



Designation: ~~A756-94 (Reapproved 2001)~~ Designation: A756 - 09

Standard Specification for Stainless Anti-Friction Bearing Steel¹

This standard is issued under the fixed designation A756; 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.

1. Scope*

1.1 This specification covers the requirements for chromium-carbon bearing quality stainless steel to be used in the manufacture of anti-friction bearings.

1.2 Supplementary Requirements of an optional nature are provided and when desired shall be so stated in the order.

~~1.3 The values stated in inch-pound units are to be regarded as the standard.~~

1.3 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

2. Referenced Documents

2.1 *ASTM Standards:*²

A484/A484M Specification for General Requirements for Stainless Steel Bars, Billets, and Forgings

A751 Test Methods, Practices, and Terminology for Chemical Analysis of Steel Products

E45 Test Methods for Determining the Inclusion Content of Steel

E381 Method of Macroetch Testing Steel Bars, Billets, Blooms, and Forgings

E1019 Test Methods for Determination of Carbon, Sulfur, Nitrogen, and Oxygen in Steel, Iron, Nickel, and Cobalt Alloys by Various Combustion and Fusion Techniques

E1077 Test Methods for Estimating the Depth of Decarburization of Steel Specimens

2.2 ~~Other Standard:~~ *Other Standards:*

ISO 683 Part 17 Ball and Roller Bearing Steels³

SAE J418a Grain Size Determination of Steel⁴

3. Ordering Information

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

3.1.1 Quantity,

3.1.2 Grade identification,

3.1.3 Specification designation and year of issue,

3.1.4 Dimensions, shape, and

3.1.5 Supplementary Requirements, if desired.

4. Process

4.1 The steel shall be made by a process that is capable of providing a high-quality product meeting the requirements of this specification.

5. Chemical Composition

5.1 Typical examples of chemical compositions are shown in Table 1. Other compositions may be specified.

5.2 An analysis of each heat of steel shall be made by the steel manufacturer in accordance with Test Methods, Practices, and Terminology A751. The chemical composition thus determined shall conform to the requirements specified in Table 1 for the

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 A01.28 on Bearing Steels.

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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, 400 Commonwealth Drive, Warrendale, PA 15096.

⁴ Available from International Organization for Standardization (ISO), 1, ch. de la Voie-Creuse, Case postale 56, CH-1211, Geneva 20, Switzerland, <http://www.iso.ch>.

⁴ Available from Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, PA 15096.

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

TABLE 1 Chemical Composition^{A,B}

Element ^C	440C Name	440C MOD											
Carbon	0.95 to 1.10	1.00 to 1.10											
Carbon	Mn	1.00 to 1.10											
Manganese, max	1.00	0.30 to 1.00	Cr	Ni	Mo 1.00	Cu (max)	O (max) ^D	Al (max)	Other				
Manganese, P (max)	S (max)	Si	Cr	Ni	Mo	Cu (max)	O (max) ^D	Al (max)	Other				
Phosphorus, max	0.025	0.0	1.00 max	0.040	0.030	1.00 max	16.00 - 18.00 max	0.75 max	0.40 - 0.65	0.050	0.0020	0.050	...
...	440C	0.95 - 1.20	1.00 max	0.040	0.030	1.00 max	16.00 - 18.00 max	0.75 max	0.40 - 0.65	0.050	0.0020	0.050	...
Sulfur, max	0.025	0.025 Silicon, -0.35	1.00 max	0.030	0.025	1.00	0.20 to 0.30	0.30 - 0.50	0.85 - 1.10	...	0.0020	...	N 0.300 - 0.500
...	X30CrMoN15-1	0.25 - 0.35	1.00 max	0.030	0.025	1.00 max	14.00 - 16.00	0.30 - 0.50	0.85 - 1.10	...	0.0020	...	N 0.300 - 0.500
Chromium	16.00 to 18.00	13.0	0 to 0 max	0.040	0.015	0.00 max	12.50 - 14.50	...	...	...	0.0020	...	...
B50	X47Cr14	0.43 - 0.50	1.00 max	0.040	0.015	1.00 max	12.50 - 14.50	...	...	...	0.0020	...	...
Nickel, max	0.75	0.70	1.00 max	0.040	0.015	1.00 max	12.50 - 14.50	0.75 max	...	...	0.0020	...	...
B51	X65Cr14	0.60 - 0.70	1.00 max	0.040	0.015	1.00 max	12.50 - 14.50	0.75 max	...	...	0.0020	...	...
Copper, max	0.50	0.50	1.00 max	0.040	0.015	1.00 max	16.00 - 18.00	...	0.40 - 0.80	...	0.0020	...	...
B52	X108CrMo17	0.95 - 1.20	1.00 max	0.040	0.015	1.00 max	16.00 - 18.00	...	0.40 - 0.80	...	0.0020	...	...
Molybdenum	0.40 to 0.65	3.75 to 0.95	1.00 max	0.040	0.25	1.00 max	17.00 - 19.00	...	0.90 - 1.30	...	0.0020	...	V 0.07 - 0.12
B53	X89CrMoV18-1	0.85 - 0.95	1.00 max	0.040	0.015	1.00 max	17.00 - 19.00	...	0.90 - 1.30	...	0.0020	...	V 0.07 - 0.12

^A Elements not quoted shall not be intentionally added to the steel without the agreement of the purchaser.

^B Intentional additions of calcium or calcium alloys for deoxidation or inclusion shape control are not permitted unless specifically approved by the purchaser.

^C Steels B50 through B53 meet the requirements of ISO 683, Part 17, Second Edition, Table 3.

^D Oxygen content applies to product analysis and shall be determined in accordance with Test Methods E1019.

ordered grade or to requirements agreed upon between the manufacturer and the purchaser.

5.3 Product analysis may be made by the purchaser in accordance with Test Methods, Practices, and Terminology A751. Permissible variations in product analysis shall be made in accordance with Specification A484/A484M.

6. Dimensions, Mass, and Permissible Variations

6.1 The size and shape of the material shall be agreed upon between manufacturer and purchaser.

6.2 Dimensional tolerances for hot-rolled or hot-rolled and annealed bars, in straight lengths or coils, and cold-finished bars 0.500 in. (12.7 mm) and larger in diameter furnished under this specification shall conform to the requirements specified in the latest edition of Specification A484/A484M.

6.3 Dimensional tolerances for cold-finished coils for ball and roller material shall be as shown in Table 2.

6.4 Coil tolerances also apply to cold-finished straight lengths under 0.500 in. (12.7 mm) in diameter.

7. Quality Tests

7.1 The supplier shall be held responsible for the quality of the material furnished and shall make the necessary tests to ensure this quality. The supplier shall be required to report on the results of the macroetch and microinclusion rating tests detailed below. Quality tests shown in 7.2 through 7.4 are based upon procedures established in Test Methods E45.

7.2 Sampling—Samples taken in accordance with the following paragraphs shall be obtained from 4 by 4-in. (102 by 102-mm) rolled billets or forged sections. Tests may be made on smaller or larger sections by agreement with the purchaser. A minimum 3 to 1 reduction of rolled billets or forged sections is required for strand cast products.

7.2.1 For top poured products, a minimum of six samples representing the top and bottom of first, middle, and last usable ingots shall be examined.

TABLE 2 Dimensional Tolerances for Cold-Finished Coils

Size, in. (mm)	Total Tolerance, in. (mm)
Through 0.096 (2.44)	0.002 (0.05)
Over 0.096 to 0.270 (2.44 to 6.86), incl	0.003 (0.08)
Over 0.270 to 0.750 (6.86 to 19.1), incl	0.004 (0.10)