Designation: A 505 – 00 (Reapproved 2005)

Standard Specification for Steel, Sheet and Strip, Alloy, Hot-Rolled and Cold-Rolled, General Requirements for[1]

This standard is issued under the fixed designation A 505 ; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This specification covers a group of common requirements that, unless otherwise specified in the material specification, apply to hot-rolled and cold-rolled alloy steel sheet and strip under each of the following specifications: A 506, A 507, and A 873/A 873M.

1.2 In case of any conflict in requirements, the requirements of the individual material specification shall prevail over those of this general specification.

1.3 The purchaser may specify additional requirements which do not negate any of the provisions of this general specification or of the individual material specification. Such additional requirements, the acceptance of which are subject to negotiation with the supplier, must be included in the order information (see 4.1.9).

1.4 For purposes of determining conformance with this specification and the various material specifications referenced in 1.1, values shall be rounded to the nearest unit in the right-hand place of figures used in expressing the limiting values in accordance with the rounding provisions of Test Methods and Definitions A 370 and Test Methods, Practices, and Terminology A 751.

2. Referenced Documents

2.1 *ASTM Standards:* [2]

A 370 Test Methods and Definitions for Mechanical Testing of Steel Products

A 506 Specification for Alloy and Structural Alloy Steel, Sheet and Strip, Hot-Rolled and Cold-Rolled

A 507 Specification for Drawing Alloy Steel, Sheet and Strip, Hot-Rolled and Cold-Rolled

A 700 Practices for Packaging, Marking, and Loading Methods for Steel Products for Domestic Shipment

A 751 Test Methods, Practices, and Terminology for Chemical Analysis of Steel Products

A 873/A 873M Specification for Steel Sheet and Strip, Chromium-Molybdenum Alloy, for Pressure Vessels[3]

A 919 Terminology Relating to Heat Treatment of Metals[3]

2.2 *Federal Standard:*[4]

Fed. Std. No. 123 Marking for Shipment (Civil Agencies)

2.3 *Military Standard:*[4]

MIL-STD-163 Steel Mill Products, Preparation for Shipment and Storage

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *sheet and strip*—hot-rolled and cold-rolled alloy steel sheet and strip is classified as shown in Table 1.

3.1.2 *exclusive*—when used in relation to ranges, as for ranges of thicknesses in the tables of permissible variations in dimensions, the term "exclusive" is intended to exclude only the greater value of the range. Thus a range from 60 to 72 in. (1524 to 1829 mm) *exclusive* includes 60 in. but does not include 72 in.

3.1.3 *manufacturer (material manufacturer)*—an organization that performs or directly controls one or more operations, such as melting, rolling, coiling, and heat treatment, that affects the chemical composition or mechanical properties of the material.

4. Ordering Information

4.1 Orders shall include the following information, as necessary, to describe adequately the desired material:

4.1.1 Specification designation, including year of issue,

4.1.2 Chemical composition (grade),

4.1.3 Classification of the material (that is, hot-rolled sheet),

4.1.4 Dimensions (thickness, width, length) in decimal inches,

4.1.5 Quantity (weight or number of pieces),

4.1.6 Condition (that is, "hot-rolled," "cold-rolled"),

4.1.7 Heat treatment required, if any,

[1] This specification is under the jurisdiction of ASTM Committee A01 on Steel, Stainless Steel, and Related Alloys and is the direct responsibility of Subcommittee A01.19 on Steel Sheet and Strip.

Current edition approved March 1, 2005. Published March 2005. Originally approved in 1964. Last previous edition approved in 2000 as A 505 – 00.

[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] Withdrawn.

[4] Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.

Copyright © ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, United States.

Copyright ASTM International
Reproduced by IHS under license with ASTM
No reproduction or networking permitted without license from IHS
Not for Resale
Reproduction authorized per License Agreement with Kathe Hooper (ASTMIHS Account); Mon Mar 21 10:59:04 EST 2005

4.1.8 Type of edge,

4.1.9 Additional information as specified in the individual material specification,

4.1.10 Any special requirements not specified in the individual material specification, and

4.1.11 Whether certification of compliance or test reports are required.

5. Materials and Manufacture

5.1 *Melting Process*—Unless otherwise specified in the individual material specification, the steel may be made by any process that produces material that conforms to the specified requirements.

5.2 *Hot or Cold Rolling*—The sheet and strip shall be produced by hot rolling or cold rolling, as specified in the individual material specification and as specified on the order.

5.3 *Heat Treatment*—When heat treatment is required, it shall be performed in accordance with the requirements specified in the individual material specification. Heat treatment may be performed by either the manufacturer or the purchaser; however, if the purchaser intends to perform the heat treatment, it shall be so stated on the order.

5.3.1 Heat treatment terms shall be in accordance with Terminology A 919.

6. *Chemical Requirements* Chemical Requirements

6.1 *Cast or Heat Analysis* of each cast or heat shall be made by the manufacturer to determine the percentage of elements specified in the individual material specification. This analysis shall be made from a test specimen preferably taken during the teeming of the cast or heat. The chemical composition thus determined shall be reported to the purchaser or his representative upon request, and shall conform to the cast or heat analysis requirements of the applicable material specification.

6.2 *Product or Verification Analysis*— An analysis may be made by the purchaser from finished material representing each cast or heat. The composition thus determined shall conform to the requirements for product analysis specified in the individual material specification or on the order; however, if only cast or heat analysis requirements are specified in the material specification or on the order, the composition determined on product analysis shall conform to those requirements subject to the product analysis tolerances specified in Table 2.

6.3 *Referee Analysis*—In case referee analysis is required to resolve a dispute concerning the results of a chemical analysis, the procedures for performing the referee analysis shall be in accordance with Test Methods, Practices, and Terminology A 751.

7. Metallurgical Structure

7.1 The requirements for metallurgical structure, if any, shall be as specified in the individual material specification.

8. Mechanical Property Requirements

8.1 *Requirements*—The requirements for mechanical properties, if any, shall be as specified in the individual material specification.

8.2 *Number of Tests*—The number of specimens shall be as specified in the individual material specification.

8.3 *Location and Orientation of Tension Test Specimens*—Unless otherwise specified in the individual material specification, tension test specimens shall be the full thickness of the material. The test coupons shall be taken from the material in its finished condition except as otherwise provided in 8.4; shall be taken approximately midway between the edge and centerline of the sheet or strip; and shall be taken such that the long axis of the test specimen will be transverse to the final direction of rolling.

8.4 *Heat Treatment of Test Coupons*:

8.4.1 When heat treatment is required by the material specification and is to be performed by the purchaser or his agent, and the material is to be supplied by the manufacturer in a condition other than that required by the material specification, the material shall be qualified on the basis of tests made on specimens taken from coupons, obtained from the material in its as-shipped condition, that have been heat treated in accordance with the requirements specified in the material specification or on the order. If the heat-treatment temperatures are not specified, the manufacturer shall heat treat the coupons under conditions he considers appropriate.

8.4.2 When specified on the order, the test coupons may be subjected to additional heat treatment to simulate thermal treatments that will be used during fabrication.

8.4.3 The purchaser shall be informed of the procedures followed in heat treating the test coupons.

8.5 *Test Methods*:

8.5.1 All tests shall be conducted in accordance with Test Methods and Definitions A 370.

8.5.2 Yield strength shall be determined either by the 0.2 % offset method or by the 0.5 % extension-under-load method.

9. Quality

9.1 *General*—Sheet and strip furnished under this specification shall be clean, sound, and free of internal or external imperfections which would make the material unsuitable for the intended application. Care should be taken to avoid cracks, seams, slivers, grooves, laminations, pits, blisters, buckles, coil breaks, creases, holes, pickling stains and patches, ragged and torn edges, and "rolled-in" dirt and scale.

9.2 *Surface Finish*—The degree or amount of surface imperfections on material in cut lengths shall be such that only a reasonable amount of metal finishing is required. Slight surface imperfections that are completely removable without reducing the thickness below the minimum permissible limits shall not be considered to be defects. Coils may contain some abnormal defects such as holes, welds, etc., which render a portion of the coil unusable, since the inspection of coils does not afford the same opportunity to reject portions containing defects as is the case with cut lengths. However, an excessive number of abnormal imperfections is cause for rejection.

10. Edges

10.1 *Edges*—The types of edges procurable in hot-rolled and in cold-rolled alloy-steel sheet and strip are as follows:

10.2 *Hot-Rolled Sheet and Strip*:

10.2.1 *Mill Edge*—Normal edge produced in hot rolling that does not conform to any definite contour.

Copyright ASTM International
Reproduced by IHS under license with ASTM
No reproduction or networking permitted without license from IHS
Copyright by ASTM Int'l (all rights reserved);
Reproduction authorized per License Agreement with Kathe Hooper (ASTMIHS Account); Mon Mar 21 10:59:04 EST 2005
Not for Resale

10.2.2 *Cut Edge*—Approximately square edge resulting from the cutting of sheet into one or more desired widths by means of rotary knives (slit edge) or blade shears (sheared edge).

10.2.3 *Square Edge*—Type of mill edge produced by hot edge-rolling; furnished on strip only.

10.3 *Cold-Rolled Sheet*:

10.3.1 *Cut Edge*—Same description as shown in 10.2.2 for hot-rolled sheet and strip.

10.4 *Cold-Rolled Strip*:

10.4.1 *No. 1 Edge*—Prepared edge of a specified round or square contour that is produced when a very accurate width is required.

10.4.2 *No. 2 Edge*—Natural mill edge carried through the cold rolling from the hot-rolled strip without additional processing of the edge.

10.4.3 *No. 3 Edge*—Approximately square edge produced by slitting.

10.4.4 *No. 4 Edge*—Rounded edge produced by edge rolling either the natural edge of hot-rolled strip or slit-edge strip. Used when an approximately round edge is desired and when the finish of the edge is not important.

10.4.5 *No. 5 Edge*—Square edge produced by edge rolling or filing for the purpose of eliminating burr.

10.4.6 *No. 6 Edge*—Square edge produced by edge rolling the natural edge of hot-rolled strip or slit-edge strip, when the width tolerances and finish required are not as exacting as for the No. 1 Edge.

11. Permissible Variations in Dimensions

11.1 The permissible variations in dimensions (see Table 3) for hot-rolled and cold-rolled alloy steel sheet and strip shall be in accordance with Tables 4-22.

12. Identification of Product

12.1 As a minimum, the material shall be identified with the manufacturer's name or brand, the specification designation, weight, purchaser's order number, and material identification which is traceable to the heat or cast.

12.2 The identification shall be legibly stenciled on top of each lift or shown on a tag attached to each coil or shipping unit.

12.3 When specified on the order, each sheet shall be identified as agreed upon.

13. Retests

13.1 The retest provisions of Test Methods and Definitions A 370 shall apply.

13.2 If the results of any tests do not conform to the specified requirements, (unless otherwise specified in the individual material specification), retests may be made on double the original number of specimens from the same lot, each of which must conform to the requirements specified. If the results of the retests do not conform to the specified requirements, the lot shall be rejected.

14. Inspection and Testing

14.1 When the order specifies that the purchaser will inspect the material and witness testing, the inspector representing the purchaser shall have entry at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works that concern the manufacture of the material ordered. The manufacturer shall afford the inspector all reasonable facilities to satisfy the inspector that the material is being furnished in accordance with the specification.

14.2 All tests (except product analysis) and inspection shall be made at the place of manufacture before shipment, unless otherwise specified on the order, and shall be so conducted as not to interfere unnecessarily with the operation of the works.

15. Rework and Retreatment

15.1 If inspection and test results fail to conform to the specified requirements, the material may be reworked or retreated, if the manufacturer can assure that the cause of failure is curable and that the quality of the material shall conform to the specified requirements. After retreatment, testing shall be done in accordance with the material specification requirements.

16. Rejection Subsequent to Shipment

16.1 Material that shows characteristics not in conformance with the material specification subsequent to its initial acceptance may be rejected. In such cases, the manufacturer should be notified in a timely manner.

17. Certification

17.1 When specified on the order, a certification of compliance shall be furnished that the material was manufactured, sampled, tested, and inspected in accordance with the requirements of the applicable specification.

17.2 When specified on the order, a report of the test results shall be furnished.

17.3 A signature is not required on the certification of compliance or the report of test results. However, the document shall clearly identify the organization submitting the document. Notwithstanding the absence of a signature, the organization submitting the document is responsible for the content of the document.

18. Packaging, Marking, and Loading for Shipment

18.1 Packaging, marking, and loading for shipment shall be in accordance with those procedures recommended in Practices A 700.

18.2 *For Government Procurement*—Packaging, packing, and marking of material for military procurement shall be in accordance with the requirements of MIL-STD-163, Level A, Level C, or commercial, as specified in the contract or purchase order. Marking for shipment of material for civil agencies shall be in accordance with Fed. Std. No. 123.

Copyright ASTM International
Reproduced by IHS under license with ASTM
No reproduction or networking permitted without license from IHS
Copyright by ASTM Int'l (all rights reserved);
Reproduction authorized per License Agreement with Kathe Hooper (ASTMIHS Account); Mon Mar 21 10:59:04 EST 2005
Not for Resale

TABLE 1 Classification of Hot-Rolled and Cold-Rolled Sheet and Strip

Hot-Rolled Sheet and Strip				
Thickness, in.[A]	Width, in.[A]			
	Up to 6, incl	Over 6 to 23 15/16, incl	24 to 48, incl	Over 48
0.2299 to 0.2031, incl	. . .	strip	sheet	. . .
0.2030 to 0.1800, incl	strip	strip	sheet	. . .
0.1799 an d thinner	strip	strip	sheet	sheet

Cold-Rolled Sheet and Strip			
Thickness, in.[A]	Width, in.[A]		
	Up to 23 15/16, incl	24 to 48, incl	Over 48
0.2499 to 0.2300, incl	strip	. . .	. . .
0.2299 to 0.1800, incl	strip	sheet	. . .
0.1799 and thinner	strip	sheet	sheet

[A] 1 in. = 25.4 mm.

TABLE 2 Product Analysis Tolerances Over or Under Specified Range or Limit

Element	Limit or Maximum of Specified Element, %	Tolerance Over Maximum Limit or Under Minimum Limit
Carbon	to 0.30, incl	0.01
	over 0.30–0.75, incl	0.02
	over 0.75	0.03
Manganese	to 0.90, incl	0.03
	over 0.90–2.10, incl	0.04
Phosphorus	over max only	0.005
Sulfur	over max only	0.005
Silicon	to 0.35, incl	0.02
	over 0.35–2.20, incl	0.05
Copper	to 1.00, incl	0.03
	over 1.00–2.00, incl	0.05
Nickel	to 1.00, incl	0.03
	over 1.00–2.00, incl	0.05
	over 2.00–5.30, incl	0.07
	over 5.30–10.00, incl	0.10
Chromium	to 0.90, incl	0.03
	over 0.90–2.10, incl	0.05
	over 2.10–3.99, incl	0.10
Molybdenum	to 0.20, incl	0.01
	over 0.20–0.40, incl	0.02
	over 0.40–1.15, incl	0.03
Vanadium	to 0.10, incl	0.01
	over 0.10–0.25, incl	0.02
	over 0.25–0.50, incl	0.03
	minimum value specified, check under minimum limit	0.01
Tungsten	to 1.00, incl	0.04
	over 1.00–4.00, incl	0.08
Aluminum	to 0.10, incl	0.03
	over 0.10–0.20, incl	0.04
	over 0.20–0.30, incl	0.05
	over 0.30–0.80, incl	0.07
	over 0.80–1.80, incl	0.10

Copyright ASTM International
Reproduced by IHS under license with ASTM
No reproduction or networking permitted without license from IHS
Copyright by ASTM Int'l (all rights reserved);
Reproduction authorized per License Agreement with Kathe Hooper (ASTMIHS Account); Mon Mar 21 10:59:04 EST 2005
Not for Resale

TABLE 3 Dimensional Tolerance Tables

NOTE 1— The following table shows the dimensional tolerance table number applicable to the different product classification and rolling methods. Continuous mill tolerances apply unless otherwise specified.

	Hot-Rolled					Cold-Rolled							
	Sheet		Strip			Sheet		Strip					
	Hand Mill		Continuous Mill					Continuous Mill					
	Mill Edge	Cut Edge	Mill Edge	Cut Edge		Mill Edge	Cut Edge	Edges					
								1	2	3	4	5	6
								Mill	Slit				
Thickness	5	5	4	4	13	6	6	18	18	18	18	18	18
Width	7	8	7	8	15	7	8	21	19	20	21	21	21
Length	9	9	9	9	16	9	9	22	22	22	22	22	22
Flatness for cut lengths	10	10	10	10	17	10	10	. . .	. . .	. . .	. . .	. . .	. . .
Camber	11	11	11	11	11	11	11	11	11	11	11	11	11
Out-of-square	. . .	12	. . .	12	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
Crown	. . .	. . .	. . .	. . .	14	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .

TABLE 4 Thickness[A] Tolerances for Hot-Rolled Sheet (Continuous Mill Product), Coils, or Cut Lengths

Width, in. (mm)	Thickness, in. (mm)				
	0.2299 to 0.1800 (5.84 to 4.57), incl	0.1799 to 0.0972 (4.56 to 2.47), incl	0.0971 to 0.0822 (2.46 to 2.09), incl	0.0821 to 0.0710 (2.08 to 1.80), incl	0.0709 to 0.0568 (1.79 to 1.44), incl
	Thickness Tolerances, Over and Under, in. (mm), for Specified Widths and Thicknesses				
24 to 32 (610 to 810), incl	0.009 (0.23)	0.008 (0.20)	0.007 (0.18)	0.007 (0.18)	0.006 (0.15)
Over 32 to 40 (810 to 1020), incl	0.009 (0.23)	0.009 (0.23)	0.008 (0.20)	0.007 (0.18)	0.006 (0.15)
Over 40 to 48 (1020 to 1220), incl	0.010 (0.25)	0.010 (0.25)	0.008 (0.20)	0.007 (0.18)	0.006 (0.15)
Over 48 to 60 (1220 to 1520), incl	. . .	0.010 (0.25)	0.008 (0.20)	0.007 (0.18)	0.007 (0.18)
Over 60 to 70 (1520 to 1780), incl	. . .	0.011 (0.28)	0.009 (0.23)	0.008 (0.20)	0.007 (0.18)
Over 70 to 80 (1780 to 2030), incl	. . .	0.012 (0.30)	0.009 (0.23)	0.008 (0.20)	. . .
Over 80 to 90 (2030 to 2290), incl	. . .	0.012 (0.30)	0.010 (0.25)	. . .	. . .
Over 90 (2290)	. . .	0.012 (0.30)	. . .	. . .	. . .

[A] Thickness is measured at any point on the sheet not less than ⅛ in. (9.5 mm) from a cut edge and not less than ¾ in. (19 mm) from a mill edge.

TABLE 5 Thickness[A] Tolerances, Hot-Rolled Sheet, Hand Mill Product

Thickness, in.[B]	Tolerance, in.[B] Over and Under
0.229 to 0.188, incl	0.015
Under 0.188 to 0.146, incl	0.014
Under 0.146 to 0.131, incl	0.012
Under 0.131 to 0.115, incl	0.010
Under 0.115 to 0.099, incl	0.009
Under 0.099 to 0.084, incl	0.008
Under 0.084 to 0.073, incl	0.007
Under 0.073 to 0.059, incl	0.006
Under 0.059 to 0.041, incl	0.005
Under 0.041 to 0.027, incl	0.004
Under 0.027 to 0.019, incl	0.003

[A] Thickness is measured at any point on the sheet not less than ⅜ in. from a cut edge and not less than ¾ in. from a mill edge.
[B] 1 in. = 25.4 mm.

Copyright ASTM International
Reproduced by IHS under license with ASTM
No reproduction or networking permitted without license from IHS
Copyright by ASTM Int'l (all rights reserved);
Reproduction authorized per License Agreement with Kathe Hooper (ASTMIHS Account); Mon Mar 21 10:59:04 EST 2005
Not for Resale

TABLE 6 Thickness[A] Tolerances for Cold-Rolled Sheet, Coils, or Cut Lengths

Specified Width, in.[B]	Thickness, in.[B]								
	0.0313 to 0.0195, incl	0.0508 to 0.0314, incl	0.0567 to 0.0509, incl	0.0709 to 0.0568, incl	0.0821 to 0.0710, incl	0.0971 to 0.0822, incl	0.1419 to 0.0972, incl	0.1799 to 0.1420, incl	0.2299 to 0.1800, incl
	Thickness Tolerances, Over and Under, in.[B], for Specified Widths and Thicknesses								
24 to 32, incl	0.003	0.004	0.005	0.005	0.005	0.006	0.007	0.008	0.008
Over 32 to 40, incl	0.003	0.004	0.005	0.005	0.006	0.007	0.008	0.009	0.009
Over 40 to 48, incl	0.003	0.004	0.005	0.005	0.006	0.007	0.009	0.010	0.010
Over 48 to 60, incl	0.003	0.004	0.005	0.006	0.006	0.008	0.010	0.010	. . .
Over 60 to 70, incl	. . .	0.005	0.006	0.006	0.007	0.009	0.010	0.011	. . .
Over 70 to 80, incl	. . .	. . .	. . .	. . .	0.007	0.009	0.011	0.012	. . .
Over 80 to 90, incl	. . .	. . .	. . .	. . .	. . .	. . .	0.012	0.012	. . .
Over 90	. . .	. . .	. . .	. . .	. . .	. . .	0.012	0.012	. . .

[A] Thickness is measured at any point on the sheet not less than ⅜ in. from a cut edge and not less than ¾ in. from a mill edge.
[B] 1 in. = 25.4 mm.

TABLE 7 Width Tolerances for Mill Edge of Hot-Rolled or Cold-Rolled Sheet, Coils, or Cut Lengths

Specified Widths, in.[A]	Tolerances Over Specified Width, in.[A], No Tolerance Under
24 to 26, excl	13/16
26 to 28, excl	15/16
28 to 35, excl	1⅛
35 to 50, excl	1¼
50 to 60, excl	1½
0 to 65, excl	1⅝
5 to 70, excl	1¾
70 to 80, excl	1⅞
80 and over	2

[A] 1 in. = 25.4 mm.

TABLE 8 Width Tolerances for Cut Edge of Hot-Rolled or Cold-Rolled Sheet, Coils, or Cut Lengths

Specified Width, in.[A]	Tolerance Over Specified Width, in.[A], No Tolerance Under
24 to 30, incl	3/16
Over 30 to 50, incl	¼
Over 50 to 80, incl	5/16
Over 80	⅜

[A] 1 in. = 25.4 mm.

TABLE 9 Length Tolerances for Hot-Rolled or Cold-Rolled Sheet

Specified Length, in. (mm)	Tolerance Over Specified Length, in. (mm), No Tolerance Under
24 to 30 (610 to 760), incl	¼(6.4)
Over 30 to 60 (760 to 1520), incl	½(12.7)
Over 60 to 120 (1520 to 3050), incl	¾ (19)
Over 120 to 156 (3050 to 3960), incl	1 (25)
Over 156 to 192 (3960 to 4880), incl	1¼ (31)
Over 192 to 240 (4880 to 6100), incl	1½ (38)
Over 240 (6100)	1¾ (44)

Copyright ASTM International
Reproduced by IHS under license with ASTM
No reproduction or networking permitted without license from IHS
Copyright by ASTM Int'l (all rights reserved);
Reproduction authorized per License Agreement with Kathe Hooper (ASTMIHS Account); Mon Mar 21 10:59:04 EST 2005
Not for Resale

TABLE 10 Flatness Tolerances for Cut Lengths of Hot-Rolled or Cold-Rolled Sheet[A]

Specified Thickness, in.[B]	Specified Width, in.[B]	Flatness Tolerance, in.[B,C]
From 0.0195 to 0.0567, incl	24 to 36, incl	½
	Over 36 to 60, incl	¾
	Over 60	1
From 0.0568 to 0.2299, incl	24 to 60, incl	½
	Over 60 to 72, incl	¾
	Over 72	1

[A] Rolled or thermally treated and flattened.
[B] 1 in. = 25.4 mm.
[C] Deviations from flatness are measured by laying the sheet on a horizontal flat surface and measuring the maximum elevation above that surface to any point on the bottom surface of the sheet.

TABLE 11 Camber[A] Tolerances for Hot-Rolled or Cold-Rolled Sheet and Strip

For sheet	¼ in. (6.35 mm) in any 8 ft (2440 mm)
For strip to 1½ in. (38 mm) in width, incl	½ in. (12.7 mm) in any 8 ft (2440 mm)
For strip over 1½ to 23 15/16 in. (38.1 to 608.0 mm) in width, incl	¼ in. (6.35 mm) in any 8 ft (2440 mm)

[A] Camber is determined by placing an 8-ft straightedge on the concave edge of the sheet or strip and measuring the greatest distance between the sheet edge or strip edge and the straightedge. When the camber shown in Table 11 is not suitable for a particular purpose, hot-rolled strip is sometimes machine straightened to a specified camber. For that requirement, the producer should be consulted.

TABLE 12 Out-Of-Square Tolerance for Hot-Rolled or Cold-Rolled Sheet (Cut Edge Not Resquared)

Out-of-square is the greatest deviation of an end edge from a straight line at a right angle to a side and touching one corner. The tolerance for sheets of all gages and all sizes is 1/16 in./6 in., 10.5 mm/m or fraction thereof, of width.

It is also obtained by measuring the difference between the diagonals of the sheet. The out-of-square deviation is one half of that difference.

TABLE 13 Thickness Tolerances for Hot-Rolled Strip Coils, or Cut Lengths[A,B]

Specified Width, in.[C]	Thickness, in.[C]							
	0.2299 to 0.2031, incl	0.2030 to 0.1875, incl	0.1874 to 0.1719, incl	0.1718 to 0.1420, incl	0.1419 to 0.1121, incl	0.1120 to 0.0972, incl	0.0971 to 0.0710, incl	0.0709 to 0.0568, incl
	Thickness Tolerances, in.[C], Over and Under for Specified Widths and Thicknesses							
To 6, incl	. . .	0.006	0.006	0.005	0.005	0.005	0.005	0.005
Over 6 to 12, incl	0.007	0.006	0.006	0.006	0.006	0.005	0.005	0.005
Over 12 to 15, incl	0.008	0.008	0.007	0.007	0.007	0.007	0.006	0.006
Over 15 to 20, incl	0.009	0.009	0.009	0.008	0.008	0.008	0.007	0.006
Over 20 to 23 15/16 , incl	0.009	0.009	0.009	0.009	0.008	0.008	0.007	0.006

[A] Thickness measurements are taken 3/8 in. from edge of strip on 1 in. or wider; and at any place on the strip when narrower than 1 in.
[B] See Table 16 for applicable crown tolerances.
[C] 1 in. = 25.4 mm.

Copyright ASTM International
Reproduced by IHS under license with ASTM
No reproduction or networking permitted without license from IHS
Not for Resale
Reproduction authorized per License Agreement with Kathe Hooper (ASTMIHS Account); Mon Mar 21 10:59:04 EST 2005

TABLE 14 Crown Tolerances for Hot-Rolled Strip, Coils, or Cut Lengths[A]

Specified Widths, in.[B]	Additional Thickness at Center, in.[B]
Over 1 to 3½, incl	0.002
Over 3½ to 6, incl	0.003
Over 6 to 12, incl	0.004
Over 12 to 15, incl	0.005
Over 15 to 23¹⁵⁄₁₆ , incl	0.006

[A] Hot-rolled alloy strip may be thicker at the center than at a point ⅜ in. from the edge as shown in this table.
[B] 1 in. = 25.4 mm.

TABLE 15 Width Tolerances for Hot-Rolled Strip, Coils, or Cut Lengths

Specified Width, in. (mm)	Mill Edge	Cut Edge[A]		
		Slit Edge		Sheared Edge
		Thickness, in. (mm)		
		To 0.109 (2.77), incl	Over 0.109 (2.77)	
	Width Tolerance, in. (mm), Over and Under	Width Tolerance, in. (mm), Over and Under		Width Tolerance, in. (mm), Over Width No Tolerance Under
To 2 (50), incl	1⁄32 (0.79)	0.010 (0.25)	0.016 (0.41)	⅛ (3.2)
Over 2 to 5 (50 to 130), incl	1⁄16 (1.59)	0.010 (0.25)	0.020 (0.51)	⅛ (3.2)
Over 5 to 9 (130 to 230), incl	3⁄32 (2.38)	0.016 (0.41)	0.024 (0.61)	⅛ (3.2)
Over 9 to 12 (230 to 300), incl	⅛ (3.20)	0.016 (0.41)	0.031 (0.79)	⅛ (3.2)
Over 12 to 20 (300 to 510), incl	¼ (6.35)	0.020 (0.51)	0.031 (0.79)	⅛ (3.2)
Over 20 to 23¹⁵⁄₁₆ (510 to 610), incl	⅜(9.50)	0.031 (0.79)	0.031 (0.79)	⅛ (3.2)

[A] Some alloy grades require annealing before cutting because of their high hardenability.

TABLE 16 Length Tolerances for Hot-Rolled Strip

Specified Widths, in.[A]	Length, in.[A]					
	To 60, incl	Over 60 to 120, incl	Over 120 to 240, incl	Over 240 to 360, incl	Over 360 to 480, incl	Over 480
	Length Tolerances, in.[A], Over Specified Length, No Tolerance Under					
To 3, incl	¼	⅜	½	¾	1	1½
Over 3 to 6, incl	⅜	½	⅝	¾	1	1½
Over 6 to 23¹⁵⁄₁₆ , incl	½	¾	1	1¼	1½	1¾

[A] 1 in. = 25.4 mm.

TABLE 17 Flatness Tolerances for Cut Lengths of Hot-Rolled Strip As-Rolled or Thermally Treated and Flattened

½ in., max, in 8 ft (5.2 mm/m) of length

Copyright ASTM International
Reproduced by IHS under license with ASTM
No reproduction or networking permitted without license from IHS
Copyright by ASTM Int'l (all rights reserved);
Reproduction authorized per License Agreement with Kathe Hooper (ASTMIHS Account); Mon Mar 21 10:59:04 EST 2005
Not for Resale

TABLE 18 Thickness Tolerances for Cold-Rolled Strip[A]

Specified Thickness, in. (mm)	Width, in. (mm)															
	3/16 to 1 (4.8 to 25), excl		1 to 3 (25 to 75), excl		3 to 6 (75 to 150), incl		Over 6 to 9 (150 to 230), incl		Over 9 to 12 (230 to 300), incl		Over 12 to 16 (300 to 410), incl		Over 16 to 20 (410 to 510), incl		Over 20 to 23 15/16 (510 to 610), incl	
	Thickness Tolerances, in. (mm) Over and Under for Specified Thicknesses and Widths															
Under 0.010 (0.25)	. . .		. . .		. . .		. . .		. . .		. . .		. . .		. . .	
0.010 (0.25)	0.001	(0.03)	0.001	(0.03)	0.001	(0.03)	0.001	(0.03)	0.001	(0.03)	0.001	(0.03)	0.0015	(0.04)	0.0015	(0.04)
0.011 (0.28)	0.001	(0.03)	0.001	(0.03)	0.001	(0.03)	0.001	(0.03)	0.001	(0.03)	0.0015	(0.04)	0.0015	(0.04)	0.0015	(0.04)
0.012 (0.30)	0.001	(0.03)	0.001	(0.03)	0.001	(0.03)	0.001	(0.03)	0.0015	(0.04)	0.0015	(0.04)	0.0015	(0.04)	0.0015	(0.04)
Over 0.012 to 0.016 (0.30 to 0.41), incl	0.001	(0.03)	0.001	(0.03)	0.001	(0.03)	0.0015	(0.04)	0.0015	(0.04)	0.0015	(0.04)	0.002	(0.05)	0.002	(0.05)
Over 0.016 to 0.019 (0.41 to 0.48), incl	0.001	(0.03)	0.001	(0.03)	0.001	(0.03)	0.0015	(0.04)	0.0015	(0.04)	0.002	(0.05)	0.002	(0.05)	0.002	(0.05)
Over 0.019 to 0.025 (0.48 to 0.64), incl	0.001	(0.03)	0.001	(0.03)	0.0015	(0.04)	0.002	(0.05)	0.002	(0.05)	0.002	(0.05)	0.0025	(0.06)	0.0025	(0.06)
Over 0.025 to 0.028 (0.64 to 0.71), incl	0.001	(0.03)	0.0015	(0.04)	0.0015	(0.04)	0.002	(0.05)	0.002	(0.05)	0.002	(0.05)	0.0025	(0.06)	0.003	(0.08)
Over 0.028 to 0.034 (0.71 to 0.86), incl	0.0015	(0.04)	0.0015	(0.04)	0.002	(0.05)	0.0025	(0.06)	0.0025	(0.06)	0.0025	(0.06)	0.003	(0.08)	0.003	(0.08)
Over 0.034 to 0.039 (0.86 to 0.99), incl	0.002	(0.05)	0.002	(0.05)	0.0025	(0.06)	0.003	(0.08)	0.003	(0.08)	0.003	(0.08)	0.003	(0.08)	0.003	(0.08)
Over 0.039 to 0.049 (0.99 to 1.25), incl	0.002	(0.05)	0.002	(0.05)	0.0025	(0.06)	0.003	(0.08)	0.003	(0.08)	0.003	(0.08)	0.004	(0.10)	0.004	(0.10)
Over 0.049 to 0.068 (1.25 to 1.73), incl	0.002	(0.05)	0.002	(0.05)	0.003	(0.08)	0.003	(0.08)	0.003	(0.08)	0.003	(0.08)	0.004	(0.10)	0.004	(0.10)
Over 0.068 to 0.099 (1.73 to 2.52), incl	0.002	(0.05)	0.002	(0.05)	0.003	(0.08)	0.003	(0.08)	0.003	(0.08)	0.004	(0.10)	0.004	(0.10)	0.004	(0.10)
Over 0.099 to 0.160 (2.52 to 4.06), incl	0.002	(0.05)	0.003	(0.08)	0.003	(0.08)	0.004	(0.10)	0.004	(0.10)	0.004	(0.10)	0.005	(0.13)	0.005	(0.13)
Over 0.160 to 0.187 (4.06 to 4.75), incl	0.002	(0.05)	0.0035	(0.09)	0.004	(0.10)	0.004	(0.10)	0.004	(0.10)	0.005	(0.13)	0.006	(0.15)	0.006	(0.15)
Over 0.187 to 0.2499 (4.75 to 6.35), incl	. . .		. . .		. . .		. . .		. . .		. . .		. . .		. . .	

[A] Thickness measurements are taken 3/8 in. (9.5 mm) in from edge of strip, except that on widths less than 1 in. (25 mm), the tolerances are applicable for measurements at all locations.

Copyright ASTM International
Reproduced by IHS under license with ASTM Int'l (all rights reserved);
No reproduction or networking permitted without license from IHS
Not for Resale
Reproduced and distributed per License Agreement with Kathe Hoopes (ASTMIHS Account); Mon Mar 21 10:59:04 EST 2005

TABLE 19 Width Tolerances for No. 2 Edge (Mill Edge) Cold-Rolled Strip

Specified Width, in.[A]	Tolerances for Specified Width, ±, in.[A]
To 2, incl	1/32
Over 2 to 5, incl	1/16
Over 5 to 9, incl	3/32
Over 9 to 12, incl	1/8
Over 12 to 20, incl	1/4
Over 20 to 23 15/16, incl	3/8

[A] 1 in. = 25.4 mm.

TABLE 20 Width Tolerances for No. 3 Edge (Slit Edge) of Cold-Rolled Strip

Specified Thickness, in.[A]		Width, in.[A]					
Over	To and incl	3/16 to 1/2, excl	1/2 to 6, incl	Over 6 to 9, incl	Over 9 to 12, incl	Over 12 to 20, incl	Over 20 to 23 15/16, incl
		Width Tolerances, in.[A], Over and Under for Indicated Thicknesses and Widths					
0.187	0.2499	. . .	. . .	. . .	. . .	. . .	. . .
0.160	0.187	. . .	0.016	0.020	0.020	0.031	0.031
0.099	0.160	0.010	0.010	0.016	0.016	0.020	0.020
0.068	0.099	0.008	0.008	0.010	0.010	0.016	0.020
0.0099	0.068	0.005	0.005	0.005	0.010	0.016	0.020
0.0099 and under	. . .	. . .	. . .	. . .	. . .	. . .	. . .

[A] 1 in. = 25.4 mm.

Copyright ASTM International
Reproduced by IHS under license with ASTM
No reproduction or networking permitted without license from IHS
Copyright by ASTM Int'l (all rights reserved);
Reproduction authorized per License Agreement with Kathe Hooper (ASTMIHS Account); Mon Mar 21 10:59:04 EST 2005
Not for Resale

TABLE 21 Width Tolerances for Edge Nos. 1, 4, 5, and 6 for Cold-Rolled Strip

Edge No.	Width, in. (mm)	Thickness, in. (mm)	Tolerances for Specified Width, ±, in. (mm)
1	To ¾ (19)	0.0938 (2.38) and thinner	0.005 (0.13)
1	Over ¾ to 5 (19 to 130), incl	0.125 (3.2) and thinner	0.005 (0.13)
4	To 1 (25), incl	0.1875 (4.8) to 0.025 (0.64), incl	0.015 (0.38)
4	Over 1 to 2 (25 to 50), incl	0.2499 to 0.025 (6.35 to 0.64), incl	0.025 (0.64)
4	Over 2 to 4 (50 to 100), incl	0.2499 to 0.035 (6.35 to 0.89), incl	0.047 (1.19)
4	Over 4 to 6 (100 to 150), incl	0.2499 to 0.035 (6.35 to 0.89), incl	0.047 (1.19)
5	To ¾ (19), incl	0.0938 (2.38) and thinner	0.005 (0.13)
5	Over ¾ to 5 (19 to 130), incl	0.125 (3.2) and thinner	0.005 (0.13)
5	Over 5 to 9 (130 to 230), incl	0.125 to 0.008 (3.2 to 0.203), incl	0.010 (0.25)
5	Over 9 to 20 (230 to 510), incl	0.105 to 0.015 (2.67 to 0.38), incl	0.010 (0.25)
5	Over 20 to 23 15/16 (510 to 610), incl	0.080 to 0.023 (2.03 to 0.58), incl	0.015 (0.38)
6	To 1 (25), incl	0.1875 (4.8) to 0.025 (0.64), incl	0.015 (0.38)
6	Over 1 to 2 (25 to 50), incl	0.2499 to 0.025 (6.35 to 0.64), incl	0.025 (0.64)
6	Over 2 to 4 (50 to 100), incl	0.2499 to 0.035 (6.35 to 0.89), incl	0.047 (1.19)
6	Over 4 to 6 (100 to 150), incl	0.2499 to 0.047 (6.35 to 1.19), incl	0.047 (1.19)

TABLE 22 Length Tolerances for Cold-Rolled Strip

Specified Width, in. (mm)	Length, in. (mm)		
	24 to 60 (610 to 1520), incl	Over 60 to 120 (1520 to 3050), incl	Over 120 to 240 (3050 to 6100), incl
	Length Tolerance, in. (mm), Over Specified Length, No Tolerance Under		
To 12 (300), incl	¼ (6.4)	½ (12.7)	¾ (19)
Over 12 to 23 15/16 (300 to 610), incl	½(12.7)	¾ (19)	1 (25)

ASTM International takes no position respecting the validity of any patent rights asserted in connection with any item mentioned in this standard. Users of this standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, are entirely their own responsibility.

This standard is subject to revision at any time by the responsible technical committee and must be reviewed every five years and if not revised, either reapproved or withdrawn. Your comments are invited either for revision of this standard or for additional standards and should be addressed to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend. If you feel that your comments have not received a fair hearing you should make your views known to the ASTM Committee on Standards, at the address shown below.

This standard is copyrighted by ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, United States. Individual reprints (single or multiple copies) of this standard may be obtained by contacting ASTM at the above address or at 610-832-9585 (phone), 610-832-9555 (fax), or service@astm.org (e-mail); or through the ASTM website (www.astm.org).

Copyright ASTM International
Reproduced by IHS under license with ASTM Int'l (all rights reserved);
No reproduction or networking permitted without license from IHS Not for Resale
Reproduction authorized per License Agreement with Kathe Hooper (ASTMIHS Account); Mon Mar 21 10:59:04 EST 2005