

Piping Inspection Code: In-service Inspection, Rating, Repair, and Alteration of Piping Systems

API 570
FIFTH EDITION, FEBRUARY 2024



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. The use of API publications is voluntary. In some cases, third parties or authorities having jurisdiction may choose to incorporate API standards by reference and may mandate compliance.

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 ensure 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 is not intended in any way to inhibit anyone from using alternative 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.

Classified areas may vary depending on the location, conditions, equipment, and substances involved in any given situation. Users of this Standard should consult with the appropriate authorities having jurisdiction.

Users of this standard should not rely exclusively on the information contained in this document. Sound business, scientific, engineering, and safety judgment should be used in employing the information contained herein.

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 to comply with authorities having jurisdiction.

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

All rights reserved. No part of this work may be reproduced, translated, 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, 200 Massachusetts Avenue, NW, Suite 1100, Washington, DC 20001.

Copyright © 2024 American Petroleum Institute

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.

The verbal forms used to express the provisions in this document are as follows.

Shall: As used in a standard, “shall” denotes a minimum requirement in order to conform to the standard.

Should: As used in a standard, “should” denotes a recommendation or that which is advised but not required in order to conform to the standard.

May: As used in a standard, “may” denotes a course of action permissible within the limits of a standard.

Can: As used in a standard, “can” denotes a statement of possibility or capability.

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, 200 Massachusetts Avenue, Suite 1100, Washington, DC 20001. 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 by API, 200 Massachusetts Avenue, Suite 1100, Washington, DC 20001.

Suggested revisions are invited and should be submitted to the Standards Department, API, 200 Massachusetts Avenue, Suite 1100, Washington, DC 20001, standards@api.org.

Contents

1	Scope.....	1
1.1	General Application	1
1.2	Special Applications	1
1.3	Fitness-For-Service and Risk-based Inspection.....	2
2	Normative References	2
3	Terms, Definitions, Acronyms, and Abbreviations.....	4
3.1	Terms and Definitions	4
3.2	Acronyms and Abbreviations	16
4	Owner-Operator Inspection Organization	18
4.1	General	18
4.2	Authorized Piping Inspector Qualification and Certification.....	18
4.3	Responsibilities.....	18
5	Inspection, Examination, and Pressure Testing Practices	23
5.1	Inspection Plans	23
5.2	RBI	25
5.3	Preparation for Inspection	25
5.4	Inspection for Types and Locations of Damage Modes of Detection and Failure	26
5.5	General Types of Inspection and Surveillance	27
5.6	CMLs.....	30
5.7	Condition Monitoring Methods	32
5.8	CUI Inspection	35
5.9	Mixing Point Inspection.....	36
5.10	Injection Point Inspection	36
5.11	Pressure Testing of Piping Systems	38
5.12	Material Verification and Traceability.....	40
5.13	Inspection of Valves.....	40
5.14	In-service Inspection of Welds.....	41
5.15	Inspection of Flanged Joints	42
5.16	Inspection of Piping in HF Acid Alkylation Process Units.....	43
6	Interval/Frequency and Extent of Inspection	43
6.1	General	43
6.2	Inspection during Installation and Service Changes	44
6.3	Piping Inspection Planning.....	45
6.4	Extent of Visual External and CUI Inspections	48
6.5	Extent of Thickness Measurement Inspection and Data Analysis.....	49
6.6	Extent of Inspections on SBP, Deadlegs, Auxiliary Piping, and Threaded Connections.....	52
6.7	Inspection and Maintenance of PRDs.....	54
7	Inspection Data Evaluation, Analysis, and Recording	55
7.1	Corrosion Rate Determination	55
7.2	Remaining Life Calculations	57
7.3	Newly Installed Piping Systems or Changes in Service	57
7.4	Existing and Replacement Piping	57
7.5	MAWP Determination.....	58
7.6	Required Thickness Determination.....	58
7.7	Assessment of Inspection Findings.....	58
7.8	Piping Stress Analysis	59
7.9	Reporting and Records for Piping System Inspection.....	59
7.10	Inspection Recommendations for Repair or Replacement.....	62
7.11	Inspection Records for External Inspections.....	62
7.12	Piping Failure and Near-miss Reports	63

7.13	Deferral of Inspections, Tests, and Examinations	63
7.14	Deferral of Inspection Repair Recommendation Due Dates	64
8	Repairs, Alterations, and Rerating of Piping Systems	64
8.1	Repairs and Alterations	64
8.2	Welding and Hot Tapping	67
8.3	Rerating	72
9	Inspection of Buried Piping	72
9.1	General	72
9.2	Frequency and Extent of Inspection	73
9.3	Repairs to Buried Piping Systems	75
9.4	Records	75
Annex A (informative) Inspector Certification		76
Annex B (informative) Requests for Interpretations		78
Annex C (informative) Two Examples of the Calculation of MAWP Illustrating the Use of the Corrosion Half-life Concept		79
Bibliography		80
Figures		
1	Typical Injection Point Piping Circuit	37
2	Life Cycle of Piping Systems	44
Tables		
1	Recommended Maximum Inspection Intervals	46
2	Recommended Extent of CUI Inspection Following Visual Inspection for Susceptible Piping	49
3	Welding Methods as Alternatives to PWHT Qualification Thickness for Test Plates and Repair Grooves	70
4	Frequency of Inspection or Alternate Leak Testing for Buried Piping without Effective Cathodic Protection	75
C.1	Examples of the Calculation of MAWP Illustrating the Use of the Corrosion Half-life Concept	79

Currently in preview, click buy full version

Piping Inspection Code: In-service Inspection, Rating, Repair, and Alteration of Piping Systems

1 Scope

1.1 General Application

1.1.1 Coverage

API 570 covers inspection, rating, repair, and alteration procedures for metallic piping systems and their associated pressure-relieving devices (PRDs) that have been placed in-service. This inspection code applies to all hydrocarbon and chemical process piping covered in 1.2.1 that have been placed in-service unless specifically designated as optional per 1.2.2. This publication does not cover inspection of specialty equipment including impulse tubing, sensory tubing or tubing associated with instrumentation, exchanger tubes, and control valves. However, this piping code could be used by owner-operators in other industries and other services at their discretion.

Process piping systems that have been decommissioned from service and abandoned in place are no longer covered by this in-service inspection code. However, abandoned in place piping may still need some amount of inspection and/or risk mitigation to ensure that it does not become a safety hazard due to continued deterioration. Process piping systems that are temporarily out of service or idled but have been mothballed (preserved for potential future use) are still covered by this code.

1.1.2 Intent

The intent of this code is to specify the in-service inspection and condition-monitoring program, as well as repair guidance that is needed to determine and maintain the ongoing integrity of piping systems. That program should provide reasonably accurate and timely assessments to determine if any changes in the condition of piping could possibly compromise continued safe operation. It is also the intent of this code that owner-operators shall respond to any inspection results that require corrective actions to ensure that the continued integrity of piping is consistent with appropriate risk analysis. API 570 is intended for use by organizations that maintain or have access to an authorized inspection agency, a repair organization, and piping engineers, inspectors, and examiners as defined in Section 3.

This code does not cover source inspection of newly fabricated pressure piping. Refer to API 588 for guidance on the surveillance of supplier vendors fabricating and/or repairing pressure piping that will be installed on-site. Owner-operators may engage the services of individuals qualified and certified in accordance with API 588 or this code.

However, inspections after new piping systems arrive on-site may still be needed at owner-operator option depending upon quality of shop inspection services and owner-operator specifications during fabrication.

1.1.3 Limitations

API 570 shall not be used as a substitute for the original construction requirements governing a piping system before it is placed in-service; nor shall it be used in conflict with any prevailing regulatory requirements. If the requirements of this code are more stringent than the regulatory requirements, then the requirements of this code shall govern.

1.2 Special Applications

1.2.1 Included Fluid Services

Except as provided in 1.2.2, API 570 applies to piping systems for process fluids that are hazardous to personnel, such as hydrocarbons, and similar flammable or toxic fluid services and processes.