	≤ 0.43
	> 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
	> 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*
	> 50 ≤ 100	"	"	"	"	"	"	"	≤ 0.40**
	> 100 ≤ 150	"	"	"	"	"	"	"	≤ 0.41**

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

***) for TMCP only

Grade 355N - comparison of tensile strength, yield strength and toughness

	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 – 630	470 – 630	470 – 630	483 – 620	90 – 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	"	"
	BS7191	EN 10225 / NORSOK			API 2H	Shipbuilding rules LR / GL / NV

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	-	-
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Grade 355 TMCP – comparison of tensile strength, yield strength and Toughness

	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 m)

*) $R_{p0.2}$

	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	–	–

355 N and TMCP – Comparison of yield to tensile strength ratios

	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 - chemical compositions

Grade	Thickness [mm]	Delivery condition	C	P	S	Ni	Mo	Nb	CE _{max}	Pcm	Stand
S420G1+Q	≤ 15	QT	≤ 0.14	≤ 0.020	≤ 0.010	≤ 0.70	≤ 0.25	≤ 0.040	≤ 0.42	≤ 0.23	EN 10
	> 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 7
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
	> 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
	> 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	-	-	shipbu rules (mob offsh uni
	≤ 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 10028-2 option 13 or BS 7191, option B24)
^{**)} to be fixed in an approved specification.

420 / 450 / 460 TMCP – comparison of tensile strength, yield strength and toughness

	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 $R_{0.2}$ [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	..	..	..	(≤ 50 mm)	..	..
> 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	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 Q+T – comparison of tensile strength, yield strength and toughness

	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_v [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 TMCP and Q+T – comparison of yield to tensile strength ratios

	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	–	–	–	–

Weldability qualifications of Dillinger Hütte

N:	TMCP:	Q+T:
355EM / 355EMZ Maximum qualified plate thickness in Dillinger Hütte: 120 mm (According to BS 7191 appendix F + G)	355EM / 355EMZ Maximum qualified plate thickness in Dillinger Hütte: 85 mm (According to BS 7191 appendix F + G)	S420G1+Q / S420G2+Q / S460G1+Q / S460G2+Q Maximum qualified plate thickness in Dillinger Hütte: 100 mm (According to EN 10225, if option 18 is chosen)
S355G7+N / S355G8+N / S355G9 N / S355G10+N Maximum qualified plate thickness in Dillinger Hütte: 120 mm (According to EN 10225, if option 18 is chosen)	S355G7+M / S355G8+M / S355G9+M / S355G10+M Maximum qualified plate thickness in Dillinger Hütte: 85 mm (According to EN 10225, if option 18 is chosen)	450EM / 450EMZ Maximum qualified plate thickness in Dillinger Hütte: 100 mm (According to BS 7191 appendix F + G)
	API 2W-50(T) Maximum qualified plate thickness in Dillinger Hütte: 90 mm (According to API RP2Z, if suppl. S11 is chosen)	
	S420G1 + M / S420G2+M / S460G1+M / S460G2+M Maximum qualified plate thickness in Dillinger Hütte: 100 mm (According to EN 10225, if option 18 is chosen)	

	450EM / 450EMZ Dillinger Hütte is qualified up to 100 mm (According to BS 7191 appendix F + G)	
	API 2W-60 Maximum qualified plate thickness in Dillinger Hütte: 75 mm (According to API RP2Z, if suppl. S11 is chosen)	*) Several grades require a weldability qualification according to a standard or an approval of a classification company, which is necessary for a delivery.

Approvals of Dillinger Hütte for shipbuilding grades

Grade	Classification Company	Thickness [mm]	Delivery Condition
ABS-EH36	ABS	≤100	TMCP
ABS-AH40 to FH40	ABS	≤65	N
	ABS	≤44	TMCP
BV-EH36	BV	≤80	TMCP
BV-E36	BV	≤50	N
NV-E36	DNV	≤100	TMCP
	DNV	≤50	N
NV-F36	DNV	≤80	TMCP
GL-E36	GL	≤250	N
	GL	≤100	TMCP
LR-EH36 LR-F36	LR	≤170	N
	LR	≤100	TMCP
	LR	≤70	TMCP
NV-A420 NV-E420	NV	≤100	TMCP
GL-A40	GL	≤100	TMCP

- Detailed inquiries concerning approvals are to be submitted to our Quality Department.
- This summary is only for information. In case of conflicts the original standard has to be applied.
- Individual feasibility and combination of grades are a matter of an inquiry.

*) **The shipbuilding grades** (e.g. E36 or E40) require a formal approval by the relevant classification company.

to E40				
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