AMPP SP21485-2022
Approved August 8, 2022

Citric Acid-Based Passivation of Maritime Stainless Steel Storage Tanks

Citric Acid-Based Passivation of Maritime Stainless Steel Storage Tanks

This AMPP 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 or she 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 AMPP 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. AMPP assumes no responsibility for the interpretation or use of this standard by other parties and accepts responsibility for only those official AMPP interpretations issued by AMPP in accordance with its governing procedures and policies which preclude the issuance of interpretations by individual volunteers.

Users of this AMPP 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 AMPP 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 AMPP 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CAUTIONARY NOTICE: AMPP standards are subject to periodic review and may be revised or withdrawn at any time in accordance with AMPP technical committee procedures. AMPP requires that action be taken to reaffirm, revise, or withdraw this standard no later than five years from the date of initial publication and subsequently from the date of each reaffirmation or revision. The user is cautioned to obtain the latest edition. Purchasers of AMPP standards may receive current information on all standards and other AMPP/NACE/SSPC publications by contacting AMPP Customer Support, 15835 Park Ten Place, Houston, Texas 77084-5145 (Tel: +1 281-228-6200, email: customersupport@ampp.org).

Document History
2022-08-08: Developed by AMPP Standards Committee (SC) 19, Maritime

AMPP values your input. To provide feedback on this standard, please contact: standards@ampp.org

Citric Acid-Based Passivation of Maritime Stainless Steel Storage Tanks

Foreword

This AMPP standard practice presents guidelines and minimum requirements for citric acid based passivation of marine storage tanks to identify good cleaning practices and improve corrosion resistance. This standard is intended for use by shipboard personnel, ship owning organizations, commodity owners, tank readiness surveyors, chemical producing organizations, ship surveyors and other stake holders.

Scope

This standard covers passivation of maritime stainless steel storage and cargo tanks, and associated stainless steel piping when necessary, using a solution of citric acid. It includes guidelines and precautions for cleaning and passivation of stainless steel tanks in marine tanker vessels.

Rationale

This standard describes the passivation process for the interior of maritime stainless steel storage and cargo tanks using citric acid, and the parameters used for this. This process has traditionally been performed using nitric acid, which presents personal and environmental hazards. The use of citric acid results in a significant reduction of these hazards.

In AMPP standards, the terms *shall* and *must* are used to state requirements and are considered mandatory. The term *should* is used to state something that is recommended, but is not considered mandatory. The term *may* is used to state something considered optional.

Referenced Standards and Other Consensus Documents

The latest edition, revision, or amendment of the referenced documents in effect shall govern unless otherwise dated.

***AMPP/NACE/SSPC, www.ampp.org*:**

SSPC-Guide 15	Field Methods for Retrieval and Analysis of Soluble Salts on Steel and Other Nonporous Substrates

Section 1: General

1.1 Stainless steel surfaces naturally passivate because of the protective passive metal oxide film forming spontaneously on exposure to air. The presence of exogenous surface contamination, including dirt, grease, free iron from contact with steel tooling, and so forth, can interfere with the formation or reformation of the passive metal oxide film. The removal of these contaminants from the stainless steel surface facilitates the spontaneous passivation by allowing the oxygen uniform access to the surface. The removal of iron from the alloy at the metal surface also enhances the passive metal oxide film that is formed.

1.2 In this standard, passivation is defined as the chemical treatment of a stainless steel surface with an acid solution, including any necessary precleaning, for the purpose of the removal of surface free iron and foreign matter. Nitric acid and citric acid are generally used for this purpose. Due to the environmental and personal hazards associated with nitric acid, this standard includes the use of citric acid only.

1.3 Tanks should be passivated upon initial fabrication or installation, and again as needed, based on use. The transport of corrosive cargos generally leads to passivation being performed sooner or more often. Stainless steel surfaces should also be passivated after welding, removal of corrosion, or other maintenance operations that cause damage to the passive metal oxide film.

1.4 The passivation treatment chemistry and process described in this standard is applicable to iron removal with all grades of stainless steel and many nonferrous metals and alloys. The method described in this standard is applicable specifically to the interiors of tanks, but other stainless steel surfaces may be treated in accordance with the process parameters described, using appropriate methods.

1.5 Users of this standard shall be responsible for specifying applicable safety, health, and environmental practices to ensure compliance with all applicable regulations, including compliance with insurance requirements and directives.