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Standard Practice

Electrical Isolation of Cathodically Protected Pipelines

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NACE International
1440 South Creek Drive
Houston, Texas 77084-4906
+1 281/228-6200

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Foreword

This standard practice is to be used in conjunction with the latest revisions of NACE SP0169[1] and SP0177.[2] Each of these standards refers to electrical isolation or isolation joints, but details are not provided. This standard, which was prepared to supplement those standards, provides engineers, designers, and technical personnel dealing with pipelines the necessary information to isolate cathodically protected pipelines electrically.

This standard was originally prepared in 1986 and revised in 1997 by former Task Group T-10A-15 on Electrical Isolation of Cathodically Protected Pipelines, a component of Unit Committee T-10A on Cathodic Protection. The standard was reaffirmed in 2002 and 2007 by Specific Technology Group (STG) 35 on Pipelines, Tanks, and Well Casings. It 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, 4th ed., Paragraph 7.4.1.9. *Shall* and *must* are used to state mandatory requirements. The term *should* is used to state something good and is recommended but is not mandatory. The term *may* is used to state something considered optional.

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Section 1: General

1.1 This standard explains the importance of pipeline electrical isolation in achieving and maintaining adequate, reliable, and economical corrosion control. The standard outlines the types of devices used for isolation; precautions to be observed; and selection of devices based on pipeline characteristics, site, and contents. The standard describes isolating flanges, gaskets, sleeves, washers, joints, unions, couplings, and spools, and discusses materials for pipeline casing isolation. Installation, field testing, and maintenance of isolating devices are also included.

1.2 This standard describes the application of isolating devices intended only for cathodic protection (CP) purposes when voltages across the isolating device are 1 to 2 volts direct current (DC) and the alternating current (AC) exposure does not exceed 15 volts root mean square (rms).[3]

1.3 This standard does not discuss situations in which isolating devices are incorporated purely for safety reasons; in those situations, reference should be made to relevant electrical safety codes. Isolating devices shall not be used in enclosed areas where combustible atmospheres are likely to be present.

1.4 Isolation of cathodically protected pipelines is recommended to minimize current requirements, facilitate testing and troubleshooting, and improve current distribution.

Section 2: Definitions

Refer to the NACE International Glossary of Corrosion-Related Terms[4] for definitions.

Section 3: Need for Isolation

3.1 CP current intended for a given pipeline can flow to other underground facilities or equipment electrically connected to the pipeline. If protection of the other underground facilities is not intended, significant CP current can be lost unless preventive measures are taken. Generally called a current drain, this current loss can be reduced through electrical isolation of the pipeline.

3.2 CP even of well coated pipelines may not be economical or practical unless electrical isolation is achieved.

3.3 Pipeline casings should be electrically isolated from the carrier pipe.

3.4 If a pipeline passes through the wall of a valve pit or a building, metallic contact can occur between the pipe and the steel reinforcement in the concrete, causing a significant loss of protective current.

3.5 Electrical isolation can minimize or eliminate galvanic corrosion caused by dissimilar metals in contact with each other or caused by similar metals in contact with each other when one metal is bare or has a dielectric coating system while the other has a permeable (e.g., concrete or mortar) coating system.

3.6 If a pipeline is designed to be electrically continuous but is supported by another metallic structure in contact with soil or groundwater, the pipeline should be isolated from that structure. The isolating supports must prevent damage to the pipeline coating and must accommodate relative movement, vibration, and temperature differential.

3.7 Isolation of power and instrumentation grounding systems may be required when electrically operated valves and similar components form part of a pipeline system. All applicable safety codes and standards must be followed.

3.8 If a pipeline is to be protected by more than one type of CP system, isolation of one or more sections may be desirable.

3.9 Isolation of pipelines can be beneficial in controlling or limiting the effect of stray currents such as telluric currents, currents associated with an electric traction system, or currents from nearby structures under CP.