

Standard Practice

External Corrosion Control of Underground Storage Tank Systems by Cathodic Protection

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Foreword

This standard presents standard practices for effective control of external corrosion of underground storage tank (UST) systems by cathodic protection (CP). It is intended to be used by corrosion professionals as a guideline to establish minimum requirements for using CP to control external corrosion of metallic UST systems, including those used to contain oil, gas, and water. Specifically addressed is CP of:

- (a) Existing bare and externally coated steel USTs;
- (b) New externally coated steel USTs;
- (c) Metallic piping and flexible connectors; and
- (d) Other metallic components.

For further information on testing CP systems for UST systems, refer to NACE Standard TM0101.¹

This standard was originally published in 1985 by Task Group (TG) T-10A-14, "Control of External Corrosion on Metallic Buried, Partially Buried, or Submerged Liquid Storage Systems." The standard was revised in 1995 by TG T-10A-14, "Corrosion Control of Underground Storage Tank Systems," a component of Unit Committee T-10A, "Cathodic Protection." It was revised in 2002 and in 2011 by TG 011, "Corrosion Control of Underground Storage Tank Systems by Cathodic Protection." TG 011 is administered by Specific Technology Group (STG) 35, "Pipelines, Tanks, and Well Casings," and is sponsored by STG 05, "Cathodic/Anodic Protection." This standard is issued by NACE International under the auspices of STG 35.

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.

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**External Corrosion Control of Underground Storage Tank Systems
by Cathodic Protection**

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Section 1: General

1.1 Introduction

1.1.1 This standard presents standard practices for effective control of external corrosion of UST systems by CP. It is intended to serve as a guideline to establish minimum requirements for using CP to control external corrosion of metallic UST systems, including those used to contain oil, gas, and water, and that are buried, partially buried, or in contact with the soil.

1.1.2 When designing the CP system, the designer shall provide the owner with the design life and the assumptions used to develop the CP system design. If conditions change at the UST site, the original CP system design life may also change. Some examples of UST system changes include fluctuation in soil resistivity, UST system coating failure, adding or removing components of the UST system or site, and electrical shorting or isolation of UST components. This information should be kept as part of the permanent UST system records.

1.1.3 This standard does not designate specific practices for every situation because the complexity of some environmental conditions in which UST systems are buried precludes standardization of corrosion control practices.

1.1.4 This standard does not include corrosion control methods based on chemical control of the environment, internal linings, or the use of UST construction materials other than steel.

1.1.5 This standard does not override applicable safety codes and should not be used to infringe on the primary requirement of protecting personnel, the environment, and equipment. In any situation, the CP system design for UST systems should incorporate all requirements of any applicable codes, standards, and regulations as determined by authorities having jurisdiction.

1.1.6 The provisions of this standard shall be applied under the responsible direction of competent individuals. Such individuals must either be registered professional engineers, NACE International certified Corrosion Specialists or CP Specialists, or individuals qualified by professional education and related practical experience. All of the above individuals must be able to demonstrate suitable experience in corrosion control of UST systems.

1.1.7 Deviation from this standard may be warranted in specific situations provided the objectives expressed in this standard have been achieved.

1.1.8 For accurate and correct application of this standard, this standard must be used in its entirety. Using or referring to only specific paragraphs or sections can lead to misinterpretation and misapplication of the standard practices contained in the standard.

Section 2: Definitions

Anode: The electrode of an electrochemical cell at which oxidation occurs. (Electrons flow away from the anode in the external circuit. It is usually the electrode where corrosion occurs and metal ions enter solution.)

Backfill: Material placed in a hole to fill the space around the anodes, vent pipe, and buried components of a cathodic protection system.

Cathode: The electrode of an electrochemical cell at which reduction is the principal reaction. (Electrons flow toward the cathode in the external circuit.)

Cathodic Disbondment: The destruction of adhesion between a coating and the coated surface caused by products of a cathodic reaction.

Cathodic Polarization: (1) The change of electrode potential caused by a cathodic current flowing across the electrode/electrolyte interface; (2) a forced active (negative) shift in electrode potential. (See *Polarization*.)

Cathodic Protection: A technique to reduce the corrosion rate of a metal surface by making that surface the cathode of an electrochemical cell.