



**PIPE**



# BLACK AND GALVANIZED PIPE

## A53 SEAMLESS, ERW, & A-106 SEAMLESS

### Schedule Weight Pipe

Seamless and Welded Steel Pipe, Plain End

**UPPER FIGURES—Wall Thickness in Inches**

**LOWER FIGURES—Weight Per Foot in Pounds**

CONTINUATION OF PAGE 97

Size: Nominal In.	Size: OD in.	USAS PIPE SCHEDULES												Extra Heavy	Double Extra Heavy
		40	STD.	60	80	100	120	140	160						
5	5.563	.258	.258	.322	.375	.375	.500	.500	.500	.500	.500	.625	.625	.750	
		14.62	14.62	20.78	20.78	20.78	20.78	20.78	20.78	20.78	20.78	20.78	32.96	32.96	38.55
6	6.625	.280	.280	.365	.432	.432	.562	.562	.562	.562	.562	.719	.719	.864	
		18.97	18.97	28.57	28.57	28.57	28.57	28.57	28.57	28.57	28.57	28.57	45.35	45.35	53.16
8	8.625	.250	.250	.322	.406	.406	.594	.594	.594	.594	.719	.812	.812	.875	
		22.36	22.36	28.55	28.55	35.64	43.39	43.39	43.39	43.39	43.39	43.39	67.76	67.76	72.42
10	10.750	.250	.250	.307	.365	.365	.500	.500	.500	.500	.500	.625	.625	.750	
		28.04	28.04	34.24	40.48	40.48	54.74	54.74	54.74	54.74	54.74	54.74	74.69	74.69	87.5
12	12.750	.250	.250	.330	.406	.406	.562	.562	.562	.562	.562	.719	.719	.875	
		33.38	33.38	43.77	53.52	49.56	73.15	73.15	73.15	73.15	73.15	73.15	104.13	104.13	115.64
14	14.000	.312	.312	.375	.438	.438	.594	.594	.594	.594	.594	.719	.719	.875	
		36.71	36.71	45.61	54.57	54.57	85.05	85.05	85.05	85.05	85.05	85.05	107.32	107.32	125.49
16	16.000	.312	.312	.375	.438	.438	.594	.594	.594	.594	.594	.719	.719	.875	
		42.05	42.05	52.27	62.58	62.58	107.50	107.50	107.50	107.50	107.50	107.50	139.67	139.67	160.27
18	18.000	.312	.312	.375	.438	.438	.594	.594	.594	.594	.594	.719	.719	.875	
		47.39	47.39	58.94	82.15	82.15	138.17	138.17	138.17	138.17	138.17	138.17	170.21	170.21	189.11
20	20.000	.375	.375	.500	.594	.594	.812	.812	.812	.812	.812	.969	.969	1.125	
		52.73	52.73	78.60	104.13	104.13	166.40	166.40	166.40	166.40	166.40	166.40	223.64	223.64	245.25
22	22.000	.375	.375	.500	.594	.594	.812	.812	.812	.812	.812	.969	.969	1.125	
		58.07	58.07	86.61	114.81	114.81	197.41	197.41	197.41	197.41	197.41	197.41	274.22	274.22	308.50
24	24.000	.375	.375	.500	.594	.594	.812	.812	.812	.812	.812	.969	.969	1.125	
		63.41	63.41	94.62	140.68	140.68	238.35	238.35	238.35	238.35	238.35	238.35	311.09	311.09	344.13



# PIPE SPECIFICATIONS

<b>SPECIFICATION</b>	<b>A53</b> Sizes 1/8"—26" Std., XS and XXS, A.N.S.I. Schedules 10 through 160—Other sizes subject to inquiry.																																																	
<b>Scope</b>	Covers seamless and welded BLACK and hot-dipped galvanized nominal (average) wall pipe for coiling, bending, flanging and other special purposes and is suitable for welding. CONTINUOUS WELD pipe is not intended for flanging (rail back operation to form flange using pipe wall). Purpose for which pipe is intended should be stated on order.																																																	
<b>Kinds of Steel Permitted For Pipe Material</b>	Open-hearth                  Basic-oxygen Electric-furnace																																																	
<b>Hot-Dipped Galvanizing</b>	Sets standards for coating of pipe with zinc inside and outside by the hot-dipped process. Weight of coating must not average less than 1.8 oz. per square foot and not less than 1.6 oz. per square foot.																																																	
<b>Permissible Variations in Wall Thickness</b>	Same as A120.																																																	
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<b>Hydrostatic Testing</b>	<p>Hydrostatic inspection test pressures for plain end and threaded and coupled pipe are specified.</p> <p>Hydrostatic pressure shall be maintained for not less than 5 seconds for all sizes of seamless and electric-weld pipe.</p>																																																	

<b>A53 Continued</b>	
<b>Permissible Variations in Weights per Foot</b>	For Extra Strong and lighter wall thicknesses Plus or Minus 5% For heavier than extra strong wall thicknesses Plus or Minus 10%
<b>Permissible Variations in Outside Diameter</b>	Same as A120.
<b>Mechanical Tests Specified</b>	Tensile Test—Transverse required on EW sizes 8½" and larger. Bending Test (Cold) Std. and XS-2" and under. XXS-1¼" and under. Degree of Bend Diameter of Mandrel For Normal A53 Uses 90 12 x nom. dia. of pipe For Close Coiling 180 8 x nom. dia. of pipe Flattening Test 2½" and larger Std. and XS (Not required for XXS pipe).
<b>Number of Tests Required</b>	Seamless and Continuous Weld—Bending, flattening tensile on one length of pipe from each lot of 500 lengths or less of a size. Electric-Weld—Bending and tensile on one length of pipe from each lot of 500 lengths or less of a size. Electric-Weld—Flattening on both crop ends of each length. (Coil, in case of multiple lengths.)
<b>Lengths</b>	Same as A120. (Lengths longer than single random, heavier wall than XS subject to negotiation.)
<b>Required Markings on Each Length</b> (On Tags attached to each Bundle in case of Bundled Pipe)	Rolled, Stamped or Stenciled Name of brand or manufacturer Kind of pipe, that is, furnace-continuous weld, EW-A, seamless B, etc. XS—for extra strong. XXS—for double extra strong. ASTM A 53. Also necessary to indicate when electric-furnace, Length of pipe. or basic-oxygen steel is used.
<b>General Information</b>	Couplings—Applied handling tight. Couplings, 2" and smaller straight tapped, other sizes taper tapped. Line pipe couplings may be specified. Thread Protection—Same as specified under A120. End Finish (unless otherwise specified) Std. or XS, or wall thicknesses less than 0.500 in. (excluding XXS): Plain end beveled. EW pipe may be furnished cold expanded. All XXS and wall thicknesses over 0.500 in.: Plain end square cut.
<b>PIPE SPECIFICATIONS</b>	
<b>SPECIFICATION</b>	<b>A106</b> Sizes 1/8"—26" A.N.S.I. Schedules to 160—Other sizes subject to inquiry.
<b>Scope</b>	Covers SEAMLESS carbon steel nominal wall pipe for high-temperature service, suitable for bending, flanging and similar forming operations.  Sizes 1½" and under may be either hot finished or cold drawn. Sizes 2" and larger shall be hot finished unless otherwise specified.
<b>Kinds of Steel Permitted For Pipe Materials</b>	Killed open-hearth Electric-furnace Basic-oxygen

<b>A106 Continued</b>				
<b>Hot-Dipped Galvanizing</b>	Not covered in specification.			
<b>Permissible Variations in Wall Thickness</b>	Same as A120.			
<b>Chemical</b>		Grade A	Grade B	Grade C
	Carbon max. %.....	0.25	0.30	0.35
	Manganese %.....	0.27 to 0.93	0.29 to 1.06	0.29 to 1.06
	Phosphorus, max. %.....	0.048	0.048	0.048
	Sulfur, max. %.....	0.058	0.058	0.058
	Silicon, min. %.....	0.10	0.10	0.10
<b>Tensile Requirements</b>		Seamless		
		Grade A	Grade B	Grade C
	Tensile Strength min., psi	48,000	60,000	70,000
	Yield Point min., psi	30,000	35,000	40,000
<b>Hydrostatic Testing</b>	Inspection test pressures produce a stress in the pipe wall equal to 60% of minimum specified Yield Point at room temperature. Maximum Pressures are not to exceed 2500 psi for sizes 3" and under, and 2800 psi for the larger sizes. Pressure is maintained for not less than 5 seconds.			
<b>Permissible Variations in Weights per Foot</b>	For Schedules 120 and under—Weight of any length shall not vary more than 6.5% over and 3.5% under. For Schedules heavier than 120—Weight of any length shall not vary more than 10% over and 3.5% under. NOTE: Size 4" and smaller—weighed in lots. Larger sizes—by length.			
<b>Permissible Variations in Outside Diameter</b>	Outside Diameter at any point shall not vary from standard specified more than—		Over	Under
	Sizes 1½" and smaller		¼"	⅛"
	2"—4"		⅜"	⅜"
	5"—8"		⅜"	⅜"
	10"—18"		⅜"	⅜"
	20"—24"		⅜"	⅜"
<b>Mechanical Tests Specified</b>	Tensile Test—All sizes—either transverse or longitudinal acceptable. Bending Test (Cold)—2" and under.			
		Degree of Bend	Diameter of Mandrel	
	For Normal A106 Uses	90	12 x nom. dia. of pipe	
	For Close Coiling	180	8 x nom. dia. of pipe	
	Flattening test—Over 2"			
<b>Number of Tests Required</b>		On One Length From Each Lot of		
	tensile	5" and smaller	400 or less	
		6" and larger	200 or less	
	Bending	2" and smaller	400 or less	
	Flattening	over 2" through 5"	400 or less	
		6" and over	200 or less	

<b>A106 Continued</b>																																														
<b>Lengths</b>	Lengths required shall be specified in order. No "joints" permitted unless otherwise specified. If no definite lengths required, following practice applies: Single Random—16'22'—5% may be 12'-16'. Double Random—Minimum length 22', Minimum average 35'—5% may be 16'-22'.																																													
<b>Required Markings on Each Length</b> (On Tags attached to each Bundle in case of Bundled Pipe.)	Rolled, Stamped or Stenciled Manufacturer's private identifying mark.   ANSI schedule number. ASTM A106 A, A106B, or A106C.           Weight (4" and larger). Hydrostatic test pressure.                 Additional "S" if tested to supplementary requirements.  Length of pipe.																																													
<b>General Information</b>	Unless otherwise specified, pipe furnished with plain ends. Surface finish standards are outlined in specification.																																													
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<b>SPECIFICATION</b>	<b>API5L</b> Sizes ½"—48"																																													
<b>Scope</b>	Covers WELDED and SEAMLESS pipe suitable for use in conveying gas, water, and oil in both the oil and natural gas industries.																																													
<b>Kinds of Steel Permitted For Pipe Material</b>	Open-hearth Electric-furnace Basic-oxygen																																													
<b>Hot-Dipped Galvanizing</b>	May be ordered galvanized to requirements of ASTM A120.																																													
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<b>Hydrostatic Testing</b>	Lists Hydrostatic inspection test pressure for all sizes covered by the specification.																																													



**API5L Continued**

<b>Permissible Variations in Weights per Foot</b>	For each length of Standard Weight, Regular Weight, Extra Strong, and Double Extra Strong—Not more than plus 10% minus 3.5%. For Special Plain End—Not more than plus 10% minus 5%. For Carload Lots—Not more than minus 1.75%.		
<b>Permissible Variations in Outside Diameter</b>	Outside Diameter at any point shall not vary from standard specified more than:		
	Sizes	Over	Under
	1½" and smaller—	¼"	½"
	2" through 3½" incl.	1%	1%
	4" through 18" incl.	0.75%	0.75%
	20" and larger	1%	1%
<b>Mechanical Tests Specified</b>	Tensile Test Seamless and Continuous Weld—All Sizes—Longitudinal Specimens. Electric-Weld—6" and smaller—Longitudinal—8" and larger—Transverse. Bending Test (Cold)—2" and smaller Continuous Weld		
	For all API Uses	Degree of Bend 90	Diameter of Mandrel 12 x OD of pipe
<b>Number of Tests Required</b>	On One Length From Each Lot of		
	Tensile	5" and smaller 6" through 12" 14" and larger	400 or less 200 or less 100 or less
	Bending	2" and smaller BW	400 or less
	Flattening	Non-Expanded Electric-Weld single lengths crop ends from each length	
<b>Lengths</b>	Shortest Length in Entire Shipment	Shortest Length in 95% of Entire Shipment	Minimum Average Length Entire Shipment
	Threaded & Coupled Pipe	16'0"	18'0"
	Single Random	22'0"	—
	Double Random	—	35'0"
<b>Required Markings on Each Length</b> (On Tags attached to each Bundle in case of Bundled Pipe.)	Paint Stenciled (Rolled at Mfgs. Option) Manufacturer's name or mark, API monogram, size, grade, process of manufacture, type of steel, length, weight per foot (4" and larger only). Test pressure when higher than tabulated (2" and larger only).		
<b>General Information</b>	Couplings—Applied handling tight. All sizes are recessed, taper tapped. Thread Protection (all shipments)—		
	1½" and Smaller Burlap	2" to 3½" Metal Protectors	4" and Over Metal Protectors

# ASTM A1085

	ASTM A500-10 Grade B	ASTM A1085
Manufacture Process	Cold-Formed Welded	Cold-Formed Welded
Maximum Perimeter	88"	88"
Thickness Range	$t < 0.875"$	0.148" - 0.875"
Yield Strength	Round—42 ksi min.	All Shapes—50 ksi min 70 ksi min
	Round—46 ksi min.	
Tensile Strength	Round—58 ksi min.	All Shapes—65 ksi min.
	Shapes—58 ksi min.	
Wall Thickness	+/- 10%	+10% / -5%
Mass Tolerance	NA	-3.5%
Corner Radii	No More Than 3t max.	$t \leq 0.400$ 1.6t to 3.0t
		$t > 0.400$ 1.8t to 3.0t
CVN	NA	25 ft-lbs @ 40°F
Elongation, min in 2:	23%	21%

# ASTM A500 – ASTM A252 COMPARISON

	ASTM A500 / A500M -13		ASTM A252 -10	
	ASTM A500M-13 covers cold-formed welded and seamless carbon steel round, square, rectangular, or special shape structural tubing for welded, riveted, or bolted construction of bridges and buildings, and for general structural purposes.		ASTM A252-10 covers nominal wall cylindrical steel pipe piles in which the steel cylinder acts as a permanent load-carrying member or as a shell to form cast-in-place concrete piles.	
Rounds	ASTM A500		ASTM A252	
	Grade B	Grade C	Grade 2	Grade 3
Yield Strength	42,000 psi min	46,000 psi min	35,000 psi min	45,000 psi min
Tensile Strength	58,000 psi min	62,000 psi min	60,000 psi min	66,000 psi min
Elongation in 2"	23	21	25	20
	ASTM A500		ASTM A252	
	Grade B	Grade C	All Grades	
Carbon	.26 max	.23 max	N/A	
Manganese	1.35 max	1.35 max	N/A	
Phosphorus	.035 max	.035 max	.050 max	
Sulphur	.035 max	.035 max	N/A	
Silicon	N/A	N/A	N/A	
	ASTM A500		ASTM A252	
O.D. Size	All Grades		All Grades	
>1.9 to 2.5 incl.	±0.75%		±1%	
>2.5 to 3.5 incl.	±0.75%		±1%	
>3.5 to 5.5 incl.	±0.75%		±1%	
>5.5	±0.75%		±1%	
Wall Thickness	±10%		-12.5%	
Weight	Not Specified		15.0% over or 5% under its theoretical weight	
Straightness	1/8" x length (in feet)÷5		Not Specified	

# STANDARD MILL PRACTICE

## Steel Pipe and Tubing

### DIMENSIONS AND WEIGHT TOLERANCES

#### ROUND TUBING AND PIPE

##### ASTM A53

**Weight** - The weight of the pipe as specified in Table X2 and Table X3 (ASTM Specification A53) shall not vary by more than #10 percent.

Note that the weight tolerance of #10 percent is determined from the weights of the customary lifts of pipe as produced for shipment by the mill, divided by the number of feet of pipe in the lift. One pipe sizes over 4 in. where individual lengths may be weighed, the weight tolerance is applicable to the individual length.

**Diameter** - For pipe 2 in. and over in nominal diameter, the outside diameter shall not vary more than #1 percent from the standard specified.

**Thickness** - The minimum wall thickness at any point shall be not more than 12.5 percent under the nominal wall thickness specified.

#### SQUARE AND RECTANGULAR TUBING

**Outside Dimensions** - The specified dimensions, measured across the flats at positions at least 2 in. from either end of square or rectangular tubing and including an allowance for convexity or concavity, shall not exceed the plus and minus tolerance shown in the following table:

Largest Outside Dimension, Across Flats, in.	Tolerance <sup>a</sup> plus and minus, in.
2½ and under	0.020
Over 2½ to 3½, inc.	0.025
Over 3½ to 5½, incl.	0.030
Over 5½	1 percent

The respective outside dimension tolerances include the allowances for convexity and concavity.

## STANDARD MILL PRACTICE—Continued Steel Pipe and Tubing

**Lengths** - Structural tubing is commonly produced in random lengths, in multiple lengths, and in definite cut lengths. When cut lengths are specified for structural tubing, the length tolerances shall be in accordance with the following table:

	22 feet and under		Over 22 to 44 feet, incl.	
	Over	Under	Over	Under
Length tolerance for specified cut lengths in.	¼	¼	¼	¼

**Straightness** - The permissible variation for straightness of structural tubing shall be 1/8 in. times the number of feet of total length divided by 5.

**Squareness of Sides** - For square or rectangular structural tubing, adjacent sides may deviate from 90 deg. by a tolerance of plus or minus 2 deg. max.

**Radius of Corners** - For square or rectangular structural tubing, the radius of any outside corner of the section shall not exceed three times the specified wall thickness.

**Twist** - The tolerances for twist or variation with respect to axial alignment of the section, for square and rectangular structural tubing, shall be as shown in the following table:

Specified Dimension of Longest Side, in.	Maximum Twist per 3 ft. of length, in.
1½ and under	0.050
Over 1½ to 2½ incl.	0.062
Over 2½ to 4 incl.	0.075
Over 4 to 6 incl.	0.087
Over 6 to 8, incl.	0.100
Over 8	0.112

Twist is measured by holding down one end of a square or rectangular tube on a flat surface plate with the bottom side of the tube parallel to the surface plate and noting the height that either corner, at the opposite end of the bottom side of the tube, extends above the surface plate.

**Wall Thickness (A500 only)** - The tolerance for wall thickness exclusive of the weld area shall be plus and minus 10 percent of the nominal wall thickness specified. The wall thickness is to be measured at the center of the flat.