Designation: A 667/A 667M – 87 (Reapproved 2003)

An American National Standard

Standard Specification for Centrifugally Cast Dual Metal (Gray and White Cast Iron) Cylinders[1]

This standard is issued under the fixed designation A 667/A 667M; 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[2] covers centrifugally cast cylinders with an outer layer of white cast iron and the remainder of the material of gray cast iron. These castings are suitable for pressure containing parts the design strength of which is based on the gray iron portion of the cylinder. These castings are suitable for service at temperatures up to 450°F [230°C].

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 independent of the other. Combining values from the two systems may result in nonconformance with the specification.

1.3 The following safety hazards caveat pertains only to the test method portion, Section 8, of this specification: *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*

A 278 Specification for Gray Iron Castings for Pressure-Containing Parts for Temperatures Up to 650°F (350°C)[3]

A 278M Specification for Gray Iron Castings for Pressure-Containing Parts for Temperatures Up to 345°C [Metric][4]

3. Materials and Manufacture

3.1 The melting procedures shall be optional with the foundry.

3.2 The white iron portion of the cylinder shall be made to a minimum hardness of 55 Scleroscope "C". The gray iron portion of the cylinder shall conform to Specification A 278, Class 20 [A 278M, Class 150].

3.3 The casting process shall be controlled to produce a metallurgical bond between the two metal layers.

4. Finish

4.1 All surfaces shall be machined prior to the cylinders being placed into service.

5. Physical Requirements

5.1 *Tensile Requirements*—Tension test specimens removed from the casting shall have a tensile strength not less than 80 % of that specified in 3.2.

5.2 *Thickness of White Cast Iron*:

5.2.1 The thickness of the white cast iron shall be not less than 5 % nor more than 30 % of the total finished wall thickness.

5.2.2 The thickness of the white cast iron shall be determined by ultrasonic testing.

6. Number of Tests

6.1 The number of tension tests shall be in conformance with Specifications A 278 and A 278M.

7. Specimen Preparation

7.1 Separately cast test bars may be used to represent the gray iron portion of the castings. The test bars shall be cast in core sand and have a nominal diameter of 2 in. [50 m]. Tension test specimens shall be machined from test bars to the dimensions given for Specimen C in Specifications A 278 and A 278M.

7.2 At the option of the manufacturer he may substitute test bars taken from the gray iron portion of the casting. The test bars shall be taken midway between the inside diameter of the

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

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[2] For ASME Boiler and Pressure Vessel Code applications see related Specification SA-667 in Section II of that Code.

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

[4] Discontinued. Replaced by A 278/A 278M. See 2000*Annual Book of ASTM Standards*, Vol 01.02.

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casting and the interface between the two layers. Tension test specimens machined from these test bars shall conform to the dimensions shown for Specimen C in Specifications A 278 and A 278M.

8. Test Method

8.1 Tension test specimens shall fit the holders of the testing machine in such a way that the load shall be axial. The use of self-aligning shackles is suggested. After reaching a stress equivalent to 15 000 psi [100 MPa] the speed of the moving head of the testing machine shall not exceed ⅛ in. [3.2 mm]/min.

9. Inspection

9.1 The inspector representing the purchaser shall have free entry at all times while work on the contract of the purchaser is being performed to all parts of the manufacturer's works that concern the manufacture of the material ordered. The manufacturer shall afford the inspector without charge all reasonable facilities to satisfy him that the material is being furnished in accordance with this specification. All tests and inspections shall be made at the place of manufacture prior to the shipment unless otherwise specified and shall be so conducted as not to interfere unnecessarily with the operation of the works.

10. Acceptance and Certification

10.1 Final acceptance of the casting shall follow complete machining of the casting. Upon request of the purchaser and when so specified in the purchase order, a certification shall be made on the basis of acceptance of the material. This shall consist of a copy of the manufacturer's test report or a statement by the supplier accompanied by a copy of the test results that the material has been sampled, tested, and inspected in accordance with the provisions of this specification. Each certification so furnished shall be signed by an authorized agent of the supplier or manufacturer.

11. Product Marking

11.1 Pressure containing castings made in accordance with this specification shall have the name of the manufacturer or his recognized trademark and the class of iron to which it conforms cast or indelibly stamped on the surface indicated by the purchaser or in such a position as not to injure the usefulness of the casting.

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