AEROSPACE
MATERIAL SPECIFICATIONS
SOCIETY OF AUTOMOTIVE ENGINEERS, Inc. 485 Lexington Ave., New York 17, N.Y.

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Revised

DISILICIDE DIFFUSION COATING OF MOLYBDENUM AND MOLYBDENUM BASE ALLOYS
Pack Cementation Method

1. ACKNOWLEDGMENT: A vendor shall mention this specification number in all quotations and when acknowledging purchase orders.

2. APPLICATION: To provide protection against oxidation of molybdenum and molybdenum base alloys at temperatures over 1100 F (595 C) and for operation in oxidizing atmospheres to approximately 3000 F (1650 C) for limited duration.

3. PREPARATION:

3.1 Unless otherwise specified, all machining, welding, brazing, forming, and heat treating shall be completed before parts are coated.

3.2 Unless otherwise specified, all components of riveted assemblies shall be coated prior to assembly and shall be recoated by the same procedure after assembly.

3.3 Unless otherwise specified, all corners and edges shall be smoothly and uniformly rounded; corner radii shall be not less than 0.125 in. and radii on edges (including holes and cutouts) shall be not less than t/2 where "t" is the thickness of the material, but in no case shall be less than 0.005 inch.

3.4 Parts to be coated shall be cleaned free of grit, dirt, oil, grease, and other foreign materials by a method which will produce results equivalent to the following: wet abrasive blast, wash in a detergent solution, rinse in distilled water, and dry with warm air blast.

3.5 Immediately before coating, parts shall be degreased with a volatile solvent.

4. PROCEDURE:

4.1 The time and temperature used for application of the coating shall be adequate for the coating to comply with the requirements specified on the drawing, but without causing recrystallization of the basis metal.

4.2 The parts to be coated shall be packed in a retort with a siliconizing compound composed of an inert filler, silicon, and a suitable halide salt. An atmosphere control compound may also be used. Alloying materials may be added, where desired, to improve the characteristics of the coating. The retort shall be sealed and heated at a temperature between 1750 F (954.4 C) and 2100 F (1148.9 C), held at heat for not less than 3 hr, and cooled. Breaking of the seal and removal of the parts from the pack shall not be performed until the pack has cooled to a temperature of 500 F (260 C) or lower.

4.3 Parts of extremely thin section or having other features which may require special handling shall be treated as agreed upon by purchaser and vendor.

5. TECHNICAL REQUIREMENTS:

5.1 Oxidation Test: Coated parts and assemblies shall be capable of meeting the following requirements: The coated parts or assemblies shall be placed in a static air atmosphere furnace previously heated to 2200 F ± 25 (1204.4 C ± 14). After the parts have reached 2200 F (1204.4 C), visual observation shall be made at least 5 times at intervals of 2 minutes. The parts shall be removed after a total time at 2200 F (1204.4 C) of 10 minutes. If molybdenum oxide smoke is observed at any time during the test, the part or assembly shall be removed from the furnace. Observation of smoke during the test or after removal from the furnace upon completion of the full 10 min. cycle shall be cause for rejection of the offending part.

5.2 Test Samples: At least one test sample, not less than 1 x 1-1/2 in., from the same heat as the basis metal and preferably of the same thickness and the same minimum radii shall be coated together with the part and furnished to the purchaser for measurement of coating thickness.

6. QUALITY: The coating shall be uniform, adherent, and free from defects and shall cover all surfaces of the part.

7. THICKNESS:

7.1 Unless otherwise specified, the total coating thickness shall be 0.0015 - 0.0025 inch.

7.2 Thickness of coating shall be determined by the metallographic method, by micrometer, or as agreed upon by purchaser and vendor.

8. PRECAUTIONS:

8.1 After preparation and before coating, parts should not be handled with bare hands or be otherwise contaminated by unclean gloves, handling devices, or transfer tools.

8.2 During coating, parts should not be within 1 in. of the walls of the retort or within 1/2 in. of each other.

8.3 Parts subjected to the oxidation test described in 5.1 may have reduced properties.

8.4 Dissimilar metals or alloys should not be processed in the same retort unless previously agreed upon by purchaser and vendor.

9. APPROVAL:

9.1 To assure adequate performance characteristics, coated parts shall be approved by purchaser before parts for production use are supplied, unless such approval be waived.