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Test Method for Measurement of Peel Strength of Multilayer Polyolefin Coating Systems

ABSTRACT

This NACE International test method describes a reliable methodology for determining the peel strength of polyolefin-based multilayer pipeline coating systems, generally for coating thickness less than 12 mm (0.47 in). This standard provides a method to measure the peel strength of polyolefin-based multilayer coating systems, such as 2-layer polyethylene coating [2LPE], 3-layer polyethylene [3LPE], 3-layer polypropylene [3LPP], and heat shrink sleeve [HSS] field joint coating. It provides essential information on the quality of the applied coating. This is particularly important for field-applied coatings, of which the application process is significantly impacted by the environmental conditions and the skill set of the field applicators. This test method is intended for use by pipeline operating companies, pipeline owners, pipeline contractors, pipeline inspection services companies, and pipeline coating mills.

KEYWORDS

adhesive, ASTM D7091, coating systems, disbondment, epoxy, externally applied coatings, 2-layer polyethylene coating (2LPE), 3-layer polyethylene (3LPE), 3-layer polypropylene (3LPP), heat shrink sleeve (HSS), field-applied coatings, field joint coating, nondestructive measurements, peel test, peeling angle, pipelines, polyolefin, steel pipe, tape coatings, test samples test temperature, TG 520, STG 03, TM21420.

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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 are 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 International test method describes a reliable methodology for determining the peel strength of polyolefin-based multilayer pipeline coating systems, generally for coating thickness less than 12 mm (0.47 in). This standard provides a method to measure the peel strength of polyolefin-based multilayer coating systems, such as 2-layer polyethylene coating (2LPE), 3-layer polyethylene (3LPE), 3-layer polypropylene (3LPP), and heat shrink sleeve (HSS) field joint coating. It provides essential information on the quality of the applied coating. This is particularly important for field-applied coatings, of which the application process is significantly impacted by the environmental conditions and the skill set of the field applicators.

There have been several efforts in the past to develop a reliable field peel strength test method for coating systems. Current practice and standards allow using of different methods to measure peel strength, leading to inconsistent results. Examples include a method that uses a hand-held, spring-loaded gauge without control of the peeling speed and angle; and a hanging weight test method where the peeling angle varies with pipe size and position at the point of peeling. Although there are types of equipment capable of providing consistent peel test results as noted in ISO[(1)] 21809-1[1], the equipment is often complicated, heavy, more practical for in-house use, but inconvenient to operate in the field.

This test method establishes a relatively simple procedure to produce more consistent test data by using compact and light in weight equipment with good control of the peeling angle and speed. The effort to develop this method was led by representatives of coating manufacturers, coating applicators, equipment suppliers, corrosion specialists, and other personnel involved in the construction of pipeline facilities. This test method is intended for use by pipeline operating companies, pipeline owners, pipeline contractors, pipeline inspection services companies, and pipeline coating mills.

This NACE test method was prepared in 2018 by Task Group (TG) 520, "Pipeline Coating Peel Strength Test," which is administered by Specific Technology Group (STG) 03, "Coatings and Linings, Protective—Immersion and Buried Service." It is issued by NACE under the auspices of STG 03.

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(1) International Organization for Standardization (ISO), Chemin de Blandonnet 8, CP 401, 1214 Vernier, Geneva, Switzerland.

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