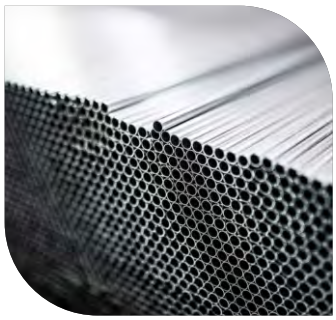
AESTEIRON STEELS LLP

STAINLESS STEEL TUBES



CARBON STEEL TUBES

ALLOY STEEL TUBES

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AESTEIRON (STEELS) Tubes

CONTENT

Steel tubes for building purposes – Hollow structural sections (HSS)

Stan-dards	Dimenstions						
	Dimensional Standards	Dimensional range	Tolerance D	Tolerance T	Lengths	Straightness	Tube ends
EN	10210-2	Hot finished circular hollow sections (HFCHS)	· ±1 % · min ±0,5 mm · max ±10 mm · ovality 2 % · weight ±6 %, max 8 %	· –10 % –12,5 % for seamless profiles · + tolerance is limited by allowed weight	Informative values: · D < 60,3 mm 5–6 m · D ≥ 60,3 mm /T < 7, 1 mm 5–6 m or 10–14 m · D ≥ 60,3 mm / T ≥ 7,1 mm 5–6 m Kinds: · random · fixed ± 500 mm · exact L < 6 m 0 +10 mm L > 6 m 0 + 15 mm · exact L > 12 m – tolerances	Allowed 0,002.L of whole length locally 3 mm/m	· square cut ends · free from excessive burrs
DIN	2448		· ±1 % · min ±0,5 mm · weight –8 % +12 %	D < 130 mm · T ≤ 2Tn –10 % +15 % · 2Tn < T < 4Tn –10 % +12,5 % · T > 4Tn 79 % Tn - basic wall thickness according to DIN 2448 D = 130–320 mm · T ≤ 0,05D –12,5% +17,5% · T > 0,05–0,11D ±12,5% · T > 0,11D ± 10%			
NFA	49-501			· D < 101,6 mm –12,5 % +15 % · D = 101,6–406, 4 mm –12,5 % +17,5 %			
STN ČSN	42 5715 42 5716						
GOST	8732						

TDC standards	Steel grade		
	Name	Condition	Surface
10210-1 [10025] [10113]	S235 JRH S275 JOH S355 JOH S275 J2H S355 J2H	Hot finished · as rolled Cold finished · normalized	adequate to production mode
	S275 NH S275 NLH S355 NH S355 NLH S460 NH S460 NLH	Hot finished · normalising rolled · normalized Cold finished · normalized	
17 121 [17 100]	Rst 37-2 St 44-2 St 37-3 St 44-3 St 52-3	Hot finished · as rolled Cold finished · normalized	
17 124	StE 255 TStE 255 EStE 255 StE 285 TStE 285 EStE 285 StE 355 TStE 355 EStE 355 StE 420 TStE 420 EStE 420 StE 460 TStE 460 EStE 460	Hot finished · normalising rolled · normalized Cold finished · normalized	
49-501	TU E235 TU E275 TU E355 TU E450 Grade 2,3,4	Hot finished · as rolled Cold finished · normalized	
42 0250	11 353 11 453 11 503 11 523	Hot finished	
8731	1050: 10, 20 19281: 09G2S		

Notes:

- C – carbon equivalent formula: CEV (IIW) = C + Mn/6 + (Cr + Mo + V)/5 + (Ni + Cu)/15 .
- Weldable steel, for specific conditions see individual standards
- Rate cold workability is set by mechanical steel properties and is definite with regulations.
- Tubes confirming to ASTM A500 (steel Grade A, B, C, D), ASTM A501 and JIS G3444 (steel STR290, STK400, STK540) upon agreement.
- Possibility of a hot dip zinc coating of tubes is necessary to discuss at inquiry.

List of dimensional standards and standards for technical delivery conditions

EN 10 025	Hot rolled products (Structural steels).
EN 10 210-1,2	Hot structural finished hollow parts of non-alloy and fine grain structural steel. Part 1: TDC. Part 2: Tolerances, dimensions and sectional properties. Refer also the ISO 630-2 (TDC) and ISO 657-14 (DS).
EN 10266	Steel tubes, fittings & structural hollow sections - Symbols & definitions of terms for use under product standards.
DIN 1629	Seamless available circular tubes of non-alloy steel with special- quality requirements.
DIN 2448	Plain end seamless steel tubes. Dimensions.
DIN 17100	Steel for general structural purposes. Quality for standard.
DIN 17121	Seamless structural steel circular tubes available for structural engineering purposes.
DIN 17124	The seamless circular tubes of fine grain steel for engineering purposes.
NFA 49-501	Steel tubes. Seamless or welded hot finished structural hollow categories. Dimensions. TDC.
STN 42 0250	ČSN 42 0250 Hot formed seamless tubes from steel class parts 10 to 16. TDC.
STN 42 5715	ČSN 42 5715 Hot formed seamless steel tubes. Dimensions.
STN 42 5716	ČSN 42 5716 The hot formed seamless steel tubes with smaller tolerances. Dimensions stated.
GOST 8731	Seamless hot-formed steel pipes.
GOST 8732	Seamless hot-formed steel pipes. Dimensions stated.
JIS G3444	Carbon steel tubes used for general structural purposes.

Steel designation according to EN

S – structural steel
235 – Minimum yield strength yield in N/mm2
Signs at the end of steel designation – additional symbols for steel names

- non-alloy steel
  J – impact test, min. average absorbed energy KV – 27J
  R – room temperature
  0 – temperature 0°C
  2 – temperature -20°C
  H – hollow section
- The Fine grain steel (ferritic grain size equal to or finer than 6)
  basic series N – normalized structure
  H – hollow section
  low temperature series N – normalized structure
  L – low temperature series
  H – The Hollow section

The Fine grain structural steel designation according to DIN 17124
StE – basic series (–20 °C)
TStE – deep-drawing series with minimum absorbed energy at temperature of –50 °C
EStE – deep-drawing series with minimum absorbed energy at temperature of –60 °C
255 – minimum yield strength in N/mm^2
Steels for structural tubes –

The Possibility of hot dip zinc coating

All structural-steels are possible to be hot dip zinc, but quality of the material,
appearance & the thickness of coating leads to influencing the chemical-composition of steel (the content of Si + P).
For general purposes, structural steels it is recommended to keep the content
of Si + P in range 0,13 %–0,27.99%.
CEV (IIW-International Institute of welding) - Carbon Equivalent Value (CEV).

List of dimensional standards and standards for technical delivery conditions

EN 10 083	Steels for quenching and tempering. Part 1: General TDC. Part 2: TDC for non-alloy steels. Part 3: TDC for alloy steels.
EN 10 084	Case hardening steel. TDC.
EN 10 216 - 1	Seamless steel tubes for pressure purposes. TDC. Part 1: Non-alloy steel tubes with specific room temperature properties.
EN 10 294 - 1	Hollow bars for machining. Part 1: Non-alloy and alloy steel.
EN 10 297 - 1	Seamless circular steel tubes for mechanical and general engineering purposes. Part 1: Non-alloy and alloy steel tubes.
DIN 1629	The Seamless circular tubes of non-alloy steel with special quality requirements.TDC.
DIN 1630	The Seamless circular tubes of non-alloy steel with very high quality requirements. TDC.
DIN 2448	Seamless tubes. Dimensions.
DIN 17200	Steels for quenching and tempering. TDC.
DIN 17204	The Seamless circular tubes of steel for quenching and tempering. TDC.
DIN 17210	Case hardening steels. TDC.
BS 6323	Specification for seamless and welded steel tubes for automobile, mechanical and general engineering purposes. Part 1: General requirements. Part 3: Specific requirements for hot finished seamless steel tubes.
ISO 2937	Plain end seamless steel tubes for mechanical application.
ISO 2938	Hollow steel bars for machining.

Steel with boron content (kind 20MnB5) upon agreement.
* List of steel – see table of chemical composition at pages 20, 21. This group of tubes can be delivered also according to DS for exact tubes (cold drawn) – see page 60 and other.
** Tubes are not mechanically worked. D tolerance upon agreement.

Steel designation according to EN:

- steel for tubes for mechanical treatment:
  steel E355 + AR, E 355 + N
  E – steel for machine parts, 355 – minimum yield strength in N/mm2, +AR – heat treatment is not required, +N – normalising annealed or formed
  steel 20MnV6
  steel designated by chemical composition – guaranteed mean C content 0,20%, guaranteed content Mn and V
  +AR – heat teratment is not required, +N – normalising annealed or formed
- steel for machine parts:
  steel without heat treatment after mechanical treatment
  non-alloy steel E 235, E275, E315, E355
  Condition +AR or +N
  steel with specific impact qualities (fine-grain) E275K2, E355K2
  K2 – guaranteed characteristic of impact energy 40 J (K) by temperature –20 °C
  steel with heat treatment after mechanical treatment
  steel C22E
  C – steel with carbon content 0,22%, E – reference to maximum checked content of S and P
  steel 38Mn6
  – guaranteed mean C content and guaranteed Mn content

Tubes for mechanical and general engineering

Stan-dards	Dimenstions						
	Dimensional Standards	Dimensional range	Tolerance D	Tolerance T	Lengths	Straightness	Tube ends
NF A	49-311		±1 %min ±0,5 mm	T < 20 mm±15 % min ±0,5 mm	· random · exact		· square cut ends · free from excessive burrs
	49-312		Weight –8 %+10 %				
UNI	4991 (ISO 4200)		Hot finished: D ≤ 51 mm ±0,5 mm D = 51–419 mm ±1% Weight ±10% Cold finished: D ≤ 25 mm ±0,25 mm D = 25–51 mm ±0,35 mm D = 51–168, 3 mm ±0,75 mm Weight –8 % +10 %	–15 % +non-specific (limited by weight) T ≤ 7mm ±12% min ±0,10mm T > 7mm –10 +12 %	· random · exact L < 6 m 0 +10 mm L > 6 m 0 +15 mm		· square cut ends · free from excessive burrs
	7729		±1 % min ±0,5 mm Weight ±10 %	T/D ≤ 3 % ±15 % T/D > 3 % ±12,5 % (do D = 168,3 mm)		1,5 mm/m	
STN ČSN	42 5715 42 5716						
GOST	8732						
PN-H	74219						
ASTM ASME	A53* SA-53*		NPS ≤ 11/2 ±1 /64 inch[±0,4 mm] NPS ≥ 2 ±1 % Weight ±10 %	–12,5 % [Table X 2.4]	· fixed 6 m ±500 mm · exact 6 m –0 +15 mm	visually straight	· square cut ends · plain, not threadet · NPS ≤ 11/2 [DN 40/48, 3 mm] option of the manu-facturer · NPS ≥ 2 [DN 50/60, 3 mm] WT=Std, XS, les than 0,5 inch /12,7 mm beveled [s. 98] WT > 0,5 inch and XXS – plain and square cut
	A519		Hot finished [table 6]: D ≤ 76,17 mm ±0,51 mm D = 76,2–114,2 mm ±0,64 mm D = 114,3–152,3 mm ±0,79 mm Cold finished: Table 8 and 9 of standard				
JIS	G3445						

TDC standards	Steel grade			
	Name	Condition	Surface	
49-311	TU 37-b TU 52-b TU 56-b TU XC35	Hot finished · as rolled		
49.312	S 470M S 450MG2	Hot finished · as rolled · normalized		
663	Fe 35-1 Fe 45-1 Fe 52-1 Fe 55-1 Fe 35-2 Fe 45-2 Fe 52-2 Fe 55-2	Hot finished · as rolled Cold finished · normalized		
7729	Fe 360 Fe 510 Fe 540			
42 0250				
8731		Steel 1050: 10, 20, 35, 45; 19281: 09G25		
74219		Steel 84018: 18G2, 18G2A; 84019: 10, 20, 35, 45, 55; 84023/7: R35, R45, R55, R65		
A53/A530 5A53/SA530	Grade A Grade B	Hot finished · as rolled dimensions 1/8-3/8[DN6-10] cold finished and thereafter heat treated	· adequate to production mode · upon agreement insulation	
A 519	Steel grade according to table	Hot finished [HF] Cold Finished [CW] · A[annealed] · N[nomalized] · SR[stress relievd] · QT[quench and temp]		
G3445	Steel grade according to table	Seamless tubes: S Hot finished : H Cold finished : C · condition according to agreement		

List of dimensional standards & standards for technical delivery conditions

STN 42 0250	ČSN 42 0250 Hot formed seamless tubes from steel class 10 to 16. TDC.
STN 42 5715	ČSN 42 5715 Hot formed seamless steel tubes. Dimensions.
STN 42 5716	ČSN 42 5716 Hot formed seamless steel tubes with smaller tolerances. Dimensions.
The ASTM A53	Pipe, steel, black and hot-dipped, zinc-coated, welded and seamless.
ASTM A519	Seamless carbon & alloy steel mechanical tubing.
The ASTM A530	General requirements for specialized carbon and alloy steel pipe.
UNI ISO 4200	Plain end steel tubes, welded and seamless. General dimensions and masses per unit length.
UNI 663	Unalloyed seamless steel tubes. Plain end tubes for general purposes.
UNI 4991	Standard plain end seamles and welded tubes. Dimensions.
UNI 7729	Unalloyed seamless steel tubes - plain end tubes for mechanical application.
NFA 49-311	Seamless steel tubes for mechanical application. Dimensions. TDC.
NFA 49-312	Seamless steel tubes with improved mechinability for mechanical machined parts.
GOST 8731	Seamless hot-formed steel pipes. TDC.
GOST 8732	Seamless hot-formed steel pipes. Dimensions.
JIS G 3445	Carbon steel tubes for machine structural purposes.
PN-H 74219	Hot rolled seamless steel tubes.
PN-H 84018	Low-alloy steel with higher properties.
PN-H 84019	Carbon steel for heat treatment.
PN-H 84023/7	Steel for higher purposes. Steel for tubes.

Steels for structural tubes

Stan-dards	Steel grade	Chemical composition (%)										Mechanical properties					
		C	Si	Mn	Pmax	Smax	Cr	Ni	Mo	Cu	Other	Re min MPa	Re min ksi	Rm min MPa	Rm max MPa	Rm min ksi	A5 min %
DIN																	
17121	RSt 37-2	max.0,17	–	–	0,050	0,050	–	–	–	–	N 0,009	235	–	340	470	–	26
	St 44-2	max.0,21	–	–	0,050	0,050	–	–	–	–	N 0,009	275	–	410	540	–	22
	St 44-3	max.0,20	–	–	0,040	0,040	–	–	–	–	Al min.0,020	275	–	410	540	–	22
	St 52-3	max.0,22	–	–	0,040	0,040	–	–	–	–	Al min.0,020	355	–	490	630	–	22
17124	StE 255	max.0,18	max.0,40	0,50–1,30	0,035	0,030	max.0,30	max.0,30	max.0,08	max.0,20	Al min.0,020	255	–	360	480	–	25
	TStE 255	max.0,16	max.0,40	0,50–1,30	0,030	0,025	max.0,30	max.0,30	max.0,08	max.0,20	Al min.0,020	255	–	360	480	–	25
	EStE 255	max.0,16	max.0,40	0,50–1,30	0,025	0,015	max.0,30	max.0,30	max.0,08	max.0,20	Al min.0,020	255	–	360	480	–	25
	StE 285	max.0,18	max.0,40	0,60–1,40	0,035	0,030	max.0,30	max.0,30	max.0,08	max.0,20	Al min.0,020	285	–	390	510	–	24
	TStE 285	max.0,16	max.0,40	0,60–1,40	0,030	0,025	max.0,30	max.0,30	max.0,08	max.0,20	Al min.0,020	285	–	390	510	–	24
	EStE 285	max.0,16	max.0,40	0,60–1,40	0,025	0,015	max.0,30	max.0,30	max.0,08	max.0,20	Al min.0,020	285	–	390	510	–	24
	StE 355	max.0,20	0,10–0,50	0,90–1,65	0,035	0,030	max.0,30	max.0,30	max.0,08	max.0,20	Al min.0,020	355	–	490	630	–	22
	TStE 355	max.0,18	0,10–0,50	0,90–1,65	0,030	0,025	max.0,30	max.0,30	max.0,08	max.0,20	Al min.0,020	355	–	490	630	–	22
	EStE 355	max.0,18	0,10–0,50	0,90–1,65	0,025	0,015	max.0,30	max.0,30	max.0,08	max.0,20	Al min.0,020	355	–	490	630	–	22
NFA																	
49-501	TUE 235	max.0,20	–	–	0,040	0,040	–	–	–	–	–	235	–	340	480	–	25
	TUE 275	max. 0,22	–	–	0,040	0,040	–	–	–	–	–	275	–	410	550	–	22
EN																	
10210-1	S 235 JRH	max.0,17	–	max.1,40	0,045	0,045	–	–	–	–	N 0,009	235	–	340	470	–	26
	S 275 J0H	max.0,20	–	max.1,50	0,040	0,040	–	–	–	–	N 0,009	275	–	410	560	–	22
	S 275 J2H	max.0,20	–	max.1,50	0,035	0,035	–	–	–	–	–	275	–	410	560	–	22
	S 355 J0H	max.0,22	max.0,55	max.1,60	0,040	0,040	–	–	–	–	N 0,009	355	--	490	630	–	22
	S 355 J2H	max.0,22	max.0,55	max.1,60	0,035	0,035	–	–	–	–	–	355	–	490	630	–	22
	S 275 NH	max.0,20	max.0,40	0,50–1,40	0,035	0,030	max.0,30	max.0,30	max.0,10	max.0,35	V max.0,05	275	–	370	510	–	24
	S 275 NLH	max.0,20	max.0,40	0,50–1,40	0,030	0,025	max.0,30	max.0,30	max.0,10	max.0,35	Nb max.0,05	275	–	370	510	–	24
	S 355 NH	max.0,20	max.0,50	0,90–1,65	0,035	0,030	max.0,30	max.0,50	max.0,10	max.0,35	V max.0,12	355	–	470	630	–	22
	S 355 NLH	max.0,18	max.0,50	0,90–1,65	0,030	0,025	max.0,30	max.0,50	max.0,10	max.0,35	Ti max.0,03	355	–	470	630	–	22
	S 460 NH	max.0,20	max.0,60	1,00–1,70	0,035	0,030	max.0,30	max.0,80	max.0,10	max.0,70	V max.0,20	460		550	720		17
	S 460 NLH	max.0,20	max.0,60	1,00–1,70	0,030	0,025	max.0,30	max.0,80	max.0,10	max.0,70	Al min.0,020	460	–	550	720	–	17

Steels for structural tubes

Standards	Steel grade	Chemical composition (%)										Mechanical properties					
		C	Si	Mn	Pmax	Smax	Cr	Ni	Mo	Cu	Other	Re min MPa	Re min ksi	Rm min MPa	Rm max MPa	Rm min ksi	A5 min %
STN,ČSN																	
	11 353	max.0,18			0,050	0,050						235		340	440		25
	11 453	max.0,24			0,050	0,050						265		441	539		21
	11 503	max.0,18	max.0,55	max.1,60	0,035	0,035	max.0,30	max.0,30		max.0,30	Al min.0,015 Nb 0,015–0,08	355		490	630		22
	11 523	max.0,22	max.0,55	max.1,60	0,035	0,035					Al min.0,015	353		510	628		23
	11 550	max.0,40			0,050	0,050						315		540	640		17
	11 650	max.0,55			0,050	0,050						365		640	735		12
	12 040	0,32–0,40	0,15–0,40	0,50–0,80	0,040	0,040	max.0,25	max.0,30		max.0,30		295			530		18
	12 050	0,42–0,50	0,17–0,37	0,50–0,80	0,040	0,040	max.0,25	max.0,30		max.0,30		325			590		17
	12 060	0,52–0,60	0,15–0,40	0,50–0,80	0,040	0,040	max.0,25	max.0,30		max.0,30		375			640		13
ASTM																	
A53*	GradeA	0,25		0,95	0,050	0,045	max.0,40	max.0,40	max.0,15	max.0,40	max.V 0,08	205	30	330		48	
	GradeB	0,30		1,20	0,050	0,045	max.0,40	max.0,40	max.0,15	max.0,40	max.V 0,08	240	35	415		60	
A519	MT 1010	0,05–0,15		0,30–0,60	0,040	0,050											
	MT 1015	0,10–0,20		0,30–0,60	0,040	0,050											
	MTX 1015	0,10–0,20		0,60–0,90	0,040	0,050											
	MT 1020	0,15–0,25		0,30–0,60	0,040	0,050											
	MTX 1020	0,15–0,25		0,70–1,00	0,040	0,050											
	1008	max.0,10		0,30–0,50	0,040	0,050											
	1010	0,08–0,13		0,30–0,60	0,040	0,050											
	1012	0,10–0,15		0,30–0,60	0,040	0,050											
	1015	0,13–0,18		0,30–0,60	0,040	0,050											
	1016	0,13–0,18		0,60–0,90	0,040	0,050											
	1017	0,15–0,20		0,30–0,60	0,040	0,050											
	1018	0,15–0,20		0,60–0,90	0,040	0,050											
	1019	0,15–0,20		0,70–1,00	0,040	0,050											
	1020	0,18–0,23		0,30–0,60	0,040	0,050						221	32	345		50	25
	1021	0,18–0,23		0,60–0,90	0,040	0,050											
	1022	0,18–0,23		0,70–1,00	0,040	0,050											
	1025	0,22–0,28		0,30–0,60	0,040	0,050						241	35	379		55	25
	1026	0,22–0,28		0,60–0,90	0,040	0,050											
	1030	0,28–0,34		0,60–0,90	0,040	0,050											
	1035	0,32–0,37		0,60–0,90	0,040	0,050						276	40	448		65	20
	1040	0,37–0,44		0,60–0,90	0,040	0,050											
	1045	0,43–0,50		0,60–0,90	0,040	0,050						310	45	517		75	15
	1050	0,48–0,55		0,60–0,90	0,040	0,050						345	50	552		80	10
	1518	0,15–0,21		1,10–1,40	0,040	0,050											
	1524	0,19–0,25		1,35–1,65	0,040	0,050											
	1541	0,36–0,44		1,35–1,65	0,040	0,050											
DIN																	
1629	St 37.0	max.0,17			0,040	0,040						235		350	480		25
	St 44.0	max.0,21			0,040	0,040						275		420	550		21
	St 52.0	max.0,22			0,040	0,035					Al min.0,020	355		500	650		21
1630	St 37.4	max.0,17	max.0,35	min.0,35	0,040	0,040					Al min.0,020	235		350	480		25
	St 44.4	max.0,20	max.0,35	min.0,40	0,040	0,040					Al min.0,020	275		420	550		21
	St 52.4	max.0,22	max.0,55	max.1,60	0,040	0,035					Al min.0,020	355		500	650		21
17204	C22	0,17–0,24	max.0,40	0,30–0,60	0,045	0,045						260		420	550		21
	Ck22	0,17–0,24	max.0,40	0,30–0,60	0,035	0,035						260		420	550		21
	Cm22	0,17–0,24	max.0,40	0,30–0,60	0,035	0,035						260		420	550		21
	C35	0,32–0,39	max.0,40	0,50–0,80	0,045	0,045						300		520	670		17
	Ck35	0,32–0,39	max.0,40	0,50–0,80	0,035	0,035						300		520	670		17
	Cm35	0,32–0,39	max.0,40	0,50–0,80	0,035	0,035						300		520	670		17
	C45	0,42–0,50	max.0,40	0,50–0,80	0,045	0,045						350		610	760		16
	Ck45	0,42–0,50	max.0,40	0,50–0,80	0,035	0,035						350		610	760		16
	Cm45	0,42–0,50	max.0,40	0,50–0,80	0,035	0,035						350		610	760		16
	C55	0,52–0,60	max.0,40	0,60–0,90	0,045	0,045						370		670	820		14
	Ck55	0,52–0,60	max.0,40	0,60–0,90	0,035	0,035						370		670	820		14
	Cm55	0,52–0,60	max.0,40	0,60–0,90	0,035	0,035						370		670	820		14

Stan-dards	Steel grade	Chemical composition (%)										Mechanical properties					
		C	Si	Mn	Pmax	Smax	Cr	Ni	Mo	Cu	Other	Re min MPa	Re min ksi	Rm min MPa	Rm max MPa	Rm min ksi	A5 min %
17210	C10	0,07–0,13	max.0,40	0,30–0,60	0,045	0,045											
	Ck10	0,07–0,13	max.0,40	0,30–0,60	0,035	0,035											
	C15	0,12–0,18	max.0,40	0,30–0,60	0,045	0,045											
	Ck15	0,12–0,18	max.0,40	0,30–0,60	0,035	0,035											
	Cm15	0,12–0,18	max.0,40	0,30–0,60	0,035	0,035											
	16MnCr5	0,14–0,19	max.0,40	1,00–1,30	0,035	0,035	0,80–1,10										
BS																	
6323/3	HFS 3	max.0,20	max.0,35	max.0,90	0,050	0,050						215		360			24
	HFS 4	max.0,25	max.0,35	max.1,20	0,050	0,050						235		410			22
	HFS 5	max.0,23	max.0,50	max.1,50	0,050	0,050						340		490			20
	HFS 8	0,40–0,55	max.0,35	0,50–0,90	0,050	0,050						340		540			18
UNI																	
663	Fe 35-1	max.0,18	–	–	0,045	0,045						240		350	450		25
	Fe 45-1	max.0,22	–	–	0,045	0,045						260		450	550		21
	Fe 55-1	max.0,36	–	–	0,045	0,045						340		550	650		17
	Fe 35-2	max.0,17	0,10–0,35	min.0,40	0,035	0,035						240		350	450		28
	Fe 45-2	max.0,22	0,10–0,35	min.0,50	0,035	0,035						260		450	550		23
	Fe 55-2	max.0,36	0,10–0,35	min.0,50	0,035	0,035						340		550	650		18
7729	Fe 360	max.0,17	max.0,36	0,40 - 0,80	0,045	0,045						215		360	480		24
	Fe 510	max.0,20	max.0,50	min.1,50	0,040	0,040						355		510	660		20
	Fe 540	0,32-0,38	0,15 - 0,40	0,50 - 0,80	0,035	0,035						275		540	660		20
NFA																	
49-311	TU 37-b	max.0,20	max.0,40	max.0,85	0,045	0,045						220		360			20
	TU 52-b	max.0,22	max.0,55	max.1,60	0,045	0,045						345		510			17
	TU XC35	0,30–0,40	0,10–0,45	0,40–0,90	0,040	0,040						320		540			16
49-312	S470M	0,15–0,22	max.0,50	1,00–1,70	0,030	0,040				max.0,30	V 0,08–0,15	470		620			18
	S450MG2	0,15–0,22	max.0,50	1,00–1,70	0,030	0,040				max.0,30	V 0,08–0,15	450		550	720		22
EN																	
10083-2	C22E	0,17–0,24	max.0,40	0,40–0,70	0,035	0,035	max.0,40	max.0,40	max.0,10			240		430			24
	C22R	0,17–0,24	max.0,40	0,40–0,70	0,035	0,040	max.0,40	max.0,40	max.0,10			240		430			24
	C25E	0,22–0,29	max.0,40	0,40–0,70	0,035	0,035	max.0,40	max.0,40	max.0,10			260		470			22
	C25R	0,22–0,29	max.0,40	0,40–0,70	0,035	0,040	max.0,40	max.0,40	max.0,10			260		470			22
	C30E	0,27–0,34	max.0,40	0,50–0,80	0,035	0,035	max.0,40	max.0,40	max.0,10			280		510			20
	C30R	0,27–0,34	max.0,40	0,50–0,80	0,035	0,040	max.0,40	max.0,40	max.0,10			280		510			20
	C35E	0,32–0,39	max.0,40	0,50–0,80	0,035	0,035	max.0,40	max.0,40	max.0,10			300		550			18
	C35R	0,32–0,39	max.0,40	0,50–0,80	0,035	0,040	max.0,40	max.0,40	max.0,10			300		550			18
	C40E	0,37–0,44	max.0,40	0,50–0,80	0,035	0,035	max.0,40	max.0,40	max.0,10			320		580			16
	C40R	0,37–0,44	max.0,40	0,50–0,80	0,035	0,040	max.0,40	max.0,40	max.0,10			320		580			16
	C45E	0,42–0,50	max.0,40	0,50–0,80	0,035	0,035	max.0,40	max.0,40	max.0,10			340		620			14
	C45R	0,42–0,50	max.0,40	0,50–0,80	0,035	0,040	max.0,40	max.0,40	max.0,10			340		620			14
	C50E	0,47–0,55	max.0,40	0,60–0,90	0,035	0,035	max.0,40	max.0,40	max.0,10			355		650			12
	C50R	0,47–0,55	max.0,40	0,60–0,90	0,035	0,040	max.0,40	max.0,40	max.0,10			355		650			12
	C55E	0,52–0,60	max.0,40	0,60–0,90	0,035	0,035	max.0,40	max.0,40	max.0,10			370		680			11
	C55R	0,52–0,60	max.0,40	0,60–0,90	0,035	0,040	max.0,40	max.0,40	max.0,10			370		680			11
	28Mn6	0,25- 0,32	max.0,40	1,30 - 1,65	0,030	0,035	max.0,40	max.0,40	max.0,10								
	C22	0,17–0,24	max.0,40	0,40–0,70	0,045	0,045	max.0,40	max.0,40	max.0,10			240		430			24
	C25	0,22–0,29	max.0,40	0,40–0,70	0,045	0,045	max.0,40	max.0,40	max.0,10			260		470			22
	C30	0,27–0,34	max.0,40	0,50–0,80	0,045	0,045	max.0,40	max.0,40	max.0,10			280		510			20
	C35	0,32–0,39	max.0,40	0,50–0,80	0,045	0,045	max.0,40	max.0,40	max.0,10			300		550			18
	C40	0,37–0,44	max.0,40	0,50–0,80	0,045	0,045	max.0,40	max.0,40	max.0,10			320		580			16
	C45	0,42–0,50	max.0,40	0,50–0,80	0,045	0,045	max.0,40	max.0,40	max.0,10			340		620			14
	C50	0,47–0,55	max.0,40	0,60–0,90	0,045	0,045	max.0,40	max.0,40	max.0,10			355		650			12
	C55	0,52–0,60	max.0,40	0,60–0,90	0,045	0,045	max.0,40	max.0,40	max.0,10			370		680			11
10084	C10E	0,07–0,13	max.0,40	0,30–0,60	0,035	0,035											
	C10R	0,07–0,13	max.0,40	0,30–0,60	0,035	0,040											
	C15E	0,12–0,18	max.0,40	0,30–0,60	0,035	0,035											
	C15R	0,12–0,18	max.0,40	0,30–0,60	0,035	0,040											
	C16E	0,12–0,18	max.0,40	0,60–0,90	0,035	0,035											
	C16R	0,12–0,18	max.0,40	0,60–0,90	0,035	0,040											

Standards	Steel grade	Chemical composition (%)										Mechanical properties					
		C	Si	Mn	Pmax	Smax	Cr	Ni	Mo	Cu	Other	Re min MPa	Re min ksi	Rm min MPa	Rm max MPa	Rm min ksi	A5 min %
	16MnCr5	0,14–0,19	max.0,40	1,00–1,30	0,035	0,035	0,80–1,10										
102941	E355+AR	max.0,22	max.0,50	max.1,50	0,045	0,050	max.0,30	max.0,40	max.0,08	max.0,30	V max.0,10	355		490			18
	E355+N	max.0,22	max.0,50	max.1,50	0,045	0,050	max.0,30	max.0,40	max.0,08	max.0,30	V max.0,10	355		490			20
	20MnV6+AR	0,16–0,22	0,10–0,50	1,30–1,70	0,045	0,050	max.0,30	max.0,40	max.0,08	max.0,30	V 0,08–0,15	470		650			17
	20MnV6+N	0,16–0,22	0,10–0,50	1,30–1,70	0,045	0,050	max.0,30	max.0,40	max.0,08	max.0,30	V 0,08–0,15	420		600			19
10297-1	E235	max.0,17	max.0,35	max.1,20	0,030	0,035						235		360			25
	E275	max.0,21	max.0,35	max.1,40	0,030	0,035						275		410			22
	E315	max.0,21	max.0,30	max.1,50	0,030	0,035						315		450			21
	E355	max.0,22	max.0,55	max.1,60	0,030	0,035						355		490			20
	E275K2	max.0,20	max.0,40	0,50–1,40	0,030	0,030	max.0,30	0,30	max.0,10	max.0,35	V max.0,05 Ti max.0,03 Al min.0,02	275		410			22
	E355K2	max.0,20	max.0,50	0,90–1,65	0,030	0,030	max.0,30	0,50	max.0,10	max.0,35	V max.0,12 Ti max.0,05 Al min.0,02	355		490			20
	C60E	0,57–0,65	max.0,40	0,60–0,90	0,035	0,035						390		710			10
	38Mn6	0,34–0,42	0,15–0,30	1,40–1,65	0,035	0,035						400		670			14
	25CrMo4	0,22–0,29	max.0,40	0,60–0,90	0,035	0,035	0,90–1,20		0,15–0,30								
	34CrMo4	0,30–0,37	max.0,40	0,60–0,90	0,035	0,035	0,90–1,20		0,15–0,30								
	42CrMo4	0,38–0,45	max.0,40	0,60–0,90	0,035	0,035	0,90–1,20		0,15–0,30								
	20NiCrMo2-2	0,17–0,23	max.0,40	0,65–0,95	0,035	0,035	0,35–0,70	0,40–0,70	0,15–0,25								
GOST																	
1050	10	0,07–0,14	0,17–0,37	0,35–0,65			max.0,15					205		330			31
	20	0,17–0,24	0,17–0,37	0,35–0,65			max.0,25					245		410			25
	35	0,32–0,40	0,17–0,37	0,50–0,80			max.0,25					315		530			20
	45	0,42–0,50	0,17–0,37	0,50–0,80			max.0,25					355		600			16
19281	09G2S	max.0,12	0,50–0,80	1,30–1,70			max.0,30	max.0,30		max.0,30		345		490			21
JIS																	
G3445	STKM 11A	max.0,12	max.0,35	max.0,60	0,040	0,040								290			35
	STKM 12A	max.0,20	max.0,35	max.0,60	0,040	0,040						175		340			35
	STKM 12B	max.0,20	max.0,35	max.0,60	0,040	0,040						275		390			25
	STKM 12C	max.0,20	max.0,35	max.0,60	0,040	0,040						355		470			20
	STKM 13A	max.0,25	max.0,35	0,30–0,90	0,040	0,040						215		370			30
	STKM 13B	max.0,25	max.0,35	0,30–0,90	0,040	0,040						305		440			20
	STKM 13C	max.0,25	max.0,35	0,30–0,90	0,040	0,040						380		510			15
	STKM 14A	max.0,30	max.0,35	0,30–1,00	0,040	0,040						245		410			25
	STKM 14B	max.0,30	max.0,35	0,30–1,00	0,040	0,040						355		500			15
	STKM 14C	max.0,30	max.0,35	0,30–1,00	0,040	0,040						410		550			15
	STKM 15A	0,25–0,35	max.0,35	0,30–1,00	0,040	0,040						275		470			22
	STKM 15C	0,25–0,35	max.0,35	0,30–1,00	0,040	0,040						430		580			12
	STKM 16A	0,35–0,45	max.0,40	0,40–1,00	0,040	0,040						325		510			20
	STKM 16C	0,35–0,45	max.0,40	0,40–1,00	0,040	0,040						460		620			12
	STKM 17A	0,45–0,55	max.0,40	0,40–1,00	0,040	0,040						345		550			20
	STKM 17C	0,45–0,55	max.0,40	0,40–1,00	0,040	0,040						480		650			10
	STKM 18A	max.0,18	max.0,55	max.1,50	0,040	0,040						275		440			25
	STKM 18B	max.0,18	max.0,55	max.1,50	0,040	0,040						315		490			23
	STKM 18C	max.0,18	max.0,55	max.1,50	0,040	0,040						380		510			15
	STKM 19A	max.0,25	max.0,55	max.1,50	0,040	0,040						315		490			23
	STKM 19C	max.0,25	max.0,55	max.1,50	0,040	0,040						410		550			15
	STKM 20A	max.0,25	max.0,55	max.1,60	0,040	0,040					V max.0,15	390		540			23
PN-H																	
84019	10	0,07–0,14	0,15–0,40	0,35–0,65	0,040	0,040	max.0,30	max.0,30	max.0,10	max.0,30							
	20	0,17–0,24	0,15–0,40	0,35–0,65	0,040	0,040											
	35	0,32–0,39	0,10–0,40	0,50–0,80	0,040	0,040											
	45	0,42–0,50	0,10–0,40	0,50–0,80	0,040	0,040											

Steel 20MnV6+AR = E470, 20MnV6+N = E420J2, 20MnV6+QT = E590K2.
Alloy steel in EN 10083-3. Steel for tubes according PN-H.
Steel 20MnV6+AR = E470, 20MnV6+N = E420J2, 20MnV6+QT = E590K2.
Alloy steel in EN 10083-3. Steel for tubes according PN-H.

Seamless steel tubes for pressure equipments for the room temperatures

Stan-dards	Dimenstions						
	Dimensional Standards	Dimensional range	Tolerance D	Tolerance T	Lengths	Straightness	Tube ends
EN	10216-1		D ≤ 219,1 mm ±1% min ±0,5 mm See page 60-64 (Cold formed precise)	D ≤ 219,1 mm ±1% min ±0,4 mm See page 60-64 (Cold formed precise)	Kinds: · random · fixed ±500 mm · exact Informative values: · D < 60,3 mm 5 - 6 m · D ≥ 60,3 mm / T < 7,1 mm 5–6 m or 10–14 m · D ≥ 60,3 mm / T ≥ 7,1 mm 5–6 m · longer upon agree-ment Precise length tolerances: · L < 6 m 0 +10 mm · L = 6–12 m 0 +15 mm · L > 12 m 0 +upon agreement	Alloved 0,0015L for Calculation to 1 m max. 3mm	· square cut ends · free from excessive burrs · option: with beveled ends
DIN	2448 2391-1 (upon agreement)		D ≤ 100 mm ±1% min ±0,5 mm D = 100 - 200 mm ±1%	D < 130 mm · T ≤ 2Tn –10 % +15 % · 2Tn < T < 4Tn –10 % +12,5 % · T > 4Tn ±9 % Tn – basic wall thickness according to DIN 2448 D = 130–320 mm · T ≤ 0,05D –12,5 % +17,5 % · T > 0,05–0,11D ±12,5 % · T > 0,11D ±10 %		Visually straight	· square cut ends · free from excessive burrs · option: with beveled ends (T ≥ 3,2 mm)
BS	3600		±1 % min ±0,5 mm Cold finished tubes with lesstolerances	≤ 3 %D ±15 % > 3 %D –12,5 % +15 %	· random · exact with tolerances: L ≤ 6 m 0 +6 mm L > 6 m 1,5 mm/m, max 12 mm	Visually straight	· square cut ends · free from excessive burrs

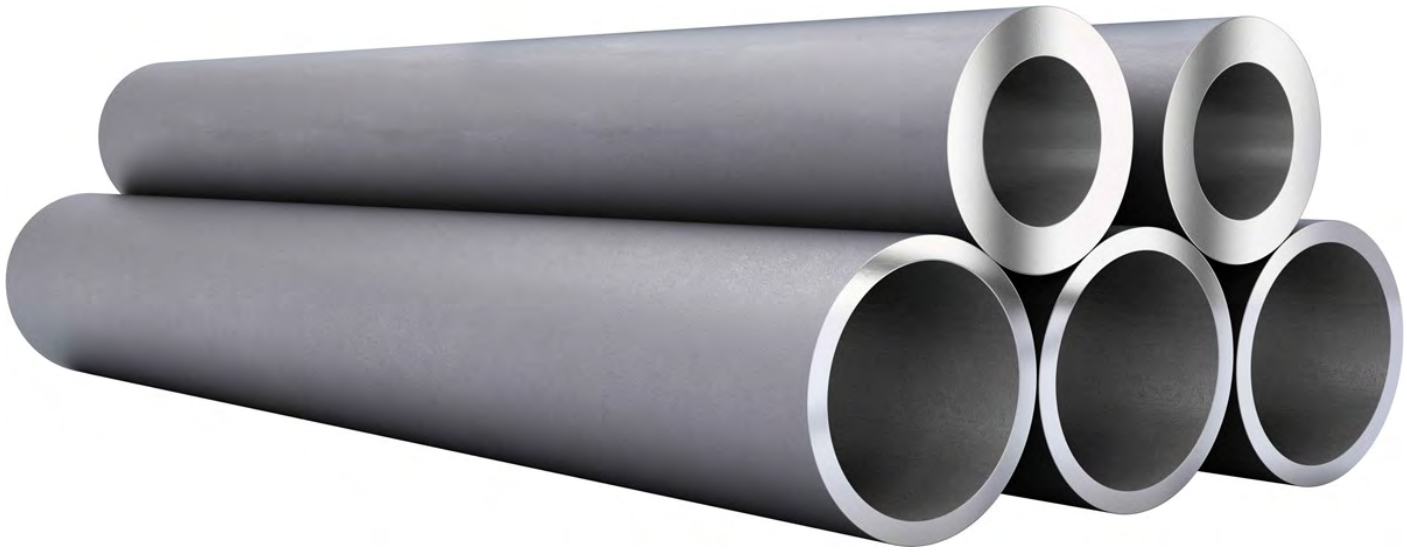
TDC standards	Steel grade			Testing and Certificates		Other TDC		
	Name	Condition	Surface	Testing	Certificate	Marking	Surface prptection	Packing
10216-1	P195TR1 P235TR1 P265TR1 P195TR2 P235TR2 P265TR2	Hot finished : Quality TR1 · as rolled · normalising formed · normalized Quality Tr2 · normalising formed · normalized Cold finished: Quality TR1 and TR2 · normalized	Visually without defects, adequate to production mode Surface treatment possibility.	Quality TR1: · non-specific · specific Quality TR2: · specific Mandatory testing: · cast analysis · tensile test · leak tightness · dimensions · visual · impact test (TR2) at room temperature	10204 · 2.2 · 3.1 · 3.1 · 3.2	D < 51 mm – label D > 51 mm – data ontube end Data: · manufacturer · EN standard · steel · specific inspection - cast number - mark of insp. represent. - identification number	· without protection · upon agreement	bundle 300–3500 kg
1629	St 37.0 St 44.0 St 52.0	Hot finished: · as rolled · condition N after normalizing only upon agreement Cold finished: · normalized – condition NBK		· tensile test · ring · leak tightness · dimensions · visual · chemical composition (scope of inspection cetificate of series 3)	50049 · 2.2 · 3.1.A · 3.1.B · 3.1.C	Data: · manufacturer · steel · letter S · mark of insp. represent. · mark at 2470T1 - marking usually die stamping or label on the bundle - marking NDT at DIN 1630		
1630	St 37.0 St 44.0 St 52.0			· tensile test · ring · leak tightness · dimensions · visual · chemical composition (scope of inspection cetificate of series 3) Upon agreement: · NDT · impact test (T > 10 mm)	50049 · 2.2 · 3.1.A · 3.1.B · 3.1.C			
3601	360 430	Hot finished: · as rolled · normalized Cold finished: · normalized		· tensile test · flattening · impact test · visual · leak tightness · hydrotest or NDT	· test certificate · test results			

List of dimensional standards and standards for technical delivery conditions

EN 10216-1	The Seamless steel tubes for pressure purposes. TDC. Part 1: The Non-alloy steel tubes with specified room temperature properties.
DIN 1629	The Seamless circular tubes of non-alloy steel with special quality requirements. TDC.
DIN 1630	The Seamless circular tubes of non-alloy steel with very high quality requirements. TDC.
DIN 2448	Plain end seamless steel tubes. Dimensions.
BS 3600	Dimension and masses per unit lengt of welded and seamless steel pipes and tubes for pressure purposes.
BS 3601	The Carbon steel pipes and tubes with specified room temperature properties for pressure purposes. TDC.
ISO 9329-1	The Seamless steel tubes for pressure purposes. TDC. Part 1: Non-alloy steel tubes with specified room temperature properties.

Steel designation according to EN:

P – steel for pressure equipments
235 – For minimum yield strength in N/mm2
T – The steel for tubes
R – room temperature
1, 2 – group of quality
TR 1 - Fluid Transportation - General Purposes (see page 54)
TR 2 - Piping and Pressure Purposes (PED, AD 2000 Merkblatt W4)



The Seamless steel-tubes for pressure equipments for room temperatures

Stan-dards	Dimenstions						
	Dimensional Standards	Dimensional range	Tolerance D	Tolerance T	Lengths	Straightness	Tube ends
NF A	49.112		±1% min ±0,5 mm	D ≤ 101,6 mm, T ≤ 10 mm ±12,5 % min ±0,5 mm D ≤ 101,6 mm, T > 10 mm ±10 % D > 101,6 mm see Tab. 4 of st.	· random · exact with tolerances: L ≤ 8 m 0 +10 mm L > 8 m 0 +15 mm	3 mm/m, total 0,2 % of length	· square cut ends · free from excessive burrs · option: with beveled ends (D ≥ 42,4 mm)
	49.210		D ≤ 38 mm ±0,25 mm D > 38 mm ±0,75 %	±10 %. min. ±0,20 mm Weight –8 % +10 %			· square cut ends · free from excessive burrs
UNI	7287		D ≤ 50 mm ±0,5 mm D > 50 mm ±1 %	–15 % Weight ±10 %	· random · exact with tolerances: L ≤ 6 m 0 +10 mm L > 6 m 0 +15 mm		
STN ČSN	42 5715 42 5716 (42 6710) (42 6711)		42 5715 D ≤ 219 mm ±1,25 % min ±0,5 mm 42 5716 D ≤ 219 mm ±1 % min ±0,5 mm 42 6710 ±1 % min ±0,4 mm 42 6711 see precision tubes	–15 % +12,5 % ±12,5 % T ≤ 3 mm –10 % +15 % T > 3 mm –10 % +12 %	· random · exact 0 +15 mm · multiple +5 mm on cut, max +50 mm	· straigh-tened 3 mm/m · precise straigh-tened 1,5 mm/m	· square cut ends · free from excessive burrs
GOST	8732						
PN-H	74219		D ≤ 50 mm ± 0,50 mm Over 50 mm Class of precision D1= ± 1,25% Class of precision D2 = ± 1,00%	Class of precision D1= ± 15% Class of precision D2 D ≤ 130 mm ± 10% D = 130 - 320 mm ± 12,5% D > 320 mm ± 15%	· random 4 - 12,5 m · exact up to 7 m: L ≤ 6 m 0 + 10 mm L > 6 m 0 + 15 mm · multiple + 5 mm on cut · fixed ± 500 mm	· T up to 20 mm 1,5 mm / m · T > 20 mm 2,0 mm / m	· square cut ends · beveled ends for D > 101,6 mm and T up to 16 mm
ASTM ASME	A53 SA53						
JIS	G3454		Hot finished: D Ł 40 mm ±0,5 mm D = 50–125 mm ±1 % D > 150 mm ±1,6 mm Cold finished: D Ł 25 mm ±0,3 mm D > 32 mm ±0,8 %	T ≤ 4 mm –0,5 mm +0,6 mm T > 4 mm –12,5 % +15 % T ≤ 3 mm ±0,3 mm T > 3 mm ±10 %		Visually straight	· square cut ends · free from excessive burrs · option: with beveled ends
	G3455		Hot finished: D Ł 50 mm ±0,5 mm D = 50–160 mm ±1 % Cold finished: D Ł 40 mm ±0,3 mm D > 40 mm ±0,8 %	T ≤ 4 mm ±0,5 mm T > 4 mm ±12,5 % T ≤ 2 mm ±0,2 mm T > 2 mm ±10 %			

TDC standards	Steel grade			Testing and Certificates		Other TDC		
	Name	Condition	Surface	Testing	Certificate	Marking	Surface prptection	Packing
	TU E220A TU E235A	Hot finished · as rolled Cold finished · normalized	Visually without defects, adequate to production mode Surface treatment possibility.	· product analysis · tensile test · flattening · drift expanding · leak tightness · dimensions · visual · upon agreement NDT	49-000 49-001 Type A Type B Type D (CCPU)	D < 26,9 mm label D > 26,9 mm each tube or label · producer · standard · steel grade	· without protection · upon agreement	bundle 300–3500 kg
49-210	TU 37B TU 42B	Cold finished · normalized				D > 48,3 mm each tube		
7287	Fe 320	Hot finished · as rolled Cold finished · normalized						
42 0250 (42 0260)	11 353* 11 453 11 503 11 523 11 550 11 650 12 040 12 050 12 060	Hot finished · as rolled condition .1 behind steel designation Cold finished · normalized	.0+ scaled .1+ pickled .5+ asphalt .6+ zinc coated Cold finished .4+ metallic clean .9+ special agreement (first number behind DS)	· tensile test Upon agreement: · hardness · flattening · drift expanding · leak tightness · NDT	42 0250 .0+ acknow-ledgement .1+ test certifi-cate .2+ customer .9+ agreement	· label · colour stripes		
8731 (1050)	10 20							
74219 (84023) (84018)	R35, R45 18G2A	Hot finished · as rolled · other condition according to agreement Cold finished · normalized	Visually without defects, adequate to production mode. Surface treatment possibility.	Pipeline - Groups of tests A1 - 3 Structural - Groups of tests B1 - 3 · dimensions - all groups · surface - all groups · composition - all except A1 · leak tightness - A1 - 3 · mechanical - all except A1, B1 · technological - A3, B3	· compliance with PN - H · certificate	D ≤ 31,8 mm, T ≤ 3,2 mm label on bundle D and T over - each tube Data: · producer · steel · cast number (at alloy steels)	· black tubes (CZ) · according to agreement	
ASTM A53/A530	Grade A Grade B							
G3454	STPG 370 STPG 410	Hot finished · as rolled Cold finished · normalized		· product analysis · tensile test · flattening · impact test · hydrotest or NDT · dimensions	G0303	· steel · prosess (-S-H, -S-C) · dimensions · manufacturer - at JIS G3454 · symbol Z3 or Z4 Z3 - ultrasonic Z4 - eddy current - at JIS G 3455 · Z2, Z3, Z4, Z5 Z2 - yield elev. temperat. Z5 - impact test		
G3455	STS 370 STS 410 STS 480							

List of dimensional standards and standards for technical delivery conditions

NFA 49-112	Steel tubes. Plain-end seamless hot rolled tubes with specified room temperature properties & with special delivery conditions. TDC.
NFA 49-210	Steel tubes – Seamless cold drawn tubes for fluids piping. Dimensions available. TDC.
UNI 7287	The Seamless plain end tubes made from basis non-alloy steel.
STN 42 0250	ČSN 42 0250 Hot formed seamless tubes from steel class 10 to 16. TDC.
STN 42 5715	ČSN 42 5715 Hot formed seamless steel tubes. Dimensions.
STN 42 5716	ČSN 42 5716 The Hot formed seamless steel tubes with smaller tolerances. Dimensions available.
GOST 8731	Seamless hot-formed steel pipes. TDC.
GOST 8732	Seamless hot-formed steel pipes. Dimensions available.
PN-H 84018	The Low-alloy steel with higher properties.
PN-H 74219	The Hot rolled seamless steel tubes for structural & distribution purposes.
PN-H 84023/07	The Steel for higher purposes. Steel for tubes.
ASTM-A53	Pipe, steel, black and hot-dipped, zinc-coated, welded and seamless.
ASTM-A530	General requirements for specialized carbon and alloy steel pipe.
JIS G 3454	Carbon steel pipes for pressure service.
JIS G 3455	The carbon steel pipes for high pressure service.

* Importantly the first 4 steels are used for pressure purposes and as steels for building. All steels are used for machine and common purposes.

The Permissible tolerances of outside diameter according to ASTM A450/A450M, ASTM A1016/A1016M (ASME SA)

Outside Diameter			
Hot finished	4" (101,6 mm) and under over 4"–71/2" (101,6–190,5 mm) incl.	-1/32 (0.8 mm) -3/64 (1.2 mm)	+1/64 (0.4 mm) +1/64 (0.4 mm)
Cold finished	under 1" (25,4 mm) 1"–11/2" (25,4–38,1 mm) incl. over 11/2"–2" (38,1–50,8 mm) excl. 2"–21/2" (50,8–63,5 mm) excl. 21/2"–3" (63,5–76,2 mm) excl. 3"–4" (76,2–101,6 mm) incl. over 4"–71/2" (101,6–190,5 mm)	–0.004 (0,1 mm) –0.006 (0,15 mm) –0.008 (0,2 mm) –0.010 (0,25 mm) –0.012 (0,3 mm) –0.015 (0,38 mm) –0.015 (0,38 mm)	+0.004 (0,1 mm) +0.006 (0,15 mm) +0.008 (0,2 mm) +0.010 (0,25 mm) +0.012 (0,3 mm) +0.015 (0,38 mm) +0.025 (0,64 mm)

Ovality for thin-wall tubes [WT≤0,020in (0,5mm) / WT≤2% of OD, up to OD=2in (50,8mm) / WT≤3% of OD for OD over 2in]:
Tubes with OD≤1in (25,4mm) = 0,020in (0,5mm), tubes with OD>1in = up to 2% of OD (difference of maximum values)

Permissible tolerances of wall thickness according to ASTM A450/A450M, ASTM A1016/A1016M (ASME SA)

Wall thickness				
Hot finished	under 0,095" (2,4 mm) 0 +40 %	0,095" - 0,15" (2,4 mm - 3,8 MM) 0 +35 %	15" - 0,18" (3,8 mm - 4,6 MM) 0 +33 %	over 0,18" (4,6 mm) 0 +28%
Cold finished	by outside diamter			
	1 /1/2" (38,1 mm) and under	0 +20%	over 1 1/2" (38,1 mm)	0 +22%
Welded	0 +18%			

For tubes with OD≥2in a WT≥0,220in (5,6mm) are permitted divergences from average WT: ±10% for seamless tubes, ±5% for welded tubes.

Steels for room temperature pressure purpose tubes.

Stan-dards	Steel grade	Chemical composition (%)										Mechanical properties					
		C	Si	Mn	Pmax	Smax	Cr	Ni	Mo	Cu	Other	Re min MPa	Re min ksi	Rm min MPa	Rm max MPa	Rm min ksi	A5 min %
STN, ČSN																	
	11 353	max.0,18			0,050	0,050						235		340	440		25
	11 453	max.0,24			0,050	0,050						265		441	539		21
	11 503	max.0,18	max.0,55	max.1,60	0,035	0,035	max.0,30	max.0,30		max.0,30	Al min.0,015 Nb 0,015–0,08	355		490	630		22
	11 523	max.0,22	max.0,55	max.1,60	0,035	0,035					Al min.0,015	353		510	628		23
ASTM																	
A 53	GradeA	0,25		0,95	0,050	0,045						205	30	330		48	
	GradeB	0,30		1,20	0,050	0,045						240	35	415		60	
DIN																	
1629	St 37.0	max.0,17			0,040	0,040						235		350	480		25
	St 44.0	max.0,21			0,040	0,040						275		420	550		21
	St 52.0	max.0,22			0,040	0,035					Al min.0,020	355		500	650		21
1630	St 37.4	max.0,17	max.0,35	min.0,35	0,040	0,040					Al min.0,020	235		350	480		25
	St 44.4	max.0,20	max.0,35	min.0,40	0,040	0,040					Al min.0,020	275		420	550		21
	St 52.4	max.0,22	max.0,55	max.1,60	0,040	0,035					Al min.0,020	355		500	650		21
BS																	
3601	360	max.0,17	max.0,35	0,40–0,80	0,040	0,040					Almax.0,06	235		360	500		25
	430	max.0,21	max.0,35	0,40–1,20	0,040	0,040					Almax.0,06	275		430	570		22
NFA																	
49-112	TU E 220A	max.0,20	max.0,40	max.0,85	0,045	0,045						220		360	500		23
	TU E 235A	max.0,24	max.0,40	max.1,05	0,045	0,045						235		410	550		21
EN																	
10216-1	P 195 TR1	max.0,13	max.0,35	max.0,70	0,025	0,020	max.0,30	max.0,30	max.0,08	max.0,30	V max.0,02 Ti max.0,04	195		320	440		27
	P 195 TR2	max.0,13	max.0,35	max.0,70	0,030	0,025	max.0,30	max.0,30	max.0,08	max.0,30	V max.0,02 Ti max.0,04 Al max.0,02	195		320	440		27
	P 235 TR1	max.0,16	max.0,35	max.1,20	0,025	0,020	max.0,30	max.0,30	max.0,08	max.0,30	V max.0,02 Ti max.0,04	235		360	500		25
	P 235 TR2	max.0,16	max.0,35	max.1,20	0,030	0,025	max.0,30	max.0,30	max.0,08	max.0,30	V max.0,02 Ti max.0,04 Al max.0,02	235		360	500		25
	P 265 TR1	max.0,20	max.0,40	max.1,40	0,025	0,020	max.0,30	max.0,30	max.0,08	max.0,30	V max.0,02 Ti max.0,04	265		410	570		21
	P 265 TR2	max.0,20	max.0,40	max.1,40	0,025	0,020	max.0,30	max.0,30	max.0,08	max.0,30	V max.0,02 Ti max.0,04 Al max.0,02	265		410	570		21
GOST																	
1050	10	0,07–0,14	0,17–0,37	0,35–0,65			max.0,15					205		330			31
	20	0,17–0,24	0,17–0,37	0,35–0,65			max.0,25					245		410			25
	35	0,32–0,40	0,17–0,37	0,50–0,80			max.0,25					315		530			20
	45	0,42–0,50	0,17–0,37	0,50–0,80			max.0,25					355		600			16
JIS																	
G3454	STPG 370	max.0,25	max.0,35	0,30–0,90	0,040	0,040						215		370			30
	STPG 410	max.0,30	max.0,35	0,30–1,00	0,040	0,040						245		410			25
G3455	STS 370	max.0,25	0,10–0,35	0,30–1,10	0,035	0,035						215		370			30
	STS 410	max.0,30	0,10–0,35	0,30–1,40	0,035	0,035						245		410			25
	STS 480	max.0,33	0,10–0,35	0,30–1,50	0,035	0,035						275		480			25
PN-H																	
84023/07	R35	0,07–0,16	0,12–0,35	0,40–0,75	0,040	0,040	max.0,30	max.0,30	max.0,10	max.0,30		215		360			24
	R45	0,16–0,22	0,12–0,35	0,60–1,2	0,040	0,040	max.0,30	max.0,30	max.0,10	max.0,30		255		430			22
	R55	0,32–0,40	0,20–0,35	0,60–0,85	0,045	0,045	max.0,30	max.0,30	max.0,10	max.0,30		295		540			17

The Seamless steel tubes for pressure equipments for elevated temperature

Stan-dards	Dimenstions						
	Dimensional Standards	Dimensional range	Tolerance D	Tolerance T	Lengths	Straightness	Tube ends
EN	10216-2		Outside diameter D ±1 % min ±0,5 mm	±12,5 % (D ≤ 219,1 mm) min ±0,4 mm	Kinds: · random · exact Informative values: · D < 60,3 mm 5–6 m · D ≥ 60,3 mm / T < 7,1 mm 5–6 m or 10–14 m · D ≥ 60,3 mm / T ≥ 7,1 mm 5–6 m · longer (22–24 m) upon agreement Exact length tolerances: · L < 6 m 0 +10 mm · L = 6–12 m 0 +15 mm · L > 12	alloved 0,0015.L on tube calculated to 1 m max. 3 mm	· square cut ends · free from excessive burrs · option: with beveled ends
			Outside diameter D ±1 % min ±0,5 mm	T_{min} +28 % (D ≤ 219,1 mm) min +0,8 mm			
			Inside diameter d or dmin · see article 8.7.4.1 of standard · delivery upon agreement only	Wall thickness T			
			Inside diameter d or dmin · see article 8.7.4.1 of standard · delivery upon agreement only	Wall thickness T_{min}			
	10305.1 (upon agreement)		Cold finished: ±0,5 % min ±0,3 mm	±10 % min ±0,2 mm			
			Cold finished –precision	Cold formed –precision			
DIN	2448		D < 100 mm ±0,75 % min ±0,5 mm D = 100–320 mm ±0,90 %	D < 130 mm · T ≤ 2Tn –10 % +15 % · 2Tn < T < 4Tn –10% +12,5% · T > 4Tn ±9 % Tn - basic wall thick-ness according to DIN 2448	Kinds: · random · fixed ±500 mm · exact Informative values: · D < 60,3 mm 5–6 m · D ≥ 60,3 mm / T < 7,1 mm 5–6 m or 10–14 m · D ≥ 60,3 mm / T ≥ 7,1 mm 5–6 m · longer upon agreement	Visually straight	· square cut ends · free from excessive burrs
			Cold finished: D < 120 mm ±0,6 % min ±0,25 mm D > 120 mm ±0,75 %	according to DIN 2391-1			
	2391-1 (upon agreement)		Cold formed - precision		Exact length tolerances: like EN		
BS	3059-1		Hot finished (HFS): ±1 % min ±0,5 mm	±12,5 %	· random · exact with tolerances: L ≤ 6 m 0 +3 mm L > 6 m 1,5 mm/m, max 12,5 mm	Visually straight	· square cut ends · free from excessive burrs
			Cold finished (CFS): ±0,5 % min ±0,10 mm	±7,5 %			
	3059-2		Class S1: ±0,5 % min ±0,10 mm Class S2: ±0,75 % min ±0,30 mm (Cold finished)	±7,5 % ±10 %			
	3602-1 3604-1		Hot finished(HFS): ±1 % min ±0,5 mm	T/D = 3 % ±15 % T/D = 3–10% ±12,5 % T/D > 10 % ±12,5 % (D < 168,3 mm)			
			Cold finished (CFS): ±0,75 % min ±0,50 mm	±7,5 %			

TDC standards	Steel grade			Testing and Certificates		Other TDC		
	Name	Condition	Surface	Testing	Certificate	Marking	Surface prptection	Packing
10216-2	P195GH P235GH P265GH	+ N + N + N	Adequate to production mode of tubes and heat treatment. Visually without defects, to remove defects surface can be worked according to appropriate standard articles. Specific working upon agreement.	Specific testing Non-alloy special steel TC1 or TC2	EN 10204 Inspection certificate · 3.1 · 3.2	Indelibly marking D < 51 mm on label D > 51 mm at end Data · producer · standard · steel grade · TC (C - in steel) · cast (code) · inspector's mark · identification number Optionally: · additional marking upon agreement	· without · upon agreement	
	16Mo3 14MoV6-3 10CrMo5-5 13CrMo4-5 10CrMo9-10 11CrMo9-10 25CrMo4 Other steels according to agreement	+ N + NT + NT + NT + NT + QT + QT Conditions for: Hot finished Cold finished + N - normalized + NT - normalized + tempered + QT - quenching & tempered + I - izotermical annealed Normalising formed includes normalizing		Alloy special steel - TC2 Mandatory testing: · product analysis · tensile test · flattening or ring expanding · drift expanding · leak tightness · dimensions · visual · NDT (at TC2) · material identification (at alloy steel) · impact test according to steel grade and dimensions Optional testing upon agreement				
17175	St 35.8 St 45.8 17Mn4 19Mn5 15Mo3	Hot finished · as rolled · normalized Cold finished · normalized		Quality class I. or III.	DIN 50049 Kinds of protocol like EN	Usually die stamping or agreement At both ends Data: · steel · grade of quality (C-steel) · manufactuter · inspector · color strap At one end for OD ≥ 159 mm · cast number · tube number (III. grade)		
	13CrMo4 4 10CrMo9 10	Hot finished · tempered · normalized and tempered Cold finished · normalized and tempered		Quality class III. Testing like EN				
	14MoV6 3	Hot finished Cold finished · normalized and tempered (both methods)						
3059-1	320	Hot finished · as rolled (HF) · normalized (N) Cold formed · normalized		· visual · tensile test · flattening · drift expanding · leak tightness (hydrotest or NDT)	Standard requirements execution	Indelibly marking Usually die stamping At one end or Label on the bundle Data: · manufacturer · standard · steel · identification number · cast (at 3604-1)	· without · upon agreement	
3059-2	360 440	Cold formed · normalized		· testing category 1 with NDT · testing category 2 with hydrotest Other tests like BS 3059-1				
	243 420	N (N + T)						
	622 - 490	N + T or Ann (tempered)						
3602-1	360 430	Hot finished · as rolled (HF) · normalized (N) Cold formed · normalized		· visual · tensile test · flattening · testing category 1 with NDT - ultrasonic · testing category 2 with NDT - eddy current				
3604-1	620-440 621 660 622	N + T* N + T N + T N + T						

* Condition N+T is a valid for method HFS and CFS

List of dimensional standards and standards for technical delivery conditions

EN 10216-2	The Seamless steel tubes for pressure purposes. TDC. Part 2: The Non-alloy and alloy steel tubes with specified elevated temperature properties.
DIN 2391-1	Seamless precision steel tubes. Part 1: Dimensions.
DIN 2448	Plain end seamless steel tubes. Dimensions.
DIN 17175	The Seamless steel tubes for elevated temperatures.
BS 3059-1	The Steel boiler and superheater tubes. Specification for low tensile carbon steel tubes without specified elevated temperature properties.
BS 3059-2	Specification for carbon, alloy and austenitic steel tubes with specified elevated temperature properties.
BS 3600	Dimensions and masses per unit lenght of seamless and welded steel pipes and tubes for pressure purposes.
BS 3602-1	The Steel pipes and tubes for pressure purposes: carbon and carbon manganese steel with specified elevated temperature properties. Part 1: Specification for seamless and electric resistance welded including induction welded tubes.

The Seamless steel tubes for pressure equipments for elevated temperature

Stan-dards	Dimenstions						
	Dimensional Standards	Dimensional range	Tolerance D	Tolerance T	Lengths	Straightness	Tube ends
NF A	49.112		D ≤ 48,3 mm –0,8 +0,4 mm D = 60,3–114,3 mm ±0,8 mm D = 139,7–219,1 mm –0,8 +1,6 mm Tube weight –3,5 +10 %	T ≤ 3,2 mm –0,15T +0,5 mm T = 3,2–20 mm –0,125T +0,15T	Exact lengths tolerances: · L ≤ 8 m 0 +10 mm · L > 8 m 0 +15 mm	max. 3 mm/m total 0,15% of tube length	· square cut ends tol. 0,5 %D (min. 0,5 mm, max. 1,6 mm) · beveled D > 60,3
	49.113		Hot finished: D ≤ 63,5 mm ±0,50 mm D = 63,5–114,3 mm ±0,75 % D > 114,3 mm ±1 % Cold finished: D ≤ 33,7 mm ±0,25 mm D > 33,7 mm ±0,5 % min ±0,25 mm	±12,5 % min ±0,4 mm ±10 %	Exact lengths tolerances: · D ≤ 88,9 mm a L ≤ 7,5 m 0 +5 mm · D > 88,9 mm 0 +10 mm · L > 7,5 m +1 mm/1 m	max. 3 mm/m total by length 6 m = 8 mm	· square cut ends · free from excessive burrs
UNI	(ISO 1129) Pipe line 4991 Boiler 5463		Hot finished: D ≤ 51 mm ±0,5 mm D = 51–419 mm ±1 % Cold finished: D ≤ 139,7 mm ±0,75 % min ±0,3 mm Tube weight –8 +10%	D ≤ 139,7 mm ±12,5 % ±10 %	Exact lengths tolerances: · L ≤ 6 m 0 +10 mm · L > 6 m 0 +15 mm		· square cut ends · free from excessive burrs
STN ČSN	42 5715 42 5716 (42 6710) (42 6711)		42 5715 D ≤ 219 mm ±1,25 % min ±0,5 mm	D < 219 mm, T < 20 mm –15 % +12,5 %	Exact lengths tolerances: 0 +15 mm Multiple: +5 mm for cut, max. +50 mm	Straightened –3 mm/m Exact straigh-tened– 1,5 mm/m	· square cut ends · free from excessive burrs · option: with beveled ends
			42 5716 D ≤ 219 mm ±1 % min ±0,5 mm	D < 219 mm, T < 20 mm ±12,5 %			
			42 6710 ±1 % min ±0,4 mm	T ≤ 3 mm –10 % +15 % T > 3 mm –10 % +12 %			
			42 6711 see precision tubes				
GOST	8732 TU 14-3-190 TU 14-3-460		D ≤ 50 mm ±0,50 mm D = 50–219 mm usually ±1 % increased ±0,8 %	D ≤ 219 mm, T ≤ 15 mm usually –15% +12,5% increased ±12,5%	Exact lengths tolerances: · L ≤ 6 m 0 +10 mm · L > 6 m 0 +15 mm	1,5 mm/m	· square cut ends · option: beveled for WT 5–20 mm
PN-H	74252		D ≤ 50 mm ±0,50 mm D = 50–219 mm usually ±1 % increased ±0,8 %	D ≤ 219 mm, T ≤ 15 mm usually –15% +12,5% increased ±12,5%	Exact lengths tolerances: · L ≤ 6 m 0 +10 mm · L > 6 m 0 +15 mm	1,5 mm/m	· square cut ends · option: beveled for WT 5–20 mm
ANSI ASME	B36.10		See table 2, page 28,29 Except 1. row tolerance ±0,4 (not –0,8 mm)		Depending on tube dimension length upon agreement. See EN	Visually straight	· square cut ends · plain ends · NPS ≤ 11/2 (DN 40/48,3 mm) agreement · NPS ≥ 2 (DN 50/60,3 mm) WT ≤ XS – beveled WT > XS – plain & square cut

TDC standards	Steel grade			Testing and Certificates		Other TDC		
	Name	Condition	Surface	Testing	Certificate	Marking	Surface prptection	Packing
49-211	TUE 220 TUE 250 TUE 275	Hot finished · as rolled · normalized Cold finished · normalized	Adequate to production mode of tubes & heat treatment. Visually without defects, to remove defects surface can be worked according to appropriate standard articles. Specific working upon agreement	Testing as in EN · leak tightness by hydrotest – pressure according to formula	NFA 49-001 3.1.B	Indelibly marking 26,9 mm and under - label 26,9 - 48,3 mm - tube or label Over 48,3 mm at tube Data · manufacturer · steel, condition · standard · dimensions · presure at test · identification number · inspector	· without · upon agreement	· D < 60,3 mm - bundles · tubes of larger dia -meter can be free laid
49-213	TU 37C TU 42C TU 48C TU 52C	Hot finished · as rolled · normalized Cold finished · normalized		· hot finished tubes of grade: L1, L2, L3 · cold finished tubes of grade: F1, F2, F3 · NDT ultrasonic of grade: L2, L3, F2, F3	NFA 49-001 company certificate C.C.P.V (3.1.B) or inspection test 3.2.C			
	TU 15D3	N						
	TU 13CD4-04 TU 10CD5-05 TU 10CD9-10	N + T N + T N + T						
5462	C14 C18	Hot finished · as rolled · normalized Cold finished · normalized		· dimensions · hydrostatic test · drift expanding · flattening · tensile test · NDT upon agreement		Marking Acc. to agreement		
	16Mo5	N						
	14CrMo3 12CrMo9 10	N + T N + T						
42 0251	11 368 11 418 12 021 12 022 12 025 15 020	Hot finished · as rolled · normalized Cold finished · normalized condition.1 behind steel mark	.0+ scaled .1+ pickled Cold finished .2+ free of csale .4+ metallic clean .9+ special agreement (first number behind DS)	· surface · dimensions · leak tightness · tensile test · flattening · drift expanding · impact test · ring-expanding · material identification · NDT (Tube class 3) (Tube class 1 and 3)*	· 6+ test certificate · 7+ customer inspection · 9+ special arrangement + = tube class	Colour according to ČSN 42 0010 Tested NDT – colour strip D < 70 mm label on bundle Marking of tubes acc. to TDC	· without · upon agreement	· bundles 300–3500 kg, bounded with steel stripes · other upon agreement
	15 121 15 128 15 313	Hot finished · normalized & tempered Cold finished · normalized & tempered condition .5 behind steel mark						
8731	10 20	Hot finished · as rolled, · normalized		· product analysis · hardnes · visual · tensile test · impact test · grain size · inclusions · leak tightness · NDT	Acc. to GOST 10692	Acc. to GOST 10692 D over 159 (114) mm & WT over 3,5 mm at tube Smaller tubes label Data: · dimensions · steel · manufacturer · alloy steel - cast & tube number	Acc. to GOST 10692	Acc. to GOST 10692
4543	10G2 15ChM	Hot finished · normalized & tempered Cold finished · normalized & tempered						
20072 TU 14-3-190 TU 14-3-460	12Ch1MF							
74252 (84024)	K10 K18	Hot finished · as rolled, · normalized						
	16M, 10H2M 15HM 13HMF	Hot finished, Cold finished · normalized & tempered						
ASTM A106 (A530) ASME SA-106 (SA-530)	GradeA GradeB GradeC	Hot finished · as rolled Cold finished · normalized		· product analysis · hardness · tensile test · impact test (up to NPS 2") · flattening · impact test · hydrostatic or NDT – E 213, E 309, E 570 · dimensions · weight · drift expanding · flanging · (upon agreement equivalent C)	A530	A530 + A700 + article 24 of standard Under 2 in (60,3 mm) data on a label. Data: · manufacturer · standard · steel grade	A530 + A700 + article 24 of standard	A530 + A700 + article 24 of standard

List of dimensional standards and standards for technical delivery conditions

The Seamless steel tubes for pressure equipments for elevated temperature
Note: At NFA 49-213 – also steel TU 15CD2-05.

NFA 49-211	Steel tubes. Seamless plain-end unalloyed steel tubes for fluid piping at elevated temperatures.. Dimensions. TDC.
NFA 49-213	Steel tubes. Seamless unalloyed and Mo and Cr-Mo alloyed steel tubes for use at high temperatures. Dimensions (with standard tolerances). TDC.
ISO 1129	Steel tubes for boilers, superheaters and heat exchangers. Dimensions, tolerances and weight per unit lengths.
UNI 4991	Seamless and welded steel tubes with plain ends. Dimensions.
UNI 5462	Seamless steel tubes - tubes for elevated temperatures and pressures.
UNI 5463	.....
STN 42 0251	ČSN 42 0251 Seamless steel tubes with guaranteed properties of elevated temperatures.
STN 42 5715	ČSN 42 5715 Hot formed seamless steel tubes.
STN 42 5716	ČSN 42 5716 Hot formed seamless steel tubes with smaller tolerances.
STN 42 6710	ČSN 42 6710 Cold drawn seamless tubes with standard tolerances.
STN 42 6711	ČSN 42 6711 The precision seamless steel tubes.
GOST 4543	The alloy structural steel.
GOST 20072	The Heat resistant steel.
GOST 8731	The Hot formed seamless steel tubes. TDC.
GOST 8732	The Hot formed seamless steel tubes. Dimensions.
GOST 8733	The Seamless cold or hot formed steel tubes.
GOST 8734	The Cold formed seamless steel tubes.
TU 14-3-190	The Seamless steel tubes for boilers and pipelines.
TU 14-3-460	The Seamless steel tubes for steam boilers and pipelines.
ANSI/ASME B 36.10M	The Welded and seamless wrought steel pipe. Dimensions.

The Seamless steel tubes for pressure equipments for elevated temperature

Stan-dards	Dimenstions						
	Dimensional Standards	Dimensional range	Tolerance D	Tolerance T	Lengths	Straightness	Tube ends
ASTM ASME	A192 SA-192				Depending on tube dimension length upon agreement. Informative - like EN. Tolerance: **A 450 a A 1016** Seamless, hot finished : All dimensions 0+3/16 in. [0+ 5mm] Seamless, cold finished: D under 2 in. [50,8 mm] 0 + 1/8 in. [0+3mm] D 2 in.[50,8 mm] and over 0 + 3/16 in. [0+ 5mm] Welded : As seamless, cold finished Toler. for L under 24 ft. [7,3 m] L over 24 ft : 0 + 1/8 in. [+3 mm] for each 10 ft [3 m] or 0 + 1/2 in. [0+13 mm] smaller vallue is valid	Visually straight	· square cut ends · free from excessive burrs · beveled ends according agreement only
	A209 SA-209						
	A210 SA-210						
	A213 SA-213						
	A335 SA-335		Ordering of Pipe or Tube See tolerances table	See tolerances table Nominal T –12,5 % Minimum T to + only	**A 530 a A 999** Seamless and welded [electric. resistant] For L under 24ft. [7,3 m] incl. 0 + 1/4 in. [0+ 6 mm] For larger lengths under agreement [Valid for A 999] Tolerances of random lengths upon agreement.		
	A556 SA-556						
JIS	G3456		D ≤ 50 mm ±0,50 mm D = 50–160 mm ±1 %	T ≤ 4 mm ±0,5 mm T > 4 mm ±12,5 %			· square cut ends · free from excessive burrs · beveled ends according agreement only
	G3458						
	G3461		Hot finished Cold finished [Tolerances see standards]		D ≤ 50 mm, L ≤ 7 m 0 +7 mm D ≤ 50 mm, L > 7 m +3 mm/m, max 15 mm D > 50 mm, L ≤ 7 m 0 +10 mm D > 50 mm, L > 7 m +3 mm/m, max 15 mm		
	G3462						

TDC standards	Steel grade			Testing and Certificates		Other TDC		
	Name	Condition	Surface	Testing	Certificate	Marking	Surface prptection	Packing
A192 (A450) SA-192 (SA-450)	A192	Hot finished · as rolled Cold finished · normalized	Adequate to production mode of tubes and heat treatment. Visually without defects, to remove defects surface can be worked according to appropriate standard articles. Specific working upon agreement.	· product analysis · hardness · flattening · drift expanding · hydrostatic or NDT	A450	A450, A700, A1016 Under OD $1^{1/4}$ in (31,8 mm) data on the label Data: · manufacturer · standard · steel grade	A450 + A700	A450 + A700
A209 (A1016) SA-209 (SA-1016)	Grade T1 Grade T1a Grade T1b	Hot finished · normalized Cold finished · normalized · normalized + tempered		· product analysis · hardness · flattening · tensile test · drift expanding · hydrostatic or NDT	A1016		A1016 + A700	A450 + A700
A210 (A450) SA-210 (SA-450)	Grade A-1 Grade C	Hot finished · as rolled Cold finished · normalized		· product analysis · hardness · flattening · tensile test · drift expanding · hydrostatic or NDT	A450		A450 + A700	A450 + A700
A213 (A1016) SA-213 (SA-1016)	T2 T11 T12 T21 T22 T24	Hot finished · normalized + tempered Cold finished · normalized + tempered		· product analysis · tensile test · hardness · flattening · drift expanding · hydrostatic or NDT – E 213, E 309	A1016			
A335 (A999) SA-335 (SA-999)	P1 P2 P11 P12 P21 P22 P24	Hot finished · normalized + tempered Cold finished · normalized + tempered		· product analysis · tensile test · hardness · dimensions · hydrostatic and NDT – E 213, E 309, EN 570 · impact test	A999	Under OD 2 in (60,3 mm) data on the label Data: · manufacturer · standard · steel grade		
A556 (A450) SA-556 (SA-450)	Grade A2 Grade B2 Grade C2	Cold finished · normalized		· product analysis · tensile test · hardness · dimensions · flattening · drift expanding · NDT	A450	Under OD $1^{1/4}$ in (31,8 mm) data on the label Data: · manufacturer · standard · steel grade		
G3456	STPT 370 STPT 410 STPT 480	Hot finished · as rolled Cold finished · normalized		· product analysis · tensile test · flattening · impact test · hydrostatic or NDT according to JIS G0582 or JIS G0583		Small diameters – label Data: · steel grade · method of manufact. [-S-H], [-S-C] · ND x NWT / OD x WT · manufacturer · supplem. requirements Z		
G3458	STPA 12 STPA 20 STPA 22 STPA 23 STPA 24	Hot finished · normalized + tempered Cold finished · normalized + tempered						
G3461	STB 340 STB 410 STB 510	Hot finished · as rolled (340,410) · normalized (510) Cold finished · normalized		· product analysis · tensile test · flattening · drift expanding · hydrostatic or NDT according to JIS G0582 or JIS G0583	JIS G0303	Small diameters – label Data: · class (steel) · method of manufact. [-S-H], [-S-C] · dimensions · manufacturer · supplem. requirements Z		
G3462	STBA 12 STBA 13 STBA 20 STBA 22 STBA 23 STBA 24	Hot finished · normalized + tempered Cold finished · normalized + tempered						

List of dimensional standards and standards for technical delivery conditions

ASTM A106	The Seamless carbon steel pipe for high-temperature service.
ASTM A192	The Seamless carbon steel boiler tubes for high-pressure service.
ASTM A209	The Seamless carbon-molybdenum alloy-steel boiler and superheater tubes.
ASTM A210	The Seamless medium-carbon steel boiler and superheater tubes.
ASTM A213	The Seamless ferritic and austenitic alloy-steel boiler, superheater and heat-exchanger tubes.
ASTM 335	The Seamless ferritic alloy-steel pipe for high-temperature service.
ASTM A450	General requirements for carbon, ferritic alloy and austenitic alloy steel tubes.
ASTM A530	The General requirements for specialized carbon and alloy steel pipe.
ASTM A556	Seamless cold drawn carbon steel feedwater heater tubes.
ASTM A692	Seamless medium-strength carbon-molybdenum alloy steel boiler and superheater tubes.
ASTM A999	The General requirements for alloy and stainless steel pipe.
ASTM A1016	The General requirements for ferritic alloy steel, austenitic alloy steel and stainless steel tubes.
JIS G 3456	Carbon steel pipes for high temperature service.
JIS G 3458	Alloyed steel pipes.
JIS G 3461	The Carbon steel boiler and heat exchanger tubes.
JIS G 3462	The Alloy steel boiler and heat exchanger tubes.
PN-H 74 252	Seamless boiler steel tubes

General notes:

The Alloy steel tube and pipe according to standard ASTM (ASME) - it is recommended to test the tube with combination of 2 NDT methods - usually according to ASTM E309 and ASTM E213.

* The boiler tubes belong into pressure tube group. Except the standards for own tube the requirements of superior regulations for pressure vessels are valid. The manufacturer have to own the respective certificates.

Reference standards stated below:

ASTM E213 (ultrasonic) - Depth of the notches shall not exceed 12 1/2 % of WT. (Acc. to agreement 10% or 5%)
ASTM E309 (eddy curent) - max. diameter of drilled hole:
for tube: 0,031 in (0,8 mm)
for pipe: see Table in Standards A999
ASTM E570 (flux leakage) - values as in Standard ASTM 213

Steel grade of boiler tubes

Stan-dards	Steel grade	Chemical composition (%)										Mechanical properties					
		C	Si	Mn	Pmax	Smax	Cr	Ni	Mo	Cu	Ostatné	Re min MPa	Re min ksi	Rm min MPa	Rm max MPa	Rm min ksi	A5 min %
STN, ČSN																	
	11 368	max.0,15	max.0,35	min.0,40	0,040	0,040	max.0,30	max.0,30		max.0,30		245		350	440		26
	11 418	max.0,20	max.0,35	max.0,50	0,040	0,040	max.0,30	max.0,30		max.0,30		255		400	490		24
	12 021	0,07–0,15	0,17–0,35	0,35–0,60	0,040	0,040	max.0,25	max.0,25		max.0,25		235		340	470		25
	12 022	0,15–0,22	0,17–0,37	0,50–0,80	0,040	0,040	max.0,25	max.0,25		max.0,25		255		410	570		21
	12 025	0,14–0,20	0,17–0,37	0,60–1,00	0,040	0,040	max.0,25	max.0,25		max.0,25	V 0,05–0,09	320		440	600		23
	15 020	0,12–0,20	0,15–0,37	0,50–0,80	0,040	0,040			0,25–0,35		Al min.0,015	270		450	600		22
	15 121	0,10–0,18	0,15–0,35	0,40–0,70	0,040	0,040	0,70–1,30		0,40–0,60			295		440	590		22
	15 128	0,10–0,18	0,15–0,40	0,45–0,70	0,040	0,040	0,50–0,75		0,40–0,60		V 0,22–0,35	365		490	690		18
	15 313	0,08–0,15	0,15–0,40	0,40–0,80	0,035	0,035	2,00–2,50		0,90–1,10			265		480	630		20
BS																	
3059/1	320	max.0,16	0,10–0,35	0,30–0,70	0,040	0,040						195		320	480		25
3059/2	360	max.0,17	0,10–0,35	0,40–0,80	0,035	0,035						235		360	500		24
	440	0,12–0,18	0,10–0,35	0,90–1,20	0,035	0,035						245		440	580		21
	243	0,12–0,20	0,10–0,35	0,40–0,80	0,035	0,035			0,25–0,35		Al max.0,012	275		480	630		22
	620-460	0,10–0,15	0,10–0,35	0,40–0,70	0,035	0,035	0,70–1,10		0,45–0,65		Al max.0,020	180		460	610		22
ASTM																	
A 106	GradeA	0,25	min.0,10	0,27–0,93	0,035	0,035						205	30	330		48	35
A 556	GradeB	0,30	min.0,10	0,29–1,06	0,035	0,035						240	35	415		60	30
(Grade A2)	GradeC	0,35	min.0,10	0,29–1,06	0,035	0,035						275	40	485		70	30
A 192		0,06–0,18	max.0,25	0,27–0,63	0,035	0,035					137HB/77HRB	180	26	325		47	35
A 209	Grade T1	0,10–0,20	0,10–0,50	0,30–0,80	0,025	0,025			0,44–0,65			205	30	380		55	30
	Grade T1a	0,15–0,25	0,10–0,50	0,30–0,80	0,025	0,025			0,44–0,65			195	28	365		53	30
	Grade T1b	max.0,14	0,10–0,50	0,30–0,80	0,025	0,025			0,44–0,65			220	32	415		60	30
A 210	Grade A-1	max.0,27	min.0,10	max.0,93	0,035	0,035						255	37	415		60	30
	GradeC	max.0,35	min.0,10	0,29–1,06	0,035	0,035						275	40	485		70	30
A 213	Grade T11	0,05–0,15	0,50–1,00	0,30–0,60	0,025	0,025	1,00–1,50	max.0,40	0,44–0,65			205	30	415		60	30
A335	Grade T12	0,05–0,15	max. 0,50	0,30-0,61	0,025	0,025	0,80–1,25		0,44-0,65			220	32	415		60	30
(GradeP)	Grade 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	30	415		60	30
	Grade T24	0,05–0,10	0,15-0,45	0,30–0,70	0,020	0,010	2,20–2,60		0,90–1,10		V, Ti, B	415	60	585		85	20
	Grade T2	0,10–0,20	0,10–0,30	0,30–0,61	0,025	0,025	0,50–0,81		0,44–0,65			205	30	380		55	30
	Grade T21	0,05–0,15	max.0,50	0,30–0,60	0,025	0,025	2,65–3,35		0,80–1,06			205	30	415		60	30
	Grade T5	max.0,15	max.0,50	0,30–0,60	0,025	0,025	4,00–6,00		0,45–0,65			205	30	415		60	30
	Grade 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	60	585		85	20
DIN																	
17175	St 35.8	max.0,17	0,10–0,35	0,40–0,80	0,040	0,040						235		360	480		25
	St 45.8	max.0,21	0,10–0,35	0,40–1,20	0,040	0,040						255		410	530		21
	17Mn4	0,14–0,20	0,20–0,40	0,90–1,20	0,040	0,040	max.0,30					270		460	580		23
	19Mn5	0,17–0,22	0,30–0,60	1,00–1,30	0,040	0,040	max.0,30					310		510	610		19
	15Mo3	0,12–0,20	0,10–0,35	0,40–0,80	0,035	0,035			0,25–0,35			270		450	600		22
	13CrMo44	0,10–0,18	0,10–0,35	0,40–0,70	0,035	0,035	0,70–1,10		0,45–0,65			290		440	590		22
	10CrMo9 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
	14MoV6 3	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
UNI																	
5462	C14	max.0,17	0,10–0,35	max.0,40	0,035	0,035						240		350	450		28
	C18	max.0,21	0,10–0,35	max.0,50	0,035	0,035						260		450	550		23
	16Mo5	0,12–0,20	0,15–0,35	0,50–0,80	0,035	0,035			0,45–0,65			290		450	550		22
NFA																	
49-211	TU E220	max.0,17	max.0,35	max.0,85	0,030	0,030						220		370	490		26
	TU E250	max.0,23	max.0,40	max.1,05	0,030	0,030						250		410	530		23
	TU E275	max.0,25	max.0,45	max.1,40	0,030	0,030				max.0,25	Sn max.0,03	275		470	590		20
49-213	TU 37C	max.0,18	0,05–0,35	0,30–0,80	0,040	0,040				max.0,25	Sn max.0,03	220		360	460		
	TU 42C	max.0,22	0,07–0,40	0,40–1,05	0,040	0,040				max.0,25	Sn max.0,03	235		410	510		
	TU 48C	max.0,24	0,09–0,40	0,60–1,30	0,040	0,040				max.0,25	Sn max.0,03	275		470	570		
	TU 52C	max.0,22	0,13–0,55	0,95–1,60	0,040	0,040				max.0,25	Sn max.0,03	350		510	630		
	TU 15D3	0,10–0,22	0,10–0,40	0,40–0,90	0,040	0,040	max.0,40	max.0,30	0,21–0,39	max.0,25	Sn max.0,03	265		430	550		22
	TU 13CD4-04	0,08–0,20	0,05–0,40	0,30–0,80	0,035	0,035	0,65–1,15	max.0,30	0,41–0,69	max.0,25	Sn max.0,03	290		440	590		22
	TU 15CD2-05	0,08–0,20	0,05–0,40	0,40–1,00	0,035	0,035	0,30–0,75	max.0,30	0,41–0,64	max.0,25	Sn max.0,03	275		440	570		22

Stan-dards	Steel grade	Chemical composition (%)										Mechanical properties					
		C	Si	Mn	Pmax	Smax	Cr	Ni	Mo	Cu	Ostatné	Re min MPa	Re min ksi	Rm min MPa	Rm max MPa	Rm min ksi	A5 min %
EN																	
10216-2																	
	P195GH	max.0,13	max.0,35	max.0,70	0,025	0,020	max.0,30	max.0,30	max.0,08	max.0,30	V max.0,02 Ti max.0,04 Al min.0,020	195		320	440		27
	P235GH	max.0,16	max.0,35	max.1,20	0,025	0,020	max.0,30	max.0,30	max.0,08	max.0,30	V max.0,02 Ti max.0,04 Al min.0,020	235		360	500		25
	P265GH	max.0,20	max.0,40	max.1,40	0,025	0,020	max.0,30	max.0,30	max.0,08	max.0,30	V max.0,02 Ti max.0,04 Al min.0,020	265		410	570		21
	14MoV 6-3	0,10-0,18	0,10-0,35	0,40-0,70	0,025	0,020	0,30-0,60		0,50-0,70		V 0,22-0,32	320		460	610		20
	16Mo3	0,12–0,20	0,15–0,35	0,40–0,90	0,025	0,020			0,25–0,35		Al max.0,040	280		450	600		22
	13CrMo4-5	0,10–0,17	0,15–0,35	0,40–0,70	0,025	0,020	0,70–1,15		0,40–0,60		Al max.0,040	290		440	590		22
GOST																	
1050	10	0,07–0,14	0,17–0,37	0,35–0,65			max.0,15					205		330			31
	20	0,17–0,24	0,17–0,37	0,35–0,65			max.0,25					245		410			25
	35	0,32–0,40	0,17–0,37	0,50–0,80			max.0,25					315		530			20
	45	0,42–0,50	0,17–0,37	0,50–0,80			max.0,25					355		600			16
4543	10G2	0,07–0,15	0,17–0,37	1,20–1,60								245		420			22
	15ChM	0,11–0,18	0,17–0,37	0,40–0,70			0,80–1,10		0,40–0,65			275		440			21
20072	12Ch1MF	0,10–0,15	0,17–0,37	0,40–0,70	0,030	0,025	0,90–1,20	max.0,30	0,25–0,35		V0,15–0,30	235		410			21
JIS																	
G3456	STPT370	max.0,25	0,10–0,35	0,30–0,90	0,035	0,035						215		370			30
	STPT410	max.0,30	0,10–0,35	0,30–1,00	0,035	0,035						245		410			25
	STPT480	max.0,33	0,10–0,35	0,30–1,00	0,035	0,035						275		480			25
G3458	STPA12	0,10–0,20	0,10–0,50	0,30–0,80	0,035	0,035			0,45–0,65			205		380			30
	STPA22	max.0,15	max.0,50	0,30–0,60	0,035	0,035	0,80–1,25		0,45–0,65			205		410			30
G3461	STB340	max.0,18	max.0,35	0,30–0,60	0,035	0,035						175		340			35
	STB410	max.0,32	max.0,35	0,30–0,80	0,035	0,035						255		410			25
	STB510	max.0,25	max.0,35	1,00–1,50	0,035	0,035						295		510			25
G3462	STBA12	0,10–0,20	0,10–0,50	0,30–0,80	0,035	0,035			0,45–0,65			205		380			30
	STBA22	max.0,15	max.0,50	0,30–0,60	0,035	0,035	0,80–1,25		0,45–0,65			205		410			30
PN-H																	
84024	K10	max.0,17	0,10–0,35	min.0,40	0,045	0,045	max.0,20	max.0,35		max.0,25		235		340	440		25
	K18	0,16–0,22	0,10–0,35	min.0,60	0,045	0,045	max.0,20	max.0,35		max.0,25		255		440	540		21
	16M	0,12–0,20	0,15–0,35	0,50–0,80	0,040	0,040	max.0,30	max.0,35	0,25–0,35	max.0,25	Al max 0,020	285		440	540		22
	15HM	0,11–0,18	0,15–0,35	0,40–0,70	0,040	0,040	0,70–1,10	max.0,35	0,40–0,55	max.0,25	Al max 0,020	295		440	570		22

Comparison of steel grade for boiler tubes.

Standard								Maximal temperature (°C)			
	450 - 475 - 500 (by lest category)				500 - 530			550 - 560			
EN 10216-2	P235GH	P265GH	(P295GH)	(P310GH)	16Mo3				13CrMo4-5	14MoV6-3	10CrMo5-5
(W.Nr.)	1.0345	1.0425			1.5415				1.7335	1.7715	1.7338
DIN 17175	St 35.8	St 45.8	17Mn4	19Mn5	15Mo3				13CrMo4 4	14MoV6 3	
(W.Nr.)	1.0305	1.0405	1.0481	1.0482	1.5415				1.7335	1.7715	
DIN 17176						16Mo5			13CrMo4 4		
(W.Nr.)						1.5423			1.7335		
BS 3059-1	320										
BS 3059-2	360	440			243				620-460		
BS 3602-1	360	430		500Nb							
BS 3604									620-440	660	621
NFA 49-211	TUE220B	TUE250B	TUE275B								
NFA 49-213	TU37C	TU42C	TU48C	TU52C	TU15D3			TU15CD2-05	TU13CD4-04		TU10CD5-05
UNI 5462	C14	C18				16Mo5			14CrMo3		
STN 42 0251	12 021	12 022			15 020				15 121	15 128	
GOST 1050	10	20									
GOST 4543									15ChM		
GOST 20072										(12Ch1MF)	
PN-H 84024	K10	K18				16M			15HM	(12HMF)	
ASTM A106	Grade A	Grade B	Grade C								
ASTM A192	A192										
ASTM A209							T1 T1a T1b				T11
ASTM A210		Grade A-1	Grade C								
ASTM A213								T2	T12		P11
ASTM A335							P1	P2	P12		
ASTM A556	Grade A2	Grade B2	Grade C2								
ASTM A692							A692				
JIS G 3456	STPT370	STPT410	STPT480								
JIS G 3458						STPA12		STPA20	STPA22		STPA23
JIS G 3461	STB340	STB410	STB510								
JIS G 3462					STBA12	STBA13	STBA20		STBA22		STBA23

600		625	650		675
10CrMo9-10	X11CrMo5+I	X11CrMo9-1+I	X20CrMoV11-1	X10CrMoVNb9-1	
1.7380	1.7362	1.7386	1.4922	1.4903	
10CrMo9 10			X20CrMoV12-1	X10CrMoVNb9-1	
1.7380			1.4922	1.4903	
	12CrMo19-5	X12CrMo9-1			
	1.7362	1.7386			
622-490		629-470	762		
622	625	629-470	762		
TU10CD9-10	TUZ12CD05-05	TUZ10CD9		TUZ10CDVNb09-01	
12CrMo9-10					
15 313					
T22	T5 T5B T5C	T9		T91	T92
P22	P5 P5B P5C	P9		P91	P92
STPA24	STPA25	STPA26		STPA28	
STBA24	STBA25	STBA26		STBA28	

The Alloy fine grain steel tubes for pressure equipment

The List of dimensional standards and technical delivery conditions standards

DIN 2391-1	Seamless precision steel tubes. Part 1: Dimensions.
DIN 2448	Plain end seamless steel tubes. Dimensions.
DIN 17179	Seamless circular tubes of fine grain steel for special requirements. TDC.
EN 10 216-3	Seamless steel tubes for pressure purposes. TDC. Stated Part 3: Non-alloy & alloy fine grain steel tubes.

Steel types

Comparison of steel according to DIN and EN standards: Fine grain steel are delivered in 4 series (steel grades):

Series	DIN 17179		EN 10216 - 3	
	Identification	Grade	Identification	Grade
Basic	StE	255, 285, 355, 420, 460	P-N	355, 460
High temperature	WStE	255, 285, 355, 420, 460	P-NH	355, 460
Low temperature	TStE	255, 285, 355, 420, 460	P-NL1	275, 355, 460
Low temperature special	EStE	255, 285, 355, 420, 460	P-NL2	275, 355, 460

Note: Steel grade condition Q are not given in comparison.

Designation of steel according to EN:

P – steel for pressure equipments
355 – minimum yield strength in N/mm2
N – normalized or normalising formed
NH – high temperature steel
NL1 – low temperature steel
NL2 – special low temperature steel
Delivery by dmin a Tmin upon agreement (page 34)
Cold finished - precision
See page 60 a 64
Cold finished - precision
See page 60 a 64
Stan- Dimensions
dards Dimensional
standards Dimensional range Tolerance D Tolerance T Lengths Straightness Tube ends
Note: Fine grain steel – ferritic grain size 6 or finer according to ASTM E112.

Steel grade of fine grain steel

Stan-dards	Steel grade	Chemical composition (%)										Mechanical properties					
		C	Si	Mn	Pmax	Smax	Cr	Ni	Mo	Cu	Other	Re min MPa	Re min ksi	Rm min MPa	Rm max MPa	Rm min ksi	A5 min %
DIN																	
17179	StE 255	max.0,18	max.0,40	0,50-1,30	0,035	0,030	max.0,30	max.0,30	max.0,08	max.0,20	Al min.0,020	255		360	480		25
	WStE 255	max.0,18	max.0,40	0,50-1,30	0,035	0,030	max.0,30	max.0,30	max.0,08	max.0,20	Al min.0,020	255		360	480		25
	TStE 255	max.0,16	max.0,40	0,50-1,30	0,030	0,025	max.0,30	max.0,30	max.0,08	max.0,20	Al min.0,020	255		360	480		25
	EStE 255	max.0,16	max.0,40	0,50-1,30	0,025	0,015	max.0,30	max.0,30	max.0,08	max.0,20	Al min.0,020	255		360	480		25
	StE 285	max.0,18	max.0,40	0,60-1,40	0,035	0,030	max.0,30	max.0,30	max.0,08	max.0,20	Al min.0,020	285		390	510		24
	WStE 285	max.0,18	max.0,40	0,60-1,40	0,035	0,030	max.0,30	max.0,30	max.0,08	max.0,20	Al min.0,020	285		390	510		24
	TStE 285	max.0,16	max.0,40	0,60-1,40	0,030	0,025	max.0,30	max.0,30	max.0,08	max.0,20	Al min.0,020	285		390	510		24
	EStE 285	max.0,16	max.0,40	0,60-1,40	0,025	0,015	max.0,30	max.0,30	max.0,08	max.0,20	Al min.0,020	285		390	510		24
	StE 355	max.0,20	0,10-0,50	0,90-1,65	0,035	0,030	max.0,30	max.0,30	max.0,08	max.0,20	Al min.0,020	355		490	630		22
	WStE 355	max.0,20	0,10-0,50	0,90-1,65	0,035	0,030	max.0,30	max.0,30	max.0,08	max.0,20	Al min.0,020	355		490	630		22
	TStE 355	max.0,18	0,10-0,50	0,90-1,65	0,030	0,025	max.0,30	max.0,30	max.0,08	max.0,20	Al min.0,020	355		490	630		22
	EStE 355	max.0,18	0,10-0,50	0,90-1,65	0,025	0,015	max.0,30	max.0,30	max.0,08	max.0,20	Al min.0,020	355		490	630		22
EN																	
10216-3	P275NL1	max.0,16	max.0,40	0,50-1,50	0,025	0,020	max.0,30	max.0,50	max.0,08	max.0,30	V max.0,05 Ti max.0,04 Al min.0,020	275		390	530		24
	P275NL2	max.0,16	max.0,40	0,50-1,50	0,025	0,015	max.0,30	max.0,50	max.0,08	max.0,30	Ti max.0,04 V max.0,05 Al min.0,020	275		390	530		24
	P355N	max.0,20	max.0,50	0,90-1,70	0,025	0,020	max.0,30	max.0,50	max.0,08	max.0,30	V max.0,10 Ti max.0,04 Al min.0,020	355		490	650		22
	P355NH	max.0,20	max.0,50	0,90-1,70	0,025	0,020	max.0,30	max.0,50	max.0,08	max.0,30	V max.0,10 Ti max.0,04 Al min.0,020	355		490	650		22
	P355NL1	max.0,18	max.0,50	0,90-1,70	0,025	0,020	max.0,30	max.0,50	max.0,08	max.0,30	V max.0,10 Ti max.0,04 Al min.0,020	355		490	650		22
	P355NL2	max.0,18	max.0,50	0,90-1,70	0,025	0,015	max.0,30	max.0,50	max.0,08	max.0,30	V max.0,10 Ti max.0,04 Al min.0,020	355		490	650		22
	P460N	max.0,20	max.0,60	1,00-1,70	0,025	0,020	max.0,30	max.0,80	max.0,10	max.0,70	V max.0,20 Ti max.0,04 Al min.0,020	460		560	730		19
	P460NH	max.0,20	max.0,60	1,00-1,70	0,025	0,020	max.0,30	max.0,80	max.0,10	max.0,70	V max.0,20 Ti max.0,04 Al min.0,020	460		560	730		19
	P460NL1	max.0,20	max.0,60	1,00-1,70	0,025	0,020	max.0,30	max.0,80	max.0,10	max.0,70	V max.0,20 Ti max.0,04 Al min.0,020	460		560	730		19
	P460NL2	max.0,20	max.0,60	1,00-1,70	0,025	0,015	max.0,30	max.0,80	max.0,10	max.0,70	V max.0,20 Ti max.0,04 Al min.0,020	460		560	730		19

The Seamless steel tubes for pressure equipments for low temperature

Stan-dards	Dimenstions					
	Dimensional Standards	Tolerance D	Tolerance T	Lengths	Straightness	Tube ends
EN	10216-4	Hot finished: D ≤ 219,1 mm ±1 % min ±0,5 mm Cold finished: ±0,5 % min ±0,3 mm	D ≤ 219,1 mm ±12,5 % min ±0,4 mm ±10 % min ±0,2 mm	Kinds: · random · exact Informative values: · D < 60,3 mm 5–6 m · D ≥ 60,3 mm / T < 7,1 mm 5–6 m or 10–14 m · D ≥ 60,3 mm / T ≥ 7,1 mm 5–6 m · longer upon agreement Exact length tolerances: · L < 6 m 0 +10 mm · L = 6–12 m 0 +15 mm · L > 12 m + upon agreement – 0	Permissible 0,0015.L for tube conversion to 1 m max. 3 mm	· square cut ends · free from excessive burrs · option: with beveled ends
	10305-1 (upon agreement)	Cold finished - precision				
DIN	2448	D ≤ 100 mm ±1 % min ±0,5 mm D = 100–200 mm ±1 %	D < 130 mm · T ≤ 2Tn –10 % +15 % · 2Tn < T < 4Tn –10 % +12,5 % · T > 4Tn ±9 % Tn – basic wall thickness according to DIN 2448	Kinds: · random · fixed ±500 mm · exact Informative values: · D < 60,3 mm 5–6 m · D ≥ 60,3 mm / T < 7,1 mm 5–6 m or 10–14 m · D ≥ 60,3 mm / T ≥ 7,1 mm 5–6 m · longer upon agreement Precise length tolerances: like EN	· visually straight · upon agreement	
	2391-1 (upon agreement)	Cold finished - precision				
BS	36000	Hot finished: ±1 % min ±0,5 mm Cold finished: ±0,75 % min ±0,5 mm	≤ 3 %D ±15 % 3–10 %D ±12,5 % ±7,5 %	· random · exact with tolerances: L ≤ 6 m 0 +6 mm L > 6 m 1,5 mm/m, max 12 mm		
NF A	49215	D ≤ 20 mm ±0,10 mm D = 20–38 mm ±0,15 mm D = 38–50 mm ±0,25 mm D > 50 mm ±0,30 mm	±9 % min ±0,20 mm upon agreement 0 +18%	Exact with tolerances: L ≤ 6 m 0 +3 mm L = 6–9 m 0 +4,5 mm L = 9–12 m 0 +6 mm L = 12–15 m 0 +7,5 mm L = 15–18 m 0 +9 mm	· locally 3 mm/m · total: L < 4 m 2 mm/m L = 4–6 m 8 mm/m L > 6 m 8 mm +1 mm/m	· square cut ends · free from excessive burrs

TDC standards	Steel grade		
	Name	Condition	Surface
10216-4	P215NL P265NL 12Ni14	+ N + N + NT Conditions valid for both methods: Hot finished Cold finished	· visually free from surface defects · adequate to production mode
17173	TTSt35N 10Ni14	N V(N] N– normalized V – quenched and tempered Conditions valid for both methods: Hot finished Cold finished	
3603	430LT 503LT (HFS,CFS]	Hot finished · normalising formed HF · normalized N Cold finished · normalized N Hot finished Cold finished · normalized N · normalized & temp. N+T	
49-215	TU 42BT TU 10N9 TU 10N14	Cold finished · normalized N Cold finished · normalized N · normalized and temp. N+T	

The List of dimensional standards and technical delivery conditions standards

EN 10 216 - 4	The Seamless steel tubes for pressure purposes. TDC. Part 4: The Non-alloy and alloy steel tubes with specified low temperature properties.
DIN 2391-1	The Seamless precision steel tubes. Part 1: Dimensions.
DIN 2448	Plain end seamless steel tubes. Dimensions.
DIN 17173	The Seamless circular steel tubes for low temperatures. TDC.
DIN 28180	The Seamless steel tubes for tubular heat exchangers. Dimensions, tolerances, materials.
BS 3600	Dimension and masses per unit length of welded and seamless steel pipes and tubes for pressure purposes.
BS 3603	The carbon & alloy steel pipes and tubes with specified low-temperature properties for pressure purposes.
NFA 49-215	Seamless tubes for ferritic non-alloy and alloy steel heat exchangers. Dimensions. TDC.

Designation of steel for low temperature according to EN:

P – steel for pressure equipments
215 – minimum yield strength in N/mm^2
N – normalized or normalising formed
L – low temperature steel

Test category:

Non alloy steels - TC1 or TC2 upon agreement in order
Alloy steels - TC2 only

The Seamless steel-tubes for pressure equipments for low temperature

Stan-dards	Dimenstions					
	Dimensional Standards	Tolerance D	Tolerance T	Lengths	Straightness	Tube ends
UNI	4991	Hot finished: D ≤ 51 mm ±0,5 mm D > 51 mm ±1 % Cold finished: D ≤ 25 mm ±0,25 mm D = 25–51 mm ±0,35 mm D > 51 mm ±0,75 % Weight –8 % +10 %	D ≤ 323,9 mm ±12,5 % (–17,5 %) Cold finished: Di ≤ 7 mm ±12 % (–14 %) min ±0,10 mm Di > 7 mm ±10 % (–12 %)	· random · exact with tolerances: L ≤ 6 m 0 +10 mm L > 6 m 0 +15 mm	Straightened - 3 mm/m Flat straightened - 1,5 mm/m	· square cut ends · free from excessive burrs · option: with beveled ends
STN ČSN	42 5715 42 5716	42 5715 D ≤ 219 mm ±1,25 % min ±0,5 mm	D ≤ 219 mm, T ≤ 20 mm –15 % +12,5 %	Eexact length tolerances: 0 +15 mm Multiple: +5 mm on cut, max. +50 mm		
	42 6710 42 6711	42 5716 D ≤ 219 mm ±1% min ±0,5 mm	±12,5 %			
		42 6710 ±1% min ±0,4 mm	T ≤ 3 mm –10 % +15 % T > 3 mm –10 % +12 %			
		42 6711 see precision tubes				
ANSI ASME	B36.10				Reasonably straight	· square cut ends · free from excessive burrs
ASTM ASME	A334 AS-334					
ANSI	B36.10					

TDC standards	Steel grade		
	Name	Condition	Surface
5949	C15 C20	Hot finished · normalized Cold finished · normalized	· visually free from surface defects · adequate to production mode
42 0165	11 369 11 419 11 448 11 449 11 503	Hot finished · normalized Cold finished · normalized	
A333 [A999] SA-333 SA-999	Grade 1 Grade 3 Grade 6 Grade 7	Hot finished · normalized Cold finished · normalized	
A334 [A1016] SA-334 A524 [A530] SA-524	Grade 1 Grade 3 Grade 6 Grade 7 Grade I and II	Hot finished · normalized Cold finished · normalized	

List of dimensional standards and standards for technical delivery conditions

UNI 4991	Seamless and welded steel tubes with plain ends. Dimensions.
UNI 5949	Special unalloyed and alloyed steel seamless tubes with low-temperature impact test.
STN 42 0165	ČSN 42 0165 Sheets and pipes of ferritic – perlitic steel with guaranteed impact properties at low temperatures. TDC.
STN 42 5715	ČSN 42 5715 Hot formed seamless steel tubes. Dimensions.
STN 425716	ČSN 42 5716 Hot formed seamless steel tubes with smaller tolerances. Dimensions.
STN 42 6710	ČSN 42 6710 Cold drawn seamless tubes with normal tolerances from steel class 11 – 16. Dimensions.
STN 42 6711	ČSN 42 6711 Precision seamless steel tubes. Dimensions.
ANSI/ASME B 36.10	Welded and seamless wrought steel pipe. Dimensions.
ASTM A333	The Seamless and welded steel pipe for low-temperature service. TDC.
ASTM A334	Seamless and welded carbon and alloy steel tubes for low-temperature service. TDC.
ASTM A450	General requirements for carbon, ferritic alloy, and austenitic alloy steel tubes.TDC.
ASTM A524	The Seamless carbon steel pipe for atmospheric and lower temperatures. TDC.
ASTM A530	The General requirements for specialized carbon and alloy steel pipe. TDC.
ASTM A999	The General requirements for alloy and stainless steel pipe.
ASTM A1016	The General requirements for ferritic alloy steel, austenitic alloy steel and stainless steel tubes.
ISO 9329-3	The Seamless steel tubes for pressure purposes. TDC. Part 3: Non-alloy and alloy steel tubes with specified low temperature properties.

Steel grades for pressure tubes for low temperature

Stan-dards	Steel grade	Chemical composition (%)										Mechanical properties					
		C	Si	Mn	Pmax	Smax	Cr	Ni	Mo	Cu	Other	Re min MPa	Re min ksi	Rm min MPa	Rm max MPa	Rm min ksi	A5 min %
STN, ČSN																	
	11 369	max.0,14	max.0,35	max.0,80	0,040	0,040	max.0,30	max.0,30		max.0,30	Al min.0,020	226		353	441		
	11 419	max.0,20	max.0,35	max.0,80	0,040	0,040	max.0,30	max.0,30		max.0,30	Al min.0,020	255		400	490		
	11 448	max.0,20	max.0,40	max.1,30	0,035	0,035	max.0,30	max.0,20		max.0,30		275		430	580		22
	11 449	max.0,15	max.0,40	max.1,50	0,035	0,035	max.0,30	max.0,20		max.0,30	Al min.0,020	295		430	530		22
	11 503	max.0,18	max.0,55	max.1,60	0,035	0,035	max.0,30	max.0,30		max.0,30	Al min.0,015	355		490	630		22
ASTM																	
A 333	Grade 1	max.0,30		0,40-1,06	0,025	0,025						205	30	380		55	35
	Grade 3	max.0,19	0,18-0,37	0,31-0,64	0,025	0,025		3,18-3,82				240	35	450		65	30
	Grade 6	max.0,30	min.0,10	0,29-1,06	0,025	0,025						240	35	415		60	30
A 334	Grade 1	max.0,30		0,40-1,06	0,025	0,025						205	30	380		55	35
	Grade 3	max.0,19	0,18-0,37	0,31-0,64	0,025	0,025		3,18-3,82				240	35	450		65	30
	Grade 6	max.0,30	min.0,10	0,29-1,06	0,025	0,025						240	35	415		60	30
	Grade 7	max.0,19	0,13-0,32	max.0,90	0,025	0,025		2,03-2,57				240	35	450		65	30
A 524		max.0,21	0,10-0,40	0,90-1,35	0,035	0,035						240	35	414	586	60	30
DIN																	
17173	TT St 35N	max.0,17	max.0,35	min.0,40	0,030	0,025					Al min.0,020	225		340	460		25
	10Ni14	max.0,15	max.0,35	0,30-0,80	0,025	0,020		3,25-3,75			V max.0,05	335		470	640		20
BS																	
3603	430LT	max.0,20	max.0,35	0,60-1,20	0,035	0,035					Al min.0,020	275		430	570		22
	503LT	max.0,15	0,15-0,35	0,30-0,80	0,025	0,020		3,25-3,75			Al min.0,020	245		440	590		16
NFA																	
49-215	TU 42BT	max0,22	max.0,40	max.1,15	0,040	0,040						235		410	510		23
	TU 10N9	max.0,17	max.0,35	max.1,00	0,035	0,035		2,00-2,60				245		450			20
	TU 10N14	max.0,17	max.0,40	max.0,75	0,035	0,035		3,20-3,80				245		450			20
EN																	
10216-4	P 215 NL	max.0,15	max.0,35	0,40-1,20	0,030	0,020	max.0,30	max.0,30	max.0,08	max.0,30	V max.0,02 Ti max.0,03 Al min.0,020	215		360	480		25
	P 265 NL	max.0,20	max.0,40	0,60-1,40	0,030	0,020	max.0,30	max.0,30	max.0,08	max.0,30	V max.0,02 Ti max.0,03 Al min.0,020	265		410	570		24
	12Ni14	max.0,15	0,15-0,35	0,30-0,80	0,025	0,010		3,25-3,75		max.0,30	V max.0,05	345		440	620		20
UNI																	
5949	C 15	max.0,15	0,15-0,35	max.1,00	0,035	0,035						220		350	500		28
	C 20	max.0,20	0,15-0,35	max.1,00	0,035	0,035						250		450	600		24

Tubes for heat exchangers (seamless and welded)

Stan-dards	Dimenstions					
	Dimensional Standards	Tolerance D	Tolerance T	Lengths	Straightness	Tube ends
SEAMLESS TUBES						
EN	10216-2	Production method as cold drawn (Tubes for low temperature see EN 10216-4)				
DIN	28180 (2391-1)	Tolerance class 1: D = 16–30 mm ±0,08 mm D > 38 mm ±0,15 mm Tolerance class 3: D = 16–38 mm ±0,50 mm	T ≤ 2 mm ±0,2 mm T > 2 mm ±10 % T ≤ 2 mm ±0,2 mm T > 2 mm –10 % +15 %	Exact lengths: L ≤ 5 m 0 +5 mm L 5–10 m 0 +10 mm L > 10 m upon agreement (seamless max. 18,3 m)	· visually straight · upon agreement	· square cut ends · free from excessive burrs
BS	3606	D ≤ 25 mm ±0,10 mm D = 25–38 mm ±0,15 mm D 38–50 mm ±0,20 mm	· ±10 % · upon agreement: D ≤ 38 mm 0 +20 % D > 38 mm 0 +22 %	Exact lengths: L ≤ 6 m 0 +3 mm L > 6 m +1,5 mm/m, max +12,5 mm	visually straight	
NF A	49-215					
UNI	ISO 1129					
STN **ČSN**	42 6710 42 6711					
ASTM **ASME**	A179 SA-179	According to ASTM A450		· upon agreement · max 18,3 m		· square cut ends · free from excessive burrs
JIS	G3461 G3462					· square cut ends · free from excessive burrs
WELDED COLD SIZED TUBES						
DIN	28181 (2394-1)	Tolerance class 1: D = 16–30 mm ±0,08 mm D > 38 mm ±0,15 mm Tolerance class 2: D ≤ 16 mm ±0,12 mm D = 20–30 mm ±0,15 mm D > 38 mm ±0,20 mm Tolerance class 3: D = 16–38 mm ±0,50 mm	T ≤ 2 mm ±0,20 mm T > 2 mm ±10 %	Exact lengths: L ≤ 5 m 0 +5 mm L 5–10 m 0 +10 mm L > 10 m upon agreement (welded max. 15 m)	· visually straight · upon agreement	· square cut ends · free from excessive burrs
ASTM	A214 A178 A334		0 + 18%			· square cut ends · free from excessive burrs

TDC standards	Steel grade	
	Name	Condition
0216-2	P235GH 16Mo3	
1629 17175 17173	St37.0 St35.8 15Mo3 TTSt35N	Cold finished · normalized (NBK)
3606	320 440 243 620 622	N N N, N + T N, N + T Cold finished · condition upon steel or agreement
49-215	TU37C TU42C TU48C TU15D3 TU13CD4-04	N N N N N + T
5462	16Mo5	
42 0251	12 021 12 022 12 025 15 020 15 121 15 128 15 313	Cold finished · normalized number .1 behind steel Cold finished · normalized and temper. number .5 behind steel
A179 (A450) SA-179	A 179	Cold finished · normalized
G3461 G3462	STB340 STB410 STB510 STBA12	Cold finished · normalized
1626	St37.0	
17174	TTSt35N	
17177	St37.8 St42.8	
A214 A178 A334 (A1016)	A214 Grade A, B, C Grade 1 Grade 6	Cold finished · normalized (Calibrated)
49-243 49-245	TS37C TS42C TS48C TS52C TS15D3 TS34C TS37C TS42C TS48C	N N N N N+T N N N N

List of dimensional standards and standards for technical delivery conditions

EN 10216-2	The Seamless steel tubes for pressure purposes. TDC. Part 2: The Non-alloy and alloy steel tubes with specified elevated temperature properties.
DIN 1629	The Seamless circular tubes of non-alloy steel with special quality requirements. TDC.
DIN 2391-1	Seamless precision steel tubes. Part 1: Dimensions.
DIN 17175	The Seamless steel tubes for elevated temperatures. TDC.
DIN 28180	The Seamless steel tubes for tubular heat exchangers. Dimensions, tolerances, materials.
BS 3606	Steel tubes for heat exchangers.
NFA 49-215	The Seamless tubes for ferritic non alloy and alloy steel heat exchangers.
NFA 49-243	Longitudinally pressure welded tubes D ≤ 168,3 mm of non-alloy and ferritic alloy steel used at elevated temperatures. Dimensions. TDC.
NFA 49-245	Longitudinally pressure welded tubes of non-alloy and ferritic alloy steel for heat exchangers of diameter 15,9 – 76,1 mmm inclusive. Dimensions. TDC.
STN 42 0251	ČSN 42 0251 The Seamless steel tubes with guaranteed properties at elevated temperatures. TDC.
STN 42 6710	ČSN 42 6710 The Cold drawn seamless tubes with normal tolerances from steel class 11–16. Dimensions.
STN 42 6711	ČSN 42 6711 The Precision seamless steel tubes. Dimensions available.
GOST 550	The Seamless steel tubes for petroleum processing and petrochemical industry.
GOST 8734	Seamless steel tubes cold deformed.
ANSI/ASME B 36.10M	Welded and seamless wrought steel pipe. Dimensions.
ASTM A178	Electric resistance welded carbon steel and carbon manganese steel boiler and superheater tubes.
ASTM A179	Seamless cold drawn low-carbon steel heat exchanger and condenser tubes. TDC.
ASTM A199	Seamless cold drawn intermediate alloy steel heat exchanger and condenser tubes. TDC.
ASTM A214	The Electric resistance welded carbon steel heat exchanger and condenser tubes.
ASTM A334	Seamless and welded carbon and alloy-steel tubes for low-temperature service. TDC.
ASTM A450	General requirements for carbon, ferritic alloy and austenitic alloy steel tubes. TDC.
JIS G 3461	The Carbon steel boiler and heat exchanger tubes.
JIS G 3462	Alloy steel boiler and heat exchanger tubes.

Steel grade for heat-exchanger tubes

Stan-dards	Steel grade	Chemical composition (%)										Mechanical properties					
		C	Si	Mn	Pmax	Smax	Cr	Ni	Mo	Cu	Other	Re min MPa	Re min ksi	Rm min MPa	Rm max MPa	Rm min ksi	A5 min %
STN, ČSN																	
	11 368	max.0,15	max.0,35	min.0,40	0,040	0,040	max.0,30	max.0,30		max.0,30		245		350	440		26
	11 418	max.0,20	max.0,35	max.0,50	0,040	0,040	max.0,30	max.0,30		max.0,30		255		400	490		24
	12 021	0,07–0,15	0,17–0,35	0,35–0,60	0,040	0,040	max.0,25	max.0,25		max.0,25		235		340	470		25
	12 022	0,15–0,22	0,17–0,37	0,50–0,80	0,040	0,040	max.0,25	max.0,25		max.0,25		255		410	570		21
	12 025	0,14–0,20	0,17–0,37	0,60–1,00	0,040	0,040	max.0,25	max.0,25		max.0,25	V 0,05–0,09	320		440	600		23
	15 020	0,12–0,20	0,15–0,37	0,50–0,80	0,040	0,040			0,25–0,35		Al min.0,015	270		450	600		22
	15 121	0,10–0,18	0,15–0,35	0,40–0,70	0,040	0,040	0,70–1,30		0,40–0,60			295		440	590		22
	15 128	0,10–0,18	0,15–0,40	0,45–0,70	0,040	0,040	0,50–0,75		0,40–0,60		V 0,22–0,35	365		490	690		18
ASTM																	
A 161	Grade C	0,10–0,20	max.0,25	0,30–0,80	0,035	0,035						179	26	324		47	35
	Grade T-1	0,10–0,20	0,10–0,50	0,30–0,80	0,025	0,025			0,44–0,65			207	30	379		55	30
A 179		0,06–0,18		0,27–0,63	0,035	0,035					max.72HRB	180	26	325		47	35
A 199	Grade T4	0,05–0,15	0,50–1,00	0,30–0,60	0,025	0,025	2,15–2,85	max.0,40	0,44–0,65		V 0,18–0,25 max.0,04	170	25	415		60	30
	Grade 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			170	25	415		60	30
A 335	Grade P12	0,05–0,15	max.0,50	0,30–0,61	0,025	0,025	0,80–1,25		0,44–0,65			220	32	415		60	30
DIN																	
1629	St 37.0	max.0,17			0,040	0,040						235		350	480		25
17175	St 35.8	max.0,17	0,10–0,35	0,40–0,80	0,040	0,040						235		360	480		25
	15Mo3	0,12–0,20	0,10–0,35	0,40–0,80	0,035	0,035			0,25–0,35			270		450	600		22
BS																	
3606	320	max.0,16	–	0,30–0,70	0,050	0,050						195		–			21
	440	0,12–0,18	0,10–0,35	0,90–1,20	0,040	0,035						265		440			21
	243	0,12–0,20	0,10–0,35	0,40–0,80	0,040	0,040			0,25–0,35		Al max.0,12	250		450			22
	620	0,10–0,15	0,10–0,35	0,40–0,70	0,040	0,040	0,70–1,10		0,45–0,65		Al max.0,20	180		460			22
UNI																	
5462	16Mo5	0,12–0,20	0,15–0,35	0,50–0,80	0,035	0,035			0,45–0,65			290		450	550		22
NFA																	
49-215	TU 37c	max.0,18	0,05–0,27	0,30–0,80	0,045	0,045				max.0,25	Sn 0,03	220		360	450		
	TU 42c	max.0,22	0,07–0,40	0,40–1,05	0,045	0,045				max.0,25	Sn 0,03	235		410	510		
	TU 48c	max.0,24	0,09–0,40	0,60–1,30	0,045	0,045				max.0,25	Sn 0,03	275		470	570		
	TU 15D3	0,10–0,22	0,10–0,40	0,40–0,90	0,040	0,040	max.0,40	max.0,30	0,21–0,39	max.0,25	Sn 0,03	265		430	530		22
	TU 13CD4-04	0,08–0,20	0,05–0,40	0,30–0,80	0,035	0,035	0,65–1,15	max.0,30	0,61–0,69	max.0,25	Sn 0,03	290		440	590		22
EN																	
10216-2	P 235 GH	max.0,16	max.0,35	max.1,20	0,025	0,020	max.0,30	max.0,30	max.0,08	max.0,30	V max.0,02 Ti max.0,04 Al min.0,020	235		360	500		25
	16Mo3	0,12-0,20	0,15-0,35	0,40-0,80	0,030	0,025			0,25-0,35		Al max.0,040	280		450	600		22
GOST																	
1050	10	0,07–0,14	0,17–0,37	0,35–0,65			max.0,15					205		330			31
	20	0,17–0,24	0,17–0,37	0,35–0,65			max.0,25					245		410			25
4543	10G2	0,07–0,15	0,17–0,37	1,20–1,60								245		420			22
JIS																	
G3461	STB 340	max.0,18	max.0,35	0,30–0,60	0,035	0,035						175		340			35
	STB 10	max.0,32	max.0,35	0,30–0,80	0,035	0,035						255		410			25
	STB 510	max.0,25	max.0,35	1,00–1,50	0,035	0,035						295		510			25
G3462	STBA 12	0,10–0,20	0,10–0,50	0,30–0,80	0,035	0,035			0,45–0,65			205		380			30
	STBA 22	max.0,15	max.0,50	0,30–0,60	0,035	0,035	0,80–1,25		0,45–0,65			205		410			30

Line Pipe

Stan-dards	Dimenstions					
	Dimensional Standards	**Tolerance D**	**Tolerance T**	**Lengths**	**Straightness**	**Tube ends**
EN	10208-1 10208-2	**Tubes:** ±0,75 % min ±0,5 mm Ovality 2% (D > 60 mm) **Tube ends:** upon agreement ±0,50 % min ±0,5 mm, max ±1,6 mm Ovality 1,5 % (D > 60 mm) (Part 2) Weight -3,5 % +10 %	T < 4 mm –0,5 +0,6 mm T = 4–25 mm –12,5 % +15 %	Class r1 (6 –11 m): min 4 m, average 8 m Class r2 (9–14 m): min 6 m, average 11 m (in dependance on diameter of pipe and upon agreement)	· deviation max 0,2% L · locally 4 mm/m	· square cut ends · free from excessive burrs · option: with beveled ends
DIN	2448					
	2448	D ≤ 200 mm ±1 % min ±0,5 mm Weight –8% +10%	D ≤ 130 mm ±10 % D > 130 mm ±12,5 %	· random average 6 m (3–8 m) average 8 m (4–11 m) average 11 m (5,5–14 m) · fixed (±500 mm) · exact		
UNI	7088	See table in standard Weight ±10 %	–12,5 % + non-specific			
API ISO ASME	5L 3183 B36.10M	D < 60,3 mm (2,375 in) –0,80 +0,40 mm (-0,031 + 0,016in) D≥60,3≤168,3 mm (2,375 - 6,625in) ±0,0075 D Tube ends –0,40 +1,60mm Ovality - tube / tube end 0,020D / 0,015 D	Seamless pipes: T ≤ 4mm (0,157 in) –0,5 +0,6 mm (–0,020 +0,024 in) T ≥ 4mm (0,157 in) ≤ 25mm (0,984in) – 0,125T +0,150T Pipe wieght - 3,5% +10%	In dependance on diameter · (SRL) – nom. 20 ft (6 m) min – midle – max ft: 9,0 – 17,5 – 22,5 m: 2,74 – 5,33 – 6,86 · (DRL) – nom. 40 ft (12 m) ft: 14,0 – 35,0 – 45,0 m: 4,27 – 10,67 – 13,72	Visually straight, max flexion 0,2% L	· square cut ends · free from excessive burrs · deviation for D ≥ 2 3/8" max.1/16" (1,6 mm) · beveled for T ≥ 3,2 mm, unless otherwise ordered

TDC standards	Steel grade		
	Name	Condition	Surface
10208-1	L210GA L235GA L245GA L290GA L360GA	Hot finished · as rolled · normalising formed · normalized Cold finished · normalized	· visually free from surface defects · adequate to production mode
10208-2	L245NB L290NB L360NB L415NB	Hot finished · normalising formed [N] · normalized [N] Cold finished · normalized	
2470-0/1629	St37.0	See DIN 1629-	
2470-2/17172	StE210.7 StE240.7 StE290.7 StE320.7 StE360.7 StE415.7	Hot finished · as rolled Cold finished · normalized	
7088	Fe35-1 Fe45-1		
5L	GradeA GradeB GradeX42 Grade X46 Grade X52 Grade X60	Hot finished Cold finished · normalized	

List of dimensional standards and standards for technical delivery conditions (The product specification PSL1 according to API)

API 5L	Specification for line pipe.
DIN 2448	Plain end seamless steel tubes. Dimensions.
DIN 2460	Steel tubes for waterworks services.
DIN 2470-1	The Steel gas pipelines - pressure up to 16 bar.
DIN 2470-2	The Steel gas pipelines - pressure exceeding 16 bar.
DIN 17172	Steel pipes for pipelines for the transport of combustible fluides and gases.
ISO 3183-1	Steel tubes for line pipe, Class A, Part 1.
ISO 3183-2	Steel tubes for line pipe, Class B, Part 2.
UNI 7088	Unalloyed steel seamless tubes - Plain gas tubes for high pressure.
EN 10 208-1	Steel pipes for pipelines for combustible fluids. TDC. Part 1: Pipes of requirement class A.
EN 10 208-2	Steel pipes for pipelines for combustible fluids. TDC. Part 2: Pipes of requirement class B.

Steel designation according to EN:

Steel grade for line pipe

Stan-dards	Steel grade	Chemical composition (%)										Mechanical properties					
		C	Si	Mn	Pmax	Smax	Cr	Ni	Mo	Cu	Other	Re min MPa	Re min ksi	Rm min MPa	Rm max MPa	A5 min ksi	A5 min %
API5L																	
	Grade A	max.0,22		max.0,90	0,030	0,030						207	30	331		48	
	Grade B	max.0,27		max.1,15	0,030	0,030						241	35	413		60	
	Grade X42	max.0,29		max.1,25	0,030	0,030						289	42	413		60	
	Gr. X46, X52	max.0,31		max.1,35	0,030	0,030						317	46	434		63	
DIN																	
1629	St 37.0	max.0,17			0,040	0,040						235		350	480		25
17172	StE 210.7	max.0,17	max.0,45	min.0,35	0,040	0,035						210		320	440		26
	StE 240.7	max.0,17	max.0,45	min.0,40	0,040	0,035						240		370	490		24
	StE 290.7	max.0,22	max.0,45	0,50–1,10	0,040	0,035						290		420	540		23
	StE 320.7	max.0,22	max.0,45	0,70–1,30	0,040	0,035						320		460	580		21
	StE 360.7	max.0,22	max.0,55	0,90–1,50	0,040	0,035						360		510	630		20
UNI																	
7088	Fe 35-1	max.0,18	–	–	0,045	0,045						240		350	450		25
	Fe 45-1	max.0,22	–	–	0,045	0,045						260		450	550		21
7287	Fe 320	–	–	–	0,060	0,060						320		530			15
EN																	
10208-1	L 210 GA	max.0,21	max.0,40	max.0,90	0,030	0,030					Al 0,015–0,060	210		335	475		25
	L 235 GA	max.0,16	max.0,40	max.1,20	0,030	0,030					Al 0,015–0,060	235		370	510		23
	L 245 GA	max.0,20	max.0,40	max.1,15	0,030	0,030					Al 0,015–0,060	245		415	555		22
	L 290 GA	max.0,20	max.0,40	max.1,40	0,030	0,030					Al 0,015–0,060	290		415	555		21
	L 360 GA	max.0,22	max.0,55	max.1,45	0,030	0,030					Al 0,015–0,060	360		460	620		20
10208-2	L 245 NB	max.0,16	max.0,40	max.1,10	0,025	0,020						245–440		415			22
	L 290 NB	max.0,17	max.0,40	max.1,20	0,025	0,020					V/ Timax.0,05/0,04	290–440		415			21
	L 360 NB	max.0,20	max.0,45	max.1,60	0,025	0,020					V/ Timax.0,10/0,04	360–510		460			20
	L 415 NB	max.0,21	max.0,45	max.1,60	0,025	0,020					V/ Timax.0,15/0,04	415–565		520			18

Dimensions of pipe line according to API 5L

NSD 5S	Outside Diameter (inch)	Outside Diameter (mm)	Schedule	Wall thickness (inch)	Wall thickness (mm)	Weight (lbs/ft)	Weight (kg/m)
0.405	0.405	10,3	STD	0.068	1,7	0.24	0,36
(1/8)			XS	0.095	2,4	0.31	0,43
0.540	0.540	13,7	STD	0.088	2,2	0.43	0,62
(1/4)			XS	0.119	3,0	0.54	0,79
0.675	0.675	17,1	STD	0.091	2,3	0.57	0,84
(3/8)			XS	0.126	3,2	0.74	1,10
0.840	0.840	21,3	STD	0.109	2,8	0.85	1,28
(1/2)			XS	0.147	3,7	1.09	1,61
1.050	1.050	26,7	STD	0.113	2,9	1.13	1,70
(3/4)			XS	0.154	3,9	1.48	2,19
1.315	1.315	33,4	STD	0.133	3,4	1.68	2,52
(1)			XS	0.179	4,6	2.17	3,21
1.660	1.660	42,2	STD	0.140	3,6	2.27	3,43
(1 1/4)			XS	0.191	4,9	3.00	4,51
1.900	1.900	48,3	STD	0.145	3,7	2.72	4,07
(1 1/2)			XS	0.200	5,1	3.63	5,43
2 3/8	2.375	60,3	STD	0.154	3,9	3.66	5,42
(2)			...	0.172	4,4	4.05	6,07
			...	0.188	4,8	4.40	6,57
			XS	0.218	5,5	5.03	7,43
			...	0.250	6,4	5.68	8,51
			...	0.281	7,1	6.29	9,31
2 7/8	2.875	73,0	...	0.156	4,0	4.53	6,81
(2 1/2)			...	0.172	4,4	4.97	7,44
			...	0.188	4,8	5.40	8,07
			STD	0.203	5,2	5.80	8,69
			...	0.216	5,5	6.14	9,16
			...	0.250	6,4	7.02	10,51
			XS	0.276	7,0	7.67	11,39

NSD – Nominal Size Designation

NSD 5S	Outside Diameter (inch)	Outside Diameter (mm)	Schedule	Wall thickness (inch)	Wall thickness (mm)	Weight (lbs/ft)	Weight (kg/m)
3 1/2	3.500	88,9	...	0.125	3,2	4.51	6,76
(3)			...	0.141	3,6	5.06	7,57
			...	0.156	4,0	5.58	8,37
			...	0.172	4,4	6.12	9,17
			...	0.188	4,8	6.66	9,95
			STD	0.216	5,5	7.58	11,31
			...	0.250	6,4	8.69	13,02
			...	0.281	7,1	9.67	14,32
			XS	0.300	7,6	10.26	15,24
4	4.000	101,6	...	0.156	4,0	6.41	9,63
(3 1/2)			...	0.172	4,4	7.04	10,55
			...	0.188	4,8	7.66	11,46
			STD	0.226	5,7	9.12	13,48
			...	0.250	6,4	10.02	15,02
			...	0.281	7,1	11.17	16,55
			XS	0.318	8,1	12.52	18,68
4 1/2	4.500	114,3	...	0.156	4,0	7.24	10,88
(4)			...	0.172	4,4	7.96	11,92
			...	0.188	4,8	8.67	12,96
			...	0.203	5,2	9.32	13,99
			...	0.219	5,6	10.02	15,01
			STD	0.237	6,0	10.80	16,02
			...	0.250	6,4	11.36	17,03
			...	0.281	7,1	12.67	18,77
			...	0.312	7,9	13.97	20,73
			XS	0.337	8,6	15.00	22,42
			...	0.438	11,1	19.02	28,25
			...	0.531	13,5	22.53	33,56

Notes: Dimensions 1/8, 1/4, 3/8 are delivered as cold drawn. Table is valid for tubes for threading and plain end tubes. Values in brackets were valid until 1995. From 2000 in the range 10,3–48,3 mm designation of tube scale Size and outside diameter D is equal. From diameter 60,3 mm are valid values of the designation of Size and D without brackets below the line. Pipe with WT of STD and XS are also designed for threading.

The Steels for precision cold drawn seamless standard tubes

Standards	Steel grade	Chemical composition (%)										Mechanical properties					
		C	Si	Mn	Pmax	Smax	Cr	Ni	Mo	Cu	Other	Re min MPa	Re min ksi	Rm min MPa	Rm max MPa	Rm min ksi	A5 min %
STN,ČSN																	
	11 353	max.0,18			0,050	0,050						235		340	440		25
	11 453	max.0,24			0,050	0,050						265		441	539		21
	11 503	max.0,18	max.0,40	max.1,40	0,035	0,035	max.0,30	max.0,30		max.0,30	Nb 0,015–0,08	355		490	630		22
	11 523	max.0,20	max.0,55	max.1,60	0,050	0,045					Al min.0,015	353		510	628		23
	11 550	max.0,40			0,050	0,050						314		539	637		17
	11 650	max.0,55			0,050	0,050						363		637	735		12
	12 040	0,32–0,40	0,15–0,40	0,50–0,80	0,040	0,040	max.0,25	max.0,30		max.0,30		295		530	530		18
	12 050	0,42–0,50	0,17–0,37	0,50–0,80	0,040	0,040	max.0,25	max.0,30		max.0,30		325		590	590		17
	12 060	0,52–0,60	0,15–0,40	0,50–0,80	0,040	0,040	max.0,25	max.0,30		max.0,30		375		640	640		13
ASTM																	
A 53	Grade A	0,25		0,95	0,050	0,045						205	30	330		48	
	Grade B	0,30		1,20	0,050	0,045						240	35	415		60	
A 519	MT 1010	0,05–0,15		0,30–0,60	0,040	0,050											
	MT 1015	0,10–0,20		0,30–0,60	0,040	0,050											
	MT X 1015	0,10–0,20		0,60–0,90	0,040	0,050											
	MT 1020	0,15–0,25		0,30–0,60	0,040	0,050											
	MT X 1020	0,15–0,25		0,70–1,00	0,040	0,050											
	1008	max.0,10		0,30–0,50	0,040	0,050											
	1010	0,08–0,13		0,30–0,60	0,040	0,050											
	1012	0,10–0,15		0,30–0,60	0,040	0,050											
	1015	0,13–0,18		0,30–0,60	0,040	0,050											
	1016	0,13–0,18		0,60–0,90	0,040	0,050											
	1017	0,15–0,20		0,30–0,60	0,040	0,050											
	1018	0,15–0,20		0,60–0,90	0,040	0,050											
	1019	0,15–0,20		0,70–1,00	0,040	0,050											
	1020	0,18–0,23		0,30–0,60	0,040	0,050						221	32	345		50	25
	1021	0,18–0,23		0,60–0,90	0,040	0,050											
	1022	0,18–0,23		0,70–1,00	0,040	0,050											
	1025	0,22–0,28		0,30–0,60	0,040	0,050						241	35	379		55	25
	1026	0,22–0,28		0,60–0,90	0,040	0,050											
	1030	0,28–0,34		0,60–0,90	0,040	0,050											
	1035	0,32–0,38		0,60–0,90	0,040	0,050						276	40	448		65	20
	1040	0,38–0,44		0,60–0,90	0,040	0,050											
	1045	0,43–0,50		0,60–0,90	0,040	0,050						310	45	517		75	15
	1050	0,48–0,55		0,60–0,90	0,040	0,050						345	50	552		80	10
	1518	0,15–0,21		1,10–1,40	0,040	0,050											
	1524	0,19–0,25		1,35–1,65	0,040	0,050											
	1541	0,36–0,44		1,35–1,65	0,040	0,050											
DIN																	
1629	St 37.0	max.0,17			0,040	0,040						235		350		480	25
	St 44.0	max.0,21			0,040	0,040						275		420		550	21
	St 52.0	max.0,22	max.0,55	max.1,60	0,040	0,035					Al min.0,020	355		500		650	21
1630	St 37.4	max.0,17	max.0,35	min.0,35	0,040	0,040					Al min.0,020	235		350		480	25
	St 44.4	max.0,20	max.0,35	min.0,40	0,040	0,040					Al min.0,020	275		420		550	21
	St 52.4	max.0,22	max.0,55	max.1,60	0,040	0,035					Al min.0,020	355		500		650	21
2391-2	St 35	max.0,17	max.0,35	min.0,40	0,025	0,025						235		340		470	25
	St 45	max.0,21	max.0,35	min.0,40	0,025	0,025						255		440		570	21
	St 52	max.0,22	max.0,35	max.1,60	0,025	0,025						355		490		630	22
17204	C22	0,17–0,24	max.0,40	0,30–0,60	0,045	0,045						260		420		550	21
	Ck22	0,17–0,24	max.0,40	0,30–0,60	0,035	0,035						260		420		550	21
	Cm22	0,17–0,24	max.0,40	0,30–0,60	0,035	0,035						260		420		550	21
	C35	0,32–0,39	max.0,40	0,50–0,80	0,045	0,045						300		520		670	17
	Ck35	0,32–0,39	max.0,40	0,50–0,80	0,035	0,035						300		520		670	17
	Cm35	0,32–0,39	max.0,40	0,50–0,80	0,035	0,035						300		520		670	17
	C45	0,42–0,50	max.0,40	0,50–0,80	0,045	0,045						350		610		760	16
	Ck45	0,42–0,50	max.0,40	0,50–0,80	0,035	0,035						350		610		760	16
	Cm45	0,42–0,50	max.0,40	0,50–0,80	0,035	0,035						350		610		760	16
	34CrMo4	0,30–0,37	max.0,40	0,60–0,90	0,035	0,035	0,90–1,20		0,15–0,30								

Stan-dards	Steel grade	Chemical composition (%)										Mechanical properties					
		C	Si	Mn	Pmax	Smax	Cr	Ni	Mo	Cu	Other	Re min MPa	Re min ksi	Rm min MPa	Rm max MPa	Rm min ksi	A5 min %
DIN																	
17210	C15	0,12–0,18	max.0,40	0,30–0,60	0,045	0,045											
	Ck15	0,12–0,18	max.0,40	0,30–0,60	0,035	0,035											
	Cm15	0,12–0,18	max.0,40	0,30–0,60	0,035	0,035											
	16MnCr5	0,14–0,19	max.0,40	1,00–1,30	0,035	0,035	0,80–1,10										
BS																	
6323	CFS 3	max.0,20	max.0,35	0,60–1,00	0,050	0,050						215		360			24
	CFS 4	max.0,25	max.0,35	max.1,20	0,050	0,050						235		410			22
	CFS 5	max.0,23	max.0,50	max.1,50	0,050	0,050						340		490			20
	CFS 6	0,30–0,40	max.0,35	0,50–0,90	0,050	0,050						280		460			21
	CFS 7	0,20–0,30	max.0,35	1,20–1,50	0,050	0,050						–		–			–
	CFS 8	0,40–0,55	max.0,35	0,50–0,90	0,050	0,050						340		540			18
UNI																	
663	Fe 35-1	max.0,18	–	–	0,045	0,045						240		350	450		25
	Fe 45-1	max.0,22	–	–	0,045	0,045						260		450	550		21
	Fe 55-1	max.0,36	–	–	0,045	0,045						340		550	650		17
	Fe 35-2	max.0,17	0,10–0,35	min.0,40	0,035	0,035						240		350	450		28
	Fe 45-2	max.0,22	0,10–0,35	min.0,50	0,035	0,035						260		450	550		23
	Fe 55-2	max.0,36	0,10–0,35	min.0,50	0,035	0,035						340		550	650		18
7945	Fe 280	max.0,13		max.0,60	0,050	0,050						155		280			25
	Fe 320	max.0,16		max.0,70	0,050	0,050						195		320			25
	Fe 360	max.0,17	max.0,35	max.0,80	0,050	0,050						215		360			24
	Fe 410	max.0,21	max.0,35	max.1,20	0,050	0,050						235		410			22
	Fe 490	max.0,23	max.0,35	max.1,50	0,050	0,050						285		490			21
NFA																	
49-310	TU 37-b	max.0,18	max.0,35	max.0,80	0,040	0,040						240		360	500		25
	TU 52-b	max.0,20	max.0,50	max.1,50	0,040	0,040						350		510	650		22
49-312	S470M	0,15–0,22	max.0,50	1,00–1,70	0,030	0,040				max.0,30	V 0,08–0,15	470		620	620		18
	S450MG2	0,15–0,22	max.0,50	1,00–1,70	0,030	0,040				max.0,30	V 0,08–0,15	450		550	720		22
EN																	
10216-1	P 195 TR1	max.0,13	max.0,35	max.0,70	0,030	0,025	max.0,30	max.0,30	max.0,08	max.0,30	V max.0,02 Ti max.0,03	195		320	440		27
	P 195 TR2	max.0,13	max.0,35	max.0,70	0,030	0,025	max.0,30	max.0,30	max.0,08	max.0,30	V max.0,02 Ti max.0,03 Al min.0,02	195		320	440		27
	P 235 TR1	max.0,16	max.0,35	max.1,20	0,030	0,025	max.0,30	max.0,30	max.0,08	max.0,30	V max.0,02 Ti max.0,03	235		360	500		23
	P 235 TR2	max.0,16	max.0,35	max.1,20	0,030	0,025	max.0,30	max.0,30	max.0,08	max.0,30	V max.0,02 Ti max.0,03 Al min.0,02	235		360	500		23
	P 265 TR1	max.0,20	max.0,40	max.1,40	0,030	0,025	max.0,30	max.0,30	max.0,08	max.0,30	V max.0,02 Ti max.0,03	265		410	570		22
	P 265 TR2	max.0,20	max.0,40	max.1,40	0,030	0,025	max.0,30	max.0,30	max.0,08	max.0,30	V max.0,02 Ti max.0,03 Al min.0,02	265		410	570		22
10216-3	P 355 N	max.0,20	max.0,50	0,90–1,70	0,030	0,025	max.0,30	max.0,50	max.0,08	max.0,30	V max.0,10 Ti max.0,03 Al min.0,02	355		490	650		22
10294-1	E235	max.0,18	max.0,35	max.1,20	0,045	0,045						235		360			25
10297-1	E275	max.0,21	max.0,35	max.1,40	0,045	0,045						275		410			22
	E315	max.0,21	max.0,30	max.1,50	0,045	0,045						315		450			21
	E355	max.0,22	max.0,55	max.1,60	0,045	0,045						355		490			20
	E275K2	max.0,20	max.0,40	max.1,40	0,035	0,030	max.0,30	0,30	max.0,10	max.0,35	V max.0,05	275		410			
	E355K2	max.0,20	max.0,50	max.1,65	0,035	0,030	max.0,30	0,50	max.0,10	max.0,35	V max.0,12	355		490			20
	C22	0,17–0,24	max.0,40	0,40–0,70	0,045	0,045						260		420			21
	C35	0,32–0,39	max.0,40	0,50–0,80	0,045	0,045						300		520			17
	C45	0,42–0,50	max.0,40	0,50–0,80	0,045	0,045						350		610			16
	C60	0,57–0,65	max.0,40	0,60–0,90	0,045	0,045						390		720			13
	38Mn6	0,34–0,42	max.0,35	1,40–1,65	0,035	0,035						400		670			14
	20MnV6	0,16–0,22	0,10–0,50	1,30–1,70	0,035	0,040					V max.0,15	420		600			19

Stan-dards	Steel grade	Chemical composition (%)										Mechanical properties					
		C	Si	Mn	Pmax	Smax	Cr	Ni	Mo	Cu	Other	Re min MPa	Re min ksi	Rm min MPa	Rm max MPa	Rm min ksi	A5 min %
EN																	
10305-1	E 215	max.0,10	max.0,05	max.0,70	0,025	0,025					Al min.0,025	215		290	430		30
	E 235	max.0,17	max.0,35	max.1,20	0,025	0,025						235		340	480		25
	E 355	max.0,22	max.0,55	max.1,60	0,025	0,025						355		490	630		22
	E 255	max.0,21	max.0,35	0,40-1,10	0,025	0,025						255		440	570		21
	26Mn5	0,20–0,30	max.0,40	1,20–1,50	0,035	0,035											
	C 35E	0,32–0,39	max.0,40	0,50–0,80	0,035	0,035	max.0,40		max.0,10			280		460			21
	C 45E	0,42–0,55	max.0,40	0,50–0,80	0,035	0,035	max.0,40		max.0,10			340		540			18
	20V1(E410)	0,16–0,22	0,10–0,50	1,30–1,70	0,030	0,035					V 0,08–0,15	410		550	700		22
	26Mo2	0,22–0,29	max.0,40	max.1,50	0,035	0,035		max.0,40	0,15–0,25								
	25CrMo4	0,22–0,29	max.0,40	0,60–0,90	0,035	0,035	0,90–1,20	max.0,40	0,15–0,30								
	42CrMo4	0,38–0,45	max.0,40	0,60–0,90	0,035	0,035	0,90–1,20		0,15–0,30								
GOST																	
1050	10	0,07–0,14	0,17–0,37	0,35–0,65			max.0,15					205		330			31
	20	0,17–0,24	0,17–0,37	0,35–0,65			max.0,25					245		410			25
	35	0,32–0,40	0,17–0,37	0,50–0,80			max.0,25					315		530			20
	45	0,42–0,50	0,17–0,37	0,50–0,80			max.0,25					355		600			16
19281	09G2S	max.0,12	0,50–0,80	1,30–1,70			max.0,30	max.0,30		max.0,30		345		490			21
JIS																	
G3445	STKM 11A	max.0,12	max.0,35	max.0,60	0,040	0,040								290			35
	STKM 12A	max.0,20	max.0,35	max.0,60	0,040	0,040						175		340			35
	STKM 12B	max.0,20	max.0,35	max.0,60	0,040	0,040						275		390			25
	STKM 12C	max.0,20	max.0,35	max.0,60	0,040	0,040						355		470			20
	STKM 13A	max.0,25	max.0,35	0,30–0,90	0,040	0,040						215		370			30
	STKM 13B	max.0,25	max.0,35	0,30–0,90	0,040	0,040						305		440			20
	STKM 13C	max.0,25	max.0,35	0,30–0,90	0,040	0,040						380		510			15
	STKM 14A	max.0,30	max.0,35	0,30–1,00	0,040	0,040						245		410			25
	STKM 14B	max.0,30	max.0,35	0,30–1,00	0,040	0,040						355		500			15
	STKM 14C	max.0,30	max.0,35	0,30–1,00	0,040	0,040						410		550			15
	STKM 15A	0,25–0,35	max.0,35	0,30–1,00	0,040	0,040						275		470			22
	STKM 15C	0,25–0,35	max.0,35	0,30–1,00	0,040	0,040						430		580			12
	STKM 16A	0,35–0,45	max.0,40	0,40–1,00	0,040	0,040						325		510			20
	STKM 16C	0,35–0,45	max.0,40	0,40–1,00	0,040	0,040						460		620			12
	STKM 17A	0,45–0,55	max.0,40	0,40–1,00	0,040	0,040						345		550			20
	STKM 17C	0,45–0,55	max.0,40	0,40–1,00	0,040	0,040						480		650			10
	STKM 18A	max.0,18	max.0,55	max.1,50	0,040	0,040						275		440			25
	STKM 18B	max.0,18	max.0,55	max.1,50	0,040	0,040						315		490			23
	STKM 18C	max.0,18	max.0,55	max.1,50	0,040	0,040						380		510			15
	STKM 19A	max.0,25	max.0,55	max.1,50	0,040	0,040						315		490			23
	STKM 19C	max.0,25	max.0,55	max.1,50	0,040	0,040						410		550			15
	STKM 20A	max.0,25	max.0,55	max.1,60	0,040	0,040					V max.0,15	390		540			23
G3454	STPG 370	max.0,25	max.0,35	0,30–0,90	0,040	0,040						215		370			30
	STPG 410	max.0,30	max.0,35	0,30–1,00	0,040	0,040						245		410			25
G3455	STS 370	max.0,25	0,10–0,35	0,30–1,10	0,035	0,035						215		370			30
	STS 410	max.0,30	0,10–0,35	0,30–1,40	0,035	0,035						245		410			25
	STS 480	max.0,33	0,10–0,35	0,30–1,50	0,035	0,035						275		480			25
G3456	STPT 370	max.0,25	0,10–0,35	0,30–0,90	0,035	0,035						215		370			30
	STPT 410	max.0,30	0,10–0,35	0,30–1,00	0,035	0,035						245		410			25
	STPT 480	max.0,33	0,10–0,35	0,30–1,00	0,035	0,035						275		480			25
PN-H																	
84018	18G2A	max.0,20	0,20–0,55	1,0–1,6	0,040	0,040	max.0,30	max.0,30				365		510			22
	18G2	max.0,22	0,20–0,55	1,0–1,6	0,050	0,040											
84019	10	0,07–0,14	0,15–0,40	0,35–0,65	0,040	0,040	max.0,30	max.0,30	max.0,10	max.0,30		195		345			25
	20	0,17–0,24	0,15–0,40	0,35–0,65	0,040	0,040	max.0,30	max.0,30	max.0,10	max.0,30		225		440			21
	35	0,32–0,39	0,10–0,40	0,50–0,80	0,040	0,040	max.0,30	max.0,30	max.0,10	max.0,30		255		540			17
	45	0,42–0,50	0,10–0,40	0,50–0,80	0,040	0,040	max.0,30	max.0,30	max.0,10	max.0,30		295		640			14
	55	0,52–0,60	0,10–0,40	0,60–0,90	0,040	0,040	max.0,30	max.0,30	max.0,10	max.0,30	max.0,050	380		680			11
84023/07	R35	0,07–0,16	0,12–0,35	0,40–0,70	0,040	0,040	max.0,30	max.0,30	max.0,10	max.0,30		215		360			24
	R45	0,16–0,22	0,12–0,35	0,60–1,20	0,040	0,040	max.0,30	max.0,30	max.0,10	max.0,30		255		430			22
	R55	0,32–0,40	0,20–0,35	0,60–0,85	0,045	0,045	max.0,30	max.0,30	max.0,10	max.0,30		295		540			17
	R65	0,45–0,52	0,20–0,35	0,60–0,85	0,045	0,045						380		640			16

Butt-welding steel pipe fittings

List of standards of buttwelding elbows

Standards	Dimensional standards	Dimensions	Standards for elbows		Standards for pipe	
			TDC	Steel Grade	TDC	Steel Grade
Elbows for steel construction, machine parts and common use – standard steel						
STN, ČSN	42 5760		ŽP-05-04	11 353	42 0250	11 353
DIN	2605 - 1, 2		2609 (A) 2609 (B) 2609 (C)	St 37.0 St 44.0 St 52.0	1629	St 37.0 St 44.0 St 52.0
EN	10 253 - 1		10 253-1	S 235 S 265	10 210 - 1	S 235 JRH S 275 JOH
Elbows for pressure purposes – room temperature						
STN, ČSN	42 5760		ŽP-05-04	11 353	42 0250	11 353
DIN	2605 - 1, 2		2609 (A) 2609 (B) 2609 (C)	St 37.0 St 44.0 St 52.0	1629	St 37.0 St 44.0 St 52.0
NF A	49 - 186 49 - 281		49 - 186 49 - 281	AE 220 A AE 220, 250, 275	49 112	TU E 220A TU E 235A
EN	10 253 - 2		10 253 - 2	P 235 TR2 P 265 TR2 P 235 TR2 P 265 TR2	10 216 - 1	P 235 TR1 P 265 TR1 P 235 TR2 P 265 TR2
Elbows for pressure purposes – elevated temperature						
STN, ČSN	42 5760		ŽP-05-05	12 021 12 022 15 020	42 0251	12 021 12 022 15 020
ASTM **ASME**	ANSI B16.9		A 234 / A 960	WPB WPC	A 106	Grade B Grade C
DIN	2605 - 1, 2		2609 (F, G) 2609 (H)	St 35.8 I, III 15Mo3	17 175	St 35.8 I, III 15Mo3
BS	1965 - 1		1965 - 1	Grade 410	3602 - 1	HFS 360
EN	10 253 - 2		10 253 - 2	P 235 GH P 265 GH 16Mo3	10 216 - 2	P 235 GH P 265 GH 16Mo3
Elbows for pressure purposes from fine grain steel						
DIN	2605 - 1, 2		2609 (R) 2609 (S) 2609 (T)	WStE 355 TStE 355 TStE 285	17 179	WStE 355 TStE 355 TStE 285
EN	10 253 - 2		10 253 - 2	P 355 N P 355 NH P 355 NL1	10 216 - 3	P 355 N P 355 NH P 355 NL1
Elbows for pressure purposes – low temperature						
PN ŽP	42 5760		ŽP-05-04	11 369 11 419 11 503	42 0165	11 369 11 419 11 503
ASME	ASME B16.9		A 420 / A 960	WPL 6	A 333	Grade 6
EN	10 253 - 2		10 253 - 2	P 215 NL P 265 NL	10 216 - 4	P 215 NL P 265 NL
Elbows for water and gas pipe line						
PN ŽP	42 5760		ŽP-05-04	11 353	42 0250	11 353
DIN	2605 - 1		2609 (A)	St 37.0	2440, 2441	St 33-2, St 37.0
Elbows for pipe line						
DIN	2605 - 1, 2		2609 (D) 2609 (E)	StE 290.7 StE 360.7	17 172	StE 290.7 StE 360.7
EN	10 523 - 2		10 253 - 2	L 415NB	10 208 - 2	L 415NB

Notes: Deliveries of welding neck flanges upon agreement.
Standards: DIN 2631, DIN 2632, DIN 2633, DIN 2635
ANSI B16,5
STN 13 1229, STN 13 1231, STN 13 1233
EN 1092-1

Dimensions: DN 15–150, ANSI 1/2"–6"
Steel grades: 11 375, 11 416, RSt 37-2, C22.8, A105/C4

List of dimensional standards and standards for technical delivery conditions for fittings

ŽP-05-04	Buttwelding elbows. TDC.
ŽP-05-05	Buttwelding elbows with specified elevated temperature properties
STN 42 0165	ČSN 42 0165 Sheets and pipes of feritic-perlitic steel with guaranteed impact properties at low temperatures.
STN 42 0250	ČSN 42 0250 The Hot formed seamless tubes from steel grade 10 to 16.
STN 42 0251	ČSN 42 0251 Seamless steel tubes with specified elevated temperature properties.
ŽP 42 5760	Buttwelding elbows. Dimensions.
STN 13 220	ČSN 13 220 The steel buttwelding fittings. Building dimensions.
ASME B16.9	The Factory-made wrought steel buttwelding fittings.
ASTM A106	The Seamless carbon steel pipe for high temperature service.
ASTM A234	The Piping fittings of wrought carbon steel and alloy steel for moderate and high-temperature service.
ASTM A333	The Seamless and welded steel pipe for low temperature service (Pipe).
ASTM A420	The Piping fittings of wrought carbon steel & alloy steel for low temperature service.
ASTM A860/MSS-SP-75	(MSS or dimension NPS over 14) The wrought high strength low alloy steel butt welding fittings. (Steel grade WPHY 42, 46, 52, 60, 65, 70).
ASTM A960	The common requirements for wrought steel piping fittings.
ASTM A999	The general requirements for alloy and stainless steel pipe.
ASTM A1016	The general requirements for ferritic alloy steel, austenitic alloy steel & stainless steel tubes.
DIN 1629	Seamless circular tubes of non-alloy steel with special quality requirements.
DIN 2440	Steel tubes, medium weight suitable for screwing.
DIN 2441	Steel tubes, heavy weight suitable for screwing.
DIN 2519	Steel flanges. TDC.
DIN 2605-1	Elbows. Reduced correlation of utilization.
DIN 2605-2	Elbows. Full correlation of utilization.
DIN 2609	Butt-weld fitting.
DIN 2631, 2632, 2633, 2634, 2635	For Steel flanges. Nominal pressure 6, 10, 16, 25, 40.
DIN 17 172	The steel pipes for long-distance pipelines for combustible liquids and gases.
DIN 17 175	The Seamless tubes of heat resistant steel.
DIN 17 179	The Seamless circular fine grain steel tubes to special requirements.
BS 1965-1	The butt-welding pipe fittings for pressure purposes.
BS 3602-1	The Steel pipes and tubes for pressure purposes: carbon and carbon manganese steel with specified elevated temperature properties.
NF A49-112	The plain-ends seamless-steel hot rolled tubes with specified room temperature properties and with special delivery conditions.
NF A49-186	Tubular accesories – bends
NFA 49-281	The steel tubes, tubular accesories, bends, tee, reduction for welding, made from seamless tube with quality specifications. Dimensions. TDC.
EN 1092-1	Flanges and their joints –The circular flanges for pipes,valves, fittings & accessories. Part 1: The Steel flanges, PN designated.
EN 10208-2	The Steel pipes for pipelines for combustible fluids. Part 2: Pipes of requirement category B.
EN 10210-1	The hot finished structural hollow sections of non-alloy & fine grain structural steel.
EN 10216-1, 2, 3, 4	The seamless steel tubes for pressure purposes. Part 1: The Non-alloy steel tubes with specified room temperature properties. Part 2: Non-alloy & alloy steel tubes with specified elevated temperature properties. Part 3: Non-alloy & alloy fine grain steel tubes . Part 4: Non-alloy & alloy steel tubes with specified low temperature properties.
EN 10253-1	Buttwelding pipe fittings. Part 1: The wrought carbon steel for general use without specific inspection requirements.
EN 10253-2	Buttwelding pipe fittings.
EN 10297-1	The Seamless steel tubes for mechanical and general engineering purposes. TDC. Part 1: Non-alloy and alloy steel tubes.
EN 764-5	Pressure equipment. Compliance and inspection document of metal materials.
ISO 3419	Non-alloy and alloy steel buttwelding fittings.
RToD M0803	Dutch rules for pressure vessels. Seamless fittings.

The submerged arc longitudinally welded steel tubes and pipes

Standards	Dimensional standards	Dimensions	TDC	Steel Grade
Structural tubes – standards steel grade				
STN, ČSN	ŽP 42 5717		ŽP 42 0154 ŽP-06-14/98	11 373, 11 375, 11 425, 11 523 C – steel
DIN	2458		1615 17120	St 33 (St37.2) USt 37-2, RSt 37-2, St 37-3 St 44-2, St 44-3, St 52-3
EN	10219 - 2		10219 - 1	S 235 JRH, S 275 JOH S 275 J2H, S 355 JOH, S 355 J2H
Structural tubes – fine-grain steel				
STN, ČSN	ŽP 42 5717		ŽP 42 0154, ŽP-06-14/98	11 369, 11 503
DIN	2458		17123	StE, TStE, EStE 255, 285, 355, 420, 460
EN	10219 - 2		10219 - 1	S 275 NH, S 275 NLH S 355 NH, S 355 NLH S 460 NH, S 460 NLH S 275 MH, S 275 MLH S 355 MH, S 355 MLH S 460 MH, S 460 MLH
Tubes for mechanical and common use				
STN, ČSN	ŽP 42 5717		ŽP 42 0154	11 523
DIN	2458		1626	St 37.0, St 44.0, St 52.0
BS	3600		6323 - 7	SAW4, SAW5
EN	10296 - 1		10296 - 1	E155, E185, E235, E275, E355
Tubes for pressure piping – room temperature				
STN, ČSN	ŽP 42 5717		ŽP 42 0154, ŽP-06-14/98	11 375, 11 523
ASTM, ASME	ANSI B36.10 (API 5L)		A 671 / A 530	Pipe Grade CA 55 Type of Steel A 285 - Grade C Class 10, 11, 12, 13
DIN	2458		1626 1628	St 37.0, St 44.0, St 52.0 St 37.4, St 44.4, St 52.4
BS	3600		3601	Grade 430
EN	10217 - 1		10217 - 1	P195, P235, P265 (TR1, TR2)
Tubes for pressure piping – elevated temperature				
STN, ČSN	ŽP 42 5717		ŽP 42 0154	11 416, 11 523 15 020, 15 121, 15 128
ASTM, ASME	ANSIB 36.10 (API 5L)		A 672 / A 530	Pipe Grade A 45, A 50, A 55 Type of Steel A 285 - Grade A, B, C Class 10, 11, 12, 13
DIN	2458		17155	H I, H II
BS	3600		3602 - 2	Grade 430, 490
EN	10217 - 5		10217 - 5	P 235 GH, P 265 GH, 16Mo3
Tubes for pressure piping – fine-grain steel				
DIN	2458		17178	StE, WStE, TStE, EStE 255, 285, 355, 460
EN	10217 - 3		10217 - 3	P 275 NL1, P 275 NL2, P 355 N, P 355 NH, P 355 NI1, P 355 NL2 P 460 N, P 460 NH, P 460 NL1, P 460 NL2
Tubes for pressure piping – low temperature				
STN, ČSN	ŽP 42 5717		ŽP 42 0154	11 369, 11 503
DIN	2458		17174 17178	TT St 35 N TStE 255, 285, 355, 460
EN	10217 - 6		10217 - 6	P 215 NL, P 265 NL

Standards	Dimensional standards	Dimensions	TDC	Steel Grade
Pipe for conveyance of aqueous liquids				
DIN	2460		1626	St 37.0, St 52.0
EN	10224		10224	L 235, L 275, L 355
Pipe for gas and combustible liquids				
API	API5L		API 5L	Grade A, B, X 42, X 46, X 52
DIN	2458		2470 - 1 2470 - 2 17172 17178	1626 - St 37.0 according to DIN 17 172 StE 210.7, StE 240.7, StE 290.7, StE 320.7, StE 360.7 StE, WStE, TStE, EStE 255, 285, 355, 460
EN	10208 - 1 10208 - 2		10208 - 1 10208 - 2	L210GA, L235GA, L245GA, L290GA, L360GA L245NB, L290NB, L360NB, L245MB, L360MB
GOST	20295		20295	1050: 10, 20

List of dimensional standards and standards for technical delivery conditions

ŽP 42 0154	Longitudinally welded steel pipes. TDC.
ŽP 42 5717	The Longitudinally welded steel pipes. Dimensions.
ŽP-06-14/98	The Steel-pipes determined for protective pipes.
ANSI B36.10	The welded and seamless wrought steel pipe. Dimension and weight (Pipe).
API 5L	Specification for line pipe.
ASTM A530	General requirements for specialized carbon & alloy steel pipe.
ASTM A671	Electric-fusion-welded steel pipe for atmospheric & lower temperatures.
ASTM A672	The electric-fusion-welded steel pipe for high-pressure service at moderate temperatures.
DIN 1615	The welded circular tubes of non-alloy steel without special quality requirements.
DIN 1626	The welded circular tubes of non-alloy steel with special quality requirements.
DIN 1628	The welded circular tubes of non-alloy steel with very high-quality requirements.
DIN 2458	The plain end welded steel tubes, dimensions, and conventional masses per unit length.
DIN 2460	Steel tubes for waterworks services.
DIN 2470-1	The steel gas pipelines for permissible service pressures up to 16 bar.
DIN 2470-2	The steel gas pipelines for permissible service pressures exceeding 16 bar.
DIN 17120	The welded structural steel circular tubes for structural engineering purposes.
DIN 17123	Welded structural fine grain steel circular tubes.
DIN 17155	The sheet metal and strip from steel with specified elevated temperature properties.
DIN 17172	The steel pipes for pipelines for the transport of combustible fluids & gases.
DIN 17174	The Welded circular steel tubes for low temperatures.
DIN 17178	The Welded circular fine grain steel tubes for specified properties.
BS 3600	Dimensions and masses per unit length of welded & seamless steel pipes and tubes for pressure purposes.
BS 3601	The carbon steel pipes & tubes with specified room temperature properties for pressure purposes.
BS 3602-2	The stated specification for steel pipes and tubes for pressure purposes: carbon and carbon-manganese steel with specified elevated temperature properties. Part 2: For the submerged arc welded tubes.
BS 6323	The Seamless and welded steel tubes for automobile, mechanical, and general engineering purposes. Part 1: The General requirements. Part 7: The Specific requirements for submerged arc welded steel tube.
EN 10208-1, 2	Steel pipes for pipelines for combustible fluids. Part 1: Pipes of requirement class A. Part 2: Pipes of requirement class B.
EN 10217-1, 3, 6	Welded steel tubes for pressure purposes. TDC. Part 1: The non-alloy steel tubes with specified room temperature properties. Part 3: Non-alloy and alloy fine grain steel tubes. Part 5: The submerged arc welded non-alloy & alloy steel tubes with specified elevated temperature properties. Part 6: The submerged arc welded non-alloy steel tubes with specified low-temperature properties.

EN 10219-1, 2	Cold formed welded structural hollow sections of non-alloy and fine grain steel. Part 1: TDC. Part 2: Tolerances, dimensions, and sectional properties.
EN 10220	Seamless and welded steel tubes. Dimension and masses per unit length.
EN 10224	The steel pipes, joints, and fittings for the conveyance of aqueous liquids, including potable water.
EN 10296-1	The welded steel tubes for mechanical and general engineering purposes. TDC. Part 1: Non-alloy and alloy steel tubes.
GOST 20295	Steel welded pipes for main gas and oil pipelines.
ISO 4019	Structural steels. Cold-formed, welded, structural hollow sections. Dimensions and sectional properties.
ISO 10 799	Structural steels. Cold-formed, welded, structural hollow sections. TDR.
ISO 9330-1	The welded steel tubes for pressure purposes. TDC. Part 1: Non-alloy steel tubes with specified room temperature properties.
ISO 9330-4	Part 4: Submerged arc welded non-alloy and alloy steel tubes with specified elevated temperature properties.
ISO 9330-5	Part 5: Submerged arc welded non-alloy steel tubes with specified low-temperature properties.

Tolerances of dimension and form

Outside diameter

Outside diameter (mm)	Maximal variation of diameter (mm)
324 - 1 020 (1 000)	±(0,5 %D + 1)
1 220 - 2 220	±6 (5)

Ovality of tube ends

Ratio D/t	Ovality
D/t < 50	max 1,4 %
50 ≤ D/t ≤ 100	1,4–2 %
D/t > 100	ovality is not guaranteed

Wall thickness

Wall thickness	Maximal variation
t ≤ 5 mm	–0,25/+0,30 mm
5 mm < t ≤ 10 mm	–0,35/+0,45 mm
t > 10 mm	–0,50 mm/upper limit terminated by alloved variation of theoretical weight

Straight factor

Tubes being visually straight. Tolerance of straight factor is 2 mm on 1 m (0,002 x l). Whole tolerance presents conjunction of permissible value
and tube length, but result must not exceed:
– 10 mm with length up to 6 m
– 15 mm with length 6–9 m
– 20 mm with length 9–12 mm

Pipe weight

Permissible tolerances: –8%/+12% (+10%) of theoretical weight.

Square cut

Outside diameter (mm)	Variation of square cut (mm)
324 - 630	2
720 - 1020	3
1 220 - 1 620	4
1 820 - 2 220	5

Scarf-weld

Wall thickness (mm)	Variation (mm)
t ≤ 8	≤ 2,5
8 < t ≤ 14	≤ 3,0
14 < t ≤ 40	≤ 4,0

Lengths and tolerances of length

The pipes with outside diameter 324–1220 mm – max. length 12 m
The pipes with outside diameter over 1220 mm – length upn agreemet
Kinds of lengths: a) production
b) fixed - ± 500 mm
c) exact – tolerances upon agreement
(To achieve required lengths, tubes are cross welded. Max. length of one part is 3 m).

Steel quality

As shown in List of standards table and table of chemical composition and mechanical properties. The pipes are made without heat treatment. The pipes are produced from sheets, those condition is in accordance with corresponding standards.
Steel marking according to EN

Stan-dards	Steel grade	Chemical composition [%]										Mechanical properties					
		C	Si	Mn	Pmax	Smax	Cr	Ni	Mo	Cu	Other	Re min MPa	Re min ksi	Rm min MPa	Rm max MPa	Rm min ksi	A5 min %
STN, ČSN																	
	11 369	max.0,14	max.0,35	max.0,80	0,040	0,040	max.0,30	max.0,30		max.0,30	Al min.0,020	226		353	441		
	11 373	max.0,20			0,050	0,050						235		360	470		24
	11 375	max.0,17			0,045	0,045						225		360	470		24
	11 416	max.0,20	max.0,35	max.0,50	0,040	0,040						245		400	490		22
	11 425	max.0,22			0,050	0,000						255		412	510		22
	11 503	max.0,18	max.0,40	max.1,40	0,035	0,050	max.0,30	max.0,30		max.0,30	Al min.0,010	355		490	630		22
	11 523	max.0,20	max.0,55	max.1,60	0,050	0,045					Al min.0,015	353		510	628		23
	15 020	0,12–0,20	0,15–0,37	0,50–0,80	0,040	0,040			0,25–0,35		Al min.0,015	270		450	600		22
	15 121	0,10–0,18	0,15–0,35	0,40–0,70	0,040	0,040	0,70–1,30		0,40–0,60			295		440	590		22
	15 128	0,10–0,18	0,15–0,40	0,45–0,70	0,040	0,040	0,50–0,75		0,40–0,60		V 0,22–0,35	365		490	690		18
API 5L																	
	Grade A	max.0,22		max.0,90	0,030	0,030						207	30	331		48	
	Grade B	max.0,27		max.1,15	0,030	0,030						241	35	413		60	
	Grade X42	max.0,29		max.1,25	0,030	0,030						289	42	413		60	
	Grade X46	max.0,31		max.1,35	0,030	0,030						317	46	434		63	
	Grade X52	max.0,31		max.1,35	0,030	0,030						358	52	455		66	
ASTM																	
A 285	Grade A	max.0,17		max.0,90	0,035	0,045											
	Grade B	max.0,22		max.0,90	0,035	0,045											
	Grade C	max.0,28		max.0,90	0,035	0,045											
BS																	
3601	Grade 430	max.0,25	max.0,50	max.1,20	0,040	0,040						275		430	570		22
3602–2	Grade 430	max.0,25	0,10–0,35	0,61–1,40	0,030	0,030						250		430	550		23
	Grade 490	max.0,22	0,10–0,40	0,91–1,60	0,030	0,030						325		490	610		21
6323–7	SAW 4	max.0,25	max.0,35	max.1,20	0,050	0,050						235		410			22
	SAW 5	max.0,23	max.0,50	max.1,50	0,050	0,050						340		490			20
GOST																	
20295	10	0,07–0,14	0,17–0,37	0,35–0,65			max.0,15					205		330			24
	20	0,17–0,24	0,17–0,37	0,35–0,65			max.0,25					245		410			21
	35	0,32–0,40	0,17–0,37	0,50–0,80			max.0,25					315		530			20
	45	0,42–0,50	0,17–0,37	0,50–0,80			max.0,25					355		600			16
DIN																	
1615	St 33											175		290	540		17
1626	St 37.0	max.0,17			0,040	0,040						235		350	480		25
	St 44.0	max.0,21			0,040	0,040						275		420	550		21
	St 52.0	max.022			0,040	0,035						355		500	650		21
1628	St 37.4	max.0,17	max.0,35	min.0,35	0,040	0,040						235		350	480		25
	St 44.4	max.0,20	max.0,35	min.0,40	0,040	0,040						275		420	550		21
	St 52.4	max.0,22	max.0,55	max.1,60	0,040	0,035						355		500	650		21
17120	USt 37.2	max.0,17			0,050	0,050						235		340	470		26
	RSt 37-2	max.0,17			0,050	0,050						235		340	470		26
	St 37-3	max.0,17			0,040	0,040						235		340	470		26
	St 44-2	max.0,21			0,050	0,050						275		410	540		22
	St 44-3	max.0,20			0,040	0,040						275		410	540		22
	St 52-3	max.0,22			0,040	0,040						355		490	630		22
17 123	StE 255	max.0,18	max.0,40	0,50–1,30	0,035	0,030	max.0,30	max.0,30	max.0,08	max.0,20	Al min.0,020	255		360	480		25
17 178	TStE 255	max.0,16	max.0,40	0,50–1,30	0,030	0,025	max.0,30	max.0,30	max.0,08	max.0,20	Al min.0,020	255		360	480		25
	EStE 255	max.0,16	max.0,40	0,50–1,30	0,025	0,015	max.0,30	max.0,30	max.0,08	max.0,20	Al min.0,020	255		360	480		25
	StE 285	max.0,18	max.0,40	0,60–1,40	0,035	0,030	max.0,30	max.0,30	max.0,08	max.0,20	Al min.0,020	285		390	510		24
	TStE 285	max.0,16	max.0,40	0,60–1,40	0,030	0,025	max.0,30	max.0,30	max.0,08	max.0,20	Al min.0,020	285		390	510		24
	EStE 285	max.0,16	max.0,40	0,60–1,40	0,025	0,015	max.0,30	max.0,30	max.0,08	max.0,20	Al min.0,020	285		390	510		24
	StE 355	max.0,20	0,10–0,50	0,90–1,65	0,035	0,030	max.0,30	max.0,30	max.0,08	max.0,20	Al min.0,020	355		490	630		22
	TStE 355	max.0,18	0,10–0,50	0,90–1,65	0,030	0,025	max.0,30	max.0,30	max.0,08	max.0,20	Al min.0,020	355		490	630		22
	EStE 355	max.0,18	0,10–0,50	0,90–1,65	0,025	0,015	max.0,30	max.0,30	max.0,08	max.0,20	Al min.0,020	355		490	630		22
	StE 420	max.0,20	0,10–0,60	1,00–1,70	0,035	0,030	max.0,30	max.1,00	max.0,10	max.0,20	Al min.0,020	420		530	680		21
	TStE 420	max.0,20	0,10–0,60	1,00–1,70	0,030	0,025	max.0,30	max.1,00	max.0,10	max.0,20	Al min.0,020	420		530	680		21
	EStE 420	max.0,20	0,10–0,60	1,00–1,70	0,025	0,020	max.0,30	max.1,00	max.0,10	max.0,20	Al min.0,020	420		530	680		21
	StE 460	max.0,20	0,10–0,60	1,00–1,70	0,035	0,030	max.0,30	max.1,00	max.0,10	max.0,20	Al min.0,020	460		560	730		19
	TStE 460	max.0,20	0,10–0,60	1,00–1,70	0,030	0,025	max.0,30	max.1,00	max.0,10	max.0,20	Al min.0,020	460		560	730		19
	EStE 460	max.0,20	0,10–0,60	1,00–1,70	0,025	0,030	max.0,30	max.1,00	max.0,10	max.0,20	Al min.0,020	460		560	730		19
17155	H I.	max.0,16	max.0,35	0,40–1,20	0,035	0,0,35						235		360	480		24
	H II.	max.0,20	max.0,35	0,50–1,30	0,035	0,0,35						265		410	530		22

Stan-dards	Steel grade	Chemical composition (%)										Mechanical properties					
		C	Si	Mn	Pmax	Smax	Cr	Ni	Mo	Cu	Other	Re min MPa	Re min ksi	Rm min MPa	Rm max MPa	Rm min ksi	A5 min %
DIN																	
17172	StE 210.7	max.0,17	max.0,45	min.0,35	0,040	0,035						210		320	440		26
	StE 240.7	max.0,17	max.0,45	min.0,40	0,040	0,035						240		370	490		24
	StE 290.7	max.0,22	max.0,45	0,50–1,10	0,040	0,035						290		420	540		23
	StE 320.7	max.0,22	max.0,45	0,70–1,30	0,040	0,035						320		460	580		21
	StE 360.7	max.0,22	max.0,55	0,90–1,50	0,040	0,035						360		510	630		20
17174	TT St 35N	max.0,17	max.0,35	min.0,40	0,030	0,025					Al min.0,020	225		340	460		25
EN																	
10025	S 355 J2G3	max.0,20	max.0,55	max.1,60	0,035	0,035						355		490	630		
10208-1	L 210 GA	max.0,21	max.0,40	max.0,90	0,030	0,030						210		335	475		25
	L 235 GA	max.0,16	max.0,40	max.1,20	0,030	0,030						235		370	510		23
	L 245 GA	max.0,20	max.0,40	max.1,15	0,030	0,030						245		415	555		22
	L 290 GA	max.0,20	max.0,40	max.1,40	0,030	0,030						290		415	555		21
	L 360 GA	max.0,22	max.0,55	max.1,45	0,030	0,030						360		460	620		20
10208-2	L 245 NB	max.0,16	max.0,40	max.1,10	0,025	0,020						245-440		415			22
	L 290 NB	max.0,17	max.0,40	max.1,20	0,025	0,020					V max.0,05 Ti max.0,04	292–440		415			21
	L 360 NB	max.0,20	max.0,45	max.1,60	0,025	0,020					V max.0,10 Ti max.0,04	360–510		460			20
10217-1	P 195 TR1	max.013	max.0,35	max.0,70	0,030	0,025	max.0,30	max.0,30	max.0,08	max.0,30	Al min.0,020 pre TR2	195		320	440		27
	P 235 TR1	max.0,16	max.0,35	max.1,20	0,030	0,025	max.0,30	max.0,30	max.0,08	max.0,30		235		360	500		25
	P 265 TR1	max.0,20	max.0,40	max.1,40	0,030	0,025	max.0,30	max.0,30	max.0,08	max.0,30		265		410	570		22
10217-3	P 275 NL1	max.0,16	max.0,40	0,50–1,50	0,030	0,020	max.0,30	max.0,50	max.0,08	max.0,30	Al min.0,020	275		390	530		24
	P 275 NL2	max.0,16	max.0,40	0,50–1,50	0,025	0,015	max.0,30	max.0,50	max.0,08	max.0,30	Al min.0,020	275		390	530		24
	P 355 N	max.0,20	max.0,50	0,90–1,70	0,030	0,025	max.0,30	max.0,50	max.0,08	max.0,30	Al min.0,020	355		490	650		22
	P 355 NH	max.0,20	max.0,50	0,90–1,70	0,030	0,025	max.0,30	max.0,50	max.0,08	max.0,30	Al min.0,020	355		490	650		22
	P 355 NL1	max.0,18	max.0,50	0,90–1,70	0,030	0,020	max.0,30	max.0,50	max.0,08	max.0,30	Al min.0,020	355		490	650		22
	P 355 NL2	max.0,18	max.0,50	0,90–1,70	0,025	0,015	max.0,30	max.0,50	max.0,08	max.0,30	Al min.0,020	355		490	650		22
	P 460 N	max.0,20	max.0,60	1,00–1,70	0,030	0,025	max.0,30	max.0,80	max.0,10	max.0,70	Al min.0,020	460		560	730		19
	P 460 NH	max.0,20	max.0,60	1,00–1,70	0,030	0,025	max.0,30	max.0,80	max.0,10	max.0,70	Al min.0,020	460		560	730		19
	P 460 NL1	max.0,20	max.0,60	1,00–1,70	0,030	0,020	max.0,30	max.0,80	max.0,10	max.0,70	Al min.0,020	460		560	730		19
	P 460 NL2	max.0,20	max.0,60	1,00–1,70	0,025	0,015	max.0,30	max.0,80	max.0,10	max.0,70	Al min.0,020	460		560	730		19
10217-5	P 235 GH	max.0,16	max.0,35	max.1,20	0,030	0,025	max.0,30	max.0,30	max.0,08	max.0,30	Al min.0,020	235		360	500		25
	P 265 GH	max.0,20	max.0,35	max.1,40	0,030	0,025	max.0,30	max.0,30	max.0,08	max.0,30	Al min.0,020	265		410	570		23
	16Mo3	0,12–0,20	max.0,35	0,40–0,90	0,030	0,025	max.0,30	max.0,30	0,25–0,35	max.0,30	Al max.0,040	280		450	600		22
10217-6	P 215 NL	max.0,15	max.0,35	0,40–1,20	0,030	0,020	max.0,30	max.0,30	max.0,08	max.0,30	Al min.0,020	215		360	480		25
	P 265 NL	max.0,20	max.0,40	0,60–1,40	0,030	0,020	max.0,30	max.0,30	max.0,08	max.0,30	Al min.0,020	265		410	570		24
10219-1	S 235 JRH	max.0,17		max.1,40	0,045	0,045						235		340	470		26
	S 275 JOH	max.0,20		max.1,50	0,040	0,040						275		410	560		22
	S 275 J2H	max.0,20		max.1,50	0,035	0,035						275		410	560		22
	S 355 JOH	max.0,22	max.0,55	max.1,60	0,040	0,040						355		490	630		20
	S 355 J2H	max.0,22	max.0,55	max.1,60	0,035	0,035						355		490	630		20
	S 275 NH	max.0,20	max.0,40	0,50–1,40	0,035	0,030	max.0,30	max.0,30	max.0,10	max.0,35	Al min.0,020	275		370	540		24
	S 275 NLH	max.0,20	max.0,40	0,50–1,40	0,030	0,025	max.0,30	max.0,30	max.0,10	max.0,35	Al min.0,020	275		370	540		24
	S 355 NH	max.0,20	max.0,50	0,90–1,65	0,035	0,030	max.0,30	max.0,50	max.0,10	max.0,35	Al min.0,020	355		470	630		22
	S 355 NLH	max.0,18	max.0,50	0,90–1,65	0,030	0,025	max.0,30	max.0,50	max.0,10	max.0,35	Al min.0,020	355		470	630		22
	S 460 NH	max.0,20	max.0,60	1,00–1,70	0,035	0,030	max.0,30	max.0,80	max.0,10	max.0,35	Al min.0,020	460		550	720		17
	S 460 NLH	max.0,20	max.0,60	1,00–1,70	0,030	0,025	max.0,30	max.0,80	max.0,10	max.0,35	Al min.0,020	460		550	720		17
	S 275 MH	max.0,13	max.0,50	max.1,50	0,035	0,030		max.0,30	max.0,20		Al min.0,020	275		360	510		24
	S 275 MLH	max.0,13	max.0,50	max.1,50	0,030	0,025		max.0,30	max.0,20		Al min.0,020	275		360	510		24
	S 355 MH	max.0,14	max.0,50	max.1,50	0,035	0,030		max.0,30	max.0,20		Al min.0,020	355		450	610		22
	S 355 MLH	max.0,14	max.0,50	max.1,50	0,030	0,025		max.0,30	max.0,20		Al min.0,020	355		450	610		22
	S 420 MH	max.0,16	max.0,50	max.1,70	0,035	0,030		max.0,30	max.0,20		Al min.0,020	420		500	660		19
	S 420 MLH	max.0,16	max.0,50	max.1,70	0,030	0,025		max.0,30	max.0,20		Al min.0,020	420		500	660		19
	S 460 MH	max.0,16	max.0,50	max.1,70	0,035	0,030		max.0,30	max.0,20		Al min.0,020	460		530	720		17
	S 460 MLH	max.0,16	max.0,50	max.1,70	0,030	0,025		max.0,30	max.0,20		Al min.0,020	460		530	720		17
10224	L 235	max.0,17	max.0,35	max.0,80	0,040	0,040						235		360	500		25
	L 275	max.0,21	max.0,35	max.1,20	0,040	0,040						275		430	570		21
	L 355	max.0,22	max.1,60	max.0,35	0,040	0,040						355		500	650		21
10296-1	E 155	max.0,10	max.0,35	max.0,60	0,045	0,045						155		260			
	E 185	max.0,15	max.0,35	max.0,70	0,045	0,045						185		320			
	E 235	max.0,20	max.0,35	max.1,40	0,045	0,045						235		360			
	E 275	max.0,25	max.0,35	max.1,20	0,045	0,045						275		410			
	E 355	max.0,25	max.0,35	max.1,40	0,045	0,045						355		490			

Comparison of steels for tube and pipe EN DIN

The steel for hollow structural sections [Type S according to EN]

EN			DIN			BS		NFA		UNI	ČSN, STN	GOST		PN-H		ASTM		JIS	
Steel	W.Nr	Stan-dard	Steel	W.Nr	Stan-dard	Steel	Stan-dard	Steel	Stan-dard	Steel	Steel	Steel	Stan-dard	Steel	Stan-dard	Steel	Stan-dard	Steel	Stan-dard
S185	1.0035	10025-2	St33-2	1.0035	17100	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S195T	1.0026	10255	-	-	-	BS1387	1387	TU34-1	49-115	Fe330	-	-	-	-	-	Gr.A	A53	STK 290	G 3444
S235	-	10253-1	St37.0	1.0254	2609	-	-	-	-	-	11353	-	-	-	-	-	-	-	-
S235JRH	1.0039	10210-1	RSt37-2	1.0038	17119	-	-	-	-	-	11373	-	-	-	-	-	-	-	-
S235JRH	1.0039	10219-1	RSt37-2	1.0038	17120	-	-	-	-	-	11373	-	-	-	-	A795	A795	-	-
S235JR	1.0038	10025-2	RSt37-2	1.0038	17121	HFS 3	6323-3	TUE235/Q2	49-501	Fe35-1	11353	10	1050	R 35	84023/7	Gr.A	A53	-	-
-	-	-	St37-3	1.0116	17119	-	-	-	-	-	11373	-	-	-	-	-	-	-	-
S235JRG2	-	-	St37-3	1.0116	17120	-	-	-	-	-	11375	-	-	-	-	-	-	-	-
-	-	-	St37-3	1.0116	17121	-	-	-	-	-	11353	-	-	-	-	-	-	-	-
S265	-	10253-1	St44.0	1.0256	2609	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S275J0H	1.0149	10210-1	St44-2	1.0044	17119	-	-	-	-	-	11443	-	-	-	-	-	-	-	-
S275J0H	1.0149	10219-1	St44-2	1.0044	17120	-	-	-	-	-	11425	-	-	-	-	-	-	-	-
S275J0	1.0143	10025-2	St44-2	1.0044	17121	-	-	-	-	-	11453	-	-	-	-	-	-	STK 400	G 3444
S275J2H	1.0138	10210-1	St44-3	1.0144	17119	-	-	-	-	-	11448	-	-	-	-	-	-	-	-
S275J2H	1.0138	10219-1	St44-3	1.0144	17120	SAW 4	6323-7	TUE275/Q4	49-501	-	11448	-	-	-	-	-	-	-	-
S275J2	1.0145	10025-2	St44-3	1.0144	17121	HFS 4	6323-3	TUE275/Q3	49-501	Fe45-1	11453	20	1050	R 45	84023/7	Gr.B	A53	-	-
-	-	-	StE255	1.0461	17123	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	StE255	1.0461	17124	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	StE255	1.0461	17125	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	TStE255	1.0463	17123	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	TStE255	1.0463	17124	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	TStE255	1.0463	17125	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	EStE255	1.1103	17123	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	EStE255	1.1103	17124	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	EStE255	1.1103	17125	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S275NH	1.0493	10210-1	StE285	1.0486	17123	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S275NH	1.0493	10219-1	StE285	1.0486	17124	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S275N	1.0490	10025-3	StE285	1.0486	17125	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S275NLH	1.0497	10210-1	TStE285	1.0488	17123	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S275NLH	1.0497	10219-1	TStE285	1.0488	17124	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S275NL	1.0491	10025-3	TStE285	1.0488	17125	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	EStE285	1.1104	17123	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	EStE285	1.1104	17124	-	-	-	-	-	-	09G2S	19281	09G2	84018	-	-	STK 490	G 3444
-	-	-	EStE285	1.1104	17125	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S275MH	1.8843	10219-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S275MLH	1.8844	10219-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S355J0H	1.0547	10210-1	St52-3	1.0570	17119	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S355J0H	1.0547	10219-1	St52-3	1.0570	17120	SAW 5	6323-7	-	-	-	-	-	-	-	-	-	-	-	-
S355J0	1.0553	10025-2	St52-3	1.0570	17121	HFS 5	6323-3	TUE355/Q3	49-501	Fe 52-1	11523	18G2	19281	18G2A	84018	-	-	STK 500	G 3444
S355J2H	1.0576	10210-1	St52-3	1.0570	17119	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S355J2H	1.0576	10219-1	St52-3	1.0570	17120	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S355J2G3	-	-	St52-3	1.0570	17121	-	-	-	-	-	11523	-	-	-	-	-	-	-	-
S355NH	1.0539	10210-1	StE355	1.0562	17123	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S355NH	1.0539	10219-1	StE355	1.0562	17124	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S355N	1.0545	10025-3	StE355	1.0562	17125	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S355NLH	1.0549	10210-1	TStE355	1.0566	17123	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S355NLH	1.0549	10219-1	TStE355	1.0566	17124	-	-	-	-	-	11503	-	-	-	-	-	-	-	-
S355NL	1.0546	10025-3	TStE355	1.0566	17125	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	EStE355	1.1106	17123	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	EStE355	1.1106	17124	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	EStE355	1.1106	17125	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S355MH	1.8845	10219-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S355MLH	1.8846	10219-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	StE420	1.8902	17123	-	-	-	-	-	-	-	-	-	-	-	-	STK 540	G 3444
-	-	-	StE420	1.8902	17124	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	StE420	1.8902	17125	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	TStE420	1.8912	17123	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	TStE420	1.8912	17124	-	-	-	-	-	-	-	-	-	-	-	-	-	-

The steel for hollow structural sections [Type S according to EN]

EN			DIN			BS		NFA		UNI	ČSN, STN	GOST		PN-H		ASTM		JIS	
Steel	W.Nr	Stan-dard	Steel	W.Nr	Stan-dard	Steel	Stan-dard	Steel	Stan-dard	Steel	Steel	Steel	Stan-dard	Steel	Stan-dard	Steel	Stan-dard	Steel	Stan-dard
-	-	-	TStE420	1.8912	17125	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	EStE420	1.8913	17123	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	EStE420	1.8913	17124	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	EStE420	1.8913	17125	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S420MH	1.8847	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S420MLH	1.8848	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S460NH	1.8953	10210-1	StE460	1.8905	17123	-	-	TUE450/Q4	49-501	-	-	-	-	-	-	-	-	-	-
S460NH	1.8953	10219-1	StE460	1.8905	17124	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S460N	1.8901	10025-3	StE460	1.8905	17125	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S460NLH	1.8956	10210-1	TStE460	1.8915	17123	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S460NLH	1.8956	10219-1	TStE460	1.8915	17124	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S460NL	1.8903	10025-3	TStE460	1.8915	17125	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	EStE460	1.8918	17123	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	EStE460	1.8918	17124	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	EStE460	1.8918	17125	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S460MH	1.8849	10219-1	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S460MLH	1.8850	10219-1	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

The steels for Line Pipe [Type L according to EN]

EN			DIN			BS		NFA		UNI		ČSN, STN		GOST		PN-H		API		ISO	
Steel	W.Nr	Stan-dard	Steel	W.Nr	Stan-dard	Steel	Stan-dard	Steel	Stan-dard	Steel	Stan-dard	Steel	Stan-dard	Steel	Stan-dard	Steel	Stan-dard	Steel	Stan-dard	Steel	Stan-dard
L235	1.0252	10224	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
L275	1.0260	10224	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
L355	1.0419	10224	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	A25	API5L	L175	3183-1
L210GA	1.0319	10208-1	StE210.7	1.0307	17172	-	-	TSE220	49-400	-	-	-	-	K34	20295	-	-	A	API5L	L210	3183-1
L235GA	1.0458	10208-1	St37.0	1.0254	1629	-	-	-	-	Fe35-1	7088	-	-	-	-	-	-	-	-	-	-
L245GA	1.0459	10208-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	B	API5L	L245	3183-1
L290GA	1.0483	10208-1	St44.0	1.0256	1629	-	-	-	-	Fe45-1	7088	-	-	-	-	-	-	X42	API5L	L290	3183-1
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X46	API5L	L320	3183-1
L360GA	1.0499	10208-1	St52.0	1.0421	1629	-	-	-	-	-	-	-	-	-	-	-	-	X52	API5L	L360	3183-1
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X56	API5L	L390	3183-1
L245NB	1.0457	10208-2	StE240.7	1.0457	17172	-	-	TSE250	49-400	-	-	-	-	K38	20295	-	-	BN	API5L	L245N	3183-2
L290NB	1.0484	10208-2	StE290.7	1.0484	17172	-	-	-	-	-	-	-	-	K42	20295	-	-	X42N	API5L	L290N	3183-2
-	-	-	StE290.7	1.0484	2609	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	StE320.7	1.0409	17172	-	-	TSE320	49-400	-	-	-	-	K50	20295	-	-	X46N	API5L	L320N	-
L360NB	1.0582	10208-2	StE360.7	1.0582	17172	-	-	TSE360	49-400	-	-	-	-	K52	20295	-	-	X52N	API5L	L360N	3183-2
-	-	-	StE360.7	1.0582	2609	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	StE385.7	1.8970	17172	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	K55	20295	-	-	X56N	API5L	L390N	-
L415NB	1.8972	10208-2	StE415.7	1.8972	17172	-	-	TSE415	49-400	-	-	-	-	K60	20295	-	-	X60N	API5L	L415N	3183-2
L415NB	1.8972	10253-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	StE445.7TM	1.8975	17172	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
L450.B	-	10208-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X65	API5L	L450x	3183-2
-	-	-	StE480.7TM	1.8977	17172	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
L485.B	-	10208-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X70	API5L	L485x	3183-2
L555.B	10208-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X80	API5L	L555x	3183-2
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	H40	API5CT	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	J55	API5CT	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	K55	API5CT	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	N80	API5CT	-	-

General notes:

1. The steels according to the EN 10208-2 standard are possible to deliver in the following delivery conditions:

   NB Seamless pipes - normalizing rolled or normalized
   Welded pipes - normalizig rolled strips or sheets and normalizing of weld seam or pipe
   Steel of type LxyzNB with minimum tensile strength 245, 290, 360, 415 Mpa

   QB Seamless pipes - quenched and tempered
   Steel of type LxyzQB with minimum tensile strength 360, 415, 450, 485, 555 Mpa

   MB Welded pipes - normalizing rolled or normalized or thermomechanical rolled strips or sheets
   Steel of type LxyzMB with minimum tensile strength 245, 290, 360, 415, 450, 485, 555 Mpa

   Delivery conditions QB and MB upon agreement only.

2. The steels in the API 5L standard (forty-fourth edition, October 1, 2007) are also designated according to the ISO 3183-1,2 standard.
   Relationship between PSL, steels (according to ISO and API 5L) and delivery conditions is the following:

   PSL 1 L175 or A25 As-rolled, normalizing rolled or normalized L210 or A

   L245 or B As-rolled, normalizing rolled, normalized or
   L290 or X42 normalized and tempered
   L320 or X46
   L360 or X52
   L390 or X56
   L415 or X60
   L450 or X65
   L485 or X70

   PSL 2 L245R or BR As-rolled

   L290R or X42R
   L245N or BN Normalizing rolled, normalized,
   L290N or X42N normalized and tempered
   L320N or X46N
   L360N or X52N
   L390N or X56N
   L415N or X60N

   Quenched and tempered
   L245Q, L290Q, L320Q, L360Q, L390Q, L415Q, L450Q, L485Q, L555Q
   (BQ, X42Q, X46Q, X52Q, X56Q, X60Q, X65Q, X70Q, X80Q)

   Thermomechanical rolled
   L245M, L290M, L320M, L360M, L390M, L415M, L450M, L485M, L555M, L625M, L690M, L830M
   (BM, X42M, X46M, X52M, X56M, X60M, X65M, X70M, X80M, X90M, X100M, X120M)

   Possible combinations of acceptable processes of manufacture (type of pipe seamless or welded), PSL and steelgrade are given in Table 2 of the API 5L standard, 44. Edition. Deliveries from Podbrezova - PSL 1 and steels inclusive X56. Other steels are given for information only or deliveries upon agreement only.

3. The calculated table weight (kg/m, tables 2 and 14) of a line pipe may differ depending on the wall thickness figure (mm) used in the calculation. The figure may be rounded off to one decimal place (dimensions according to The API 5L Standard, editions up to 2004), or it may be rounded off to two decimal places (dimensions according to The ASME B 36.10M Standard are valid currently for line pipes according to API5L standard as well).

4. In GOST standards the data indicate the class of strength of the steel.

5. The table of L - type steels according to the EN standard also contains thesteels according to the API 5CT standard.

The C-steels for mechanical engineering [Type E according to EN]

EN			DIN			BS		NFA		UNI		ČSN, STN		GOST		PN-H		ASTM		JIS	
Grade	W.Nr	Stan-dard	Grade	W.Nr	Stan-dard	Grade	Stan-dard	Grade	Stan-dard	Grade	Stan-dard	Grade	Stan-dard	Grade	Stan-dard	Grade	Stan-dard	Grade	Stan-dard	Grade	Stan-dard
E155	1.0033	10296-1	-							Fe280	7945										
E155	1.0033	10305-2	-		-	CEW1	6323-6	-	-	Fe280	7946	-	-	-	-	O8XA	84023	-	-	STKM11A	G 3445
E155	1.0033	10305-3	-		-	ERW1	6323-5	-	-	Fe280	7947	-	-	-	-	-	-	-	-	-	-
E155	1.0033	10305-5	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E155	1.0033	10305-6	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E190	1.0031	10296-1	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E190	1.0031	10305-3	-		-	-	-	-	-	-	-	11320	420142	-	-	-	-	-	-	-	-
E190	1.0031	10305-5	St33	1.0035	2395-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E195	1.0034	10296-1	-		-	-	-	-	-	Fe320	7945	-	-	-	-	-	-	-	-	-	-
E195	1.0034	10305-2	RSt34-2	1.0034	2393-2	CEW2	6323-6	ES185	49-646	Fe320	7946	11343	420142	-	-	12X	84023	-	-	-	-
E195	1.0034	10305-3	RSt34-2	1.0034	2394-2	ERW2	6323-5	ES185	49-646	Fe320	7947	11343	420142	-	-	12X	84023	-	-	-	-
E195	1.0034	10305-5	-		-	-	-	-	-	Fe320	7287	-	-	-	-	-	-	-	-	-	-
E195	1.0034	10305-6	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E215	1.0212	10305-1	St30Al	1.0212	2391-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E215	1.0212	10305-4	St30Al	1.0212	2391-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E220	1.0215	10296-1	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E220	1.0215	10305-3	-		-	-	-	ES200	49-646	-	-	-	-	-	-	-	-	-	-	-	-
E220	1.0215	10305-5	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E235	1.0308	10296-1	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E235	1.0308	10297-1	-		-	HFS3	6323-3	TU37-b	49-311	Fe360	7729	-	-	-	-	-	-	-	-	STKM12A	G 3445
E235	1.0308	10305-1	St35	1.0308	2391-2	CFS3	6323-4	TU37-b	49-310	Fe360	7945	11353	420250	10	1050	10	84019	Gr.A	A53	-	-
E235	1.0308	10305-2	RSt37-2	1.0038	2393-2	CEW3	6323-6	ES235	49-646	Fe360	7946	-	-	-	-	R35	84023	-	-	-	-
E235	1.0308	10305-3	RSt37-2	1.0038	2394-2	ERW3	6323-5	-	-	Fe360	7947	11373	420142	10	10707	St3x	84020	-	-	-	-
E235	1.0308	10305-4	-		-	-	-	TU37-b	49-330	-	-	-	-	-	-	-	-	A822	A822		
E235	1.0308	10305-5	RSt37-2	1.0038	2395-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E235	1.0308	10305-6	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-		-	-		-	-	-	-	-	Fe35-1	663	-	-	-	-	-	-	-	-	-	-
-		-	-		-	-	-	-	-	Fe35-2	663	-	-	-	-	-	-	-	-	-	-
-		-	-		-	-	-	-	-	Fe360	6363	-	-	-	-	-	-	-	-	-	-
E255		10305-1	-		-	CFS4	6323-4	TU42-b	49-310	-	-	-	-	-	-	-	-	-	-	-	-
E255		10305-1	-		-	CFS4	6323-4	TU42BT	49-330	-	-	-	-	-	-	-	-	-	-	-	-
E255		10305-1	-		-	HFS4	6323-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E260	1.0220	10296-1	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E260	1.0220	10305-3	-		-	-	-	ES250	49-646	-	-	-	-	-	-	-	-	-	-	-	-
E260	1.0220	10305-5	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E275	1.0225	10296-1	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E275	1.0225	10297-1	-		-	-	-	-	-	Fe430	7729	-	-	-	-	-	-	-	-	-	-
-		-	St45	1.0408	2391-2	CFS4	6323-4	TU42-b	49-310	Fe410	7945	11453	420260	20	1050	20	84019	Gr.B	A53	STKM18A	G 3445
E275	1.0225	10305-2	St44-2	1.0044	2393-2	CEW4	6323-6	ES275	49-646	Fe410	7946	-	-	-	-	-	-	-	-	-	-
E275	1.0225	10305-3	St44-2	1.0044	2394-2	ERW4	6323-5	ES275	49-646	Fe410	7947	-	-	20	10707	R45	84023	-	-	-	-
E275	1.0225	10305-5	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E275	1.0225	10305-6	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-		-	-		-	-	-	-	-	Fe45-1	663	-	-	-	-	-	-	-	-	-	-
-		-	-		-	-	-	-	-	Fe45-2	663	-	-	-	-	-	-	-	-	-	-
-		-	-		-	-	-	-	-	Fe410	6363	-	-	-	-	-	-	-	-	-	-
E275K2	1.0456	10296-1	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E275K2	1.0456	10297-1	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E295	1.0050	10025-2																			
E315	1.0236	10297-1	-		-	-	-	ES300	49-646	Fe460	7946	-	-	-	-	-	-	-	-	STKM19A	G 3445
E315	1.0236	10297-1	-		-	-	-	ES300	49-646	Fe460	7947	-	-	-	-	-	-	-	-	STKM19A	G 3445
E320	1.0237	10296-1	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E320	1.0237	10305-3	-		-	-	-	ES320	49-646	-	-	-	-	-	-	-	-	-	-	-	-
E320	1.0237	10305-5	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E335	1.0060	10025-2																			
E355	1.0580	10294-1	-		-	-	-	-	-	Fe52-1	663	-	-	-	-	-	-	-	-	-	-
E355	1.0580	10296-1	-		-	-	-	-	-	Fe52-2	663	-	-	-	-	-	-	-	-	-	-
E355	1.0580	10297-1	-		-	HFS5	6323-3	TU52-b	49-311	Fe510	7729	11523	420250	-	-	-	-	-	-	-	-
E355	1.0580	10305-1	St52	1.0580	2391-2	CFS5	6323-4	TU52-b	49-310	Fe490	7945	11523	420260	-	-	-	-	1524	A519	-	-
E355	1.0580	10305-2	St52-3	1.0570	2393-2	CEW5	6323-6	ES355	49-646	Fe510	7946	-	-	18G2A	19281	18G2A	84018	-	-	-	-
E355	1.0580	10305-3	St52-3	1.0570	2394-2	ERW5	6323-5	ES355	49-646	Fe510	7947	-	-	-	-	-	-	1518	A519	-	-
E355	1.0580	10305-4	St52.0	1.0421	1629	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

EN			DIN			BS		NFA		UNI		ČSN, STN		GOST		PN-H		ASTM		JIS	
Grade	W.Nr	Stan-dard	Grade	W.Nr	Stan-dard	Grade	Stan-dard	Grade	Stan-dard	Grade	Stan-dard	Grade	Stan-dard	Grade	Stan-dard	Grade	Stan-dard	Grade	Stan-dard	Grade	Stan-dard
E355	1.0580	10305-5	St52.3	1.0570	2395-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E355	1.0580	10305-6	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-		-	-		-	-	-	-	-	Fe510	6363	-	-	-	-	-	-	-	-	-	-
E355K2	1.0920	10296-1	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E355K2	1.0920	10297-1	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E360	1.0070	10025-2																			
E370	1.0261	10296-1	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E370	1.0261	10305-3	-		-	-	-	ES380	49-646	-	-	-	-	-	-	-	-	-	-	-	-
E370	1.0261	10305-5	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E410		10305-1	-		-	-	-	TU20MV6	49-310	-	-	-	-	-	-	-	-	-	-	-	-
E420	1.0575	10305-3			-	-	-	-	ES420	49-646	-	-	-	-	-	-	-	-	-	-	-
E420	1.0575	10305-5	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E420J2	1.0599	10297-1	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E460K2	18891	10296-1	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E460K2	1.8891	10297-1	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E470	1.0536	10297-1	-		-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-		-	-	-	-	TU56-b	49-311	Fe55-1	663	11550	420250	-	R55	84 023/7	1541	A519	-	-
		-	-		-	-	-	-	TU56-b	49-311	Fe55-2	663	11550	420250	-	-	-	-	-	-	-
		-	-		-	-	-	-	TU56-b	49-311	Fe540	7729	11550	420250	-	-	-	-	-	-	-
		-	-		-	-	HFS8	6323-3	-	-	-	-	11650	420250	-	-	-	-	-	-	-
E590K2*	1.0644	10297-1	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E730K2*	1.8893	10297-1	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E275M*	1.8895	10296-1	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E355M*	1.8896	10296-1	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E460M*	1.8898	10296-1	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

From point of view of chemical composition are identifical following steels:
E155 equals E190, E195 equals E220, E235 equals E260, E275 equals E320, E355 equals E370 in standard EN 10305-3.
The strips for production of welded tubes are differed with method of production and with mechanical properties.

The C-steels for quenching and tempering and case hardening steels, Type C according to EN

EN			DIN			BS		NFA		UNI	ČSN, STN	GOST		PN-H		ASTM		JIS	
Steel	W.Nr	Stan-dard	Steel	W.Nr	Stan-dard	Steel	Stan-dard	Steel	Stan-dard	Steel	Steel	Steel	Stan-dard	Steel	Stan-dard	Steel	Stan-dard	Steel	Stan-dard
-		-	St30Si	1.0211	2391-2	-	-	-	-	-	-	-	-	-	-	1008	A519	-	-
-		-	-		-	-	-	-	-	-	-	-	-	-	-	1008	A513	-	-
-		-	-		-	-	-	-	-	-	-	-	-	-	-	1008	A512	-	-
-		-	C10	1.0301	17210	045M10	970	XC 10	35-551	C10	-	10	1050	-	-	1010	A519	STKM11A	G3445
-		-	C10	1.0301	17210	-	-	-	-	-	-	-	-	-	-	1010	A513	STKM11A	G3445
-		-	C10	1.0301	17210	-	-	-	-	-	-	-	-	-	-	1010	A512	STKM11A	G3445
C10E	1.1121	10084	Ck10	1.1121	17210	040A10	970	XC 10	35-551	C10	12010	10	1050	10	84019	1010	A519	STKM11A	G3445
C10E	1.1121	10084	Ck10	1.1121	17210	-	-	-	-	-	-	-	-	-	-	1010	A513	STKM11A	G3445
C10E	1.1121	10084	Ck10	1.1121	17210	-	-	-	-	-	-	-	-	-	-	1010	A512	STKM11A	G3445
C10E	1.1121	10297-1	Ck10	1.1121	17210	-	-	-	-	-	-	-	-	-	-	1010	A519	STKM11A	G3445
C10E	1.1121	10297-1	Ck10	1.1121	17210	-	-	-	-	-	-	-	-	-	-	1010	A513	STKM11A	G3445
C10E	1.1121	10297-1	Ck10	1.1121	17210	-	-	-	-	-	-	-	-	-	-	1010	A512	STKM11A	G3445
C10R	1.1207	10084	-		-	-	-	-	-	-	-	-	-	-	-	1010	A519	STKM11A	G3445
C10R	1.1207	10084	-		-	-	-	-	-	-	-	-	-	-	-	1010	A513	STKM11A	G3445
C10R	1.1207	10084	-		-	-	-	-	-	-	-	-	-	-	-	1010	A512	STKM11A	G3445
-		-	-		-	-	-	-	-	-	-	-	-	-	-	MT1010	A519	-	-
-		-	-		-	-	-	-	-	-	-	-	-	-	-	MT1010	A513	-	-
-		-	-		-	-	-	-	-	-	-	-	-	-	-	MT1010	A512	-	-
-		-	-		-	-	-	-	-	-	-	-	-	-	-	1012	A519	-	-
-		-	-		-	-	-	-	-	-	-	-	-	-	-	1012	A513	-	-
-		-	-		-	-	-	-	-	-	-	-	-	-	-	1012	A512	-	-
-		-	C15	1.0401	17210	080M15	970	XC 15	35-551	C 15	-	-	-	-	-	1015	A519	-	-
-		-	C15	1.0401	17210	-	-	-	-	-	-	-	-	-	-	1015	A513	-	-
-		-	C15	1.0401	17210	-	-	-	-	-	-	-	-	-	-	1015	A512	-	-
C15E	1.1141	10084	Ck15	1.1141	17210	080M15	970	XC 15	35-551	C 15	12023	15	1050		-	1015	A519	S15CK	G4051
C15E	1.1141	10084	Ck15	1.1141	17210	-	-	-	-	-	-	-	-	-	-	1015	A513	-	-
C15E	1.1141	10084	Ck15	1.1141	17210	-	-	-	-	-	-	-	-	-	-	1015	A512	-	-
C15E	1.1141	10297-1	Ck15	1.1141	17210	-	-	-	-	-	-	-	-	-	-	1015	A519	-	-
C15E	1.1141	10297-1	Ck15	1.1141	17210	-	-	-	-	-	-	-	-	-	-	1015	A513	-	-
C15E	1.1141	10297-1	Ck15	1.1141	17210	-	-	-	-	-	-	-	-	-	-	1015	A512	-	-
C15R	1.1140	10084	Cm15	1.1140	17210	-	-	-	-	-	-	-	-	-	-	1015	A519	-	-
C15R	1.1140	10084	Cm15	1.1140	17210	-	-	-	-	-	-	-	-	-	-	1015	A513	-	-
C15R	1.1140	10084	Cm15	1.1140	17210	-	-	-	-	-	-	-	-	-	-	1015	A512	-	-
C15R	1.1140	10297-1	Cm15	1.1140	17210	-	-	-	-	-	-	-	-	-	-	1015	A519	-	-
C15R	1.1140	10297-1	Cm15	1.1140	17210	-	-	-	-	-	-	-	-	-	-	1015	A513	-	-
C15R	1.1140	10297-1	Cm15	1.1140	17210	-	-	-	-	-	-	-	-	-	-	1015	A512	-	-
-		-	-		-	-	-	-	-	-	-	-	-	-	-	MT1015	A519	-	-
-		-	-		-	-	-	-	-	-	-	-	-	-	-	MT1015	A513	-	-
-		-	-		-	-	-	-	-	-	-	-	-	-	-	MT1015	A512	-	-
-		-	-		-	-	-	-	-	-	-	-	-	-	-	MTX1015	A519	-	-
-		-	-		-	-	-	-	-	-	-	-	-	-	-	MTX1015	A513	-	-
-		-	-		-	-	-	-	-	-	-	-	-	-	-	MTX1015	A512	-	-
C16E	1.1148	10084	-		-	-	-	-	-	-	-	-	-	-	-	1016	A519	-	-
C16E	1.1148	10084	-		-	-	-	-	-	-	-	-	-	-	-	1016	A513	-	-
C16E	1.1148	10084	-		-	-	-	-	-	-	-	-	-	-	-	1016	A512	-	-
C16R	1.1208	10084	-		-	-	-	-	-	-	-	-	-	-	-	1016	A519	-	-
C16R	1.1208	10084	-		-	-	-	-	-	-	-	-	-	-	-	1016	A513	-	-
C16R	1.1208	10084	-		-	-	-	-	-	-	-	-	-	-	-	1016	A512	-	-
-		-	-		-	-	-	-	-	-	-	-	-	-	-	1017	A519	-	-
-		-	-		-	-	-	-	-	-	-	-	-	-	-	1017	A513	-	-
-		-	-		-	-	-	-	-	-	-	-	-	-	-	1018	A519	STKM12A	G3445
-		-	-		-	-	-	-	-	-	-	-	-	-	-	1018	A513	STKM12A	G3445
-		-	-		-	-	-	-	-	-	-	-	-	-	-	1018	A512	STKM12A	G3445
-		-	-		-	-	-	-	-	-	-	-	-	-	-	1019	A519	-	-
-		-	-		-	-	-	-	-	-	-	-	-	-	-	1019	A513	-	-
-		-	-		-	-	-	-	-	-	-	-	-	-	-	1019	A512	-	-
-		-	-		-	-	-	-	-	-	-	-	-	-	-	1020	A519	-	-
-		-	-		-	-	-	-	-	-	-	-	-	-	-	1020	A513	-	-

EN			DIN			BS		NFA		UNI	ČSN, STN	GOST		PN-H		ASTM		JIS	
Steel	W.Nr	Stan-dard	Steel	W.Nr	Stan-dard	Steel	Stan-dard	Steel	Stan-dard	Steel	Steel	Steel	Stan-dard	Steel	Stan-dard	Steel	Stan-dard	Steel	Stan-dard
-		-	-		-	-	-	-	-	-	-	-	-	-	-	1020	A512	-	-
-		-	-		-	-	-	-	-	-	-	-	-	-	-	1021	A519	-	-
-		-	-		-	-	-	-	-	-	-	-	-	-	-	1021	A513	-	-
-		-	-		-	-	-	-	-	-	-	-	-	-	-	1021	A512		
			C22	1.0402	17200	040A20	970	1C22	35-552	C20	12024	20	1050	-	-	1022	A519	S22C	G4051
			C22	1.0402	17204	-	-	-	-	-	-	-	-	-	-	1022	A513	-	-
C22E	1.1151	10297-1	Ck22	1.1151	17200	070M20	970	XC18	35-552	C20	12024	20	1050	20	84019	1022	A519	S20C	G4051
C22E	1.1151	10297-1	Ck22	1.1151	17204	-	-	-	-	-	-	-	-	-	-	1022	A519	-	-
C22E	1.1151	10083-2	Ck22	1.1151	17200	-	-	-	-	-	-	-	-	-	-	1022	A513	-	-
C22E	1.1151	10297-1	Ck22	1.1151	17204	-	-	-	-	-	-	-	-	-	-	1022	A519	-	-
C22E	1.1151	10083-2	Ck22	1.1151	17200	-	-	-	-	-	-	-	-	-	-	1022	A513	-	-
C22E	1.1151	10083-2	Ck22	1.1151	17204	-	-	-	-	-	-	-	-	-	-	1022	A513	-	-
C22R	1.1149	10083-2	Cm22	1.1149	17200	-	-	-	-	-	-	-	-	-	-	1022	A519	-	-
C22R	1.1149	10083-2	Cm22	1.1149	17204	-	-	-	-	-	-	-	-	-	-	1022	A513	-	-
-		-	-		-	-	-	-	-	-	-	-	-	-	-	MT1020	A519	-	-
-		-	-		-	-	-	-	-	-	-	-	-	-	-	MT1020	A513	-	-
-		-	-		-	-	-	-	-	-	-	-	-	-	-	MT1020	A512	-	-
-		-	-		-	-	-	-	-	-	-	-	-	-	-	MTX1020	A519	STKM13A	G3445
-		-	-		-	-	-	-	-	-	-	-	-	-	-	MTX1020	A513	STKM13A	G3445
-		-	-		-	-	-	-	-	-	-	-	-	-	-	MTX1020	A512	STKM13A	G3445
-		-	C25	1.0406	17200	070M26	970	1C25	35-552	C25	12030	-	-	-	-	1025	A519	-	-
-		-	C25	1.0406	17200	-	-	-	-	-	-	-	-	-	-	1025	A513	-	-
-		-	C25	1.0406	10083-2	C25	1.0406	17200	-	-	-	-	-	-	-	1025	A512	-	-
C25E	1.1158	10083-2	Ck25	1.1158	17200	070M26	970	XC25	35-552	C25	12030	25	1050	-	-	1025	A519	S25C	G4051
C25E	1.1158	10083-2	Ck25	1.1158	17200	-	-	-	-	-	-	-	-	-	-	1025	A513	-	-
C25E	1.1158	10083-2	Ck25	1.1158	17200	-	-	-	-	-	-	-	-	-	-	1025	A512	-	-
C25R	1.1163	10083-2	Cm25	1.1163	17200	-	-	-	-	-	-	-	-	-	-	1025	A519	-	-
C25R	1.1163	10083-2	Cm25	1.1163	17200	-	-	-	-	-	-	-	-	-	-	1025	A513	-	-
C25R	1.1163	10083-2	Cm25	1.1163	17200	-	-	-	-	-	-	-	-	-	-	1025	A512	-	-
-		-	-		-	-	-	-	-	-	-	-	-	-	-	1026	A519	STKM14A	G3445
-		-	-		-	-	-	-	-	-	-	-	-	-	-	1026	A513	STKM14A	G3445
-		-	-		-	-	-	-	-	-	-	-	-	-	-	1026	A512	STKM14A	G3445
-		-	-		-	-	-	-	-	-	-	-	-	-	-	1027	A513	-	-
			C30	1.0528	17200	-	-	-	-	-	12031	-	-	-	-	1030	A519	-	-
			C30	1.0528	17200	-	-	-	-	-	-	-	-	-	-	1030	A513	-	-
C30	1.0528	10083-2	C30	1.0528	17200	-	-	-	-	-	-	-	-	-	-	1030	A512	-	-
C30E	1.1178	10083-2	Ck30	1.1178	17200	080M30	970	XC32	35-552	C30	12031	-	-	-	-	1030	A519	S30CM	G4051
C30E	1.1178	10083-2	Ck30	1.1178	17200	-	-	-	-	-	-	-	-	-	-	1030	A513	-	-
C30E	1.1178	10083-2	Ck30	1.1178	17200	-	-	-	-	-	-	-	-	-	-	1030	A512	-	-
C30R	1.1179	10083-2	Cm30	1.1179	17200	-	-	-	-	-	-	-	-	-	-	1030	A519	-	-
C30R	1.1179	10083-2	Cm30	1.1179	17200	-	-	-	-	-	-	-	-	-	-	1030	A513	-	-
C30R	1.1179	10083-2	Cm30	1.1179	17200	-	-	-	-	-	-	-	-	-	-	1030	A512	-	-
-		-	-		-	-	-	-	-	-	-	-	-	-	-	1033	A513	-	-
C35	1.0501	10083-2	C35	1.0501	17200	080M36	970	1C35	35-552	C35	12040	35	1050	-	-	1035	A519	STKM15A	G3445
C35	1.0501	10083-2	C35	1.0501	17204	-	-	-	-	-	-	-	-	-	-	1035	A519	STKM15A	G3445
C35	1.0501	10083-2	C35	1.0501	17200	-	-	-	-	-	-	-	-	-	-	1035	A513	STKM15A	G3445
C35	1.0501	10083-2	C35	1.0501	17204	-	-	-	-	-	-	-	-	-	-	1035	A513	STKM15A	G3445
C35	1.0501	10083-2	C35	1.0501	17200	-	-	-	-	-	-	-	-	-	-	1035	A512	STKM15A	G3445
C35	1.0501	10083-2	C35	1.0501	17204	-	-	-	-	-	-	-	-	-	-	1035	A512	STKM15A	G3445
C35E	1.1181	10297-1	Ck35	1.1181	17204	CFS6	6323-4	XC38H1	35-552	C35	12040	35	1050	35	84019	1035	A519	STKM15A	G3445
C35E	1.1181	10297-1	Ck35	1.1181	17204	CFS6	6323-4	-	-	-	12040	35	1050	35	84019	1035	A513	STKM15A	G3445
C35E	1.1181	10297-1	Ck35	1.1181	17204	CFS6	6323-4	-	-	-	12040	35	1050	35	84019	1035	A512	STKM15A	G3445
C35E	1.1181	10083-2	Ck35	1.1181	17200	CFS6	6323-4	-	-	-	12040	35	1050	35	84019	1035	A519	STKM15A	G3445
C35E	1.1181	10083-2	Ck35	1.1181	17200	CFS6	6323-4	-	-	-	12040	35	1050	35	84019	1035	A513	STKM15A	G3445
C35E	1.1181	10083-2	Ck35	1.1181	17200	CFS6	6323-4	-	-	-	12040	35	1050	35	84019	1035	A512	STKM15A	G3445
C35R	1.1180	10083-2	Cm35	1.1180	17200	-	-	-	-	-	-	-	-	R55	84023	1035	A519	STKM16A	G3445
C35R	1.1180	10083-2	Cm35	1.1180	17204	-	-	-	-	-	-	-	-	R55	84023	1035	A519	STKM16A	G3445
C35R	1.1180	10083-2	Cm35	1.1180	17200	-	-	-	-	-	-	-	-	R55	84023	1035	A513	STKM16A	G3445

EN			DIN			BS		NFA		UNI	ČSN, STN	GOST		PN-H		ASTM		JIS	
Steel	W.Nr	Stan-dard	Steel	W.Nr	Stan-dard	Steel	Stan-dard	Steel	Stan-dard	Steel	Steel	Steel	Stan-dard	Steel	Stan-dard	Steel	Stan-dard	Steel	Stan-dard
C35R	1.1180	10083-2	Cm35	1.1180	17204	-	-	-	-	-	-	-	-	R55	84023	1035	A513	STKM16A	G3445
C35R	1.1180	10083-2	Cm35	1.1180	17200	-	-	-	-	-	-	-	-	R55	84023	1035	A512	STKM16A	G3445
C35R	1.1180	10083-2	Cm35	1.1180	17204	-	-	-	-	-	-	-	-	R55	84023	1035	A512	STKM16A	G3445
C40	1.0511	10083-2	C40	1.0511	17200	080M40	970	1C40	35-552	C40	12041	-	-	-	-	1040	A519	-	-
C40	1.0511	10083-2	C40	1.0511	17200	-	-	-	-	-	-	-	-	-	-	1040	A513	-	-
C40E	1.1186	10083-2	Ck40	1.1186	17200	080M40	970	XC42H1	35-552	C40	12041	40	1050	-	-	1040	A519	S40C	G4051
C40E	1.1186	10083-2	Ck40	1.1186	17200	-	-	-	-	-	-	-	-	-	-	1040	A513	-	-
C40R	1.1189	10083-2	Cm40	1.1189	17200	-	-	-	-	-	-	-	-	-	-	1040	A519	-	-
C40R	1.1189	10083-2	Cm40	1.1189	17200	-	-	-	-	-	-	-	-	-	-	1040	A513	-	-
C45	1.0503	10083-2	C45	1.0503	17200	080M46	970	1C45	35-552	C45	12050	45	1050	-	-	1045	A519	S45C	G4051
C45	1.0503	10083-2	C45	1.0503	17204	-	-	-	-	-	-	-	-	-	-	1045	A519	-	-
C45E	1.1191	10297-1	Ck45	1.1191	17200	CFS8	6323-4	XC48H1	35-552	C45	12050	45	1050	45	84019	1045	A519	S45C	G4051
C45E	1.1191	10297-1	Ck45	1.1191	17204	CFS8	6323-4	-	-	-	12050	45	1050	45	84019	1045	A519	-	-
C45E	1.1191	10083-2	Ck45	1.1191	17200	CFS8	6323-4	-	-	-	12050	45	1050	45	84019	1045	A519	-	-
C45E	1.1191	10083-2	Ck45	1.1191	17204	CFS8	6323-4	-	-	-	12050	45	1050	45	84019	1045	A519	-	-
C45R	1.1201	10083-2	Cm45	1.1201	17200	-	-	-	-	-	-	-	-	R65	84023	1045	A519	STKM17A	G3445
C45R	1.1201	10083-2	Cm45	1.1201	17204	-	-	-	-	-	-	-	-	R65	84023	1045	A519	STKM17A	G3445
-		-	-		-	-	-	-	-	-	-	-	-	-	-	1545	A519	-	
			C50	1.0540	17200	-	-	1C50	35-552	C50	12051	-	-	-	-	1050	A519	-	-
			C50	1.0540	17200	-	-	-	-	-	-	-	-	-	-	1050	A513	-	
C50E	1.1206	10083-2	Ck50	1.1206	17200	080M50	970	XC50H1	35-552	C50	12050	50	1050	-	-	1050	A519	-	-
C50E	1.1206	10083-2	Ck50	1.1206	17200	-	-	-	-	-	-	-	-	-	-	1050	A513	-	-
C50R	1.1241	10083-2	Cm50	1.1241	17200	-	-	-	-	-	-	-	-	-	-	1050	A519	-	-
C50R	1.1241	10083-2	Cm50	1.1241	17200	-	-	-	-	-	-	-	-	-	-	1050	A513	-	-
C55	1.0535	10083-2	C55	1.0535	17200	070M55	970	1C55	35-552	C55	12060	55	1050	-	-	1055	A519	S55C	G4051
C55	1.0535	10083-2	C55	1.0535	17204	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C55E	1.1203	10083-2	Ck55	1.1203	17200	070M55	970	XC55H1	35-552	C55	12060	55	1050	55	84019	1055	A519	S55C	G4051
C55E	1.1203	10083-2	Ck55	1.1203	17204	-	-	-	-	-	12060	-	-	55	84019	-	-	-	-
C55R	1.1209	10083-2	Cm55	1.1209	17200	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C55R	1.1209	10083-2	Cm55	1.1209	17204	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C60	1.0601	10083-2	C60	1.0601	17200	-	-	1C60	35-552	C60	12061	60	1050	-	-	1060	A513	S58C	G4051
C60	1.0601	10083-2	C60	1.0601	17204	-	-	-	-	-	-	-	-	-	-	1060	A513	-	-
C60E	1.1221	10297-1	Ck60	1.1221	17204	070M62	970	XC60H1	35-552	C60	12061	60	1050	-	-	1060	A513	S58C	G4051
C60E	1.1221	10083-2	Ck60	1.1221	17200	-	-	-	-	-	-	-	-	-	-	1060	A513	-	-
C60R	1.1223	10083-2	Cm60	1.1223	17200	-	-	-	-	-	-	-	-	-	-	1060	A513	-	-
C60R	1.1223	10083-2	Cm60	1.1223	17204	-	-	-	-	-	-	-	-	-	-	1060	A513	-	-

The C-steels for tubes for pressure purposes [Type P according to EN]

EN			DIN			BS		NFA		UNI	ČSN, STN	GOST		PN-H		ASTM		JIS	
Steel	W.Nr	Stan-dard	Steel	W.Nr	Stan-dard	Steel	Stan-dard	Steel	Stan-dard	Steel	Steel	Steel	Stan-dard	Steel	Stan-dard	Steel	Stan-dard	Steel	Stan-dard
P195TR1	1.0107	10216-1	-		-	-	-	-	-	Fe320	-	-	-	-	-	-	-	-	-
P195TR1	1.0107	10217-1	-		-	-	-	-	-	Fe320	-	-	-	-	-	-	-	-	-
P195TR2	1.0108	10216-1	-		-	-	-	-	-	-	-	-	-	-	-	A822	A822	-	-
P195TR2	1.0108	10217-1	-		-	-	-	-	-	-	-	-	-	-	-	A822	A822	-	-
P195GH	1.0348	10216-2	-		-	320	3059-1	-	-	-	-	-	-	-	-	-	-	-	-
P195GH	1.0348	10217-2	-		-	320	3606	TS34-C	49-245	-	-	-	-	-	-	-	-	-	-
P215NL	1.0451	10216-4	TTSt35N	1.0356	17173	430LT	3603	-	-	C15	11369	-	-	-	-	Gr.1	A333	STPL380	G3460
P215NL	1.0451	10217-4	TTSt35N	1.0356	17174	-	-	-	-	-	-	-	-	-	-	Gr.1	A334	STBL380	G3464
P215NL	1.0451	10217-6	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P215NL	1.0451	10253-2	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P235		10253-2	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P235TR1	1.0254	10216-1	St37.0	1.0254	1629	-	-	-	-	Fe320	11353	-	-	-	-	-	-	-	-
P235TR1	1.0254	10216-1	St37.0	1.0254	2609	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P235TR1	1.0254	10217-1	St37.0	1.0254	1626	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P235TR2	1.0255	10216-1	St37.4	1.0255	1630	360	3601	-	-	-	-	-	-	R35	84023	-	-	STPG370	G3454
P235TR2	1.0255	10217-1	St37.4	1.0255	1628	-	-	-	-	-	-	-	-	-	-	-	-	STS370	G3455
P235TR2	1.0255	10216-1	-		-	CFS360	7416	TUE220A	49-112	-	-	-	-	-	-	-	-	-	-
P235TR2	1.0255	10216-1	-		-	-	-	AE220A	49-186	-	-	-	-	-	-	-	-	-	-
P235TR2	1.0255	10216-1	-		-	-	-	AE220	49-281	-	-	-	-	-	-	-	-	-	-
P235TR2	1.0255	10253-2	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P235GH	1.0345	10216-2	St35.8	1.0305	17175	360	3059-2	TU37c	49-213	C14	12021	10	1050	K10	74252	Gr.A	A106	STPT370	G3456
P235GH	1.0345	10216-2	St35.8	1.0305	17175	360	3602-1	TU37c	49-215	C14	12021	10	1050	K10	74252	A179	A179	STPT370	G3456
P235GH	1.0345	10216-2	St35.8	1.0305	17175	360	3602-1	TU37c	49-215	C14	12021	10	1050	K10	74252	A192	A192	STPT370	G3456
P235GH	1.0345	10216-2	St35.8	1.0305	17175	360	3602-1	TU37c	49-215	C14	12021	10	1050	K10	74252	Gr.A-2	A556	STPT370	G3456
P235GH	1.0345	10216-2	St35.8	1.0305	2609	-	-	TUE220	49-211	-	-	-	-	-	-	Gr.A	A178	STB340	G3461
P235GH	1.0345	10216-2	St35.8	1.0305	2609	-	-	TUE220	49-211	-	-	-	-	-	-	A214	A214	STB340	G3461
P235GH	1.0345	10217-2	St37.8	1.0315	17177	-	-	TS37C	49-243	-	-	-	-	-	-	-	-	-	-
P235GH	1.0345	10217-5	St37.8	1.0315	17177	-	-	TS37C	49-245	-	-	-	-	-	-	-	-	-	-
-		-	StE255	1.0461	17179	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-		-	StE255	1.0461	17178	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-		-	WStE255	1.0462	17179	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-		-	WStE255	1.0462	17178	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-		-	TStE255	1.0463	17179	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-		-	TStE255	1.0463	17178	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-		-	EStE255	1.1103	17179	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-		-	EStE255	1.1103	17178	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P255QL	1.0452	10216-4	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P265		10253-2	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P265TR1	1.0258	10216-1	St44.0	1.0256	1629	-	-	-	-	-	11453	-	-	-	-	-	-	-	-
P265TR1	1.0258	10216-1	St44.0	1.0256	2609	-	-	-	-	-	11453	-	-	-	-	-	-	-	-
P265TR1	1.0258	10217-1	St44.0	1.0256	1626	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-		-	-		-	430	3601	-	-	-	-	-	-	-	-	-	-	-	-
P265TR2	1.0259	10216-1	St44.4	1.0257	1630	CFS430	7416	TUE235A	49-112	-	-	-	-	R45	84023	-	-	STPG410	G3454
P265TR2	1.0259	10217-1	St44.4	1.0257	1628	-	-	-	-	-	-	-	-	R45	84023	-	-	STS410	G3455
P265TR2	1.0259	10253-2	St44.4	1.0257	2609	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P265GH	1.0425	10216-2	St45.8	1.0405	17175	430	3602-1	TU42c	49-213	C18	12022	20	1050	K18	74252	Gr.B	A106	STPT410	G3456
P265GH	1.0425	10216-2	St45.8	1.0405	17175	430	3059-2	TU42c	49-215	C18	12022	20	1050	K18	74252	Gr.A-1	A210	STPT410	G3456
P265GH	1.0425	10216-2	St45.8	1.0405	17175	430	3602-1	TUE250	49-211	-	-	-	-	-	-	Gr.B-2	A556	-	-
P265GH	1.0425	10216-2	St45.8	1.0405	17175	430	3602-1	TUE250	49-281	-	-	-	-	-	-	WPB	A234	-	-
P265GH	1.0425	10217-2	St42.8	1.0498	17177	440	3606	TS42c	49-243	-	-	-	-	-	-	Gr.B	A178	STB410	G3461
P265GH	1.0425	10217-5	St42.8	1.0498	17177	440	3606	TS42c	49-245	-	-	-	-	-	-	Gr.B	A178	STB410	G3461
P265NL	1.0453	10216-4	TTSt35V	1.0356	17173	430LT	3603	TU42BT	49-215	C20	11419	-	-	-	-	Gr.6	A333	-	-
P265NL	1.0453	10217-4	TTSt35V	1.0356	17174	430LT	3603	TU42BT	49-215	C20	11448	-	-	-	-	Gr.6	A334	-	-
P265NL	1.0453	10217-6	TTSt35V	1.0356	17173	430LT	3603	TU42BT	49-215	C20	11419	-	-	-	-	WPL6	A420	-	-
P265NL	1.0453	10253-2	-		-	-	-	TU48c	49-213	-	-	-	-	-	-	-	-	STS480	G3455
-		-	-		-	-	-	TU48c	49-215	-	-	-	-	-	-	-	-	-	-
-		-	-		-	-	-	TS48c	49-243	-	-	-	-	-	-	-	-	-	-
-		-	-		-	-	-	TS48c	49-245	-	-	-	-	-	-	-	-	-	-

EN			DIN			BS		NFA		UNI	ČSN, STN	GOST		PN-H		ASTM		JIS	
Steel	W.Nr	Stan-dard	Steel	W.Nr	Stan-dard	Steel	Stan-dard	Steel	Stan-dard	Steel	Steel	Steel	Stan-dard	Steel	Stan-dard	Steel	Stan-dard	Steel	Stan-dard
-		-	-		-	-	-	AE275	49-281	-	-	-	-	-	-	-	-	-	-
-		-	StE285	1.0486	17179	-	-	TUE290B2	49-411	-	-	-	-	-	-	-	-	-	-
-		-	StE285	1.0486	17178	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-		-	WStE285	1.0487	17179	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-		-	WStE285	1.0487	17178	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P275NL1	1.0488	10216-3	TStE285	1.0488	17179	-	-	TUE290B3	49-411	-	-	-	-	-	-	-	-	-	-
P275NL1	1.0488	10216-3	TStE285	1.0488	2609	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P275NL1	1.0488	10217-3	TStE285	1.0488	17178	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P275NL2	1.1104	10216-3	EStE285	1.1104	17179	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P275NL2	1.1104	10217-3	EStE285	1.1104	17178	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-		-	St52.0	1.0421	1629	-	-	-	-	-	11523	-	-	-	-	-	-	-	-
-		-	St52.0	1.0421	2609	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-		-	St52.0	1.0421	1626	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-		-	St52.4	1.0581	1630	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-		-	St52.4	1.0581	1628	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P355N	1.0562	10216-3	StE355	1.0562	17179	-	-	TUE360B2	49-411	-	-	-	-	-	-	-	-	-	-
P355N	1.0562	10253-2	StE355	1.0562	17179	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P355N	1.0562	10217-3	StE355	1.0562	17178	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P355NH	1.0565	10216-3	WStE355	1.0565	17179	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P355NH	1.0565	10253-2	WStE355	1.0565	2609	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P355NH	1.0565	10217-3	WStE355	1.0565	17178	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P355NL1	1.0566	10216-3	TStE355	1.0566	17179	-	-	TUE360B3	49-411	-	11503	-	-	-	-	-	-	-	-
P355NL1	1.0566	10217-3	TStE355	1.0566	17178	-	-	-	-	-	11503	-	-	-	-	-	-	-	-
P355NL1	1.0566	10253-2	TStE355	1.0566	2609	-	-	-	-	-	11503	-	-	-	-	-	-	-	-
P355NL2	1.1106	10216-3	EStE355	1.1106	17179	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P355NL2	1.1106	10217-3	EStE355	1.1106	17178	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-		-	StE420	1.8902	17179	-	-	TUE420B2	49-411	-	-	-	-	-	-	-	-	-	-
-		-	StE420	1.8902	17178	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-		-	WStE420	1.8932	17179	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-		-	WStE420	1.8932	17178	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-		-	TStE420	1.8912	17179	-	-	TUE420B3	49-411	-	-	-	-	-	-	-	-	-	-
-		-	TStE420	1.8912	17178	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-		-	EStE420	1.8913	17179	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-		-	EStE420	1.8913	17178	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P460N	1.8905	10216-3	StE460	1.8905	17179	-	-	TUE485B2	49-411	-	-	-	-	-	-	-	-	-	-
P460N	1.8905	10217-3	StE460	1.8905	17178	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P460NH	1.8935	10216-3	WStE460	1.8935	17179	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P460NH	1.8935	10217-3	WStE460	1.8935	17178	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P460NL1	1.8915	10216-3	TStE460	1.8915	17179	-	-	TUE485B3	49-411	-	-	-	-	-	-	-	-	-	-
P460NL1	1.8915	10217-3	TStE460	1.8915	17178	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P460NL2	1.8918	10216-3	EStE460	1.8918	17179	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P460NL2	1.8918	10217-3	EStE460	1.8918	17178	-	-	-	-	-	-	-	-	-	-	-	-	-	-
*P620Q	1.8876	10216-3	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
*P620QH	1.8877	10216-3	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
*P620QL	1.8890	10216-3	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
*P690Q	1.8879	10216-3	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
*P690QH	1.8880	10216-3	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
*P690QL1	1.8881	10216-3	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
*P690QL2	1.8888	10216-3	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*for information only

The alloy steels for tubes for mechanical purposes and heat treatment, Type 26Mn5 according to EN

EN			DIN			BS		NFA		UNI	ČSN, STN	GOST		PN-H		ASTM		JIS	
Steel	W.Nr	Stan-dard	Steel	W.Nr	Stan-dard	Steel	Stan-dard	Steel	Stan-dard	Steel	Steel	Steel	Stan-dard	Steel	Stan-dard	Steel	Stan-dard	Steel	Stan-dard
Mn steel																			
			21Mn4	1.0469	17115					20Mn4		20G	4543	20G	84019				
26Mn5	1.1161	10305-1				CFS7	6323-4					25G2	4543						
28Mn6	1.1170	10083-2	28Mn6	1.1170	17200	150M28	970	28Mn6	35-552	C28Mn	13141	30G2	4543	30G2	84030/04	1330	A519	SCMn1	G4051
			16Mn9								13320					1527			
			36Mn4	1.0561	17204							35G	4543						
			36Mn5	1.1167	17204	150M36	970-3	35M5	35-552			35G2	4543	-	-	1335	A519	SMn438	G4052
			(36Mn7)								14240	35G2	4543						
38Mn6	1.1127	10297-1	36Mn6									40G2	4543						
			46Mn5	1.1128															
			46Mn7	1.0912							13250	45G2	4543						
Mn-B steel																			
20MnB5	1.5530	10083-3						20MB5	35-552										
30MnB5	1.5531	10083-3																	
38MnB5	1.5532	10083-3						38MB5	35-552										
Mn-Cr steel																			
16MnCr5	1.7131	10084	16MnCr5	1.7131	17210	590M17	970	16MC5	35-551	16MnCr5	14220	18ChG	4543			5115	A519	SCr415	G4051
16MnCr5	1.7131	10297-1									14220								
20MnCr5	1.7147	10084	20MnCr5	1.7147	17210			20MC5	35-551	20MnCr5	14221	18ChG	4543	-	-	(5120)	A519		
Mn-Cr-B steel																			
16MnCrB5	1.7160	10084									14224	20ChGR	4543						
27MnCrB5-2	1.7182	10083-3																	
33MnCrB5-2	1.7185	10083-3																	
39MnCrB6-2	1.7189	10083-3																	
Mn-Cr-Si steel																			
(30MnCrSi4)	1.71XY										14331	30ChGSA	4543						
12MnCrSirMoTi	1.51XY										POD2001								
Mn-Cr-V steel																			
27MnCrV4	1.8162										15231								
Mn-Si steel																			
			10MnSi6 3	1.5125								09G2S	19281	-	-	-	-	-	-
(18MnSi6-3)												18G2S	5781						
(25MnSi6-3)												25G2S	5781						
			37MnSi5	1.5122				38MS5			13240	35GS	5781						
(20MnSi7)	1.51XY										Pre Trip								
Mn-V steel																			
20MnV6	1.5217	10294-1	20MnV6	1.5217		Gr.55	4360	20MV6	49-310	20MnV5	13220			18G2AV	84018	K01907		STKM20A	G3445
(E410)	1.0509	10305-1	(StE460)	1.8905	17124			S470M	49-312			-	-	-	-	K12202		STKM20A	G3445
Mo steel																			
26Mo2	1.5417	10305-1				CFS 9	6323-4												
20MoCr3	1.7320	10084																	
20MoCr4	1.7321	10084	20MoCr4	1.7321	17210														
Cr-Ni steel																			
16NiCr4	1.5714	10084								16CrNi4						3115	SAE		
15NiCr13	1.5752	10084	14NiCr14	1.5752		655M13	970	12NC15			16420							SNC815	G4052
			31NiCr14	1.5755				(30NC12)			16440	30ChN3A	4543			3435	SAE		
10NiCr5-4	1.5805	10084	(10NiCr6)																
35NiCr6	1.5815	10083-3																	
17CrNi6-6	1.5918	10084	15CrNi6	1.5919	17210	(815M17)	970	16NC6	35-551	16CrNi4	16321	(12ChN2)							
Cr-Ni-Mo steel																			
36CrNiMo4	1.6511	10083-3	36CrNiMo4	1.6511	17200	817M37	970-1			38NiCrMo4		40ChGNM	4543			9840	SAE		
36CrNiMo4	1.6511	10297-1																	
34CrNiMo6	1.6582	10083-3	34CrNiMo6	1.6582	17200	817M40	970			35NiCrMo6	16343	36Ch2N2MA	4543						
30CrNiMo8	1.6580	10083-3	30CrNiMo8	1.6580	17200	823M30	970	30CND8	35-556	30NiCrMo8	16430								
30CrNiMo8	1.6580	10297-1																	
																		SNCM431	G4103
18CrNiMo7-6	1.6587	10084	17CrNiMo6	1.6587	17210			18NCD6	35-551		16326								

EN			DIN			BS		NFA		UNI	ČSN, STN	GOST		PN-H		ASTM		JIS	
Steel	W.Nr	Stan-dard	Steel	W.Nr	Stan-dard	Steel	Stan-dard	Steel	Stan-dard	Steel	Steel	Steel	Stan-dard	Steel	Stan-dard	Steel	Stan-dard	Steel	Stan-dard
Ni-Cr-Mo steel																			
			16NiCrMo2							16NiCrMo2						8617	A519		
20NiCrMo2-2	1.6523	10084	21NiCrMo2	1.6523	17210	805M20	970	20NCD2	35-551	20NiCrMo2	16125	20ChGNM	4543			8620	A519	SNCM220	G4103
20NiCrMo2-2	1.6523	10297-1																	
41NiCrMo7-3-2	1.6563	10297-1	40NiCrMo73							40NiCrMo7									
17NiCrMo6-4	1.6566	10084	17NiCrMo5							17NiCrMo5									
14NiCrMo13-4	1.6657	10084	14NiCrMo134	1.6657		832M13	970	16NCD13								9310	A519		
36NiCrMo16	1.6773	10083-3	35NiCrMo16			835M30	970	38NCD16	35-571	34NiCrMo16									
39NiCrMo3	1.6510	10083-3																	
26NiCrMo8-5	1.6931		26NiCrMo85	1.6931							16431								
18NiCrMo14-6			17NiCrMo14	1.3533	17230														
Cr steel																			
38Cr2	1.7003	10083-3	38Cr2	1.7003	17200			38C2	35-552	38Cr2									
46Cr2	1.7006	10083-3	46Cr2	1.7006	17200			42C2	35-552	45Cr2						5045	A519		
17Cr3	1.7016	10084	17Cr3	1.7016	17210	523M15	970-1	18C3			14120	15Ch	4543			(5015)	A519	SCr415	G4104
			20Cr4	1.7027	17210														
28Cr4	1.7030	10084	28Cr4	1.7030	17200	530A30	970					30Ch	4543			5130	A519		
34Cr4	1.7033	10083-3	34Cr4	1.7033	17200	530A32	970-1	32C4	35-552	34Cr4	14141	35Ch	4543	-	-	5132	A519	SCr430	G4052
37Cr4	1.7034	10083-3	37Cr4	1.7034	17200	530M36	970-1	38C4	35-553	38Cr4	14140	38Ch	4543			5135	A519	SCr435	G4052
41Cr4	1.7035	10083-3	41Cr4	1.7035	17200	530A40	970-1	42C4	35-552	41Cr4	14148	40Ch	4543	40H	84030	(5140)	A519	SCr440	G4051
41Cr4	1.7035	10297-1	41Cr4	1.7035	17204				-		(14151)	40Ch	4543	40H	84030	(5140)	A519	SCr440	G4051
100Cr6	1.3505	683-17	100Cr6	1.3505	17230	535A99	970-1	100C6	35-565	100Cr6	14109	'Ch15	801	Lh15	84041	52100		SUJ2	G4805
Cr-Mo steel																			
18CrMo4	1.7243	10084						18CD4	35-551	18CrMo4	15124	20ChM	4543		-			SCM418	G4052
25CrMo4	1.7218	10083-3	25CrMo4	1.7218	17200	708A25	970-1	25CD4	35-552	25CrMo4	15130	30ChM	4543			4130	A519	SCM420	G4105
25CrMo4	1.7218	10297-1	25CrMo4	1.7218	17204	CFS10	6323-4	(27CD4)			15130	30ChM	4543			4130	A519	SCM420	G4105
30CrMo4	1.7216	10297-1								30CrMo4		30ChM	4543						
34CrMo4	1.7220	10083-3	34CrMo4	1.7220	17200	708A37	970-1	34CD4	35-552	34CrMo4	15141	35ChM	4543			4135	A519	SCM435	G4052
34CrMo4	1.7220	10297-1	34CrMo4	1.7220	17204														
42CrMo4	1.7225	10083-3	42CrMo4	1.7225	17200	708A40	970-1	42CD4	35-552	42CrMo4	15142	38ChM	4543			4140	A519	SCM440	G4052
42CrMo4	1.7225	10297-1	42CrMo4	1.7225	17204	CFS11	6323-4									4142	A519	(SCM4)	G4052
50CrMo4	1.7228	10083-3	50CrMo4	1.7228	17200			50CD4	35-552	50CrMo4						4150	A519	SCM445	G4052
100CrMo7-3	1.3536	683-17	100CrMo7	1.3537	17230			100CD7	35-565	100CrMo7									
Cr-Mn-Mo steel																			
12CrMnMoV8-6	1.79XY										(POD90)								
16CrMnMoV8-7	1.79XY		(BTR 110)								POD2000								
15CrMnMo9	1.79XY							15CMD9											
Cr-V steel																			
			42CrV6	1.7561							15241								
			(30CrV9)	1.76XY							15230								
51CrV4	1.8159	10083-3	50CrV4	1.8159	17200	735A50	970-1	50CV4	35-552	50CrV4	15260	50ChGFA	14959			6150H	A519	SUP10	G4801
Cr-Mo-V steel																			
			15CrMoV5-9	1.8521	17211														
			15CrMoV5-10	1.7745															
			15CrMoV6	1.7734				15CDV6		15CrMoV6									
21CrMoV5-7	1.7709	10269	21CrMoV5 7	1.7709	17240			20CDV6	35-559	24CrMoV55	15320	25Ch1M1F	20072						
30CrMoV9	1.7707	10250-3	30CrMoV9	1.7707	17200						15330	30Ch3MF	4543						
31CrMoV9	1.8519	10085								31CrMoV9	15330	30Ch3MF	4543						
										31CrMoV10									
32CrMoV12-9		10085	32CrMoV1210	1.7765				32CDV12											
40CrMoV13-9	1.8523	10085	39CrMoV139	1.8523	17211	897M39	970-1	40CDV13	35-590										
Cr-Al-Mo steel																			
			34CrAl6	1.8504							14340	(38Ch2Ju)	4543						
32CrAlMo7-10	1.8505	10085																	
34CrAlMo5-10	1.8507	10085	34CrAlMo5	1.8507	17211			30CAD6.12		34CrAlMo7						K23510	A355		
41CrAlMo7-10	1.8509	10085	41CrAlMo7	1.8509	17211	905M39	970	40CAD6.12	35-552	41CrAlMo7	15340	38Ch2MJuA	4543			K24065	A355	SACM645	G4202
31CrMo12	1.8515	10085	31CrMo12	1.8515	17211	722M24	970	30CD12		32CrMo12									
34CrAlNi7-10	1.8550	10085	34CrAlNi7	1.8550	17211						(16347)								
Cr-Si steel																			
			(38CrSi6-5)	(1.71XY)							14341	38ChS							

Steel 25CrMo4 is steel for machinery parts.
In EN 10216-2 is as boiler steel with reduced contents of P and S and guaranteed contents of Al.

The alloy steels for pressure purposes [Type 16Mo3 according to EN].

EN			DIN			BS		NFA		UNI	ČSN, STN	GOST		PN-H		ASTM		JIS	
Steel	W.Nr	Stan-dard	Steel	W.Nr	Stan-dard	Steel	Stan-dard	Steel	Stan-dard	Steel	Steel	Steel	Stan-dard	Steel	Stan-dard	Steel	Stan-dard	Steel	Stan-dard
Mn steel																			
(P295GH)	1.0481	-	17Mn4	1.0481	17175	440	3059-2	TUE275	49-211		11481	14G2	4543	-	-	Gr.C	A106	STPT480	G3456
-		-	17Mn4	1.0481	17175	-	-	TUE275	49-211	-	13030	-	-	-	-	Gr.C	A178	-	-
-		-	17Mn4	1.0481	17175	-	-	TUE275	49-211	-	-	-	-	-	-	Gr.C	A210	-	-
-		-	17Mn4	1.0481	17175	-	-	TUE275	49-211	-	-	-	-	-	-	WPC	A234	-	-
																Gr.C2	A556		
(P310GH)	1.0482	-	19Mn5	1.0482	17175	-	-	TU52c	49-213	-	-	-	-	-	-	Gr.D	A178	STB510	G3461
(P355GH)	1.0473	-	19Mn6	1.0473	17155	-	-	TS52C	49-243	-	-	-	-	-	-	-	-	-	-
Mn + Nb,V steel																			
20MnNb6	1.0471	10216-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17MnV4			17MnV4								12025								
Mo steel																			
16Mo3	1.5415	10216-2	15Mo3	1.5415	17175	243	3059-2	TU15D3	49-213	16Mo3	15020	-	-	16M	74252	-	-	-	-
16Mo3	1.5415	10217-2	15Mo3	1.5415	17177	243	3606	TU15D3	49-215	-	15020	-	-	16M	74252	-	-	-	-
16Mo3	1.5415	10217-5	15Mo3	1.5415	17177					-		-	-			-	-	-	-
16Mo3	1.5415	10253-2	15Mo3	1.5415	2609					-		-	-			-	-	-	-
-		-			-			TS15D3	49-243	-	-	-	-	-	-	-	-	-	-
-		-	16Mo5	1.5423	-			-	-	16Mo5	-	-	-	-	-	T1, T1a, T1b	A209	STBA12	G3462
-		-	-		-			-	-	16Mo5	-	-	-	-	-	P1	A335	STPA12	G3458
20Mo5	1.5419	10213-2	-		-	245	3606	-	-	-	-	-	-	-	-	A692	A692	STBA13	G3462
8MoB 5-4	1.5450	10216-2				261	3606												
Cr - Mo steel																			
25CrMo4	1.7218	10216-2																	
26CrMo4-2	1.7219	10216-4	26CrMo4	1.7219	17173														
(15CrMo2-5)		-	-		-	-	-	TU15CD2-05	49-213	-	-	-	-	-	-	T2	A213	STBA20	G3462
-		-	-		-	-	-	TU15CD2-05	49-213	-	-	-	-	-	-	P2	A335	STPA20	G3458
13CrMo4-5	1.7335	10216-2	13CrMo4 4	1.7335	17175	620	3059-2	TU13CD4-04	49-213	14CrMo3	15121	15ChM	4543	15HM	74252	T12	A213	STBA22	G3462
13CrMo4-5	1.7335	10253-2	13CrMo4 4	1.7335	2609	620-440	3604-1	TU13CD4-04	49-215							P12	A335	STPA22	G3458
-		-	-		-	620	3606			-		-	-	-	-	-	-	-	-
10CrMo5-5	1.7338	10216-2	-		-	621	3604-1	TU10CD05-05	49-213	-		-	-	-	-	T11	A213	STBA23	G3462
10CrMo5-5	1.7338	10253-2	-		-	621	3604-2	-	-	-	-	-	-	-	-	P11	A335	STPA23	G3458
			-		-	621	3606	-	-	-	-	-	-	-	-	-	-	-	-
10CrMo9-10	1.7380	10216-2	10CrMo9 10	1.7380	17175	622-490	3059-2	TU10CD09-10	49-213	12CrMo9 10	15313	10Ch2M	5520	-	-	T22	A213	STBA24	G3462
10CrMo9-10	1.7380	10253-2	10CrMo9 10	1.7380	2609	622	3604-1			-	-	-	-	-	-	P22	A335	STPA24	G3458
11CrMo9-10	1.7383	10216-2	-		-	622	3606			-	-	-	-	-	-				
			12CrMo12-10	1.7381	17176					-	-	-	-	-	-	T21	A213		
			12CrMo12-10	1.7381												P21	A335		
X11CrMo5	1.7362	10216-2	12CrMo19 5	1.7362	17176	625	3604-1	TUZ10CD5-05	49-213		17102	15Ch5M	550			T5,T5b,T5c	A213	STBA25	G3462
X11CrMo5	1.7362	10253-2	12CrMo19 5	1.7362	17176	625	3606	TUZ12CD5-05	49-215		17102	15Ch5M	20072			P5,P5b,P5c	A335	STPA25	G3458
(X12CrMo7)	(1.7368)		-		-											(T7)	A213		
(X12CrMo7)	(1.7368)	-	-		-	-		-		-		-	-	-	-	(P7)	A335	-	-
X11CrMo9-1	1.7386	10216-2	X12CrMo9 1	1.7386	17176	629	3059-2	TUZ10CD9	49-213	-	17116	-	-	-	-	T9	A213	STBA26	G3462
X11CrMo9-1	1.7386	10253-2				629	3604-1	-	-	-	-	-	-	-	-	P9	A335	STPA26	G3458
Cr-Mo-V steel, alloyed also with B, Cu, Nb, Ni, Ti, W																			
			17CrMoV 10	1.7766	590						15323								
7CrMoVTiB10-10	1.7378															T24	A213		
7CrMoVTiB10-10	1.7378															P24	A335		
			8CrMoNiNb9 10	1.6770	640						15418								
(12CrV2-2)	(1.75XY)										15110		-	-					
14MoV6-3	1.7715	10216-2	14MoV6 3	1.7715	17175	660	3604-1	14DCV 6	49-213		15128		-	-					
(16CrMoV3-5-5)	(1.77XY)	-	-		-			-	-	-	15229	-	-	-	-	-	-	-	-
(12CrMoV4-3-2)	(1.77XY)	-	-		-			-	-	-	-	12Ch1MF	20072	-	-	-	-	-	-
20CrMoV13-5-5	1.7779	10216-2	20CrMoV13 5	1.7779	17176	-	-	-	-	-	15423	-	-	-	-	-	-	-	-
X10CrMoVNb9-1	1.4903	10216-2				629-590	3059-2	TUZ10CDVNb 09-01	49-213	-	17119	-	-	-	-	T91	A213	STBA28	G3462
X10CrMoVNb9-1	1.4903	10253-2						TUZ10CDVNb 09-01	49-213	-	17119			-	-	P91	A335	STPA28	G3458
X20CrMoV11-1	1.4922	10216-2	X20CrMoV12 1	1.4922	17175	762	3059-2			-	17134	-	-	-	-				
X20CrMoV11-1	1.4922	10216-2	X20CrMoV12 1	1.4922	17175	762	3604-1			-	17134	-	-	-	-				

EN			DIN			BS		NFA		UNI	ČSN, STN	GOST		PN-H		ASTM		JIS	
Steel	W.Nr	Stan-dard	Steel	W.Nr	Stan-dard	Steel	Stan-dard	Steel	Stan-dard	Steel	Steel	Steel	Stan-dard	Steel	Stan-dard	Steel	Stan-dard	Steel	Stan-dard
7CrWVMoNb 9-6																T23	A213	HCM2S	
X11CrMoWVNb 9-1-1																T/P911	A213		
X10CrWMoVNb 9-2																T/P92	A213	STBA29	
11CrWCuMo VNbNB																T/P122	A213	HCM12A	
Ni steel																			
(10Ni9)	(1.56XY)		-		-	-	-	TU10N9	49-215	18Ni9	-	-	-	-	-	Gr.7	A333		
-					-	-	-	TU10N9	49-215	18Ni9	-	-	-	-	-	Gr.7	A334		
12Ni14	1.5637	10216-4	10Ni14	1.5637	17173	503LT	3603	TU10N14	49-215	18Ni14	16222	-	-	-	-	Gr.3	A333	STPL450	G3460
12Ni14	1.5637	10253-2	10Ni14	1.5637	17173	503LT	3603	TU10N14	49-215	18Ni14	16222	-	-	-	-	Gr.3	A334	STBL450	G3464
X12Ni5	1.5680	10216-4	12Ni19	1.5680	17173						16527								
X10Ni9	1.5682	10216-4	X8Ni9	1.5662	17173	509LT	3603	TUZ6N9	49-215	X12Ni09	17501					Gr.8	A333		
X10Ni9	1.5682	1.5662			17173	509LT	3603	TUZ6N9	49-215	X12Ni09	17501	-	-	-	-	Gr.8	A334		
Ni-Mn steel																			
11MnNi5-3	1.6212	10216-4	11MnNi53	1.6212	17173														
13MnNi6-3	1.6217	10216-4	13MnNi63	1.6217	17173														
15NiCuMo Nb5-6-4	1.6368	10216-2	(WB 36)													T/P 36			

Summary: [TDC for tube groups based on application]

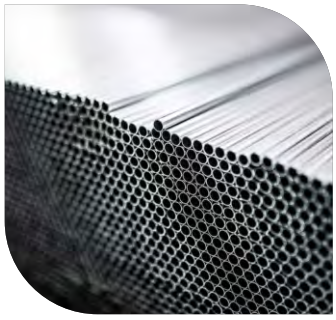
Tube Group	EN	DIN	BS	NF A	UNI	ČSN, STN	GOST	PN-H	ASTM A ASME SA	JIS	ISO
Hollow structural sections	10210-1 (10025)	17121, 17124 (17100)		49-501		42 0250	8731 (1050, 19281)		A 500 A 501	G 3444	630-2
For machine parts and general use	10294-1 10297-1 10083-1-3 10084	1629, 1630 17200 17204 17210	6323/1,2	49-311 49-312	663 7729	42 0250	8731	74219 (84018) (84019) (84023/7)	A 53 A 519	G 3445	2937 2938
Pressure: For room temperatures	10216-1	1629, 1630	3601	49-112 49-210	7287	42 0250	8731, (1050)	74219 (84023/7)	A 53	G 3454 G 3455	9329-1
Pressure: For elevated temperatures (boiler)	10216-2	17175	3059/1,2 3602-1 3604-1	49-211 49-213	5462	42 0251	8731 TU14-3-190 TU14-3-460 4543,20072	74252 (84024)	A 106, A 192 A 209, A 210 A 213, A 335 A 556	G 3456 G 3458 G 3461 G 3462	9329-2
Pressure: Alloy fine grain steels	10216-3	17179									
Pressure: For low temperatures	10216-4	17173	3603	49-215	5949	42 0165			A 333, A 334		9329-3
Pressure: For heat exchangers	10216-2 10216-4	17173 (17174) 17175 (17177) (28180, 28181)	3606	49-215 49-243 49-245	5462 5949	42 0165 42 0251	550 1060		A 179, A 178 A214 A333. A 334	G 3461 G 3462	6758 6759
For welding and threading	10224 10255	2440, 2441 (2442), 2460	1387	49-115	8863 6363	42 0250	3262	74220 74200	A 53 A 795	G 3452	65 559
Line pipe	10208-1 10208-2	2470-1/ 1629 2470-2/ 17172							API 5L ISO 3183-1,2		3183
Casing and Tubing									API 5 CT ISO 11 960		11960
Precision seamless cold drawn standard tubes	10305-1	2391-2	6323/1,4	49-310 49-312	7945	42 0260	8733 12132, 21729	74240 (74220)	A 519	G 3445	3304
Cylinder tubes HPZ and HP			Precision tubes from steel St 52, E 355 Type HPZ for mechanical treatment, Type HP – "ready to use"								
For hydraulic lines	10305-4	2391-2c/ 2445-2	7416	49-330	7945	42 0260		74245	A 822	JOHS-102	
Injection tubes			Deliveries upon agreement only (ČSN 42 6718,DIN 73000,ISO 8535-1)								
Bearing tubes	ISO 683-17	17230	Deliveries according to agreed TDC								
Cold sized welded tubes	10305-3 (10305-5)	2394-2 (2395-2)	6323/1,5	49-646	7947	42 0142 (42 6713)	10707	74241	A 513	G 3445	3306
Cold drawn precision welded tubes	10305-2 10305-6	2393-2	6323/1,6		7946	42 0142 42 6714			A 513 A 512		3305
Buttwelding fittings	10253-1,2	2609	1965-1	49-186		ŽP-05-05			A 234, A 420		3419
Submerged arc welded steel tubes and pipes	TDC Standards										

STAINLESS STEEL TUBES

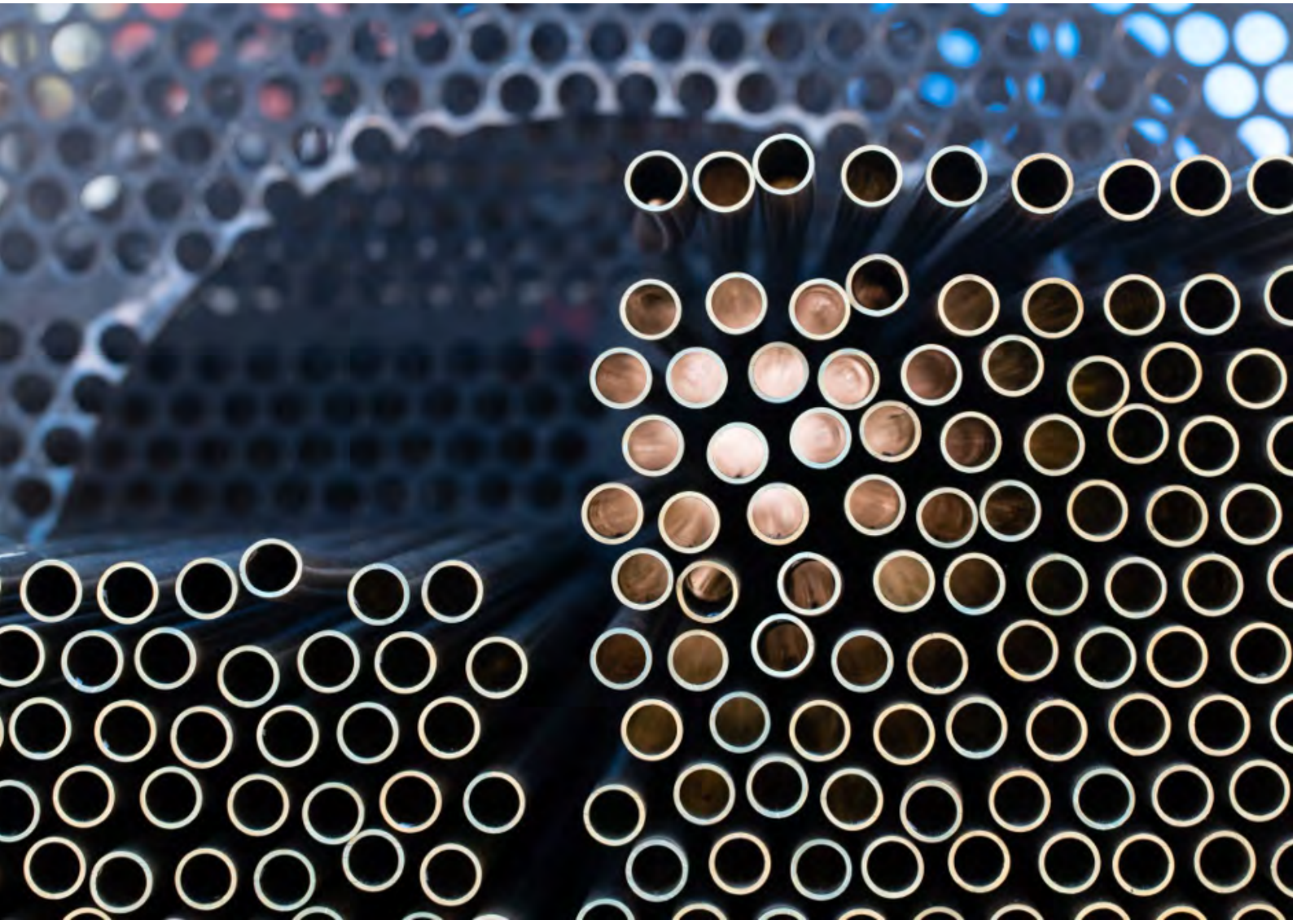
CARBON STEEL TUBES

SPECIAL STEEL TUBES

ALLOY STEEL TUBES



DUPLEX STEEL TUBES



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