

Permissible Variations in Outside Diameter

- 8.1 Except as provided in 8.2.1 and 8.3, variations from the specified outside diameter shall not exceed the amounts prescribed in Table 3.
- 8.2 Thin-wall tubes usually develop significant ovality(out of roundness) during final annealing, or straightening, or both. Thin-wall tubes are defined as those meeting the specified outside diameters and specified wall thicknesses set forth as follows:

Table 3 Permissible Variations in Outside Diameter^A

Outside Diameter, in. [mm]	Permissible Variations, in.[mm]	
	Over	Under
Hot-Finished Seamless Tubes		
4[101.6] and under	1/64[0.4]	1/32[0.8]
Over 4 to 7 1/2[101.6 to 190.5], incl	1/64[0.4]	3/64[1.2]
Over 7 1/2 to 9[190.5 to 228.6], incl	1/64[0.4]	1/16[1.6]
Welded Tubes and Cold-Finished Seamless Tubes		
Under 1[25.4]	0.004[0.1]	0.004[0.1]
1 to 1 1/2[25.4 to 38.1], incl	0.006[0.15]	0.006[0.15]
Over 1 1/2 to 2[38.1 50.8], incl	0.008[0.2]	0.008[0.2]
2 to 2 1/2[50.8 to 63.5], excl	0.010[0.25]	0.010[0.25]
2 1/2 to 3[63.5 to 76.2], excl	0.012[0.3]	0.012[0.3]
3 to 4[76.2 to 101.6], incl	0.015[0.38]	0.025[0.64]
Over 4 to 7 1/2[101.6 to 190.5], incl	0.015[0.38]	0.025[0.64]
Over 7 1/2 to 9[190.5 to 228.6], incl	0.015[0.38]	0.045[1.14]

^AExcept as provided in 8.2 and 8.3, these permissible variations include out-of-roundness. These permissible variations in outside diameter apply to no-finished seamless, welded and cold-finished seamless tubes before other fabricating operations such as upsetting, swaging, expanding, bending, or polishing.

Specified Outside Diameter	Specified Wall Thickness
2 in. [50.8mm] and less	2% or less of specified outside diameter
Greater than 2 in. [50.8mm]	3% or less of specified outside diameter
All diameters	0.020 in. [0.5mm] or less

8.2.1 The diameter tolerances of Table 3 are not sufficient to provide for additional ovality expected in thin-wall tubes, and for such tubes, are applicable only to the mean of the extreme (maximum and minimum) outside diameter readings in any one cross section. However, for thin wall tubes the *difference* in extreme outside diameter readings(ovality) in any one cross section shall not exceed the following ovality allowances:

Outside Diameter	Ovality Allowance
1 in. [25.4mm] and under	0.020 in. [0.5mm]
over 1 in. [25.4mm]	20% of specified outside diameter

8.3 For cold-finished seamless austenitic and ferritic/austenitic tubes an ovality allowance is necessary for all sizes less than 2 in. [50.8mm] outside diameter since they are likely to become out of round during their final heat treatment. In such tubes, the maximum and minimum diameters at any cross section shall deviate from the nominal diameter by no more than ± 0.010 in. [± 0.25 mm]; however, the mean diameter at that cross section must still be within the given permissible variation given in Table 3. In the event of conflict between the provisions of 8.3 and those of 8.2.1, the larger value of ovality tolerance shall apply.