AERONAUTICAL MATERIAL SPECIFICATION

Society of Automotive Engineers, Inc.
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ALLOY IRON CASTINGS, DUCTILE, SAND, CORROSION AND HEAT RESISTANT 2Cr - 20Ni

1. ACKNOWLEDGMENT: A vendor shall mention this specification number in all quotations and when acknowledging purchase orders.

2. APPLICATION: Primarily for parts, such as valve and compressor housing, subject to moderate stresses and requiring moderate corrosion and heat resistance up to 1200 F.

3. COMPOSITION: Shall be as follows, treated with magnesium as necessary to meet the tensile and microstructure requirements.

Carbon	2.4 - 3.0
Manganese	0.8 - 1.6
Silicon	2.0 - 3.2
Phosphorus	0.25 max
Chromium	1.7 - 2.4
Nickel	18.0 - 22.0
Copper	0.50 max
Lead	0.003 max

4. CONDITION: Stress relieved, unless otherwise specified.

5. TECHNICAL REQUIREMENTS:

5.1 Casting: A melt shall be the metal poured from a single magnesium-treated ladle of 5000 lb or less.

5.2 Test Specimens:

5.2.1 Tensile Test Coupons: Shall be standard keel blocks as shown in Figure 1, unless purchaser permits use of "Y" blocks as shown in Figure 2. Coupons shall be cast with each melt of metal for castings and, when requested, shall be supplied with the castings. Coupons shall be cast in open molds made of suitable core sand, shall be poured directly after pouring the castings, and shall be left in the mold until black. Metal for the coupons shall be part of the melt which is used for the castings. Molding practice, and the coupon size when use of "Y" blocks is permitted, shall, insofar as practicable, be such that cooling rates of castings and coupons are substantially the same.

5.2.2 Chemical Analysis Specimens: For carbon determinations, a chilled pencil type specimen shall be cast from each melt or a solid sample shall be cut from the tensile test coupon or specimen from each melt.

5.3 Heat Treatment: All castings and tensile test specimens representing them shall be stress relieved as follows, unless otherwise specified.

5.3.1 Castings and tensile test coupons shall be heated to temperatures not lower than 1100 F which will produce substantially the same hardness in castings and test coupons, held at heat for 1 hr per inch of cross section, and air cooled. When section sizes of castings and test coupons are such that the same stress relieving temperature is used for both, at least one set of tensile test specimens shall be put into a batch-type furnace with each load of castings or into a continuous furnace at intervals of not longer than 3 hours.

5.4 Tensile Properties:

5.4.1 Tensile Test Specimens: Standard tensile test specimens (0.357 in. diameter at the reduced parallel section from 1/2 in. "Y" block, 0.505 in. diameter at the reduced parallel section from other tensile test coupons) cut from the coupons as shown in Figures 1 and 3 shall conform to the following requirements:

Tensile Strength, psi	55,000 min
Yield Strength at 0.2% Offset or at 0.0075 in. in 2 in. Extension Under Load (E = 18,500,000), psi	32,000 min
Elongation, % in 4D	7 min

5.4.2 Castings: When tensile properties of actual castings are determined, tensile properties of specimens cut from sections of castings shall conform to the following requirements:

Tensile Strength, psi	55,000 min
Yield Strength at 0.2% Offset or at 0.0075 in. in 2 in. Extension Under Load (E = 18,500,000), psi	32,000 min
Elongation, % in 4D	5 min

5.5 Hardness: Castings and test coupons shall have hardness of Brinell 140-180 using 3000 kg load, or Rockwell B 75-88.

5.6 Microstructure: Shall consist of spheroidal graphite with small amounts of carbide in matrix of austenite, essentially free from flake graphite. Parts shall be capable of being cooled to -75 F without the austenite transforming to martensite; parts so cooled, after returning to room temperature, shall be sufficiently non-magnetic to prevent a small steel magnet from adhering to the casting.

6. QUALITY:

6.1 Castings shall be uniform in quality and condition, sound, and free from foreign materials and from internal and external defects detrimental to fabrication or to performance of parts. Castings shall have smooth surfaces and shall be well cleaned.

6.2 Radiographic and other quality standards shall be as agreed upon by purchaser and vendor.

6.3 Unless otherwise specified, castings shall be produced under radiographic control. This shall consist of radiographic examination of castings until proper foundry technique, which will produce castings free from harmful internal defects, is established for each part number, and of production castings as necessary to ensure maintenance of satisfactory quality.

6.4 Castings shall not be repaired by plugging, welding, or other methods, without written permission from purchaser.

7. REPORTS:

7.1 Unless otherwise specified, the vendor of castings shall furnish with each shipment three copies of a report of the results of tests for chemical composition of each melt and for tensile properties of the test coupons representing each melt. This report shall include the purchase order number, melt number, material specification number, part number, and quantity from each melt.

7.2 Unless otherwise specified, the vendor of finished or semi-finished parts shall furnish with each shipment three copies of a report showing the purchase order number, material specification number, contractor or other direct supplier of castings, part number, and quantity. When castings for making parts are produced or purchased by the parts vendor, that vendor shall inspect castings from each melt represented to determine conformance to the requirements of this specification, and shall include in the report a statement that the castings conform, or shall include copies of laboratory reports showing the results of tests to determine conformance.

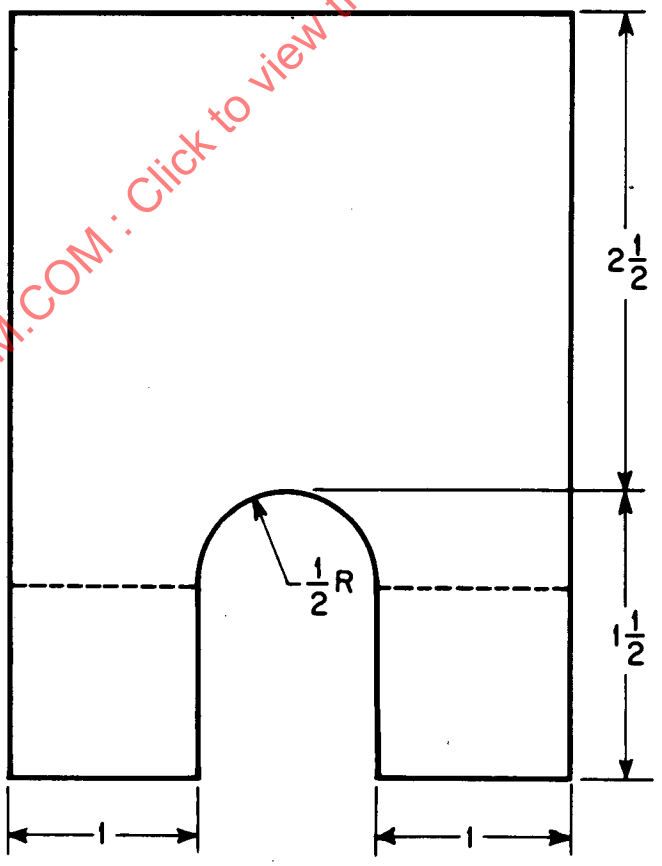
8. IDENTIFICATION: Castings shall be identified in accordance with the latest issue of AMS 2804.

9. APPROVAL:

9.1 To assure uniformity of quality, sample castings from new or reworked patterns shall be approved by purchaser, unless such approval be waived.

9.2 Vendor shall use the same foundry practices and the same heat treating procedures for production castings as for approved sample castings. If necessary to make any change, vendor shall notify purchaser prior to the first shipment of castings incorporating such change.

10. REJECTIONS: Castings not conforming to this specification or to authorized modifications will be subject to rejection.



Length of Block shall be 6 in.

Figure 1