

Linings of Aboveground Petroleum Storage Tank Bottoms

API RECOMMENDED PRACTICE 652
THIRD EDITION, OCTOBER 2005



Currently in preview, click buy full version

Lining of Aboveground Petroleum Storage Tank Bottoms

Downstream Segment

API RECOMMENDED PRACTICE 652
THIRD EDITION, OCTOBER 2005



SPECIAL NOTES

API publications necessarily address problems of a general nature. With respect to particular circumstances, local, state, and federal laws and regulations should be reviewed.

Neither API nor any of API's employees, subcontractors, consultants, committees, or other assignees make any warranty or representation, either express or implied, with respect to the accuracy, completeness, or usefulness of the information contained herein, or assume any liability or responsibility for any use, or the results of such use, of any information or process disclosed in this publication. Neither API nor any of API's employees, subcontractors, consultants, or other assignees represent that use of this publication would not infringe upon privately owned rights.

API publications may be used by anyone desiring to do so. Every effort has been made by the Institute to assure the accuracy and reliability of the data contained in them; however, the Institute makes no representation, warranty, or guarantee in connection with this publication and hereby expressly disclaims any liability or responsibility for loss or damage resulting from its use or for the violation of any authorities having jurisdiction with which this publication may conflict.

API publications are published to facilitate the broad availability of proven sound engineering and operating practices. These publications are not intended to obviate the need for applying sound engineering judgment regarding when and where these publications should be utilized. The formulation and publication of API publications are not intended in any way to inhibit anyone from using any other practices.

Any manufacturer marking equipment or materials in accordance with the marking requirements of an API standard is solely responsible for complying with all the applicable requirements of that standard. API does not represent, warrant, or guarantee that such products do in fact conform to the applicable API standard.

All rights reserved. No part of this work may be reproduced, stored in a retrieval system, or transmitted by any means, electronic, mechanical, photocopying, recording, or otherwise, without prior written permission from the publisher. Contact the Publisher, API Publishing Services, 1220 L Street, N.W., Washington, D.C. 20005.

FOREWORD

Nothing contained in any API publication is to be construed as granting any right, by implication or otherwise, for the manufacture, sale, or use of any method, apparatus, or product covered by letters patent. Neither should anything contained in the publication be construed as insuring anyone against liability for infringement of letters patent.

This document was produced under API standardization procedures that ensure appropriate notification and participation in the developmental process and is designated as an API standard. Questions concerning the interpretation of the content of this publication or comments and questions concerning the procedures under which this publication was developed should be directed in writing to the Director of Standards, American Petroleum Institute, 1220 L Street, N.W., Washington, D.C. 20005. Requests for permission to reproduce or translate all or any part of the material published herein should also be addressed to the director.

Generally, API standards are reviewed and revised, reaffirmed, or withdrawn at least every five years. A one-time extension of up to two years may be added to this review cycle. Status of the publication can be ascertained from the API Standards Department, telephone (202) 682-8000. A catalog of API publications and materials is published annually and updated quarterly by API, 1220 L Street, N.W., Washington, D.C. 20005.

Suggested revisions are invited and should be submitted to the Standards and Publications Department, API, 1220 L Street, NW, Washington, DC 20005, standards@api.org.

Currently in preview, click buy full version

CONTENTS

	Page
1 SCOPE.....	1
2 REFERENCES	1
2.1 Codes, Standards, and Specifications	1
2.2 Other References	2
3 DEFINITIONS.....	2
4 CORROSION MECHANISMS	4
4.2 Chemical Corrosion.....	4
4.3 Concentration Cell Corrosion	4
4.4 Galvanic Cell Corrosion	4
4.5 Corrosion Caused by Sulfate-Reducing Bacteria	4
4.6 Erosion-Corrosion	5
4.7 Fretting-Related Corrosion	5
5 DETERMINATION OF THE NEED FOR TANK BOTTOM LINING	5
5.2 Linings for Corrosion Prevention	5
5.3 Tank Corrosion History	5
5.4 Tank Foundation	5
6 TANK BOTTOM LINING SELECTION	6
6.2 Thin-Film Tank Bottom Linings	6
6.3 Thick-Film, Reinforced Tank Bottom Linings	7
6.4 Thick-Film, Un-reinforced Linings	8
6.5 Circumstances Affecting Lining Selection	8
7 SURFACE PREPARATION	9
7.2 Pre-cleaning	10
7.3 Bottom Repair and Weld Preparation	10
7.4 Environmental Conditions During Blasting	10
7.5 Surface Profile or Anchor Pattern	10
7.6 Air and Abrasive Cleanliness	10
7.7 Removal of Dust	11
8 LINING APPLICATION	11
8.2 Guidelines for Lining Application.....	11
8.3 Temperature and Humidity Control	11
8.4 Lining Thickness	11
8.5 Lining Curing.....	11
9 QUALITY CONTROL INSPECTION.....	11
9.1 General.....	11
9.2 Qualification of Inspection Personnel	12
9.3 Recommended Inspection Parameters	12
10 EVALUATION AND REPAIR OF EXISTING LININGS	12
10.2 Evaluation Methods	12
10.3 Evaluation Criteria for Linings.....	12

CONTENTS

	Page
10.4 Evaluating Serviceability of Existing Linings	12
10.5 Determining the Cause of Lining Degradation/Failure	13
10.6 Lining Repair and Replacement	13
11 MAXIMIZING LINING SERVICE LIFE BY PROPER MATERIAL SELECTION AND SPECIFICATION	13
11.1 Lining Material Selection	14
11.2 Written Specification	14
12 SAFETY	4
12.1 General	14
12.2 Tank Entry	14
12.3 Surface Preparation and Lining Application	14
12.4 Manufacturer's Material Safety Data Sheets	14
Tables	
1 Thin-film Tank Bottom Lining Systems	6
2 Thick-film, Tank Bottom Lining Resins	7

Linings of Aboveground Storage Tank Bottoms

1 Scope

This recommended practice provides guidance on achieving effective corrosion control in aboveground storage tanks by application of tank bottom linings. It contains information pertinent to the selection of lining materials, surface preparation, lining application, cure, and inspection of tank bottom linings for existing and new storage tanks. In many cases, tank bottom linings have proven to be an effective method of preventing internal corrosion of steel tank bottoms.

The intent of this recommended practice is to provide information and guidance specific to aboveground steel storage tanks in hydrocarbon service. Certain practices recommended herein may also be applicable to tanks in other services. This recommended practice is intended to serve only as a guide. Detailed tank bottom lining specifications are not included.

This recommended practice does not designate specific tank bottom linings for every situation because of the wide variety of service environments.

NACE No.10/SSPC-PA 6 and NACE No. 11/SSPC-PA 8 are industry consensus standards for installation of linings on tank floors and vessels. They are written in compulsory language and contain specific criteria intended for use by persons who provide written specifications for tank and vessel linings. These documents should be given consideration when designing and installing a lining system for steel tank bottoms.

2 References

2.1 CODES, STANDARDS, AND SPECIFICATIONS

Unless otherwise specified, the most recent edition or revision of the following standards, codes, or specifications shall, to the extent specified herein, form a part of this recommended practice.

API

- RP 575 *Inspection of Atmospheric and Low-Pressure Storage Tanks*
- Std 620 *Design and Construction of Large, Welded, Low-Pressure Storage Tanks*
- Std 650 *Welded Steel Tanks for Oil Storage*
- RP 653 *Cathodic Protection of Aboveground Petroleum Storage Tanks*
- Std 653 *Tank Inspection, Repair, Alteration, and Reconstruction*
- Std 2015 *Requirements for Safe Entry and Cleaning of Petroleum Storage Tanks*
- RP 2016 *Guidelines and Procedures for Entering and Cleaning Petroleum Storage Tanks*

ASTM¹

- D 2583 *Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor*
- D 4414 *Standard Practice for Measurement of Wet Film Thickness by Notch Gauges*
- D 4417 *Standard Test Methods for Field Measurement of Surface Profile of Blast-Cleaned Steel*
- D 4940 *Standard Test Method for Conductometric Analysis of Water Soluble Ionic Contaminants of Blasting Abrasives*
- D 5402 *Standard Practice for Assessing the Solvent Resistance of Organic Coatings Using Solvent Rubs*
- E 96 *Standard Test Methods for Water Vapor Transmission of Materials*
- G 9 *Standard Test Method for Water Penetration into Pipeline Coating*

DEFENSE²

- Defense Standard 8-97 *Paint System, Medium Build for the Interior of Bulk Fuel Tanks and Fittings*

Military Standards³

- MIL-PRF 4556 *Coating Kit, Epoxy for Interior of Steel Fuel Tanks*
- 23236 *Coating Systems for Ship Structures*

NACE⁴

- 37519 *Corrosion Data Survey—Metals Section*
- TM0174 *Laboratory Methods for the Evaluation of Protective Coatings and Lining Materials on Metallic Substrates in Immersion Service*
- RP0188 *Discontinuity (Holiday) Testing of New Protective Coatings on Conductive Substrates*

¹ASTM International, 100 Bar Harbor Drive, West Conshohocken, Pennsylvania, 19428-2959. www.astm.org.

²UK Defence Standardization, Room 1138, Kentigern House, 65 Brown Street, Glasgow, G2 8EX. www.dstan.mod.uk.

³Department of Defense Single Stock Point, 700 Robbins Avenue, Building 4/Section D, Philadelphia, Pennsylvania, 19111-5098. www.dodssp.daps.dla.mil.

⁴NACE International, 1440 South Creek Drive, P.O. Box 218340, Houston, Texas 77218-8340. www.nace.org.