NACE Standard RP0297-2004
Item No. 21081

Standard
Recommended Practice

Maintenance Painting of Electrical Substation Apparatus Including Flow Coating of Transformer Radiators

This NACE International standard represents a consensus of those individual members who have reviewed this document, its scope, and provisions. Its acceptance does not in any respect preclude anyone, whether he has adopted the standard or not, from manufacturing, marketing, purchasing, or using products, processes, or procedures not in conformance with this standard. Nothing contained in this NACE International standard is to be construed as granting any right, by implication or otherwise, to manufacture, sell, or use in connection with any method, apparatus, or product covered by Letters Patent, or as indemnifying or protecting anyone against liability for infringement of Letters Patent. This standard represents minimum requirements and should in no way be interpreted as a restriction on the use of better procedures or materials. Neither is this standard intended to apply in all cases relating to the subject. Unpredictable circumstances may negate the usefulness of this standard in specific instances. NACE International assumes no responsibility for the interpretation or use of this standard by other parties and accepts responsibility for only those official NACE International interpretations issued by NACE International in accordance with its governing procedures and policies which preclude the issuance of interpretations by individual volunteers.

Users of this NACE International standard are responsible for reviewing appropriate health, safety, environmental, and regulatory documents and for determining their applicability in relation to this standard prior to its use. This NACE International standard may not necessarily address all potential health and safety problems or environmental hazards associated with the use of materials, equipment, and/or operations detailed or referred to within this standard. Users of this NACE International standard are also responsible for establishing appropriate health, safety, and environmental protection practices, in consultation with appropriate regulatory authorities if necessary, to achieve compliance with any existing applicable regulatory requirements prior to the use of this standard.

CAUTIONARY NOTICE: NACE International standards are subject to periodic review, and may be revised or withdrawn at any time without prior notice. NACE International requires that action be taken to reaffirm, revise, or withdraw this standard no later than five years from the date of initial publication. The user is cautioned to obtain the latest edition. Purchasers of NACE International standards may receive current information on all standards and other NACE International publications by contacting the NACE International Membership Services Department, 1440 South Creek Drive, Houston, Texas 77084-4906 (telephone +1 [281] 228-6200).

Reaffirmed 2004-03-31
Approved 1997-06-27
NACE International
1440 South Creek Dr.
Houston, Texas 77084-4906
+1 (281)228-6200

ISBN 1-57590-042-4

Foreword

Aspects of normal industrial maintenance painting such as surface preparation, coating selection, application methods, and safety considerations are subject to entirely different rules when placed within the confines of an energized, high-voltage substation. With utilities and industries attempting to obtain maximum use of their systems, transmission and distribution apparatus are being pushed to the limits of their designed service life. Properly engineered and implemented maintenance painting programs protect equipment from the detrimental effects of corrosion and help it perform to the fullest extent of its operating life.

Maintenance personnel for utilities and large industrial concerns who are responsible for maintenance painting of electrical equipment are primarily electrical engineers or have their background in electrical work. These individuals often have little, if any, practical knowledge of corrosion and its control. Consequently, many specifications that are poorly written, incomplete, and technically inaccurate are being used. This standard has been prepared to assist maintenance personnel responsible for painting electrical equipment.

A sample specification is included in Appendix A. This specification provides an example of one of the many types of specifications currently used by the industry. NACE International neither endorses nor recommends the use of this sample specification. It is provided for information only.

This standard was originally prepared in 1997 by NACE International Task Group T-6H-50, a component of former Unit Committee T-6H on Coating Materials for Atmospheric Service. It was reaffirmed in 2004 by Specific Technology Group (STG) 02 on Protective Coatings and Linings—Atmospheric. This standard is issued by NACE under the auspices of STG 02.

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 considered good and is recommended but is not mandatory. The term *may* is used to state something considered optional.

NACE International
Standard
Recommended Practice

Maintenance Painting of Electrical Substation Apparatus Including Flow Coating of Transformer Radiators

Contents

Section 1: General

1.1 This standard recommended practice provides standards for preparing specifications and procedures for coating electrical substation apparatus.

1.2 This standard is designed to introduce owners, engineers, maintenance personnel, and contractors to the four unique aspects of substation coating:

- Safety Considerations
- Surface Preparation for Radiators
- Coating Selection
- Application (Flow Coating)

1.3 This standard:

1.3.1 Informs the reader of the factors that make electrical substation coating unique among all other forms of industrial maintenance painting and highlights special factors such as worker safety and coating of radiators.

1.3.2 Provides owners, engineers, and maintenance personnel with a sample specification they may modify to meet their specific requirements.

1.4 This standard deals only with substation apparatus, which include:

- Transformers
- Circuit breakers (all types)
- Switchgear
- Regulators
- Potential transformers
- Current transformers
- Coupling capacitor potential devices (CCPDs)

1.5 This standard does not include the painting of structural steel, fencing, buildings, or other miscellaneous items within the substations.

Section 2: Purpose of Coating Electrical Substation Apparatus

2.1 Electrical substation apparatus is coated for one or more of the following reasons:

2.1.1 To protect the metal portions of the apparatus from corrosion.

2.1.2 To help a substation blend in with the surrounding environment.

2.1.3 To improve the cosmetic appearance of the apparatus.

2.1.4 To improve or maintain the efficiency of transformer radiators.

2.1.5 To draw attention to important indicators (e.g., circuit breakers or switch open/close indicators that tell operators whether a breaker is open [meaning the circuit is cut out] or closed [meaning the circuit is in service]) or dangerous high-voltage areas (e.g., breaker closure switches, bushing caps).

Section 3: Safety Considerations

3.1 No industrial maintenance painting project is exempt from safety considerations. Precautions that are taken on other jobs, such as fall protection, lockout/tagout procedures, worker protection from abrasive blasting and coating operations, and all other typical precautions must also be observed when coating substations. However, working in a substation exposes personnel to a hidden and potentially fatal danger: **high voltages and the associated lethal current**.

3.2 Danger of Electrical Accidents: To be in danger of electrical shock it is not necessary to make actual physical contact with an energized conductor. The high voltages found in substations have the capability and the inclination to pass through air space to strike a worker. The actual amount of air space that may be spanned varies with voltage. Minimum safe working clearances from energized components are given in Table 1.

3.3 Existing Safety Procedures: All utilities and many industrial customers have written procedures and policies designed to address the inherent danger when working in energized substations. The owner must review these safety policies and procedures with the contractor and maintenance personnel before they work on or around energized high-voltage apparatus. All personnel must review and learn these procedures in order to ensure that they are familiar with the required safety practices.