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Standard Specification for Gray Iron Castings¹

This standard is issued under the fixed designation A 48/A 48M; 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. This specification replaces Federal Specification QQ-I-652.

1. Scope

1.1 This specification covers gray iron castings intended for general engineering use where tensile strength is a major consideration. Castings are classified on the basis of the tensile strength of the iron in separately cast test bars.

1.1.1 This specification subordinates chemical composition to tensile strength.

1.2 Castings produced to this specification are graded on the basis of minimum tensile strength obtained in special test coupons designed to standardize cooling rate. The tensile strength developed in certain casting sections may vary from test coupon values (see X1.2).

1.3 The values stated in either ~~inch-pound~~SI units or ~~SI~~inch-pound units are to be regarded separately as standard. ~~Within the text, the SI units are shown in brackets. The values stated in each system are~~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 ~~specification.~~standard.

2. Referenced Documents

2.1 *ASTM Standards:*

A 644 Terminology Relating to Iron Castings

E 8 Test Methods for Tension Testing of Metallic Materials

2.2 *Military Standard:*

MIL-STD-129 Marking for Shipment and Storage²

2.3 *Federal Standard:*

Federal Standard No. 123 Marking for Shipment (Civil Agencies)²

3. Terminology

3.1 *Definitions:*

3.1.1 Definitions for many terms common to gray iron castings are found in Terminology A 644.

4. Classification

4.1 Castings ordered and produced in accordance with this specification are classified into a number of grades based on the properties of separately cast test bars (Table 1, Table 2). Each class is designated by a number followed by a letter. The number indicates the minimum tensile strength of the separately cast test bar, and the letter indicates the size of the test bar. Examples of proper designations are as follows:

Gray Iron Castings, ASTM Specification A 48, Class 30B.

Gray Iron Castings, ASTM Specification A 48, Class 40C.

5. Ordering Information

5.1 Orders for material to this specification shall include the following information:

5.1.1 ASTM designation number and year of issue,

5.1.2 Class of iron required (see 4.1 and Table 1, and Table 2),

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² This specification is under the jurisdiction of ASTM Committee A04 on Iron Castings and is the direct responsibility of Subcommittee A04.01 on Grey and White Iron Castings.

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³ Annual Book of ASTM Standards, Vol 01.02.

⁴ Available from Standardization Documents Order Desk, DODSSP, Bldg. 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111-5098, <http://www.dodssp.daps.mil>.

TABLE 1 Requirements for Tensile Strength of Gray Cast Irons in Separately Cast Test Bars (Inch-Pound)

| Class | Tensile Strength, min, ksi [MPa] | Nominal Test Bar Diameter, in. [mm] |
|----------|-------------------------------------|--|
| No. 20 A | 20 (138) | 0.88 (22.4) |
| No. 20 A | 20 | 0.88 |
| No. 20 B | — | 1.2 (30.5) |
| No. 20 B | — | 1.2 |
| No. 20 C | — | 2.0 (50.8) |
| No. 20 C | — | 2.0 |
| No. 20 S | — | Bars S ^A |
| No. 25 A | 25 (172) | 0.88 (22.4) |
| No. 25 A | 25 | 0.88 |
| No. 25 B | — | 1.2 (30.5) |
| No. 25 B | — | 1.2 |
| No. 25 C | — | 2.0 (50.8) |
| No. 25 C | — | 2.0 |
| No. 25 S | — | Bars S ^A |
| No. 30 A | 30 (207) | 0.88 (22.4) |
| No. 30 A | 30 | 0.88 |
| No. 30 B | — | 1.2 (30.5) |
| No. 30 B | — | 1.2 |
| No. 30 C | — | 2.0 (50.8) |
| No. 30 C | — | 2.0 |
| No. 30 S | — | Bars S ^A |
| No. 35 A | 35 (241) | 0.88 (22.4) |
| No. 35 A | 35 | 0.88 |
| No. 35 B | — | 1.2 (30.5) |
| No. 35 B | — | 1.2 |
| No. 35 C | — | 2.0 (50.8) |
| No. 35 C | — | 2.0 |
| No. 35 S | — | Bars S ^A |
| No. 40 A | 40 (276) | 0.88 (22.4) |
| No. 40 A | 40 | 0.88 |
| No. 40 B | — | 1.2 (30.5) |
| No. 40 B | — | 1.2 |
| No. 40 C | — | 2.0 (50.8) |
| No. 40 C | — | 2.0 |
| No. 40 S | — | Bars S ^A |
| No. 45 A | 45 (310) | 0.88 (22.4) |
| No. 45 A | 45 | 0.88 |
| No. 45 B | — | 1.2 (30.5) |
| No. 45 B | — | 1.2 |
| No. 45 C | — | 2.0 (50.8) |
| No. 45 C | — | 2.0 |
| No. 45 S | — | Bars S ^A |
| No. 50 A | 50 (345) | 0.88 (22.4) |
| No. 50 A | 50 | 0.88 |
| No. 50 B | — | 1.2 (30.5) |
| No. 50 B | — | 1.2 |
| No. 50 C | — | 2.0 (50.8) |
| No. 50 C | — | 2.0 |
| No. 50 S | — | Bars S ^A |
| No. 55 A | 55 (379) | 0.88 (22.4) |
| No. 55 A | 55 | 0.88 |
| No. 55 B | — | 1.2 (30.5) |
| No. 55 B | — | 1.2 |
| No. 55 C | — | 2.0 (50.8) |
| No. 55 C | — | 2.0 |
| No. 55 S | — | Bars S ^A |
| No. 60 A | 60 (414) | 0.88 (22.4) |
| No. 60 A | 60 | 0.88 |
| No. 60 B | — | 1.2 (30.5) |
| No. 60 B | — | 1.2 |
| No. 60 C | — | 2.0 (50.8) |
| No. 60 C | — | 2.0 |
| No. 60 S | — | Bars S ^A |

^AAll dimensions of test bar S shall be as agreed upon between the manufacturer and the purchaser.

TABLE 2 Requirements for Tensile Strength of Gray Cast Irons in Separately Cast Test Bars (Metric)

| Class | Tensile Strength, min, ksi [MPa] | Nominal Test Bar Diameter, in. [mm] |
|----------|-------------------------------------|--|
| No. 150A | 150 | 20 to 22 |
| No. 150B | — | 30 |
| No. 150C | — | 50 |
| No. 150S | — | Bars S ^A |
| No. 175A | 175 | 20 to 22 |
| No. 175B | — | 30 |
| No. 175C | — | 50 |
| No. 175S | — | Bars S ^A |
| No. 200A | 200 | 20 to 22 |
| No. 200B | — | 30 |
| No. 200C | — | 50 |
| No. 200S | — | Bars S ^A |
| No. 225A | 225 | 20 to 22 |
| No. 225B | — | 30 |
| No. 225C | — | 50 |
| No. 225S | — | Bars S ^A |
| No. 250A | 250 | 20 to 22 |
| No. 250B | — | 30 |
| No. 250C | — | 50 |
| No. 250S | — | Bars S ^A |
| No. 275A | 275 | 20 to 22 |
| No. 275B | — | 30 |
| No. 275C | — | 50 |
| No. 275S | — | Bars S ^A |
| No. 300A | 300 | 20 to 22 |
| No. 300B | — | 30 |
| No. 300C | — | 50 |
| No. 300S | — | Bars S ^A |
| No. 325A | 325 | 20 to 22 |
| No. 325B | — | 30 |
| No. 325C | — | 50 |
| No. 325S | — | Bars S ^A |
| No. 350A | 350 | 20 to 22 |
| No. 350B | — | 30 |
| No. 350C | — | 50 |
| No. 350S | — | Bars S ^A |
| No. 375A | 375 | 20 to 22 |
| No. 375B | — | 30 |
| No. 375C | — | 50 |
| No. 375S | — | Bars S ^A |
| No. 400A | 400 | 20 to 22 |
| No. 400B | — | 30 |
| No. 400C | — | 50 |
| No. 400S | — | Bars S ^A |

^AAll dimensions of test bar S shall be as agreed upon between the manufacturer and the purchaser.

- 5.1.3 The size of the separately cast test bar (letter classification—A, B, C, or S) that best represents the thickness of the controlling section of the casting (see Table 2/3),
- 5.1.4 The tension test specimen (B or C) to be machined from test bar C (see 13.3, Table 3/4, and Fig. 1),
- 5.1.5 The tension test specimen to be machined from test bar S (see 13.4, Table 3/4, and Fig. 1),
- 5.1.6 Lot size (see Section 10),
- 5.1.7 Special requirements (see Section 6),
- 5.1.8 Saving tested specimens or unbroken test bars (see 15.1), and
- 5.1.9 Special preparation for delivery (see Section 19).

6. Special Requirements

- 6.1 When agreed upon in writing between the manufacturer and the purchaser, it may be necessary for the castings to meet