



Solid 山西索立得工贸有限公司

Shanxi Solid Industrial Co.,Ltd.

STEEL PIPES

Shanxi Solid Industrial Co.,Ltd.

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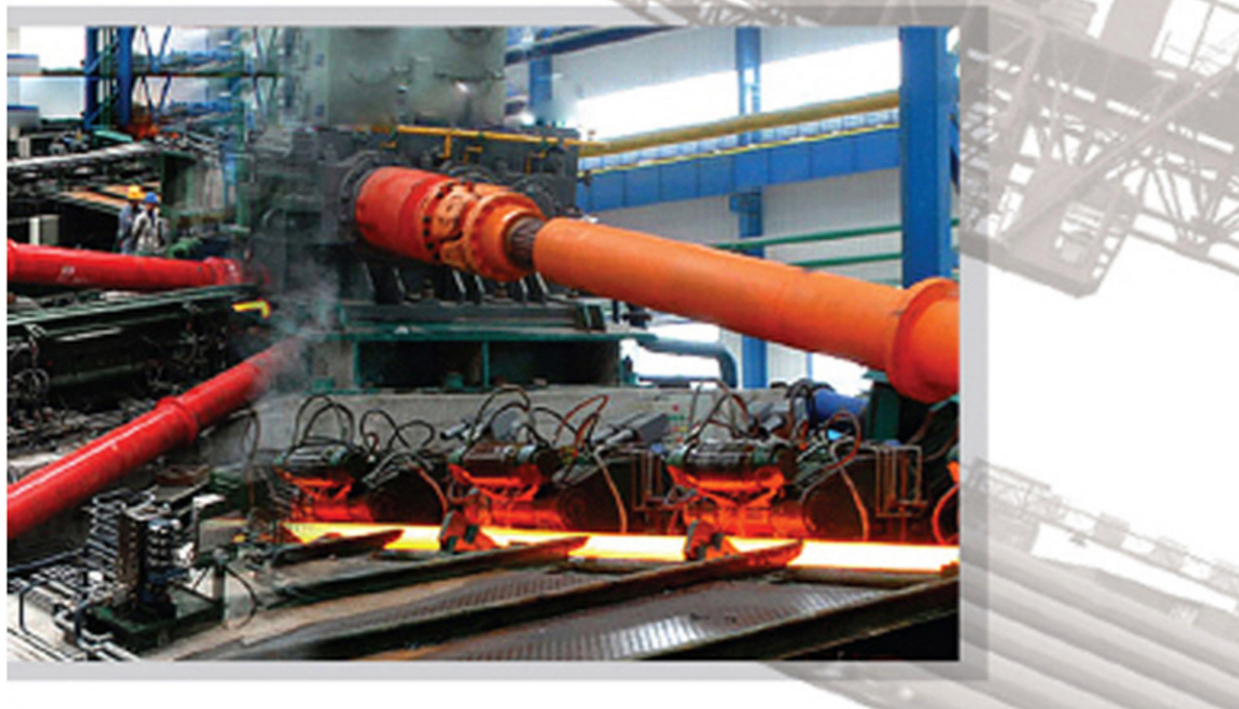
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钢管和管件适用于按BS21加工螺纹

Steel Tubes and Tubulars Suitable for Screwing to BS21 Pipe Threads BS 1387-1985

钢管 Tube	尺寸 Normal Size	螺纹规格 Designation of thread	外径 Outer diameter				壁厚 Thickness		单重 Weight			
			max		min				平端 Plain end		车丝用带接箍 Screwed and Socketed	
			in.	mm	in.	mm	in.	mm	lb/ft	Kg/m	lb/ft	Kg/m
Light	15	1/2	0.843	21.4	0.827	21.0	0.079	2.0	0.636	0.947	0.642	0.956
	20	3/4	1.059	26.9	1.039	26.4	0.091	2.3	0.927	1.38	0.934	1.39
	25	1	1.331	33.8	1.307	33.2	0.102	2.6	1.331	1.98	1.344	2.00
	32	1 1/4	1.673	42.5	1.650	41.9	0.102	2.6	1.707	2.54	1.727	2.57
	40	1 1/2	1.906	48.4	1.882	47.8	0.114	2.9	2.171	3.23	2.198	3.27
	50	2	2.370	60.2	2.346	59.6	0.114	2.9	2.742	4.08	2.789	4.15
	65	2 1/2	2.992	76.0	2.961	75.2	0.126	3.2	3.387	5.71	3.918	5.83
	80	3	3.492	88.7	3.461	87.9	0.126	3.2	4.516	6.72	4.630	6.89
Medium	100	4	4.484	113.9	4.449	113.0	0.142	3.6	6.552	9.75	6.721	10.0
	15	1/2	0.854	21.7	0.831	21.1	0.102	2.6	0.813	1.21	0.820	1.22
	20	3/4	1.071	27.2	1.047	26.6	0.102	2.6	1.048	1.56	1.055	1.57
	25	1	1.346	34.2	1.315	33.4	0.126	3.2	1.620	2.41	1.633	2.43
	32	1 1/4	1.689	42.9	1.657	42.1	0.126	3.2	2.083	3.10	2.104	3.13
	40	1 1/2	1.921	48.8	1.890	48.0	0.126	3.2	2.399	3.57	2.426	3.61
	50	2	2.394	60.8	2.354	59.8	0.142	3.6	3.380	5.03	3.427	5.10
	65	2 1/2	3.016	76.6	2.969	75.4	0.142	3.6	4.328	6.44	4.402	6.55
Heav	80	3	3.524	89.5	3.469	88.1	0.157	4.0	5.625	8.37	5.739	8.54
	100	4	4.524	114.9	4.461	113.3	0.177	4.5	8.199	12.2	8.401	12.5
	125	5	5.535	140.6	5.461	138.7	0.197	5.0	11.156	16.6	11.492	17.1
	150	6	6.539	166.1	6.461	164.1	0.197	5.0	13.239	19.7	13.643	20.3
	15	1/2	0.854	21.7	0.831	21.1	0.126	3.2	0.968	1.44	0.974	1.45
	20	3/4	1.071	27.2	1.047	26.6	0.126	3.2	1.257	1.87	1.263	1.88
	25	1	1.346	34.2	1.315	33.4	0.157	4.0	1.976	2.94	1.989	2.96
	32	1 1/4	1.689	42.9	1.657	42.1	0.157	4.0	2.554	3.80	2.574	3.83
Heav	40	1 1/2	1.921	48.8	1.890	48.0	0.157	4.0	2.944	4.38	2.970	4.42
	50	2	2.394	60.8	2.354	59.8	0.177	4.5	4.160	6.19	4.207	6.26
	65	2 1/2	3.016	76.6	2.969	75.4	0.177	4.5	5.329	7.93	5.410	8.05
	80	3	3.524	89.5	3.469	88.4	0.197	5.0	6.922	10.3	7.057	10.5
	100	4	4.524	114.9	4.461	113.3	0.213	5.4	9.745	14.5	9.946	14.8
	125	5	5.535	140.6	5.461	138.7	0.213	5.4	12.030	17.9	12.366	18.4
	150	6	6.539	166.4	6.461	164.4	0.213	5.4	14.315	21.3	14.718	21.8

螺旋焊管执行标准和生产规格
HSAW/SSAW Pipe Executive Standard and Product Size

执行标准	Standard	
标准类别 Type	标准代号 Code	标准名称 Standard Title
国内标准 Domestic standard	GB/T9711.1	石油天然气工业输送钢管，第一部分，A级钢管 Steel pipe for pipeline of petroleum and natural gas industries(Class A steel pipe),Part one
	GB/T9711.2	石油天然气工业输送钢管，第二部分，B级钢管 Steel pipe for pipeline of petroleum and natural gas industries(Class B steel pipe),Part two
	SY/T5037	低压流体输送管道用螺旋埋弧焊钢管 Spiral submerged arc welded pipe for pipeline for low pressure fluid service
	SY/T5040	桩用螺旋埋弧焊钢管SSAW Pipe for Piling
美标 American standard	API 5L	管线管 (PSL1/PSL2) Line Pipe

钢级对照 Steel Grade Comparison

钢级对照 Steel Grade Comparison	GB/T9711.1		L175, L210, L245, L290, L320, L360, L390, L415, L450, L485, L555																			
	GB/T9711.2		L245NB, L245MB, L290NB, L290MB, L360NB, L360MB, L360QB, L415NB, L415MB, L415QB, L450MB, L450QB, L485MB, L485QB, L555MB, L555QB																			
	API 5L		A, B, X42, X46, X52, X56, X60, X65, X70, X80																			
	SY/T5040	SY/T5037	Q235B, Q345B																			
生产规格 Product Size	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25.4		
φ219.1																						
φ273.1																						
φ325																						
φ377																						
φ426																						
φ478																						
φ508																						
φ529																						
φ610																						
φ630																						
φ720																						
φ820																						
φ920																						
φ1016																						
φ1020																						
φ1220																						
φ1420																						
φ1620																						
φ1820																						
φ2020																						
φ2200																						
φ2420																						
φ2620																						
φ2820																						
φ3000																						





ERW焊管钢级对照表 ERW Steel Grade Comparison

生产标准 Standard	钢级 Available Steel Grade									
GB/T 3091 YB/T4028 YB/T5209 GB/T13793 GB/T14291 ASTM A252	08F,08Z,10F,15F,20#,Q195,Q215A,Q235A.B,Q295A.B,Q345A.B									
GB/T9711.1	L175	L210	L245	L290	L320	L360	L390	L415	L450	
GB/T9711.2			L245NB L245MB	L290NB L290MB		L360NB L360MB		L415NB L415MB	L450MB	L485
API 5L	A25	A	B	X42	X46	X52	X56	X60	X65	X70
API 5CT	H40					J55 K55				
ASTM A53	GR.A GR.B									

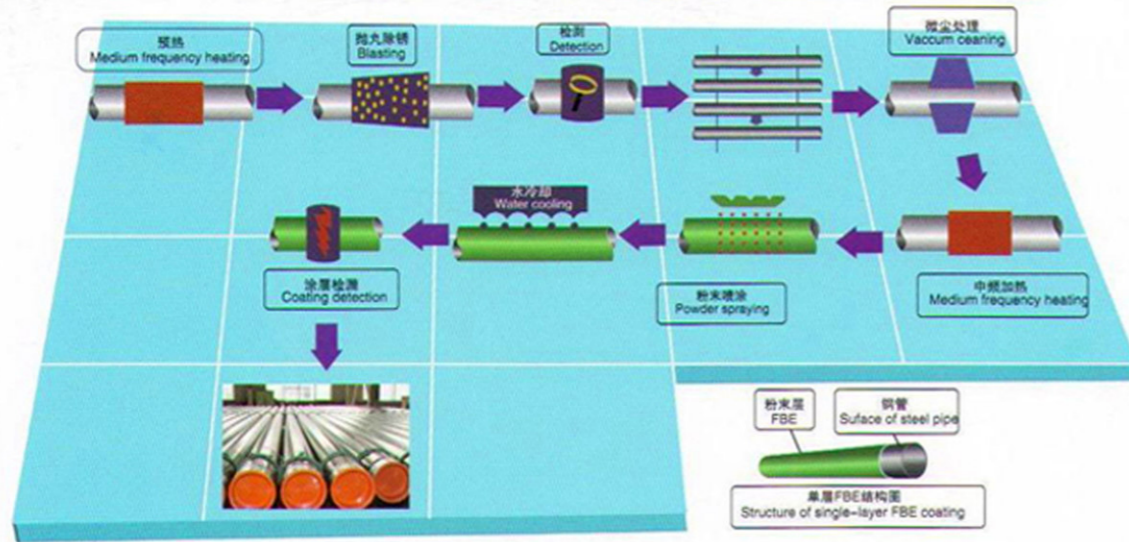
注: GB/T9711.1,GB/T9711.2,API 5L,API 5CT,ASTM A53中的钢级是相对应的
 Note:Steel Grades are correspondent with GB/T9711.1,GB/T9711.2,API 5L,API 5CT,ASTM A53

产品规格
Product Size Round Pipe(length:5M-15M)

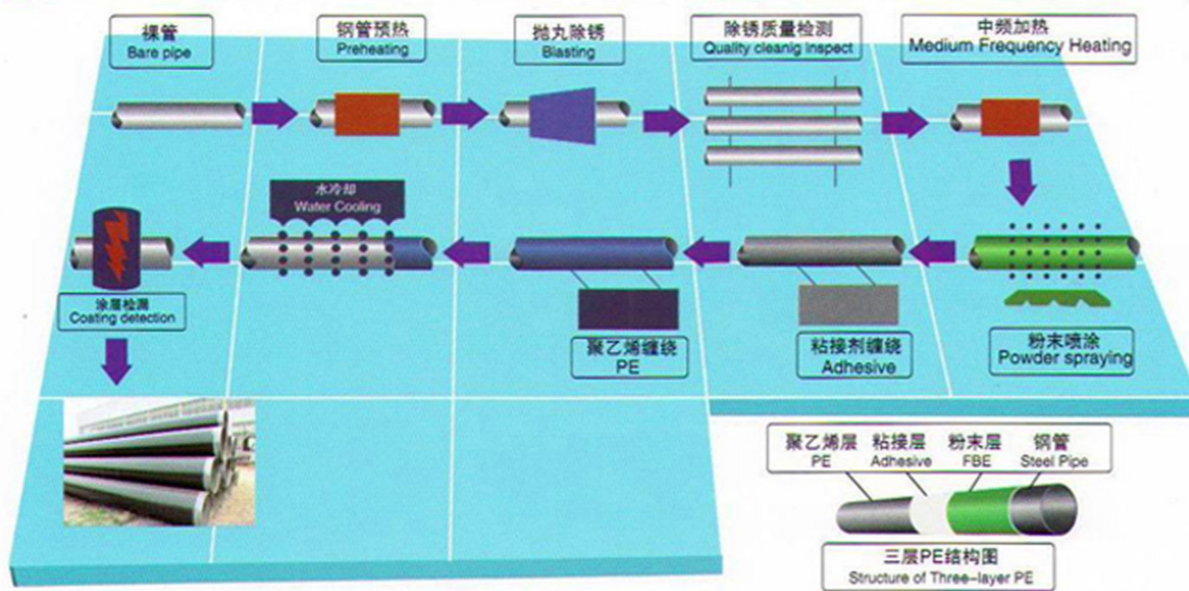
壁厚 W.T mm Inch	3.0 0.118	3.8 0.150	4.0 0.157	4.4 0.173	4.8 0.189	5.2 0.205	5.6 0.220	6.4 0.252	7.1 0.280	7.5 0.295	7.9 0.311	8.5 0.335	8.7 0.343	9.0 0.354	9.5 0.374	10.03 0.395	11.1 0.437	12.7 0.500	14.0 0.551
1 1/4	42.3																		
1 1/2	48.3																		
2	60.3																		
2 1/2	73.0																		
2 7/8	76.1																		
3 1/2	89.0																		
4	101.6(102)																		
4 1/4	108.0																		
4 1/2	114.3																		
4 3/4	120.0																		
5	127.0																		
5 1/4	133.0																		
5 1/2	139.7																		
5 5/8	141.3																		
5 7/8	152.0																		
6 1/4	159.0																		
6 1/2	165.0																		
6 5/8	168.3																		
7	177.8																		
7 5/8	193.7																		
8 5/8	219.1																		
9 5/8	244.5																		

Process of Anticorrosive 防腐工艺流程

单层环氧粉末涂敷工艺流程示意图 Process Diagram of Single-layer FBE Coating



2PE/PP、3PE/PP涂敷工艺流程示意图 Process Diagram of 2PE/PP、3PE/PP Coating



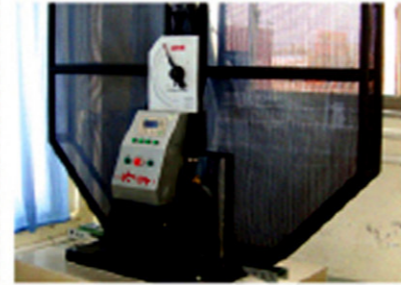
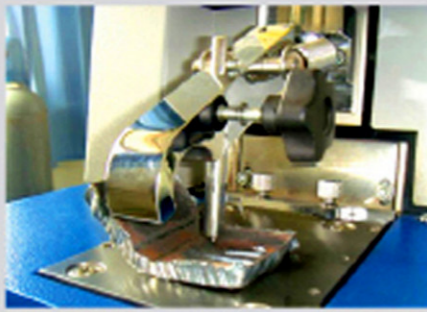
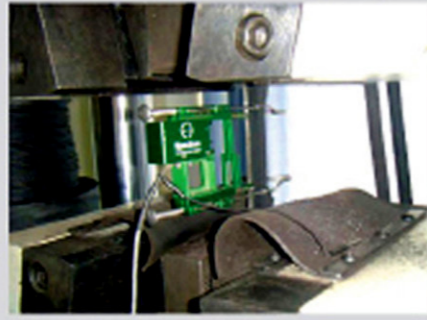
检测设备

DETECTING EQUIPMENT



检测设备

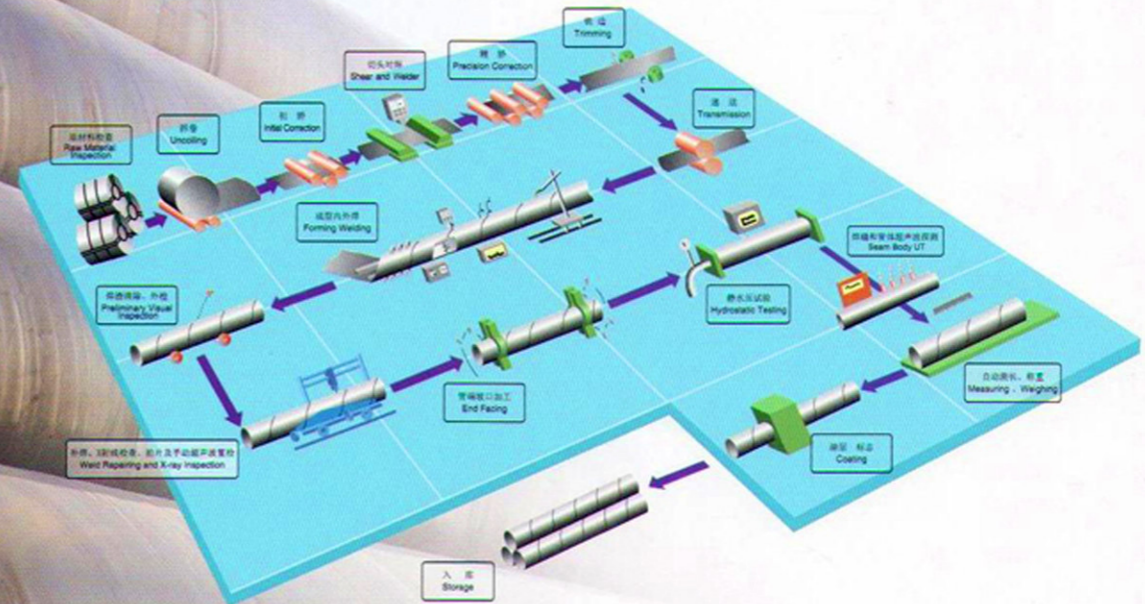
DETECTING EQUIPMENT



Spiral Pipe

Manufacture Process

生产工艺流程



螺旋钢管
Spiral Pipe

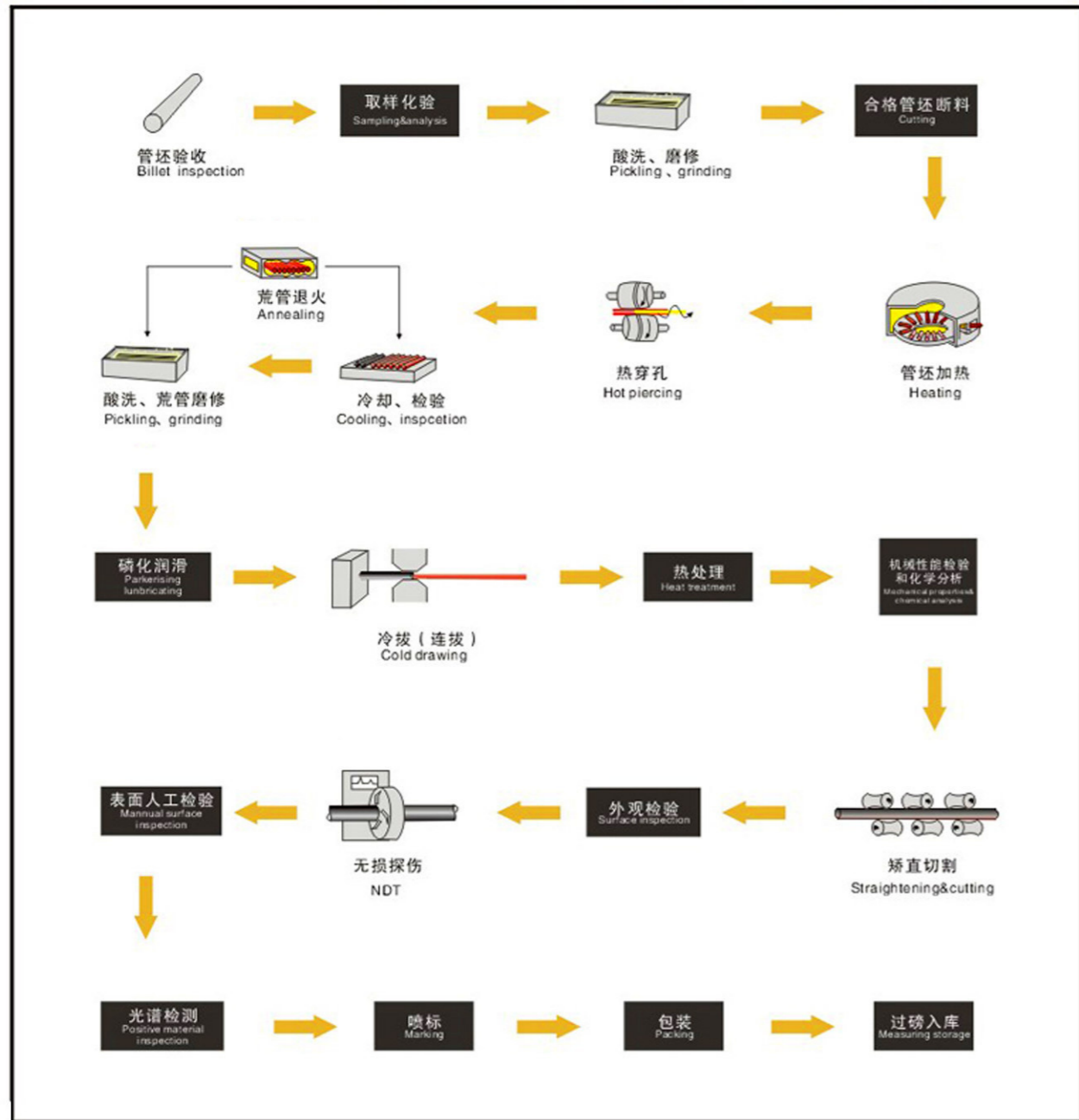


打桩管
Piling Pipe



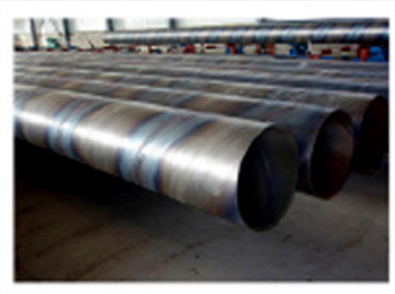
石油天然气输送管
Transmission of Petroleum & Natural Gas

冷拔无缝钢管工艺流程 COLD-DRAWN SEAMLESS STEEL TUBES AND PIPES PROCESS FLOW

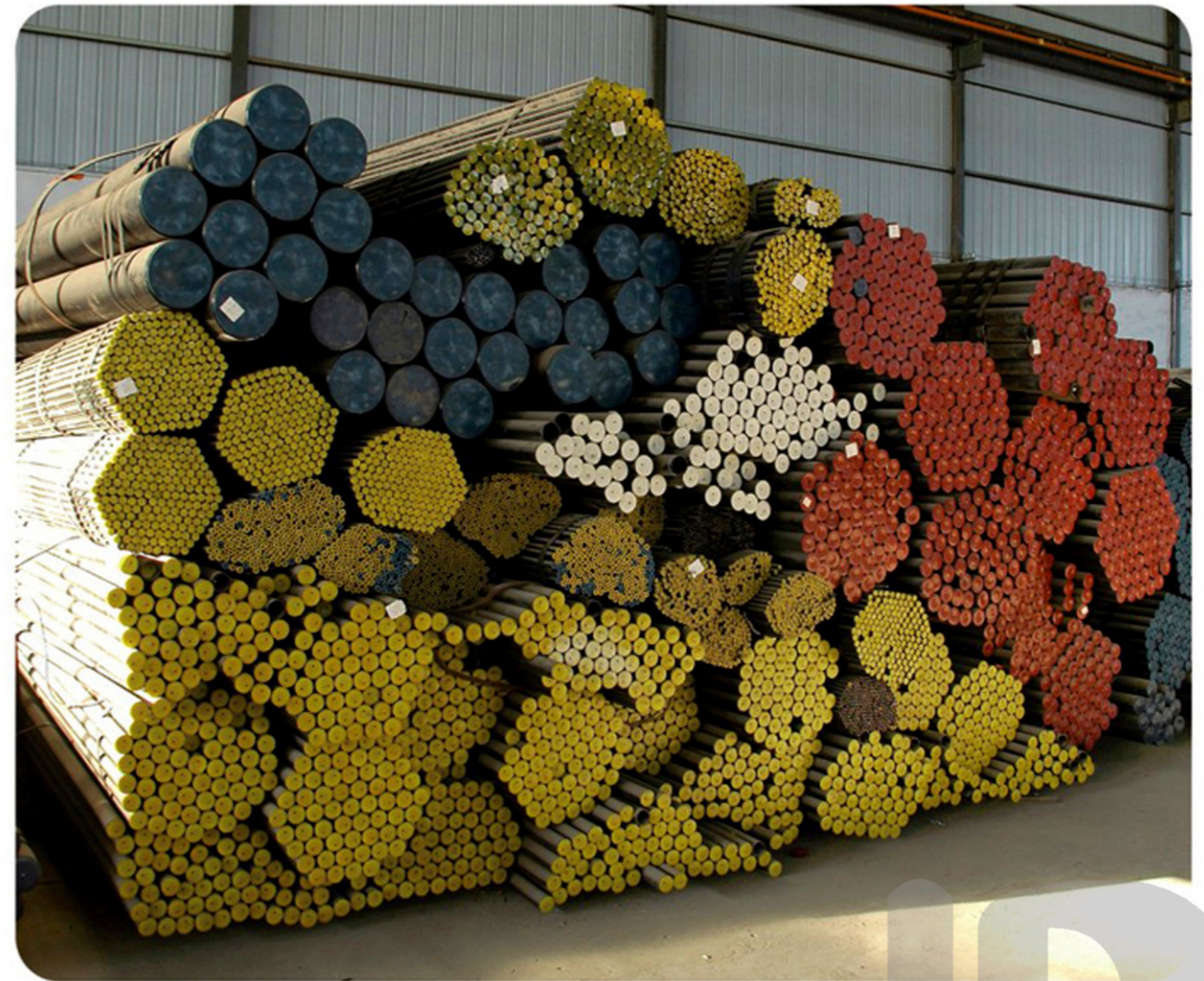


优质产品

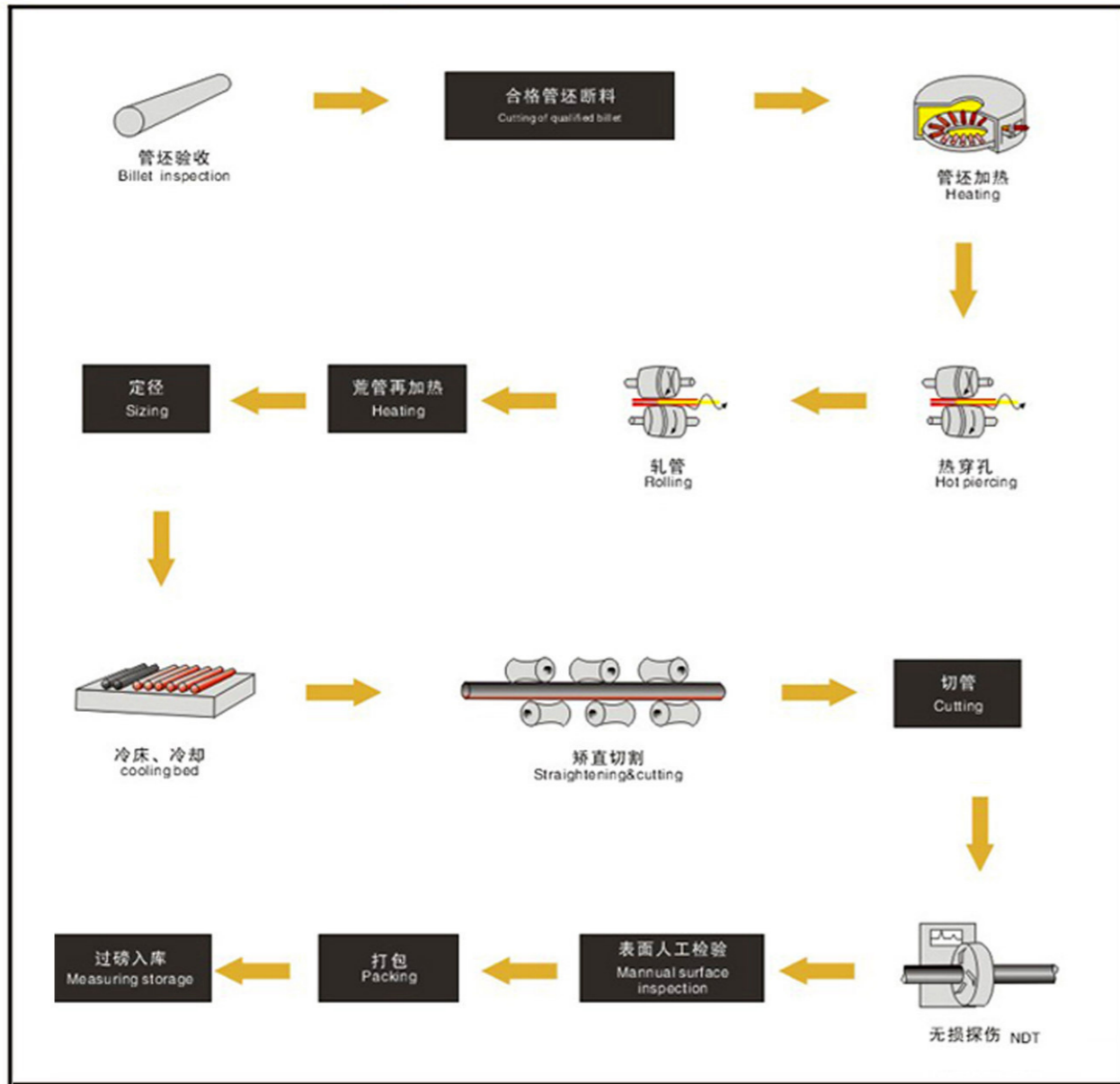
Quality Production



COLD-DRAWN SEAMLESS
STEEL TUBES
冷拔无缝钢管



热轧无缝钢管工艺流程 HOT-ROLLING SEAMLESS STEEL TUBES AND PIPES PROCESS FLOW



SAMPLE PIPE
样品管



SAMPLE PIPE
样品管

API 5L/ASTM A106/A53 GR.B 24 " STD

API 5L/ASTM A106/A53 GR.B 20 " SCH40

API 5L/ASTM A106/A53 GR.B 16 " SCH40

API 5L/ASTM A106/A53 GR.B 14 " SCH40

HOT-ROLLING SEAMLESS STEEL TUBES
热轧无缝钢管



SPECIFICATION AND WEIGHTS OF STEEL PIPES
钢管规范重量表

- ▶ 标准 (standard):
- JIS(日本工业规格协会)
- JIS G3452 SGP
- JIS G3454 STPG
- JIS G3455 STS
- JIS G3456 STPT
- JIS G3460 STPL

▶▶ **钢管规范重量表** Specification and Weights of Steel Pipes

名称 Name	外径 Outside Diameter	外径厚度 (mm) Outside Diameter Thickness											外径 Outside Diameter			
		(A)	(B)	(mm)	S.G.P.	Sch. 10	Sch. 20	Sch. 30	Sch. 40	Sch. 60	Sch. 80	Sch. 100		Sch. 120	Sch. 140	Sch. 160
6	1.8	10.5	2.0 0.419				1.7 0.369	2.2 0.450	2.4 0.479							10.5
8	1/4	13.8	2.3 0.652				2.2 0.629	2.4 0.675	3.0 0.799							13.8
10	3/8	17.3	2.3 0.851				2.3 0.851	2.8 1.00	3.2 1.11							17.3
15	1/2	21.7	2.8 1.31				2.8 1.31	3.2 1.46	3.7 1.64						4.7 1.97	21.7
20	3/4	27.2	2.8 1.68				2.9 1.74	3.4 2.00	3.9 2.24						5.5 2.94	27.2
25	1	34.0	3.2 2.43				3.4 2.57	3.9 2.89	4.5 3.27						6.4 4.36	34.0
32	1 1/4	42.7	3.5 3.38				3.6 3.47	4.5 4.24	4.9 4.57						6.4 5.73	42.7
40	1 1/2	48.6	3.5 3.89				3.7 4.10	4.5 4.89	5.1 5.47						7.1 7.27	48.6
50	2	60.5	3.8 5.31				3.9 5.44	4.9 6.72	5.5 7.46						8.7 11.1	60.5
65	2 1/2	76.3	4.2 7.47				4.5 7.97	5.2 9.12	6.0 10.4	7.0 12.0					9.5 15.6	76.3

TECHNICAL PARAMETERS OF TUBE FOR STRUCTURES OF PIPELINES, VESSELS AND EQUIPMENT
管道、容器、设备结构用管技术参数

- ▶ 标准 (standard):
- GB/T 8162 China National Standard
- Q/BQB 203 Baosteel Corporation standard
- DIN 1629 Deutsche Industrie Normen
- ▶ 用途 (Uses):
- 用于制造管道、容器、设备、管件及钢结构
- For manufacture of pipelines,vessels,equipment,pipe fittings and steel structures

▶▶ **尺寸公差** Tolerances on Dimensions

标准 Standard	外径公差 Outside Diameter Tolerance		壁厚公差 Wall Thickness Tolerance	
	D < 50	± 0.5mm	S < 4mm	± 12.5% (最小0.40mm)
GB/T 8162	D ≥ 50	± 1%	4mm ≤ S ≤ 20mm	+15% / -12.5%
			S > 20mm	± 12.5%
Q/BQB 203 DIN 1629	D ≤ 50	± 0.5mm	da ≤ 130mm	
			S ≤ 2Sn	+15% / -10%
			2Sn < S ≤ 4Sn	+12.5% / -10%
	S > 4Sn	± 9%		
	D > 50	± 1%	Da > 130mm	
			S ≤ 0.05da	+15% / -10%
0.05da < S ≤ 0.11da			± 12.5%	
			S > 0.11da	± 10%

注: Sn为标准壁厚
 Note: " Sn " is standard wall thickness.

机械性能 Mechanical Properties

标准 Standard	钢级 Grade	抗拉强度 Tensile strength (MPa)	屈服强度 (MPa) 不小于 Yield Strength Not less than		伸长率 (%) 不小于 Elongation Not less than
			≤16mm	>16-30mm	
GB/T 8162	10	≥ 335	205	195	24
	20	≥ 390	245	235	20
	35	≥ 510	305	295	17
	45	≥ 590	335	325	14
	Q345	≥ 490	325	315	21
Q/BQB 203 DIN 1629	-	-	≤16mm	>16mm	-
	St37.0	350-480	235	225	25
	St44.0	420-550	275	265	21
	St55	540-645	295	285	17
	St52.0	500-650	355	345	21
	CK45	590-730	335	325	14

化学成分 Chemical Composition(%)

标准 Standard	牌号 Grade	C	Si	Mn	P	S	Cr	Ni	Cu	V
GB/T 8162	10	0.07-0.13	0.17-0.37	0.35-0.65	≤0.025	≤0.020	≤0.15	≤0.30	≤0.25	-
	20	0.17-0.23	0.17-0.37	0.35-0.65	≤0.025	≤0.020	≤0.25	≤0.30	≤0.25	-
	35	0.32-0.39	0.17-0.37	0.50-0.80	≤0.025	≤0.020	≤0.25	≤0.30	≤0.25	-
	45	0.42-0.50	0.17-0.37	0.50-0.80	≤0.025	≤0.020	≤0.25	≤0.30	≤0.25	-
	Q345A	≤0.20	≤0.55	1.00-1.60	≤0.025	≤0.020	≤0.30	≤0.30	≤0.30	-
	Q345B	≤0.20	≤0.55	1.00-1.60	≤0.025	≤0.020	≤0.30	≤0.30	≤0.30	-
	Q345C	≤0.20	≤0.55	1.00-1.60	≤0.025	≤0.020	≤0.30	≤0.30	≤0.30	0.02-0.15
	Q345D	≤0.18	≤0.55	1.00-1.60	≤0.025	≤0.020	≤0.30	≤0.30	≤0.30	0.02-0.15
Q345E	≤0.18	≤0.55	1.00-1.60	≤0.025	≤0.020	≤0.30	≤0.30	≤0.30	0.02-0.15	
Q/BQB 203 DIN 1629	St37.0	≤0.17	0.17-0.37	0.35-0.65	≤0.025	≤0.020	≤0.25	≤0.25	≤0.25	-
	St44.0	≤0.21	0.17-0.37	0.50-0.80	≤0.025	≤0.020	≤0.25	≤0.25	≤0.25	-
	St55	0.33-0.41	0.17-0.37	0.50-0.80	≤0.025	≤0.020	≤0.25	≤0.25	≤0.25	-
	St52.0	≤0.22	≤0.55	≤1.60	≤0.025	≤0.020	≤0.25	≤0.25	≤0.25	-
	CK45	0.42-0.50	0.17-0.37	0.50-0.80	≤0.025	≤0.020	≤0.25	≤0.25	≤0.25	-

注：经协商，也可供应其他牌号的钢管
Note: Other grade also be provided after consulting with customers.

钢管规范重量表 Specification and Weights of Steel Pipes

名称 Name	外径 Outside Diameter	(mm)	外径厚度 (mm) Outside Diameter Thickness											外径 Outside Diameter	
			(A)	(B)	S.G.P.	Sch. 10	Sch. 20	Sch. 30	Sch. 40	Sch. 60	Sch. 80	Sch. 100	Sch. 120		Sch. 140
80	3	89.1	4.2 8.79		4.5 9.39		5.5 11.3	6.6 13.4	7.6 15.3					11.1 21.4	89.1
90	3 1/2	101.6	4.2 10.1		4.5 10.8		5.7 13.5	7.0 16.3	8.1 18.7					12.7 27.8	101.6
100	4	114.3	4.5 12.2		4.9 13.2		6.0 16.0	7.1 18.8	8.6 22.4		11.1 28.2			13.5 33.6	114.3
125	5	139.8	4.5 15.0		5.1 16.9		6.6 21.7	8.1 26.3	9.5 30.5		12.7 39.8			15.9 48.6	139.8
150	6	165.2	5.0 19.8		5.5 21.7		7.1 27.7	9.3 35.8	11.0 41.8		14.3 53.2			18.2 66.0	165.2
200	8	216.3	5.8 30.1		6.4 33.1	7.0 36.1	8.2 42.1	10.3 52.3	12.7 63.8	15.1 74.9	18.3 88.9	20.6 99.4	23.0 110	216.3	
250	10	267.4	6.6 42.4		6.4 41.2	7.8 49.9	9.3 59.2	12.7 79.8	15.1 93.9	18.2 112	21.4 130	25.4 152	28.6 168	267.4	
300	12	318.5	6.9 53.0		6.4 49.3	8.4 64.2	10.3 78.3	14.3 107	17.4 129	21.4 157	25.4 184	28.6 204	33.3 234	318.5	
350	14	355.6	7.9 67.7	6.4 55.1	7.9 67.7	9.5 81.1	11.1 94.3	15.1 127	19.0 158	23.8 195	27.8 225	31.8 254	35.7 282	355.6	
400	16	406.4	7.9 77.6	6.4 63.1	7.9 77.6	9.5 93.0	12.7 123	16.7 160	21.4 203	26.2 246	30.9 286	36.5 333	40.5 365	406.4	
450	18	457.2	7.9 87.5	6.4 71.1	7.9 87.5	11.1 122	14.3 156	19.0 206	23.8 254	29.4 310	34.9 263	39.7 409	45.2 459	457.2	
500	20	508.0	7.9 97.4	6.4 79.2	9.5 117	12.7 155	15.1 184	20.6 248	26.2 311	32.5 381	38.1 441	44.4 508	50.0 565	508.0	
550	22	558.8		6.4 86.5	9.5 129	12.7 171	15.9 213	22.2 294	28.6 374	34.9 451	41.3 527	47.6 600	54.0 672	558.8	
600	24	609.6		6.4 94.5	9.5 141	14.3 210	17.5 256	24.6 355	31.0 442	38.9 547	46.0 639	52.4 720	59.5 807	609.6	
650	26	660.4					18.9 299	26.4 413	34.0 525	41.6 635	49.1 740	56.6 843	64.2 944	660.4	
(A)	(B)	(mm)	S.G.P.	Sch. 10	Sch. 20	Sch. 30	Sch. 40	Sch. 60	Sch. 80	Sch. 100	Sch. 120	Sch. 140	Sch. 160	(mm)	

END: 1 1/4" & under plain square cut ends
2" & above bevelled ends



钢管规范重量表 Specification and Weights of Steel Pipes

Nominal pipe size mm/inch	OD mm	10	20	30	STD	40	60	X S	80	100	120	140	160	XXS
80 3	88.9				5.49 11.29	5.49 11.29		7.62 15.27	7.62 15.27				11.13 21.35	15.24 27.68
90 3 1/2	101.6				5.74 13.57	5.74 13.57		8.08 18.63	8.08 18.63				-	-
100 4	114.3				6.02 16.07	6.02 16.07		8.56 22.32	8.56 22.32		11.13 28.32		13.49 33.54	17.12 41.03
125 5	141.3				6.55 21.77	6.55 21.77		9.53 30.97	9.53 30.97		12.70 40.26		15.88 49.11	19.05 57.43
150 6	168.3				7.11 28.26	7.11 28.26		10.97 42.56	10.97 42.56		14.27 54.2		18.26 67.56	21.95 79.22
200 8	219.1		6.35 33.31	7.04 36.81	8.18 42.55	8.18 42.55	10.31 53.08	12.70 64.64	12.70 64.64	15.09 75.92	18.26 90.44	20.62 100.92	23.01 111.27	22.23 107.92
250 10	273.1		6.35 41.77	7.80 51.03	9.27 60.31	9.27 60.31	12.70 81.55	12.70 81.55	15.09 96.01	18.26 114.75	21.44 133.06	25.40 155.15	28.58 172.33	25.40 155.15
300 12	323.9		6.35 49.73	8.38 65.20	9.53 73.88	10.31 79.73	14.27 108.96	12.70 97.46	17.48 132.08	21.44 159.91	25.40 186.75	28.58 208.14	33.32 238.76	25.40 186.97
350 14	355.6	6.35 54.69	7.92 67.90	9.53 81.33	9.53 81.33	11.13 94.55	15.09 126.71	12.70 107.39	19.05 158.10	23.83 194.96	27.79 224.65	31.75 253.56	35.71 281.70	
400 16	406.4	6.35 62.64	7.92 77.83	9.53 93.27	9.53 93.27	12.70 123.30	16.66 160.12	12.70 203.53	21.44 245.56	26.19 286.64	30.96 333.19	36.53 333.19	40.49 365.35	
450 18	457.2	6.35 70.57	7.92 87.71	11.13 122.38	9.53 105.16	14.27 155.80	19.05 205.74	12.70 139.15	23.88 254.55	29.36 309.62	34.93 363.56	39.67 408.26	45.24 459.37	
500 20	508.0	6.35 78.55	9.53 117.15	12.7 155.12	9.53 117.15	15.09 183.42	20.62 247.83	12.70 155.12	26.19 311.17	32.54 381.53	38.10 441.49	44.45 508.11	50.01 564.81	
550 22	558.8	6.35 86.54	9.53 129.13	12.7 171.09	9.53 129.13	-	22.23 294.25	12.70 171.09	28.58 373.83	34.93 451.42	41.28 527.02	47.63 600.63	53.98 672.26	
600 24	609.6	6.35 94.53	9.53 141.12	14.27 209.64	9.53 141.12	17.48 255.41	24.61 355.26	12.70 187.06	30.96 442.08	38.89 547.71	46.02 640.03	52.37 720.15	59.54 808.22	
650 26	660.4	7.92 127.36	12.7 202.72	-	9.53 152.87	-		12.70 202.72						
700 28	711.2	7.92 137.32	12.7 218.69	15.88 271.21	9.53 164.85	-		12.70 218.69						
750 30	762.0	7.92 147.28	12.7 234.67	15.88 292.18	9.53 176.84	-		12.70 234.67						
800 32	812.8	7.92 157.24	12.7 250.64	15.88 312.15	9.53 188.82	17.48 342.91		12.70 250.64						
850 34	863.6	7.92 167.20	12.7 266.61	15.88 332.12	9.53 200.31	17.48 364.90		12.70 266.61						
900 36	914.4	7.92 176.96	12.7 282.27	15.88 351.70	9.53 212.56	19.05 420.40		12.70 282.27						

Wall Thickness=mm
Weight=kg/m(plam end mass)
5s,10s,40s,80s,-ANSI B36.19

TECHNICAL PARAMETERS OF LINE PIPE 管线管技术参数

API SPEC 5L

► 用途 (Uses):

用于石油、天然气工业中的气、水、油输送。

For conveying gas,water,and oil in both the oil and natural gas industries.

尺寸公差 Tolerances on Dimensions

标准 Standard	外径公差 Outside Diameter Tolerance		壁厚公差 Wall Thickness Tolerance
API SPEC 5L	D < 60.3mm	+0.41mm / -0.40mm	+15% / -12.5%
	D ≥ 60.3mm	+0.75% / -0.40mm	

机械性能 Mechanical Properties

标准 Standard	钢级 Grade	屈服强度 (MPa) Yield Strength		抗拉强度 (MPa) Tensile strength		伸长率 (%) Elongation	冲击功 (J) Impact Energy		
API SPEC 5L	PSL1								
	A25	≥ 172		≥ 310		查API SPEC 5L表3 See table 3 of API SPEC 5L	Min		
	A	≥ 207		≥ 331					
	B	≥ 241		≥ 414					
	X42	≥ 290		≥ 414					
	X46	≥ 317		≥ 434					
	X52	≥ 359		≥ 455					
	X56	≥ 386		≥ 490					
	X60	≥ 414		≥ 517					
	X65	≥ 448		≥ 531					
	X70	≥ 483		≥ 565					
	PSL2								
			Min	Max	Min			Max	
	B	241	448	414	758			41(27)	
	X42	290	496	414	758			41(27)	
	X46	317	524	434	758			41(27)	
	X52	359	531	455	758			41(27)	
X56	386	544	490	758	41(27)				
X60	414	565	517	758	41(27)				
X65	448	600	531	758	41(27)				
X70	483	621	565	758	41(27)				
X80	552	690	621	827	101(68)				

注: 括号内为横向冲击功要求

Note: Transverse impact energy requirements are shown in brackets.

化学成分 Chemical Composition(%)

标准 Standard	钢级 Grade	C	Mn	P		S	Ti
		Max	Max	Min	Max	Max	Max
API SPEC 5L	PSL1						
	A25 I	0.21	0.60		0.030	0.030	
	A25 II	0.21	0.60	0.45	0.080	0.030	
	A	0.22	0.90		0.030	0.030	
	B	0.28	1.20		0.030	0.030	0.04
	X42	0.28	1.30		0.030	0.030	0.04
	X46,X52,X56	0.28	1.40		0.030	0.030	0.04
	X60	0.28	1.40		0.030	0.030	0.04
	X65,X70	0.28	1.40		0.030	0.030	0.06
	PSL2						
	B	0.24	1.20		0.025	0.015	0.04
	X42	0.24	1.30		0.025	0.015	0.04
	X46,X52,X56,X60	0.24	1.40		0.025	0.015	0.04
	X65,X70,X80	0.24	1.40		0.025	0.015	0.06

注: PSL2最大碳当量CE(II W)为0.43%
Note: CE(II W) 0.43%MAX. for PSL2.

SPECIFICATION AND WEIGHTS OF STEEL PIPES
钢管规范重量表

标准 (standard):

ANSI Pipe Schedule
SI-units(metric)

OD's=mm
Wall thickness=mm
Weight=kg/m(plain end mass)

For 5 S, 10 S, 40 S, 80 S:
Figures based on austenitic steel
(ASTM/API/ASME)

钢管规范重量表 Specification and Weights of Steel Pipes

Nominal pipe size mm/inch	OD mm	10	20	30	STD	40	60	XS	80	100	120	140	160	XXS
6 1/8	10.3				1.73 0.73	1.73 0.73		2.41 0.47	2.41 0.47					
8 1/4	13.7				2.24 0.63	2.24 0.63		3.02 0.80	3.02 0.80					
10 3/8	17.1				2.31 0.84	2.31 0.84		3.20 1.10	3.20 1.10					
15 1/2	21.3				2.77 1.27	2.77 1.27		3.73 1.62	3.73 1.62				4.78 1.95	4.77 2.55
20 3/4	26.7				2.87 1.69	2.87 1.69		3.91 2.20	3.91 2.20				5.56 2.90	7.82 3.64
25 1	33.4				3.38 2.50	3.38 2.50		4.55 3.24	4.55 3.24				6.35 4.24	9.09 5.45
32 1 1/4	42.2				3.56 3.39	3.56 3.39		4.85 4.47	4.85 4.47				6.35 5.61	9.70 7.77
40 1 1/2	48.3				3.68 4.05	3.68 4.05		5.08 5.41	5.08 5.41				7.14 7.25	10.15 9.56
50 2	60.3				3.91 5.44	3.91 5.44		5.54 7.48	5.54 7.48				8.74 11.11	11.07 13.44
65 2 1/2	73.0				5.16 8.63	5.16 8.63		7.01 11.41	7.01 11.41				9.53 14.92	14.02 20.39

▶ ASTM A 53M, ASTM A 106规格系列 Ranges acc. ASTM A 53M, ASTM A 106

名义尺寸 Nominal Size	外径 Outside Diameter		壁厚 Wall Thickness		平端管米重 Plain-End Weight Wpc	
	inch	mm	inch	mm	lb/ft	Kg/m
3-1/2	4.00	101.6	0.156	3.96	6.40	9.63
	4.00	101.6	0.172	4.37	7.03	10.55
	4.00	101.6	0.188	4.78	7.65	11.46
	4.00	101.6	0.226	5.74	9.11	13.48
	4.00	101.6	0.250	6.35	10.01	15.02
	4.00	101.6	0.281	7.14	11.16	16.55
	4.00	101.6	0.318	8.08	12.50	18.68
4	4.500	114.3	0.156	3.96	7.24	10.88
	4.500	114.3	0.172	4.37	7.95	11.92
	4.500	114.3	0.188	4.78	8.66	12.96
	4.500	114.3	0.203	5.16	9.32	13.99
	4.500	114.3	0.219	5.56	10.01	15.01
	4.500	114.3	0.237	6.02	10.79	16.02
	4.500	114.3	0.250	6.35	11.35	17.03
	4.500	114.3	0.281	7.14	12.66	18.77
	4.500	114.3	0.312	7.92	13.96	20.73
	4.500	114.3	0.337	8.56	14.98	22.42
	4.500	114.3	0.438	11.13	19.00	28.25
	4.500	114.3	0.531	13.49	22.51	33.56
	5	4.500	114.3	0.674	17.12	27.54
5.563		141.3	0.156	3.96	9.02	13.41
5.563		141.3	0.188	4.78	10.80	16.09
5.563		141.3	0.219	5.56	12.51	18.61
5.563		141.3	0.258	6.35	14.63	21.76
5.563		141.3	0.281	7.11	15.87	23.62
5.563		141.3	0.312	7.92	17.51	26.05
5.563		141.3	0.344	8.74	19.19	28.57
5.563		141.3	0.375	9.53	20.80	30.97
5.563		141.3	0.500	10.70	27.06	40.28
5.563		141.3	0.625	15.88	32.99	49.11
6.625		141.3	0.750	19.05	38.59	57.43
6		6.625	168.3	0.188	4.78	12.92
	6.625	168.3	0.219	5.56	14.98	22.31
	6.625	168.3	0.250	6.35	17.02	25.36
	6.625	168.3	0.280	7.11	18.97	28.26
	6.625	168.3	0.312	7.92	21.04	31.32
	6.625	168.3	0.344	8.74	32.10	34.39
	6.625	168.3	0.375	9.53	35.05	37.31
	6.625	168.3	0.432	10.97	38.57	42.56
	6.625	168.3	0.562	14.27	45.20	54.20
	6.625	168.3	0.719	18.26	53.35	67.56
	6.625	168.3	0.864	21.95	63.16	79.22

TECHNICAL PARAMETERS OF BOILER TUBE
锅炉管技术参数

- ▶ 标准 (standard):
 美国机械工程师协会标准/American Society of Mechanical Engineers
 ASME SA-106、ASME SA-192M、ASME SA-209M、ASME SA-210M、ASME SA-213M
 德国工业标准/Deutsche Industrie Normen / DIN17175
 中国国家标准/China National Standard/ GB 3087、GB5310
 日本工业标准/Japanese Industrie Standard/ JIS G 3461
- ▶ 用途 (Uses):
 用于锅炉水冷壁、省煤器、再热器、过热器和蒸汽管道的制造。
 For manufacture wall panel, economizer, reheater, superheater and steam pipeline of boilers.

▶ 尺寸公差 Tolerances on Dimensions 外径允许偏差 Outside Diameter Tolerance

标准 Standard	外径 Outside Diameter (mm)	外径允许偏差 Tolerance
DIN17175	≤100	+0.75% (min. +0.5mm)
	>100	+0.90%
GB 3087	≤180	+1.0% (min. +0.5mm)
	>180	+1.0%
GB 5310	≤50	+0.5mm
	>50	+1.0%
ASME SA-192M、ASME SA-209M、ASME SA-210M、ASME SA-213M、JIS G 3461	≤101.6	±0.4,-0.8mm
	>101.6-190.5	±0.4,-1.2mm
ASME SA-106	≤48.3	+0.40mm
	>48.3-114.3	+0.79mm
	>114.3	+1.5,-0.79mm

▶ 壁厚允许偏差 Wall Thickness Tolerance

标准 Standard	外径 Outside Diameter da (mm)	壁厚 Wall Thickness S (mm)	壁厚允许偏差 Tolerance
DIN17175	≤130	S ≤ 2Sn	+15%,-10%
		2Sn ≤ S ≤ 4Sn	+12.5%,-10%
		S > 4Sn	+9%
	>130	S ≤ 0.05da	+17.5%,-12.5%
		0.05da ≤ S ≤ 0.11da	+12.5%
GB 3087	—	S > 0.11da	+10%
		3-20	+15%,-12.5% (min. +0.45mm-0.35mm)
		>20	+12.5%
GB 5310	—	<3.5	+15%,-10% (min. +0.48mm-0.32mm)
		3.5-20	+15%,-10%
		>20	+10%
ASME SA-192M、ASME SA-209M、ASME SA-210M、ASME SA-213M、JIS G 3461	—	2.41-3.8	+35%,-0%
		>3.8-4.6	+33%,-0%
		>4.6	+28%,-0%
ASME SA-106	—	—	+12.5%

注: Sn为标准壁厚。 Note: "Sn" is standard wall thickness.

力学性能 Mechanical Properties

标准 Standard	牌号 Grade	抗拉强度 Tensile strength (MPa)	屈服强度 (MPa) 不小于 Yield Strength Not less than		伸长率 (%) 不小于 Elongation Not less than	冲击功 (J) 不小于 Impact Not less than	硬度 不大于 Hardness Not more than
			<15mm	≥15mm			
GB 3087	10	335-475	195		24	—	—
	20	410-550	245	225	20	—	—
DIN 17175			≤16mm	>16mm			
	St35.8	360-480	235	225	25	—	—
	St45.8	410-530	255	245	21	—	—
	15Mo3	450-600	270		22	—	—
	13CrMo44	440-590	270		22	—	—
	10CrMo910	450-600	280		20	—	—
	14MoV63	460-610	320		20	55	—
	12Cr1MoV	470-640	255		21	41	—
GB 5310	20G	410-550	245		24	35	—
	20MnG	≥415	240		22	35	—
	25MnG	≥485	275		20	35	—
	15MoG	450-600	270		22	35	—
	20MoG	≥415	220		22	35	—
	12Cr1MoG	410-560	205		21	35	—
	15Cr1MoG	440-640	235		21	35	—
	12Cr2MoG	450-600	280		20	35	—
	12Cr1MoG	470-640	255		21	35	—
	12CrMoWVTB	540-735	345		18	35	—
	10Cr9Mo1VNb	≥585	415		20	—	77HRB(137HB)
	ASME SA-192M	SA-192	≥325	180		35	—
ASME SA-106M	SA-106B	≥415	240		—	—	—
	SA-106C	≥485	275		—	—	79HRB(143HB)
ASME SA-210M	SA-210A1	≥415	255		—	—	89HRB(179HB)
	SA-210C	≥485	275		—	—	81HRB(153HB)
ASME SA-209M	SA-209T1a	≥415	220		—	—	85HRB(163HB)
ASME SA-213M	SA-213T2	≥415	205		—	—	85HRB(163HB)
	SA-213T11	≥415	205		—	—	85HRB(163HB)
	SA-213T12	≥415	220		—	—	85HRB(163HB)
	SA-213T22	≥415	205		—	—	85HRB(163HB)
	SA-213T23	≥510	400		—	—	97HRB(220HB)
	SA-213T91	≥585	415		—	—	25HRC(250HB)
JIS G 3461	STB 340	≥340	175		—	—	—
	STB 410	≥410	255		—	—	—

ASTM A 53M, ASTM A 106规格系列 Ranges acc. ASTM A 53M, ASTM A 106

名义尺寸 Nominal Size	外径 Outside Diameter		壁厚 Wall Thickness		平端管米重 Plain-End Weight Wpc	
	inch	mm	inch	mm	lb/ft	Kg/m
1	1.315	33.4	0.133	3.38	1.68	2.52
	1.315	33.4	0.179	4.55	2.17	3.21
1-1/4	1.600	42.2	0.140	3.56	2.27	3.43
	1.660	42.2	0.191	4.85	3.00	4.51
1-1/2	1.900	48.3	0.145	3.68	2.72	4.07
	1.900	48.3	0.200	5.08	3.63	5.43
	1.900	48.3	0.281	7.14	4.86	7.25
	1.900	48.3	0.400	10.15	6.41	9.56
2	2.375	60.3	0.125	3.18	3.00	4.51
	2.375	60.3	0.141	3.58	3.36	5.03
	2.375	60.3	0.154	3.91	3.65	5.42
	2.375	60.3	0.172	4.37	4.05	6.07
	2.375	60.3	0.188	4.78	4.39	6.57
	2.375	60.3	0.218	5.54	5.02	7.43
	2.375	60.3	0.250	6.35	5.67	8.51
	2.375	60.3	0.281	7.14	6.28	9.31
	2.375	60.3	0.344	8.74	7.46	11.11
	2.375	60.3	0.436	11.07	9.03	13.47
2-1/2	2.875	73.0	0.125	3.18	3.67	5.51
	2.875	73.0	0.141	3.58	4.12	6.16
	2.875	73.0	0.156	3.96	4.53	6.81
	2.875	73.0	0.172	4.37	4.97	7.44
	2.875	73.0	0.188	4.78	5.40	8.07
	2.875	73.0	0.203	5.16	5.79	8.69
	2.875	73.0	0.216	5.49	6.13	9.16
	2.875	73.0	0.250	6.35	7.01	10.51
	2.875	73.0	0.276	7.01	7.66	11.39
	2.875	73.0	0.375	9.52	10.01	14.92
3	3.500	88.9	0.141	3.58	5.06	7.57
	3.500	88.9	0.156	3.96	5.57	8.37
	3.500	88.9	0.172	4.37	6.11	9.17
	3.500	88.9	0.188	4.78	6.65	9.95
	3.500	88.9	0.216	5.49	7.58	11.31
	3.500	88.9	0.250	6.35	8.68	13.02
	3.500	88.9	0.281	7.14	9.66	14.32
	3.500	88.9	0.300	7.62	10.25	15.24
	3.500	88.9	0.438	11.13	14.32	21.35
	3.500	88.9	0.600	15.24	18.58	27.68

机械性能 Mechanical Properties

标准 Standard	牌号 Grade	抗拉强度 Tensile strength (MPa)	屈服强度 (MPa) Yield Strength		伸长率 (%) Elongation
			≥16mm	>16mm	
GB/T 8163	10	335-475	≥205	≥195	≥24
	20	410-550	≥245	≥235	≥20
	Q295	430-610	≥295	≥285	≥22
	Q345	490-665	≥325	≥315	≥21
ASTMA 53M	A	≥330	≥205		查ASTMA53的表3 See Table 3 of ASTM A 53
	B	≥415	≥240		
ASTM A 106	A	≥330	≥205		查ASTMA106的表4 See Table 4 of ASTM A 106
	B	≥415	≥240		
	C	≥485	≥275		

化学成分 Chemical Composition(%)

标准 Standard	牌号 Grade	C	Si	Mn	P	S	Ni	Cr	Cu	Mo	V
GB/T 8163	10	0.07-0.13	0.07-0.37	0.35-0.65	≤0.035	≤0.035	≤0.30	≤0.15	≤0.25	-	-
	20	0.17-0.23	0.17-0.37	0.35-0.65	≤0.035	≤0.035	≤0.30	≤0.25	≤0.25	-	-
	Q295A	≤0.16	≤0.55	0.80-1.50	≤0.045	≤0.045	≤0.30	≤0.30	≤0.30	-	-
	Q295B	≤0.16	≤0.55	0.80-1.50	≤0.040	≤0.040	≤0.30	≤0.30	≤0.30	-	-
	Q345A	≤0.20	≤0.55	1.00-1.60	≤0.045	≤0.045	≤0.30	≤0.30	≤0.30	-	-
	Q345B	≤0.20	≤0.55	1.00-1.60	≤0.040	≤0.040	≤0.30	≤0.30	≤0.30	-	-
	Q345C	≤0.20	≤0.55	1.00-1.60	≤0.035	≤0.035	≤0.30	≤0.30	≤0.30	-	0.02-0.15
	Q345D	≤0.18	≤0.55	1.00-1.60	≤0.030	≤0.030	≤0.30	≤0.30	≤0.30	-	0.02-0.15
Q345E	≤0.18	≤0.5	1.00-1.60	≤0.025	≤0.025	≤0.30	≤0.30	≤0.30	-	0.02-0.15	
ASTMA 53M	A	≤0.25	-	≤0.95	≤0.05	≤0.045	≤0.40	≤0.40	≤0.40	≤0.15	≤0.08
	B	≤0.30	-	≤1.20	≤0.05	≤0.045	≤0.40	≤0.40	≤0.40	≤0.15	≤0.08
ASTMA 106	A	≤0.25	≥0.10	0.27-0.93	≤0.035	≤0.035	≤0.40	≤0.40	≤0.40	≤0.15	≤0.08
	B	≤0.30	≥0.10	0.29-1.06	≤0.035	≤0.035	≤0.40	≤0.40	≤0.40	≤0.15	≤0.08
	C	≤0.35	≥0.10	0.29-1.06	≤0.035	≤0.035	≤0.40	≤0.40	≤0.40	≤0.15	≤0.08

注：经协商，也可供应其他牌号的钢管
Note: Other grade also be provided after consulting with customers.

TECHNICAL PARAMETERS OF BOILER TUBE
锅炉管技术参数

化学成分 Chemical Composition(%)

采用标准 Standard	牌号 Grade	C	Si	Mn	P	S	Cr	Mo	V	Ti	B	W	Nb
GB 3087	10	0.07-0.13	0.17-0.37	0.35-0.65	≤0.025	≤0.020	≤0.15	-	-	-	-	-	-
	20	0.17-0.23	0.17-0.37	0.35-0.65	≤0.025	≤0.020	≤0.25	-	-	-	-	-	-
DIN 17175	St35.8	≤0.17	0.10-0.35	0.40-0.80	≤0.025	≤0.020	-	-	-	-	-	-	-
	St45.8	≤0.21	0.10-0.35	0.40-1.20	≤0.025	≤0.020	-	-	-	-	-	-	-
	15Mo3	0.12-0.20	0.10-0.35	0.40-0.80	≤0.025	≤0.020	-	0.25-0.35	-	-	-	-	-
	13CrMo44	0.10-0.18	0.10-0.35	0.40-0.70	≤0.025	≤0.020	0.70-1.10	0.45-0.65	-	-	-	-	-
	10CrMo910	0.08-0.15	≤0.50	0.40-0.70	≤0.025	≤0.020	2.00-2.50	0.90-1.20	-	-	-	-	-
	14MoV63	0.10-0.18	0.10-0.35	0.40-0.70	≤0.025	≤0.020	0.30-0.60	0.50-0.70	0.22-0.32	-	-	-	-
	12Cr1MoV	0.08-0.15	0.17-0.37	0.40-0.70	≤0.025	≤0.020	0.90-1.20	0.25-0.35	0.15-0.30	-	-	-	-
GB 5310	20G	0.17-0.24	0.17-0.37	0.35-0.65	≤0.025	≤0.020	-	-	-	-	-	-	-
	20MnG	0.17-0.24	0.17-0.37	0.70-1.00	≤0.025	≤0.020	-	-	-	-	-	-	-
	25MnG	0.22-0.30	0.17-0.37	0.70-1.00	≤0.025	≤0.020	-	-	-	-	-	-	-
	15MoG	0.12-0.20	0.17-0.37	0.40-0.80	≤0.025	≤0.020	-	0.25-0.35	-	-	-	-	-
	20MoG	0.15-0.25	0.17-0.37	0.40-0.80	≤0.025	≤0.020	-	0.44-0.65	-	-	-	-	-
	12CrMoG	0.08-0.15	0.17-0.37	0.40-0.70	≤0.025	≤0.020	0.40-0.70	0.40-0.55	-	-	-	-	-
	15CrMoG	0.12-0.18	0.17-0.37	0.40-0.70	≤0.025	≤0.020	0.80-1.10	0.40-0.55	-	-	-	-	-
	12Cr2MoG	0.08-0.15	≤0.50	0.40-0.70	≤0.025	≤0.020	2.00-2.50	0.90-1.20	-	-	-	-	-
	12Cr1MoVG	0.08-0.15	0.17-0.37	0.40-0.70	≤0.025	≤0.020	0.90-1.20	0.25-0.35	0.15-0.30	-	-	-	-

化学成分 Chemical Composition(%)

采用标准 Standard	牌号 Grade	C	Si	Mn	P	S	Cr	Mo	V	Ti	B	W	Nb
GB 5310	12Cr2MoWVTb	0.08-0.15	0.45-0.75	0.45-0.65	≤0.025	≤0.020	1.60-2.10	0.50-0.65	0.28-0.42	0.08-0.18	0.002-0.18	0.002-0.008	—
	10Cr9Mo1VNb	0.08-0.12	0.20-0.50	0.30-0.60	≤0.025	≤0.010	8.00-9.50	0.85-1.05	0.18-0.25	Ni ≤0.40	Al ≤0.40	N 0.030-0.070	0.06-0.10
ASME SA-192M	SA-192	0.06-0.18	≤0.25	0.27-0.63	≤0.025	≤0.020	—	—	—	—	—	—	—
ASME SA-106	SA-106B	≤0.30	≥0.10	0.29-1.06	≤0.025	≤0.020	—	—	—	—	—	—	—
	SA-106C	≤0.35	≥0.10	0.29-1.06	≤0.025	≤0.020	—	—	—	—	—	—	—
ASME SA-209M	SA-209T1a	0.15-0.25	0.10-0.50	0.30-0.80	≤0.025	≤0.020	—	0.44-0.65	—	—	—	—	—
ASME SA-210M	SA-210A1	≤0.27	≥0.10	≤0.93	≤0.025	≤0.020	—	—	—	—	—	—	—
	SA-210C	≤0.35	≥0.10	0.29-1.06	≤0.025	≤0.020	—	—	—	—	—	—	—
ASME SA-213M	SA-213T11	0.05-0.15	0.50-1.00	0.30-0.60	≤0.025	≤0.020	1.00-1.50	0.44-0.65	—	—	—	—	—
	SA-213T22	0.05-0.15	≤0.50	0.30-0.60	≤0.025	≤0.020	1.90-2.60	0.87-1.13	—	—	—	—	—
	SA-213T91	0.08-0.12	0.20-0.50	0.30-0.60	≤0.025	≤0.010	8.00-9.50	0.85-1.05	0.18-0.25	Ni ≤0.40	Al ≤0.40	N 0.030-0.070	0.06-0.10
	SA-213T23	0.04-0.10	0.50	0.10-0.60	≤0.025	≤0.010	1.90-2.60	0.05-0.30	0.20-0.30	Al, Ni ≤0.030	0.0005-0.006	1.45-1.75	0.02-0.08
	SA-213T2	0.10-0.20	0.10-0.30	0.30-0.61	≤0.025	≤0.020	0.50-0.81	0.44-0.65	—	—	—	—	—
	SA-213T12	0.05-0.15	≤0.50	0.30-0.61	≤0.025	≤0.020	0.80-1.25	0.44-0.65	—	—	—	—	—
JIS G 3461	STB 340	≤0.18	≤0.35	0.30-0.60	≤0.025	≤0.020	—	—	—	—	—	—	—
	STB 410	≤0.32	≤0.35	0.30-0.80	≤0.025	≤0.020	—	—	—	—	—	—	—

注：经协商，也可供应其他牌号的钢管
Note: Other grade also be provided after consulting with customers.

TECHNICAL PARAMETERS OF TUBE FOR CONVEYANCE OF FLUID
流体输送管技术参数

- ▶ 标准 (standard):
 GB/T 8163 China National Standard
 ASTM A 53M Standard of American Society for Testing & Materials
 ASTM A 106 Standard of American Society for Testing & Materials
- ▶ 用途 (Uses):
 用于石油、天然气输送以及其他流体输送。
 For conveyance of petroleum, gas and conveyance of other fluid.

尺寸公差 Tolerances on Dimensions

标准 Standard	外径公差 Outside Diameter Tolerance		壁厚公差 Wall Thickness Tolerance
GB/T 8163	D < 50mm	±0.50mm	+15%/-12.5% (最小min +0.45mm -0.40mm)
	D ≥ 50mm	±1%	
ASTM A 53M	D ≤ 48.3mm	±0.4mm	±12.5%
	D > 48.3	±1%	
ASTM A 106	D ≤ 48.3mm	±0.40mm	±15%/-10%
	48.3mm < D ≤ 114.3mm	±0.79mm	
	D > 114.3mm	±1.59/-0.79mm	