AN AMERICAN NATIONAL STANDARD

Society of Automotive Engineers, Inc.
400 COMMONWEALTH DRIVE, WARRENDALE, PA. 15096

AEROSPACE MATERIAL SPECIFICATION

AMS 2310C
Superseding AMS 2310B

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QUALIFICATION SAMPLING OF STEELS
Transverse Tensile Properties

1. SCOPE: This specification covers procedures for sampling both aircraft-quality and premium-quality steels to ensure that, when used for parts and structures subject to severe transverse tensile stresses in service, steels will have the properties required.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications (AMS) shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications: Available from Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

AMS 2350 - Standards and Test Methods

2.2 ASTM Publications: Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

ASTM A370 - Mechanical Testing of Steel Products

3. TECHNICAL REQUIREMENTS:

3.1 Sampling: Samples shall be selected as in 3.1.1 through 3.1.6. Samples shall be taken from full cross-sections not less than 3/4 in. (20 mm) thick taken from the largest size billet or bar for which the steel is to be qualified but before reduction to less than 5 in. (125 mm) in diameter or least distance between parallel sides. Each sample, except those from individual billets or bars, shall be identified with its location in the ingot and, when known, the ingot number, and ingot position in the heat. Specimens prepared as in 3.2 and tested as in 3.3 shall meet the specified requirements.

3.1.1 Heat Qualification: When the product of an entire heat is to be qualified, samples shall be taken as follows:

3.1.1.1 Pouring Sequence Known: When the pouring sequence is known and traceability of billets or bars to ingot position has been maintained, samples shall be taken from one end of billets or bars representing the following positions, depending on the number of ingots in the heat:

3.1.1.2 One Or Two Ingots: Top and bottom of each ingot.

3.1.1.3 Three To Nine Ingots: Top and bottom of the first and last ingots in the pouring sequence.

3.1.1.4 Ten Or More Ingots: Top and bottom of the first, middle, and last ingots in the pouring sequence.

3.1.2 Partial Heat Qualification: When the product of only some ingots from a heat is to be qualified, samples shall be taken from one end of billets or bars representing the positions in those ingots specified in 3.1.1.1 when pouring sequence is known. When only a portion of an ingot is to be qualified, samples shall be taken from one end of billets or bars representing the top and bottom of that portion of the ingot.

3.1.3 Billet or Bar Qualification: If the product of an entire heat is not qualified as in 3.1.1 or the product of a portion of a heat is not qualified as in 3.1.2 or if traceability to ingot position has not been maintained, samples shall be taken from both ends of each billet or bar to be qualified.

3.1.4 Multiple Size Qualifications: If the product of a heat or portion of a heat is qualified at one size, that heat or portion of a heat will be considered qualified for any size of smaller cross-sectional area without additional testing if the results of the original tests meet the requirements specified for the smaller size unless purchaser specifies that each size be tested for qualification.

3.1.5 Products from a heat qualified to the requirements of a specification requiring premium-quality steel may be supplied, without retesting, to a specification requiring aircraft-quality steel of the same basic composition.

3.1.6 When the material specification requires that samples be forged to specific size for qualification or when specified by purchaser, the steel shall be forged to that size before cutting samples.

3.2 Specimen Preparation: The samples obtained as in 3.1 shall be heat treated as specified. Tensile test specimens shall be prepared from the heat treated samples as specified in 3.2.1 and 3.2.2 and tested as in 3.3.

3.2.1 Aircraft-Quality Steels: From each sample from round or square product, two tensile test specimens conforming to ASTM A370 shall be taken from the locations shown in Fig. 1. Specimens from rectangular product having a nominal thickness of 4.5 in. (115 mm) or more shall be taken at the 1/4 and 3/4 width locations at the midpoint of the thickness. For nominal thicknesses less than 4.5 in. (115 mm), samples shall be similarly located in the long-transverse direction.

3.2.1.1 Standard 0.500 in. (12.5 mm) diameter test specimens are preferred but sub-size specimens not less than 0.250 in. (6.5 mm) in diameter may be used. The 0.500 in. (12.5 mm) diameter specimen will be used in any referee tests.

3.2.2 Premium-Quality Steels: Specimens shall be prepared as in 3.2.1 except that the location of specimens from round or square product shall be as shown in Fig. 2 and the location of specimens from rectangular product shall be adjacent to the midthickness or midwidth line.

3.3 Testing: Each specimen prepared as in 3.2 shall be tested in accordance with ASTM A370 to determine conformance to specified requirements.

3.3.1 Test Validity: If it can be shown that failure of any specimen to meet the specified requirements is due to improper specimen preparation, heat treatment, or testing technique, an additional cross-section may be taken immediately adjacent to the section from which the failed specimen was taken. Results of tests of specimens from this section may be used in lieu of those from which the invalid specimens were obtained without resort to the resampling and retesting provisions of 4.2.

4. QUALITY ASSURANCE PROVISIONS: Shall be in accordance with requirements of the applicable material specification except as follows:

4.1 Reports: The vendor of the product shall include in the report required by the material specification for each shipment the results of tests for transverse-tensile properties of each specimen; results shall be identified with cross-section from which each specimen was obtained and, when known, the location in the ingot, the ingot number, and the ingot position in the heat. The tensile specimen size used shall be reported. If the material specification presents any options for heat treatment, the report shall detail the heat treatment used to qualify the stock.

4.2 Resampling and Retesting:

4.2.1 Heat Consisting of Three or More Ingots Where Pouring Sequence Is Known: If either specimen from any cross-section fails to meet the requirements of the applicable material specification, the heat may be resampled and retested as follows:

4.2.1.1 An additional cross-section shall be cut from one end of billet or bar representing the two available ingots most immediately adjacent in pouring sequence to the original nonconforming ingot. Specimens shall be prepared from these cross-sections as in 3.2 and tested as in 3.3. If both specimens from each of these cross-sections meet the specified requirements, all product of the heat, except billets and bars from the original nonconforming ingot, shall be accepted.

4.2.1.2 The original nonconforming ingot may be cropped and retested in accordance with the provisions of 3.1.1 through 3.1.6 and 3.2. If both specimens from each end of any retested product meet the specified requirements, that product shall be acceptable.

4.2.1.3 If the retests of the original nonconforming ingot as in 4.2.1.2 meet the requirements of the applicable material specification, all ingots in the heat shall be cropped the same amount unless the tests of product from adjacent ingots as in 4.2.1.1 conform to specified requirements.

4.2.1.4 If any specimen from the cross-sections tested as in 4.2.1.1 fails to meet the specified requirements, the billets or bars from those ingots may be cropped and dealt with in accordance with the provisions of 3.1.1 through 3.1.6 and 3.2. If both specimens from each end of any billet or bar meet the specified requirements, that billet or bar shall be accepted.

4.2.2 Heat Qualified In Part or Pouring Sequence Not Known: If either specimen from any cross-section of any ingot fails to meet the requirements of the applicable material specification, that ingot may be resampled and retested as follows:

4.2.2.1 An additional cross-section shall be cut from the opposite end of the billet or bar previously tested. Specimens from this cross-section shall be prepared as in 3.2 and tested as in 3.3. If both specimens meet the specified requirements, the remaining portion of that ingot, excluding the retested billet or bar, shall be acceptable. The retested billet or bar may then be individually qualified as in 4.2.3 except that only the cropped end need be resampled and retested.

4.2.2.2 If one or both specimens from the additional cross-section of 4.2.2.1 fail to meet the specified requirements, the billet or bar from which that cross-section was taken shall be rejected. The remaining billets or bars from that ingot may be cropped if desired and retested as in 3.1.3.

4.2.3 Billets or Bars Individually Qualified: If one or both specimens from only one end of the billet or bar fails to meet the specified requirements, that billet or bar may be cropped, resampled as in 3.2, and retested as in 3.3. If one or both specimens from both ends of the billet or bar fail to meet the specified requirements, no additional resampling and retesting will be permitted.

5. PREPARATION FOR DELIVERY:

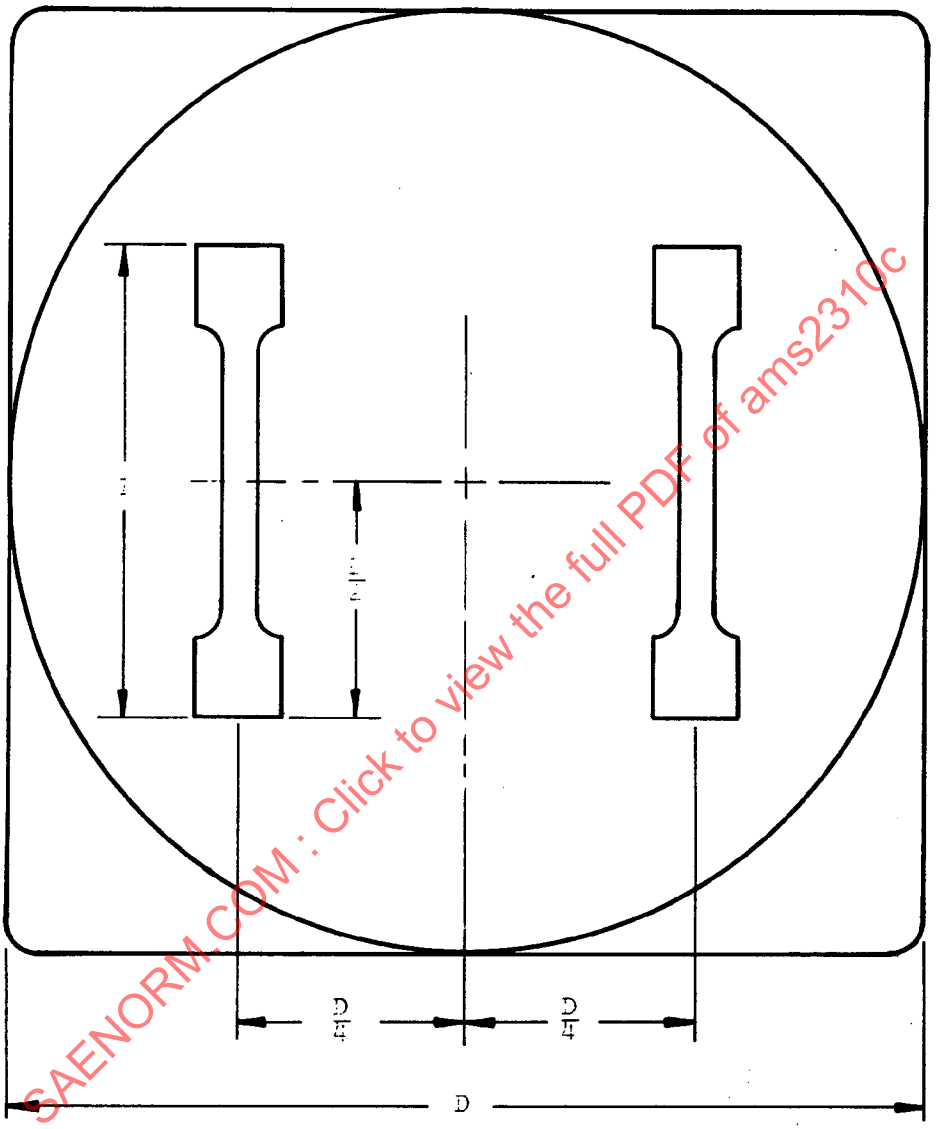
5.1 Identification: In addition to the identification required by the applicable material specification, product qualified as specified herein shall be marked "Special Quality AMS 2310" within 2 in. (50 mm) of one end.

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

7. REJECTIONS: Material not conforming to this specification or to authorized modifications will be subject to rejection.

8. NOTES:

8.1 Marginal Indicia: The phi (ø) symbol is used to indicate technical changes from the previous issue of this specification.



D = Diameter or Distance between Parallel Sides of the Product
L = Length of Tensile Test Specimen

FIGURE 1