



Standard Specification for Ductile Iron Castings for Paper Mill Dryer Rolls^{1,2}

This standard is issued under the fixed designation A476/A476M; 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 ductile iron castings for use in pressure containing paper mill dryer rolls at temperatures up to 450°F [230°C].

1.2 No precise quantitative relationship can be stated between the properties of the iron in various locations of the same casting or between the properties of a casting and those of a test specimen cast from the same iron (see [Appendix X1](#)).

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.

1.3.1 *Exception*—Within the text, the SI units are shown in brackets.

2. Referenced Documents

2.1 *ASTM Standards*:³

[A644 Terminology Relating to Iron Castings](#)

[E8 Test Methods for Tension Testing of Metallic Materials](#)

[E10 Test Method for Brinell Hardness of Metallic Materials](#)

[E94 Guide for Radiographic Examination](#)

[E446 Reference Radiographs for Steel Castings Up to 2 in. \(50.8 mm\) in Thickness](#)

3. Terminology

3.1 Definitions for many terms common to iron castings are found in Terminology [A644](#).

4. Ordering Information

4.1 Orders for material purchased to the requirements of this specification should include the following information:

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 ASME Boiler and Pressure Vessel Code Applications see related Specifications SA-467 in Section II of that Code.

³ 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.

- 4.1.1 Quantity,
- 4.1.2 Specification number and date of issue,
- 4.1.3 Description of casting by pattern number or drawing,
- 4.1.4 Heat treatment, if required (see [5.1](#)),
- 4.1.5 Type of test coupon (see [9.2](#)),
- 4.1.6 Certification, if required (see [13.1](#)),
- 4.1.7 Marking location (see [14.1](#)), and
- 4.1.8 Additional requirements.

5. Heat Treatment

5.1 The castings may be stress relieved at a temperature not to exceed 1200°F [650°C].

6. Chemical Requirements

6.1 The castings shall conform to the following chemical requirements:

Total carbon, min, %	3.0
Silicon, max, %	3.0
Phosphorus, max, %	0.08
Sulfur, max, %	0.05

6.2 The castings shall have a carbon equivalent of 3.8 to 4.5 inclusive.

NOTE 1—The carbon content equivalent is calculated as follows:
Total carbon + 0.3 (silicon + phosphorus)

6.3 The chemical analysis for total carbon shall be made on either chilled cast pencil-type specimens or on thin wafers approximately $\frac{1}{32}$ in. [0.8 mm] thick, cut from test coupons. Drillings shall not be used due to attendant loss of graphite.

7. Mechanical Properties

7.1 The iron represented by test coupons shall conform to tensile requirements prescribed in [Table 1](#).

7.2 The yield strength prescribed in [Table 1](#) may be determined by any of the approved procedures described in 7.3 of Test Methods [E8](#).

7.3 The Brinell hardness of the material shall be a minimum of 201 HB. Hardness tests shall be conducted in accordance with Test Method [E10](#), using a 3000-kgf load. The test may be made on either the casting or on a test coupon representing the casting.

8. Workmanship, Finish, and Appearance

8.1 The castings shall conform to the dimensions on the drawings furnished by the purchaser, or if no drawing has been