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

AEROSPACE MATERIAL SPECIFICATION

AMS 7207E
Superseding AMS 7207D
Issued 2-15-53
Revised 7-1-76

SPRING PINS, TUBULAR
Corrosion and Moderate Heat Resistant Steel

1. SCOPE:

1.1 Type: This specification covers tubular-shaped pins, fabricated from a corrosion and moderate heat resistant steel, having a full-length longitudinal slot to permit flexure when inserted into a hole.

1.2 Application: Primarily to provide a pin with sufficient flexure to remain tight against the inner surface of a hole into which it has been inserted, after adjusting itself to the hole tolerances, and requiring corrosion resistance and oxidation resistance up to 700°F (371°C).

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
AMS 2371 - Quality Assurance Sampling of Corrosion and Heat Resistant Alloys, Wrought Products Except Forgings
AMS 5506 - Steel Sheet, Strip, and Plate, Corrosion and Moderate Heat Resistant, 13Cr (0.30 - 0.40C) SAE 51420

2.1.2 Standards and Recommended Practices:

J496 - Spring Type Straight Pins

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

ASTM E18 - Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials

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

2.3.1 Military Standards:

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

3. TECHNICAL REQUIREMENTS:

3.1 Material: Shall be steel strip conforming to AMS 5506 except that carbon content may be as low as 0.22%.

Printed in U.S.A.

3.2 Condition: Heat-treated, cleaned, and passivated.

3.3 Properties:

Ø 3.3.1 Shear Strength: Shall be as specified in Table I, determined in accordance with SAE J496.

Ø TABLE I

Nominal Pin Diameter Inch	Hole Diameter Inch	Double Shear Strength lb, min
0.062	0.062 - 0.065	425
0.078	0.078 - 0.081	650
0.094	0.094 - 0.097	1,000
0.109	0.109 - 0.112	1,410
0.125	0.125 - 0.129	1,840
0.141	0.141 - 0.145	2,200
0.156	0.156 - 0.160	2,880
0.188	0.187 - 0.192	4,140
0.219	0.219 - 0.224	5,640
0.250	0.250 - 0.256	7,360
0.312	0.312 - 0.318	11,500
0.375	0.375 - 0.382	16,580
0.438	0.437 - 0.445	20,000
0.500	0.500 - 0.510	25,800

TABLE I (SI)

Nominal Pin Diameter Millimetres	Hole Diameter Millimetres	Double Shear Strength kN, min
1.57	1.575 - 1.651	1.89
1.98	1.981 - 2.057	2.89
2.39	2.388 - 2.464	4.45
2.77	2.769 - 2.845	6.27
3.18	3.175 - 3.277	8.18
3.58	3.581 - 3.683	9.79
3.96	3.962 - 4.064	12.81
4.76	4.750 - 4.877	18.41
5.56	5.563 - 5.690	25.09
6.35	6.350 - 6.502	32.74
7.92	7.925 - 8.077	51.15
9.52	9.525 - 9.703	73.75
11.13	11.100 - 11.303	88.96
12.70	12.700 - 12.954	114.76

3.3.2 Hardness: Shall be 83 - 87 HR15N or equivalent, determined in accordance with ASTM E18 on a Ø prepared flat surface on the pin OD.

3.3.3 Microstructure: Shall be tempered martensite produced by hardening and tempering and shall be Ø free from grain boundary carbide network, determined by microscopic examination of a polished and etched specimen.

3.3.4 Ductility: Pins shall withstand, without cracking, squeezing in a vise until the gap closes. Pins which have been tested for shear strength shall show a ductile shear with no longitudinal cracks longer than 0.250 in. (6.35 mm) or 1/3 the total length of the pin, whichever is less.

3.3.5 Insertion: Pins shall withstand being inserted in the minimum hole size shown on the drawing without the sides of the gap touching. The hole in the ring gage used for this test shall have a basic diameter equal to the minimum hole size shown on the drawing and a tolerance of ± 0.0003 in. (± 0.008 mm).

3.3.6 Pins shall show not more than a slight haze of copper adhering to the surface after being subjected to the following test:

3.3.6.1 Scrub sample pins with soap and warm water, rinse in hot water, dip in 95% ethyl alcohol, and dry. Immerse the cleaned samples in a solution containing 4 g cupric sulfate, 10 g sulfuric acid (sp gr 1.84), and 90 cm^3 distilled water for 6 min. at 65° F ± 2 (18.3° C ± 1.1). Remove the samples and wash with a cloth saturated with clean water.

3.4 Quality: Pins shall be sound, smooth, and free from foreign materials and from internal and external imperfections detrimental to their performance.

3.5 Tolerances:

3.5.1 Minimum Average Diameter: Shall be as shown on the drawing, determined by averaging three measurements made at the angular locations, with respect to the slot, shown on the drawing. Measurements shall be made at midlength of pins 1 in. (25 mm) or less in length and at least 1/2 in. (12.7 mm) from the end of pins over 1 in. (25 mm) in length. Minimum diameter shall be as shown on the drawing, determined by means of a "no-go" ring gage having a length of hole not greater than 0.125 in. (3.18 mm).

3.5.2 Maximum Diameter: Shall be not greater than shown on the drawing, determined by means of a "go" ring gage having length of hole not greater than 0.125 in. (3.18 mm).

3.5.3 Straightness: Shall be such that pins will pass freely through the appropriate ring gage constructed to meet the following requirements:

3.5.3.1 The maximum ID of the gage shall be equal to the maximum diameter shown on the drawing of the pin plus the straightness tolerance of Table II. The length of the gages shall depend on the straightness tolerance and shall be as follows:

TABLE II

Nominal Pin Length Inches	Straightness Tolerance Inch	Length of Gage Inches
Up to 1.000, incl	0.007	0.995 - 1.005
Over 1.000 to 2.000, incl	0.010	1.995 - 2.005
Over 2.000	0.013	2.995 - 3.005

TABLE II (SI)

Nominal Pin Length Millimetres	Straightness Tolerance Millimetre	Length of Gage Millimetres
Up to 25.40, incl	0.178	25.273 - 25.527
Over 25.40 to 50.80, incl	0.254	50.673 - 50.927
Over 50.80	0.33	76.073 - 76.327

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of pins 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 pins conform to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests to determine conformance to material (3.1), shear strength (3.3.1), hardness (3.3.2), microstructure (3.3.3), ductility (3.3.4), and tolerance (3.5) requirements are classified as acceptance tests.

4.2.2 Periodic Tests: Tests to determine conformance to insertion (3.3.5) and corrosion resistance (3.3.6) requirements are classified as periodic tests.

4.3 Sampling: Shall be as follows; a lot shall be all pins of the same nominal dimensions, except length, produced from the same size stock of the same composition, heat treated as a batch or sequentially heat treated in a continuous furnace in not more than eight consecutive hours and presented for vendor's inspection at one time.

4.3.1 Acceptance Tests:

4.3.1.1 Material: In accordance with AMS 2371.

4.3.1.2 Shear Strength and Ductility: Three specimens from each lot.

4.3.1.3 Hardness: Five specimens from each lot.

4.3.1.4 Microstructure: One specimen from each lot.

4.3.2 Periodic Tests: As agreed upon by purchaser and vendor.

4.4 Reports: The vendor of pins shall furnish with each shipment three copies of a report showing the results of tests for material, shear strength, hardness, and ductility of each lot and stating that the pins 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 pin or specimen used in the above tests fails to meet the specified requirements, disposition of the pins may be based on the results of testing three additional pins or specimens for each original nonconforming specimen. Failure of any retest pins or specimen to meet the specified requirements shall be cause for rejection of the pins represented and no additional testing shall be permitted. Results of all tests shall be reported.

5. PREPARATION FOR DELIVERY:

5.1 Identification: Pins of each different part number shall be packaged in separate containers. Each container shall be marked to show the following information:

SPRING PINS, TUBULAR, CORROSION AND MODERATE HEAT RESISTANT STEEL
AMS 7207E
PART NUMBER_____
PURCHASE ORDER NUMBER_____
QUANTITY_____
MANUFACTURER'S IDENTIFICATION_____

5.2 Packaging: