

AEROSPACE MATERIAL SPECIFICATION



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Superseding AMS 5210

Steel Castings, Investment, Electrical
Induction Melted, Annealed

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1. ACKNOWLEDGMENT:

A vendor shall mention this specification number and its revision letter in all quotations and when acknowledging purchase orders.

2. APPLICATION:

Primarily for parts used on direct current devices requiring high magnetic saturation and permeability and low magnetic retentivity.

3. COMPOSITION:

	min	max
Carbon + Manganese + Phosphorus + Sulfur	--	0.10
Silicon	0.75	1.3
Carbon	--	0.040
Sulfur	--	0.030
Phosphorus	--	0.010
Copper	--	0.12

4. CONDITION:

Annealed.

5. TECHNICAL REQUIREMENTS:

5.1 Casting:

Castings shall be poured either from remelted metal from a master heat or master heat lot or directly from a master heat. In either case, metal for casting shall be qualified as in 5.2. A master heat is refined metal of a single furnace charge. Gates, sprues, risers, and rejected castings shall be used only in preparation of master heats; they shall not be remelted directly, without refining, for pouring of castings.

- 5.1.1 Unless prohibited by purchaser, metal from two or more master heats may be blended to form a master heat lot provided that the composition of each master heat to be blended is within the limits of Section 3 above and that the total weight of metal in the master heat lot does not exceed 10,000 pounds. Ingot and pig may be blended together, shot may be blended, but shot shall not be blended with ingot or pig.

5.2 Master Heat Qualification:

Each master heat and master heat lot shall be qualified by evaluation of chemical analysis specimens conforming to 5.2.1. A master heat or master heat lot may be considered conditionally qualified if vendor's test results show conformance to all applicable requirements of this specification. However, except when purchaser waives confirmatory testing, final qualification shall be based on purchaser's test results. Conditional qualification of a master heat or master heat lot shall not be construed as a guarantee of acceptance of castings poured therefrom.

- 5.2.1 Chemical Analysis Specimens: Shall be any convenient size, shape, and form for vendor's tests; when chemical analysis specimens are required by purchaser, specimens shall be cast to a size, shape, and form agreed upon by purchaser and vendor. Composition of specimens shall conform to Section 3.

5.3 Heat Treatment:

After all grinding, polishing, or machining is completed, castings shall be annealed by heating to 875 C $\pm$ 15 (1607 F $\pm$ 27), holding at heat for 2 hr, cooling slowly to 550 C (1022 F) or below, and then air cooling to room temperature. The heating medium or atmosphere shall cause neither surface hardening nor carburization.

5.4 Hardness:

Castings shall have hardness not higher than Rockwell B 72 or equivalent.

6. QUALITY:

- 6.1 Metal for castings shall be induction melted. 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 permitted, 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 defects.
- 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 imperfections, is established for each part number, and of production castings as necessary to ensure maintenance of satisfactory quality.
- 6.4 Inspection standards and procedures shall be as agreed upon by purchaser and vendor.
- 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 at least one casting from each master heat or master heat lot represented, and a statement that the castings conform to the requirements of this specification. This report shall include the purchase order number, master heat or master heat lot number (and code symbol if used), material specification number and its revision letter, 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 and its revision letter, 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 or master heat lot represented, 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, each casting shall be identified with the part number and with master heat number, master heat lot 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.

9. APPROVAL:

- 9.1 Sample castings from new or reworked master patterns and the casting procedure shall be approved by purchaser before castings for production use are supplied, unless such approval be waived.
- 9.2 Vendor shall establish, for production of sample castings of each part number, the control factors of processing which will produce acceptable castings; this shall constitute the approved casting procedure and shall be used for producing production castings. If necessary to make any change in control factors of processing which could affect quality or properties of the castings, vendor shall submit for reapproval a detailed statement of the revised operations and, when requested, sample castings. No production castings incorporating the revised operations shall be shipped prior to receipt of reapproval.