



NACE Standard RP0292-2003
Item No. 21054

Standard Recommended Practice

Installation of Thin Metallic Wallpaper Lining in Air Pollution Control and Other Process Equipment

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Foreword

Extremely corrosive conditions are encountered by certain types of air pollution control equipment. Such equipment is subject to wide temperature fluctuations and formations of condensates of sulfuric, sulfurous, and other acids. High-performance metals and alloys are increasingly being used to resist these environments. The application of these materials to a carbon steel or other substrate as thin metallic linings is commonly called *wallpapering*. Wallpapering has been identified as a practical and effective method of providing anti-corrosive linings in both new equipment and retrofit installations. Wallpapering is widely applied in response to power industry (utility) flue gas desulfurization (FGD) experiences, and is equally applicable to use in other air pollution control and process equipment subject to corrosive conditions.

This standard recommended practice provides technical and quality assurance guidelines for handling and installing nickel alloy, stainless steel, and titanium linings in air pollution control equipment (e.g., FGD systems, ducts, and stacks). The concepts and guidance included in this standard may also be useful in other process industries, but may require modification to meet the requirements of a particular process. This standard is intended to be a basis for preparation of a specification to be agreed on by contracting parties for the installation of wallpaper lining in process equipment. It is the responsibility of users of this standard to determine the suitability of specific procedures, metals, and alloys for particular applications.

This standard recommended practice is intended for use by those specifying and installing thin metallic linings (stainless steel, nickel alloy, and titanium) in air pollution control equipment and process equipment subject to corrosive conditions.

This standard was originally prepared in 1992 by Task Group T-5F-5 of NACE Unit Committee T-5F on Corrosion Problems Associated with Pollution Control and revised by that task group in 1998. This 2003 revision was prepared by Task Group (TG) 129 on Flue Gas Desulfurization (FGD) Welding Techniques. TG 129 is administered by Specific Technology Group (STG) 45 on Pollution Control, Waste Incineration, and Process Waste. This standard is issued by NACE International under the auspices of STG 45.

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.

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Section 1: General

1.1 This standard provides technical and quality assurance guidelines for handling and installing nickel alloy, stainless steel, and titanium linings in air pollution control equipment such as FGD systems, ducts, and stacks.

1.2 The techniques recommended in this standard are also applicable to installation of thin, high-performance metallic linings in a wide variety of other process equipment. However, titanium welding procedures contained herein are only applicable to seal welds in air pollution control equipment.

1.3 It is the responsibility of users of this standard to determine the suitability of construction materials specified for particular applications.

1.4 This standard is applicable to wallpapering materials of 1.6- to 3.20-mm (0.063- to 0.125-in.) thickness applied as linings over new or existing metallic structures. General, commercial, and safety conditions, etc., are beyond the scope of this standard. It is assumed that users will develop these requirements in accordance with their individual needs.

1.5 New and improved welding techniques as well as new alloys applicable to wallpaper installation are being developed. References to specific weld designs and techniques in this standard are not intended to preclude the use of newer technology. Use of alternative methods shall be mutually agreed on by all contractual parties after adequate engineering analysis.

1.6 In this standard, ASME⁽¹⁾ material specifications may be used in place of ASTM⁽²⁾ specifications.

1.7 While the techniques described in this standard have demonstrated high levels of success, some extreme environmental and/or design conditions encountered in the use of air pollution control equipment can result in corrosive conditions so severe that even the most corrosion-resistant construction material will occasionally fail. Such failures generally affect a relatively small percentage of the total lined surface and may require periodic maintenance.

Section 2: Installation of Nickel Alloy Linings

2.1 Materials

2.1.1 Nickel alloys with a nominal content of at least 9% molybdenum (Mo) shall be selected in accordance with the requirements of the particular application and ASTM specifications. Superaustenitic stainless steels are addressed in Section 3.

2.2 Delivery, Storage, and Handling

2.2.1 All lining alloys shall be stored and handled in a manner that does not result in damage to or contamination of the alloys.

2.2.2 All lining alloys (including cut or formed pieces) shall be marked to maintain material identity and separation. These identifying marks shall not be made in such a way as to contribute to corrosion of the alloy.

2.3 Design Factors

2.3.1 All installation details shall be approved by the purchaser before work begins. A complete layout plan shall be reviewed, and pieces shall be marked according to the plan. Figures 1 through 5 illustrate layout

details. All reasonable efforts should be made to minimize welding.

2.3.2 Weld size shall be agreed on by the contracting parties. Guidelines are provided in Appendix A.

2.3.3 All internal structural attachments shall be made to the existing substrate. The lining alloys shall not be used to support any internal or temporary supports.

2.3.4 Joints between lining alloys shall be lap joints (see Figures 1 and 2). Lap joints should have a nominal 25-mm (1.0-in.) overlap. The overlap shall not be less than 6.0 mm (0.25 in.). The alloys forming a lap joint shall be held in as close contact as possible, and the separation shall not be more than 1.6 mm (0.063 in.)

2.3.5 Joining alloy linings in corners should be avoided because corner seal welds are difficult to make and to properly inspect. The method to be used shall be agreed on by the purchaser and installer. Two methods that have been used to avoid this problem are illustrated in Figures 3, 4, and 5.

⁽¹⁾ ASME International, Three Park Avenue, New York, NY 10016-5990.

⁽²⁾ ASTM International, 100 Barr Harbor Dr., West Conshohocken, PA 19428-2959.