NACE International and IEEE Joint Standard Practice for

Below-Grade Corrosion Control of Transmission, Distribution, and Substation Structures by Coating Repair Systems

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"Electric Utility Generation, Transmission, and Distribution

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Abstract: This NACE/IEEE joint standard provides general coating repair guidelines for in-service carbon steel and galvanized steel electric transmission structures coated with polyurethanes, moisture cure urethane (MCU), coal tar, epoxy, coal tar epoxy, and cold-applied tape systems including petrolatum and polyethylene.

Key Words: below-grade, carbon steel, coal tar, coal tar epoxy, coatings, coating systems, coating repair systems, cold-applied tape systems, corrosion control, electric, electric distribution, electric substation, galvanized steel, IEEE 1839, MCU, epoxy, polyurethanes, SP0215, steel, transmission

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Foreword

The current procedure for assessing and repairing below-grade coatings on in-service steel electric transmission, distribution, and substation structures is a subject of much discussion.

This standard is intended for owners, applicators, field repair technicians, subcontractors, inspectors, and those interested in corrosion control of below-grade steel electric transmission, distribution, and substation structures by coatings.

A wide range of generic repair coatings including polyurethane, epoxies, bitumen-based coatings, alkyds, and hot- and cold-applied tape wrap systems are used for below-grade electric transmission structures. Various combinations of these coating systems as well as newly developed coating systems, are also in use. This presents a very complex array of possible coating systems that may have been applied to in-service electric transmission, distribution, and substation structures over the years.

This standard provides general coating repair guidelines for in-service carbon steel and galvanized steel electric transmission structures coated with polyurethanes, moisture cure urethane (MCU), coal tar, epoxy, coal tar epoxy, and cold-applied tape systems including petrolatum and polyethylene.

This standard was prepared in 2015 by NACE/IEEE Joint Task Group (TG) 386, "Below-Grade Corrosion Control of Transmission, Distribution, and Substation Structures by Coating Systems," which is administered by Specific Technology Group (STG) 41, "Electric Utility Generation, Transmission, and Distribution," and is sponsored by STG 03, "Coatings and Linings, Protective—Immersion and Buried Service," and STG 04, "Coatings and Linings, Protective—Surface Preparation." It is published by NACE under the auspices of STG 41, and by IEEE's corrosion working group: Power and Energy Society/Transmission and Distribution (PE/T&D/TPC-corrosion).

In NACE and IEEE standards, the terms *shall, must, should*, and *may* are used in accordance with the definitions of these terms in the *NACE Publications Style Manual* and the *IEEE-SA Standards 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.

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Contents

Section 1: Overview

1.1 Scope—This standard provides a procedure that shall be used to (1) identify electric transmission, distribution, and substation structures that may be at higher risk for below-grade coating degradation; (2) excavate and inspect the selected structure; (3) assess the level of risk to the structure in terms of corrosion attack and degradation to the existing coating system; (4) prioritize structures to be repaired based on those findings as to whether coating repair is needed and if so, to what extent; and (5) apply repair coatings to the structure, if applicable.

1.1.1 This standard is limited to assessment and repair of coating applied below grade and in the transition zone portions of carbon steel and galvanized steel electric transmission towers, grillage, and substation structures. It does not address assessment and repair of coatings above the transition zone. For the purposes of this standard, this area comprises of the below-grade portion, the transition zone, and is defined as that portion of the coating exposed up to 600 mm (24 in) above grade.

1.1.2 This standard does not address structural damage assessment, structural repairs, weathering steel, or structural integrity. This standard does not address concrete foundations or above-grade attachment points including anchor rods, attachment nuts, and noncoated ground sleeves. This standard does not address continuous immersion environments. This standard does not provide guidelines and repair procedures for coating systems for every specific situation because of the complexity and diverse nature of conditions to which buried structures may be exposed.

1.2 Purpose—This standard provides guidelines and repair procedures for coating systems most commonly applied to below-grade electric transmission structures and typical of what inspection and coating repair crews most often find.

Section 2: General

2.1 This standard applies to the repair of below-grade electric transmission structures that have up to 10% degradation of the excavated coated area as defined by SSPC[(1)]-VIS 2[1] and are subject to coating repair or, in some cases, local structural repairs. Electric transmission structures that have more than 10% coating degradation should be evaluated for structural repairs in addition to coating repairs. For the purposes of this standard, this area is composed of the below-grade portion, the transition zone, defined as that portion of the coating exposed up to 600 mm (24 in) above grade. Depth of current excavation and additional further excavation is dependent on the corrosiveness of soil conditions.

2.2 This standard refers to industry standards from ASTM International (ASTM),[(2)] NACE, and SSPC. In some cases these organizations have developed equivalent standards for a test method specified in this standard. It is not the intention of this standard to specify one organization's standard over another when equivalent standards are available. Where applicable, equivalent standards may be interchanged as deemed appropriate.

2.3 Before any of the guidelines in this standard are implemented, the inspection, assessment, and repair process shall be defined and agreed on in advance by the owner and all parties involved. Acceptance and rejection criteria, in addition to the methods and standards used to make determinations, shall be established before commencement of work. A plan of action that identifies priorities, objectives, and expectations for each aspect of the program shall also be developed. Typical considerations vary, but should include topics such as:

2.3.1 Project management

(a) Planning, scheduling, logistics, documentation, and reporting;

(b) Regulations, ordinances, permits, and maintenance of traffic (MOT);

(c) Labor, skills, and qualification of personnel;

(d) Safety, health, and environmental regulations;

[(1)]SSPC: The Society for Protective Coatings (SSPC), 40 24th Street, 6th Floor, Pittsburgh PA 15222-4656.
[(2)]ASTM International (ASTM), 100 Barr Harbor Dr., West Conshohocken, PA 19428-2959.