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AEROSPACE MATERIAL SPECIFICATION

AMS 2372A

Superseding AMS 2372

Society of Automotive Engineers, Inc.
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QUALITY ASSURANCE SAMPLING OF CARBON AND LOW-ALLOY STEELS Forgings and Forging Stock

1. **SCOPE:** This specification covers quality assurance sampling procedures which may be used to determine conformance to applicable specification requirements of wrought carbon and low-alloy steel forgings and forging stock.
2. **APPLICABLE DOCUMENTS:** None.
3. **TECHNICAL REQUIREMENTS:**
 - 3.1 **General Requirements:**
 - 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 products which conform in all respects to the applicable specification.
 - 3.1.2 In the event of a conflict between the requirements specified herein and the requirements of a particular material specification, the following rules shall apply:
 - 3.1.2.1 When the requirements of the material specification are more stringent, they shall take precedence.
 - 3.1.2.2 When the 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.
 - 3.2 **Responsibility for Tests:** The vendor of the product shall supply all samples and shall be responsible for performing all required tests.

3.3 **Detail Requirements:**

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

| Class | Description |
|-------|---|
| I | Forgings furnished in the final heat treated condition and requiring destructive testing for verification of specified mechanical properties. |
| II | Forgings furnished normalized, normalized and tempered, normalized and annealed, or annealed only, requiring capability testing to assure conformance to specified mechanical properties after subsequent heat treatment. |
| III | Forgings furnished hardened and tempered to a specified hardness range only. |
| IV | Forgings furnished normalized, normalized and tempered, normalized and annealed, or annealed only, e.g., carburizing grades. |

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- 3.3.2 Test Methods: Shall be in accordance with the 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: Unless otherwise agreed upon by purchaser and vendor, an inspection lot shall consist of forgings of the same part number, made from one mill heat of material, and heat treated as a batch or sequentially heat treated in a continuous furnace.
- 3.3.4 Tests: Forgings and forging stock shall be subjected to such tests and inspections as necessary to assure conformance to applicable requirements.
- 3.3.4.1 General: Tests for properties which are characteristic of a heat, such as composition, hardenability, cleanliness, etc, which are made on the forging stock, need not be repeated on forgings from that heat provided that these tests have been performed on the stock and that heat identity of the forgings is maintained.
- 3.3.4.2 Grainflow: A pre-production forging shall be sectioned and macroetched to reveal the grainflow pattern, unless otherwise specified. The pattern shall be in essential agreement with flowlines sketched on the drawing or, when not so sketched, shall be as agreed upon by the purchaser and vendor. This procedure shall be repeated following any major change in forging technique or die design.
- 3.3.4.3 Nondestructive Testing: Nondestructive testing shall be performed as specified or as necessary to assure freedom from harmful imperfections. The methods, standards, and frequency for such testing shall be as agreed upon by purchaser and vendor.
- 3.3.4.4 Decarburization: When a check for decarburization depth is specified, the location, frequency, and method of testing shall be as agreed upon by purchaser and vendor.
- 3.3.4.5 Dimensions: Forgings shall be inspected as required to assure conformance to dimensions shown on the applicable drawing.
- 3.3.4.6 Mechanical Property Tests: When tensile testing of a forging is specified, the location of the specimens within the part shall be shown on the drawing or a sketch. Deviations from specification requirements because of section size or test orientation shall be as agreed upon by purchaser and vendor.
- 3.3.4.6.1 Product Tests: Class I forgings shall be sectioned and tested on the basis of one per inspection lot, unless otherwise specified. Once a valid hardness/tensile property relationship has been established for a given forging and heat treat cycle, the frequency of destructive testing may be reduced and hardness used as the conformance criterion, when permitted by purchaser.
- 3.3.4.6.2 Capability Tests: Class II forgings selected for destructive testing shall, if necessary, be rough machined to an appropriate section size prior to heat treating to the specified final hardness. In the case of ultra-high-strength alloy steel forgings, specimen blanks may be cut from the proper locations and heat treated in accordance with specification requirements. Capability testing shall be performed from each mill heat, unless otherwise specified.
- 3.3.4.6.3 Integral Coupon Tests: Integral coupon tests may be used for product or capability tests, when agreed upon by purchaser and vendor. A sufficient number of forgings shall have been destructively tested to establish a correlation between the part properties and those of the integral coupon.
- 3.3.4.6.4 Hardness: Each Class I and Class III forging shall be checked for Brinell hardness. Class II and Class IV forgings shall be hardness tested on a sampling basis as agreed upon by purchaser and vendor.