Designation: A 108 – 07

Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished[1]

This standard is issued under the fixed designation A 108; 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 cold-finished carbon and alloy steel bars produced in straight length and coil to chemical compositions. Cold-finished bars are suitable for heat treatment, for machining into components, or for use in the as-finished condition as shafting, or in constructional applications, or for other similar purposes (Note 1). Grades of steel are identified by grade numbers or by chemical composition.

NOTE 1—A guide for the selection of steel bars is contained in Practice A 400.

1.2 Some end uses may require one or more of the available designations shown under Supplementary Requirements. Supplementary requirements shall apply only when specified individually by the purchaser.

1.3 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

2. Referenced Documents

2.1 *ASTM Standards:* [2]

A 29/A 29M Specification for Steel Bars, Carbon and Alloy, Hot-Wrought, General Requirements for

A 304 Specification for Carbon and Alloy Steel Bars Subject to End-Quench Hardenability Requirements

A 322 Specification for Steel Bars, Alloy, Standard Grades

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

A 400 Practice for Steel Bars, Selection Guide, Composition, and Mechanical Properties

A 510 Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel

A 576 Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality

2.2 *Other Documents:*

SAE Handbook and SAE J1086 Recommended Practice for Numbering Metals and Alloys (UNS)[3]

ISS Steel Bar Product Guidelines [4]

3. Terminology

3.1 *Definition:*

3.1.1 *product tolerance levels*—cold-finished steel bar is produced with up to four (4) increasingly tight tolerance levels, for the individual product characteristics, dependent on the method of manufacture necessary to meet purchaser-ordered specification requirements. (Product Tolerance Level 1 is selected, unless otherwise specified by purchaser.)

4. Ordering Information

4.1 Orders for cold-finished steel bar to this specification should include the following items to adequately describe the material:

4.1.1 Name of material,

4.1.2 ASTM specification number and date of issue,

4.1.3 Chemical composition, grade designation or limits,

4.1.4 Silicon level, if required,

4.1.5 Additional machinability-enhancing elements (see Footnote F to Table 1 of Specification A 29/A 29M),

4.1.6 Condition (Surface Roughness tolerances listed in Table A1.7),

4.1.7 Tolerance Levels (Reference tolerances listed in Table A1.1 through Table A1.9),

4.1.8 Shape (round, hexagon, square, flat, etc.), size, and length,

4.1.9 Report of heat analysis, if required,

4.1.10 End use,

4.1.11 Additions to the specification and special or supplementary requirements, if required, and

4.1.12 For coiled product, the coil weights, inside diameter, outside diameter, and coil height limitations, when required.

NOTE 2—A typical ordering description is as follows: Steel Bar; ASTM A 108, dated _____; SAE 1117; Coarse Grain; Cold Drawn; 1.500-in.

[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 A01.15 on Bars.

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[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] Available from Society of Automotive Engineers (SAE), 400 Commonwealth Dr., Warrendale, PA 15096-0001.

[4] Available from ISS Customer Service, 410 Commonwealth Drive, Warrendale, PA, 15086.

***A Summary of Changes section appears at the end of this standard.**

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(38.10 mm) diameter round; 12 ft (3657.61 mm) long; Heat Analysis Required; Precision Machined Parts.

NOTE 3—A more complex ordering description is as follows: Steel Bar; ASTM A 108, dated ____; SAE 1045; Fine Grain; Cold Drawn, Turned, Ground and Polished; chamfer both ends; Mechanical Property Test Results; Hardness test; 2.000-in. (50.80 mm) diameter round; 12 ft (3657.61 mm) long; Heat Analysis Required; Precision Machined Parts. Product codes allow you to abbreviate, yet identify a complex ordering description in the following simplified description: Steel Bar: ASTM A 108, dated ____; SAE 1045; Fine Grain; 2.000-in. (50.80 mm) diameter round; 12 ft (3657.61 mm) long; Heat Analysis Required; Precision Machined Parts.

5. General Requirements

5.1 Material furnished under this specification shall conform to the applicable requirements of the current edition of Specification A 29/A 29M.

6. Materials and Manufacture

6.1 *Feedstock*—Cold-finished steel bar shall be produced from hot-wrought carbon or alloy steel bar (Specification A 29/A 29M), or from hot-wrought rod designated for cold-finished bar (Specification A 510).

6.2 *Condition*—The product shall be furnished in one of the following conditions as specified by the purchaser.

6.2.1 *Rounds*:
6.2.1.1 Cold drawn,
6.2.1.2 Cold drawn, turned, and polished,
6.2.1.3 Cold drawn, ground, and polished,
6.2.1.4 Cold drawn, turned, ground, and polished,
6.2.1.5 Cold drawn, turned, and ground,
6.2.1.6 Hot wrought, turned, and polished,
6.2.1.7 Hot wrought, turned, ground and polished,
6.2.1.8 Hot wrought, turned, and ground, and
6.2.1.9 Hot wrought, rough turned.

6.2.2 *Squares, Hexagons*:
6.2.2.1 Cold drawn, and
6.2.2.2 Cold rolled.

6.2.3 *Flats*:
6.2.3.1 Cold drawn, and
6.2.3.2 Cold rolled.

6.2.4 *Special Bar Sections*:
6.2.4.1 Cold drawn, and
6.2.4.2 Cold rolled.

6.3 *Heat Treatment*:

6.3.1 Unless otherwise specified, the bars shall be furnished as cold-finished. Plain Carbon Steels with a maximum carbon over 0.55 % and Alloy Steels with a maximum carbon over 0.38 % shall be annealed prior to cold finishing.

6.3.2 The following heat-treatment processes may be performed singularly or in combination:
6.3.2.1 Annealed,
6.3.2.2 Normalized,
6.3.2.3 Stress relieved, and
6.3.2.4 Quenched and tempered.

7. Chemical Composition

7.1 *Chemical Composition*:

7.1.1 The chemical analysis of the steel shall conform to that specified in Specification A 29/A 29M for the steel grade ordered, or to such other limits as may be specified using the standard ranges in Specification A 29/A 29M.

7.1.2 Steels may be selected from: Specifications A 29/A 29M, A 304, A 322, A 510, and A 576; the SAE Handbook; or the ISS Steel Bar Product Guideline for Bar Steel.

7.1.3 When a steel's composition cannot be identified by a standard grade number in accordance with 7.1.1 and 7.1.2, the limits for each required element may be specified using the chemical ranges shown in the table (Heat Analysis Chemical Ranges and Limits of Carbon Steel Bars) of Specification A 29/A 29M.

8. Tolerance Levels

8.1 *Cold-Finished Bars*—The permissible dimensional variations for cold-finished carbon and alloy steel bar shall not exceed the applicable tolerance levels or limits stated in Annex A1 for inch-pound values.

9. Workmanship, Finish, and Product Presentation

9.1 *Workmanship*:

9.1.1 Within the limits of good manufacturing and inspection practices, the bars shall be free of injurious imperfections which, due to their nature, degree, or extent, will interfere with the use of the material in machining or fabrication of suitable parts.

9.1.2 Table A1.8 contains the recommended minimum stock removal to ensure removal of surface discontinuities in cold finished bars.

9.2 *Finish*:

9.2.1 Unless otherwise specified, the bars shall have a commercial bright smooth surface finish, obtained by conventional cold-finishing operations such as cold drawing or cold rolling.

9.2.2 When a superior bar surface finish is required, bars may be obtained as: turned and polished, ground and polished, or turned, ground, and polished. (Reference Table A1.7)

9.2.3 Bars that are thermally treated after cold finishing may exhibit a discolored or oxidized surface.

9.3 *Product Presentation*:

9.3.1 The bars shall be given a surface coating of oil or other rust inhibitor to protect against corrosion during shipment.

9.3.2 The bar bundles shall be identified, packaged and loaded to preserve the physical appearance, product tolerance and identity of the cold-finished product, as agreed upon between the purchaser and supplier.

10. Certification

10.1 Upon request of the purchaser in the contract or order, a manufacturer's certification that the material was manufactured and tested in accordance with this specification together with a report of the test results shall be furnished at the time of shipment.

11. Keywords

11.1 alloy steel; carbon steel; cold-finished; steel bar

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SUPPLEMENTARY REQUIREMENTS

One or more of the following supplementary requirements shall be applied only when specified by the purchaser in the inquiry, contract, or order. Details of these supplementary requirements shall be agreed upon in writing, by the manufacturer and the purchaser. Supplementary requirements shall in no way negate any requirement of the specification itself.

S1. Hot Rolling Reduction Ratio

S1.1 When required, purchaser may require the supplier to report the reduction ratio of the initial Bloom/Billet cross sectional area to finished hot rolled cross sectional area.

S2. Steel Melting Process

S2.1 When required, purchaser may require the supplier to report the steel melting process (Basic Oxygen Furnace, Electric Arc Furnace, etc.) for each initial heat/lot number supplied to the purchaser.

S3. Steel Refinement Process

S3.1 When required, purchaser may require the supplier to report the steel refinement processes performed after melting and before casting (Vacuumed Degassed, etc.) on the heat/lot number supplied to the purchaser.

S4. Continuous Casting Process

S4.1 When required, purchaser may require the supplier to report the casting process (Bloom, Billet, etc.) for each heat/lot number supplied to the purchaser.

S5. Country or Countries of Origin

S5.1 When required, purchaser may require the supplier to report the country of origin where the steel was melted for each heat/lot number supplied to the purchaser.

S5.2 When required, purchaser may require the supplier to report the country of origin where the steel was hot rolled for each heat/lot number supplied to the purchaser.

S5.3 When required, purchaser may require the supplier to report the country of origin where the steel was cold finished for each heat/lot number supplied to the purchaser.

S6. Mechanical Properties

S6.1 When required, purchaser may require the supplier to report the cold-finished steel bar mechanical properties for each heat/lot number supplied to the purchaser. Mechanical properties shall be evaluated in accordance with Test Methods and Definitions in Test Methods A 370.

S7. Surface Inspection

S7.1 When required, purchaser may require the supplier to inspect the cold finish steel bar surface within an electromagnetic surface inspection process to detect and sort surface discontinuities that exceed the maximum allowed depth tolerances listed in Table A1.8 or other tolerances agreed upon between the purchaser and supplier.

S8. Bar Marking

S8.1 When required, bar marking specification requirements shall be agreed upon between the purchaser and supplier.

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ANNEX

(Mandatory Information)

A1. PERMISSIBLE VARIATIONS IN QUALITY CHARACTERISTICS—INCH-POUND AND METRIC UNITS

TABLE A1.1 Size Tolerances for Level One Cold-Finished Carbon Steel Bars, Cold Drawn or Turned and Polished

Size, in. (mm)[A]	Maximum of Carbon Range 0.28 % or less	Maximum of Carbon Range over 0.28 % to 0.55 % incl	Maximum of Carbon Range to 0.55 % incl, Stress Relieved or Annealed after Cold Finishing	Maximum of Carbon Range over 0.55 % or All Grades Quenched and Tempered or Normalized and Tempered before Cold Finishing
	All tolerances are in inches (mm) and are minus[B]			
Rounds—Cold Drawn[C] to 6 in.(152.4 mm) or Turned and Polished				
To 1½ (38.1) incl, in coils, or cut lengths	0.002 (.051)	0.003 (.076)	0.004 (.102)	0.005 (.127)
Over 1½ (38.10) to 2½ (63.50) incl	0.003 (.076)	0.004 (.102)	0.005 (.127)	0.006 (.152)
Over 2½ (63.50) to 4 (101.60) incl	0.004 (.102)	0.005 (.127)	0.006 (.152)	0.007 (.178)
Over 4 (101.60) to 6 (152.40) incl	0.005 (.127)	0.006 (.152)	0.007 (.178)	0.008 (.203)
Over 6 (152.40) to 8 (203.20) incl	0.006 (.152)	0.007 (.178)	0.008 (.203)	0.009 (.229)
Over 8 (203.20) to 9 (228.60) incl	0.007 (.178)	0.008 (.203)	0.009 (.229)	0.010 (.254)
Hexagons				
To ¾ (19.05) incl	0.002 (.051)	0.003 (.076)	0.004 (.102)	0.006 (.152)
Over ¾ (19.05) to 1½ (38.10) incl	0.003 (.076)	0.004 (.102)	0.005 (.127)	0.007 (.178)
Over 1½ (38.10) to 2½ (63.50) incl	0.004 (.102)	0.005 (.127)	0.006 (.152)	0.008 (.203)
Over 2½ (63.50) to 3⅛ (79.38) incl	0.005 (.127)	0.006 (.152)	0.007 (.178)	0.009 (.229)
Over 3⅛ (79.38) to 4 (101.60) incl	0.005 (.127)	0.006 (.152)	. . .	. . .
Squares				
To ¾ (19.05) incl	0.002 (.051)	0.004 (.102)	0.005 (.127)	0.007 (.178)
Over ¾ (19.05) to 1½ (38.10) incl	0.003 (.076)	0.005 (.127)	0.006 (.152)	0.008 (.203)
Over 1½ (38.10) to 2½ (63.50) incl	0.004 (.102)	0.006 (.152)	0.007 (.178)	0.009 (.229)
Over 2½ (63.50) to 4 (101.60) incl	0.006 (.152)	0.008 (.203)	0.009 (.229)	0.011 (.279)
Over 4 (101.60) to 5 (127.00) incl	0.010 (.254)	. . .	. . .	. . .
Over 5 (127.00) to 6 (152.4) incl	0.014 (.356)	. . .	. . .	. . .
Flats[D]				
Width:				
To ¾ (19.05) incl	0.003 (.076)	0.004 (.102)	0.006 (.152)	0.008 (.203)
Over ¾ (19.05) to 1 ½ (38.10) incl	0.004 (.102)	0.005 (.127)	0.008 (.203)	0.010 (.254)
Over 1½ (38.10) to 3 (76.2) incl	0.005 (.127)	0.006 (.152)	0.010 (.254)	0.012 (.305)
Over 3 (76.2) to 4 (101.60) incl	0.006 (.152)	0.008 (.203)	0.011 (.279)	0.016 (.410)
Over 4 (101.60) to 6 (152.40) incl	0.008 (.203)	0.010 (.254)	0.012 (.305)	0.020 (.508)
Over 6 (152.40)	0.013 (.330)	0.015 (.381)	. . .	. . .

[A] Standard manufacturing practice is shear cut for cold drawn bars (size limits vary by producer) which can cause end distortion resulting in those portions of the bar being outside the applicable size tolerance. When this end condition is undesirable, a saw cut end to remove end distortion should be considered.

[B] While size tolerances are usually specified as minus, tolerances may be ordered all plus, or distributed plus and minus, with the sum being equivalent to the tolerances listed.

[C] Maximum allowable deviation in roundness around the circumference of the same cross-section of a round cold drawn bar is ½ the size tolerance range.

[D] Width governs the tolerances for both width and thickness of flats. For example, when the maximum of carbon range is 0.28 % or less, for a flat 2 in. (50.80 mm) wide and 1 in. (25.40 mm) thick, the width tolerance is 0.005 in. (.127 mm) and the thickness tolerance is the same, namely, 0.005 in. (.127 mm).

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TABLE A1.2 Size Tolerances for Level One Cold-Finished Alloy Steel Bars, Cold Drawn or Turned and Polished

Size, in. (mm)[A]	Maximum of Carbon Range 0.28 % or less	Maximum of Carbon Range over 0.28 % to 0.55 % incl	Maximum of Carbon Range to 0.55 % incl, Stress Relieved or Annealed after Cold Finishing	Maximum of Carbon Range over 0.55 % with or without Stress Relieving or Annealing after Cold Finishing. Also, all Carbons, Quenched and tempered (heat treated), or Normalized and Tempered, before Cold Finishing
	All tolerances are in inches (mm) and are minus[B]			
Rounds-Cold Drawn[C] to 6 in. (152.40 mm) or Turned and Polished				
To 1 (25.4) incl, in coils	0.002 (.051)	0.003 (.076)	0.004 (.102)	0.005 (.127)
Cut Lengths:				
To 1½ (38.10) incl	0.003 (.076)	0.004 (.102)	0.005 (.127)	0.006 (.152)
Over 1½ (38.10) to 2½ (63.50) incl	0.004 (.102)	0.005 (.127)	0.006 (.152)	0.007 (.178)
Over 2½ (63.50) to 4 (101.60) incl	0.005 (.127)	0.006 (.152)	0.007 (.178)	0.008 (.203)
Over 4 (101.60) to 6 (152.40) incl	0.006 (.152)	0.007 (.178)	0.008 (.203)	0.009 (.229)
Over 6 (152.40) to 8 (203.20) incl	0.007 (.178)	0.008 (.203)	0.009 (.229)	0.010 (.254)
Over 8 (203.20) to 9 (228.60) incl	0.008 (.203)	0.009 (.229)	0.010 (.254)	0.011 (.279)
Hexagons				
To ¾ (19.05) incl	0.003 (.076)	0.004 (.102)	0.005 (.127)	0.007 (.178)
Over ¾ (19.05) to 1½ 38.10) incl	0.004 (.102)	0.005 (.127)	0.006 (.152)	0.008 (.203)
Over 1½ (38.10) to 2½ (63.50) incl	0.005 (.127)	0.006 (.152)	0.007 (.178)	0.009 (.229)
Over 2½ (63.50) to 3⅛ (79.38) incl	0.006 (.152)	0.007 (.178)	0.008 (.203)	0.010 (.254)
Over 3⅛ (79.38) to 4 (101.60) incl	0.006 (.152)	...	...	...
Squares				
To ¾ (19.05) incl	0.003 (.076)	0.005 (.127)	0.006 (.152)	0.008 (.203)
Over ¾ (19.05) to 1½ (38.10) incl	0.004 (.102)	0.006 (.152)	0.007 (.178)	0.009 (.229)
Over 1½ (38.10) to 2½ (63.50) incl	0.005 (.127)	0.007 (.178)	0.008 (.203)	0.010 (.254)
Over 2½ (63.50) to 4 (101.60) incl	0.007 (.178)	0.009 (.229)	0.010 (.254)	0.012 (.305)
Over 4 (101.60) to 5 (127.00) incl	0.011 (.279)	...	...	...
Flats[D]				
To ¾ (19.05) incl	0.004 (.102)	0.005 (.127)	0.007 (.178)	0.009 (.229)
Over ¾ (19.05) to 1½ (38.10) incl	0.005 (.127)	0.006 (.152)	0.009 (.229)	0.011 (.279)
Over 1½ (38.10) to 3 (76.2) incl	0.006 (.152)	0.007 (.178)	0.011 (.279)	0.013 (.330)
Over 3 (76.2) to 4 (101.60) incl	0.007 (.178)	0.009 (.229)	0.012 (.305)	0.017 (.432)
Over 4 (101.60) to 6 (152.40) incl	0.009 (.229)	0.011 (.279)	0.013 (.330)	0.021 (.533)
Over 6 (152.40)	0.014 (.356)	...	...	...

[A] Standard manufacturing practice is shear cut for cold drawn bars (size limits vary by producer) which can cause end distortion resulting in those portions of the bar being outside the applicable size tolerance. When this end condition is undesirable, a saw cut end to remove end distortion should be considered.

[B] While size tolerances are usually specified as minus, tolerances may be ordered all plus, or distributed plus and minus, with the sum being equivalent to the tolerances listed.

[C] Maximum allowable deviation in roundness around the circumference of the same cross-section of a round cold drawn bar is ½ the size tolerance range.

[D] Width governs the tolerances for both width and thickness of flats. For example, when the maximum of carbon range is 0.28 % or less, for a flat 2 in. (50.80 mm) wide and 1 in. (25.40 mm) thick, the width tolerance is 0.006 in. (.152 mm) and the thickness tolerance is the same, namely, 0.006 in. (.152mm).

TABLE A1.3 Size Tolerances for Level Two and Level Three Cold Finished Round Bars Cold Drawn, Ground and Polished, or Turned, Ground and Polished

Size, in. (mm) Cold Drawn, Ground and Polished[A]	Size, in. (mm) Turned, Ground and Polished[A]	Tolerances from Specified Size, Minus Only, in. (mm)	
		Level 2	Level 3
To 1½ (38.10) incl	To 1½ (38.10) incl	0.001 (.0254)	0.0008 (.0203)
Over 1½ (38.10) to 2½ (63.50) excl	Over 1½ (38.10) to 2½ (63.50) excl	0.0015 (.0381)	0.0013 (.033)
2½ (63.50) to 3 (76.20) incl	2½ (63.50) to 3 (76.20) incl	0.002 (.0508)	0.001 5(.0381)
Over 3 (76.20) to 4 (101.60) incl	Over 3 (76.20) to 4 (101.60) incl	0.003 (.0762)	0.0025 (.0635)
. . .	Over 4 (101.60) to 6 (152.40) incl	0.004 (.1016)[B]	0.003 (.0762)[B]
. . .	Over 6 (152.40)	0.005 (.127)[B]	0.004 (.1016)[B]

[A] Maximum allowable deviation of roundness or ovality tolerances are agreed upon between purchaser and supplier.

[B] For nonresulfurized steels (steels specified to maximum sulfur limits under 0.08 %), or for steels thermally treated, the tolerance is increased by 0.001 in. (.025 mm).

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TABLE A1.4 Straightness Tolerances for Level One Cold Finished Bars[A,B]

NOTE—All grades quenched and tempered or normalized and tempered to Brinell 302 max before cold finishing; and all grades stress relieved or annealed after cold finishing. Straightness tolerances are not applicable to bars having Brinell hardness exceeding 302.

Size, in. (mm)	Length, ft (mm)	Straightness Tolerances, in. (mm) (Maximum Deviation) from Straightness in any 10-ft Portion of the Bar			
		Maximum of Carbon Range, 0.28 % or Less		Maximum of Carbon Range, over 0.28 % and All Grades Thermally Treated	
		Rounds	Squares, Hexagons, and Octagons	Rounds	Squares, Hexagons, and Octagons
Less than 5/8 (15.88)	Less than 15 (4572)	1/8 (3.17)	3/16 (4.76)	3/16 (4.76)	1/4 (6.35)
Less than 5/8 (15.88)	15 (4572) and over	1/8 (3.17)	5/16 (7.94)	5/16 (7.94)	3/8 (9.53)
5/8 (15.88) and over	Less than 15 (4572)	1/16 (1.59)	1/8 (3.17)	1/8 (3.17)	3/16 (4.76)
5/8 (15.88) and over	15 (4572) and over	1/8 (3.17)	3/16 (4.76)	3/16 (4.76)	1/4 (6.35)

[A] The foregoing tolerances are based on the following method of measuring straightness: Departure from straightness is measured by placing the bar on a level table so that the arc or departure from straightness is horizontal, and the depth of the arc is measured with a feeler gage and a straightedge.

[B] It should be recognized that straightness is a perishable quality and may be altered by mishandling. The preservation of straightness in cold-finished bars requires the utmost care in subsequent handling. Specific straightness tolerances are sometimes required for carbon and alloy steels in which case the purchaser should inform the manufacturer of the straightness tolerances and the methods to be used in checking the straightness.

TABLE A1.5 Length Tolerances for Cold Finished Steel Bar

Product Tolerance Level	Tolerances, inches (mm) Plus Allowable Deviation above Specified Uniform Length		
	Cutting Process	Minimum	Maximum
Level 1	Shear Cut	0.000	2.000 (50.80)
Level 2	In-Line Saw Cut	0.000	1.000 (25.40)
Level 3	Off-Line Saw Cut	0.000	0.500 (12.70)

TABLE A1.6 Across-Corner Tolerances for Hexagon and Square Cold Drawn Steel Bar[A]

Product Tolerance Level	Tolerance Range Applied to Across Corner Calculations	
	Hexagon, Inches (mm), Minus	Square, Inches (mm), Minus
Level 1	0.025 (.64)	0.030 (.76)
Level 2	0.020 (.51)	0.025 (.64)
Level 3	0.015 (.38)	0.020 (.51)
	Sharp Corner Hexagon Calculation = $(1.1547 \times D)$	Sharp Corner Square Calculation = $(1.4142 \times D)$
	Round Corner Hexagon Calculation = $[1.1547 \times (D - 2r)] + 2r$	Round Corner Square Calculation = $[1.4142 \times (D - 2r)] + 2r$

[A] When required, type of corner must be specified at time of order inquiry.

TABLE A1.7 Surface Roughness Average[A] (Ra) Tolerances for Cold-Finished Steel Bar

Product Tolerance Level	Allowable Maximum Deviation of Surface Roughness Average (Ra) Measurement	
	Turned and Polished Maximum, (μin.) (Ra)	Ground and Polished Maximum, (μin.) (Ra)
Level 1	Not Required	40
Level 2[B]	60	30
Level 3[B]	40	20

[A] RMS (root mean square calculation) is no longer applied to measure surface roughness. Roughness average (Ra) is current technology measurement output data.

[B] Special surface Ra restrictions must be agreed upon at time of order inquiry, between purchaser and supplier. Lower Ra values are available with additional bar passes and/or special processing conditions.

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TABLE A1.8 Surface Discontinuity Tolerances for Cold-Finished Steel Bar[A]

Product Tolerance Level	Maximum Allowable Surface Discontinuity Depth					
	Carbon and Alloy Non-resulfurized		Carbon and Alloy Resulfurized (0.08 thru 0.19 % Sulfur)		Carbon and Alloy Resulfurized (0.20 thru 0.35 % Sulfur)	
	Maximum Depth ¼ (6.35 mm) thru ⅝ (15.88 mm) max. inches (mm)	Maximum Depth (% of Size) over ⅝ (15.88 mm) thru 6 (152.40 mm) (max. percentage)	Maximum Depth ¼ (6.35 mm) thru ⅝ (15.88 mm) max. inches (mm)	Maximum Depth (% of Size) over ⅝ (15.88 mm) thru 6 (152.40 mm) max. percentage)	Maximum Depth ¼ (6.35 mm) thru ⅝ (15.88 mm) max. inches (mm)	Maximum Depth (% of Size) ⅝ (15.88 mm) thru 6 (152.40 mm) (max., percentage)
Level 1	0.008 (.20)	1.6 %	0.010 (.25)	2.0 %	0.012 (.30)	2.4 %
Level 2	0.006 (.15)	1.0 %	0.008 (.20)	1.3 %	0.010 (.25)	1.6 %
Level 3	0.006 (.15)	0.75 %	0.006 (.15)	1.0 %	0.008 (.20)	1.3 %
Level 4[B]	Nil	Nil	Nil	Nil	Nil	Nil

[A] The information in the chart is the expected maximum surface discontinuity depth within the limits of good manufacturing practice. Occasional bars in a shipment may have surface discontinuities that exceed these limits. For critical applications, the purchaser may require the cold finish steel bar supplier to eddy current test the bars prior to shipment.

[B] Level 4 requires metal removal by turning or multiple grinding passes for small bars.

TABLE A1.9 Surface Decarburization Tolerances for Cold-Finished Steel Bar

Product Tolerance Level	Maximum Affected Depth All Carbon or Alloy Steel Grades	
	Maximum Inches of Decarburization per Side of Bar ¼ (6.35 mm) thru ⅝ (15.88 mm) Sizes, All Shapes, Max. inches (mm)	Maximum Percentage of Decarburization per Side Based on Percentage of Size over ⅝ (15.88 mm) thru 6 (152.40 mm) Sizes, All Shapes, (max., %)
Level 1	0.010 in.(.25)	1.6 %
Level 2	0.006 in.(.15)	1.0 %
Level 3[A]	Nil	Nil

[A] Level 3 requires metal removal by turning or multiple grinding for small bars.

SUMMARY OF CHANGES

Committee A01 has identified the location of selected changes to this standard since the last issue (A 108 – 03$^{\epsilon 1}$) that may impact the use of this standard. (Approved Sept. 1, 2007.)

(*1*) Changes made to 9.1.1.

(*2*) Added 9.1.2.

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