

UNCLASSIFIED

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14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office) Brittle Lacquer Technique of Stress Analysis. <del>Test Operations Procedure.</del>		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

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ITEM (cont'd)

REQUIREMENT (cont'd)

Testing chamber

Spray gun

Aluminum-pigmented lacquer  
and brittle lacquer

Camera and film

color and b/w

2.2 Instrumentation.

ITEM

MAXIMUM PERMISSIBLE  
ERROR OF MEASUREMENT

Psychrometer

none

3. REQUIRED TEST CONDITIONS.

3.1 Selection of Coating. Determine and record the proper coating to be used by

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4.1 Pre-Test Data. Record the following:

- a. Nomenclature and serial number of the test item

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4.2.2 Data Required. Record the following:

- a. Aging temperature in °C
- b. Aging time in hours

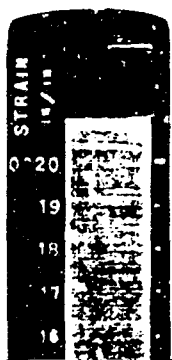
4.3 Calibration of Strip.

- a. Hold the standard calibration strip in the clamping device.
- b. Deflect its free end to a fixed distance, thereby producing a graduated tensile strain on its upper surface and a compressive strain on its undersurface. The greatest strain is at the fulcrum.
- c. Record the distance deflected.
- d. Determine the strain sensitivity of the coating by placing the tested calibration strip in a strain scale (Figure 1). Note the least strain required to fracture the coating. The strain scale shown is graduated to show the strain on the calibration strip when it was tested in a standard calibrating device which is part of a commercially available stress coat kit.

NOTE: If the strain sensitivity value of the calibration strip is higher than desired, warm up the test item. If the strain sensitivity value of the calibration strip is too low, cool the test item. Record the adjusted temperature, if applicable.

4.4 Load Application.

- a. Load the test item and record applied load.
- b. Determine test item sensitivity by visually inspecting the cracks



4.5 Data Required. Record the following:

a. Calibration strip:

- (1) Distance deflected of the strip in centimeters
- (2) Strain obtained in cm/cm

b. Adjusted temperature of test item, if applicable, in °C

c. Load applied to test item in kPa

d. Strain sensitivity of test item in  $\mu\text{cm/cm}$

5. DATA PRESENTATION. From a qualitative point of view, the overall strain picture is graphically presented, as shown in Figure 2. Closeup views are shown in Figures 3 and 4. Based on the premise that the greater the density of the strain pattern, the greater the strain, it is often possible to determine which section or areas are strained more than others. In Figure 4, area number 2 was strained more than area number 1.

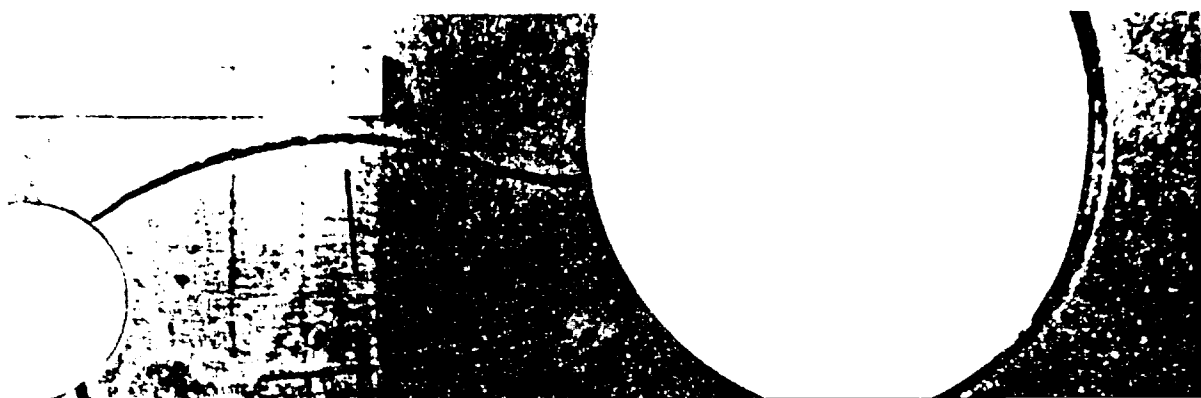
Since strain patterns in brittle lacquer coatings form at right angles to the principal strain, the location and axial orientation for electrical resistance strain gages can be selected so that the maximum strain can be accurately measured.

Brittle lacquer coatings will flake off during yielding if the compressive strain exceeds 1 percent or the tensile strain exceeds 2 percent. Whether the flaking was caused by tensile or compressive strains cannot be definitely ascertained from an examination of the coating. Strain patterns emanating from the flaked off area usually signify, however, that the flaking was due to tensile strain.

Recommended changes of this publication should be forwarded to Commander, US Army Test and Evaluation Command, ATTN: DRSTE-AD-M, Aberdeen Proving Ground, Md. 21005. Technical information may be obtained from the preparing activity: Commander, US Army Aberdeen Proving Ground, ATTN: STEAP-MT-M, Aberdeen Proving Ground, Md. 21005. Additional copies are available from the Defense Technical Information Center, Cameron Station, Alexandria, Va. 22314. This document is identified by the accession number (AD No.) printed on the first page.







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APPENDIX A  
REFERENCES

1. Test Operations Procedure (TOP) 1-2-605, Birefringent Coating Technique of Photoelastic Stress Analysis, 28 August 1980.