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MILITARY SPECIFICATION

COATING, PERMANENT RESIN; PROCESS FOR APPLICATION OF, TO AIRCRAFT PARTS

This specification was approved by the Departments of the Army, the Navy, and the Air Force for use of procurement services of the respective Departments.

1. SCOPE AND CLASSIFICATION

1.1 This specification is drawn to present detailed requirements governing the process for the application of permanent resin coating to aircraft parts other than engine parts.

2. APPLICABLE SPECIFICATIONS

2.1 Specifications.- The following specifications of the issue in effect on the date of invitation for bids, shall form a part of this specification to the extent specified herein.

Military

MIL-R-3043	Resin-Coating, Permanent (For Internal Engine Parts)
MIL-S-5002	Surface Treatments (Except Priming and Painting) For Metal and Metal Parts in Aircraft

Air Force-Navy Aeronautical

AN-S-55	Stripper; Cleaner and Paint (for Ferrous Surfaces)

(Copies of this publication and copies of other publications referenced herein or required for Government procurement, and the Index of Military Aeronautical (AN or MIL) Standards, may be obtained upon application to the Commanding General, Air Material Command, Wright-Patterson Air Force Base, Dayton, Ohio; or the Commanding Officer, U. S. Naval Air Station, Johnsville, Pennsylvania.)

3. REQUIREMENTS

3.1 Equipment.- The complete equipment used for the application of resin coating to aircraft parts shall be of such type as to produce the specified results to the satisfaction of the Government Inspector.

3.2 Materials.- All materials used shall conform to the applicable specifications referenced herein. Application of resin coating to such aircraft parts as are specified by the Procuring Service shall be accomplished as herein prescribed and with material conforming to Specification MIL-R-3043.

3.3 Surface Treatment.- All parts shall be thoroughly cleaned so that all fingerprints and all shop coatings, dirt, metal chips, and other foreign substances are completely removed from all surfaces and shall receive appropriate surface pre-treatment in accordance with Specification MIL-S-5002 prior to application of the permanent resin coating.

3.3.1 Drying.- Parts shall be moisture free before application of the permanent resin coating. The time interval between cleaning and the application of the resin coating shall be kept to a minimum, inasmuch as thoroughly cleaned and unprotected metal surfaces are extremely susceptible to corrosion.

3.3.2 Handling.- The parts shall not be handled after cleaning in any manner that will allow fingerprints, dirt, dust, and other foreign substances to contaminate the surface to be coated.

3.4 Application of Resin Coating.- Application of resin coating to aircraft parts shall be accomplished preferably by spraying. When spraying is impractical, dipping will be permitted provided all other requirements of this specification are met. If resin coating is to be applied to localized areas which cannot readily be dipped or sprayed, brush application may be employed, provided all other requirements of this specification are met. Application shall be so controlled that the coating will be continuous, uniform and free from bubbles, fatty edges, pin holes, runs, sags, and other surface imperfections. A very slight "organge peel" shall not be sole cause for rejection. Orange peel should not be confused with small blisters, which are cause for rejection.

3.4.1 Set of Film.- After application of the resin coating, the coated parts shall be allowed to remain at room temperature for a period of approximately 30 minutes for preliminary set of the film. This initial set is mandatory. It not only avoids any possible flow of the coating when the part is introduced into the baking oven and permits handling incident to the baking operation, but also avoids pinholes and bubbles due to rapid escape of solvent in the baking operation with resultant flaking of the coating on these areas. Handling of the unbaked, coated parts shall be kept to a minimum, inasmuch as at this stage the coating will not have permanently set up and may be easily damaged. Care shall be exercised to avoid contamination from dust and other foreign matter after the part is sprayed and before it is baked. This may be accomplished by proper arrangement of the spray booth and the baking equipment.

3.4.2 Film Thickness.- All surfaces shall be coated with a film thickness between 0.0005 and 0.0010 inch, except shot peened surfaces and sand castings, which shall have a resin film thickness between 0.0006 and 0.0010 inch. The thickness shall be controlled as specified in Section 4.

3.5 Routine Film Thickness Inspection.- The contractor shall maintain a suitable method of accomplishing routine film thickness inspection on parts prior to baking. A color control method, as outlined in Section 4 is recommended.

3.6 Baking.- Subsequent to the preliminary set at room temperature, non-metal masking material may be removed and the coated parts shall then be baked at 325°F for 30 minutes, EXCLUSIVE OF THE TIME REQUIRED FOR THE SURFACE TO REACH THE BAKING TEMPERATURE. Although a green color is generally an indication of proper bake, this can be misleading since one of the existing formulations of resin coating will turn green on aging. However, a blue or bluish green color indicates insufficient bake. A confirmatory test can be accomplished by means of the acetone test. This test consists of applying a clean, white cloth or a clean swab of absorbent cotton saturated with acetone to selected spots of the COOLED PART, and rubbing briskly for one minute. Reduction of gloss of the area tested or transfer of the dye to the cloth or cotton indicates insufficient baking time. Parts which indicate insufficient bake may be recoated in the test area and then given an additional bake.

3.6.1 Parts should also be tested for overbaking, if this is suspected, by drawing a knife blade over the surface of a pilot or sample part processed simultaneously and observing any inferior adhesion or tendency to chip or flake.

3.6.2 In order to determine that parts receive proper bake, color comparison standards should be prepared showing the color changes between baking schedule of 30 minutes at 275°F and a schedule of 60 minutes at 325°F. The color of production articles should be maintained intermediate between the above standards. These standards shall be renewed as necessary, observing the precautions noted in the latter part of paragraph "Routine Film Thickness."

3.7 Routine Baking Inspection.- The contractor shall maintain a suitable method of accomplishing inspection of the film after baking to insure proper curing of the coating.

3.8 Spotting.- When the coating damage after baking consists either of abrasions caused by handling and not by loss of adhesion of the resin coating, or of bare spots required for marking, reconditioning shall be accomplished by thoroughly cleaning such areas and applying the resin to the exposed metal. For such reconditioning, since touch-up areas are relatively small, baking is not required but will be permitted. A preliminary set of at least 15 minutes at room temperature after spraying or brushing these areas shall be allowed before the part is handled.

3.9 Respraying.-

3.9.1 Prior to Baking.- Parts which by inspection are shown to have too thin a coating may be resprayed to produce the desired thickness.

3.9.2 After Baking.- Parts which are rejected by baking inspection shall be stripped, recleaned, and resprayed.

3.10 Stripping.- Coated parts which have to be stripped may be treated as follows:

3.10.1 Before Baking.- The coating shall be stripped by washing with acetone or other suitable solvents which will not attack or injure bearings, inserts, or any other metallic part or surface finish.

3.10.2 After Baking.- Ferrous parts shall be stripped by using material conforming to Specification AN-S-55. Bearings or other inserts shall be masked or removed if necessary to prevent damage by stripping solution. Removal of coating on non-ferrous parts shall be accomplished by mechanical means.

3.11 Workmanship.- All operations and procedures connected with the application of resin coating to aircraft parts shall be in accordance with high grade practices associated with aircraft manufacture.

4. SAMPLING, INSPECTION, AND TEST PROCEDURES

4.1 General.- All the tests required for the testing of the coating are classified as Inspection tests, for which necessary sampling techniques and methods are specified in the following paragraphs of this section.

4.2 Routine Film Thickness.- The film thickness of the unbaked coating may be estimated by comparison with the color of standard inspection panels whose film thickness has been carefully established by a suitable means, such as the "magne-gage." Several panels may be prepared having film thicknesses between the specified limits in steps of 0.0001 inch and shall not be baked. It may be necessary to renew these standards

occasionally. It must be noted that variations in the color intensity of the resin coating materials exist from batch to batch and accordingly new standards must be prepared for each batch of new material. It is also important to note that the metal panels employed for these standards must be selected to simulate the surface appearance of the part to be coated. The standards should be protected by any suitable means from color change due to increased temperature or exposure to sunlight, and should be renewed as noted above, but in any event the effective utility of these standards should be limited to two weeks due to effects of deterioration.

4.3 Routine Baking Test.- In order to insure uniform baking of parts having different mass, a color comparison standard may be prepared showing the color change resulting from the minimum and maximum baking conditions likely to be encountered in the manufacturer's equipment. The color of the finished coating will be maintained intermediate between the specified limits of color.

4.4 Spot Checking.-

4.4.1 Production spot checking shall be accomplished at sufficiently frequent intervals to establish and maintain uniformity of coating and compliance with the other requirements of the specification to the satisfaction of the Inspector. Production spot checking shall include investigation of requirements specified herein under Application of Resin Coating, Spotting, and the following:

4.4.1.1 Film Thickness.- Samples of various representative parts shall be withdrawn from production after baking and film thickness determined by "magne-gage" or other suitable means.

4.4.1.2 Baking Test.- Samples of various representative parts shall be withdrawn from production after baking and tested for adequacy of the baking treatment by the following methods:

(a) Underbake test: Apply a clean white cloth continually soaked with acetone to various spots of a number of parts selected at random, rubbing briskly for one minute. No softening or removal of film or reduction in gloss should be apparent at the points of contact.

(b) Overbake test: Compare various areas of samples selected from production for brittleness of film with panels prepared in accordance with Specification MIL-R-3043. Comparison shall be made by drawing a knife blade over the surface and observing the relative adhesion and tendency to chip or flake. Inspected parts, when not rejected, may be reconditioned as specified under "Spotting."

4.4.2 Defective Samples.- When satisfactory samples are found sufficient additional inspection shall be made to insure rejection of all parts with defective coating.

4.5 Rejections.- Parts rejected for unsatisfactory coating may have the coating removed by processes referenced herein. Such parts shall be recleaned and recoated in accordance with requirements of this specification. Parts rejected solely for underbaking may be reclaimed by additional baking.

5. PREPARATION FOR DELIVERY

5.1 Requirements for preparation for delivery are not applicable to this specification.

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