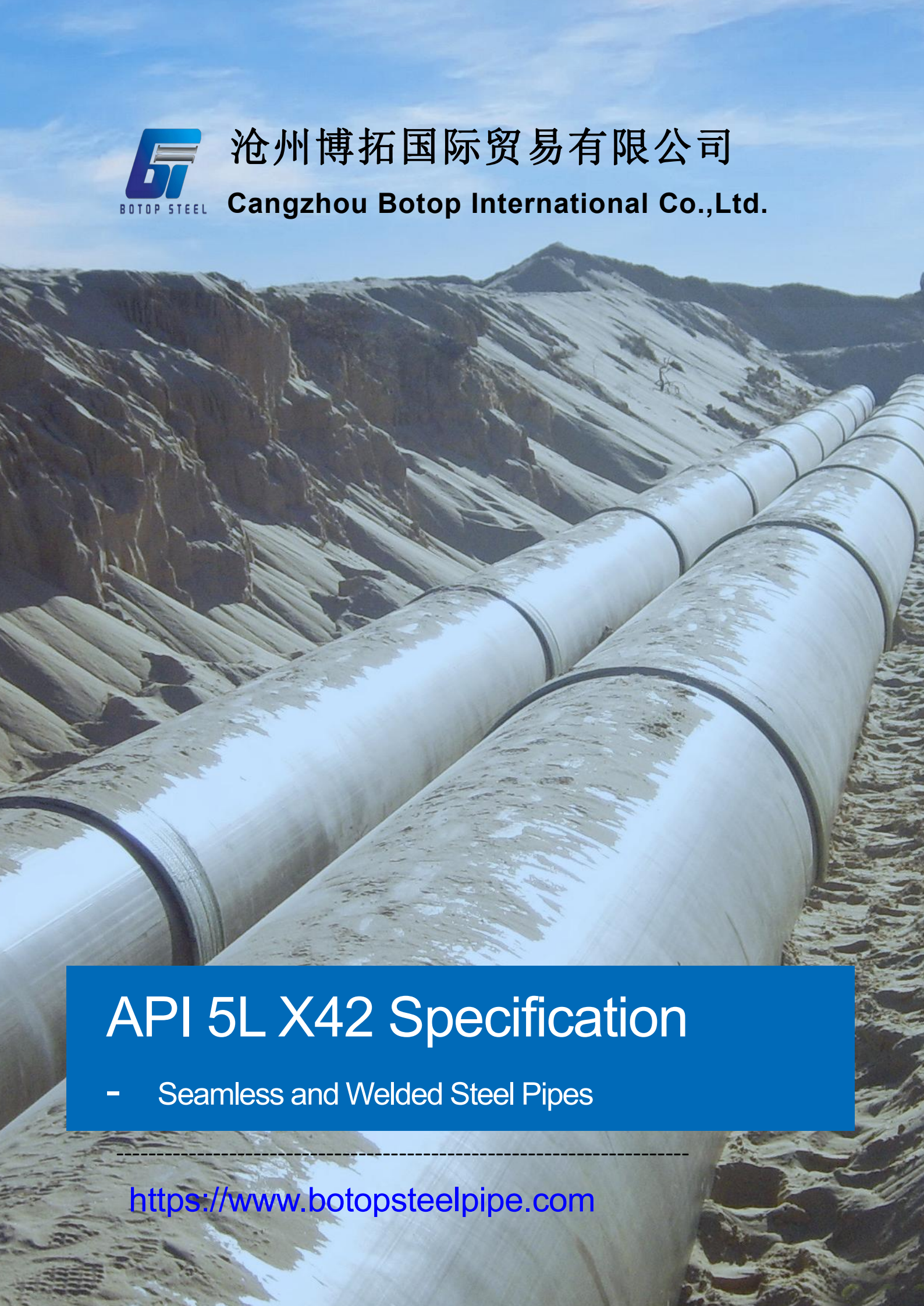

沧州博拓国际贸易有限公司

Cangzhou Botop International Co.,Ltd.

API 5L X42 Specification

- Seamless and Welded Steel Pipes

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https://www.botopsteelpipe.com

Navigation Buttons

What is API 5L Grade X42 Material?

- **API 5L X42**, also known as L290, is a type of line pipe used in the oil and gas industry.
- Material properties are a minimum yield strength of 42,100 psi (290 MPa) and a minimum tensile strength of 60,200 psi (415 MPa). It is one grade higher than API 5L Grade B and is suitable for medium-strength applications.
- X42 is commonly manufactured in Seamless, SSAW, LSAW, and ERW. Coatings and finishes are available to meet specific application requirements.

Delivery Conditions

Depending on the delivery conditions and PSL level, it can be categorized as follows：

PSL1: X42 or L290;

PSL2: X42R, X42N, X42Q, X42M or L290R, L290N, L290Q, L290M;

PSL	Delivery Condition	Pipe Grade/Steel Grade	
PSL1	As-rolled, normalizing rolled, thermomechanical rolled, thermomechanical formed, normalizing formed, normalized, normalized and tempered or quenched and tempered	X42	L290
PSL2	As-rolled	X42R	L290R
	Normalizing rolled, normalizing formed, normalized, or normalized and tempered	X42N	L290N
	Quenched and tempered	X42Q	L290Q
	Thermomechanical rolled or thermomechanical formed	X42M	L290M

The letters of the PSL2 suffix each represent a different heat treatment.

- **R**: Rolled;
- **N**: Normalizing;
- **Q**: Quenched and Tempered;
- **M**: Thermo-mechanical treatment.

API 5L X42 Manufacturing Process

X42 allows for the following manufacturing process:

API 5L PSL1 X42	**SMLS**	**LFW**	**HFW**	**LW**	**SAWL**	**SAWH**	**COWL**	**COWH**
API 5L PSL2 X42	**SMLS**	**—**	**HFW**	**—**	**SAWL**	**SAWH**	**COWL**	**COWH**

Common manufacturing processes and size ranges are listed below:

Abbreviations	Name	Outer Diameter	Wall Thickness
SSAW (HSAW,SAWH)	Spiral Submerged Arc Welding	200-3500 mm	5-25 mm
LSAW (SAWL)	Longitudinal Submerged Arc Welding	350-1500 mm	8-80 mm
ERW	Electric Resistance Welded	20-660 mm	2-20 mm
SMLS	Seamless	13.1-660 mm	2-100 mm

If you are interested in the above types of steel pipe and need further information or purchase, please feel free to contact us. We are able to supply steel pipes in various sizes and specifications to meet your needs.

Pipe End Types for API 5L X42

PSL1 Steel Pipe End: Belled end or Plain end;

PSL2 Steel Pipe End: Plain end;

For plain pipe ends the following requirements should be followed:

The end faces of t ≤ 3.2 mm (0.125 in) plain end pipe shall be square cut.

Plain-end tubes with t > 3.2 mm (0.125 in) shall be beveled for welding. The bevel angle should be 30-35° and the width of the root face of the bevel should be 0.8 - 2.4 mm (0.031 - 0.093 in).

API 5L X42 Chemical Composition

Chemical Composition for PSL 1 Pipe with t ≤ 25.0 mm (0.984 in.)

Steel Grade	Pipe Type	Mass Fraction,Based on Heat and Product Analyses [a,g] ,%						
		C	Mn	P	S	V	Nb	Ti
		max [b]	max [b]	max	max	max	max	max
X42 (L290)	Seamless Pipe	0.28	1.30	0.03	0.03	d	d	d
X42 (L290)	Welded Pipe	0.26	1.30	0.03	0.03	d	d	d

a Cu ≤ 0.50 %; Ni ≤ 0.50 %; Cr ≤ 0.50 % and Mo ≤ 0.15 %.
b For every 0.01 % decrease in carbon content from the specified maximum carbon content, the permitted manganese content is increased by 0.05 % from the specified maximum manganese content. For X42, the maximum manganese content is 1.65 %;
d Nb + V + Ti ≤ 0.15 %.
g No deliberate addition of B is permitted and the residual B ≤ 0.001 %.

Chemical Composition for PSL 2 Pipe with t ≤ 25.0 mm (0.984 in.)

Steel Grade	Pipe Type	Mass Fraction,Based on Heat and Product Analyses % max									Carbon Equivalent [a] %max	
		C [b]	Si	Mn [b]	P	S	V	Nb	Ti	Other	CE_{IIW}	CE_{pcm}
X42R (L290R)	Seamless and Welded Pipe	0.24	0.40	1.20	0.025	0.015	0.06	0.05	0.04	e,l	0.43	0.25
X42N (L290N)		0.24	0.40	1.20	0.025	0.015	0.06	0.05	0.04	e,l	0.43	0.25
X42Q (L290Q)		0.18	0.45	1.40	0.025	0.015	0.05	0.05	0.04	e,l	0.43	0.25
X42M (L290M)	Welded Pipe	0.22	0.45	1.30	0.025	0.015	0.05	0.05	0.04	e,l	0.43	0.25

a Based on product analysis,for seamless pipe with t>20.0 mm (0.787 in.),the CE limits shall be as agreed;the CEIIw limits apply if C > 0.12 % and the CE_{pcm} limits apply if C ≤ 0.12 %.
b For every 0.01 % decrease in carbon content from the specified maximum carbon content, the permitted manganese content is increased by 0.05 % from the specified maximum manganese content. For X42, the maximum manganese content is 1.65 %.
e Unless otherwise agreed, Cu ≤ 0.50 %; Ni ≤ 0.30 %; Cr ≤ 0.30 % and Mo ≤ 0.15 %.
l Unless otherwise agreed no intentional addition of B is permitted and residual B < 0.001 %.

For PSL2 steel pipe products analyzed with a carbon content of ≤0.12%, the carbon equivalent CEpcm can be calculated using the following formula:

$$CEpcm = C + \frac{Si}{30} + \frac{Mn}{20} + \frac{Cu}{20} + \frac{Ni}{60} + \frac{Cr}{20} + \frac{Mo}{15} + \frac{V}{15} + 5B$$

API 5L X42 Chemical Composition

For PSL2 steel pipe products analyzed with a carbon content > 0.12%, the carbon equivalent CE_{llw} can be calculated using the formula below:

$$CEllw = C + \frac{Mn}{6} + \frac{(Cr + Mo + V)}{5} + \frac{(Ni + Cu)}{15}$$

Chemical Composition with t＞25.0 mm (0.984 in.)

It shall be determined by negotiation and modified to a suitable composition based on the chemical composition requirements above.

API 5L X42 Mechanical Properties

Tensile Properties

PSL1 X42 Tensile Properties

Pipe Grade	Pipe Body of Seamless and Welded Pipe			Weld Seam of EW, LW, SAW, and COW Pipe
	Yield Strength $R_{t0.5}$ psi(MPa), min	Tensile Strength R_m psi(MPa), min	Elongation (on 50 mm or 2 in.) A_f %, min	Tensile Strength R_m psi(MPa), min
X42 (L290)	42,100 (290)	60,200 (415)	Note	60,200 (415)

PSL2 X42 Tensile Properties

Pipe Grade	Pipe Body of Seamless and Welded Pipe						Weld Seam of HFW SAW and COW Pipe
	Yield Strength $R_{t0.5}$ psi (MPa)		Tensile Strength R_m psi (MPa)		Ratio [a] $R_{t0.5}/R_m$	Elongatio (on 50 mm or 2 in.) A_f %	Tensile Strength R_m psi (MPa)
	min	max	min	max	max	min	min
X42R (L290R) X42N (L290N) X42Q (L290Q) X42M (L290M)	42,100 (290)	71,800 (495)	60,200 (415)	95,000 (655)	0.93	Note	60,200 (415)

a This limit applies for pipe with D > 323.9 mm (12.750 in.).

Note: The specified minimum elongation, Af shall be as determined using the following equation:

$$A_f = C \times (A_{xc}^{0.2}/U^{0.9})$$

API 5L X42 Mechanical Properties

Other Mechanical Experiments

Bend Test

Flattening Test

Guided-bend Test

CVN Impact Test for PSL 2 Pipe

DWT Test for PSL 2 Welded Pipe

Of course, not all tubes need to be tested for a full set of mechanical properties, but rather the tests are selected according to the type of tube. Specific requirements can be found in Tables 17 and 18 of the API 5L standard.

Hydrostatic Test

Test Time

All sizes of seamless and welded steel tubes with D ≤ 457 mm (18 in.): test time ≥ 5s;

Welded steel pipe D > 457 mm (18 in.): test time ≥ 10s.

Test Frequency

Each steel pipe and there shall be no leakage from the weld or pipe body during the test.

Test pressures

The hydrostatic test pressure P of a plain-end steel pipe can be calculated by using the formula.

$$P = 2St/D$$

S is the hoop stress. the value is equal to the specified minimum yield strength of the steel pipe x a percentage, in MPa (psi);

Pipe Grade	Specified Outside Diameter D mm (in.)	Percentage of Specified Minimum Yield Strength for Determination of S	
		Standard Test Pressure	Alternative Test Pressure
X42	≤ 141.3 (5.563)	60 [b]	75 [c]
	> 141.3 (5.563) to 219.1 (8.625)	75 [b]	75 [c]
	> 219.1 (8.625) to 508 (20)	85 [b]	85 [c]
	≥ 508 (20)	90 [b]	90 [c]

b It is not necessary that the test pressure exceed 20.5 MPa (2970 psi).
c For D ≤ 406.4 mm (16.000 in.), it is not necessary that the test pressure exceed 50.0 MPa (7260 psi); for D > 406.4 mm (16.000 in.), it is not necessary that the test pressure exceed 25.0 MPa (3630 psi).

Hydrostatic Test

t is the specified wall thickness, expressed in millimeters (inches);

D is the specified outside diameter, expressed in millimeters (inches).

Nondestructive Inspection

For SAW tubes, two methods, **UT** (ultrasonic testing) or **RT** (radiographic testing), are usually used.

ET (electromagnetic testing) is not applicable to SAW tubes.

Welded seams on welded pipes of grades ≥ L210/A and diameters ≥ 60.3 mm (2.375 in) shall be nondestructively inspected for full thickness and length (100 %) as specified.

Nondestructive Inspection

All seamless tubes of PSL 2, and quenched and tempered seamless tubes of PSL1 Grade B, shall be subjected to full-length (100 %) nondestructive testing.

One or a combination of **ET** (Electromagnetic Testing), **UT** (Ultrasonic Testing), and **MT** (Magnetic Particle Testing) can be used for NDT.

API 5L Pipe Schedule Chart

For ease of viewing and use, we have organized the relevant schedule PDF files.

You can always download and view these documents if needed.

API 5L Pipe Schedule Chart

Specify Outside Diameter and Wall Thickness

Standardized values for specified outside diameters and specified wall thicknesses of steel pipe are given in **ISO 4200** and **ASME B36.10M**.

Permissible Specified Outside Diameter and Specified Wall Thickness		
Specified Outside Diameter D mm (in.)	Specified Wall Thickness t mm (in.)	
	Special Light Sizes [a]	Regular Sizes
≥ 10.3 (0.405) to < 13.7 (0.540)	—	≥ 1.7 (0.068) to ≤ 2.4 (0.094)
≥ 13.7 (0.540) to < 17.1 (0.675)	—	≥ 2.2 (0.088) to ≤ 3.0 (0.118)
≥ 17.1 (0.675) to < 21.3 (0.840)	—	≥ 2.3 (0.091) to ≤ 3.2 (0.125)
≥ 21.3 (0.840) to < 26.7 (1.050)	—	≥ 2.1 (0.083) to ≤ 7.5 (0.294)
≥ 26.7(1.050) to < 33.4 (1.315)	—	≥ 2.1 (0.083) to ≤ 7.8 (0.308)
≥ 33.4(1311}5) to < 48.3 (1.900)	—	≥ 2.1 (0.083) to ≤ 10.0 (0.394)
≥ 48.3 (1.900) to < 60.3 (2.375)	—	≥ 2.1 (0.083) to ≤ 12.5 (0.492)
≥ 60.3 (2.375) to < 73.0 (2.875)	≥ 2.1 (0.083) to ≤ 3.6 (0.141)	> 3.6 (0.141) to ≤ 14.2 (0.559)
≥ 73.0 (2.875) to < 88.9 (3.500)	≥ 2.1 (0.083) to ≤ 3.6 (0.141)	> 3.6 (0.141) to ≤ 20.0 (0.787)
≥ 88.9 (3.500) to < 101.6 (4.000)	≥ 2.1 (0.083) to ≤ 4.0 (0.156)	> 4.0 (0.156) to ≤ 22.0 (0.866)
≥ 101.6(4.000) to < 168.3 (6.625)	≥ 2.1 (0.083) to ≤ 4.0 (0.156)	> 4.0(0.156) to ≤ 25.0 (0.984)
≥ 168.3 (6.625) to < 219.1 (8.625)	≥ 2.1 (0.083) to ≤ 4.0 (0.156)	> 4.0 (0.156) to ≤ 40.0(1.575)
≥ 219.1 (8.625) to < 273.1 (10.750)	≥ 3.2 (0.125) to ≤ 4.0 (0.156)	> 4.0 (0.156) to ≤ 40.0 (1.575)
≥ 273.1 (10.750) to < 323.9 (12.750)	≥ 3.6 (0.141) to ≤ 5.2 (0.203)	> 5.2 (0.203) to ≤ 45.0 (1.771)
≥ 323.9 (12.750) to < 355.6 (14.000)	≥ 4.0 (0.156) to ≤ 5.6 (0.219)	> 5.6 (0.219) to ≤ 45.0 (1.771)
≥ 355.6 (14.000) to < 457 (18.000)	≥ 4.5 (0.177) to ≤ 7.1 (0.281)	> 7.1 (0.281) to ≤ 45.0 (1.771)
≥ 457 (18.000) to < 559 (22.000)	≥ 4.8 (0.188) to ≤ 7.1 (0.281)	> 7.1 (0.281) to ≤ 45.0(1.771)
≥ 559 (22.000) to < 711 (28.000)	≥ 5.6 (0.219) to ≤ 7.1 (0.281)	> 7.1 (0.281) to ≤ 45.0 (1.771)
≥ 711 (28.000) to < 864 (34.000)	≥ 5.6 (0.219) to ≤ 7.1 (0.281)	> 7.1 (0.281) to ≤ 52.0 (2.050)
≥ 864 (34.000) to < 965 (38.000)	—	≥ 5.6 (0.219) to ≤ 52.0 (2.050)
≥ 965 (38.000) to < 1422 (56.000)	—	≥ 6.4 (0.250) to ≤ 52.0 (2.050)
≥ 1422 (56.000) to < 1829 (72.000)	—	≥ 9.5 (0.375) to ≤ 52.0 (2.050
≥ 1829 (72.000) to < 2134(84.000)	—	≥ 10.3 (0.406) to ≤ 52.0 (2.050)

a Pipe having the combination of specified outside diameter and specified wall thickness is defined as special light size pipe;other combinations given in this table are defined as regular size pipe.

Dimensional Tolerances

Tolerances for Diameter and Out-of-roundness

The diameter of a steel pipe is defined as the circumference of the pipe in any circumferential plane divided by π.

Specified Outside Diameter D mm (in.)	Diameter Tolerances mm (in.)				Out-of-roundness Tolerances mm (in.)	
	Pipe Except the End [a]		Pipe End [a,b,c]		Pipe Except the End [a]	Pipe End [a,b,c]
	SMLS Pipe	Welded Pipe	SMLS Pipe	Welded Pipe		
< 60.3 (2.375)	-0.8 (0.031) to +0.4 (0.016)		-0.8 (0.031) to +0.4 (0.016)		1.2 (0.048)	1.2 (0.036)
≥ 60.3 (2.375) to 168.3 (6.625)	±0.0075D		-0.4 (0.016) to +1.6 (0.063)		0.020D for D/t ≤ 75; by agreement for D/t > 75	0.015D for D/t ≤ 75; by agreement for D/t > 75
≥168.3 (6.625) to 610 (24.000)	±0.0075D	±0.0075D, but maximum of ±3.2 (0.125)	±0.005D, but maximum of ±1.6 (0.063)		0.020D	0.015D
≥610 (24.000) to 1422 (56.000)	±0.01D	±0.005D, but maximum of ±14.0 (0.063)	±2.0 (0.079)	± 1.6 (0.063)	0.015D, but maximum of 15 (0.6) for D/t ≤ 75; by agreement for D/t > 75	0.01D, but maximum of 13 (0.5) for D/t ≤ 75; by agreement for D/t > 75
> 1422 (56.000)	As agreed					

a The pipe end includes a length of 100 mm (4.0 in.) at each of the pipe extremities.
b For SMLS pipe, the tolerances apply for t < 25.0 mm (0.984 in.), and the tolerances for thicker pipe shall be as agreed.
c For expanded pipe with D ≥ 219.1 mm (8.625 in.) and for nonexpanded pipe, the diameter tolerance and the out-of-roundness tolerance may be determined using the calculated inside diameter (the specified outside diameter minus two times the specified wall thickness) or measured inside diameter rather than the specified outside diameter (see 10.2.8.3).

Dimensional Tolerances

Tolerances for Wall Thickness

Wall Thickness t mm (in.)	Tolerances [a] mm (in.)
SMLS Pipe [b]	
≤ 4.0 (0.157)	+0.6 (0.024) -0.5 (0.020)
> 4.0 (0.157) to < 25.0 (0.984)	+0.150t -0.125t
≥ 25.0 (0.984)	+3.7 (0.146) or +0.1t, whichever is the greater -3.0 (0.120) or -0.1t, whichever is the greater
Welded Pipe [c, d]	
≤ 5.0 (0.197)	±0.5 (0.020)
> 5.0 (0.197) to < 15.0 (0.591)	±0.1t
≥ 15.0 (0.591)	±1.5 (0.060)

a If the purchase order specifies a minus tolerance for wall thickness smaller than the applicable value given in this table, the plus tolerance for wall thickness shall be increased by an amount sufficient to maintain the applicable tolerance range.
b For pipe with D ≥ 355.6 mm (14.000 in.) and t ≥ 25.0 mm (0.984 in.), the wall thickness tolerance locally may exceed the plus tolerance for wall thickness by an additional 0.05t, provided that the plus tolerance for mass (see 9.14) is not exceeded.
c The plus tolerance for wall thickness does not apply to the weld area.
d See 9.13.2 for additional restrictions.

Dimensional Tolerances

Tolerance for Length

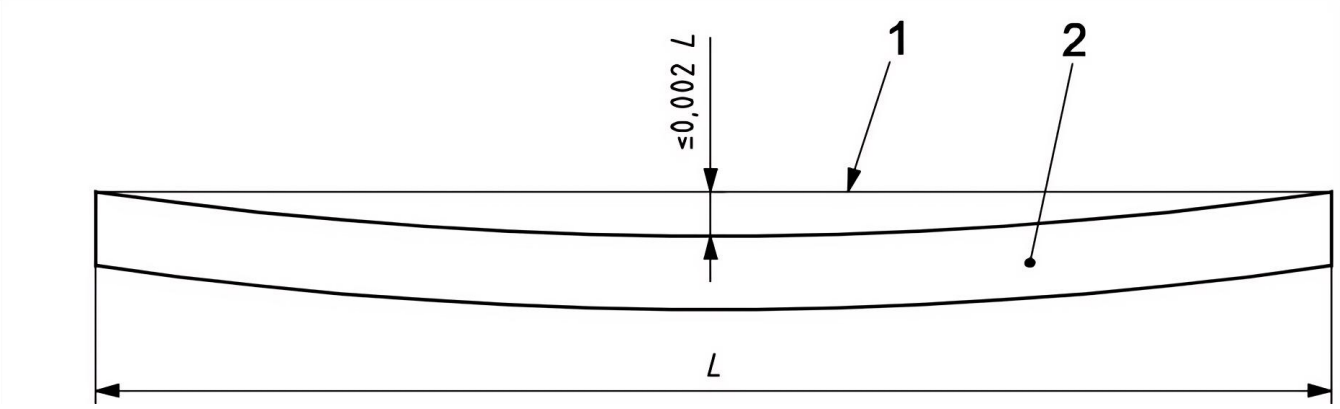
Approximate lengths shall be delivered within a tolerance of ±500 mm (20 in.).

Tolerances for **random length:**

Random Length Designation m (ft)	Minimum Length m (ft)	Minimum Average Length for Each Order Item m (ft)	Maximum Length m (ft)
Threaded-and-coupled Pipe			
6 (20)	4.88 (16.0)	5.33 (17.5)	6.86 (22.5)
9 (30)	4.11 (13.5)	8.00 (26.2)	10.29 (33.8)
12 (40)	6.71 (22.0)	10.67 (35.0)	13.72 (45.0)
Plain-end Pipe			
6 (20)	2.74 (9.0)	5.33 (17.5)	6.86 (22.5)
9 (30)	4.11 (13.5)	8.00 (26.2)	10.29 (33.8)
12 (40)	4.27 (14.0)	10.67 (35.0)	13.72 (45.0)
15 (50)	5.33 (17.5)	13.35 (43.8)	16.76 (55.0)
18 (60)	6.40 (21.0)	16.00 (52.5)	19.81 (65.0)
24 (80)	8.53 (28.0)	21.34 (70.0)	25.91 (85.0)

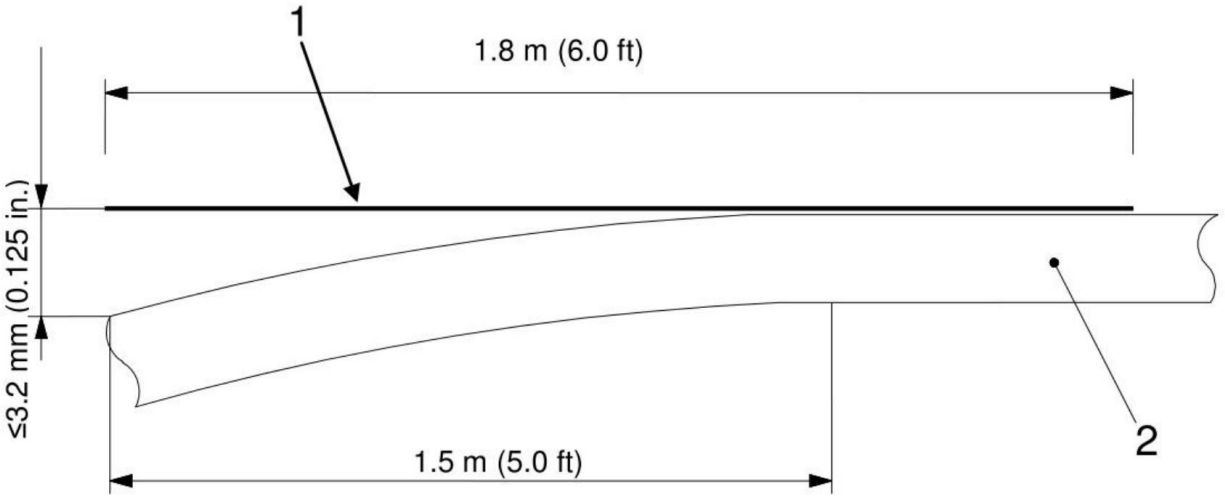
Tolerance for Straightness

Straightness deviation over the entire length of the tube: ≤ 0.200 L;



Dimensional Tolerances

Straightness deviation of 1.5 m (5.0 ft) pipe end of steel pipe: ≤ 3.2mm (0.125 in.).

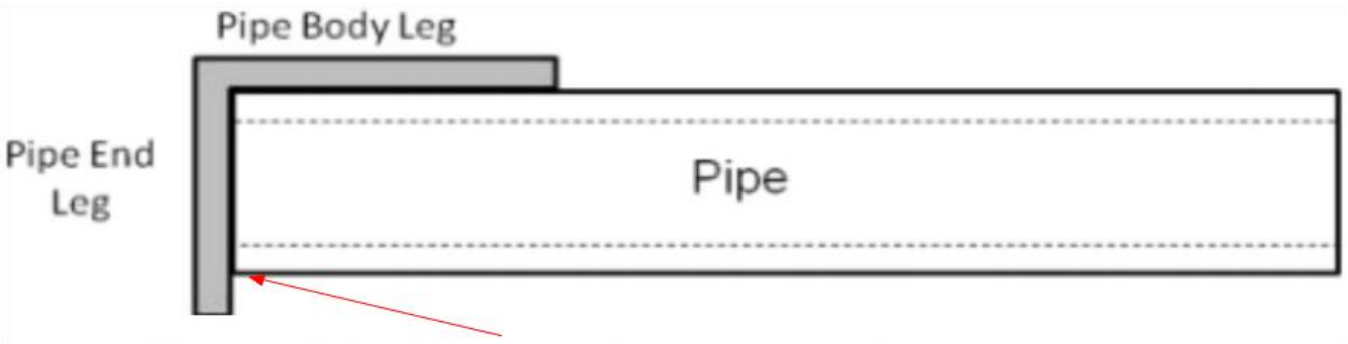


Key
1 straight line
2 pipe

Figure 2—Measuring End Straightness

Tolerance for Straightness

The out-of-squareness shall be < 1.6 mm (0.063 in.). The out-of-squareness is measured as the gap between the end of the pipe and the pipe end leg.



Dimensional Tolerances

Tolerances for the Weld Seam

Maximum Permissible Radial Offset for SAW and COW Pipe.

Specified Wall Thickness t mm (in.)	Maximum Permissible Radial Offset [a] mm (in.)
≤ 15.0 (0.590)	1.5 (0.060)
> 15.0 (0.590) to 25.0 (0.984)	0.1t
> 25.0 (0.984)	2.5 (0.098)
a These limits apply also to strip/plate end welds	

Maximum Permissible Weld Bead Height for SAW and COW Pipe (Except at Pipe Ends).

Specified Wall Thickness mm (in.)	Weld Bead Height mm (in.) maxim	
	Internal Bead	External Bead
≤13.0 (0.512)	3.5 (0.138)	3.5 (0.138)
>13.0 (0.512)	3.5 (0.138)	4.5 (0.177)

The weld shall have a smooth transition to the surface of the adjacent steel pipe. Pipe end welds are to be ground to a length of 100 mm (4.0 in.) with a residual weld height of ≤ 0.5 mm (0.020 in.).

Dimensional Tolerances

Tolerances for Mass

Each steel pipe：

a) for special light size pipe: -5.0% - +10.0%;

b) for pipe in Grade L175, L175P, A25, and A25P: -5.0% - +10.0%;

c) for all other pipes: -3.5% - +10.0%.

Pipe per lot (≥ 18 tons (20 tons) for order lot)：

a) for grades L175, L175P, A25, and A25P: -3.5 %;

b) for all other grades: -1.75 %.

Our Supply Range

- ★ Standard: API 5L or ISO 3183;
- ★ PSL1: X42 or L290;
- ★ PSL2: X42R, X42N, X42Q, X42M or L290R, L290N, L290Q, L290M;
- ★ Welded steel pipe: LSAW (SAWL), SSAW (HSAW), DSAW, ERW;
- ★ Seamless steel pipe: SMLS;
- ★ Pipe Schedules: SCH10, SCH20, SCH30, SCH40, SCH60, SCH80, SCH100, SCH120, SCH140 and SCH160.
- ★ Identification: STD (Standard), XS (Extra Strong), XXS (Double Extra Strong);
- ★ Coating: Paint, varnish, 3LPE, FBE, 3LPP, HDPE, galvanized, epoxy zinc-rich, cement weighted, etc.
- ★ Packing: Waterproof cloth, wooden case, steel belt or steel wire bundling, plastic or iron pipe end protector, etc. Customized.
- ★ Matching Products: Bends, flanges, pipe fittings, and other matching products are available.

Our Supply Range

In addition to high quality API 5L X42 steel pipe, we can also provide a wide range of pipe coatings to meet the needs of different projects.

Our Supply Range

Several different packaging methods for steel tubes: