DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
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METHOD FOR HOLIDAY DETECTION IN EPOXY-COATED REINFORCING STEEL

CAUTION: Prior to handling test materials, performing equipment setups, and/or conducting this method, testers are required to read "**SAFETY AND HEALTH**" in Section F of this method. It is the responsibility of the user of this method to consult and use departmental safety and health practices and determine the applicability of regulatory limitations before any testing is performed.

A. SCOPE

The procedures to be used for determining holidays in epoxy coatings on ferrous materials are described in this method. This method uses an electrical current flow through a low resistance path to trigger an alarm (buzzer) to indicate to the operator the presence of a holiday.

Holidays are defined as pinholes and voids in non-conductive coatings that allow current to pass through the protective coating to the metal base material. These discontinuities are such that they may not be visible to a person with normal or corrected vision.

B. APPARATUS

1. A low voltage holiday detector tester having an electrical source of 67.5 to 100 V DC that meets the requirement of ASTM G 62 Section 1.2, Method A. Example: Tinker & Rasor, Model M/1 Holiday Detector.

2. A cellulose sponge with an insulated handle. The sponge is wired to the positive contact electrode.

3. A grounding clamp/magnet and wire to the negative (ground) terminal. This provides the system connection to the low resistance base metal.

4. Tap water. Plain, if measuring pin holes and voids in coating thickness up to 10 mils.

5. A non-sudsing type wetting agent. Use the following dilution factor for measuring pin holes and voids in coating thickness up to 20 mils: One ounce agent to one gallon of tap water. Reference: Tinker & Rasor Water-Wetter.

6. An 80,000-ohm, ½ watt resistor mounted on an insulated terminal board for checking proper audio indication and the drop in battery voltage with this resistance load. (This test resistance may be built in to newer models of the holiday tester.)

C. TEST PROCEDURE

Wet the sponge with sufficient wetting solution to assure moisture penetration of any defect in the surface coating. Squeeze out any excess.

1. Before starting the testing process, place the moist sponge on one end of the 80,000-ohm resistor and place the magnet contact on the other end. Verify that an audible alarm is given. Weekly, check the voltage (with a high impedance volt/ohm meter) across the tester terminals when the system

is loaded with the 80,000-ohm resistor. If the voltage less than 90 % of required voltage, replace the system battery.

2. If the sample bar ends are coated, grind the coating off one end of the bar being tested. This is for the ground contact.

3. Place the magnet with the attached ground wire on the bare end of the bar. The magnet should be in direct contact with the base metal.

4. Test the connections by contacting the bare end with the sponge. The audible alarm should be triggered.

5. Test the coated metal sample by sweeping the moist cellulose sponge up and down the deformation sides and the ribbed sides of the sample. The sweep rate shall not exceed 2½ inches per second. Count the alarm indications, mark the spots (See Note 3) and record the total number detected.

D. NOTES

1. Sample coating shall be dry and free from contamination before holiday testing.

2. Insure that sponge contact covers the entire surface of the bar to accurately detect all holidays.

3. Mark all detected holidays on the bar with an indelible marker to insure an accurate count.

4. Obvious shipping and handling caused skinned or damaged spots are not to be counted as holidays.

5. Follow manufacturer's instructions for adjusting the electronic circuit to sound at 80,000-ohms across the terminals.

E. REPORTING RESULTS

Document results of tests with appropriate comments and notations on a test form (example of an appropriate form is shown in Figure 1). Report results in formal form (as complying or not complying with specifications) on a sample testing form (sample of an example is shown in Figure 2). The sample will be documented with the inspector's or the coater's name and lot number, the date sampled, the required specification, and the number of holidays found.

F. SAFETY AND HEALTH

Prior to handling, testing or disposing of any waste materials, testers are required to read: Part A (Section 5.0), Part B (Sections: 5.0, 6.0 and 10.0) and Part C (Section 1.0) of Caltrans Laboratory Safety Manual. Users of this method do so at their own risk.

REFERENCE
California Standard Specifications,
ASTM A 775/775M, A 884/884M,
A 934/934M, G 62

End of Text
(California Test 685 contains 4 pages)

Figure 1 Test Form for Recording Holiday Detection Results

California Test 685 - Holiday Detection Results

Standard Specs: 52-1.02B
ASTM: A775/A934
Holiday Detection:
Criterion for passing = less than 1 holiday per foot.

SM No.: 03-1601

TL 101 No.: C900348

Date Received: 9/21/04

Date Tested: 9/22/04

Operator: BRIAN WU

Lot No.: B6031

Contract No.: 14-618344

Epoxy Color: (Purple) Gray Green

No. of Bars: 4

Bar ID: 57

Length: 2.5 ft

Lot/Load/Release No.: 0916, FT, WT

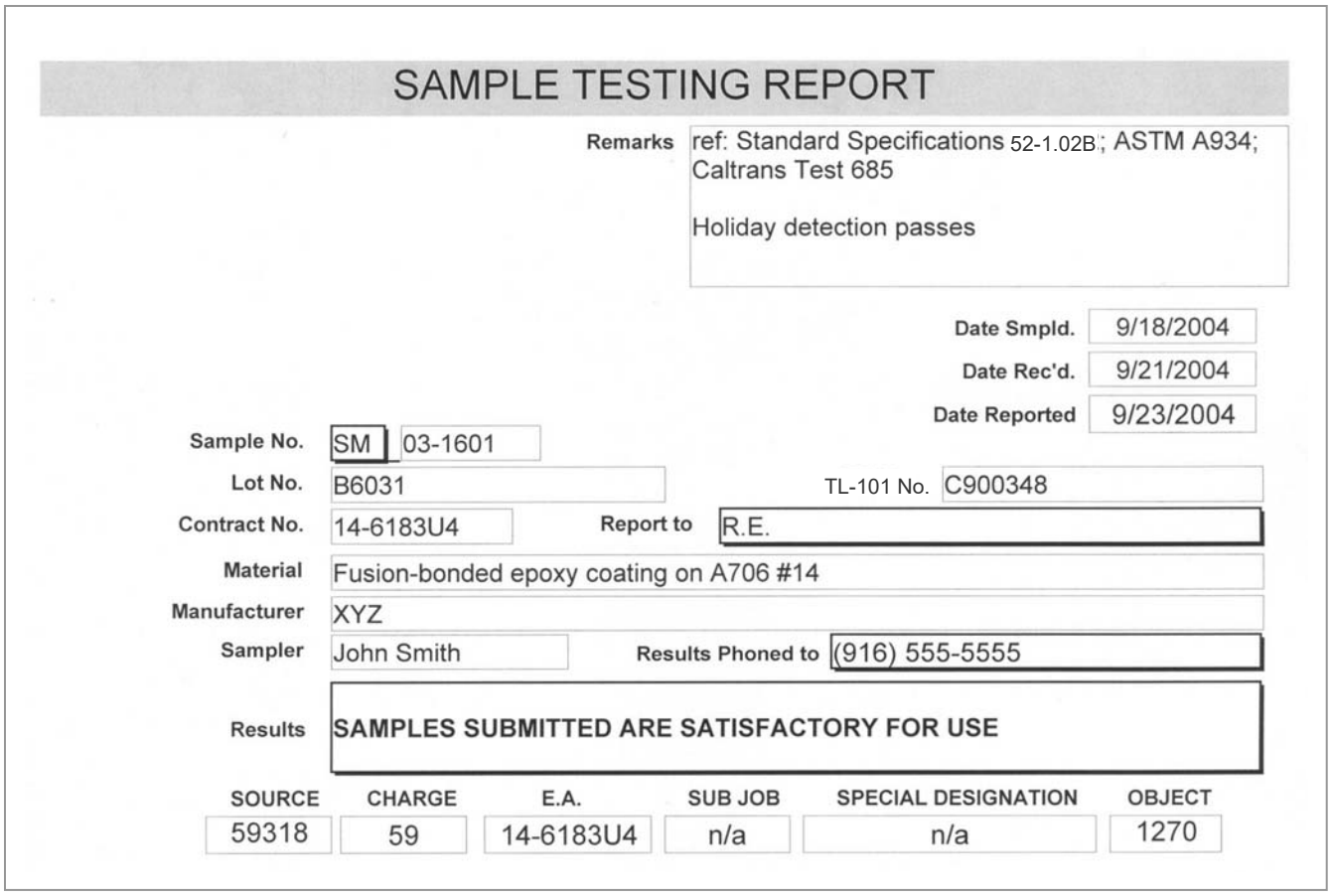
Holiday Detection Equipment Calibrated? (Yes) No

No. of Holidays Detected: 1

Holidays/Foot: <1

Results: (Pass) Fail

Figure 2 Sample Testing Report



SAMPLE TESTING REPORT

Remarks: ref: Standard Specifications 52-1.02B; ASTM A934; Caltrans Test 685

Holiday detection passes

Date Smpld. 9/18/2004
Date Rec'd. 9/21/2004
Date Reported 9/23/2004

Sample No. SM 03-1601
Lot No. B6031 TL-101 No. C900348
Contract No. 14-6183U4 Report to R.E.
Material Fusion-bonded epoxy coating on A706 #14
Manufacturer XYZ
Sampler John Smith Results Phoned to (916) 555-5555

Results: SAMPLES SUBMITTED ARE SATISFACTORY FOR USE

SOURCE	CHARGE	E.A.	SUB JOB	SPECIAL DESIGNATION	OBJECT
59318	59	14-6183U4	n/a	n/a	1270