



Standard Specification for Austenitic Ductile Iron Castings¹

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This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope

1.1 This specification covers austenitic ductile iron castings, which are used primarily for their resistance to heat, corrosion, and wear, and for other special purposes.

1.2 Austenitic ductile iron, also known as austenitic nodular iron or austenitic spheroidal iron, is characterized by having its graphite substantially in a spheroidal form and substantially free of flake graphite. It contains some carbides and sufficient alloy content to produce an austenitic structure.

1.3 The values stated in either SI units or inch-pound units are to be regarded separately as standard. 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 non-conformance with the standard.

2. Referenced Documents

2.1 *ASTM Standards:*²

A247 Test Method for Evaluating the Microstructure of Graphite in Iron Castings

A370 Test Methods and Definitions for Mechanical Testing of Steel Products

E8 Test Methods for Tension Testing of Metallic Materials

E10 Test Method for Brinell Hardness of Metallic Materials

E30 Methods for Chemical Analysis of Ferroalloys³

E59 Practice for Sampling Steel and Iron for Determination of Chemical Composition³

E351 Test Methods for Chemical Analysis of Cast Iron—All Types

¹ This specification is under the jurisdiction of ASTM Committee A04 on Iron Castings and is the direct responsibility of Subcommittee A04.02 on Malleable and Ductile Iron Castings.

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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³ Withdrawn. The last approved version of this historical standard is referenced on www.astm.org.

3. Ordering Information

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

3.1.1 ASTM designation,

3.1.2 Type of austenitic ductile iron required (see 6.1),

3.1.3 Heat treatment options (see 4.3 – 4.6),

3.1.4 If repair of castings is permitted (see 4.7),

3.1.5 Size and number of test bars required (see 9.1 – 9.4 and 10.1),

3.1.6 Special tests, if required (see 12.1),

3.1.7 Certification, if required (see 14.1), and

3.1.8 Different preparation for delivery requirements, if needed (see 15.1).

4. Manufacture

4.1 Melting may be done in any furnaces that produce castings meeting the chemical and mechanical requirements outlined in this specification. These include cupolas, air furnaces, electric furnaces, crucible furnaces, and so forth. Nodularizing and inoculation practice shall be optional with the foundry to produce a microstructure in accordance with 1.2 and Test Method A247.

4.2 Austenitic ductile iron castings may be supplied in either the as-cast or the heat-treated condition.

4.3 By agreement between the manufacturer and the purchaser, the castings may be stress relieved by heating to 1150 to 1200°F [620 to 650°C] for not less than 1 h and not for more than 2 h per inch [25 mm] of thickness in the thickest section. Heating and cooling shall be uniform and shall not be more than 400°F/h [220°C/h] for castings less than 1 inch [25 mm] in maximum thickness and shall be not more than 400°F/h [220°C/h] divided by the maximum section thickness in inches [25 mm] for thicker castings. During the cooling cycle, castings may be cooled in still air after the temperature has dropped to 600°F [310°C].

4.4 By agreement between the manufacturer and the purchaser, the castings may be in-mold stress relieved by allowing castings to cool slowly in the mold at a rate not exceeding 400°F/h [220°C/h]. Once the temperature has dropped below 600°F [310°C], castings can be removed from the mold and cooled in still air.