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Standard Practice

Application of a Coating System to Interior Surfaces of New and Used Rail Tank Cars

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Foreword

This standard practice has been prepared for the rail car industry to address the need for high-quality application of coatings to the interior surfaces of rail tank cars handling a variety of chemicals at various temperatures. Qualified inspection of the completed coating system and testing by the use of adequate, readily available instruments also are covered. Coating manufacturers, coating applicators, and those who have contracting authority for car internal coating installation should be able to use this standard to ascertain the facilities, equipment, and personnel needed to satisfy the requirements for coating systems for cars in chemical service.

This standard emphasizes that corrosion and product contamination are major factors that must be considered in the design of tank cars transporting liquid commodities. In addition to adhering to the conditions set forth in this standard, these tank cars must comply with U.S. Department of Transportation (DOT)⁽¹⁾ Code of Federal Regulations (CFR) Title 49, Part 179,¹ Transport Canada (Transportation of Dangerous Goods [TDG])⁽²⁾ CAN/CGSB⁽³⁾ 43-147,² and Association of American Railroads (AAR)⁽⁴⁾ Standard M1002.³ This standard is not meant to provide a full treatise on corrosion of steel by chemicals, which is an extensive subject in its own right.

Although most coatings are applied to prevent shipped product from being contaminated by a corroding tank car, DOT and AAR are attempting to resolve the issue of how much corrosion should be allowed in tank cars. One factor to consider when adding a corrosion allowance is the required life of the tank car. The extra wall thickness of a tank car that is expected to be in service for 40 to 50 years can add substantially to the tank car's weight and result in a severe reduction in carrying capacity. In cars handling corrosive liquids, adding a corrosion allowance without any other form of corrosion protection is clearly not a practical solution for long-term operation.

This standard was originally developed in 1995 by NACE International Task Group (TG) T-14C-6, a component of Unit Committee T-14C—Rail Equipment Corrosion. It was reaffirmed in 2003 by Specific Technology Group (STG) 43—Land Transportation. It was revised in 2008 by Task Group 333—Application of a Coating System to Interior Surfaces of New and Used Rail Tank Cars, and is issued by NACE under the auspices of STG 43.

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.

⁽¹⁾ U.S. Department of Transportation (DOT), 400 7th St. SW, Washington, DC 20590.

⁽²⁾ Transport Canada (TDG), 330 Sparks Street, Ottawa, ON K1A 0N5 Canada.

⁽³⁾ Canadian General Standards Board (CGSB), Ottawa, ON K1A 1G6 Canada.

⁽⁴⁾ Association of American Railroads (AAR), 50 F St. NW, Washington, DC 20001-1564.

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Section 1: General

1.1 This standard describes a procedure for the application of a coating system to the interior surfaces of new and used rail tank cars that transport various commodities.

1.2 The requirements for surface preparation, coatings, application, inspection, and quality tests for coating a tank car internally also are covered in this standard.

1.3. Liquid coatings discussed in this standard may be hazardous; therefore, basic safety precautions regarding the handling and application of these coating materials and solvents shall be used. NACE TPC 2⁴ contains more

detailed information in its chapter on safety. The material safety data sheets (MSDSs) supplied by the coating manufacturer provide additional information relative to government regulations.

1.4 Appendix A (nonmandatory) is an example of a suggested tank car coating system inspection report form.

1.5 Appendix B (nonmandatory) describes essential facilities and equipment for application of a coating system to the interior of tank cars.

Section 2: Definitions

Car Owner: The person or firm that owns the tank car. (This person or firm may also be the contracting authority.)

Coat: One layer of a coating applied to a surface in a single continuous application to form a uniform film when dry.

Coating Applicator: The firm that is executing the specified work.

Coating System: The complete number and types of coats applied to a substrate in a predetermined order. (When used in a broader sense, surface preparation, pretreatments, dry film thickness, and manner of application are included.)

Contracting Authority: The person or firm responsible for the approval and purchase of a completed tank car coating system.

Crater: A small, rounded depression in a coating generally resulting from foreign matter in or deposited on a wet coating film.

Discontinuity: (1) An interruption in the normal physical structure or configuration of a coating such as cracks, laps, seams, inclusions, porosity, or holidays. A discontinuity may or may not affect the usefulness of the coating. (2) A condition in which the electrical path of a structure is interrupted by a device that acts as a dielectric or insulating fitting.

Dry Film Thickness (DFT): The thickness of a dried film, coating, or membrane.

DFT Measurement: An average of three DFT readings.

DFT Reading: A single DFT gauge determination.

Holiday: A discontinuity in a protective coating that exposes unprotected surface to the environment.

Holiday Detector: An instrument that locates discontinuities in a coating film applied to a conductive surface.

Inspection Agency: The party charged with the responsibility for inspection.

Orange Peel: The dimpled appearance of a dried coating resembling the surface of an orange.

Pinhole: A minute hole through a coat or coats that exposes an underlying coat or the substrate.

Pit: A surface anomaly. A cavity, usually round in shape, with depth equal to or greater than the diameter at the opening.

Pot Life: The elapsed time within which a coating can be effectively applied after all components of the coating have been thoroughly mixed.

Quality Assurance: All those planned and systematic actions necessary to provide specified documentation and adequate confidence that the tank car coating system will perform satisfactorily in service.

Quality Control: Those quality assurance actions related to the physical characteristics of the entire coating system's application as a means of providing compliance with specified requirements.

Shelf Life: The maximum length of time packaged materials (e.g., coating materials) can be stored at specified conditions and remain in usable condition.