



AEROSPACE MATERIAL SPECIFICATION

AMS2253**REV. E**

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Reaffirmed 2013-11

Superseding AMS2253D

Tolerances
Carbon and Alloy Steel Tubing

RATIONALE

AMS2253E has been reaffirmed to comply with the SAE five-year review policy.

1. SCOPE:

This specification covers established inch/pound manufacturing tolerances applicable to carbon and alloy tubing ordered to inch/pound dimensions. These tolerances apply to all conditions unless otherwise noted. The term "excl" is used to apply only to the higher figure of the specified range.

2. DIAMETER:

2.1 Aircraft Type, Seamless; Cold Finished:

TABLE 1

Specified OD Inches	OD Tolerance, Inch, Plus and Minus Annealed, Normalized, or Stress Relieved	OD Tolerance, Inch Plus and Minus Quenched and Tempered
Up to 0.5, incl	0.005	0.010
Over 0.5 to 1.5, incl	0.005	0.015
Over 1.5 to 3.0, incl	0.010	0.030
Over 3.0 to 5.5, incl	0.015	0.045
Over 5.5	0.020	0.060

2.1.1 Tubes with wall thickness less than 3% of the nominal OD will be allowed an ovality tolerance over and under equal to 0.5% of the nominal OD in addition to the tolerance indicated in Table 1, but the mean OD shall be within the individual measurement tolerances specified in Table 1.

2.1.2 When specified on the purchase order, the tolerance for OD shall apply to the ID instead, but not to both ID and OD of the same lot of tubing.

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2.2 Aircraft Type, Welded; Annealed, Normalized, or Stress Relieved:

TABLE 2

Specified OD Inches	Specified Wall Thickness Inch	OD Tolerance, Inch Diameter Plus and Minus	OD Tolerance, Inch Ovality
Up to 0.500, incl	All	0.003	0.004
Over 0.500 to 0.625, incl	All	0.004	0.004
Over 0.625 to 1.000, incl	0.028 to 0.065, excl	0.004	0.005
Over 0.625 to 1.000, incl	0.065 to 0.120, incl	0.004	0.004
Over 1.000 to 1.375, incl	0.028 to 0.120, incl	0.005	0.008
Over 1.375 to 2.000, incl	0.028 to 0.065, excl	0.006	0.008
Over 1.375 to 2.000, incl	0.065 to 0.134, incl	0.005	0.006
Over 2.000 to 2.500, incl	All	0.007	0.010
Over 2.500 to 3.000, incl	0.035 to 0.083, excl	0.010	0.020
Over 2.500 to 3.000, incl	0.083 to 0.134, incl	0.010	0.015
Over 3.000 to 3.500, incl	0.042 to 0.095, excl	0.012	0.020
Over 3.000 to 3.500, incl	0.095 to 0.134, incl	0.010	0.020
Over 3.500 to 4.000, incl	0.040 to 0.095, excl	0.016	0.025
Over 3.500 to 4.000, incl	0.095 to 0.134, incl	0.012	0.020
Over 4.000 to 5.000, incl	0.049 to 0.095, excl	0.022	0.032
Over 4.000 to 5.000, incl	0.095 to 0.134, incl	0.016	0.032

2.2.1 When specified on the purchase order, the tolerance for OD shall apply to the ID instead, but not to both ID and OD of the same lot of tubing.

2.2.2 Ovality is the difference between the maximum and minimum diameters of any one section of the tube.

2.3 Mechanical Type, Seamless; Cold Finished, As Finished or Stressed Relieved:

TABLE 3

Specified OD Inches	Specified Wall Thickness Inch	OD Tolerance, Inch Plus	OD Tolerance, Inch Minus
0.187 to 0.50, excl	All	0.004	0
0.50 to 1.50, excl	All	0.005 (2.3.1)	0 (2.3.1)
1.50 to 3.50, excl	All	0.010 (2.3.1)	0 (2.3.1)
3.50 to 5.50, excl	All	0.015 (2.3.1)	0 (2.3.1)
5.50 to 8.00, excl	Under 5% of OD	0.030 (2.3.1)	0.030 (2.3.1)
5.50 to 8.00, excl	5 - 7.5%, incl, of OD	0.020	0.020
5.50 to 8.00, excl	Over 7.5% of OD	0.030	0
8.00 to 10.75, incl	Under 5% of OD	0.045 (2.3.1)	0.045 (2.3.1)
8.00 to 10.75, incl	5 - 7.5%, incl, of OD	0.035	0.035
8.00 to 10.75, incl	Over 7.5% of OD	0.045	0

2.3.1 Tubes with wall thickness less than 3% of the nominal OD will be allowed an ovality tolerance over and under equal to 0.5% of the nominal OD in addition to the tolerance indicated in Table 3, but the average OD shall be within the individual measurement tolerances specified in Table 3.

2.4 Mechanical Type, Seamless; Hot Finished:

TABLE 4

Specified OD Inches	Specified Wall Thickness Inch	OD Tolerance, Inch Plus and Minus As Finished, Annealed or Normalized	OD Tolerance, Inch Plus and Minus Quenched and Tempered
1.50 to 3.00, excl	Over 0.094	0.023	0.030
3.00 to 3.25, excl	Over 0.094	0.031	0.045
3.25 to 5.50, excl	3% of OD or more	0.031	0.045
5.50 to 8.00, excl	3% of OD or more	0.047	0.060
8.00 to 10.75, incl	3 to 5%, excl, of OD	0.063	0.075
8.00 to 10.75, incl	5% of OD or more	0.047	0.060

2.5 Mechanical Type, Seamless; Cold Finished, Annealed, Normalized, or Quenched and Tempered:

TABLE 5

Specified OD Inches	Specified Wall Thickness Inch	OD Tolerance, Inch Plus and Minus
0.187 to 0.50, incl	All	0.010
Over 0.50 to 1.50, incl	3% of OD or more	0.015
Over 1.50 to 3.50, incl	3% of OD or more	0.030
Over 3.50 to 5.50, incl	3% of OD or more	0.045
Over 5.50 to 8.00, incl	3% of OD or more	0.060
Over 8.00 to 10.75, incl	3% to 5%, excl, of OD	0.075
Over 8.00 to 10.75, incl	5% of OD or more	0.060

3. WALL THICKNESS:

3.1 Aircraft Type, Seamless; Cold Finished:

3.1.1 Wall thickness of tubes 0.5 inch and over in nominal ID shall not vary more than $\pm 10\%$.3.1.2 Wall thickness of tubes under 0.5 inch in nominal ID shall not vary more than $\pm 15\%$.

3.2 Aircraft Type, Welded:

TABLE 6

Specified Wall Thickness Inches	Tolerance, Inch, Minus Only (3.2.1) Outside Diameter Ranges, Inches 0.375 to 0.875, incl	Tolerance, Inch, Minus Only (3.2.1) Outside Diameter Ranges, Inches Over 0.875 to 2.0, incl	Tolerance, Inch, Minus Only (3.2.1) Outside Diameter Ranges, Inches Over 2.0 to 3.0, incl	Tolerance, Inch, Minus Only (3.2.1) Outside Diameter Ranges, Inches Over 3.0 to 4.0, incl
Up to 0.028, incl	0.004	0.004	-	-
Over 0.028 to 0.035, incl	0.004	0.004	0.005	-
Over 0.035 to 0.049, incl	0.004	0.005	0.006	-
Over 0.049 to 0.065, incl	0.004	0.006	0.006	0.006
Over 0.065 to 0.083, incl	0.004	0.006	0.006	0.006
Over 0.083 to 0.109, incl	-	0.006	0.006	0.006
Over 0.109 to 0.120, incl	-	0.006	0.008	0.008
Over 0.120 to 0.134, incl	-	0.006	0.008	0.008