SAE Aerospace
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AEROSPACE MATERIAL SPECIFICATION

SAE AMS 2374D

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Superseding AMS 2374C

Quality Assurance Sampling and Testing Corrosion and Heat-Resistant Steel and Alloy Forgings

RATIONALE

This document has been reaffirmed to comply with the SAE 5-year Review policy.

1. SCOPE:

This specification covers quality assurance sampling and testing procedures used to determine conformance to applicable material specifications of corrosion and heat-resistant steel and alloy forgings.

1.1 Quality assurance sampling and testing procedures for forging stock are covered in AMS 2371.

2. APPLICABLE DOCUMENTS:

The issue of the following documents in effect on the date of the purchase order forms a part of this specification to the extent supplied herein. The supplier may work to a subsequent revision of a document unless a specific document issue is specified. When the referenced document has been cancelled and no superseding document has been specified, the last published issue of that document shall apply.

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001 or www.sae.org.

AMS 2808 Identification, Forgings

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: custsvc@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959 or www.astm.org.

ASTM E 8 Tension Testing of Metallic Materials
ASTM E 8M Tension Testing of Metallic Materials (Metric)
ASTM E 292 Conducting Time-for-Rupture Notch Tension Tests of Materials

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 applicable material specifications does not relieve the vendor of responsibility for furnishing products which conform in all aspects to the applicable material specification.

3.1.2 In event of conflict between requirements specified herein and requirements of a particular material specification, requirements of the material specification shall take precedence.

3.2 Responsibility for Tests:

The vendor of forgings shall supply all samples for vendor's tests and shall be responsible for the performance of all required tests. Results of such tests shall be reported to the purchaser as required by the applicable material specification.

3.3 Detail Requirements:

3.3.1 Classification: For the purpose of clarifying test requirements, forgings shall be classified as shown in Table 1:

TABLE 1 – Classifications of Forgings

Class	Description
I	Forgings supplied in the final heat treated condition and requiring destructive testing for verification of specified mechanical properties.
II	Forgings supplied in any heat treated condition other than the final heat treated condition that require testing to ensure conformance to specified mechanical properties after subsequent heat treatment.
III	Forgings supplied in the final heat treated condition only to a specified hardness.
IV	Forgings supplied in a preliminary heat treated condition for machinability, welding, etc, and not subject to testing for specified mechanical properties, other than hardness, after final heat treatment.

3.3.2 Lot: A lot shall be all forgings of a similar configuration, opposite hand being considered as a single configuration, identifiable to a single heat of steel or alloy and processed by either of the following methods (See 3.3.2.2 or 3.3.2.3):

3.3.2.1 Heat: A heat shall be all steel or alloy melted in a single furnace charge. For consumable electrode remelted steel or alloy, a heat shall be all consumable electrode remelted ingots processed from steel or alloy originally melted as a single furnace charge.

3.3.2.2 Sequentially heat treated during a 24-hour period in a continuous furnace with no interruptions in operations and no change in furnace temperature, charge rate, or racking pattern.

3.3.2.3 Sequentially heat treated during a 48-hour period in one or a series of batch-type furnace loads provided the loads are processed in the same furnace or same series of furnaces and there is no change in power, set temperature, soak time, quench parameters, or racking pattern.

3.3.3: Sampling and Testing: Shall be as follows:

3.3.3.1 Class I Forgings: Shall be sectioned and tested for conformance on the basis of at least one forging from each lot for mechanical properties other than hardness; in addition, if hardness is specified, production forgings shall be sampled for hardness as shown in Table 2.

3.3.3.1.1 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 when permitted by purchaser, and hardness used as the conformance criterion.

TABLE 2 – Hardness Sampling Plan for Class I or Class III Forgings

Lot Quantity	Sample Size
1 – 44	All
45 – 65	44
66 – 110	60
111 – 180	67
181 – 300	73
301 – 500	78
501 – 800	80
Over 800	10% or 85 pieces, min

TABLE 3 – Hardness Sampling Plan for Class II or Class IV Forgings

Lot Quantity	Sample Size
1 – 20	All
20 – 100	25% or 20 pieces, min
101 – Over	10% or 25 pieces, min

3.3.3.1.2 Each furnace load or container of forgings shall be included in the selection of samples.

3.3.3.1.3 All samples tested shall conform to the specified hardness or all forgings shall be tested. If all forgings are checked, the vendor may either reheat treat nonconforming forgings, submit the nonconformance to purchaser for disposition, or reject the forgings.

3.3.3.2 Class II Forgings: Samples shall be taken from each lot, heat treated as specified, sectioned, and tested to demonstrate conformance to specified requirements; in addition, if hardness is specified, production forgings shall be sampled for hardness as shown in Table 3.

3.3.3.3 Class III Forgings: Shall be sampled for hardness as shown in Table 2.

3.3.3.4 Class IV Forgings: If hardness is specified, shall be sampled as shown in Table 3.

3.3.4 Testing: Shall be as follows:

3.3.4.1 Tests for properties which are characteristic of the heat, such as composition, hardenability, cleanliness, etc, need not be repeated on forgings from a heat provided that these tests have been performed on the forging stock from that heat and that heat identity of the forgings is maintained.

3.3.4.2 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 acceptable to purchaser.

3.3.4.3 Tensile, Stress-Rupture, and Creep Properties:

3.3.4.3.1 Orientation: When destructive testing is required, orientation of the specimen shall be as follows:

3.3.4.3.2 Forgings Other Than Disc Forgings: Longitudinal specimens shall be taken with the axis of the specimen within 15 degrees of parallel to the forging flow lines, except when transverse tensile properties are required by the applicable material specification or by purchaser; in which case, specimens shall be taken with the axis of the specimen within 15 degrees of perpendicular to the forging flow lines.

3.3.4.3.3 Disc Forgings: Specimens shall be taken from any plane perpendicular to the axis of the forging, with axis of specimen in the selected plane perpendicular to a radius. When size and shape permit, additional specimens shall be taken with the axis of specimen approximately parallel to the axis of the forging.

3.3.4.3.4 Size: Specimens, except notched and combination smooth-and-notched stress-rupture specimens, shall conform to ASTM E 8 or ASTM E 8M and shall be either 0.250-inch (6.35-mm) diameter at the reduced parallel gage section, 0.500-inch (12.70-mm) diameter at the reduced parallel gage section, standard rectangular specimens, or subsize specimens proportional to the standard when the configuration of the forging does not permit the use of standard size specimens. Notched specimens and combination smooth-and-notched specimens shall conform to the respective dimensions shown in ASTM E 292.