

AERONAUTICAL MATERIAL SPECIFICATION

Society of Automotive Engineers, Inc.
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Revised

STEEL CASTINGS, PRECISION INVESTMENT, CORROSION AND HEAT RESISTANT 19Cr - 12Ni - Cb

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1. **ACKNOWLEDGMENT:** A vendor shall mention this specification number in all quotations and when acknowledging purchase orders.
2. **APPLICATION:** Small parts, such as exhaust couplings, stator vanes and nozzle diaphragm vanes, for use at temperatures up to 1500 F and where welding during fabrication may be required.
3. **COMPOSITION:** Castings shall conform to the following:

Carbon	0.12 max
Manganese	2.00 max
Silicon	1.00 max
Phosphorus	0.04 max
Sulfur	0.03 max
Chromium	18.00 - 19.50
Nickel	10.00 - 14.00
Columbium	10xC - 1.50
Molybdenum	0.50 max
Copper	0.50 max
4. **CASTING:** Castings shall be poured either from remelted master heat metal or directly from a master heat. A master heat is previously refined metal of a single furnace charge. Gates, sprues, risers, and rejected castings shall only be used in preparation of master heats but shall not be remelted directly, without refining, for pouring of castings.
5. **CONDITION:** Solution heat treated, unless otherwise specified.
6. **TECHNICAL REQUIREMENTS:**
 - (a) Hardness.- Unless otherwise specified, castings shall have hardness not higher than Brinell 175 or equivalent.
 - (b) Embrittlement.- Material in the solution heat treated condition shall be capable of meeting the following test:

Embrittlement test specimens, after being heated to 1200 F for 2 hr and air cooled, shall withstand immersion for 48 hr in a boiling aqueous solution containing 100 g of $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ and 100 ml of H_2SO_4 (sp gr 1.84) per liter of solution under a reflux condenser, without evidence of intercrystalline surface attack. After such immersion, the specimens shall withstand, without cracking, bending at room temperature through an angle of 180 degrees around a diameter equal to the thickness of the specimen.

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7. QUALITY: (a) 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. Unless otherwise specified, metallic shot or grit shall not be used for final cleaning.
- (b) When castings are broken for fracture test, the fracture shall have uniform color and be substantially free from oxides and other defects.
- (c) Unless otherwise specified, castings shall be produced under radiographic control.
- (d) Inspection standards and procedures shall be as agreed upon by purchaser and vendor.
- (e) Castings shall not be repaired by plugging, welding or other methods without written permission from the purchaser.
8. REPORTS: (a) Unless otherwise specified, the vendor of castings shall furnish with each shipment three copies of a notarized report of the results of tests for chemical composition of at least one casting from each master heat represented and a statement that the castings conform to the requirements of this specification. This report shall include the purchase order number, master heat number (and code symbol if used), material specification number, part number, and quantity from each heat.
- (b) Unless otherwise specified, the vendor of finished or semi-finished parts shall furnish with each shipment three copies of a notarized 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 master heat represented, and shall include in the report a certification that the castings conform, or shall include copies of laboratory reports showing the results of tests to determine conformance.
9. IDENTIFICATION: Unless otherwise specified, each casting shall be identified as to part number and master heat number or code symbol. Methods of applying identifying characters shall be as agreed upon by purchaser and vendor. Marking materials shall have no deleterious effects on the castings or their performance.
10. APPROVAL: (a) Unless otherwise ordered, sample castings from new or reworked master patterns shall be approved by purchaser before production castings are supplied.
- (b) A vendor shall use the same casting technique, including rate of cooling after casting, and the same solution treating procedure, for production castings as for sample castings. If any change is found necessary, vendor shall notify purchaser prior to the first shipment of castings embodying such change.