

Quality Assurance Sampling and Testing
Corrosion and Heat-Resistant Steels and Alloys
Wrought Products and Forging Stock

1. SCOPE:

This specification covers quality assurance sampling and testing procedures used to determine conformance to applicable specification requirements of wrought corrosion and heat-resistant steel and alloy products and of forging stock.

- 1.1 Attributes included in detail herein are: Composition, tensile properties, macrostructure, and micro-inclusion rating. Other requirements are included in Table 2.
- 1.2 Quality assurance sampling and testing procedures for forgings are covered in AMS 2374.

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 specified 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 2374 Quality Assurance Sampling and Testing, Corrosion and Heat-Resistant Steel and Alloy Forgings

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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)

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 products which conform in all respects 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 the product 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 Lot: A lot shall be as defined in 3.3.1.1 or 3.3.1.2, the applicable definition being as specified in Table 2 for the type of test and type of product being tested.
 - 3.3.1.1 A lot shall be all product identifiable to a single heat.
 - 3.3.1.1.1 A heat shall be all steel melted in a single furnace charge. For consumable electrode remelted steel, a heat shall be all consumable electrode remelted ingots processed from steel or alloy originally melted as a single furnace charge.
 - 3.3.1.2 A lot shall be a mill form of one shape, condition, and nominal cross-sectional dimensions from a single heat, processed in accordance with 3.3.1.2.1 or 3.3.1.2.2.
 - 3.3.1.2.1 Sequentially heat treated during a 24-hour period in a continuous furnace with no interruption in operations and no change in furnace temperature, charge rate, or racking pattern.
 - 3.3.1.2.1.1 Time may be extended to 120 hours for austenitic, non-hardenable grades.

- 3.3.1.2.1.2 The nominal cross-sectional dimension restriction may be disregarded when multiple sizes are heat treated in a single batch or during an eight-hour period in a continuous furnace operating at a constant speed. In such cases, tensile and macrostructure testing shall be performed on the size having the greatest equivalent round cross-section. The equivalent round cross-section shall be determined by multiplying wall thickness of tubing and thickness or diameter of solids by the shape factors shown in Table 1.

TABLE 1 - Shape Factors

Product	Shape Factor
Tubing	2.0
Rounds	1.0
Hexagons	1.1
Squares	1.25
Flats	1.50

- 3.3.1.2.2 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 at the same power setting, set temperature, soak time, quench parameters, and racking pattern.

- 3.3.1.2.2.1 Time may be extended to 120 hours for austenitic, non-hardenable grades.

- 3.3.2 Sampling and Testing: Shall be in accordance with Table 2 and as follows:

- 3.3.2.1 Composition:

- 3.3.2.1.1 The reported chemical composition of the steel or alloy subjected to a single melting operation shall be that of a sample taken immediately before or during the pouring of a heat. Analysis results of the sample shall be within the composition limits established by the material specification, excluding any consideration of product check analysis.

- 3.3.2.1.1.1 If the sample of 3.3.2.1.1 is lost, a new sample shall be taken from the semi-finished or finished product.

- 3.3.2.1.2 For remelted steels and alloys, analyses shall be obtained from the remelted ingot or product thereof in accordance with a sampling plan that will allow the reported chemical composition of the steel to conform to one of the following options:

The average of all ingots in the remelted heat.

The average of the ingots directly involved with the order.

The average of samples representing the first and last usable metal poured from the heat.

The analysis of each ingot involved with the order.

- 3.3.2.1.2.1 If an average for an element is reported, each analysis of the element shall fall within the composition limits established by the material specification; each individual analysis may include the applicable product check analysis allowance, but no average shall include analyses which are both above and below the compositional limits.