

**AYDIN BORU**



## VISION

We are a company that stores competitively priced, superior quality pipes and fittings that are accepted locally and internationally and backed up by good service. We pursue quality, we believe in harmony: that Labor and Management be partners in achieving common goals and interests.

## MISSION

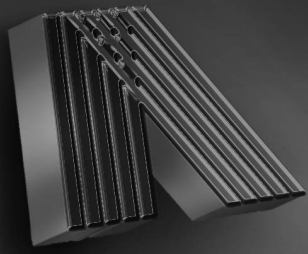
We provide steel pipes and other steel based fittings to support line piping, constructions and infrastructure projects, including technical engineering and procurement services.

## VALUES

Customer Orientation  
Integrity is the foundation of our business  
Safety and security are ensured  
Long-term business approach guides our prosperities

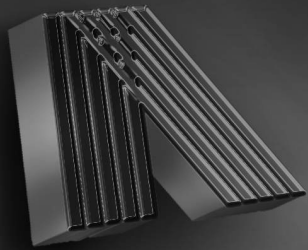


AYDIN BORU



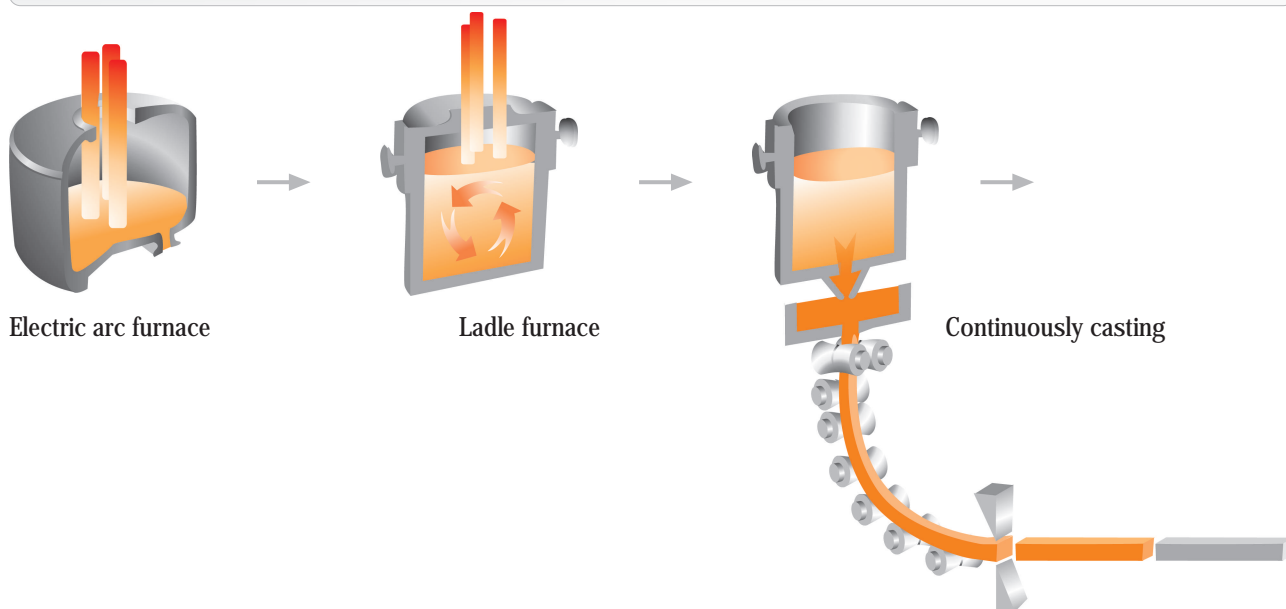
## COMPARISON TABLE – SERVICE TEMPERATURES

Max. Service Temperature	ASTM	EN	DIN	BS	AFNOR	JIS	
	(USA)	(Europe)	(Germany)	(U.K.)	(France)	(Japan)	
– 100° C	A 334 Gr. 3	10216-2	17175	3059-3601	NF A 49-213	G 3456	
	A 334 Gr. 146			3602-3603	NF A 49-215	G 3458	
	A 179	P235GH	St35.8	3604-3606		G 3461	
– 40° C	A 106 Gr. A					G 3462	
	A 192					G 3462	
475° C	A 106 Gr. B	P265GH	St45.8	430	TU 42 C	STPT 38	
	A 210 Gr. A1					STB 35	
	A 106 Gr. C		17Mn4	440	TU 48 C	STPT 42	
	A 210 Gr. C					STB 42	
				19Mn5	500 Nb	TU 52 C	STPT 49
							STB 52
			16Mo3	15Mo3	243	TU 15 D 3	
500° C	A 209 T1	16Mo3	16Mo5	245		STBA 12	
	A 335 P1		(VD TÜV)			STPA 12	
550° C						STBA 13	
	A 213 T2				TU 15 CD 2.05	STBA 20	
560° C	A 335 P12					STPA 20	
	A 213 T12	13CrMo4-5	13CrMo44	620-460	TU 13 CD 4.04	STBA 22	
575° C	A 335 P12					STPA 22	
	A 213 T11			621	TU 10 CD 5.05	STBA 22	
600° C	A 335 P11					STPA 23	
	A 213 T5	X11CrMo5	12CrMo195	625	TU Z 10 CD 05.05	STBA 25	
	A 335 P5				TU Z 12 CD 05.05	STPA 25	
	A 213 T22	10CrMo9-10	10CrMo910	622-490	TU 10 C 9.10	STBA 24	
	A 335 P22					STPA 24	
625° C			14MoV63				
	A 213 T9	11CrMo9-10	X12CrMo91	629-470	TU Z 10 CD 09	STBA 26	
650° C	A 335 P9		(VD TÜV)	629-490		STPA 26	
	A 213 T91	X10CrMoVNb9-1	X10CrMoVNb9-1		TU Z 10 CDVNb 09.01		
	A 335 P91				TU Z 10 CDNbV 09.02		

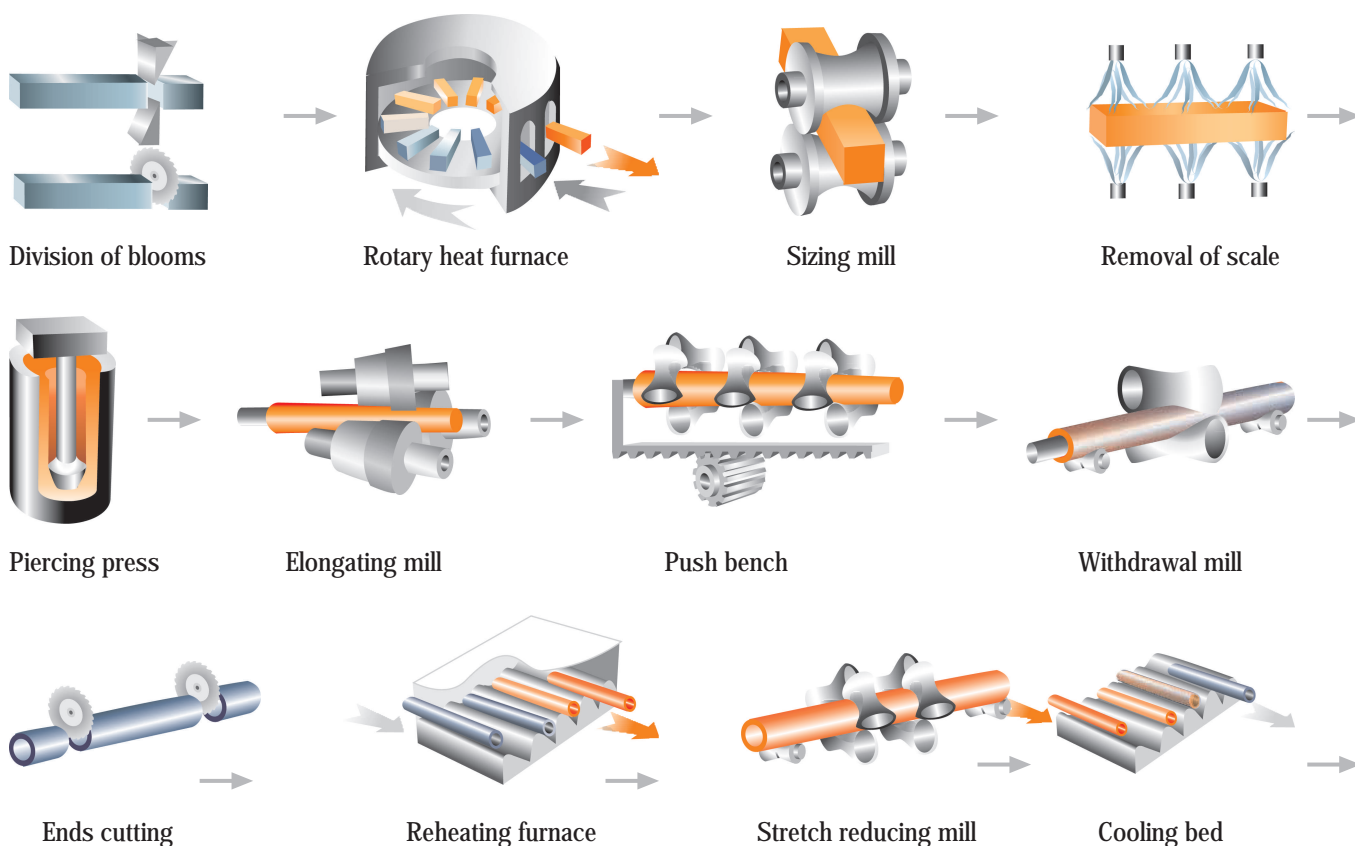


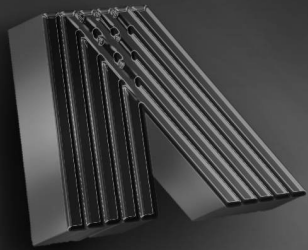
## PRODUCTION FLOW CHART

### STEEL PRODUCTION

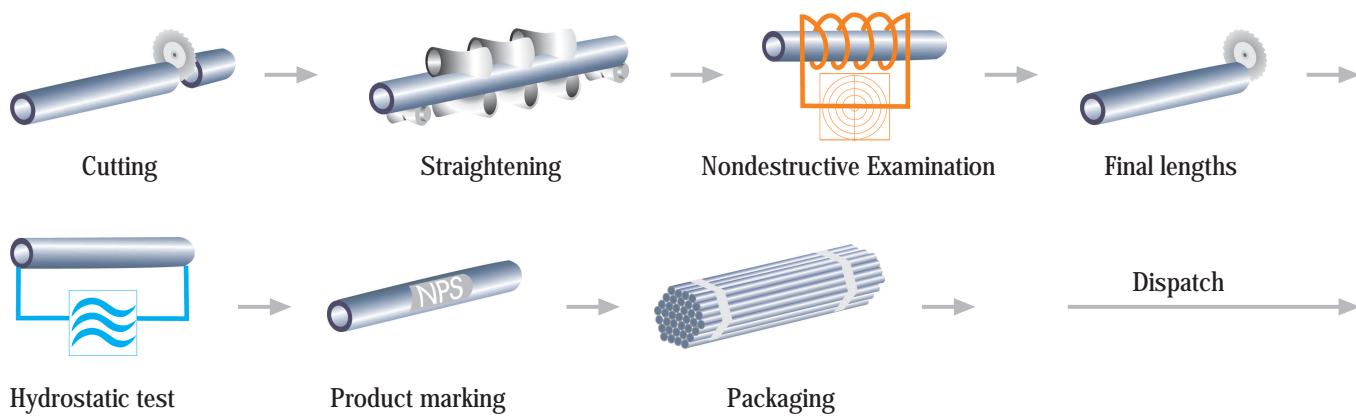


### HOT FINISHED TUBES PRODUCTION

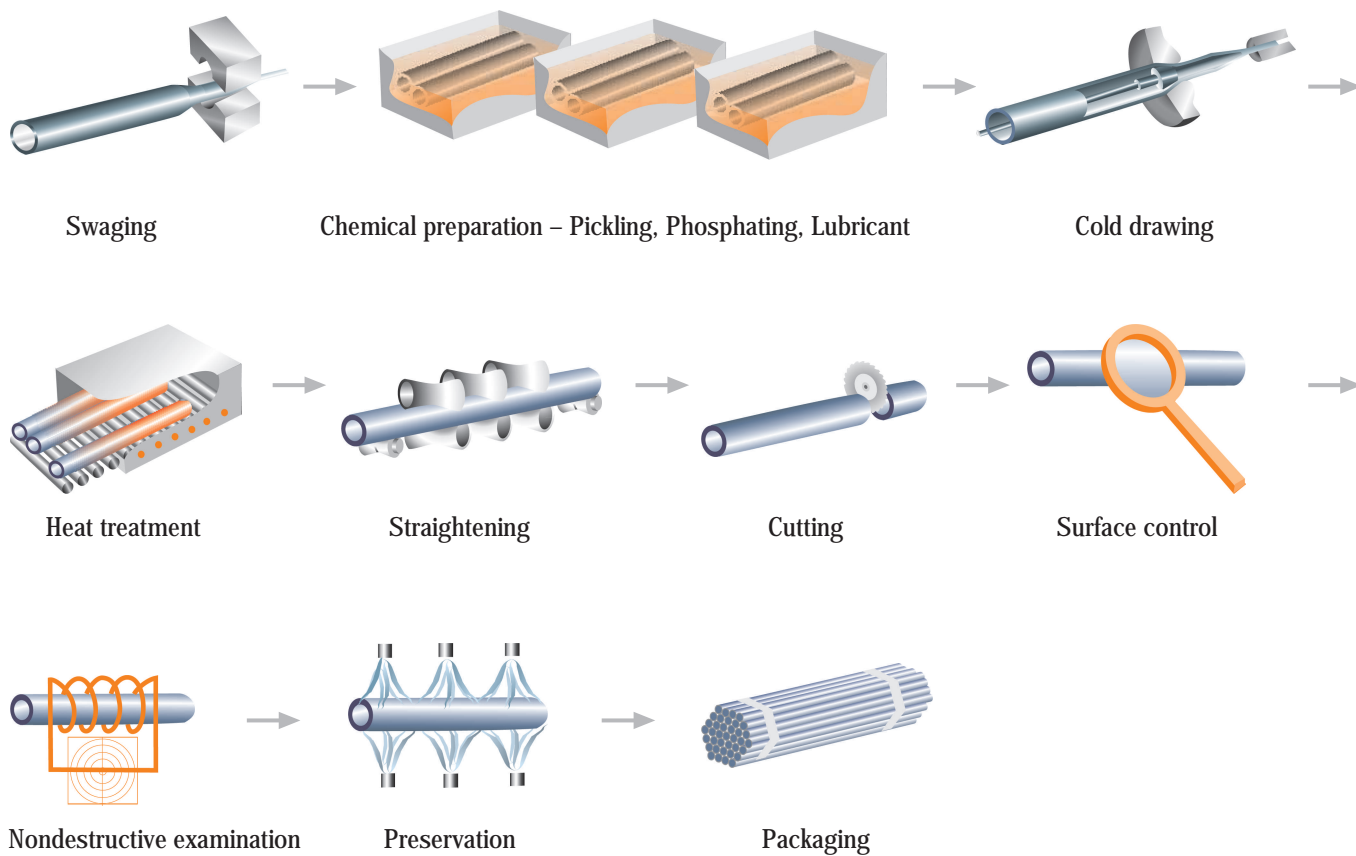


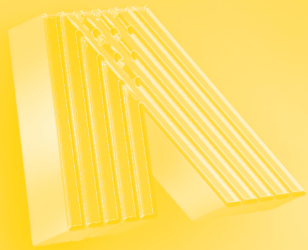


## PRODUCTION FLOW CHART



### PRECISION COLD DRAWN TUBES PRODUCTION





**CHEMICAL COMPOSITION**

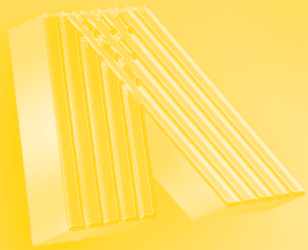
Steel Grade	C (%)					
	C	Mn	Si	P (max.)	S (max.)	Cr (max.)
10	0,07 - 0,14	0,35 - 0,65	0,17 - 0,37	0.035	0.04	0.15
20	0,17 - 0,24	0,35 - 0,65	0,17 - 0,37	0.035	0.04	0.25
35	0,32 - 0,40	0,50 - 0,80	0,17 - 0,37	0.035	0.04	0.25
45	0,42 - 0,50	0,50 - 0,80	0,17 - 0,37	0.035	0.04	0.25
20X	0,17 - 0,23	0,50 - 0,80	0,17 - 0,37	0.035	0.035	0,70 - 1,00

**MECHANICAL PROPERTIES**

Steel Grade	Tensile Strength (Mpa)	Yield Strength (Mpa)	Elongation (%)
10	353	206	24
20	412	245	21
35	510	294	17
45	588	323	14
20X	431	-	16

**PERMISSIBLE VARIATIONS ON DIMENSIONS**

Outside Diameter (mm)	Tolerance (%)		Wall Thickness (mm)	Tolerance (%)	
	With Higher Accuracy	With Common Accuracy		With Higher Accuracy	With Common Accuracy
up to 219	+/- 0,8	+/- 1,0	up to 15	+/- 12,5	-15,0 / +12,5
			from 15 to 30	-12,5 / +10	+/- 12,5
			over 30	+/- 10,0	-12,5 / +10,5
over 219	+/- 1,0	+/- 1,25	up to 15	-15,0 / +12,5	
			from 15 to 30	- / + 12,5	
			over 30	-12,5 / +10,00	



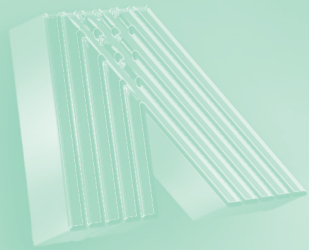
## COMPARISON TABLE (GOST 8731 - 8732 & DIN 17121, 1629, 1630)

### CHEMICAL PROPERTIES

Steel Grade		Chemical Composition (by %)							
GOST	DIN	C	Mn	Si	P	S	Cr	N	Al
					max				
10		0,07-0,14	0,35-0,65	0,17-0,37	0,035	0,04	0,15	0,008	-
	st37.0	0,17	-	-	0,04	0,04	-	0,009	-
	st37.2	0,17	-	-	0,05	0,05	-	0,009	-
	st37.3	0,17	-	-	0,04	0,04	-	-	0,02
	st37.4	0,17	0,35	0,35	0,04	0,04	-	-	0,02
20		0,07-0,24	0,35-0,65	0,17-0,37	0,035	0,04	0,25	0,008	-
	st44.0	0,21	-	-	0,04	0,04	-	0,009	-
	st44.2	0,21	-	-	0,05	0,05	-	0,009	-
	st44.3	0,20	-	-	0,04	0,04	-	-	0,02
	st44.4	0,20	0,40	0,35	0,04	0,04	-	-	0,02
35		0,32-0,40	0,50-0,80	0,17-0,37	0,035	0,04	0,25	0,008	-
45		0,42-0,50	0,50-0,80	0,17-0,37	0,035	0,04	0,25	0,008	-
	st52.0	0,22	1,6	0,55	0,040	0,035	-	-	0,02
	st52.3	0,22	1,6	0,55	0,04	0,04	-	-	0,02
	st52.4	0,22	1,6	0,55	0,040	0,035	-	-	0,02

### MECHANICAL PROPERTIES

Steel Grade		Tensile Strength	Yield Strength			Elongation		Fracture	
GOST	DIN		S 16	16 S 40	S>40	Longitudinal	Transverse	Longitudinal	Transverse
10		353		216		24	-	-	-
	st37.0	350-480	235	225	215	25	23	-	-
	st37.2	340-470	235	225	215	26	24	27	-
	st37.3	340-470	235	225	215	26	24	27	-
	st37.4	350-480	235	225	215	25	23	43	-
20		412		245		21	-	-	-
	st44.0	420-550	275	265	255	21	19	-	-
	st44.2	410-540	275	265	255	22	20	27	-
	st44.3	410-540	275	265	255	22	20	27	-
	st44.4	420-550	275	265	255	21	19	43	27
35		510		294		17	-	-	-
45		588		323		14	-	-	-
	st52.0	500-650	355	345	335	21	19	-	-
	st52.3	490-630	355	345	335	22	20	27	-
	st52.4	500-650	355	345	335	21	19	43	27



## MECHANICAL SEAMLESS STEEL PIPES

Norm	DIN	EN
Material	1629 St 37.0	10216-1 P235 TR1/TR2
	1629 St 44.0	10216-1 P265 TR1/TR2
	1629 St 52.0	10216-3 P355N

Pipes are for various tank productions, pipeline constructions, also for general machinery and equipments.

### CHEMICAL COMPOSITION

Standard	Grade	C max	Mn max	Si max	P max	S max	Cu max	Ni max	Cr max	Mo max	V max	Al min	N max	Nb, Ti, B, As & W
EN 10216-1	P235TR1	0,16	1,20	0,35	0,025	0,02	0,30	0,30	0,30	0,08	0,02			Nb =0,010 Ti = 0,04 Cr+Cu+Mo+Ni max.0,7
EN 10216-1	P235TR2	0,16	1,20	0,35	0,025	0,02	0,30	0,30	0,30	0,08	0,02	0,02		Nb =0,010 Ti = 0,04 Cr+Cu+Mo+Ni max.0,7
EN 10216-1	P265TR1	0,20	1,40	0,40	0,025	0,02	0,30	0,30	0,30	0,08	0,02			Nb =0,010 Ti = 0,04 Cr+Cu+Mo+Ni max.0,7
EN 10216-1	P265TR2	0,20	1,40	0,40	0,025	0,02	0,30	0,30	0,30	0,08	0,02	0,02		Nb =0,010 Ti = 0,04 Cr+Cu+Mo+Ni max.0,7
EN 10216-3	P355N	0,20	0,9-1,7	0,50	0,025	0,02	0,30	0,50	0,30	0,08	0,1	0,02	0,02	Cr+Cu+Mo max.0,45 Nb+Ti+V max.0,12

### MECHANICAL PROPERTIES

Standard	Grade	Heat Treatment	Re min. (MPa)			Rm (MPa)	A5min. (%)	KV (J)
			t up to 16 mm	t 16-40 mm	t 40-65 mm			
EN 10216-1	P235TR1	U,N	235	225	215	360-500	23	
EN 10216-1	P235TR2	U,N	235	225	215	360-500	23	KV=27 (0°C)
EN 10216-1	P265TR1	U,N	265	255	245	410-570	19	
EN 10216-1	P265TR2	U,N	265	255	245	410-570	19	KV=27 (0°C)
EN 10216-3	P355N	U,N	355	345	335	490-650	22	KV=27 (-20°C)
					325			

### TOLERANCE

EN 10216-1					
Outside diameter (mm)	Permissible Variations of Outside diameter	Permissible Variations of Wall thickness according to ratio t/D			
		t/D	0.025 < t/D	0.05 < t/D	t/D > 0.1
D	± 1 % or ± 0.5 mm (higher value is always valid)	± 12.5 % or ± 0.4 mm (higher value is always valid)			
219.1					
D > 219.1	value is always valid)	± 20 %	± 15 %	± 12.5 %	± 10 %
219.1					

For D 355.6 mm it is possible to increase the local tolerance by about 5 %

EN 10216-3					
Outside diameter (mm)	Permissible Variations of Outside diameter	Permissible Variations of Wall thickness according to ratio t/D			
		t/D	0.025 < t/D	0.05 < t/D	t/D > 0.1
D	± 1 % or ± 0.5 mm (higher value is always valid)	± 12.5 % or ± 0.4 mm (higher value is always valid)			
219.1					
D > 219.1	value is always valid)	± 20 %	± 15 %	± 12.5 %	± 10 %
219.1					

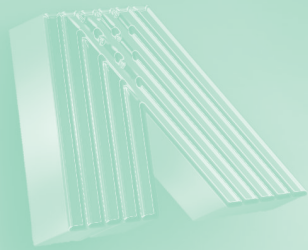
There are also tolerances for combination of tolerances for inner diameter and wall thickness, outside diameter and minimum wall thickness, inner diameter and minimum wall thickness.

t – wall thickness

U – without heat treatment

N – normalizing





## STEEL CONSTRUCTION PIPES

Norm	DIN	EN
Material	17121 St 52.3	10210 S355J2H
	17121 St 44.3	10210 S275JEH
	17121 St 44.2	10210 S275JRH
	17121 St 37.3	10210 S235JEH
	17121 St 37.2	10210 S235JRH

Pipes are for infrastructure and building constructions. Hot finished structural hollow section of non alloy and fine grain structural steels.

### CHEMICAL COMPOSITION

Standard	Grade	C max	Mn max	Si max	P max	S max	Cu max	Ni max	Cr max	Mo max	V max	Al min	N max
DIN 17 121	RSt 37-2	0,17			0.05	0.05							0,009
DIN 17 121	St 44-2	0,21			0.05	0.05							0,009
DIN 17 121	St 37-3	0,17			0.04	0.04						0,02	
DIN 17 121	St 44-3	0,20			0.04	0.04						0,02	
DIN 17 121	St 52-3	0,22	01,60	0,55	0.04	0.04						0,02	

### MECHANICAL PROPERTIES

Standard	Grade	Heat Treatment	Re min. (MPa)			Rm (MPa)	A5min. (%)	KV (J)
			t up to 16 mm	t 16-40 mm	t 40-65 mm			
DIN 17 121	RSt 37-2	U,N	235	225	215	340-470	26	KV=27
DIN 17 121	St 44-2	U,N	235	225	215	340-470	26	KV=27 (-20°C)
DIN 17 121	St 37-3	U,N	275	265	255	410-540	22	KV=27
DIN 17 121	St 44-3	U,N	275	265	255	410-540	22	KV=27 (-20°C)
DIN 17 121	St 52-3	U,N	355	345	335	490-630	22	KV=27 (-20°C)

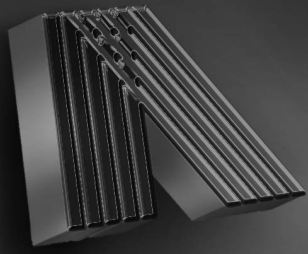
### TOLERANCE

EN 10210	
Permissible Variations of Outside diameter	± 1 % min. ± 0.5 mm. max. ± 10 mm
Permissible Variations of Wall thickness	- 10 %. + it is limited by weight tolerance
It is possible max. tolerance -12. 5 % for 25 % of the diameter.	
Permissible Variations of Weight for individual tube	± 6 % (it is possible max. tolerance + 8 %)

t – wall thickness

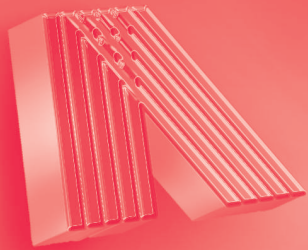
U – without heat treatment

N – normalizing



da mm	S mm	1,6 0,063	1,8 0,071	2 0,079	2,3 0,091	2,6 0,102	2,9 0,114	3,2 0,126	3,6 0,142	4 0,157	4,5 0,177	5 0,197	5,6 0,22	6,3 0,248	7,1 0,28	8 0,15	8,8 0,346	10 0,394	11 0,433	12,5 0,492	14 0,5	
10,2	1,8	0,339	0,373	0,404	0,448	0,487																
13,5	1,8		0,519	0,567	0,635	0,699	0,756	0,813	0,879													
16	1,8		0,630	0,691	0,777	0,689	0,937	1,01	1,10	1,18												
17,2	1,8		0,684	0,750	0,845	0,936	1,02	1,10	1,21	1,30	1,41											
19	2			0,838	0,947	1,05	1,15	1,25	1,37	1,48	1,61	1,73										
20	2			0,888	1,00	1,12	1,22	1,33	1,46	1,58	1,72	1,85										
21,3	2			0,692	1,08	1,20	1,32	1,43	1,57	1,71	1,86	2,01										
25	2			1,13	1,29	1,44	1,58	1,72	1,90	2,07	2,28	2,47	2,68	2,91								
25,4	2			1,15	1,31	1,46	1,61	1,75	1,94	2,11	2,31	2,52	2,73	2,97								
26,9	2			1,23	1,40	1,56	1,72	1,87	2,07	2,26	2,49	2,70	2,94	3,20	3,47							
30	2,3				1,57	1,76	1,94	2,11	2,34	2,56	4,44	3,08	3,37	3,68	4,01							
31,8	2,3				1,67	1,87	2,07	2,26	2,50	2,74	4,86	3,30	3,62	3,96	4,32	4,70						
33,7	2,3				1,78	1,99	2,20	2,41	2,67	2,93	5,16	3,54	3,88	4,60	4,66	5,07						
38	2,6					2,27	2,51	2,75	3,05	3,35	5,49	4,07	4,47	4,93	5,41	5,92	6,34					
42,4	2,6					2,55	2,82	3,09	3,44	3,79	5,83	4,61	5,08	5,61	6,18	6,79	7,29	7,99				
44,5	2,3					2,69	2,98	3,26	3,63	4,00	6,19	4,87	5,37	5,94	6,55	7,20	7,75	8,51	9,09			
48,3	2,6					2,93	3,25	3,56	3,97	4,37	6,55	5,34	5,90	6,53	7,21	7,95	8,57	9,45	10,1	11,0		
51	2,6					3,10	3,44	3,77	4,21	4,64	7,27	5,67	6,27	6,94	7,69	8,48	9,16	10,1	10,9	11,9	2,	
54	2,6					3,30	3,65	4,01	4,47	4,93	7,60	6,04	6,68	7,41	8,21	9,08	9,81	10,9	11,7	12,8	13	
57	2,9						3,87	4,25	4,74	5,23	7,95	6,41	7,10	7,88	8,74	9,67	10,5	11,6	12,5	13,7	15	
60,3	2,9						4,11	4,51	5,03	5,55	8,66	6,82	7,55	8,39	9,32	10,3	11,2	12,4	13,4	14,7	16	
63,5	2,9						4,33	4,76	5,32	5,87	9,37	7,21	8,00	8,89	9,88	10,9	11,9	13,2	14,2	15,7	17	
70	2,9						4,80	5,27	5,90	6,51	10,8	8,01	8,89	9,90	11,0	12,2	13,3	14,8	16,0	17,7	19	
73	2,9						5,01	5,51	6,16	6,81	11,5	8,38	9,37	10,4	11,5	12,8	13,9	15,5	16,8	18,7	20	
76,1	2,9						5,24	5,75	6,44	7,11	12,2	8,77	9,74	10,8	12,1	13,4	14,6	16,3	17,2	19,6	21	
82,5	2,9							6,26	7,00	7,74	13,6	9,56	10,6	11,8	13,2	14,7	16,0	17,9	19,4	21,6	23	
88,9	3,2							6,76	7,57	8,38	14,3	10,3	11,5	12,8	14,3	16,0	17,4	19,5	21,1	23,6	26	
101,6	3,6								8,70	9,63	15,0	14,9	13,3	14,8	16,50	18,5	20,1	22,6	24,6	27,5	30	
108	3,6								9,27	10,3	16,4	12,7	14,1	15,8	17,20	19,7	21,5	24,2	26,3	29,4	32	
114,3	3,6								9,83	10,9	17,1	13,5	15,0	16,8	18,10	21,0	22,9	25,7	28,0	31,4	35	
127	4									12,1	18,2	15,0	16,8	18,8	21,00	23,50	25,7	28,9	31,5	35,3	39	
133	4									12,7	14,3	15,8	17,6	19,7	22,0	24,7	27,0	30,3	33,1	37,1	41	
139,7	4									13,4	15,0	16,6	18,5	20,7	23,2	26,0	28,4	32,0	34,9	39,2	43	
152,4	4,5										16,4	18,2	20,3	22,7	25,4	28,5	31,2	35,1	38,4	43,1	48	
159	4,5										17,1	19,0	21,2	23,7	26,6	29,8	32,6	36,7	40,1	45,2	50	
168,3	4,5										18,2	20,1	22,5	25,2	28,2	31,6	34,6	39,0	42,7	48,0	54	
177,8	5											21,3	23,8	26,6	29,9	33,5	36,7	41,4	45,2	51,0	57	
193,7	5,6												26,0	29,1	32,7	36,6	40,1	45,3	49,6	55,9	62	
219,1	6,3													33,1	37,1	41,6	45,6	51,6	56,5	63,7	71	
244,5	6,3													37,0	41,6	46,7	51,2	57,8	63,3	71,5	80	
273	6,3													41,4	46,6	52,3	57,3	64,9	71,1	80,3	90	
323,9	7,1														55,5	62,3	68,4	77,4	84,9	96,0	10	
355,6	8															68,6	75,3	85,2	93,5	106	12	
406,4	8,8																86,3	97,8	107	121	13	
457	10																	110	121	137	15	
508	11																		135	153	17	
559	12,5																			168	19	
610	12,5																			184	20	
660	14,2																					22





## BOILERS AND HEAT EXCHANGER PIPES

Norm	DIN	EN
Material	17175	10216-2 P195GH
	17175 St 35,8	10216-2 P235GH
	17175 St 45,8	10216-2 P265GH

Seamless steel tubes for pressure purposes - non-alloy and alloy steel tubes with specified elevated temperature properties

### CHEMICAL COMPOSITION

Standard	Grade	C max	Mn max	Si max	P max	S max	Cu max	Ni max	Cr max	Mo max	V max	Al min	N max	Nb, Ti, B, As & W
EN 10216-2	P195GH	0,13	0,70	0,35	0,025	0,02	0,30	0,30	0,30	0,08	0,02	0,02		Cr+Cu+Mo+Ni max.0,7
EN 10216-2	P235GH	0,16	1,20	0,35	0,025	0,02	0,30	0,30	0,30	0,08	0,02	0,02		Cr+Cu+Mo+Ni max.0,7
EN 10216-2	P265GH	0,20	1,40	0,40	0,025	0,02	0,30	0,30	0,30	0,08	0,02	0,02		Cr+Cu+Mo+Ni max.0,7

### MECHANICAL PROPERTIES

Standard	Grade	Heat Treatment	Re min. (MPa)			Rm (MPa)	A5min. (%)	KV (J)
			t up to 16 mm	t 16-40 mm	t 40-65 mm			
EN 10216-2	P195GH	U,N	195	-	-	320-440	27	KV=27 (0°C)
EN 10216-2	P235GH	U,N	235	225	215	360-500	25	KV=27 (0°C)
EN 10216-2	P265GH	U,N	265	255	245	410-572	23	KV=27 (0°C)

### TOLERANCE

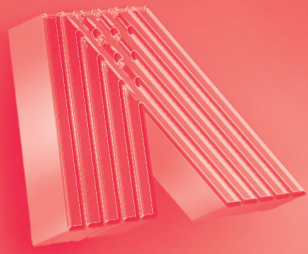
EN 10216-2					
Outside diameter (mm)	Permissible Variations of Outside diameter	Permissible Variations of Wall thickness according to ratio t/D			
		t/D	0.025 < t/D	0.05 < t/D	t/D > 0.1
D	± 1 % or ± 0.5 mm (higher value is always valid)	0.025	0.05	0.1	0.1
219.1		± 12.5 % or ± 0.4 mm (higher value is always valid)			
D > 219.1	value is always valid)	± 20 %	± 15 %	± 12.5 %	± 10 %

There are also tolerances for combination of tolerances for inner diameter and wall thickness, outside diameter and minimum wall thickness, inner diameter and minimum wall thickness.

t – wall thickness

U – without heat treatment

N – normalizing



## HIGH ALLOY STEEL PIPES

Norm	DIN	EN
Material	17175 15Mo3	10216-2 16Mo3
	17175 10CrMo910	10216-2 10CrMo9-10 10216-2 11CrMo9-10
	17175 14MoV63	10216-2 14MoV6-3 10216-2 13CrMo45 10216-2 X10CrMoVNb9-1

### CHEMICAL COMPOSITION

Standard	Grade	C	Mn	Si	P	S	Cu	Ni	Cr	Mo	V	Al	N	Nb
					max	max	max	max						
EN 10216-2	16Mo3	0,12-0,2	0,4-0,9	max. 0,35	0,025	0,02	0,30	0,30	max. 0,30	0,25-0,35		0,04		
EN 10216-2	10CrMo9-10	0,08-0,14	0,3-0,7	max. 0,50	0,025	0,02	0,30	0,30	2,0-2,5	0,9-1,1		0,04		
EN 10216-2	11CrMo9-10	0,08-0,15	0,4-0,8	max. 0,50	0,025	0,02	0,30	0,30	2,0-2,5	0,9-1,1		0,04		
EN 10216-2	14MoV6-3	0,10-0,15	0,4-0,7	0,15-0,35	0,025	0,02	0,30	0,30	0,3-0,6	0,5-0,7	0,22-0,28	0,04		
EN 10216-2	13CrMo45	max. 0,17	max. 0,7	max. 0,35	0,025	0,02	0,30	0,30	max. 1,15	max. 0,6		0,04		
EN 10216-2	X10CrMoVNb9-1	0,08-0,12	0,3-0,6	0,20-0,50	0,02	0,01	0,30	0,40	8,0-9,5	0,85-1,05	0,18-0,25	0,04	0,03-0,07	Nb0,06-0,1

### MECHANICAL PROPERTIES

Standard	Grade	Heat Treatment	Re min. (MPa)			Rm (MPa)	A5min. (%)	KV (J)
			t up to 16 mm	t 16-40 mm	t 40-65 mm			
EN 10216-2	16Mo3	N	280	270	260	450-600	22	KV=27 (20°C)
EN 10216-2	10CrMo9-10	Z	280	280	270	480-630	22	KV=27
EN 10216-2	11CrMo9-10	Z	355	355	355	540-680	20	KV=27
EN 10216-2	14MoV6-3	Z	320	320	310	460-610	20	T=27(20°C);L=40(20°C)
EN 10216-2	13CrMo45	Z	290	290	280	440-590	22	KV=27 (20°C)
EN 10216-2	X10CrMoVNb9-1	Z	420	450	450	630-830	19	KV=27

### TOLERANCE

#### EN 10216-2

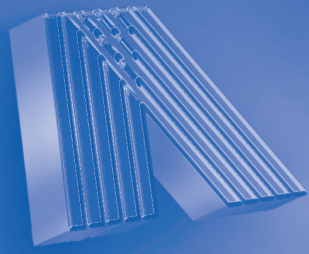
Outside diameter (mm)	Permissible Variations of Outside diameter	Permissible Variations of Wall thickness according to ratio t/D			
		t/D	0.025 < t/D	0.05 < t/D	t/D >
		0.025	0.05	0.1	0.1
D	± 1 % or ± 0.5 mm (higher value is always valid)	± 12.5 % or ± 0.4 mm (higher value is always valid)			
D > 219.1	value is always valid)	± 20 %	± 15 %	± 12.5 %	± 10 %

There are also tolerances for combination of tolerances for inner diameter and wall thickness, outside diameter and minimum wall thickness, inner diameter and minimum wall thickness.

t – wall thickness

Z – quenching and tempering

N – normalizing



## ASTM (A53-A106) PIPES

Norm	DIN	EN
Material	A53	Grade A
	A53	Grade B
	A106	Grade A
	A106	Grade B
	A106	Grade C
	A106	Grade C

A53: Specification for Pipe, Steel, Black and Hot- Dipped, Zinc-coated welded and seamless

A106: Specification for only Seamless Carbon Steel Pipe for High-Temperature Service

### CHEMICAL COMPOSITION

Standard	Grade	C max	Mn	Si min	P max	S max	Cu max	Ni max	Cr max	Mo max	V max	Al	N	Nb, Ti, B, As & W
ASTM A53	Gr.A	0,25	max. 0,95		0,05	0,045	0,40	0,40	0,40	0,15	0,08			
ASTM A53	Gr.B	0,30	max. 1,20		0,05	0,045	0,40	0,40	0,40	0,15	0,08			
ASTM A106	Gr.A	0,25	0,27-0,93	0,1	0,035	0,035	0,40	0,40	0,40	0,15	0,08			
ASTM A106	Gr.B	0,30	0,29-1,06	0,1	0,035	0,035	0,40	0,40	0,40	0,15	0,08			
ASTM A106	Gr.C	0,35	0,29-1,06	0,1	0,035	0,035	0,40	0,40	0,40	0,15	0,08			

### MECHANICAL PROPERTIES

Standard	Grade	Heat Treatment	Re min. (MPa)			Rm (MPa)	A5min. (%)	Temperature of application
			t up to 16 mm	t 16-40 mm	t 40-65 mm			
ASTM A53	Gr.A	U,N	205	205	205	min. 330	viz. ASTM	20
ASTM A53	Gr.B	U,N	240	240	240	min. 415	viz. ASTM	20
ASTM A106	Gr.A	N	205	205	205	min. 330	35	475
ASTM A106	Gr.B	N	240	240	240	min. 415	30	475
ASTM A106	Gr.C	N	275	275	275	min. 485	30	20

### TOLERANCE

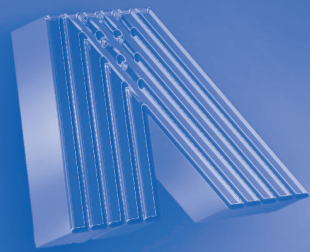
ASTM A 106		
Outside diameter (mm)	Permissible Variations of Outside diameter	
	upper mm	lower mm
from 48,3 to 114,3 (including)	+ 0,8	- 0,8
from 114,3 to 219,1 (including)	+ 1,6	- 0,8
from 219,1 to 457 (including)	+ 2,4	- 0,8
Permissible Variations of Wall thickness	-12,5%	
Permissible Variations of Weight	+10%/-3,5%	

ASTM A 53	
Permissible Variations of Dimension over 60,3 mm (including)	± 1%
Permissible Variations of Wall thickness	- 12,5%
Permissible Variations of Weight	Weight in the dimensional standard ASME B36.10M can not differ by more than ±10 %

t – wall thickness

U – without heat treatment

N – normalizing



## API 5L LINE PIPES

### CHEMICAL COMPOSITION

Standard	Grade	C max	Mn max	Si	P max	S max	Cu	Ni	Cr	Mo	V	Al	N	Nb, Ti, B, As & W
API Spec. 5L	A	0,22	0,90		0,03	0,03								Ti max. 0,04 Nb + V + Ti max. 0,15
API Spec. 5L	B - PSL 1	0,28	1,20		0,03	0,03								Ti max. 0,04 Nb + V + Ti max. 0,15
API Spec. 5L	B - PSL 2	0,24	1,20		0,025	0,015								Ti max. 0,04 Nb + V + Ti max. 0,15
API Spec. 5L	X42 - PSL 1	0,28	1,30		0,03	0,03								Ti max. 0,04 Nb + V + Ti max. 0,15
API Spec. 5L	X42 - PSL 2	0,24	1,30		0,025	0,015								Ti max. 0,04 Nb + V + Ti max. 0,15
API Spec. 5L	X46 - PSL 1	0,28	1,40		0,03	0,03								Ti max. 0,04 Nb + V + Ti max. 0,15
API Spec. 5L	X46 - PSL 2	0,24	1,40		0,025	0,015								Ti max. 0,04 Nb + V + Ti max. 0,15
API Spec. 5L	X52 - PSL 1	0,28	1,40		0,03	0,03								Ti max. 0,04 Nb + V + Ti max. 0,15
API Spec. 5L	X52 - PSL 2	0,24	1,40		0,025	0,015								Ti max. 0,04 Nb + V + Ti max. 0,15
API Spec. 5L	X56 - PSL 1	0,28	1,40		0,03	0,03								Ti max. 0,04 Nb + V + Ti max. 0,15
API Spec. 5L	X56 - PSL 2	0,24	1,40		0,025	0,015								Ti max. 0,04 Nb + V + Ti max. 0,15
API Spec. 5L	X60 - PSL 1	0,28	1,40		0,03	0,03								Ti max. 0,04 Nb + V + Ti max. 0,15
API Spec. 5L	X60 - PSL 2	0,24	1,40		0,025	0,015								Ti max. 0,04 Nb + V + Ti max. 0,15

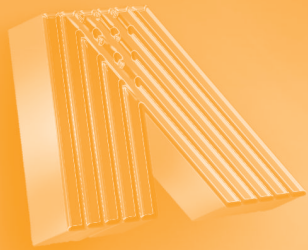
### MECHANICAL PROPERTIES

Standard	Grade	Heat Treatment	Re min. (MPa)			Rm (MPa)	A5min. (%)	KV (J)	Temperature of application
			t up to 16 mm	t 16-40 mm	t 40-65 mm				
API Spec. 5L	A	U,N	207	207	207	min. 331	viz. API	20	
API Spec. 5L	B - PSL 1	U,N	241	241	241	min. 414	viz. API	20	
API Spec. 5L	B - PSL 2	U,N	241 - 448	241 - 448		414 - 758	viz. API	KV=27 (0°C)	
API Spec. 5L	X42 - PSL 1	U,N	290	290	290	min. 414	viz. API	20	
API Spec. 5L	X42 - PSL 2	U,N	290 - 496	290 - 496		414 - 758	viz. API	KV=27 (0°C)	
API Spec. 5L	X46 - PSL 1	U,N	317	317	317	min. 434	viz. API	20	
API Spec. 5L	X46 - PSL 2	U,N	317 - 524	317 - 524		434 - 758	viz. API	KV=27 (0°C)	
API Spec. 5L	X52 - PSL 1	U,N	359	359	359	min. 455	viz. API	20	
API Spec. 5L	X52 - PSL 2	U,N	359 - 531	359 - 531		455 - 758	viz. API	KV=27 (0°C)	
API Spec. 5L	X56 - PSL 1	U,N	386	386	386	min. 490	viz. API	20	
API Spec. 5L	X56 - PSL 2	U,N	386 - 544	386 - 544		490 - 758	viz. API	KV=27 (0°C)	
API Spec. 5L	X60 - PSL 1	U,N	414	414	414	min. 517	viz. API	20	
API Spec. 5L	X60 - PSL 2	U,N	414 - 565	414 - 565		517 - 758	viz. API	KV=27 (0°C)	

t – wall thickness

U – without heat treatment

N – normalizing



## API 5 CT CASING, TUBING

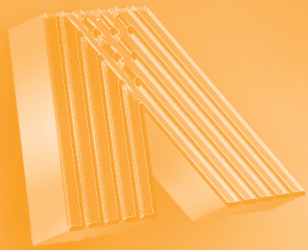
### CHEMICAL COMPOSITION

	Chemical Composition (by %)								
	C (max)	Mn (max)	Mo	Cr	Ni (max)	Cu (max)	P (max)	S (max)	Si (max)
H 40	-	-	-	-	-	-	0,030	0,030	-
J 55	-	-	-	-	-	-	0,030	0,030	-
K 55	-	-	-	-	-	-	0,030	0,030	-
N 80	-	-	-	-	-	-	0,030	0,030	-
M 65	-	-	-	-	-	-	0,030	0,030	-
L 80	0,43	1,90	-	-	0,25	0,35	0,030	0,030	0,45
C 90	0,35	1,00	0,25 - 0,75	1,20	0,99	-	0,020	0,010	-
C 95	0,45	1,90	-	-	-	-	0,030	0,030	0,45
T 95	0,35	1,20	0,25 - 0,85	0,40 - 1,50	0,99	-	0,020	0,010	-
P 110	-	-	-	-	-	-	0,030	0,030	-
Q 125	0,35	1,00	0,25 - 0,75	1,20	0,99	-	0,020	0,010	-

### MECHANICAL PROPERTIES

Grade	Tensile Strength		Yield Strength			
	(min)		(min)		(min)	
	psi	Mpa	psi	Mpa	psi	Mpa
H 40	60000	414	40000	276	80000	
J 55	75000	517	55000	379	80000	
K 55	95000	655	55000	379	80000	
N 80	100000	689	80000	552	110000	
M 65	85000	586	65000	448	85000	
L 80	95000	655	80000	552	95000	
C 90	100000	689	90000	621	105000	
C 95	105000	724	95000	655	110000	
T 95	105000	724	95000	655	110000	
P 110	125000	862	110000	758	140000	
Q 125	135000	931	125000	862	150000	





## TUBING

Manufacturing Procedures	Technical Conditions	Steel Grades
Hot rolled	SR EN ISO 11960 API 5 CT	J55; L80; N80; C90; P110

Thread Type	Pipe Designation
Round	Upset ends; non-upset ends

### DIMENSIONS

Outside Diameter		Wall Thickness	Steel Grade				
inch	mm	mm	J55	L80	N80	C90	P110
1,900	48,3	3,18	P	-	-	-	-
	48,3	3,68	PNU	-	PNU	PNU	-
	48,3	5,08	PU	-	PU	PU	-
	48,3	6,35	-	P	-	P	-
2 3/8	60,3	4,83	PNU	PNU	PNU	PNU	PNU
	60,3	6,45	-	PNU	PNU	PNU	PNU
2 7/8	73,0	5,51	PNU	PNU	PNU	PNU	PNU
	73,0	7,01	-	PNU	PNU	PNU	PNU
	73,0	7,82	-	PNU	PNU	PNU	PNU
3 1/2	88,9	6,45	PNU	PNU	PNU	PNU	PNU
4	101,6	5,74	PN	PN	PN	PN	PN
	101,6	6,65	PU	PU	PU	PU	PU
4 1/2	114,3	6,88	PNU	PNU	PNU	PNU	PNU

P: plain - end

U: externally upset

N: non - upset



## DRILL PIPES

Manufacturing Procedures	Technical Conditions
Hot rolled	API Spec. 5 D / SR ISO 11961

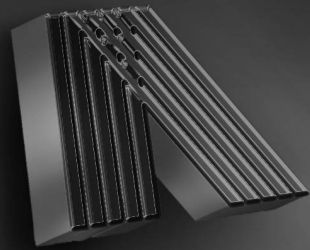
### DIMENSIONS

Outside Diameter		Nominal Weight		Wall Thickness		Grade	Upset Type
inch	mm	lb/ft	k/m	inch	mm		
2 7/8	73,0	10,40	14,48	0,362	9.19	E, X, G, S	IU, EU
3 1/2	88,9	9,50	13,12	0,254	6.45	E	IU, EU
3 1/2	88,9	13,30	18,34	0,368	9.35	E, X, G, S	IU, EU
3 1/2	88,9	15,50	21,79	0,449	11.40	E	IU, EU
3 1/2	88,9	15,50	21,79	0,449	11.40	X, G, S	EU, EU
4	101,6	14,00	19,26	0,330	8.38	E, X, G, S	IU, EU
4 1/2	114,3	13,75	18,23	0,271	6.88	E	IU, EU
4 1/2	114,3	16,60	22,31	0,337	8.56	E, X, G, S	EU, IEU
4 1/2	114,3	20,00	27,84	0,430	10.92	E, X, G, S	EU, IEU
5	127,0	16,25	22,15	0,296	7.52	X, G, S	IU
5	127,0	19,50	26,71	0,362	9.19	E	IEU
5	127,0	19,50	26,71	0,362	9.19	X, G, S	EU, IEU
5	127,0	25,60	35,79	0,500	12.70	E	IEU
5	127,0	25,60	35,79	0,500	12.70	X, G, S	EU, IEU
5 1/2	139,7	21,90	29,51	0,361	9.17	E, X, G, S	IEU
5 1/2	139,7	24,70	33,57	0,415	10.54	E, X, G, S	IEU
6 5/8	168,3	25,20	33,05	0,330	8.38	E, X, G, S	IEU
6 5/8	168,3	27,72	36,06	0,362	9.19	E, X, G, S	IEU

EU: external upset

IU: internal upset

IEU: external - internal upset



## THE SIZES AND WEIGHT OF ASTM A 53 / A 106 acc. to ASME B16.9

Nominal pipe	O.D. mm	5 S	10 S	10	20	30	STD and 40 S	40	60	XS and 80 S	80	100	120	140	160	XXS
1/8"	10.30	-	1.24	-	-	-	1,73	-	-	2,41	-	-	-	-	-	-
		-	0.28	-	-	-	0,36	-	-	0,46	-	-	-	-	-	-
1/4"	13.71	-	1.65	-	-	-	2,24	-	-	3,02	-	-	-	-	-	-
		-	0.49	-	-	-	0,63	-	-	0,80	-	-	-	-	-	-
3/8"	17.14	-	1.65	-	-	-	2,31	-	-	3,20	-	-	-	-	-	-
		-	0.63	-	-	-	0,85	-	-	1,10	-	-	-	-	-	-
1/2"	21.34	1.65	2.11	-	-	-	2,77	-	-	3,73	-	-	-	-	4.78	7.47
		0.80	1.00	-	-	-	1,27	-	-	1,62	-	-	-	-	1.94	2.55
3/4"	26.67	1.65	2.11	-	-	-	2,87	-	-	3,91	-	-	-	-	5.56	7.82
		1.03	1.28	-	-	-	1,68	-	-	2,19	-	-	-	-	2.90	3.63
1"	33.40	1.65	2.77	-	-	-	3,38	-	-	4,55	-	-	-	-	6.35	9.09
		1.29	2.08	-	-	-	2,50	-	-	3,23	-	-	-	-	4.18	5.45
1 1/4"	42.16	1.65	2.77	-	-	-	3,56	-	-	4,85	-	-	-	-	6.35	9.70
		1.65	2.69	-	-	-	3,38	-	-	4,46	-	-	-	-	5.58	7.76
1 1/2"	48.26	1.65	2.77	-	-	-	3,68	-	-	5,08	-	-	-	-	7.14	10.16
		1.90	3.12	-	-	-	4,05	-	-	5,41	-	-	-	-	7.22	9.55
2"	60.32	1.65	2.77	-	-	-	3,91	-	-	5,54	-	-	-	-	8.74	11.07
		2.38	3.94	-	-	-	5,44	-	-	7,49	-	-	-	-	11.08	13.45
2 1/2"	73.02	2.11	3.05	-	-	-	5,16	-	-	7,01	-	-	-	-	9.52	14.02
		3.70	5.26	-	-	-	8,68	-	-	11,42	-	-	-	-	14.88	20.41
3"	88.90	2.11	3.05	-	-	-	5,49	-	-	7,62	-	-	-	-	11.13	15.24
		4.50	6.45	-	-	-	11,29	-	-	15,27	-	-	-	-	20.98	27.67
3 1/2"	101.60	2.11	3.05	-	-	-	5,74	-	-	8,08	-	-	-	-	-	-
		5.20	7.40	-	-	-	13,57	-	-	18,63	-	-	-	-	-	-
4"	114.30	2.11	3.05	-	-	-	6,02	-	-	8,56	-	11.13	-	-	13.49	17.12
		5.81	8.34	-	-	-	16,07	-	-	22,31	-	28.25	-	-	33.48	41.02
5"	141.30	2.77	3.40	-	-	-	6,55	-	-	9,52	-	12.70	-	-	15.88	19.05
		9.45	11.56	-	-	-	21,78	-	-	30,95	-	40.24	-	-	49.11	57.42
6"	168.30	2.77	3.40	-	-	-	7,11	-	-	10,97	-	14.27	-	-	18.26	21.95
		11.31	13.82	-	-	-	28,26	-	-	42,56	-	54.20	-	-	67.22	79.18
8"	219.10	2.77	3.76	-	6.35	7.04	8,18	-	10.31	12,70	-	15.09	18.26	20.62	23.01	22.22
		14.78	19.94	-	33.03	36.72	42,53	-	52.88	64,63	-	75.80	90.32	101.04	111.32	107.87
10"	273.00	3.40	4.19	-	6.35	7.80	9,27	-	12.70	12,70	15.09	18.26	21.44	25.40	28.58	25.40
		22.62	27.83	-	41.70	51.00	60,29	-	81.46	81,46	95.95	114.59	132.74	154.94	172.14	154.94
12"	323.85	3.96	4.57	-	6.35	8.38	9,52	10.31	14.27	12,70	14.47	21.44	25.40	28.58	33.34	25.40
		33.00	36.00	-	49.81	65.07	73,82	79.87	108.97	97,36	131,70	159.52	186.77	206.96	238.11	186.77
14"	355.60	3.96	4.78	6.35	7.92	9.52	9,52	11.13	15.09	12,70	19.05	23.82	27.79	31.75	35.71	-
		34.23	41.18	54.63	67.95	81.28	81,28	94.31	126.49	107,28	157,94	194.82	224.42	253.14	281.38	-
16"	406.40	4.19	4.78	6.35	7.92	9.52	9,52	12.70	16.64	12,70	21.44	26.19	30.96	36.52	40.49	-
		41.60	47.33	62.58	77.88	93.21	93,21	123.18	159.98	123,18	203,16	245.32	286.44	332.62	364.85	-
18"	457.20	4.19	4.78	6.35	7.92	11.13	9,52	14.27	19.05	12,70	23.82	29.36	34.92	39.69	45.24	-
		46.83	53.18	70.53	87.81	122.12	105,14	155.90	205.62	139,07	254,19	309.44	363.19	408.01	459.18	-
20"	508.00	4.78	5.54	6.35	9.52	12.70	9,52	15.09	20.62	12,70	26.19	32.54	38.10	44.45	50.01	-
		59.22	68.50	78.47	117.07	154.97	117,07	183.12	247.79	154,97	310,90	381.04	440.93	587.54	564.14	-
22"	558.80	-	-	6.35	9.52	12.70	9,52	-	22.22	12,70	28.60	34.92	41.28	47.62	53.98	-
		-	-	86.49	129.01	171.01	129,01	-	294.06	171,01	373,58	451.14	526.70	600.27	671.85	-
24"	609.60	5.54	6.35	6.35	9.52	14.27	9,52	17.48	24.61	12,70	30.96	38.89	46.02	52.30	59.54	-
		82.60	94.37	94.37	209.54	209.54	140,94	254,74	354.64	186,75	441,10	546.92	639.18	718.94	806.61	-



**AYDIN BORU**

Aydin Boru Endüstrisi A.Ş.  
Tuzla Mermerciler Organize Sanayi Bölgesi Gazi Bulvarı 1. Sok. No 4 34953 Tuzla / İstanbul TÜRKİYE  
T +90 216 593 16 00 (Pbx) F +90 216 593 16 10 [www.aydinboru.com](http://www.aydinboru.com)