AN AMERICAN NATIONAL STANDARD

SAE The Engineering Resource For Advancing Mobility®
400 COMMONWEALTH DRIVE, WARRENDALE, PA 15096

AEROSPACE MATERIAL SPECIFICATION

AMS 2550C
Superseding AMS 2550B
Issued 6-30-60
Revised 7-1-76

TREATMENT OF SHEET METAL PARTS
Steel Corrosion-Resistant

1. SCOPE: This specification covers the engineering requirements for a treatment to provide maximum attainable corrosion resistance to sheet metal parts, such as brackets, spacers, and washers, fabricated from martensitic corrosion-resistant steels, usually AMS 5504 or AMS 5508 and having hardness not higher than 40 HRC, or ferritic corrosion-resistant steels, usually AMS 5506. The treatment is not recommended for use on parts subject to impact in service.

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

2.2.1 Military Standards:

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

3. TECHNICAL REQUIREMENTS:

3.1 Heating Equipment: Furnaces may be any type ensuring uniform temperature throughout the parts being heated and shall be equipped with, and operated by, automatic temperature controllers. The heating medium or atmosphere shall cause no surface hardening or softening.

3.2 Atmosphere: Shall be one of the following; specified dew points apply to the gas being exhausted from the furnace or retort work zone:

3.2.1 Hydrogen of not less than 99.94% purity and dew point not higher than -25°F (-32°C).

3.2.2 Argon of not less than 99.99% purity and dew point not higher than -35°F (-37°C).

3.2.3 Mixtures of argon and hydrogen in any proportions, the hydorgen purity being as specified in 3.2.1, the argon purity being as specified in 3.2.2, and the dew point of the mixture being not higher than -35°F (-37°C).

3.2.4 Vacuum of 5 - 20 microns of Hg; the specified partial pressure may be maintained by back-filling with an inert atmosphere as in 3.2.2 or 3.2.3 before the furnace temperature exceeds 1600°F (871°C).

Printed in U.S.A.

3.2.5 Atmospheres other than those listed above and quenching media other than that listed in 3.4.1.1 may be used when authorized in writing by purchaser; such authorization will be granted only after demonstration, to the satisfaction of the purchaser, that use of such atmospheres will produce parts which consistently meet all technical requirements of this specification.

3.3 Preparation: Forming operations, welding, and brazing at temperatures above the austenitizing temperature of the steel shall be completed prior to heat treatment of the parts when heat treatment is specified and prior to cleaning of all parts.

3.4 Procedure:

3.4.1 Heat Treatment: Parts requiring heat treatment to specified hardness or strength shall be heat treated as follows:

3.4.1.1 Hardening: Parts shall be heated in an atmosphere of a type specified in 3.2 to a temperature not higher than 1900°F (1038°C), held at heat for 10 - 15 min., and gas quenched. Parts shall be cooled to 400°F (204°C) or lower before being exposed to air.

3.4.1.2 Tempering: Hardened parts shall be tempered by heating uniformly to the temperature necessary to produce the specified hardness or strength, holding at heat for not less than 1 hr, and cooling.

3.4.2 Cleaning: After hardening and tempering, parts shall be cleaned as follows:

3.4.2.1 Abrasive Blasting: All brazed parts and assemblies, and all other parts and assemblies containing recesses, pockets, overlaps, etc, in which acids could be trapped, shall be blasted with a substantially iron-free abrasive, preferably alumina or silica sand, applied either dry or as a slurry. Blasting shall be performed in such a manner as to avoid undesirable roughening of surfaces. Such parts shall receive no further treatment. Parts which have been wet blasted shall be thoroughly washed and dried. Abrasive blasting may be used on other parts as an aid to removal of heat treatment scale; the above restrictions on types of abrasive do not apply to such parts.

3.4.2.2 Descaling: All parts and assemblies exposed to tempering temperatures higher than 800°F (426°C) during processing, except those on which only abrasive blasting is permitted by 3.4.2.1, shall be cleaned of embedded foreign contaminants, scale, and oxide by immersion in one or more aqueous acid solutions, usually inhibited hydrochloric, hydrofluoric, and nitric, singly or in combination, together with alkali cleaners and adequate rinses. No specific procedure will be required but the process used shall produce results equivalent to those produced by the following: Immerse in alkali cleaner at 180° - 200°F (82.2° - 93.3°C) for 1 - 2 min., rinse, immerse in inhibited hydrochloric acid at 150° - 170°F (65.6° - 76.7°C) for 8 - 12 min., rinse, immerse in a solution consisting of 20% by volume nitric acid and 1.5% by volume hydrofluoric acid at room temperature for 3 - 10 min., rinse, spray wash, immerse in trisodium phosphate solution containing wetting agent at room temperature for 2 - 3 min., rinse, hot rinse, and immerse in water-displacing, corrosion-preventive oil.

3.4.2.3 Acid Cleaning: Parts and assemblies which have not been heated to tempering temperatures over 800°F (426°C) during processing, including those heated to not over 800°F (426°C) during any processing following descaling, except parts and assemblies on which only abrasive blasting is permitted, shall be immersed in an equeous solution of 15 - 25% by volume nitirc acid for 30 - 40 min. at 70° - 90°F (21.1° - 32.2°C) or for 10 - 15 min. at 140 - 160°F (60° - 71.1°C), unless other conditions of immersion are agreed upon by purchaser and vendor. Parts shall be rinsed thoroughly, dried, and coated with corrosion-preventive oil or immersed in water-displacing, corrosion-preventive oil.

3.4.3 Polishing: When specified, parts shall be mechanically polished using a suitable compound; the compound used for final polishing shall be free of iron and compounds of iron. After polishing, parts shall be cleaned of residual compound by suitable solvent or cleaning solution.

3.5 Properties:

3.5.1 Surfaces of finished parts shall be free of decarburization, carburization, and nitriding.

3.5.2 Parts shall have microstructure of tempered martensite, free from massive areas of free ferrite. Standards for acceptance shall be as agreed upon by purchaser and vendor.

3.5.3 Hardness of parts shall be uniform and within the range specified on the drawing.

3.6 Quality: Parts shall have clean, bright or matte surfaces free from scale, pitting, and other surface imperfections detrimental to performance of the parts. Temper color characteristic of heating at temperatures lower than 800°F (426°C) will be permitted.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The processing vendor 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 4.5. Purchaser reserves the right to perform such confirmatory testing as he deems necessary to ensure that the product conforms to the requirements of this specification.

4.2 Classification of Tests: Tests to determine conformance to all technical requirements of this specification are classified as acceptance tests.

4.2.1 For direct U.S. Military procurement, substantiating test data and, when requested, preproduction test material shall be submitted to the cognizant agency as directed by the procuring activity, the contracting officer, or the request for procurement.

4.3 Sampling: Shall be as follows; a lot shall be all parts of the same steel heat treated to the same hardness or tensile strength level in the same furnaces and/or cleaned in the same manner in not more than 24 hr continuous operation.

4.3.1 Hardness or Tensile Strength: Five parts for hardness and/or two specimens for tensile strength from each lot.

4.3.2 Microstructure, Including Case and Decarburization: One part or specimen from each lot.

4.4 Approval:

4.4.1 Sample parts shall be approved by purchaser before parts for production use are supplied, unless such approval be waived. Results of tests on production parts shall be essentially equivalent to those on the approved sample parts.

4.4.2 Vendor shall use atmospheres, manufacturing procedures, processes, and methods of inspection on production parts which are essentially the same as those used on the approved sample parts. If any change is necessary in atmosphere, in type of equipment for processing, or in manufacturing procedures, vendor shall submit for reapproval a statement of the proposed changes in processing and, when requested, sample parts. Production parts processed by the revised procedure shall not be shipped prior to receipt of reapproval.

4.5 Reports: The processing vendor shall furnish with each shipment three copies of a report stating that the parts have been processed and tested in accordance with this specification and that they conform to the acceptance test requirements. This report shall include the purchase order number, this specification number and its revision letter, part number, and quantity.

4.6 Resampling and Retesting: If any specimen used in the above tests fails to meet the specified requirements, disposition of the parts may be based on the results of testing three additional specimens for each original nonconforming specimen. Except as specified in 4.6.1, failure of any retest specimen to meet the specified requirements shall be cause for rejection of the parts represented and no additional testing shall be permitted. Results of all tests shall be reported.