

Cratharn Steel



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

Size: Nominal in.	Size: OD in.	USAS PIPE SCHEDULES										Extra Heavy	Double Extra Heavy	
		10	20	30	40	STD.	60	80	100	120	140			160
¼	.405				.068	.068		.095						
					.24	.24		.31						
¼	.540				.088	.088		.119						
					.42	.42		.54						
¾	.675				.091	.091		.126						
					.57	.57		.74						
½	.840				.109	.109		.147						
					.85	.85		1.09						
¾	1.050				.113	.113		.154						
					1.13	1.13		1.47						
1	1.315				.133	.133		.179						
					1.68	1.68		2.17						
1¼	1.660				.140	.140		.191						
					2.27	2.27		3.00						
1½	1.900				.145	.145		.200						
					2.72	2.72		3.63						
2	2.375				.154	.154		.218						
					3.65	3.65		5.02						
2½	2.875				.203	.203		.276						
					5.79	5.79		7.66						
3	3.500				.216	.216		.300						
					7.58	7.58		10.25						
3½	4.000				.226	.226		.318						
					9.11	9.11		12.51						
4	4.500				.237	.237		.337						
					10.79	10.79		14.98						

BLACK AND GALVANIZED PIPE
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CONTINUATION OF PAGE 97

Size: Nominal in.	Size: OD in.	USAS PIPE SCHEDULES										Extra		Double Extra Heavy
		10	20	30	40	STD.	60	80	80	100	120	140	160	
5	5.563		.250	.277	.322	.322	.406	.500	.375	.500	.500	.812	.906	.750
			22.36	24.70	28.55	28.55	35.64	43.39	20.78	27.04		67.76	74.09	38.55
6	6.625		.250	.307	.365	.365	.500	.594	.432	.562	.562			.864
			28.04	34.24	40.48	40.48	54.74	64.43	28.57	36.39	36.39			53.16
8	8.625		.250	.277	.322	.322	.406	.500	.432	.594	.719	.812	.906	.875
			22.36	24.70	28.55	28.55	35.64	43.39	20.78	27.04	60.71	67.76	74.09	72.42
10	10.750		.250	.307	.365	.365	.500	.594	.432	.562	.844	1.000	1.125	—
			28.04	34.24	40.48	40.48	54.74	64.43	28.57	36.39	77.03	104.13	115.64	—
12	12.750		.250	.330	.406	.375	.562	.688	.500	.844	1.000	1.125	1.312	—
			33.38	43.77	53.52	49.56	73.15	88.63	50.00	107.32	125.49	139.67	160.27	—
14	14.000	.250	.312	.375	.438	.375	.594	.750	.500	.938	1.094	1.250	1.406	—
		36.71	45.61	54.57	63.44	54.57	85.05	106.13	72.09	130.85	150.79	170.21	189.11	—
16	16.000	.250	.312	.375	.500	.375	.656	.844	.500	1.031	1.219	1.438	1.594	—
		42.05	52.27	62.58	82.77	62.58	107.50	136.61	82.77	164.82	192.43	223.64	245.25	—
18	18.000	.250	.312	.438	.562	.375	.750	.938	.500	1.156	1.375	1.562	1.781	—
		47.39	58.94	82.15	104.67	70.59	138.17	170.92	93.45	207.96	244.14	274.22	308.50	—
20	20.000	.250	.375	.500	.594	.375	.812	1.031	.500	1.281	1.500	1.750	1.969	—
		52.73	78.60	104.13	123.11	78.60	166.40	208.87	104.13	256.10	296.37	341.09	379.17	—
22	22.000	.250	.375	.500	—	.375	.875	1.125	.500	1.375	1.625	1.875	2.125	—
		58.07	86.61	114.81	—	86.61	197.41	250.82	114.81	302.88	354.51	403.00	451.06	—
24	24.000	.250	.375	.562	.688	.375	.969	1.219	.500	1.531	1.812	2.062	2.344	—
		63.41	94.62	140.68	171.29	94.62	238.35	296.58	125.49	367.39	429.39	483.12	542.13	—



PIPE SPECIFICATIONS																																																	
SPECIFICATION	A53 Sizes ½"—26" Std., XS and XXS, A.N.S.I. Schedules 10 through 160—Other sizes subject to inquiry.																																																
Scope	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.																																																
Kinds of Steel Permitted For Pipe Material	Open-hearth Basic-oxygen Electric-furnace																																																
Hot-Dipped Galvanizing	Sets standards for coating of pipe with zinc inside and outside by the 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.																																																
Permissible Variations in Wall Thickness	Same as A120.																																																
Chemical Requirements	<table><tr><td colspan="5">Type S (Seamless pipe) & Type E (electric weld)</td></tr><tr><td>Open-Hearth, Electric-Furnace or Basic Oxygen</td><td colspan="4">Composition — Max %</td></tr><tr><td></td><td>C</td><td>Mn</td><td>P</td><td>S</td></tr><tr><td>Grade A</td><td>0.25</td><td>0.95</td><td>0.05</td><td>0.06</td></tr><tr><td>Grade B</td><td>0.30</td><td>1.20</td><td>0.05</td><td>0.06</td></tr><tr><td colspan="5">Type F (furnace-welded pipe)</td></tr><tr><td>Open-Hearth, Electric-Furnace or Basic Oxygen</td><td colspan="4">Composition—Max %</td></tr><tr><td></td><td>C</td><td>Mn</td><td>P</td><td>S</td></tr><tr><td></td><td>—</td><td>—</td><td>0.08</td><td>0.06</td></tr></table>				Type S (Seamless pipe) & Type E (electric weld)					Open-Hearth, Electric-Furnace or Basic Oxygen	Composition — Max %					C	Mn	P	S	Grade A	0.25	0.95	0.05	0.06	Grade B	0.30	1.20	0.05	0.06	Type F (furnace-welded pipe)					Open-Hearth, Electric-Furnace or Basic Oxygen	Composition—Max %					C	Mn	P	S		—	—	0.08	0.06
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Tensile Requirements	<table><tr><td>Continuous Weld (furnace-welded)</td><td>Acid-Bessemer</td><td>O.H., Basic Oxygen or Elec. Furn.</td></tr><tr><td>Tensile Strength min., psi</td><td>50,000</td><td>45,000</td></tr><tr><td>Yield Point min., psi.....</td><td>30,000</td><td>25,000</td></tr><tr><td>Seamless or Electric-Weld</td><td>Grade A</td><td>Grade B</td></tr><tr><td>Tensile Strength min., psi</td><td>48,000</td><td>60,000</td></tr><tr><td>Yield Point min., psi.....</td><td>30,000</td><td>35,000</td></tr></table>				Continuous Weld (furnace-welded)	Acid-Bessemer	O.H., Basic Oxygen or Elec. Furn.	Tensile Strength min., psi	50,000	45,000	Yield Point min., psi.....	30,000	25,000	Seamless or Electric-Weld	Grade A	Grade B	Tensile Strength min., psi	48,000	60,000	Yield Point min., psi.....	30,000	35,000																											
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Hydrostatic Testing	Hydrostatic inspection test pressures for plain end and threaded and coupled pipe are specified. Hydrostatic pressure shall be maintained for not less than 5 seconds for all sizes of seamless and electric-weld pipe.																																																

A53 Continued

Permissible Variations in Weights per Foot	For Extra Strong and lighter wall thicknesses Plus or Minus 5% For heavier than extra strong wall thicknesses Plus or Minus 10%
Permissible Variations in Outside Diameter	Same as A120.
Mechanical Tests Specified	Tensile Test—Transverse required on EW sizes 8½" and larger. Bending Test (Cold) Std. and XS-2" and under. XXS-1½" 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).
Number of Tests Required	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.)
Lengths	Same as A120. (Lengths longer than single random, heavier wall than XS subject to negotiation.)
Required Markings on Each Length (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.
General Information	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.
PIPE SPECIFICATIONS	
SPECIFICATION	A106 Sizes 1/8"—26" A.N.S.I. Schedules to 160—Other sizes subject to inquiry.
Scope	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.
Kinds of Steel Permitted For Pipe Materials	Killed open-hearth Electric-furnace Basic-oxygen

A106 Continued

Hot-Dipped Galvanizing	Not covered in specification.																				
Permissible Variations in Wall Thickness	Same as A120.																				
Chemical	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																		
Tensile Requirements	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																		
Hydrostatic Testing	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.																				
Permissible Variations in Weights per Foot	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.																				
Permissible Variations in Outside Diameter	Outside Diameter at any point shall not vary from standard specified more than— <table><tr><td></td><td>Over</td><td>Under</td></tr><tr><td>Sizes 1½" and smaller</td><td>¼"</td><td>⅓₂"</td></tr><tr><td>2"—4"</td><td>⅓₂"</td><td>⅓₂"</td></tr><tr><td>5"—8"</td><td>⅓₁₆"</td><td>⅓₂"</td></tr><tr><td>10"—18"</td><td>⅓₃₂"</td><td>⅓₃₂"</td></tr><tr><td>20"—24"</td><td>⅓₈"</td><td>⅓₃₂"</td></tr></table>				Over	Under	Sizes 1½" and smaller	¼"	⅓₂"	2"—4"	⅓₂"	⅓₂"	5"—8"	⅓₁₆"	⅓₂"	10"—18"	⅓₃₂"	⅓₃₂"	20"—24"	⅓₈"	⅓₃₂"
	Over	Under																			
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10"—18"	⅓₃₂"	⅓₃₂"																			
20"—24"	⅓₈"	⅓₃₂"																			
Mechanical Tests Specified	Tensile Test—All sizes—either transverse or longitudinal acceptable. Bending Test (Cold)—2" and under. <table><tr><td></td><td>Degree of Bend</td><td>Diameter of Mandrel</td></tr><tr><td>For Normal A106 Uses</td><td>90</td><td>12 x nom. dia. of pipe</td></tr><tr><td>For Close Coiling</td><td>180</td><td>8 x nom. dia. of pipe</td></tr></table> Flattening test—Over 2"				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									
	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																			
Number of Tests Required	On One Length From Each Lot of <table><tr><td>tensile</td><td>5" and smaller</td><td>400 or less</td></tr><tr><td></td><td>6" and larger</td><td>200 or less</td></tr><tr><td>Bending</td><td>2" and smaller</td><td>400 or less</td></tr><tr><td>Flattening</td><td>over 2" through 5"</td><td>400 or less</td></tr><tr><td></td><td>6" and over</td><td>200 or less</td></tr></table>			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			
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																			

A106 Continued

Lengths	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'.			
Required Markings on Each Length (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.			
General Information	Unless otherwise specified, pipe furnished with plain ends. Surface finish standards are outlined in specification.			
	PIPE SPECIFICATIONS			
SPECIFICATION	API5L Sizes $\frac{1}{8}$ "—48"			
Scope	Covers WELDED and SEAMLESS pipe suitable for use in conveying gas, water, and oil in both the oil and natural gas industries.			
Kinds of Steel Permitted For Pipe Material	Open-hearth Electric-furnace Basic-oxygen			
Hot-Dipped Galvanizing	May be ordered galvanized to requirements of ASTM A120.			
Permissible Variations in Wall Thickness	Tolerances on wall thicknesses shall not be more than those listed at right from the nominal walls specified.			
Chemical	Carbon % Max.	Manganese, % Max.	Phosphorous, % Max.	Sulphur, % Max.
SMLS Grade A	0.22	0.90	0.04	0.05
SMLS Grade B	0.27	1.15	0.04	0.05
SMLS A25 Class I	0.21	0.30-0.60	0.045	0.06
SMLS A25 Class II	0.21	0.30-0.60	0.045-0.080	0.06
EW and DSA Grade A	0.21	0.90	0.04	0.05
EW and DSA Grade B	0.26	1.15	0.04	0.05
EW A25 Class I	0.21	0.30-0.60	0.045	0.06
EW A25 Class II	0.21	0.30-0.60	0.045-0.080	0.06
Tensile Requirements	Seamless or Electric-Weld <div style="display: flex; justify-content: space-between;"> <div></div> <div>Tensile Strength</div> <div>Yield Point</div> </div> <div style="display: flex; justify-content: space-between;"> <div></div> <div>Min., psi</div> <div>Min., psi</div> </div> Grade A48,000 30,000 Grade B60,000 35,000 SMLS or EW Grade A25 Class I45,000 25,000 SMLS or EW Grade A25 Class II45,000 25,000			
Hydrostatic Testing	Lists Hydrostatic inspection test pressure for all sizes covered by the specification.			

API5L Continued

Permissible Variations in Weights per Foot	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%.																				
Permissible Variations in Outside Diameter	Outside Diameter at any point shall not vary from standard specified more than: <table><tr><td>Sizes</td><td>Over</td><td>Under</td></tr><tr><td>1½" and smaller—</td><td>¼"</td><td>½"</td></tr><tr><td>2" through 3½" incl.</td><td>1%</td><td>1%</td></tr><tr><td>4" through 18" incl.</td><td>0.75%</td><td>0.75%</td></tr><tr><td>20" and larger</td><td>1%</td><td>1%</td></tr></table>			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%			
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%																			
Mechanical Tests Specified	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 <table><tr><td>Degree of Bend</td><td>Diameter of Mandrel</td></tr><tr><td>For all API Uses</td><td>12 x OD of pipe</td></tr></table>			Degree of Bend	Diameter of Mandrel	For all API Uses	12 x OD of pipe														
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Number of Tests Required	<table><tr><td></td><td></td><td>On One Length From Each Lot of</td></tr><tr><td>Tensile</td><td>5" and smaller</td><td>400 or less</td></tr><tr><td></td><td>6" through 12"</td><td>200 or less</td></tr><tr><td></td><td>14" and larger</td><td>100 or less</td></tr><tr><td>Bending</td><td>2" and smaller BW</td><td>400 or less</td></tr><tr><td>Flattening</td><td colspan="2">Non-Expanded Electric-Weld single lengths crop ends from each length</td></tr></table>					On One Length From Each Lot of	Tensile	5" and smaller	400 or less		6" through 12"	200 or less		14" and larger	100 or less	Bending	2" and smaller BW	400 or less	Flattening	Non-Expanded Electric-Weld single lengths crop ends from each length	
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Lengths	<table><tr><td></td><td>Shortest Length in Entire Shipment</td><td>Shortest Length in 95% of Entire Shipment</td><td>Minimum Average Length Entire Shipment</td></tr><tr><td>Threaded & Coupled Pipe</td><td></td><td></td><td></td></tr><tr><td>Single Random</td><td>16'0"</td><td>18'0"</td><td>—</td></tr><tr><td>Double Random</td><td>22'0"</td><td>—</td><td>35'0"</td></tr></table>		Shortest Length in Entire Shipment	Shortest Length in 95% of Entire Shipment	Minimum Average Length Entire Shipment	Threaded & Coupled Pipe				Single Random	16'0"	18'0"	—	Double Random	22'0"	—	35'0"				
	Shortest Length in Entire Shipment	Shortest Length in 95% of Entire Shipment	Minimum Average Length Entire Shipment																		
Threaded & Coupled Pipe																					
Single Random	16'0"	18'0"	—																		
Double Random	22'0"	—	35'0"																		
Required Markings on Each Length (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).																				
General Information	Couplings—Applied handling tight. All sizes are recessed, taper tapped. Thread Protection (all shipments)— <table><tr><td>1½" and Smaller</td><td>2" to 3½"</td><td>4" and Over</td></tr><tr><td>Burlap</td><td>Metal Protectors</td><td>Metal Protectors</td></tr></table>			1½" and Smaller	2" to 3½"	4" and Over	Burlap	Metal Protectors	Metal Protectors												
1½" and Smaller	2" to 3½"	4" and Over																			
Burlap	Metal Protectors	Metal Protectors																			

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 ^a 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.	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{3}{4}$	$\frac{1}{4}$

Straightness - The permissible variation for straightness of structural tubing shall be $\frac{1}{8}$ 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.