



TABLE 3 Permissible Variations in Dimensions

Group	Size, Outside Diameter, in.	Permissible Variations in Outside Diameter, in. (mm)	Permissible Variations in Wall Thickness, ^A %	Permissible Variations in Cut Length, in. (mm) ^B		Thin Walled Tubes ^C
				Over	Under	
1	Up to ½	±0.005 (0.13)	±15	⅛ (3.2)	0	...
2	½ to 1½, excl	±0.005 (0.13)	±10	⅛ (3.2)	0	less than 0.065 in. (1.65 mm) nominal
3	1½ to 3½, excl	±0.010 (0.25)	±10	⅜ (4.8)	0	less than 0.095 in. (2.41 mm) nominal
4	3½ to 5½, excl	±0.015 (0.38)	±10	⅜ (4.8)	0	less than 0.150 in. (3.81 mm) nominal
5	5½ to 8, excl	±0.030 (0.76)	±10	⅜ (4.8)	0	less than 0.150 in. (3.81 mm) nominal
6	8 to 12, excl	±0.040 (1.01)	±10	⅜ (4.8)	0	less than 0.200 in. (5.08 mm) nominal
7	12 to 14, excl	±0.050 (1.26)	±10	⅜ (4.8)	0	less than 0.220 in. (5.59 mm) nominal

^A When tubes as ordered require wall thicknesses ⅜ in. (19.0 mm) or over, or an inside diameter 60 % or less of the outside diameter, a wider variation in wall thickness is required. On such sizes a variation in wall thickness of 12.5 % over or under will be permitted.

For tubes less than ½ in. (12.7 mm) in inside diameter which cannot be successfully drawn over a mandrel, the wall thickness may vary ±15 % from that specified.

^B These tolerances apply to cut lengths up to and including 24 ft (7.3 m). For lengths greater than 24 ft (7.3 m), the above over tolerances shall be increased by ⅛ in. (3 mm) for each 10 ft (3 m) or fraction thereof over 24 ft, or ½ in. (13 mm), whichever is lesser.

^C Ovality provisions of 12.2 apply.

furnace charge. When the final heat treatment is in a continuous furnace or when the heat-treated condition is obtained directly by quenching after hot forming, a lot shall include all tubes of the same size and heat, heat treated in the same furnace at the same temperature, time at heat, and furnace speed, or all tubes of the same size and heat, hot formed and quenched in the same production run.

9.4 When more than one heat is involved, the flaring, flanging, and hardness test requirements shall apply to each heat.

9.5 *Reverse Flattening Test*—For welded tubes, one reverse flattening test shall be made on a specimen from each 1500 ft (460 m) of finished tubing. Coiled tubing greater than 1500 ft (450 m) in length shall be sampled at both ends. A coil must be continuous without any circumferential butt welds.

10. Hydrostatic or Nondestructive Electric Test

10.1 Each tube shall be subjected to the nondestructive electric test or the hydrostatic test. The type of test to be used shall be at the option of the manufacturer, unless otherwise specified in the purchase order.

11. Hardness Requirements

11.1 Grades TPXM-29, S24565, N08367, and N08926 tubes shall have a hardness number not exceeding 256 HB/270 HV or 100 HRB. Grades TPXM-10, TPXM-11, and TPXM-19 tubes shall have a hardness number not exceeding 269 HB/285 HV or 25 HRC. S31254 shall have a hardness number not exceeding 220 HB/230 HV or 96 HRB. S32654 shall have a hardness number not exceeding 250 HB/263 HV or 100 HRB. Tubes made from all other grades shall have a hardness number not exceeding 192 HB/200 HV or 90 HRB.

11.2 For tubing less than 0.065 in. (1.65 mm) in wall thickness, it is permissible to use the Rockwell superficial hardness test or the Vickers hardness test. When the Vickers test is used, the values of 11.1 will apply. The superficial hardness number for Grade TPXM-29 tubes shall not exceed 80 on the 30 T scale or 92 on the 15 T scale. The hardness number for Grades TPXM-10, TPXM-11, and TPXM-19 tubes shall not exceed 46 on the 30 N scale or 73 on the 15 N scale. The hardness number for S31254 shall not exceed 79 on the 30

T scale or 91 on the 15 T scale. Tubes made from all other grades shall not exceed 74 on the 30 T scale or 88 on the 15 T scale.

11.3 The hardness test shall not be required on tubes smaller than ¼ in. (6.4 mm) in inside diameter or tubes having a wall thickness thinner than 0.020 in. (0.51 mm) (see A2.4 of Methods and Definitions A 370). Smaller or thinner tubes should be tension tested only, in accordance with Specification A 632.

12. Permissible Variations in Dimensions

12.1 Variations in outside diameter, wall thickness, and length, from those specified, shall not exceed the amounts prescribed in Table 3.

12.2 The permissible variations in outside diameter given in Table 3 are not sufficient to provide for ovality in thin-walled tubes, as defined in the Table. In such tubes, the maximum and minimum diameters at any cross section shall deviate from the nominal diameter by no more than twice the permissible variation in outside diameter given in Table 3; however, the mean diameter at that cross section must still be within the given permissible variation.

13. Surface Condition

13.1 The tubes shall be pickled free of scale. When bright annealing is used, pickling is not necessary.

14. Product Marking

14.1 In addition to the marking prescribed in Specification A 1016/A 1016M, the marking shall include whether the tubing is seamless or welded and the final heat-treatment temperature in degrees Fahrenheit after the suffix “HT” if the final heat treatment temperature is under 1900°F (1040°C).

14.2 When the Nondestructive Electric Test is performed, each length of tubing shall be marked with the letters “NDE,” and the certification, when required, shall also indicate this test.

15. Keywords

15.1 austenitic stainless steel; seamless steel tube; stainless steel tube; steel tube; welded steel tube