

Recommended Practice for Internal Coating of Line Pipe for Non-corrosive Gas Transmission Service

API RECOMMENDED PRACTICE 5L2
FOURTH EDITION, JULY 2002

REAFFIRMED, MAY 2015



AMERICAN PETROLEUM INSTITUTE

Recommended Practice for Internal Coating of Line Pipe for Non-corrosive Gas Transmission Service

Upstream Segment

API RECOMMENDED PRACTICE 5L2
FOURTH EDITION, JULY 2002

REAFFIRMED, MAY 2015



AMERICAN PETROLEUM INSTITUTE

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.

API is not undertaking to meet the duties of employers, manufacturers, or suppliers to warn and properly train and equip their employees, and others exposed, concerning health and safety risks and precautions, nor undertaking their obligations under local, state, or federal laws.

Information concerning safety and health risks and proper precautions with respect to particular materials and conditions should be obtained from the employer, the manufacturer or supplier of that material, or the material safety data sheet.

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.

Generally, API standards are reviewed and revised, reaffirmed, or withdrawn at least every five years. Sometimes a one-time extension of up to two years will be added to this review cycle. This publication will no longer be in effect five years after its publication date as an operative API standard or, where an extension has been granted, upon republication. Status of the publication can be ascertained from the API Upstream Segment [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.

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 standard or comments and questions concerning the procedures under which this standard was developed should be directed in writing to the standardization manager, 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 general manager.

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

Any manufacturer marking equipment or materials in conformance 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.

Copyright © 2002 American Petroleum Institute

FOREWORD

This Recommended Practice is under the jurisdiction of the Subcommittee on Tubular Goods of the American Petroleum Institute. It was prepared by a Formulating Committee which included representatives of Pipeline Operators and Line Pipe Manufacturers and advisors from coating manufacturers and coating applicators as well as other interested individuals.

The purpose of this Recommended Practice is to present methods of qualifying coating materials, production application of such materials, and a final acceptance test of coated pipe for non-corrosive natural gas transmission. Some benefits to be derived from internally coated line pipe are: (1) Improved flow characteristics (2) Corrosion protection during the period preceding construction (3) The enhancement of visual inspection of the internal pipe surfaces (4) The Improvement of pigging efficiency.

Recommendations made in this Recommended Practice need not necessarily be considered as minimum standard requirements. However, the Recommended Practice is written in such a manner that it may be adopted as part of a contract specification. The Recommended Practice does not in any way intend to recommend one type of coating over any other type and regards all types which can pass the specified qualification as being suitable for the intended purpose. As new materials and practices are developed they will be considered for inclusion in this Recommended Practice.

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 federal, state, or municipal regulation with which this publication may conflict.

Suggested revisions are invited and should be submitted to the standardization manager, American Petroleum Institute, 1220 L Street, N.W., Washington, D.C. 20005.

CONTENTS

	Page
1 SCOPE.....	1
1.1 General	1
1.2 Definitions.....	1
2 COATING MATERIAL SPECIFICATION	1
2.1 Purpose	1
2.2 Description	1
2.3 Physical Properties	2
3 LABORATORY COATING TESTING	2
3.1 Purpose	2
3.2 Steel Panels for Performance Testing.....	2
3.3 Laboratory Application of Coating Materials	2
3.4 Conditioning of Coated Panels.....	3
3.5 Performance of Laboratory Coated Steel Panels	3
3.6 Performance Testing—Glass Panels	3
4 APPLICATION PRACTICES	3
4.1 Purpose	3
4.2 General	3
4.3 Handling of Pipe.....	4
4.4 Handling of Coating Materials.....	4
4.5 Cleaning of Pipe	5
4.6 Coating of Pipe	5
4.7 Repairs to Coating	6
4.8 Pipe Marking	6
5 PRODUCTION INSPECTION AND ACCEPTANCE.....	6
5.1 Purpose	6
5.2 General	6
5.3 Production Tests	7
APPENDIX A METHOD OF DETERMINING VOLUME SOLIDS	9
APPENDIX B SALT SPRAY LABORATORY TEST.....	11
APPENDIX C STRIPPING TEST	13
APPENDIX D ADHESION LABORATORY TEST	15
APPENDIX E GAS BLISTERING LABORATORY TEST	17
APPENDIX F HYDRAULIC BLISTERING LABORATORY TEST	19
APPENDIX G PINHOLE LABORATORY TEST	21
Tables	
3.5 Performance of Laboratory Coated Steel Panels	4

API Recommended Practice for Internal Coating of Line Pipe For Gas Transmission Service

1 Scope

This Recommended Practice provides for the internal coating of line pipe used for non-corrosive natural gas service. The recommendations provided herein cover:

- a. Section 1 Scope
- b. Section 2 Coating Material Specification
- c. Section 3 Laboratory Coating Testing
- d. Section 4 Application Practices
- e. Section 5 Production Inspection and Acceptance

The Recommendation is limited to the application of internal coatings on new pipe prior to installation.

It is intended that the applicator be responsible for complying with all of the provisions of this Recommended Practice, but that the Purchaser may make any investigation necessary to satisfy himself of compliance by the applicator.

1.1 GENERAL

1.1.1 Coating Supplier Information

The coating material supplier shall furnish to the purchaser and/or applicator the following information in a written form with each batch:

- a. Directions for mixing and/or thinning with solvents as required.
- b. Directions for handling and storing of the coating materials.
- c. Specification of the basic physical properties and performance test results of the material. These basic physical properties and performance test results shall be within the range permitted in this Recommended Practice (Section 2).
- d. Certification of the determined physical properties (2.3) of each batch of coating material shipped.

1.2 DEFINITIONS

1.2.1 Applicator: The “Applicator” is the organization responsible to the purchaser for the application of the coating.

1.2.2 Purchaser: The “Purchaser” is the owner company or the authorized agency that buys the coated pipe.

1.2.3 Supplier: The “Supplier” is the manufacturer and/or distributor of the coating material and its authorized qualified technician.

1.2.4 Inspector: The “Inspector” is the authorized agent of the purchaser.

1.2.5 Coating Material: “Coating material” indicates the liquid material prior to application on the substrate.

1.2.6 Coating: “Coating” indicates the coating film as applied to the substrate.

1.2.7 Batch: A “Batch” is the quantity of coating material manufactured at one time in a single vessel and identified by a unique batch number.

2 Coating Material Specification

2.1 PURPOSE

This section describes laboratory methods of identifying and qualifying coating materials suitable for use under the intent of this Recommended Practice.

2.2 DESCRIPTION

2.2.1 Coating Materials

2.2.1.1 The material normally consists of the following:

- a. Pigmented or clear base.
- b. Pigmented or clear converter.
- c. Pigment that includes sufficient rust inhibitor to pass salt spray test. (See 3.5.1)
- d. Application solvent for adjusting to suitable spray viscosity.

2.2.1.2 The coating material shall contain no substances which could be released from the coating in service and prove detrimental to the operation of the pipeline and/or quality of the gas.

2.2.1.3 The coating material, including repair materials, shall neither degrade nor produce hazardous vapors when later subjected to external coating thermal cycles up to 575°F (300°C).

2.2.2 Mixing

The coating materials shall be mixed before use by agitating together portions of base and converter as recommended by the supplier.

2.2.3 Thinning

The coating material may be thinned by mixing with the solvent supplied and/or specified by the supplier.

2.3 PHYSICAL PROPERTIES

2.3.1 Individual Components

	Property	Value	Range Permitted	Method
Base	Gal. Wt	(1)	±0.2 lb (±90 g)	ASTM D1475
Converter	Gal. Wt.	(1)	±0.2 lb (±90 g)	ASTM D1475
Solvent	Boiling Range	(1)	Specify Initial and 95%	ASTM D1078
Base	Boiling Range	(1)	Specify Initial and 95%	ASTM D1078
Converter	Boiling Range	(1)		ASTM D1078
Application	Boiling Range	(1)		ASTM D1078
Base	Settling	(1)	4, minimum	ASTM D1309 (testing) ASTM D869 (reporting)
Converter	Settling	(1)	4, minimum	ASTM D1309 (testing) ASTM D869 (reporting)

2.3.2 Mixed Components

Property	Value	Range Permitted	Method
Volume Solids	(1)	±1%	Appendix #1
Grind	(1)	#4 minimum (Hegman Scale)	ASTM D1210
Coarse Particles	(1)	None, 200 Mesh	ASTM D185 (except use ETHYLENE GLYCOL MONOBUTYL ETHER as wash liquid)

2.3.3 Thinned (In ratio according to Supplier's instructions)

Property	Value	Range Permitted	Method
Flow	(1)	No non-uniform ppearance when applied on vertical surface	Spray application on steel at 50°F (10°C), 100°F (37°C) 150°F (66°C) to result in 3.0 mil (76 micron) minimum dry film.
Pot Life		Max. 100% viscosity increase in 3 hr 77°F (25°C). (2) 250 g sample.	
Viscosity	(1)	±5 seconds	ASTM D1200 #4 Ford Cup at 77°F (25°C)

(1) Designates value specified by supplier.

(2) Shorter pot life may be used subject to mutual agreement between purchaser and applicator.

3 Laboratory Coating Testing

3.1 PURPOSE

This section describes laboratory tests required to qualify coating materials. Qualification of coating by laboratory methods is required prior to production. Once qualification is made, no further qualification tests are required unless the coating materials or laboratory application methods change. For each qualified material, the supplier shall provide a qualitative analysis. An acceptable method is an infra-red spectrum. The supplier shall certify to the applicator and/or purchaser the results of tests performed under Section 3 for each qualified coating material.

3.2 STEEL PANELS FOR PERFORMANCE TESTING

Test Panels shall be mild carbon steel 3 x 6 x 0.032 in. (75 x 150 x 0.81 mm). The surface to be coated shall be sand blasted to any of the following standards:

1. NACE No. 1 white metal finish in accordance with NACE Visual Standard TM-01-75.
2. Steel Structures Painting Council SSPC-Vis 1-82T SP5.
3. Swedish Pictorial Standard SIS 05-59-00 S.a.3.
4. DIN 55928 PART 4.

3.3 LABORATORY APPLICATION OF COATING MATERIALS

3.3.1 Mixing

Coating material shall be mixed or thinned to normal spray viscosity in accordance with supplier's recommendation.

3.3.2 Application

Application shall be made by spray on the prepared side of a test panel. The atmospheric environment, during spraying, shall be controlled to 77 ± 5°F (25 ± 3°C), and a maximum relative humidity of 80%. The back and edges of the panel shall be protected.