

NF A49-213-84 STEEL TUBES SEAMLESS UNALLOYED AND MO CRMO ALLOY STEEL TUBES FOR USE AT HIGH TEMPERATURES

Grade	Mfg. Process	Chemical Composition (%)								
		C	Si	Mn	P	S	Ni	Cr	Mo	Others
TU37C	S	0.16Max	0.06-0.30	0.35-0.75	0.035Max	0.035Max	-	-	-	Cu 0.25Max Sn 0.030Max
TU42C	S	0.20Max	0.08-0.35	0.45-1.00	0.035Max	0.035Max	-	-	-	Cu 0.25Max Sn 0.030Max
TU42CR	S	0.20Max	0.08-0.35	0.60-1.15	0.035Max	0.035Max	-	-	-	Cu 0.25Max Sn 0.030Max
TU48C	S	0.22Max	0.10-0.35	0.65-1.20	0.040Max	0.040Max	-	-	-	Cu 0.25Max Sn 0.030Max
TU48CR	S	0.20Max	0.15-0.50	1.00-1.50	0.035Max	0.035Max	-	-	-	Cu 0.25Max Sn 0.03Max
RU52C	S	0.20Max	0.15-0.50	1.00-1.50	0.035Max	0.035Max	-	-	-	Cu 0.25Max Sn 0.030Max
TU15D3	S	0.12-0.20	0.15-0.50	0.50-0.80	0.035Max	0.035Max	0.30Max	0.30Max	0.25-0.35	Cu 0.25Max Sn 0.030Max
TU15CD2-05	S	0.10-0.18	0.10-0.35	0.50-0.80	0.030Max	0.030Max	0.30Max	0.40-0.65	0.45-0.60	Cu 0.25Max Sn 0.030Max
TU10CD5-05	S	0.15Max	0.50-1.00	0.30-0.60	0.030Max	0.030Max	0.30Max	1.00-1.50	0.45-0.65	Cu 0.25Max Sn 0.030Max
TU10CD9-10	S	0.15Max	0.10-0.50	0.30-0.60	0.030Max	0.030Max	0.30Max	2.00-2.50	0.90-1.10	Cu 0.25Max Sn 0.030Max
TUZ10CD5-05	S	0.15Max	0.10-0.50	0.30-0.60	0.030Max	0.030Max	-	4.00-6.00	0.45-0.65	Cu 0.25Max Sn 0.030Max
TUZ10CD9	S	0.15Max	0.25-1.00	0.30-0.60	0.030Max	0.030Max	0.30Max	8.00-10.00	0.90-1.10	Cu 0.25Max Sn 0.03Max
TUZ10CDNbV9.2	S	0.15Max	0.20-0.65	0.80-1.30	0.030Max	0.030Max	0.30Max	8.50-10.50	1.70-2.30	Nb 0.30-0.55 V 0.20-0.40 Cu 0.25Max

A 106 Seamless Carbon Steel Pipe for High Temperature Service																	
Grade A	K02501	SPHT 38 / STPT 370	D3570 / G3456	(16)(30)	St 35.8	17175	1.0305		3602	HFS 360		TU 37C	A49-213		C 14	5462	
Grade B	K03006	SPHT 42 / STPT 410	D3570 / G3456	(16)(30)	St 45.8	17175	1.0405		3602	HFS 410		TU 42C	A49-213		C 18	5462	

Material Comparison Tables (ASTM, KS, JIS, DIN, BS, NF, UNI)

ASTM Standard	UNS NO.	KOREA/JAPANES			GERMAN				BRITISH			FRENCH			ITALIAN		
		KS/JIS Symbol	KS/JIS Number	Remarks	DIN Type	DIN Number	Material Number	Remarks	B.S Number	B.S Grade	Remarks	AFNOR Type	NF Number	Remarks	UNI Type	UNI Number	Remarks
A 192 Seamless Carbon Steel Boiler Tube for High Pressure Service	K01201	STBH 340 / STB 340	D3563 / G3461	(30)	St 35.8	17175	1.0305		3059	320	(27)(30)	TU 37C	A49-213	(27)	C14	5462	(27)

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ASTM Standard	UNS NO.	KOREA/JAPANES			GERMAN				BRITISH			FRENCH			ITALIAN		
		KS/JIS Symbol	KS/JIS Number	Remarks	DIN Type	DIN Number	Material Number	Remarks	B.S Number	B.S Grade	Remarks	AFNOR Type	NF Number	Remarks	UNI Type	UNI Number	Remarks
A 200 Seamless Intermediate Alloy Steel Tubes for Refinery Service																	
T 5	K41545	STHA 24 / STBA 25	D3572 / G3462	(32)	12 CrMo 19 5		1.7362	(3a)	3604	625	(30)(32)	TU Z 12 CD	A49-213	(32)			Dalmine 234(3b)
T 11	K11597	STHA 22 / STBA 23	D3572 / G3462	(32)	13 CrMo 44	17175	1.7335	(8)	3604	621	(30)(32)	5.05	A49-213	(32)			Dalmine 227(3b)

T 22	K2159	STHA 23 / STBA 24	F3572 / G3462	(32)	10 CrMo 9 10	17175	1.7380		3606	622	(30)(32)	TU 10 CD 5.05	A49-213	(32)	12CrMo 9 10	5462	(3b)
												TU 12 CD 9.10					

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ASTM Standard	UNS NO.	KOREA/JAPANES			GERMAN				BRITISH			FRENCH			ITALIAN		
		KS/JIS Symbol	KS/JIS Number	Remarks	DIN Type	DIN Number	Material Number	Remarks	B.S Number	B.S Grade	Remarks	AFNOR Type	NF Number	Remarks	UNI Type	UNI Number	Remarks
A 210 Seamless Medium Carbon Steel Boiler and Superheater Tubes																	
Grade A-1	K02707	STHA 410 / STBA 410	D3563 / G3461	(30)(24)	St45.8	17175	1.0405		3059	320	(30)	TU A42-C	A49-213	(6)(13)	C 18	5462	(38)

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ASTM Standard	UNS NO.	KOREA/JAPANES			GERMAN				BRITISH			FRENCH			ITALIAN		
		KS/JIS Symbol	KS/JIS Number	Remarks	DIN Type	DIN Number	Material Number	Remarks	B.S Number	B.S Grade	Remarks	AFNOR Type	NF Number	Remarks	UNI Type	UNI Number	Remarks
A 213 Seamless Alloy Steel Boiler and Heat Exchanger Tubes																	
Grade T 5	K41545	STHA 24 / STBA 25	D3572 / G3462	(30)(24)	12 CrMo 19 5		1.7362	(3a)	3606	625	(30)	TU12C	A49-213	(3a)(32)			Dalmine 234(3b)
Grade T 11	K11597	STHA 22 / STBA 24	D3572 / G3462	(30)(24)	13 CrMo 44	17175	1.7335	(8)(32)	3606	621	(30)	5.05		(3b)(32)			Dalmine 227(3b)
Grade T 12	K11562	STHA 21 / STBA 22	D3572 / G3462	(30)(24)	13 CrMo 44	17175	1.7335	(32)	3606	620	(30)	TU 10 CD 5.05					
Grade T 22	K21590	STHA 23 / STBA 24	D3572 / G3462	(30)(24)	10 CrMo 9 10	17175	1.7380	(32)	3606	622	(30)(32)			(3a)(32)	12 CrMo 9 10	5462	Dalmine 235(3b)

TP 304	S30400	STS 304 TB / SUS 304 TB	D3577 / G3463	(30)(24)	X5 CrNi 18 9	17440	1.4301	(3b)	3606	304S25	(30)	TU 10 CD 9.10	A49-218	(3b)	X5 CrNi 18 10	6904	(3b)
TP 304L	S31403	STS 304LTB / SUS 304LTB	D3577 / G3463	(30)(24)	X2 CrNi 18 9	17440	1.4306	(3b)	3606	304S22	(30)	Z 6 CN 18.09	A49-218	(3b)	X2 CrNi 18 11	6904	(3b)
TP 310	S31000	STS 310STB/SUS 210STB	D3577 / G3463	(30)(24)	X12 CrNi 2528		1.4845	WBL-470(3b)			(3)	Z 2 CN 18.09		(3)	X22CrNi 25 20	6904	(3b)(11)
TP 316	S31600	STS 316TB / SUS 316TB	D3577 / G3463	(30)(24)	X5 CrNiMo 18 10	17440	1.4401	(3b)	3606	316S30	(30)		A49-218	(3b)	X5 CrNiMo 17 12	6904	(3b)
TP 316L	S211603	STS 316LTB /SUS 316LTB	D3577 / G3463	(30)(24)	X2 CrNiMo 18 10	17440	1.4404	(3b)	3606	316S29	(30)	Z 6 CND 17.12	A49-218	(3b)	X2 CrNiMo 17 12	6904	(3b)
TP 321	S32100	STS 312TB/SUS 321TB	D3577 / G3463	(30)(24)	X10 CrNiTi 18 9	17440	1.4541	(3b)	3606	321S22	(30)	Z2 CND 17.13	A49-218	(3b)	X6 CrNiTi 18 11	6904	(3b)
TP 347	S34700	STS 347TB / SUS 347TB	D3577 / G3463	(30)(24)	X10 CrNiNb 18 9	17440	1.4550	(3b)	3606	347S17	(30)	Z6 CNT 18.11	A49-218	(3b)	X6 CrNiNb 18 11	6904	(3b)
												Z 6 CNNb 18.11					

Material Comparison Tables (ASTM, KS, JIS, DIN, BS, NBN, NF, UNI)

ASTM Standard	UNS NO.	KOREA/JAPANESE			GERMAN				BRITISH			FRENCH			ITALIAN		
		KS/JIS Symbol	KS/JIS Number	Remarks	DIN Type	DIN Number	Material Number	Remarks	B.S Number	B.S Grade	Remarks	AFNOR Type	NF Number	Remarks	UNI Type	UNI Number	Remarks
A 335 Seamless Ferritic Alloy Steel Pipe for High Temperature Service																	
P1	K11522	SPA 12 / STPA 12	D 3573 / G 3458	(16)	16 Mo 5		1.5423	(3a)			(3)	TU 15 D 3	A49-213		16 Mo 5	5462	
P5	K41545	SPA 25 /	D 3573 /	(16)	12		1.7362	WBL-590(3b)	3604	FHS 625	CAT.2	TU Z12	A49-213				Dalmine234(3b)

JIS Number and Corresponding Foreign Standards

JIS			ASTM			BS			DIN			NF			ISO			Index Number
Standard Number	Grade	Type	Standard Number	Grade	Type	Standard Number	Grade	Type	Standard Number	Grade	Type	Standard Number	Grade	Type	Standard Number	Grade	Type	
G3458	STPA12	Mo	A335	P1	Mo													C006
	STPA20	CrMo	A335	P2	CrMo							A49-213	TU15CD205	CrMo				
	STPA22	CrMo	A355	P12	CrMo	3604	HFS620-460	CrMo	17175	13CrMo44	CrMo							
						"	CFS620-460	CrMo										
						"	ERW620-460	CrMo										
						"	CEW620-460	CrMo										
						"	HFS620-440	CrMo										
						"	CFS620-440	CrMo										
						"	ERW620-440	CrMo										
						"	CEW620-440	CrMo										
	STPA23	CrMo	A355	P11	CrMo	3604	HFS621	CrMo				A49-213	TU10CD5.05	CrMo				
						"	CFS621	CrMo										
						"	ERW621	CrMo										
						"	CEW621	CrMo										
	STPA24	CrMo	A355	P22	CrMo	3604	HFS622	CrMo	17175	10CrMo910	CrMo	A49-213	TU10CD9.10	CrMo				
						"	CFS622	CrMo										
	STPA25	CrMo	A355	P5	CrMo	3604	HFS625	CrMo				A49-21	TUZ12CD0.05	CrMo	2604/2	TS37	CrMo	
						"	CFS625	CrMo										
	STPA26	CrMo	A355	P9	CrMo	3604	HFS629-470	CrMo				A49-213	TUZ10CD9	CrMo				
						"	CFS629-470	CrMo										

JIS Number and Corresponding Foreign Standards

JIS			ASTM			BS			DIN			NF			ISO			Index Number
Standard Number	Grade	Type	Standard Number	Grade	Type	Standard Number	Grade	Type	Standard Number	Grade	Type	Standard Number	Grade	Type	Standard Number	Grade	Type	
G3461	STB340	C	A161	LC	C	3059	HFS320	C				A49-245	TS34e	C				C010
	(STB35)		A192	-	C	"	CFS320	C				"	TS34c	C				
			A226	-	C	"	ERW320	C										
			A556	GrA2	C	"	CEW320	C										
			A557	GrA2	C	"	S1 360	C										
						"	S2 360	C										
						"	ERW 360	C										
						"	CEW360	C										
						3606	ERW320	C										
						"	CEW320	C										
						"	CFS320	C										
	STB410	C	A179	GrC	C	3059	S1 440	C	17175	St45.8	C	A49-213	TU42c	C	2604/2	TS9H	C	
	(STB42)		A210	GrA1	C	"	S2 440	C	17177	St42.8	C	A49-215	TU42c	C	"	TW9H	C	
			A556	GrB2	C	"	ERW 440	C				A49-243	TS42c					
			A557	GrB2	C	"	CEW 440	C				A49-245	TS42c					
						3602	HFS 410	C				"	TS42c					
						"	CFS 410	C										
						"	ERW 410	C										
						"	CEW 410	C										
						3606	ERW 440	C										
						"	CEW 440	C										
						"	CFS 440	C										
STB510	C							C	17175	19Mn5	C	A49-213	TU52C	C	2604/2	TS18	C	
(STB52)								C				A49-248	TU52C	C				