AERONAUTICAL MATERIAL SPECIFICATION

Society of Automotive Engineers, Inc.
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CONTRAST DYE PENETRANT INSPECTION

1. ACKNOWLEDGMENT: A vendor shall mention this specification number 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. Because inspection can be performed in normal light, this method can be used under conditions where use of fluorescent penetrant inspection is impracticable.

3. MATERIALS AND EQUIPMENT:

3.1 Penetrant: Shall be a strongly colored liquid capable of penetrating fine discontinuities. The penetrant shall be removable by washing with water or with other common solvents, or by vapor degreasing; penetrant shall also be non-corrosive.

3.2 Developer: The developer shall be of the type recommended by the manufacturer of the penetrant used.

3.3 Equipment: For permanent installations where materials are applied by immersion of parts, equipment shall be so constructed and arranged as to permit uniform, controlled operation.

4. PREPARATION OF PARTS:

4.1 Parts shall normally be contrast dye penetrant inspected prior to all surface treatments such as plating, anodizing, dichromating, peening, or similar treatments which would tend to close or mask surface discontinuities. Contrast dye penetrant inspection may be performed after surface treatments provided it is demonstrated that the treatment is of such a nature that discontinuities are not obscured.

4.2 If machined surfaces are to be inspected, they shall be 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 discontinuities. Parts shall not be etched indiscriminately because etching itself tends to mask surface discontinuities.

4.3 All parts shall be cleaned and dried in such a manner as to leave the surfaces free from grease, oil, soaps, alkalies, and other substances which would interfere with inspection. Vapor degreasing is generally suitable for this purpose.

4.4 This section shall not be interpreted as prohibiting additional contrast dye 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 The parts shall be immersed in the penetrant, or shall be sprayed or brushed with the penetrant, and shall be allowed to remain immersed in the penetrant or to stand for a sufficient length of time to allow satisfactory penetration into all discontinuities. This time shall not be less than 5 minutes. The time of immersion or standing will depend upon the character and fineness of the discontinuities, the effectiveness of penetration increasing with time.

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 with water shall 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. Excessive cleaning which would remove the penetrant from discontinuities shall be avoided.

5.3 The parts shall be dried as thoroughly as possible. 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 or temperature should be avoided to prevent evaporation of the penetrant.

5.4 The developer shall be applied to the dry parts as lightly and as evenly as possible. Wet developer shall be thoroughly mixed by agitation immediately prior to its application. After the developer has been applied, care shall be taken that no indication is disturbed or obliterated in subsequent handling.

5.5 After sufficient time has been allowed to develop indications, parts shall be examined.

5.6 Interpretation of the indications revealed by contrast dye penetrant inspection and final disposition of the parts should be the responsibility of only those persons qualified by experience with contrast dye penetrant inspection.

5.7 The parts shall be cleaned following the inspection, to remove penetrant and developer.

6. DISPOSITION:

6.1 Parts containing minor discontinuities which would not be considered detrimental to the part under operating conditions may be approved for acceptance without remedial operations at the discretion of authorized personnel.

6.2 If a discontinuity should be of such nature and so located that its removal would not adversely affect the serviceability of the part, although local sections might be outside drawing limits, the correction may be made with the approval of authorized personnel after due consideration of the stress distribution within the part and the function of the part itself. If a discontinuity is removed, the spot shall be well blended in such a manner as to minimize surface flow of the material. Swab etching of the blended area before reinspection is recommended wherever practicable. Etched surface shall be polished after reinspection.

6.3 Parts having discontinuities which are considered detrimental to strength or serviceability shall be rejected.