AERONAUTICAL MATERIAL SPECIFICATION

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29 West 39th Street
New York City

AMS 2645B

Issued 7-1-48
Revised 6-15-53

FLUORESCENT PENETRANT INSPECTION

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

2. APPLICATION: Detection of surface discontinuities, such as cracks, laps, porosity, cold shuts, lack of bond, and similar defects.

3. MATERIALS:

3.1 Penetrant: The penetrant shall be a highly fluorescent liquid capable of penetrating fine discontinuities and, unless otherwise permitted, shall be ø made up from a water washable base. It shall also be non-toxic and non-corrosive.

3.2 Developer: The developer shall be a highly absorbent, non-fluorescent and non-toxic powder, either capable of being used dry or suspended in water. ø When the suspension is used, the powder shall be thoroughly mixed with water to a concentration of not less than 1 lb to 5 gal and a uniform distribution maintained through mechanical agitation.

4. PREPARATION OF PARTS: Parts shall normally be fluorescent penetrant inspected prior to all surface treatments such as plating, anodizing, dichromating, peening or similar treatments which would tend to close or mask surface defects. Fluorescent penetrant inspection may be performed after surface treatments provided it is demonstrated that the treatment is of such a nature that defects are not obscured. If machined surfaces are to be inspected they shall be ø finished with a clean cut to prevent flowing or burnishing of the surface layer or shall be etched with a suitable etchant to remove flowed or burnished layers which might mask defects. Parts shall not be etched indiscriminately since etching itself tends to mask surface defects. All parts shall be cleaned and dried in such a manner as to leave the surface free from grease, oil, soaps, alkalies and other substances which would interfere with inspection. Vapor degreasing is suitable for this purpose. This paragraph shall not be interpreted as prohibiting additional fluorescent penetrant inspections after further processing or after use of parts.

5. PROCEDURE: After preparation, the parts shall immediately be subjected to the following operations:

5.1 Unless other methods of applying penetrant are permitted, the parts shall be immersed in the penetrant for a sufficient length of time to allow satisfactory penetration into all discontinuities. The time of immersion will depend upon the character and fineness of the defects, the effectiveness of the penetration increasing with the time of immersion.

5.2 Parts shall be removed from the penetrant and cleaned thoroughly using a medium which will remove penetrant from the surfaces of parts; washing in water shall ø be used when the penetrant is water washable. When other than water washable penetrants are used, the penetrant shall be removed with a suitable cleaner. During cleaning, the parts may be viewed under a suitable "black light" to ensure complete removal of the penetrant from the surface of the part. Excessive cleaning which would remove the penetrant from defects shall be avoided.

5.3 When a wet developer is used, the developer shall be applied to the parts immediately after washing, by immersing the parts in the tank containing the water-suspended powder or by spraying or flowing the suspension onto the parts. The suspension shall be suitably agitated either during, or immediately prior to, immersion of parts. Parts shall be removed from the wet developer, and excess developer shall be allowed to drain off the parts.

5.4 When a dry developer or no developer is used, the above operation shall be omitted and the parts dried as in 5.5.

5.5 The parts shall be dried as thoroughly as possible by exposure to clean air. Drying of parts may be accomplished by evaporation at room temperature or by placing the parts in a circulating warm air oven or in the air stream of a hot air dryer. Excessive drying time should be avoided to prevent evaporation of the penetrant.

5.6 When a dry developer is used, the developing powder shall be dusted uniformly over the parts.

5.7 After sufficient time has been allowed to develop indications, parts shall be examined in a darkened enclosure under a suitable "black light".

5.8 When greater sensitivity is desired, the parts may be heated to 150-220 F before immersion in the penetrant and/or before "black light" examination.

5.9 Interpretation of the indications revealed by fluorescent penetrant inspection and final decision regarding disposition of the parts should be the responsibility of only those persons qualified by experience with fluorescent penetrant inspection.

5.10 The parts shall be cleaned following the inspection, to remove retained penetrant and developer. All parts susceptible to corrosion shall be slushed with a corrosion-inhibiting oil.

6. MARKING: Wherever practicable, the character Ꝑ or Ⓟ (P with an F backward) shall be marked on all parts which have satisfactorily passed the fluorescent penetrant inspection depending on whether inspection has been made on a 100% or a sampling basis respectively. Parts too small for letter marking may be marked with a suitable maroon dye if 100% inspection has been made or yellow if inspection has been made on a sampling basis.