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

AEROSPACE MATERIAL SPECIFICATION

AMS 2310B
Superseding AMS 2310A
Issued 11-15-60
Revised 12-15-74

QUALIFICATION SAMPLING OF STEELS
Transverse Tensile Properties

1. SCOPE: This specification covers procedures for sampling steels to assure 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, Pennsylvania 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, Pennsylvania 19103.

ASTM E8 - Tension Testing of Metallic Materials

3. TECHNICAL REQUIREMENTS: Samples shall be selected as follows; except as specified in 3.1.3, samples need be taken only from the largest size billet or bar from each of the size ranges of 3.1.1 and 3.1.2 provided that the properties of specimens from such samples, prepared as in 3.4 and tested as in 3.5, meet the requirements given in the applicable material specification for the smaller sizes:

3.1 Heat Qualification: If the full product of a heat of steel is to be qualified, samples for transverse tensile tests shall be taken as follows:

3.1.1 If the cross-sectional areas of all billets or bars from the heat are over 100 sq in. (645 cm^2) or if all are 100 sq in. (645 cm^2) and under, samples shall be taken from one end of billets or bars representing the top and bottom of the first, middle, and last ingots from the heat.

3.1.2 If some billets or bars from the heat have cross-sectional areas over 100 sq in. (645 cm^2) and others have cross-sectional areas of 100 sq in. (645 cm^2) and under, samples shall be taken from one end of billets or bars representing the top and bottom of the first and last ingots used to produce each of the two size ranges.

3.1.3 If ingots from a heat qualified as in 3.1.1 or 3.1.2 are subsequently used to produce billets or bars of a larger size than used for the original qualification tests, additional samples shall be taken from the top and bottom of one ingot used to produce that larger size. However, results of original qualification tests of billets or bars over 100 sq in. (645 cm^2) in cross-sectional area may be used to qualify billets or bars having cross-sectional areas 100 sq in. (645 cm^2) and under but larger than the size used for original qualification.

3.2 Partial Heat Qualification: If the product of only certain ingots from a heat is to be qualified, samples for transverse tensile tests shall be taken as follows; these requirements do not apply if the product of the entire heat is qualified as in 3.1: ø

3.2.1 Pouring Sequence Known:

3.2.1.1 If the product of 3 - 10, incl, ingots is to be qualified, samples shall be taken from one end of billets or bars representing the top and bottom of the first and last ingots in pouring sequence of those ingots to be qualified.

3.2.1.2 If the product of more than 10 ingots is to be qualified, samples shall be taken from one end of billets or bars representing the top and bottom of the first, middle, and last ingots in pouring sequence of those ingots to be qualified.

3.2.2 Pouring Sequence Unknown: If the sequence of pouring from the heat is not known or if the product of only one or two ingots is to be qualified, samples shall be taken from one end of billets or bars representing the top and bottom of each ingot to be qualified. ø

3.3 Billet or Bar Qualification: If the product of the entire heat is not qualified as in 3.1 or the product of those ingots to be used is not qualified as in 3.2, samples shall be taken from both ends of each individual billet or bar to be qualified.

3.4 Specimen Preparation:

3.4.1 Full transverse cross-section samples not less than 3/4 in. (19 mm) thick shall be cut from billets or bars as specified in 3.1, 3.2, or 3.3, as applicable. Specimens shall be taken from billet or bar before reduction to below 5 in. (127 mm) in diameter or maximum 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.

3.4.1.1 When permitted by purchaser, samples may be taken from a billet or bar which has been reduced by forging an amount agreed upon by purchaser and vendor.

3.4.2 Aircraft-Quality Steels: From each sample from round or square product, two tensile test specimens conforming to ASTM E8 shall be taken from the locations shown in Fig. 1. From rectangular product 3.5 in. (89 mm) and over in width or thickness, two tensile test specimens shall be taken; the axis of such specimens shall be at the 1/4 and 3/4 thickness or width locations and the midpoint of the axis at the midwidth or midthickness location. If the width-to-thickness ratio is 2.5:1 or less, tensile test specimens shall be taken in the short-transverse direction; if the width-to-thickness ratio is greater than 2.5:1, specimens shall be taken in the long-transverse direction. ø

3.4.2.1 Standard 0.505 in. (12.83 mm) diameter test specimens are preferred but sub-size specimens not less than 0.252 in. (6.40 mm) in diameter may be used, unless prohibited by purchaser. ø

3.4.3 Premium-Quality Steels: Specimens shall be prepared as in 3.4.1 and 3.4.2.1 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. ø

3.5 Testing: Each tensile test specimen prepared as in 3.4.2 shall be heat treated as specified in the applicable material specification and tested to determine conformance to the requirements of that specification. ø

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

ø 4.1 Sampling: Shall be as specified in 3.1, 3.2, or 3.3.

4.2 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.

4.3 Resampling and Retesting:

4.3.1 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:

4.3.1.1 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 3.4 and tested as in 3.5. 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.

4.3.1.2 The original nonconforming ingot may be cropped and retested in accordance with 3.3. If both specimens from each end of any billet or bar meet the specified requirements, that billet or bar shall be accepted.

4.3.1.3 If the retest of the original nonconforming ingot as in 4.3.1.2 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 4.3.1.1 conform to specified requirements.

4.3.1.4 If any specimen from the cross-sections tested as in 4.3.1.1 fails to meet the specified requirements, the billets or bars from those ingots may be cropped and retested as in 3.3. If both specimens from each end of any billet or bar meet the specified requirements, that billet or bar shall be accepted.

4.3.2 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:

4.3.2.1 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 3.4 and tested as in 3.5. If both specimens meet the specified requirements, the remaining portion of that ingot, excluding the retested billet or bar, shall be accepted. The retested billet or bar may then be individually qualified as in 4.3.3 except that only the cropped end need be resampled and retested.

4.3.2.2 If one or both specimens from the additional cross-section of 4.3.2.1 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 3.3.

4.3.3 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 3.4, and retested as in 3.5. If one or both specimens from both ends of the billet or bar fail to meet the specified requirements, no resampling and retesting will be permitted.

4.4 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 4.3.

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. (51 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.