

Seamless tubes and pipes for boilers



The boiler tubes are manufactured from materials which are able to withstand high temperatures and high pressures. They must therefore meet the greatest technical requirements of the production process and also the most stringent control regulations in order to guarantee their durability and reliability over a period of time

Hot rolled seamless carbon and alloy steel tubes and pipes for boilers

Features

Definition of the order

Ordering Information:

- Tubes or pipes product
- Steel grade and heat treatment
- Sizes, wall thickness
- Lengths
- Quantity
- End use
- Norms specifications

Options:

- Fixed or multiple lengths*
- Special tests*
- Surface Protection*
- Special marking*
- Colour coding*
- Special packing*

Reference standards

EN - ASTM/ASME - DIN -NF A - BS -
UNI - ISO

Size range

See table

Lengths

The tubes and pipes are supplied in random lengths or in fixed lengths from 4000 mm up to 24000 mm depending on size, please verify before ordering.

Lengths different from those in the specification can be agreed at the time of ordering.

Tests and inspections

Main tests performed:

- Heat analysis
- Product analysis (if required)
- Tensile test
- Impact test (if required)
- Hydraulic test or equivalent NDE
- NDE
- Visual and dimensional inspection

Additional specific tests can be agreed at the time of ordering.



Quality System Certified
n. 110950

Tolerances

OUTSIDE DIAMETER	
O.D. mm	TOLERANCES
O.D. ≤ 133,0	± 0.75% with a minimum of ± 0.5 mm
133,0 < O.D. ≤ 355.6	± 0.75%
O.D. > 355,6	± 1%

WALL THICKNESS		
O.D. mm	W.T. mm	TOLERANCES
O.D. ≤ 133,0		± 12.5%
133,0 < O.D. ≤ 355.6		± 12.5%
355,6 < O.D. ≤ 711.2	≤ 25	± 12.5%
355,6 < O.D. ≤ 711.2	> 25	Min ± 12.5% and Max + 22% - 15% Depending on the ratio W.T./O.D.

Tighter manufacturing tolerances available upon request
 Tenaris applies a Total Quality Assurance programme in compliance with ISO 9001

Surfaces

Tubes and pipes will be supplied in accordance with the standard workmanship as per hot finished products.
 Special surface protection may be agreed at the time of ordering.

Certification

The products are supplied with 3.1 specific test certificates, according to EN 10204.
 Certification according to 3.2 can be agreed at the time of ordering.

Identification and marking

All the products are identified in accordance with the material STD Specification and/or in accordance with P O requirements (to be agreed)
 Special specific marking to be agreed.

Packing

Pipes may be furnished bare or with STD Mill coating and with capped ends.
 In order to prevent rust during sea shipment, bundles of tubes may be wrapped with polypropylene sheets, and secured with flat steel bands.
 Products up to 3" OD will be supplied in bundles.
 Over 3" OD will be supplied loose.

Minimum quantity

- Carbon steels, low alloy and high alloy steels:
up to 3" OD - 3 ton
up to 14" OD - 200 m
up to 28" OD - 100 m

Technical assistance

Tenaris offers the option of technical consultancy for the use of its products.

Specific qualification

Tenaris is qualified by international accredited inspection bodies of TÜV - IBR - UDT, etc.

TÜV QUALIFICATION		
MATERIAL	SPECIFICATION	CONDITION
CARBON STEEL	DIN1629	CR,N
HIGH TEMPERATURE	DIN 17175	CR, N, V
15 NiCuMoNb 5	VdTÜV 377/2	V
X 10 CrMoVNb 91	VdTÜV 511/2	V

CR = CONTROLLED ROLLED
 N = NORMALIZED
 V = QUENCHED AND TEMPERED

Tubes for pressure purposes

STANDARD CORRELATION BETWEEN EN - ASTM/ASME - DIN - NF A - BS - UNI

EN		ASTM/ASME				
Pr EN 10216 Part 1 - TR2	53	106				
Unalloy		Carbon Steel				
General use	Black	High Temp.				
Ambient Temperature	Hot-deep zinc-coat.					
Pressure purposes						
P195TR1 *	A + Carbon equival	A + Carbon equival				
P195TR2						
P235TR1 *	B + Carbon equival	B + Carbon equival				
P235TR2						
P265TR1 *		C + Carbon equival				
P265TR2						
EN		ASTM/ASME				
Pr EN 10216 Part 2	106	179	192	209	210	213
Unalloy	Carbon Steel	Low-Carbon Steel	Carbon Steel	C-Mo	Medium-carbon	Alloy (Ferr.& Aust.)
Alloy						
Elevated Temperature	High Temp.	Cold-Drawn	Boiler	Superheater	Boiler	Heat-Exchanger
Pressure purposes		Heat-Exchanger	High-pressure		Superheater	Boiler Superheater
P195GH	A + High temp serv	Low C	Low C			
P235GH						
P265GH	B + High temp serv				A1	
					C	
	C + High temp serv					
20MnNb6						
16Mo3				T1 T1a T1b		T2
8MoB5-4						
						T17
14MoV6-3						T11
10CrMo5-5						T12
13CrMo4-5						T21
10CrMo9-10						T22
11CrMo9-10						
25CrMo4						
20CrMoV13-5-5						
15NiCuMoNb5-6-4						
X11CrMo5+I						T5
X11CrMo5+NT1						
X11CrMo5+NT2						
X11CrMo9-1+I						T9
X11CrMo9-1+NT						
X10CrMoVNb9-1						T91
X20CrMoV11-1						
						T23
						T24
						T911
						T92
						T122
						18Cr-2Mo

* Tubes made of these material grades (TR1) are unlikely to support the essential requirements of the PED - Directive 97/23/EC

** Vd TÜV 511/2

		DIN		NF			
	1629 Unalloyed	1630 Unalloyed	49-111 (p)	49-112			
	Special Quality Requirem.	Pressure purposes 300 °C max	Commercial quality Medium Pressure	Ambient Temp.			
	St 37.0		TU 37-a	TU E 220 A			
	St 44.0	St 37.4		TU E 235 A			
		St 44.4					
	St 52.0	St 52.4					
		DIN		NF			
335 Alloy (Ferr.)	17175	17176	49-210	49-211 Alloy	49-213 Unalloy Alloy (Mo & Cr-Mo)	49-215 (p) Unalloy Alloy (Ferritic) Heat-Exchanger	49-219 Unalloy Alloy (Mo & C) Elevated Temp Furnaces
High Temp.	Elevated Temp.	Elevated Temp. For Hydrogen Service		Elevated Temp.	Elevated Temp.		
	St 35.8			TU E 220	TU 37 C - TU 42 C - TU 42 CR	TU 37 C - TU 42 C	TU 37 F - TU 42 F
	St 45.8			TU E 250			
				TU E 275		TU 48 C	
	17 Mn 4				TU 48 C - TU 48 CR		
	19 Mn 5				TU 48 C - TU 48 CR		
					TU 52 C		
P1	15Mo3					TU 15 D 3	TU 15 D 3
P2					TU 15 D 3		
						TU 15 CD 2-05	
	14MoV63						
P11						TU 10 CD 5-05	TU 10 CD 5-05
P12	13CrMo44	13CrMo44			TU 10 CD 5-05		TU 13 CD 4-04
P15					TU 13 CD 4-04		
P21							
P22	10CrMo910	10CrMo910				TU 10 CD 9-10	TU 10 CD 9-10
		12CrMo910				TU 10 CD 9-10	
		12 Cr Mo 12 10					
		25CrMo4					
		20CrMoV135					
P5		12CrMo195(G)					TU Z 12 CD 05-05
		12CrMo195(V1)			TU Z 12 CD 05-05 a		TU Z 12 CD 05-05
		12CrMo195(V2)			TU Z 12 CD 05-05 b	TU Z 10 CD 5-05	
P9		X12CrMo91(G)				TU Z 10 CD 9	TU Z 10 CD 09
		X12CrMo91(V)			TU Z 10 CD 09 a		TU Z 10 CD 09
P91	X10CrMoVNb91(**)				TU Z 10 CD 09 b		TU Z 10 CD 09
	X20CrMoV121	X20CrMoV121			TU Z 10 CD 09 b		TU Z 10 CD 09
					TU Z 10 CD 09-01		TU Z 10 CD 09
P23							
P911							
P92						TU Z 10 CD NbV 09-02	
P122							

		BS		UNI		ISO
	3059-1 Carbon	3601 Carbon Steel		663 Unalloyed steel	7088	9329-1 Unalloyed steel
	Boiler Superheater No elevated Temp.	Special Delivery Cond. Ambient Temp. Pressure purposes		General Purposes		Ambient Temp. Pressure purposes
	320	0				
		360		Fe 35-1 Fe 35-2	Fe 35-1	TS 360
		430		Fe 45-1 Fe 45-2	Fe 45-1	TS 410 TS 430
				Fe 52-1 Fe 52-2		TS 500
		BS		UNI		ISO
	3059-2 Carbon Alloy Boiler Superheater Elevated Temp.	3602-1 Carbon and C-Mn	3604-1 Alloy (Ferritic)	3606	5462	9329-2 Unalloy Alloy Pressure purposes Specific Temp.
		Pressure purposes Elevated Temp.	Pressure purposes Elevated Temp.	Heat Exchangers	High-pressure Elevated Temp.	
				320		
	360	360		400	C 14	PH 23
	440	430		440	C 18	PH 26
						PH 29
		500 Nb				PH 35
	243			243	16 Mo 5	16Mo3
				261		8CrMo4-5
			660			12MoCr6-2
			621	621		8CrMo5-5
	620-460		620 - 440	620	14 Cr Mo 3	13CrMo4-5
	622-490		622	622	12 Cr Mo 910	11CrMo9-10(TA) (TN-TT)
			591			
			625	625		X11CrMo5TA X11CrMo5TN-TT
	a		629-470			X11CrMo9-1TA
	b		629-590			X11CrMo9-1TN-TT
	09-01		9 1			X10CrMoVNb9-1
			762			X20CrMoNiV11-1-1 9NiMnMoNb5-4-4

DIMENSIONAL RANGE FOR CARBON STEEL AND LOW ALLOY STEEL

OUTSIDE DIAMETER	AVERAGE WALL THICKNESS																		
	2.3	2.6	2.9	3.2	3.6	4	4.5	5.2	5.6	6.3	7.1	8	8.8	10	11	12.5	14.2	16	17.5
21.3	█	█	█	█	█														
25	█	█	█	█	█	█													
26.9	█	█	█	█	█	█	█												
30	█	█	█	█	█	█	█	█											
31.8	█	█	█	█	█	█	█	█	█										
33.7	█	█	█	█	█	█	█	█	█	█									
38	█	█	█	█	█	█	█	█	█	█	█								
42.4		█	█	█	█	█	█	█	█	█	█	█							
44.5		█	█	█	█	█	█	█	█	█	█	█	█						
48.3		█	█	█	█	█	█	█	█	█	█	█	█	█					
51		█	█	█	█	█	█	█	█	█	█	█	█	█					
54		█	█	█	█	█	█	█	█	█	█	█	█	█	█				
57		█	█	█	█	█	█	█	█	█	█	█	█	█	█	█			
60.3		█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█		
63.5		█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	
70			█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
73			█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
76.1			█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
82.5				█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
88.9				█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
101.6					█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
108						█	█	█	█	█	█	█	█	█	█	█	█	█	█
114.3							█	█	█	█	█	█	█	█	█	█	█	█	█
121								█	█	█	█	█	█	█	█	█	█	█	█
127									█	█	█	█	█	█	█	█	█	█	█
133										█	█	█	█	█	█	█	█	█	█
139.7											█	█	█	█	█	█	█	█	█
152.4												█	█	█	█	█	█	█	█
159													█	█	█	█	█	█	█
168.3														█	█	█	█	█	█
177.8															█	█	█	█	█
193.7																█	█	█	█
219.1																	█	█	█
244.5																		█	█
273																			█
323.9																			
355.6																			
406.4																			
457																			
508																			
559																			
610																			
660																			
711																			
	0.091	0.102	0.114	0.126	0.142	0.157	0.177	0.197	0.220	0.248	0.280	0.346	0.394	0.394	0.433	0.492	0.559	0.630	0.689

- Carbon and up to T/P Remark: different sizes (ODxWT) are available upon request
- P22 - P5: different sizes (ODxWT) are available upon request

For steel grades P/T23, T24,T911 T91/P91 please contact technical department, to be verified for each inquiry

20	22.2	25	28	30	32	36	40	45	50	55	60	65	70	75	80	85	90	100		
																				0.840
																				0.985
																				1.060
																				1.185
																				1.250
																				1.330
																				1.500
																				1.670
																				1.750
																				1.900
																				2.010
																				2.125
																				2.245
																				2.375
																				2.500
																				2.760
																				2.875
																				3.000
																				3.250
																				3.500
																				4.000
																				4.250
																				4.500
																				4.625
																				5.000
																				5.240
																				5.500
																				6.000
																				6.250
																				6.625
																				7.000
																				7.625
																				8.625
																				9.625
																				10.750
																				12.750
																				14.000
																				16.000
																				18.000
																				20.000
																				22.000
																				24.000
																				26.000
																				28.000
0.787	0.874	0.984	1.102	1.181	1.260	1.417	1.575	1.772	1.969	2.165	2.362	2.559	2.756	2.953	3.150	3.346	3.543	3.937	in	

OUTSIDE DIAMETER

AVERAGE WALL THICKNESS

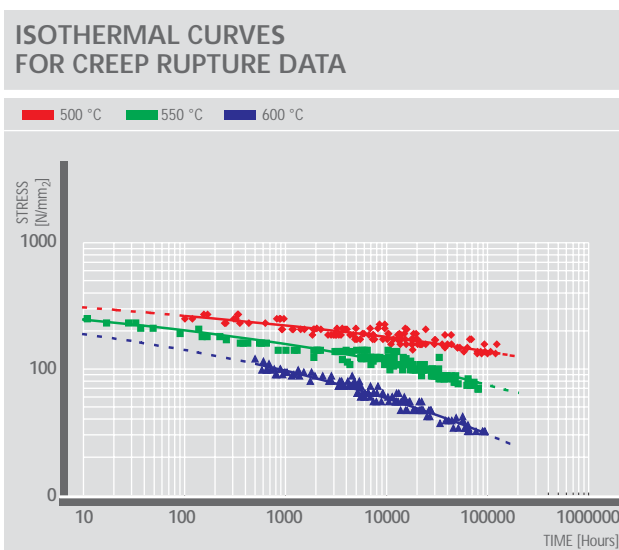
 Sizes in the field outlined to be verified at the time of the inquiry

Notes on the behaviour of steel at high temperatures

The boiler tubes must be able to operate at high pressures and temperatures, such as 650 °C for long periods of time. At high temperature a constant load produces a micro structural variation of the metallic material, this brings a progressive reduction of the properties of the material itself (Creep). Since 1957 Dalmine have conducted a study of this phenomenon with the aim of identifying a group of steels for critical components which would have theoretical life superior to the norm, even in severe conditions like those typical to the

thermal sector. The findings are stored in a data base which is at the disposal of the international association "Working Group Creep." They gather and utilize the results of the Creep tests which were undertaken in various laboratories in Europe. The same data, once analyzed, is utilized for issuing a technical specification which becomes more and more stringent. In Dalmine such studies, which sometimes require tests with a duration of more than 100000 hours per specimen,

are carried out in a laboratory. The laboratory, one of the largest in the Europe, is equipped with 82 machines for a total of 292 specimens which are all tested at the same time. The completed tests, until now, have checked 6500 different specimen steels for 75,000,000 hours. Dalmine for its large experience participates, through CSM (Centro Sviluppo Materiali of Rome), in European Projects for Research, Development and Qualification of advanced materials.



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