



AEROSPACE MATERIAL SPECIFICATION

AMS2232™**REV. H**

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Superseding AMS2232G

(R) Tolerances
Carbon Steel, Sheet, Strip, and Plate

RATIONALE

AMS2232H is a Five-Year review and update of this specification that includes the addition of and alignment with relevant ASTM standard tolerance tables.

1. SCOPE

This specification covers established inch/pound manufacturing tolerances applicable to carbon steel sheet, strip, and plate 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. Tolerances for product sizes not listed herein shall be as agreed upon by purchaser and vendor.

1.1 MAM2232, the metric version of this AMS, has been cancelled and superseded by this specification.

2. THICKNESS

Tolerances apply to measurements made at any point on widths less than 1 inch, at any point not less than 3/8 inch from a cut edge, or not less than 3/4 inch from a mill edge on widths 1 inch and over, and at a point 3/8 to 3/4 inch from the longitudinal edge of rectangular sheared plates. Regardless of whether thickness tolerances for sheet and strip are specified equally or unequally, plus and minus, the total tolerance shall be equal to the arithmetic sum of the tabular plus and minus tolerances (twice the tabular tolerances when specified equally plus and minus).

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2.1 Cold Rolled Sheet, Coils and Cut Lengths (see 2.1.1)

See Table 1 (equivalent to ASTM A568-15 Table 15).

Table 1 - Thickness tolerances, inch, plus and minus for width ranges, inches

Specified Thickness Inch	2 to 15, incl	Over 15 to 72, incl	Over 72
0.014 to 0.019, incl	0.002	0.002	--
Over 0.019 to 0.039, incl	0.003	0.003	0.003
Over 0.039 to 0.057, incl	0.004	0.004	0.004
Over 0.057 to 0.071, incl	0.005	0.005	0.005
Over 0.071 to 0.098, incl	0.005	0.005	0.006
Over 0.098 to 0.142, incl	0.005	0.006	0.007

2.1.1 Tolerances in Table 1 for nominal widths of 2 to 12 inches, inclusive, in nominal thicknesses of 0.0142 to 0.0821 inch, inclusive, apply to product slit from wider sheet.

2.2 Hot Rolled Sheet

2.2.1 Coils and Cut Lengths

See Table 2 (equivalent to one-half of the tolerance values in ASTM A568-15 Table S1.1).

Table 2 - Thickness tolerances, inch, plus and minus for width ranges, inches

Specified Thickness Inch	Over 12 to 20, incl	Over 20 to 40, incl	Over 40 to 48, incl	Over 48 to 60, incl	Over 60 to 72, incl	Over 72
0.0449 to 0.051, incl	0.005	0.005	0.005	--	--	--
Over 0.051 to 0.057, incl	0.005	0.005	0.006	0.006	0.007	--
Over 0.057 to 0.071, incl	0.006	0.006	0.006	0.007	0.007	--
Over 0.071 to 0.098, incl	0.006	0.007	0.007	0.007	0.008	0.008
Over 0.098 to 0.180, incl	0.007	0.007	0.008	0.008	0.008	0.008
Over 0.180 to 0.230, incl	0.007	0.008	0.009	0.010	0.011	0.012

2.2.2 Coils Only

See Table 3.

Table 3 - Thickness tolerances, inch, plus and minus for width ranges, inches

Specified Thickness Inch	Over 12 to 20, incl	Over 20 to 40, incl	Over 40 to 48, incl	Over 48 to 60, incl	Over 60 to 72, incl	Over 72
Over 0.1800 to 0.2299, incl	--	--	--	0.010	0.011	0.012
Over 0.2299 to 0.3130, incl	0.010	0.011	0.012	0.012	0.013	0.015
Over 0.3130 to 0.3750, incl	0.012	0.012	0.013	0.014	0.015	0.016
Over 0.3750 to 0.5000, incl	0.014	0.014	0.014	0.015	0.016	0.018

2.2.3 Tolerances in Table 2 and Table 3 do not apply to the uncropped ends of mill edge coils.

2.3 Cold Rolled Strip, Coils and Cut Lengths

See Table 4 (comparable to ASTM A109-15 Table 5 and ASTM A684-15 Table 7).

Table 4 - Thickness tolerances, inch, plus and minus for width ranges, inches

Specified Thickness Inch	0.500 to 1, excl	1 to 3, Excl	3 to 6, incl	Over 6 to 9, incl	Over 9 to 12, incl	Over 12 to 16, incl	Over 16 to 20, incl	Over 20 to 23-15/16, incl
Up to 0.007, excl	0.0005	0.0005	0.0005	--	--	--	--	--
0.007 to 0.009, excl	0.00075	0.00075	0.00075	--	--	--	--	--
0.009 to 0.013, excl	0.00075	0.00075	0.00075	0.001	0.001	0.001	0.001	0.001
0.013 to 0.020, excl	0.00075	0.00075	0.00075	0.001	0.001	0.0015	0.0015	0.0015
0.020 to 0.023, excl	0.001	0.001	0.001	0.0015	0.0015	0.0015	0.0015	0.0015
0.023 to 0.026, excl	0.001	0.001	0.001	0.0015	0.0015	0.002	0.002	0.002
0.026 to 0.029, excl	0.001	0.0015	0.0015	0.002	0.002	0.002	0.002	0.002
0.029 to 0.032, excl	0.0015	0.0015	0.0015	0.002	0.002	0.002	0.002	0.002
0.032 to 0.035, excl	0.0015	0.0015	0.002	0.002	0.002	0.002	0.002	0.002
0.035 to 0.040, excl	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
0.040 to 0.050, excl	0.002	0.002	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025
0.050 to 0.069, excl	0.002	0.002	0.0025	0.0025	0.0025	0.003	0.003	0.003
0.069 to 0.100, excl	0.002	0.002	0.0025	0.003	0.003	0.0035	0.0035	0.0035
0.100 to 0.161, excl	0.002	0.002	0.003	0.003	0.003	0.0035	0.0045	0.005
0.161 to 0.200, excl	0.0025	0.0035	0.004	0.004	0.0045	0.0045	0.005	0.005
0.200 to 0.250, excl	0.003	0.004	0.0045	0.0045	0.005	0.0055	0.0055	0.0055

2.4 Hot Rolled Strip, Coils and Cut Lengths (see 2.4.1)

See Table 5 (comparable to ASTM A749-14 Table 2).

Table 5 - Thickness tolerances, inch, plus and minus for width ranges, inches

Specified Thickness Inch	Up to 3-1/2, incl	Over 3-1/2 to 6, incl	Over 6 to 8, incl	Over 8 to 12, incl
0.0255 to 0.0343, incl	0.003	--	--	--
Over 0.0343 to 0.0448, incl	0.003	0.003	--	--
Over 0.0448 to 0.0570, incl	0.003	0.003	0.004	0.004
Over 0.0570 to 0.1180, incl	0.004	0.005	0.005	0.005
Over 0.1180 to 0.1870, incl	0.005	0.005	0.005	0.005
Over 0.1870 to 0.2030, incl	0.006	0.006	0.006	0.006
Over 0.2030 to 0.2299, incl	--	--	0.006	0.006
Over 0.2299 to 0.3124, incl	--	--	--	0.008
Over 0.3124 to 0.3750, incl	--	--	--	0.009
Over 0.3750 to 0.5000, incl	--	--	--	0.010

2.4.1 Tolerances in Table 5 do not include crown; the tolerances shown in Table 6 are in addition to those shown in Table 5.

2.5 Crown (see 2.4.1)

See Table 6 (comparable to ASTM A749-14 Table 4).

Table 6 - Crown tolerances, inch; for width ranges, inches

	Specified Thickness Inch	Over 1 to 3-1/2, incl	Over 3-1/2 to 6, incl	Over 6 to 12, incl
	0.0255 to 0.0343, incl	0.002	--	--
Over	0.0343 to 0.0448, incl	0.002	0.003	--
Over	0.0448 to 0.1180, incl	0.002	0.003	0.004
Over	0.1180 to 0.1870, incl	0.002	0.002	0.003
Over	0.1870 to 0.2030, incl	0.001	0.002	0.003
Over	0.2030 to 0.2299, incl	--	--	0.002

2.5.1 Strip may be thicker at the center than at a point $\frac{3}{8}$ inch from the edge by the amounts shown in Table 6.

2.6 Rectangular Sheared Plates

See Table 7 (comparable to ASTM A6-16 Table 1).

Table 7 - Thickness tolerances, inch, plus only for width ranges, inches

[illegible]

2.6.1 Minus tolerance for all sizes shall be 0.010 inch; plus, tolerances shall be as shown in Table 7.

2.6.2 For thickness measured at any location other than that specified in Section 2, the permissible maximum plus tolerance shall be increased by 75%, rounded to the nearest 0.01 inch.

3. WIDTH

3.1 Cold Rolled Sheet Over 12 inches in Width and Hot Rolled, Cut Edge Sheet Not Resquared, Coils, and Cut Lengths

See Table 8 (equivalent to ASTM A568-15 Table 7).

Table 8 - Width tolerances

Specified Width Inches	Tolerance, Inch Plus Only
Over 12 to 30, incl	1/8
Over 30 to 48, incl	3/16
Over 48 to 60, incl	1/4
Over 60 to 80, incl	5/16
Over 80	3/8

3.1.1 For hot rolled sheet, tolerances apply only to thicknesses 0.2299 inch and under.

3.2 Cold Rolled Sheet 2 to 12 inches in Width, Produced by Slitting Wider Sheet, Not Resquared, Coils, and Cut Lengths

See Table 9 (comparable to ASTM A568-15 Table 18).

Table 9 - Width tolerances, inch, plus and minus for thickness ranges, inch

Specified Width Inches	0.0142 to 0.0680, incl	Over 0.0680 to 0.0821, incl
2 to 6, incl	0.008	0.012
Over 6 to 9, incl	0.016	0.016
Over 9 to 12, incl	0.032	0.032

3.3 Cold Rolled Strip, Coils, and Cut Lengths

3.3.1 Mill Edge

See Table 10 equivalent to ASTM A109-15 Table 7 and ASTM A684-15 Table 9).

Table 10 - Width tolerances

Specified Width Inches	Tolerance, Inch Plus and Minus
Over 1/2 to 2, incl	1/32
Over 2 to 5, incl	3/64
Over 5 to 10, incl	5/64
Over 10 to 15, incl	3/32
Over 15 to 20, incl	1/8
Over 20 to 24, excl	5/32

3.3.2 Slit Edge

See Table 11 (equivalent to ASTM A684-15 Table 10).

Table 11 - Width tolerances, inch, plus and minus for thickness ranges, inch

Specified Width Inches	Up to 0.068, incl	Over 0.068 to 0.099, incl	Over 0.099 to 0.160, incl	Over 0.160 to 0.2490, incl
Over 1/2 to 6, incl	0.005	0.008	0.010	0.016
Over 6 to 9, incl	0.005	0.010	0.016	0.020
Over 9 to 12, incl	0.010	0.010	0.016	0.020
Over 12 to 20, incl	0.016	0.016	0.020	0.031
Over 20 to 24, excl	0.020	0.020	0.020	0.031

3.4 Hot Rolled Strip, Coils, and Cut Lengths (see 3.4.1)

See Table 12 (equivalent to ASTM A749-15 Table 5).

Table 12 - Width tolerances, inch, plus and minus for thickness ranges, inch

Specified Width Inches	Mill Edge or Square Edge Up to 0.2299, incl	Slit or Cut Edge Up to 0.109, incl	Slit or Cut Edge Over 0.109 to 0.2299, incl
Up to 2, incl	1/32	0.008	0.016
Over 2 to 5, incl	3/64	0.008	0.016
Over 5 to 10, incl	1/16	0.010	0.016
Over 10 to 12, incl	3/32	0.016	0.016

3.4.1 Tolerances for strip over 0.2299 to 0.5000 inch in specified thickness with mill edge or square edge apply only to coiled strip.

3.5 Hot Rolled Plate

3.5.1 Sheared Plate

See Table 13 (equivalent to ASTM A6-16 Table 3).

Table 13 - Width tolerances, inches, plus only for thickness ranges, inches

Specified Width Inches	Specified Length Inches	Up to 3/8, excl	3/8 to 5/8, excl	5/8 to 1, excl	1 to 1-1/2, incl
Up to 60, excl	Up	3/8	7/16	1/2	5/8
60 to 84, excl	To	7/16	1/2	5/8	3/4
84 to 108, excl	120,	1/2	5/8	3/4	1
108 and over	excl	5/8	3/4	7/8	1-1/8
Up to 60, excl	120	3/8	1/2	5/8	3/4
60 to 84, excl	To	1/2	5/8	3/4	7/8
84 to 108, excl	240,	9/16	11/16	13/16	1
108 and over	excl	5/8	3/4	7/8	1-1/8
Up to 60, excl	240	3/8	1/2	5/8	3/4
60 to 84, excl	To	1/2	5/8	3/4	7/8
84 to 108, excl	360,	9/16	11/16	7/8	1
108 and over	excl	11/16	7/8	1	1-1/4
Up to 60, excl	360	7/16	1/2	5/8	3/4
60 to 84, excl	To	1/2	5/8	3/4	7/8
84 to 108, excl	480,	9/16	3/4	7/8	1
108 and over	excl	3/4	7/8	1	1-1/4
Up to 60, excl	480	7/16	1/2	5/8	3/4
60 to 84, excl	To	1/2	5/8	3/4	7/8
84 to 108, excl	600,	5/8	3/4	7/8	1
108 and over	excl	3/4	7/8	1	1-1/4
Up to 60, excl	600	1/2	5/8	3/4	7/8
60 to 84, excl	To	5/8	3/4	7/8	1
84 to 108, excl	720,	5/8	3/4	7/8	1-1/8
108 and over	excl	7/8	1	1-1/8	1-1/4
Up to 60, excl	720	9/16	3/4	7/8	1
60 to 84, excl	And	3/4	7/8	1	1-1/8
84 to 108, excl	over	3/4	7/8	1	1-1/4
108 and over		1	1-1/8	1-1/4	1-3/8

3.5.1.1 Minus tolerance shall be 1/4 inch for all sizes; plus, tolerance shall be as shown in Table 13.

3.5.2 Gas Cut Rectangular Plate, Thicknesses Up to 2 inches, Exclusive

See Table 14 (equivalent to ASTM A6-16 Table 9).

Table 14 - Width tolerance

Specified Width Inches	Tolerance, Inch, Plus and Minus
All	1/2

3.5.2.1 Tolerance may be taken all minus or divided unequally plus and minus, if so specified.

3.5.2.2 Plates with universal rolled edges are commonly cut to length only.

3.5.3 Universal Mill Plate

See Table 15 (equivalent to ASTM A6-16 Table 5).

Table 15 - Width tolerances, inch, plus only for thickness ranges, inches

Specified Width Inches	Up to 3/8, excl	3/8 to 5/8, excl	5/8 to 1, excl	1 to 2, excl
Up to 20, excl	1/8	1/8	3/16	1/4
20 to 36, excl	3/16	1/4	5/16	3/8
36 and over	5/16	3/8	7/16	1/2

3.5.3.1 Minus tolerance shall be 1/8 inch. Plus, tolerances shall be as shown in Table 15.

3.5.4 Mill Edge Plates in Coils and Cut Lengths for Plates Produced on Strip Mills

See Table 16 (equivalent to ASTM A6-16 Table 4).

Table 16 - Width tolerances

Specified Width Inches	Tolerance, Inches Plus and Minus
Up to 14, excl	7/16
14 to 17, excl	1/2
17 to 19, excl	9/16
19 to 21, excl	5/8
21 to 24, excl	11/16
24 to 26, excl	13/16
26 to 28, excl	15/16
28 to 35, excl	1-1/8
35 to 50, excl	1-1/4
50 to 60, excl	1-1/2
60 to 65, excl	1-5/8
65 to 70, excl	1-3/4
70 to 80, excl	1-7/8
80 and over	2

3.5.4.1 Tolerances in Table 16 do not apply to the uncropped ends of mill edge plate in coils.

4. LENGTH

4.1 Cold Rolled Sheet, Cut Lengths, Not Resquared

See Table 17 (equivalent to ASTM A568-15 Tables 16 and 17).

Table 17 - Length tolerances, inches, plus only for width ranges, inches

Specified Length Inches	2 to 12, incl	Over 12
Over 12 to 24, incl	--	1/8
Over 24 to 30, incl	1/2	1/8
Over 30 to 60, incl	1/2	1/4
Over 60 to 96, incl	3/4	1/2
Over 96 to 120, incl	3/4	3/4
Over 120 to 156, incl	1	1
Over 156 to 192, incl	1	1-1/4
Over 192 to 240, incl	1	1-1/2
Over 240	--	1-3/4

4.1.1 Tolerances in Table 17 for widths 2 to 12 inches, inclusive, apply to product produced by slitting from wider sheet.

4.2 Hot Rolled Sheet, Cut Lengths, Not Resquared

See Table 18 (equivalent to ASTM A568-15 Table 8).

Table 18 - Length tolerances

Specified Length Inches	Tolerance, Inches Plus Only
Up to 15, incl	1/8
Over 15 to 30, incl	1/4
Over 30 to 60, incl	1/2
Over 60 to 120, incl	3/4
Over 120 to 156, incl	1
Over 156 to 192, incl	1-1/4
Over 192 to 240, incl	1-1/2
Over 240	1-3/4

4.3 Cold Rolled Strip

See Table 19 (equivalent to ASTM A109-15 Table 9 and ASTM A684-15 Table 12).

Table 19 - Length tolerances, inch, plus only for width ranges, inches

Specified Length Inches	Over 1/2 to 12, incl	Over 12 to to 24, excl
24 to 60, incl	1/4	1/2
Over 60 to 120, incl	1/2	3/4
Over 120 to 240, incl	3/4	1

4.4 Hot Rolled Strip

See Table 20 (equivalent to ASTM A749-14 Table 6).

Table 20 - Length tolerances, inches, plus only for width ranges, inches

Specified Length Feet	Up to 3, incl	Over 3 to 6, incl	Over 6 to 12, incl
Up to 5, incl	1/4	3/8	1/2
Over 5 to 10, incl	3/8	1/2	3/4
Over 10 to 20, incl	1/2	5/8	1
Over 20 to 30, incl	3/4	3/4	1-1/4
Over 30 to 40, incl	1	1	1-1/2
Over 40	1-1/2	1-1/2	1-3/4

4.5 Hot Rolled Plate

4.5.1 Sheared Plate, Universal Mill Plate, and Mill Edge Plate

See Table 21 (equivalent to ASTM A6-16 Table 3).

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Table 21 - Length tolerances, inches, plus only for thickness ranges, inches

Specified Length Inches	Specified Width Inches	Up to 3/8, excl	3/8 to 5/8, excl	5/8 to 1, excl	1 to 2, incl
Up to 120, excl	Up to 60, excl 60 to 84, excl 84 to 108, excl 108 and over	1/2 5/8 3/4 7/8	5/8 11/6 7/8 1	3/4 7/8 1 1-1/8	1 1 1-1/8 1-1/4
120 to 240, excl	Up to 60, excl 60 to 84, excl 84 to 108, excl 108 and over	3/4 3/4 7/8 1	7/8 7/8 15/16 1-1/8	1 1 1-1/8 1-1/4	1-1/8 1-1/4 1-3/8 1-3/8
240 to 360, excl	Up to 60, excl 60 to 84, excl 84 to 108, excl 108 and over	1 1 1 1-1/8	1-1/8 1-1/8 1-1/8 1-1/4	1-1/4 1-1/4 1-3/8 1-3/8	1-1/2 1-1/2 1-1/2 1-3/4
360 to 480, excl	Up to 60, excl 60 to 84, excl 84 to 108, excl 108 and over	1-1/8 1-1/4 1-1/4 1-3/8	1-1/4 1-3/8 1-3/8 1-1/2	1-3/8 1-1/2 1-1/2 1-5/8	1-5/8 1-5/8 1-7/8 1-7/8
480 to 600, excl	Up to 60, excl 60 to 84, excl 84 to 108, excl 108 and over	1-1/4 1-3/8 1-3/8 1-1/2	1-1/2 1-1/2 1-1/2 1-5/8	1-5/8 1-5/8 1-5/8 1-3/4	1-7/8 1-7/8 1-7/8 1-7/8
600 to 720, excl	Up to 60, excl 60 to 84, excl 84 to 108, excl 108 and over	1-3/4 1-3/4 1-3/4 1-3/4	1-7/8 1-7/8 1-7/8 2	1-7/8 1-7/8 1-7/8 2-1/4	2-1/4 2-1/4 2-1/4 2-1/2
720 and over	Up to 60, excl 60 to 84, excl 84 to 108, excl 108 and over	2 2 2 2	2-1/8 2-1/8 2-1/8 2-3/8	2-1/4 2-1/4 2-1/4 2-1/2	2-3/4 2-3/4 2-3/4 3

4.5.1.1 Minus tolerance shall be 1/4 inch for all sizes. Plus, tolerances shall be as shown in Table 21 except as specified in 4.5.1.2.

4.5.1.2 For sheared plate, the tolerances in Table 21 apply only to specified thicknesses 1-1/2 inches and under.

4.5.2 Gas Cut Rectangular Plates, Thicknesses Up to 2 inches, Exclusive

See Table 22 (equivalent to ASTM A6-16 Table 9).

Table 22 - Length tolerances

Specified Length Inches	Tolerance, Inch, Plus Only
All	1/2

4.5.2.1 Tolerances may be taken all minus or divided plus and minus if so specified.

4.5.2.2 Plates with universal rolled edges are commonly cut to length only.

5. CAMBER (LATERAL BOW)

5.1 Sheet

Camber (lateral bow) is the greatest deviation of a side edge from a straight line, the measurement being taken on the concave side with a straight edge.

5.1.1 Cold Rolled Sheet Over 12 inches Wide and Hot Rolled Sheet, Not Resquared, Cut Lengths

See Table 23 (equivalent to ASTM A568-15 Table 10).

Table 23 – Camber

Specified Cut Length Feet	Tolerance Inches
Up to 4, incl	1/8
Over 4 to 6, incl	3/16
Over 6 to 8, incl	1/4
Over 8 to 10, incl	5/16
Over 10 to 12, incl	3/8
Over 12 to 14, incl	1/2
Over 14 to 16, incl	5/8
Over 16 to 18, incl	3/4
Over 18 to 20, incl	7/8
Over 20 to 30, incl	1-1/4
Over 30 to 40, incl	1-1/2

5.1.2 Cold Rolled Sheet Over 12 inches Wide and Hot Rolled Sheet in Coils

1 inch in any 20 feet.

5.1.3 Cold Rolled Sheet, 2 to 12 inches in Width, in Coils (Applies to widths produced by slitting from wider sheet).

1/4 inch in any 8 feet.

5.2 Strip

Camber (lateral bow) is the deviation of a side edge from a straight line. Such a deviation is determined by placing an 8-foot straight edge on the concave side and measuring the greatest distance between the strip edge and the straight edge.