

ASME PTC 25-2014
(Revision of ASME PTC 25-2008)

Pressure Relief Devices

Performance Test Codes

AN AMERICAN NATIONAL STANDARD



**The American Society of
Mechanical Engineers**

ASME PTC 25-2014
(Revision of ASME PTC 25-2008)

Pressure Relief Devices

Performance Test Codes

AN AMERICAN NATIONAL STANDARD



**The American Society of
Mechanical Engineers**

Two Park Avenue • New York, NY • 10016 USA

Date of Issuance: June 17, 2014

This Code will be revised when the Society approves the issuance of a new edition.

ASME issues written replies to inquiries concerning interpretations of technical aspects of this Code. Interpretations are published on the Committee Web page and under go.asme.org/InterpsDatabase. Periodically certain actions of the ASME PTC Committee may be published as Code Cases. Code Cases are published on the ASME Web site under the PTC Committee Page at go.asme.org/PTCcommittee as they are issued.

Errata to codes and standards may be posted on the ASME Web site under the Committee Pages to provide corrections to incorrectly published items, or to correct typographical or grammatical errors in codes and standards. Such errata shall be used on the date posted.

The PTC Committee Page can be found at go.asme.org/PTCcommittee. There is an option available to automatically receive an e-mail notification when errata are posted to a particular code or standard. This option can be found on the appropriate Committee Page after selecting “Errata” in the “Publication Information” section.

ASME is the registered trademark of The American Society of Mechanical Engineers.

This code or standard was developed under procedures accredited as meeting the criteria for American National Standards. The Standards Committee that approved the code or standard was balanced to assure that individuals from competent and concerned interests have had an opportunity to participate. The proposed code or standard was made available for public review and comment that provides an opportunity for additional public input from industry, academia, regulatory agencies, and the public-at-large.

ASME does not “approve,” “rate,” or “endorse” any item, construction, proprietary device, or activity.

ASME does not take any position with respect to the validity of any patent rights asserted in connection with any items mentioned in this document and does not undertake to insure anyone utilizing a standard against liability for infringement of any applicable letters patent, nor assumes any such liability. Users of a code or standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, is entirely their own responsibility.

Participation by federal agency representative(s) or person(s) affiliated with industry is not to be interpreted as government or industry endorsement of this code or standard.

ASME accepts responsibility for only those interpretations of this document issued in accordance with the established ASME procedures and policies, which precludes the issuance of interpretations by individuals.

No part of this document may be reproduced in any form,
in an electronic retrieval system or otherwise,
without the prior written permission of the publisher.

The American Society of Mechanical Engineers
Two Park Avenue, New York, NY 10016-5990

Copyright © 2014 by
THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS
All rights reserved
Printed in U.S.A.

CONTENTS

Notice	vi
Foreword	vii
Committee Roster	viii
Correspondence With the PTC Committee	ix
Introduction	x
Part I General	1
Section 1 Object and Scope	1
1-1 Object	1
1-2 Scope	1
1-3 Measurement Uncertainty	1
1-4 General	1
Section 2 Definitions and Description of Terms	3
2-1 Purpose	3
2-2 General	3
2-3 Types of Devices	3
2-4 Parts of Pressure Relief Devices	4
2-5 Dimensional Characteristics — Pressure Relief Valves	5
2-6 Dimensional Characteristics — Nonreclosing Pressure Relief Devices	7
2-7 Operational Characteristics of Pressure Relief Devices	7
2-8 Description of Terms	8
Part II Flow Capacity Testing	11
Section 3 Guiding Principles	11
3-1 Items on Which Agreement Shall Be Reached	11
3-2 Qualification of Person Supervising the Test	11
3-3 Responsibility of Person Supervising the Test	11
3-4 Test Apparatus	11
3-5 Preliminary Tests	11
3-6 Spare Instruments	11
3-7 Calibration of Instruments	11
3-8 Metering Sections	12
3-9 Flow Resistance Test Rigs	12
3-10 Adjustments During Tests	14
3-11 Records and Test Results	14
3-12 Measurement Uncertainty	14
Section 4 Instruments and Methods of Measurements	15
4-1 General	15
4-2 Fluid Conditions, Test Conditions, and Instrumentation	15
4-3 Testing With Steam, Pressure Relief Device Discharging to Atmospheric Pressure	18
4-4 Testing With Gas or Air, Pressure Relief Device Discharging to Atmospheric Pressure	23
4-5 Testing With Liquids, Pressure Relief Devices Discharging to Atmospheric Pressure	24
4-6 Testing With Steam, With Back Pressure Above Atmospheric	25
4-7 Testing With Gas or Air, With Back Pressure Above Atmospheric	27
4-8 Testing With Liquids, With Back Pressure Above Atmospheric	29

4-9	Testing With Gas or Air, Nonreclosing Pressure Relief Device Flow Resistance Method	30
4-10	Testing Nonreclosing Pressure Relief Devices to Determine a Set Pressure for Incompressible Fluids	31
Section 5	Computation of Results	34
5-1	Correction of Measured Variables	34
5-2	Review of Instrument Readings	34
5-3	Use of Equation Symbols	34
5-4	Density	34
5-5	Capacity Calculations	34
Section 6	Test Summary Report Form	48
6-1	General Instructions	48
6-2	Part I: General Information	48
6-3	Part II: Summary of Results	48
6-4	Part III: Description of Device Under Test	48
6-5	Part IV: Observed Data and Computed Results	48
6-6	Part V: Test Conditions and Corrections Agreements	48
6-7	Part VI: Test Methods and Procedures	49
6-8	Part VII: Supporting Data	49
6-9	Part VIII: Graphical Presentation of Back-Pressure Test Results	49
Part III	In-Service and Bench Testing	54
Section 7	Guiding Principles	54
7-1	Items on Which Agreement Shall Be Reached	54
7-2	Qualification of Person Conducting the Test	54
7-3	Responsibility of Person Conducting the Test	54
7-4	Test Apparatus	54
7-5	Preliminary Training	54
7-6	Spare Instruments	54
7-7	Calibration of Instruments	54
7-8	Adjustments During Test	55
7-9	Records and Test Results	55
7-10	Measurement Uncertainty	55
Section 8	Instruments and Methods of Measurements	56
8-1	General	56
8-2	Instrumentation	56
8-3	In-Service Testing Procedures	59
8-4	Bench Testing Procedures	61
8-5	Seat Tightness Test	61
Section 9	Computation of Results	62
9-1	Correction of Measured Variables	62
9-2	Review of Instrument Readings	62
9-3	Computation of Operational Characteristics	62
Section 10	Test Summary Report Form	63
10-1	General Instructions	63
10-2	Part I: General Information	63
10-3	Part II: Summary of Results	63
10-4	Part III: Description of Valve Under Test	63
10-5	Part IV: Observed Data and Computed Results	63
10-6	Part V: Contract and Agreed Test Conditions Corrections	63
10-7	Part VI: Test Methods and Procedures	63
10-8	Part VII: Supporting Data	63

Figures		
2-5-1	Typical Curtain Areas of Pressure Relief Valves	6
3-9-1	Recommended Arrangements for Testing Nonreclosing Pressure Relief Device Flow Resistance	13
4-2.3-1	Recommended Arrangements for Testing Devices With Atmospheric Back Pressure — Flowmeter Test Arrangement	16
4-2.10-1	Recommended Internal Contours of Nozzles, Fittings, Adapter, and Reducers Between Test Vessel and Test Device	19
4-2.10-2	Recommended Arrangements for Testing Devices With Atmospheric Back Pressure — Weighed-Condensate Test Arrangement	20
4-2.10-3	Recommended Arrangements for Testing Devices With Atmospheric Back Pressure — Weighed-Water Test Arrangement	20
4-2.10-4	Recommended Discharge Arrangements for Testing Devices With Superimposed Back Pressure	21
4-2.10-5	Recommended Arrangement for Testing Nonreclosing Pressure Relief Devices in Combination With Pressure Relief Valves	21
4-6-1	Recommended Discharge Arrangements for Testing Devices With Built-Up Back Pressure	26
4-10-1	Recommended Arrangements for Conducting Opening Test on Nonreclosing Pressure Relief Devices With Incompressible Fluids	32
8-2.2-1	Recommended Arrangement for Testing Valves With Compressible Fluids	57
8-2.2-2	Recommended Arrangement for Testing Valves With Incompressible Fluids	58
8-3.2-1	Pilot-Operated Pressure Relief Valve Field Test Accessory	60
Forms		
5-5.1	Pressure Relief Device Tested With Steam and Water: Observed Data and Computed Results — Weighed-Water Method	37
5-5.2	Pressure Relief Device Tested With Steam: Observed Data and Computed Results — Flowmeter Method	38
5-5.3	Pressure Relief Device Tested With Liquids: Observed Data and Computed Results — Flowmeter Method	40
5-5.4	Pressure Relief Device Tested With Air or Gas: Observed Data and Computed Results — Flowmeter Method	41
5-5.5	Pressure Relief Device Tested With Air or Gas: Observed Data and Computed Results — Sonic-Flow Method	43
5-5.6	Pressure Relief Device Tested With Fuel Gas: Observed Data and Computed Results — Flowmeter Method	44
5-5.7	Nonreclosing Pressure Relief Device Tested With Air: Observed Data and Computed Results — Flow Resistance	46
6-5.1	Pressure and Relief Valve Performance Test Report: Steam	50
6-5.2	Pressure and Relief Valve Performance Test Report: Liquids and Water	51
6-5.3	Pressure and Relief Valve Performance Test Report: Air, Gas, or Fuel Gas	52
6-5.4	Nonreclosing Pressure Relief Device Performance Test Report: Air, Gas, or Fuel Gas	53
Mandatory Appendices		
I	SI (Metric) Units and Conversion Factors	65
II	Examples of Determining Flow Rate Uncertainties	67
Nonmandatory Appendix		
A	References	72