Designation: A 582/A 582M – 05

Standard Specification for Free-Machining Stainless Steel Bars[1]

This standard is issued under the fixed designation A 582/A 582M; 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 hot-finished or cold-finished bars, except bars for forging (Note 1), suitable for machining processes. It includes rounds, squares, and hexagons in the more commonly used types of stainless free-machining steels designed especially for optimum machinability and for general corrosion and high-temperature service. Stainless steel bars other than the free-machining types are covered in a separate specification (Note 2).

1.2 This specification is expressed in both inch-pound units and in SI units; however, unless the purchase order or contract specifies the applicable *M* specification designation (SI units), the inch-pound units shall apply. The values stated in either inch-pound units or SI (metric) units are to be regarded separately as standard: within the text and tables, the SI units are shown in [brackets]. The values 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 nonconformance with the specification.

NOTE 1—For bars for reforging, see Specification A 314.

NOTE 2—For non-free machining stainless bars, see Specification A 276.

2. Referenced Documents

2.1 *ASTM Standards:* [2]

A 276 Specification for Stainless Steel Bars and Shapes

A 314 Specification for Stainless Steel Billets and Bars for Forging

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

A 484/A 484M Specification for General Requirements for Stainless Steel Bars, Billets, and Forgings

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

A 959 Guide for Specifying Harmonized Standard Grade Compositions for Wrought Stainless Steels

E 527 Practice for Numbering Metals and Alloys (UNS)

2.2 *SAE Document:*[3]

SAE J 1086 Recommended Practice for Numbering Metals and Alloys[3]

3. Ordering Information

3.1 It is the responsibility of the purchaser to specify all requirements that are necessary for product ordered under this specification. Such requirements to be considered include, but are not limited to, the following:

3.1.1 Quantity (weight or number of pieces),

3.1.2 Type or UNS designation (Table 1),

3.1.3 Form (bars, angles, etc.),

3.1.4 Condition (Table 2),

3.1.5 Finish (5.1),

3.1.6 Applicable dimensions, including size, thickness, width, and length,

3.1.7 Cross section (round, square, etc.),

3.1.8 ASTM designation (Specification A 582/A 582M) and publication date,

3.1.9 Preparation for delivery, and

3.1.10 Marking requirements.

NOTE 3—A typical ordering description is as follows: 5000 lb [2000 kg] Type 416 bars, annealed and centerless ground, 1½ in. [40 mm] round, 10 to 12 ft [3 to 4 m] in length, ASTM Specification A 582/A 582M dated.

4. General Requirements for Delivery

4.1 Product furnished to this specification shall conform to the requirements of Specification A 484/A 484M, including any supplementary requirements indicated in the purchase order or contract. Failure to comply with the general requirements of Specification A 484/A 484M constitutes nonconformance with this specification. In case of conflict between the requirements of this specification and Specification A 484/A 484M, this specification shall prevail.

[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 A01.17 on Flat-Rolled and Wrought Stainless Steel.

Current edition approved March 1, 2005. Published March 2005. Originally approved in 1967. Last previous edition approved in 2000 as A 582/A 582M – 95b (2000)ε1.

[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.

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

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 14 13:18:55 EST 2005

TABLE 1 Chemical Requirements

UNS Designation[A]	Type	Chemical Composition, %									
		Carbon[B]	Manganese[B]	Phosphorus,[B]	Sulfur[B]	Silicon, max	Chromium	Nickel	Molybdenum	Selenium	Other Elements
						Austenitic					
S20300	XM-1	0.08	5.0–6.5	0.04	0.18–0.35	1.00	16.0–18.0	5.0–6.5	. . .	. . .	Cu 1.75–2.25
S30300	303	0.15	2.00	0.20	0.15 min	1.00	17.0–19.0	8.0–10.0	. . .	. . .	. . .
S30310	XM-5	0.15	2.5–4.5	0.20	0.25 min	1.00	17.0–19.0	7.0–10.0	. . .	. . .	. . .
S30323	303Se	0.15	2.00	0.20	0.06	1.00	17.0–19.0	8.0–10.0	. . .	0.15 min	. . .
S30345	XM-2	0.15	2.00	0.05	0.11–0.16	1.00	17.0–19.0	8.0–10.0	0.40–0.60	. . .	Al 0.60–1.00
						Martensitic					
S41600	416	0.15	1.25	0.06	0.15 min	1.00	12.0–14.0	. . .	. . .	. . .	. . .
S41610	XM-6	0.15	1.50–2.50	0.06	0.15 min	1.00	12.0–14.0	. . .	. . .	. . .	. . .
S41623	416Se	0.15	1.25	0.06	0.06	1.00	12.0–14.0	. . .	. . .	0.15 min	. . .
S42020	420F	0.30–0.40	1.25	0.06	0.15 min	1.00	12.0–14.0	0.50[C]	. . .	. . .	Cu 0.60[C]
S42023	420FSe	0.20–0.40	1.25	0.06	0.06	1.00	12.0–14.0	0.50[C]	. . .	0.15 min	Cu 0.60[C]
S44020	440F	0.95–1.20	1.25	0.06	0.15 min	1.00	16.0–18.0	0.50[C]	. . .	. . .	Cu 0.60[C]
S44023	440FSe	0.95–1.20	1.25	0.06	0.06	1.00	16.0–18.0	0.50[C]	. . .	0.15 min	Cu 0.60[C]
						Ferritic					
S18200	XM-34	0.08	2.50	0.04	0.15 min	1.00	17.5–19.5	. . .	1.50–2.50	. . .	. . .
S18235	. . .	0.025	0.50	0.030	0.15–0.35	1.00	17.5–18.5	1.00	2.00–2.50	. . .	Ti 0.30–1.00 N 0.025 C+N 0.035
S41603	. . .	0.08	1.25	0.06	0.15 min	1.00	12.0-14.0	. . .	. . .	. . .	. . .
S43020	430F	0.12	1.25	0.06	0.15 min	1.00	16.0–18.0	. . .	. . .	. . .	. . .
S43023	430FSe	0.12	1.25	0.06	0.06	1.00	16.0–18.0	. . .	. . .	0.15 min	. . .

[A] Designation established in accordance with Practice E 527 and SAE J 1086, Recommended Practice for Numbering Metals and Alloys (UNS).
[B] Maximum unless otherwise noted.
[C] At manufacturer's option, reported only when intentionally added.

TABLE 2 Condition

Type	Condition A (Annealed)	Condition T (Intermediate Temper)	Condition H (Hard Temper)
XM-1	A		. . .
303	A	. . .	. . .
XM-5	A	. . .	. . .
303Se	A	. . .	. . .
XM-2	A	. . .	. . .
416	A	T	H
XM-6	A	T	H
416Se	A	T	H
420F	A	. . .	. . .
420FSe	A	. . .	. . .
440F	A	. . .	. . .
440FSe	A	. . .	. . .
XM-34	A	. . .	. . .
S18235	A	. . .	. . .
S41603	A	. . .	. . .
430F	A	. . .	. . .
430FSe	A	. . .	. . .

5. Materials and Manufacture

5.1 Bars may be furnished either hot finished or cold finished in one of the conditions listed in Table 2.

5.2 Surface finishing shall be performed in accordance with finishing methods as defined in Specification A 484/A 484M.

6. Chemical Requirements

6.1 The chemical composition shall conform to the requirements specified in Table 1.

6.2 Methods and practices relating to chemical analysis required by this specification shall be in accordance with Test Methods, Practices, and Terminology A 751.

7. Hardness Requirement

7.1 The product shall conform with the hardness requirements listed in Table 3 for Brinell Hardness Number (HB).

7.2 At least one hardness test shall be made midway between surface and center on each lot to determine that the material conforms to Table 3.

7.2.1 Hardness testing shall be performed in accordance with Test Methods and Definitions A 370.

7.2.2 For sizes below 1 in. [25 mm] cross section, it is permitted to determine the hardness value by tensile test with conversion to hardness in accordance with Test Methods and Definitions A 370.

8. Certification

8.1 *Certificate of Compliance*—When specified in the purchase order or contract, the producer or supplier shall furnish a certificate of compliance stating that the product was manufactured, sampled, tested, and inspected in accordance with this specification (including year date) and any other requirements designated in the purchase order or contract, and has been found to meet such requirements.

TABLE 3 Mechanical Test Requirements

Types	Condition	Hardness[A] (HB)
All (except 440F, 440FSe and S18235)	A	262 max
416, 416Se, 420FSe, and XM-6	T	248 to 302
416, 416Se, and XM-6	H	293 to 352
440 F and 440FSe	A	285 max
S18235	A	207 max

[A] Sizes below approximately 1 in. [25 mm] cross section may be tensile tested and converted to hardness in accordance with Test Methods and Definitions A 370.

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 14 13:18:55 EST 2005
Not for Resale

8.2 *Test Reports*—When specified in the purchase order or contract, test reports shall be furnished to the purchaser containing the results of all tests and chemical analyses required by this specification (including year date), and any other requirements designated in the purchase order or contract.

9. Keywords

9.1 austenitic stainless steel; ferritic stainless steel; free-machining stainless steel; martensitic stainless steel; stainless steel bars

APPENDIX

(Nonmandatory Information)

X1. CROSS REFERENCE

X1.1 This table is intended to assist the user when Specification A 582/A 582M is referenced in a government procurement. It shows the types of steels in Specification A 582/A 582M replacing the steels formerly specified in QQ-S-764B.

TABLE X1.1 Cross Reference

UNS Designation[A]	QQ-S-764B	Specification A 582, Type
S20300	203EZ	XM-1
S30300	303	303
S30310	303 Plus X	XM-5
S30323	303Se	303Se
S30345	303Ma	XM-2
S41600	416	416
S41610	416 Plus X	XM-6
S41623	416Se	416Se
S42020	420F	420F
S42023	420FSe	420FSe
S43020	430F	430F
S43023	430FSe	430FSe

[A] Designation established in accordance with Practice E 527 and SAE J 1086, Recommended Practice for Numbering Metals and Alloys (UNS).

SUMMARY OF CHANGES

Committee A01 has identified the location of selected changes to this standard since the last issue, A 582/A 582M – 95b (2000)$^{\epsilon 1}$, that may impact the use of this standard. (Approved March 1, 2005.)

(*1*) The following sections were modified to conform with current form and style practices: Scope, Referenced Documents, Ordering Information, General Requirements, and Certification.
(*2*) Section 2 was revised to include references to Test Methods and Definitions A 370 and Specification A 484/A 484M.
(*3*) Section 5, Materials and Manufacture, was updated to include a description of finishing processes.
(*4*) Section 7, Hardness Requirements, was updated to specify hardness and conversion factor requirements.
(*5*) Table 1 was revised for compliance with Guide A 959 regarding the number of digits in the composition listed.

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
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 14 13:18:55 EST 2005
Not for Resale