



AEROSPACE MATERIAL SPECIFICATION

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

AMS 7229E

Superseding AMS 7229D

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RIVETS, STEEL, CORROSION AND HEAT RESISTANT 18Cr - 10.5Ni - (Cb + Ta)

1. SCOPE:

- 1.1 Type: This specification covers rivets made of a corrosion and heat resistant steel.
- 1.2 Application: Primarily for joining corrosion-resistant steel parts where corrosion, heat and oxidation resistance up to approximately 1500°F (816°C) are required but high shear strength is not 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 2248 - Chemical Check Analysis Limits, Wrought Heat and Corrosion Resistant Steels and Alloys

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 A262 - Detecting Susceptibility to Intergranular Attack in Stainless Steels

ASTM E353 - Chemical Analysis of Stainless, Heat-Resisting, Maraging, and Other Similar Chromium-Nickel-Iron Alloys

- 2.3 Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

2.3.1 Federal Standards:

Federal Test Method Standard No. 151 - Metals; Test Methods

2.3.2 Military Standards:

MIL-STD-794 - Parts and Equipment, Procedures for Packaging and Packing of

MIL-STD-1312 - Fasteners, Test Methods

3. TECHNICAL REQUIREMENTS:

SAE Technical Board rules provide that: "All technical reports, including standards approved practices recommended, are advisory only. Their use by anyone engaged in industry or trade is entirely voluntary. There is no agreement to adhere to any SAE standard or recommended practice, and no commitment to conform to or be guided by any technical report. In formulating and approving technical reports, the Board and its Committees will not investigate or consider patents which may apply to the subject matter. Prospective users of the report are responsible for protecting themselves against infringement of patents."

- 3.1 **Composition:** Rivets shall conform to the following percentages by weight, determined by wet chemical methods in accordance with ASTM E353, by spectrographic methods in accordance with Federal Test Method Standard No. 151, Method 112, or by other approved analytical methods:

	min	max
Carbon	--	0.08
Manganese	--	2.00
Silicon	--	1.00
Phosphorus	--	0.040
Sulfur	--	0.030
Chromium	17.00 - 19.00	
Nickel	9.00 - 12.00	
Columbium + Tantalum	10xC -	1.10
Molybdenum	--	0.75
Copper	--	0.75

- 3.1.1 **Check Analysis:** Composition variations shall meet the requirements of AMS 2248.

- 3.2 **Condition:** Cold-headed from cold-drawn wire or bar, unless purchaser permits machining. Rivets, after forming, shall be solution heat treated free from continuous carbide network and descaled if necessary; solution heat treatment shall be performed in a furnace atmosphere which will not cause surface hardening.

- 3.3 **Properties:** Rivets shall conform to the following requirements:

- 3.3.1 **Hardness:** Shall be not higher than 165 HV10 or equivalent, determined in accordance with MIL-STD-1312, Test No. 6.

- 3.3.2 **Formability:** Solid-shank rivets shall drive cold satisfactorily with a full head free from cracks and with expansion of the shank to the full diameter of the hole in which it is installed.

- 3.3.3 **Flarability:** Hollow-end rivets shall flare to a diameter of 1.5 times the nominal shank diameter without bending the shank and without cracking in the flared end.

- 3.3.4 **Embrittlement:** Representative rivets, after sensitizing treatment, shall meet the copper/copper sulfate/sulfuric acid test conducted in accordance with ASTM A262, practice E.

- 3.4 **Quality:** Rivets shall be uniform in quality and condition, clean, sound, smooth, and free from foreign materials and from internal and external imperfections detrimental to their performance.

4. QUALITY ASSURANCE PROVISIONS:

- 4.1 **Responsibility for Inspection:** The vendor of rivets shall supply all samples and shall be responsible for performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.4. Purchaser reserves the right to perform such confirmatory testing as he deems necessary to ensure that the rivets conform to the requirements of this specification.

4.2 Classification of Tests:

- 4.2.1 **Acceptance Tests:** Tests to determine conformance to composition (3.1) and hardness (3.3.1) requirements are classified as acceptance or routine control tests.

- 4.2.2 **Qualification Tests:** Tests to determine conformance to formability (3.3.2) or flarability (3.3.3) as applicable, and embrittlement (3.3.4) requirements are classified as qualification or periodic control tests.

4.2.2.1 For direct U. S. Military procurement, qualification test material and supporting test data shall be submitted to the cognizant qualification agency as directed by the request for procurement, the procuring activity, or the contracting officer.

4.3 Sampling: Shall be in accordance with the following; a lot shall be all rivets of the same part number solution heat treated in one furnace charge:

4.3.1 Acceptance Tests:

∅ 4.3.1.1 Composition: One sample from bars or wire from each heat.

∅ 4.3.1.2 Hardness: One sample, consisting of five rivets, from each lot.

∅ 4.3.2 Qualification Tests: As agreed upon by purchaser and vendor.

4.4 Reports: The vendor of rivets shall furnish with each shipment three copies of a report of the results of tests for chemical composition and hardness of each lot in the shipment and stating that the rivets conform to the other technical requirements of this specification. This report shall include the purchase order number, this specification number and its revision letter, part number, and quantity.

4.5 Resampling and Retesting: If any rivet or specimen used in the above tests fail to meet the specified requirements, disposition of the rivets may be based on the results of testing three additional rivets or specimens for each original nonconforming specimen. Failure of any retest rivet or specimen to meet the specified requirements shall be cause for rejection of the rivets represented and no additional testing shall be permitted. Results of all tests shall be reported.

5. PREPARATION FOR DELIVERY:

5.1 Identification and Packaging:

5.1.1 Rivets of each different part number shall be packed in separate containers.

5.1.2 Each container shall be marked to show the following information:

RIVETS, STEEL, CORROSION AND HEAT RESISTANT
AMS 7229E
PART NUMBER _____
PURCHASE ORDER NUMBER _____
QUANTITY _____
MANUFACTURER'S IDENTIFICATION _____

5.1.3 Containers of rivets shall be prepared for shipment in accordance with commercial practice to ensure carrier acceptance and safe transportation to the point of delivery. Packaging shall conform to carrier rules and regulations applicable to the mode of transportation.

5.1.4 For direct U. S. Military procurement, packaging shall be in accordance with MIL-STD-794, Level A or C, as specified in the request for procurement. Commerical packaging as in 5.1.3 will be acceptable if it meets the requirements of Level C.

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

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

8. NOTES: