Designation: A 942 – 95 (Reapproved 2001)

Standard Specification for Centrifugally Cast White Iron/Gray Iron Dual Metal Abrasion-Resistant Roll Shells[1]

This standard is issued under the fixed designation A 942; 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 double pour, centrifugally cast, abrasion-resistant roll shells for general application. The outer layer is white iron and the inner layer is gray iron. There shall be no gradient of mottled iron between the white iron and the gray iron.

1.2 The values stated in either inch-pound units or SI 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 not exact equivalents; therefore, each system must be used independently of the other. Combining values from the two systems may result in nonconformance with this specification.

2. Referenced Documents

2.1 *ASTM Standards:*

A 48 Specification for Gray Iron Castings[2]

E 8 Test Methods for Tension Testing of Metallic Materials[3]

E 10 Test Method for Brinell Hardness of Metallic Materials[3]

3. Classification

3.1 The white iron portion of the casting shall be classified by type based upon Brinell Hardness.

3.2 The gray iron portion of the casting shall be classified by class based upon tensile strength.

4. Ordering Information

4.1 Orders for material to this specification shall include the following:

4.1.1 Specification title, designation, and year of issue,

4.1.2 Quantity of castings required,

4.1.3 Required dimensions and thickness of white iron layer (8.1),

4.1.4 Surface condition—as cast or machined,

4.1.5 Type of white iron required for the outer layer of the casting (7.1),

4.1.6 Class of gray iron required for the inner layer (7.2),

4.1.7 Certification, if required (Section 13), and

4.1.8 Special position of marking information, if required (Section 14).

4.2 Additional requirements may be agreed upon between the manufacturer and the purchaser.

5. Materials and Manufacture

5.1 Both the white and the gray irons may be melted by any suitable melting process.

5.2 The white iron portion of the casting shall be produced by chemistry rather than chilling.

6. Chemical Composition

6.1 A chemical analysis shall be performed by the manufacturer on both the white and gray irons. The chemical compositions shall be controlled to obtain the required mechanical properties.

7. Mechanical Properties

7.1 The white iron shall conform to the following requirements:

Type I — 450 to 500 HB
Type II — 500 to 550 HB
Type III — 550 to 600 HB
Type IV — 600 to 650 HB

7.2 The gray iron shall conform to the following requirements:

	Tensile Strength	
Class	min, ksi	min, (MPa)
No. 20	20	(138)
No. 25	25	(172)
No. 30	30	(207)
No. 35	35	(241)

8. Other Requirements

8.1 The thickness of the white iron layer shall be a minimum of ½ in.

8.1.1 The thickness of the white iron layer shall be measured on the roll face at each end and shall conform to the specified thickness.

9. Finish and Appearance

9.1 All exterior surfaces shall be machined or ground prior to the rolls being placed into service.

9.2 The manufacturer shall be responsible for providing castings with adequate stock for final machining.

[1] This specification is under the jurisdiction of ASTM Committee A04 on Iron Castings and is the direct responsibility of Subcommittee A04.01 on Gray and White Iron Castings.

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[2] *Annual Book of ASTM Standards*, Vol 01.02.

[3] *Annual Book of ASTM Standards*, Vol 03.01.

9.3 Surfaces and corners of the machined castings shall be free from burrs and extremely sharp edges.

9.4 Machined surfaces of the castings may be protected by the application of a rust and corrosion preventive coating.

10. Sampling

10.1 Each casting shall be tested for chemical composition, hardness, and tensile strength.

10.2 The white iron hardness shall be determined on crop ends removed from the casting.

10.3 The tension test of the gray iron shall be performed on specimens obtained from separately cast test bars poured in accordance with Specification A 48. Standard test bar B shall be the size of the test bar poured.

10.4 Chemical analysis shall be performed on samples obtained during pouring of the iron.

11. Test Methods

11.1 The hardness test shall be performed in accordance with Test Method E 10, using a 10-mm tungsten carbide ball and 3000 kgf load. Test results shall be considered accurate up to 700 HB.

11.2 The tension test shall be performed in accordance with Test Methods E 8.

12. Inspection

12.1 All tests and inspections required by this specification shall be performed by the manufacturer or other reliable source whose services have been contracted by the manufacturer. Complete records of all tests and inspections shall be maintained by the manufacturer, and shall be available for review by the purchaser.

13. Certification

13.1 When specified by the purchaser, the manufacturer's certification shall be furnished to the purchaser stating that the material was manufactured, sampled, tested, and inspected in accordance with this specification. This certification shall include the results of all tests required by this specification and give the thickness of the white iron supplied.

14. Packaging and Package Marking

14.1 When specified by the purchaser, the manufacturer's name or identifying mark shall be stamped at one end in the gray iron portion of the casting. When further specified, the casting identification number shall be stamped at the casting end.

14.2 Unless otherwise specified by the contract or purchase order, castings shall be packed in accordance with the manufacturer's commercial practice to ensure acceptance and safe delivery by the carrier.

15. Keywords

15.1 abrasion-resistant; cast iron; centrifugal casting; dual metal; gray cast iron; roll shell; white cast iron