AERONAUTICAL
MATERIAL SPECIFICATIONS

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AMS 5359

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Revised

STEEL CASTINGS, SAND, CORROSION AND HEAT RESISTANT
15Cr - 4Ni - 2.3Mo - 0.1N

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

2. APPLICATION: Primarily for parts and assemblies requiring corrosion resistance, high strength, and oxidation resistance up to 850 F, and especially where parts and assemblies require welding during fabrication.

3. COMPOSITION: Castings shall conform to the following:

Carbon	0.08 - 0.15
Manganese	0.40 - 1.10
Silicon	0.75 max
Phosphorus	0.04 max
Sulfur	0.03 max
Chromium	14.5 - 15.5
Nickel	3.5 - 4.5
Molybdenum	2.0 - 2.6
Nitrogen	0.05 - 0.11
Carbon + Nitrogen	0.15 - 0.25

4. CONDITION: Solution heat treated, unless otherwise specified.

5. TECHNICAL REQUIREMENTS:

5.1 Casting: A melt shall be the metal poured from a single furnace charge of 5000 lb or less.

5.2 Test Specimens:

5.2.1 Tensile Test Coupons: Shall be attached to castings if practicable, or shall be standard keel blocks as shown in Figure 1, unless purchaser permits use of cast-to-size specimens. Coupons shall be cast with each melt of metal for castings and, when requested, shall be supplied with the castings. Keel blocks shall be cast in molds made of suitable core sand, shall be poured directly after pouring the castings, and shall be kept in the mold until black. Metal for the coupons shall be part of the melt which is used for the castings.

5.2.2 Chemical Analysis Specimens: When required by purchaser, shall be of size and shape agreed upon by purchaser and vendor.

5.3 Heat Treatment: All castings and tensile test specimens representing them shall be heat treated as follows:

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5.3.1 Tensile test specimens from each melt, together with production castings, shall be solution heat treated by heating to 2000 F ± 50, holding at heat for not less than 1 hr per inch of section, and cooling rapidly in air for castings with all sections 1 in. and under in thickness and in water or oil for castings with any section greater than 1 inch.

5.3.1.1 When specified by purchaser, castings shall, after heat treatment as in 5.3.1, be heated to 1400 F ± 50, held at heat for 3 hr, cooled in air to room temperature or below, reheated to 1050 F ± 25, held at heat for 3 hr, and cooled in air.

5.4 Hardness: Shall be not higher than Rockwell C 39 or equivalent.

5.5 Properties after Austenite Conditioning, Sub-Zero Cooling, and Tempering: Tensile test specimens produced in accordance with 5.2 and heat treated in accordance with 5.3.1 shall be capable of meeting the following requirements after heating to 1725 - 1850 F, holding at heat for not less than 1 hr per inch of cross section, quenching in water or otherwise cooling as rapidly as possible to room temperature, cooling to not higher than -100 F, holding at this temperature for not less than 3 hr, warming in air to room temperature, heating to 850 F ± 25, holding at heat for not less than 3 hr, and cooling in air. If supplied tensile test specimens fail to meet the requirements or are not available, suitable specimens may be prepared from castings for test.

5.5.1 Tensile Properties:

Tensile Strength, psi	200,000 min
Yield Strength at 0.2% Offset or at 0.0144 in. in 2 in. Extension Under Load (E = 29,000,000), psi	150,000 min
Elongation, % in 4D	8 min

5.5.2 Hardness: Shall be not lower than Rockwell C 40 or equivalent.

6. QUALITY:

6.1 Castings shall be uniform in quality and condition, sound, and free from foreign materials and from internal and external imperfections detrimental to fabrication or to performance of parts. Castings shall have smooth surfaces and shall be well cleaned. Unless otherwise specified, metallic shot or grit shall not be used for final cleaning.

6.2 When castings are broken for fracture test, the fracture shall have uniform color and be substantially free from oxides and other imperfections.

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

6.4 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 imperfections, is established for each part number, and of production castings as necessary to assure maintenance of satisfactory quality.

6.5 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. This report shall include the purchase order number, melt number, material specification number, part number, and quantity from each heat.

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: Unless otherwise specified, 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 master 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 in processing which could unfavorably affect any characteristics of the castings, 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.