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## AEROSPACE MATERIAL SPECIFICATION

Submitted for recognition as an American National Standard

AMS 2369A

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Superseding AMS 2369

### QUALITY ASSURANCE SAMPLING Carbon and Low-Alloy Steel Castings

#### 1. SCOPE:

- 1.1 Form: This specification covers quality assurance sampling procedures which may be used to determine conformance to applicable specification requirements of carbon and low-alloy steel castings.

#### 2. APPLICABLE DOCUMENTS: None.

#### 3. TECHNICAL REQUIREMENTS:

##### 3.1 General:

- 3.1.1 Omission from this specification of confirmatory tests of certain material properties or attributes controlled by the applicable material specification does not relieve the vendor of responsibility for furnishing castings which conform in all respects to the applicable specification.
- 3.1.2 In event of a conflict between the requirements specified herein and requirements of a particular material specification, the following rules shall apply:
- 3.1.2.1 When requirements of the material specification are more stringent, they shall take precedence.
- 3.1.2.2 When requirements of this AMS are more stringent, they shall take precedence.
- 3.1.2.3 When instructions are issued by the purchaser regarding quality assurance sampling procedures, such instructions shall take precedence over the requirements of either this specification or the particular specification in which this specification is invoked.

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3.2 Responsibility For Tests: The vendor of castings shall supply all samples for vendor's tests and shall be responsible for performing all required tests.

3.3 Detail Requirements:

3.3.1 Classification: For the purpose of clarifying test requirements, castings shall be classified as follows:

| Class | Description                                                                                                                                                                                                                                        |
|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| I     | Castings furnished in the final heat treated condition to the mechanical properties specified for the final product.                                                                                                                               |
| II    | Castings furnished normalized, normalized and tempered, normalized and annealed, or annealed only, e.g., carburizing grades, and castings which must exhibit capability of meeting specified mechanical properties when subsequently heat treated. |
| III   | Castings furnished hardened and tempered to a specified hardness range only.                                                                                                                                                                       |

3.3.2 Test Methods: Shall be in accordance with requirements of the applicable material specification. If a test method is not specified, the method of test shall be as agreed upon by purchaser and vendor.

3.3.3 Inspection Lot: Shall consist of castings of the same part number, made from one heat of material, heat treated as a batch or sequentially heat treated in a continuous furnace, and presented for vendor's inspection at one time.

3.3.4 Tests: Castings shall be subjected to such tests and inspections as necessary to ensure conformance to applicable specification requirements.

3.3.4.1 General: Tests for properties which are characteristic of a heat of metal for casting such as composition, hardenability, cleanliness, etc, need not be conducted on castings from that heat, provided that these tests have been performed on the heat and heat identity of the castings is maintained. When analyzed or tested, castings shall conform to the requirements of the applicable material specification.

3.3.4.2 Class I Castings: Shall be tested on the basis of at least one casting from each inspection lot. Once a valid hardness/tensile property relationship has been established and accepted by purchaser and vendor for a given casting and heat treat cycle, the frequency of destructive testing may be reduced to the level permitted by purchaser and hardness used as the conformance criteria.

3.3.4.3 Class II and III Castings: Shall be nondestructively tested to determine conformance to specified hardness, grain size, and structural requirements.

3.3.5 Sampling: Shall be in accordance with the following:

3.3.5.1 Preproduction Castings: Sample shall consist of at least one casting from each new or reworked master pattern and shall be representative of the materials and procedures to be used in producing production castings.

3.3.5.2 Production Castings:

3.3.5.2.1 Composition: Shall be determined on sample coupons cast in a mold with parts or on a casting from each heat of metal in the delivered lot of castings.

3.3.5.2.2 Mechanical Properties: Shall be determined on specimens cut from at least one casting (in specific areas when required by purchaser) or, when permitted by purchaser, on at least two separately-cast specimens representative of each inspection lot.

3.3.5.2.2.1 When testing of specimens cut from castings is limited to a given area of the casting, size, number, and specific location of such specimens shall be as agreed upon by purchaser and vendor.

3.3.5.2.2.2 Integrally-cast specimens may be used for acceptance test or periodic testing when permitted by purchaser, provided that the vendor of castings submits test data to establish a consistent relationship between casting and integral specimen properties.

3.3.5.2.3 Decarburization: Shall be determined on at least one sample from each inspection lot.

3.3.5.2.4 Grain Size, Macrostructure or Microstructure, Cleanliness, and Inclusion Rating: When required by purchaser, shall be determined on at least one casting from each inspection lot.

3.3.5.3 When a statistical sampling plan and acceptance quality level (AQL) have been agreed upon by purchaser and vendor, sampling shall be in accordance with such plan in lieu of sampling as in 3.3.5.2 and the report of conformance shall state that such plan was used.

3.3.6 Resampling and Retesting: If any specimen used in the above tests fails to meet the specified requirements, disposition of the castings may be based on the results of testing three additional specimens for each original nonconforming specimen. The retest specimens shall be taken from casting areas essentially equivalent to that from which the original nonconforming specimen was taken. Failure of any retest specimen to meet the specified requirements shall be cause for rejection of the castings represented and no additional testing shall be permitted. Results of all tests shall be reported.

4. QUALITY ASSURANCE PROVISIONS: Not applicable.

5. PREPARATION FOR DELIVERY: Not applicable.

6. ACKNOWLEDGMENT: Not applicable.