



NACE Standard TM0186-2002  
Item No. 21218

## Standard Test Method

# Holiday Detection of Internal Tubular Coatings of 250 to 760 $\mu\text{m}$ (10 to 30 mils) Dry-Film Thickness

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### Foreword

This NACE standard test method was prepared as a guide for evaluating the application of polymeric coatings of 250 to 760  $\mu\text{m}$  (10 to 30 mils) to the internal surfaces of metallic tubular goods used in the oil and gas industry. It is not intended as a means of predicting the service life or service performance of these coatings. This test method is based on the current technology and experience of the petroleum production industry. NACE Standard TM0384<sup>1</sup> addresses holiday detection of internal tubular coatings of less than 250  $\mu\text{m}$  (10 mils) dry-film thickness. This standard is intended for end users, manufacturers, applicators, corrosion engineers, and quality inspectors.

This NACE standard was originally prepared by Task Group T-1G-9 on Holiday Testing of Plastic Linings, a component of Unit Committee T-1G on 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 on Oil and Gas Production—Nonmetallics and Wear Coatings (Metallics). This STG 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.

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*, 4<sup>th</sup> ed., Paragraph 7.4.1.9. *Shall* and *must* are used to state mandatory requirements. The term *should* is used to state something considered good and is recommended but is not mandatory. The term *may* is used to state something considered optional.

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Standard  
Test Method**

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**Contents**

1. General .....	1
2. Test Apparatus .....	1
3. Calibration and Test Procedure .....	3
4. Reporting Test Data .....	3
5. Safety .....	4
References.....	4
Figure 1—Wet Probe .....	2
Figure 2—Dry Probe .....	2

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## 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 tubular goods. The apparatus and the recommended procedure for conducting 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 250 to 760  $\mu\text{m}$  (10 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 can mechanically damage the coating during the test.

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

1.4 The voltage range for holiday detection is 4 to 12 V (DC) per  $\mu\text{m}$  (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 pipe.

1.5 Several internal tubular coatings have specified thickness ranges of 200 to 330  $\mu\text{m}$  (8 to 13 mils). These coatings shall be tested with a wet sponge at 67.5 V (DC) and 80,000 ohms ( $\pm 10\%$ ) resistance.<sup>1</sup>

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## Section 2: Test Apparatus

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

2.1.1 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) is identical for both probe types. Probe type shall be specified by the customer:

2.1.1.1 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 pipe to ensure 360 degrees of contact throughout the pipe length (see Figure 1).

2.1.1.2 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 pipe to ensure 360 degrees of contact throughout the pipe length (see Figure 2). Either of the probe configurations shown

in Figure 2 can be used if the 360-degree contact with the coating is obtained. The minimum test voltage shall be 4 V per  $\mu\text{m}$  (100 V per mil) of maximum specified dry-film thickness. (See Paragraph 1.4)

2.1.1.3 Pipe sizes that are too large to use a 360-degree contact probe (e.g., 50-cm [20-in.] diameter pipe) may require a probe that covers less than 360 degrees of the pipe. In this case, the probe shall be run through the pipe a sufficient number of times to cover the entire coated surface. In a very large-diameter pipe, a hand-held probe may be used, provided the entire coated surface is holiday tested.

2.1.1.4 The probe back-up plates (Figures 1 and 2) shall be constructed of a material and in such a manner that they do not damage the coating.

2.1.2 Lance—The probe shall be attached to a lance that consists of a hollow, nonconductive tube to insulate the probe lead from the pipe.