

Type Testing of Process Valve Packing for Fugitive Emissions

API STANDARD 622
THIRD EDITION, OCTOBER 2018



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.

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 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, 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, 1220 L Street, NW, Washington, DC 20005.

Copyright © 2018 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 this publication be construed as insuring anyone against liability for infringement of letters patents.

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, 1220 L Street, NW, Washington, DC 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, NW, Washington, DC 20005.

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

Contents

	Page
1 Score	1
2 Normative References	1
3 Terms and Definitions	2
4 Fugitive Emissions Test	4
4.1 Test Fixture	4
4.2 Leak Test Equipment Selection and Calibration	8
4.3 Packing Selection and Installation	9
4.4 Test Procedure	10
5 Corrosion Test	12
5.1 Corrosion Test Overview	12
5.2 Pre-Test Requirements	13
5.3 Ambient Corrosion Testing	13
5.4 High Temperature Corrosion Testing	15
5.5 Corrosion Test Reporting	15
6 Packing Materials Test	16
6.1 Graphite Packing Ring Weight Loss Test Procedure	16
6.2 Density	16
6.3 Lubricant Content	17
6.4 Leachables	17
6.5 Packing Materials Test Reporting	18
7 Packing Qualified	18
8 Reporting Requirements	18
Annex A (normative) Emissions Test Fixture Construction	19
Annex B (normative) Test Forms	20
Figures	
1 Fugitive Emissions Test Fixture	5
2 Test Fixture Bonnet	6
3 Emission Test Equipment Setup	9
4 Mechanical and Thermal Cycling Diagram	10
5 Emission Test Fixture Detail	12
6 Corrosion Test Vessel	13
7 Compression Test Fixture $\frac{1}{4}$ " and $\frac{1}{8}$ " Packing Configuration	14
8 High Temperature Corrosion Test System	15
Tables	
1 Test Fixture Dimensions	5
2 Test Fixture Bonnet Dimensions	6
3 Test Fixture Stem/Stuffing Box Dimensions	7
B.1 Fugitive Emissions Test Report Summary	20
B.2 Ambient Temperature Corrosion Test Data Sheet	24
B.3 High Temperature Corrosion Test Data Sheet	25
B.4 Material Test Report	26

Introduction

The purpose of this API standard is to establish a uniform procedure for evaluation of process valve stem packing. The testing approaches defined within this standard provide a method for evaluating packing systems. This testing program shall provide a basis for the comparison of the emissions and life cycle performance of packing.

Use of this standard assumes the execution of its provisions is entrusted to appropriately qualified and experienced personnel because it calls for procedures that can be injurious to health if adequate precautions are not taken. This standard refers only to technical suitability and does not absolve the user from legal obligations relating to health and safety at any stage of the procedure.

Type Testing of Process Valve Packing for Fugitive Emissions

1 Scope

This standard specifies the requirements for comparative testing of valve stem packing for process applications where fugitive emissions are a consideration. Packing(s) shall be suitable for use at service temperatures $-29\text{ }^{\circ}\text{C}$ to $538\text{ }^{\circ}\text{C}$ ($-20\text{ }^{\circ}\text{F}$ to $1000\text{ }^{\circ}\text{F}$). Factors affecting fugitive emissions performance that are considered by this standard include temperature, pressure, thermal and mechanical cycling, and corrosion.

This standard is not intended to replace type testing of valve assemblies or valve production testing.

This standard establishes requirements and parameters for the following tests:

- a) fugitive emissions;
- b) corrosion; and
- c) packing material composition and properties.

Test methods apply to packing for use in on-off valves with the following stem motion(s):

- a) rising stem;
- b) rotating stem; or
- c) rising and rotating stem.

2 Normative References

The following standards contain provisions that, through reference in this text, constitute provisions of this API standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

ASME B16.5¹, *Pipe Flanges and Flanged Fittings*

ASME B16.20, *Metallic Gaskets for Pipe Flanges—Ring Joint, Spiral-wound, and Jacketed*

ASTM D512, *Standard Test Methods for Chloride Ion in Water*

ASTM D1179, *Standard Test Methods for Fluoride Ion in Water*

ASTM D4327, *Standard Test Method for Anions in Water by Suppressed Ion Chromatography*

MSS² SP-120, *Flexible Graphite Packing System for Rising Stem Steel Valves*

¹ ASME International, 2 Park Avenue, New York, New York 10016-5990, www.asme.org.

² Manufacturers Standardization Society, 127 Park St. NE, Vienna, VA 22180-4602, www.msshq.org