



Designation: D 4788 – 88 (Reapproved 2001)

Standard Test Method for Detecting Delaminations in Bridge Decks Using Infrared Thermography¹

This standard is issued under the fixed designation D 4788; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This test method covers the determination of delaminations in portland-cement concrete bridge decks using infrared thermography. This test method is intended for use on exposed and overlaid concrete bridge decks.

NOTE 1—This test method can be used on asphalt or concrete overlays as thick as 4 in. (100 mm).

1.2 This test method uses an imaging infrared scanner and video recorder, mounted on a vehicle, to detect delaminations and debonded areas on bridge decks and to record the information.

1.3 The values stated in inch-pound units are to be regarded as the standard.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:

D 4580 Practice for Measuring Delaminations in Concrete Bridge Decks by Sounding²

3. Summary of Test Method

3.1 The vehicle-mounted infrared scanner and video recorder is driven over the center of each lane of a bridge deck. The data from the scanner is recorded on video tape. Delaminations appear as white or “hot” areas on a gray or “cooler” background in the video image on a monochrome scanner system during daytime testing. During nighttime testing, the delaminations will appear as dark or “cooler” areas on a white or “warmer” background. Delaminations will appear as the warmer colors on color scanner systems during daytime testing. Calibration of thermal anomalies using sounding techniques are used to determine the colors associated with delaminations.

3.2 The conventional video image is used to edit the infrared image and separate those patches or surface defects that may be present and may appear as hot areas.

3.3 The video recording is used to map the delaminated areas at a suitable scale.

4. Significance and Use

4.1 This test method may be used in conjunction with other test methods in determining the general condition of a bridge deck.

4.2 Areas indicated as delaminated on overlaid bridge decks may be an indication of lack of bond between the overlay and the underlying bridge deck. This test method may be used in determining specific areas of delaminations requiring repair.

5. Apparatus

5.1 *General*—In order to collect data on the areal extent and location of the delaminations, the following apparatus is required:

5.1.1 *Infrared Scanner*— An imaging infrared scanner having a minimum thermal resolution of 0.2 Celsius degrees under ambient air conditions. The scanner shall be mounted on the front of the vehicle at a height sufficient to allow a minimum image width of 14 ft (4.3 m). The scanner shall be capable of producing a television-compatible image.

5.1.2 *Video Recorders* capable of reproducing a thermal image or a conventional video image. Each device shall have at least one audio channel available and provide a minimum resolution of 240 lines per inch. Two are required.

5.1.3 *Video Camera*— A conventional video camera capable of viewing a minimum image of 14 ft (4.3 m) and producing a color video signal that can be recorded on a standard video recorder.

5.1.4 *Distance Measuring Device* having an accuracy of ± 3 in. (76 mm) over the longest span in the deck. The output of this device shall be recorded by both the infrared video recorder and the conventional video recorder.

5.1.5 *Test Vehicle* on which the imaging infrared scanner and video recorder will be mounted. The vehicle shall be capable of supporting the infrared scanner and the conventional video camera at a height sufficient to allow a minimum width of 14 ft (4.3 m) of pavement to be observed at one time. The vehicle shall be capable of supplying the necessary electrical

¹ This test method is under the jurisdiction of ASTM Committee D04 on Road and Paving Materials and is the direct responsibility of Subcommittee D04.32 on Bridges and Structures.

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² *Annual Book of ASTM Standards*, Vol 04.03.