



Designation: ~~A434-06~~ (Reapproved 2012) A434/A434M-15

Standard Specification for Steel Bars, Alloy, Hot-Wrought or Cold-Finished, Quenched and Tempered¹

This standard is issued under the fixed designation ~~A434~~; A434/A434M; 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 U.S. Department of Defense.

1. Scope-~~Scope~~*

1.1 This specification covers hot-wrought and cold-finished quenched and tempered alloy steel bars.

1.2 Hot-wrought bars are available in three strength level classes designated BB, BC, and BD, and cold-finished bars in two strength level classes designated BB and BC. The bars are available in the conditions specified in 4.4 subject to the size limitations shown.

1.3 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

2. Referenced Documents

2.1 *ASTM Standards*:²

[A29/A29M Specification for General Requirements for Steel Bars, Carbon and Alloy, Hot-Wrought](#)

[A108 Specification for Steel Bar, Carbon and Alloy, Cold-Finished](#)

[A370 Test Methods and Definitions for Mechanical Testing of Steel Products](#)

[E112 Test Methods for Determining Average Grain Size](#)

3. Ordering Information

3.1 Orders for material under this specification should include the following information:

3.1.1 Quantity (weight or number of pieces), [ASTM A434/A434M-15](#)

3.1.2 Name of material (heat-treated alloy steel bars), [p88f0-a117-4ae7-b96c-26784557a20c/astm-a434-a434m-15](#)

3.1.3 Method of finish (condition) (4.4),

3.1.4 Dimensions, including length (if hot-wrought bars are for cold finishing, the cold-finished size should also be specified),

3.1.5 ASTM designation and date of issue,

3.1.6 Chemical composition grade (Section 5),

3.1.7 Strength class (Table 1),

3.1.8 Test report, if required (Section 11),

3.1.9 ~~Supplementary Requirements or Special Requirements~~, Requirements, if required, and

3.1.10 End use.

NOTE 1—A typical ordering description is as follows: ~~40-00010 000~~ lb, Heat-Treated Alloy Steel Bars, Hot Rolled, 1.000 in. diameter \times 10 ft, ASTM A434 dated ____, Grade 4140, Class BB, Test Report Required, Motor Shafts.

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.

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



TABLE 1 Tensile Properties

NOTE 1—The mechanical properties of hot-wrought bars ordered for cold finishing, shall be governed by the cold-finished size.

Class	Diameter, in. (mm)[mm]	Yield Strength, min, ksi (MPa)[MPa] ^A	Tensile Strength, min, ksi (MPa)[MPa]	Elongation in 2 in. or 50 mm, min, %	Reduction of Area, min, %	SAE or AISI Representative Grade Types ^B
BB ^C BB ^C	1½ (38.1) and under	90 (620)	110 (760)	20	50	-3100, 4100, 3100, 4100, -8600, 8700, 8600, 8700
	1½ [38.1] and under	90 [620]	110 [760]	20	50	
	Over 1½ to 2½ (38.1 to 63.5), incl	80 (550)	105 (720)	20	50	
	Over 1½ to 2½ [38.1 to 63.5], incl	80 [550]	105 [720]	20	50	
	Over 2½ to 4 (63.5 to 114), incl	75 (520)	100 (690)	20	50	
	Over 2½ to 4 [63.5 to 114], incl	75 [520]	100 [690]	20	50	
	Over 4 to 7 (114 to 178), incl	75 (520)	95 (660)	20	50	
	Over 4 to 7 [114 to 178], incl	75 [520]	95 [660]	20	50	
BC ^C BC ^C	1½ (38.1) and under	110 (760)	130 (900)	16	50	-3100, 4100, 6100, 3100, 4100, -8600, 8700, 8600, 8700
	1½ [38.1] and under	110 [760]	130 [900]	16	50	
	Over 1½ to 2½ (38.1 to 63.5), incl	105 (720)	125 (860)	16	50	
	Over 1½ to 2½ [38.1 to 63.5], incl	105 [720]	125 [860]	16	50	
	Over 2½ to 4 (63.5 to 114), incl	95 (660)	115 (790)	16	45	
	Over 2½ to 4 [63.5 to 114], incl	95 [660]	115 [790]	16	45	
	Over 4 to 7 (114 to 178), incl	85 (590)	110 (760)	16	45	
	Over 4 to 7 [114 to 178], incl	85 [590]	110 [760]	16	45	
BD ^C BD ^C	1½ (38.1) and under	130 (900)	155 (1070)	14	35	-4100, 4300, 4100, 4300, -9800, 9800, 9800
	1½ [38.1] and under	130 [900]	155 [1070]	14	35	
	Over 1½ to 2½ (38.1 to 63.5), incl	120 (830)	150 (1030)	14	35	
	Over 1½ to 2½ [38.1 to 63.5], incl	120 [830]	150 [1030]	14	35	
	Over 2½ to 4 (63.5 to 114), incl	110 (760)	140 (960)	14	35	
	Over 2½ to 4 [63.5 to 114], incl	110 [760]	140 [960]	14	35	
	Over 4 to 7 (114 to 178), incl	105 (720)	135 (930)	14	35	
	Over 4 to 7 [114 to 178], incl	105 [720]	135 [930]	14	35	

^A The carbon content of all steels listed in this column may vary up to 0.55 % max, as agreed upon by the manufacturer and the purchaser.

^B Determined by the 0.2 % offset method.

^C Class BB, BC, BD hot-wrought; Class BB, BC cold-finished.

4. Materials and Manufacture

4.1 *Melting Practice*—The steel shall be made by one or more of the following primary processes: open-hearth, basic-oxygen, or electric-furnace. The primary melting may incorporate separate degassing or refining and may be followed by secondary melting using electroslog remelting or vacuum arc remelting. Where secondary melting is employed, the heat shall be defined as all of the ingots remelted from a single primary heat.

4.2 *Discard*—Sufficient discard shall be made to secure freedom from injurious piping and undue segregation.

4.3 *Slow Cooling*—Hot-wrought alloy bars shall, immediately after rolling, be allowed to cool to a temperature below the critical range under suitable conditions to prevent injury by too rapid cooling.

4.4 *Condition*—Bars shall be furnished in one of the following conditions, as specified by the purchaser. Generally, size limits for various methods of processing round bars are:

Hot wrought or hot-wrought descaled	9½ in. (241.3 mm), max
Gold-drawn	¼ to 4 in. (3.2 to 102 mm), incl
Gold-drawn, ground, and polished	¼ to 4 in. (3.2 to 102 mm), incl
Turned and polished	¾ to 9 in. (19.1 to 229 mm), incl
Turned, ground, and polished	¾ to 9 in. (19.1 to 229 mm), incl