



## SEAMLESS TUBES FOR BOILER AND HEAT EXCHANGER (HIGH TEMPERATURE)

Used for boiler, pipe lines, pressure vessels, equipment for high temperature and pressure, equipment for heat-exchanger and condenser at a temperature lower than 650 °C

### STANDARDS & MATERIAL QUALITY

Max Service Temperature	EUROPE EN	GERMANY DIN	USA ASTM
475°C	EN10216-2 P235GH TC1 & TC2	DIN 17175 St35.8/I & III	ASTM A106 GR.A, ASTM A179
	EN 10216-2 P265GH TC1 & TC2	DIN 17175 St45.8/I & III	ASTM A106 GR.B, ASTM A210 Gr.A1
	----	DIN 17175 17Mn4	ASTM A106 GR.C, ASTM A210 Gr.C
500°C	EN 10216-2 16Mo3	DIN 17175 15Mo3	ASTM A209 T1, ASTM 335 P1
560°C	EN 10216-2 13CrMo4-5	DIN 17175 13CrMo4-4	ASTM A213 T12, ASTM A335 P12
575°C	----	----	ASTM A213 T11, ASTM A335 P11
600°C	EN 10216-2 X11CrMo5	DIN 17175 12CrMo195	ASTM A213 T5, ASTM A335 P5
	EN 10216-2 10CrMo9-10	DIN 17175 10CrMo910	ASTM A213 T22, ASTM A335 P22
625°C	EN 10216-2 11CrMo9-10	DIN 17175 X12CrMo91	ASTM A213 T9, ASTM A335 P9
650°C	EN 10216-2 X10CrMoVNb9-1	DIN 17175 X10CrMoVNb9-1	ASTM A213 T91, ASTM A335 P91

<b>Dimension Range</b> <b>Outer Diameter</b> <b>Wall Thickness</b>	10,2 up to 711 mm 1,00 mm up to 100 mm
<b>Tube Tolerance</b> <b>Outer Diameter</b> <b>Inner Diameter</b>	±1%or±0,5mm whichever is the greater ±1% or ±2 mm whichever is the greater
<b>Tolerance of Wall thickness</b>	OD≤219.1 mm ±12.5%or±0,4 mm whichever is the greater OD>219.1 mm from ±10% up to ±20% OD: Outer Diameter
<b>Lengths</b>	- 6 and 12 meters - 5-12m(16.4-39.8 ft) with respect to customer demand for special production - Tolerances: +100/-0mm (+3.94/-0 in)
<b>Protection</b>	- Unprotected - External varnished with black or clear lacquer - the tubes is delivered with plastic caps at both ends
<b>Marking</b>	According to standard or per customer request for special production
<b>Certification</b>	Mill test reports are issued to customer requirements. Usually they comply with EN 10204 3.1 ( If it is wanted during order for special production then EN 10204 3.2 issued )

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Mechanical Properties										Mechanical Properties				
Steel Group	C	Si	Mn	P max	S max	Cr	Mo	Ni	Other	Yield Strength min. N/mm <sup>2</sup>	Tensile Strength N/mm <sup>2</sup>	Elongation Min.(%)	Impact J	Impact (°C)
GRADE A	MAX. 0.25	MIN. 0.10	0.27-0.93	0.035	0.035					205	MIN. 330	35		
GRADE B	MAX. 0.30	MIN. 0.10	0.29-1.06	0.035	0.035					240	MIN 415	30		
ST35.8	MAX. 0.17	0.10-0.35	0.40-0.80	0.040	0.040					235	360-480	25		
ST45.8	MAX. 0.21	0.10-0.35	0.40-1.20	0.040	0.040					255	410-530	21		
P195GH	MAX. 0.13	MAX. 0.35	MAX.0.70	0.025	0.020	MAX. 0.30	MAX. 0.08	MAX. 0.30		195	320-440	27	28	-10
P235GH	MAX. 0.16	MAX. 0.35	MAX. 1.20	0.025	0.020	MAX. 0.30	MAX. 0.08	MAX. 0.30		225	360-500	25	28	-10
P265GH	MAX. 0.20	MAX. 0.40	MAX. 1.40	0.025	0.020	MAX. 0.30	MAX. 0.08	MAX. 0.30		255	410-570	23	28	-10
17MM4	0.14-0.20	0.20-0.40	0.90-1.20	0.040	0.040	MAX 0.30				270	460-580	23		
16M03	0.12-0.20	MAX. 0.35	0.40-0.90	0.025	0.020	MAX. 0.30	0.25-0.35	MAX. 0.30		270	450-600	22	40	20
13CRM04-5	0.10-0.17	MAX. 0.35	0.40-0.70	0.025	0.020	0.70-1.15	0.40-0.60	MAX. 0.30		290	440-590	22	40	20
10CRM09-10	0.08-0.15	MAX.0.50	0.40-0.70	0.035	0.035	2.00-2.50	0.90-1.20			280	450-600	20	40	20
14M0V63	0.10-0.18	0.10-0.35	0.40-0.70	0.035	0.035	0.30-0.60	0.50-0.70		V 0.22-0.32	320	460-610	20		
ASTM A179	0.06-0.18	-	0.27-0.63	0.035	0.035					180	325	36	HRB=MAX72	
GRADE A-1	MAX. 0.27	MIN. 0.10	MAX. 0.93	0.035	0.035					255	415	30	HRB=MAX79	
X10CRM0VNB9-1	0.08-0.12	0.20-0.50	0.30-0.60	0.020	0.010	8.00-9.50	0.85-1.05		NB0.06-0.1	450	620	19	40	20
P1, T1	0.10-0.20	0.10-0.50	0.30-0.80	0.025	0.025		0.44-0.65			205	380	30		
P9, T9	MAX.0.15	0.25-1.00	0.30-0.60	0.025	0.025	8.00-10.00	0.45-0.65			205	415	30		
P11, T11	0.05-0.15	0.50-1.00	0.30-0.60	0.025	0.025	1.00-1.50	0.44-0.65	MAX. 0.40		205	415	30		
P12, T12	0.50-0.15	MAX.0.50	0.30-0.61	0.025	0.025	0.80-1.25	0.44-0.65			220	415	30		
P22, T22	0.05-0.15	MAX.0.50	0.30-0.60	0.025	0.025	1.90-2.60	0.87-1.13			205	415	30	HRB=MAX85	
P5, T5	MAX.0.15	MAX.0.50	0.30-0.60	0.025	0.025	4.00-6.00	0.45-0.65			205	415	30		
P91, T91	0.08-0.12	0.20-0.50	0.30-0.60	0.020	0.010	8.00-9.50	0.85-1.05		V/NB	415	585	20		