NACE Standard TM0186-2016
Item No. 21218

Revised 2016-02-12
Reaffirmed 2002-09-11
Reaffirmed March 1994
Reaffirmed September 1989
Approved November 1985

Holiday Detection of Internal Tubular Coatings of 355 to 760 µm (14 to 30 mils) Dry-Film Thickness

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ABSTRACT

This NACE standard test method was prepared as a guide for evaluating the application of polymeric coatings of 250 to 760 µm (10 to 30 mils) to the internal surfaces of metallic tubular goods used in the oil and gas industry. This NACE standard provides a nondestructive test method for the detection of holidays in a nonconductive coating film that has been applied to the inner wall (bore) of oilfield tubular goods. The apparatus and the recommended procedure for conducting the test are described, as are methods of reporting the test data. This standard is maintained by Task Group 450.

KEYWORDS

holiday, dry-film thickness, wet probe, dry probe

ISBN 1-57590-154-4
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Foreword

In NACE standards, the terms shall, must, should, and may are used in accordance with the definitions of these terms in the NACE Publications Style Manual. The terms shall and must are used to state a requirement, and is considered mandatory. The term should is used to state something good and is recommended, but is not considered mandatory. The term may is used to state something considered optional.

This NACE standard provides a nondestructive test method for evaluating the application of polymeric coatings of 355 to 760 µm (14 to 30 mils) to the internal surfaces of metallic tubular goods used in the oil and gas industry. This test method is based on the current technology and experience of the petroleum production industry. NACE Standard TM0384[1] addresses holiday detection of internal tubular coatings of less than 330 µm (13 mils) dry-film thickness. This standard is intended for end users, manufacturers, applicators, corrosion engineers, and quality inspectors of internally coated metallic tubular goods.

This NACE standard was originally prepared in 1986 by Task Group (TG) T-1G-9, "Holiday Testing of Plastic Linings," a component of Unit Committee T-1G, "Protective Coatings, Elastomers, and other Nonmetallic Materials for Oilfield Use," and was reaffirmed by T-1G in 1989 and 1994. It was reaffirmed in 2002 by Specific Technology Group (STG) 33, "Oil and Gas Production—Nonmetallics and Wear Coatings (Metallics)," and revised in 2015 by TG 450 "Review of NACE Standard TM0186." STG 33 is comprised of representatives from the oil and gas industry including consumers, producers, and interested individuals. This standard is issued by NACE International under the auspices of STG 33.

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Figures

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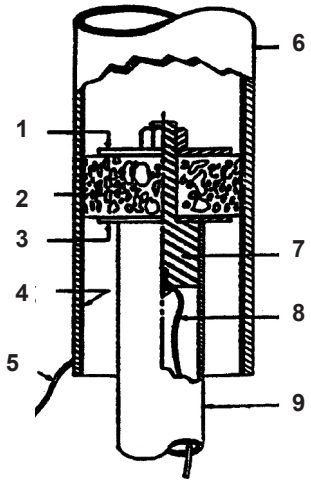
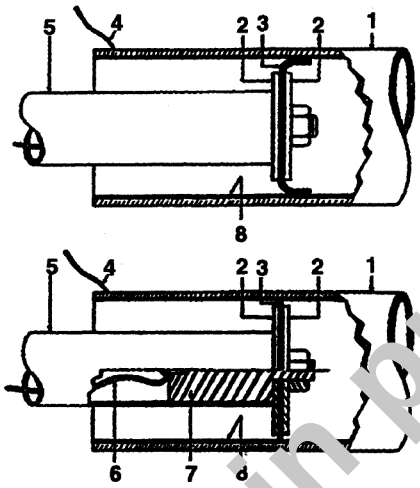
FIGURE 1: Wet Probe



1 Back up plate
2 Probe (wetted sponge)
3 Back up plate
4 Coating
5 Ground lead
6 Metallic tubular good
7 Metallic conductor
8 High voltage lead
9 Lance

FIGURE 2: Dry Probe



1 Metallic tubular good
2 Back up plates for probe (each side)
3 Probe (rubber)
4 Ground lead (to ground terminal of detector)
5 Lance
6 High-voltage lead (to terminal of detector)
7 Metal conductor
8 Coating

Section 1: General

1.1 This NACE standard provides a nondestructive test method for the detection of holidays in a nonconductive coating film that has been applied to the inner wall (bore) of oilfield metallic tubular goods. The apparatus and the procedure for performing the test are described, as are methods of reporting the test data.

1.2 The test method applies to coatings that have a specified dry-film thickness of 355 to 760 µm (14 to 30 mils). It is valid only for coatings that have not been in service or previously tested with a salt solution. When holiday testing is performed on coatings that have been in service or that have been previously tested for holidays with a salt solution, there is a possibility of misleading results arising from surface contamination or salt bridging. The coating surface shall be free of materials that give added electrical insulation or that may mechanically damage the coating during the test.

1.3 This test method is not intended as a means of predicting the service life or service performance of these coatings.

1.4 A "holiday" is defined as a discontinuity in a protective coating that exposes unprotected surface to the environment. For the purposes of this test method, it means an area in an applied nonconductive coating that exhibits electrical conductivity when exposed to a known increased voltage.

1.5 The voltage range for holiday detection shall be 4 to 12 V direct current (DC) per µm (100 to 300 V [DC] per mil) of dry-film thickness. The test voltage is determined by the type of probe, the maximum specified dry-film thickness, the type of coating application, and the customer. The voltage shall be measured between the probe and the metallic tubular good.

Section 2: Test Apparatus

Apparatus and materials required to perform this holiday test include a probe, a lance, a detector, and a conductive solution for the wet probe.

2.1 Probe—A wet probe or a dry probe may be used to conduct this test. Both probe types provide acceptable results. The calibration and test procedure (see Section 3) are identical for both probe types. Probe type shall be specified by the customer.

2.1.1 Wet Probe—The probe shall be a circular piece of sponge, conductive when wetted with a conductive water (e.g., tap water, not deionized or distilled). The sponge shall be 50 mm (2 in) thick and shall be cut sufficiently larger than the inside diameter of the metallic tubular good to ensure 360° of contact throughout the length (see Figure 1).

2.1.2 The wetting solution used to wet the probe shall be tap water (not deionized or distilled).

2.1.3 Dry Probe—The probe shall be a circular piece of dry conductive silicone rubber that is 3.0 mm (0.13 in) thick and cut sufficiently larger than the inside diameter of the metallic tubular good to ensure 360° of contact throughout the length (see Figure 2). Either of the probe configurations shown in Figures 1 and 2 may be used if the 360° contact with the coating is obtained. The minimum test voltage shall be 4 V per µm (100 V per mil) of maximum specified dry-film thickness (see paragraph 1.4).

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