

Type Testing of Rising Stem Valves Equipped with Graphite Packing for Fugitive Emissions

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Contents

	Page
1 Scope.....	1
2 Normative References	1
3 Terms and Definitions	1
4 Valve Selection and Test Preparation	3
5 Safety Considerations for Type Testing	3
6 Type Testing.....	4
6.1 Test Fluid	4
6.2 Qualification Facility	4
6.3 Test Set-up.....	4
6.4 Test Profile	4
6.5 Leak Measurement	5
6.6 Packing Adjustment	5
6.7 Temperature Monitoring	5
7 Acceptance Criteria	6
8 Supplementary High Temperature Testing.....	6
9 Leak Test Equipment and Calibration	6
10 Post-test Inspection	7
11 Recording and Documentation	7
12 Valves Qualified	8
13 Valve Marking	9
14 Valves Previously Qualified to this Standard	9
14.1 Retest Exemption	9
14.2 Partial Qualification	10
14.3 High Temperature Test.....	10
14.4 Full Retest.....	10
15 Manufacturing Location Change.....	10
Annex A (normative) Fugitive Emissions Test Report.....	11
Annex B (informative) Suggested Valves for Testing.....	14
Annex C (normative) Partial Re-test Valve Selection Criteria.....	16
Annex D (informative) High Temperature Testing Procedure	17

Contents

	Page
Figures	
1	Valve Cycling 5
2	Temperature Locations 6
3	Calibration Setup 7

Tables

B.1	Size and Class to be Tested for Each Gate Valve Made in Accordance with API Standard 602 14
B.2	Size and Class to be Tested for Each Globe Valve Made in Accordance with API Standard 602 14
B.3	Size and Class to be Tested for Each Gate Valve Made in Accordance with API Standard 600 14
B.4	Size and Class to be Tested for Each Gate Valve Made in Accordance with API Standard 603 15
B.5	Size and Class to be Tested for Each Globe Valve Made in Accordance with API Standard 623 15

Type Testing of Rising Stem Valves Equipped with Graphite Packing for Fugitive Emissions

1 Scope

This standard specifies the requirements and acceptance criteria (100 ppmv) for fugitive emission type testing of rising and rising-rotating stem valves equipped with packing previously tested in accordance with API Standard 622. Valves larger than NPS 42 or valves greater than class 1500 are outside the scope of this standard.

2 Normative References

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any addenda) applies.

API Standard 600, *Steel Gate Valves – Flanged and Butt-welding Ends, Bolted Bonnets*

API Standard 602, *Steel Gate, Globe and Check Valves for Sizes DN 100 and Smaller for the Petroleum and Natural Gas Industries*

API Standard 603, *Corrosion-resistant, Bolted Bonnet Gate Valves—Flanged and Butt-welding Ends*

API Standard 622, *Type Testing of Process Valve Packing for Fugitive Emissions*

API Standard 623, *Steel Globe Valves—Flanged and Buttwelding Ends, Bolted Bonnets*

ASME B16.34,¹ *Valves—Flanged, Threaded, and Welding End*

3 Terms and Definitions

For the purposes of this document, the following terms and definitions apply.

3.1

ambient temperature

Temperature that is between 15 °C to 40 °C (59 °F to 104 °F).

3.2

auxiliary connection

Drain(s), vent(s), thermal relief(s), or sealant injection port(s).

3.3

bolting torque

The amount of twisting or turning effort (expressed as N-m, ft-lb, or in.-lb) required to tighten a threaded fastener.

3.4

braided packing type

Packing rings that have an interlaced construction in which yarns/filaments are woven to a round, square or lattice weave pattern. Can also be die formed into shape.

3.5

combo-set packing type

Combination of die formed packing type and braided packing type.

¹ ASME International, 3 Park Avenue, New York, New York 10016-5990, www.asme.org.

3.6

die-formed packing type Rings produced from graphite material that is axially compressed in molds to an increased density and to the desired shape.

3.7**dynamic leak measurement**

Measurement of leakage taken at the valve stem packing while the stem is traveling through an opening and closing cycle.

3.8**emissions**

Gaseous leak given off by a piece of equipment used in reference to volatile organic compounds (VOCs) and expressed in parts per million volumetric (ppmv or ppm) for methane.

3.9**leakage**

Measurable amount of test medium escaping from the valve pressure boundary.

3.10**manufacturing facility**

Location of final assembly, inspection, and testing of the valve selected for evaluation.

3.11**mechanical cycle**

A motion of the stem that moves a valve obturator open and close 90 % of the full travel without backseating/seating the valve.

3.12**obturator**

Part of a valve, such as a wedge, disc, or plug, which is positioned in the flow stream to permit or prevent flow.

3.13**packing stress**

Packing compressive load divided by the packing cross sectional area based upon the stem and bore dimensions.

3.14**purchaser**

A person, group, company, agency, corporation, or designated representative responsible for valve acceptance.

3.15**qualification facility**

A testing entity capable of type testing valves for fugitive emissions in accordance with this standard.

3.16**rising stem valve**

Valve in which the movement of the stem is in an axial direction with no rotation.

3.17**rising-rotating stem valve**

Valve in which the movement of the stem is in an axial direction with rotation.

3.18**running torque**

The amount of torque required to move a valve stem through the packing.

3.19**static leak measurement**

Measurement of leakage taken when the stem is not moving.

3.20**stem**

Metal rod that connects the obturator of a valve to a handwheel, handle, or actuator.

3.21**thermal cycle**

A change in temperature from ambient temperature to elevated or lower temperature(s), and back to ambient temperature.

3.22**third party**

A person, group, company, agency, corporation, or designated representative independent from the manufacturer.

3.23**type testing**

A test conducted to assess the performance of a specific valve design at prescribed temperatures and pressures.

4 Valve Selection and Test Preparation

4.1 Packing that meets the requirements of API Standard 622 3rd Edition (or later) shall be installed in the valve to be tested. Valves with $\frac{3}{16}$ in. packing cross section and smaller shall require the $\frac{1}{8}$ in. cross section packing tests. Valves with larger than $\frac{3}{16}$ in. packing cross section shall require the $\frac{1}{4}$ in. cross section packing tests.

4.2 The test valve shall be completely assembled and ready for testing. The test valve shall be randomly selected from manufacturer or distributor stock where such stock is available. For valves not in stock, the manufacturer shall certify that the test valve was not modified in any way to meet type test requirements and is a typical representation of the manufacturer's stock product. The method of valve selection shall be documented on the Fugitive Emissions Test Report in [Annex A](#).

4.3 Body-bonnet and gland bolting torque shall be verified to be in accordance with published manufacturer's installation specifications.

4.4 All pre-test activities to the valve shall be documented on the Fugitive Emissions Test Report in [Annex A](#).

5 Safety Considerations for Type Testing

WARNING—Methane used during testing is a pressurized flammable gas which requires that appropriate safety measures be taken.

5.1 The valve may be partially or fully depressurized between thermal cycles, such as during a non-active testing period (i.e. overnight) or during thermal transients.

5.2 Testing of valves is potentially hazardous and it is essential that the safety of personnel be given prime consideration. Given the nature of this test, hazardous release of pressurized, combustible gas could occur. The qualification facility shall be designed to ensure that all the test conditions are conducted in a safe and protected environment.

The measures stated in 5.3 through 5.6 are noted for consideration in providing a safe testing environment. The qualification facility shall be responsible to assess the potential hazards resulting from the testing requirements and conditions, to ensure that proper safety precautions are implemented and to comply with all applicable safety regulations and laws.

5.3 All equipment shall have appropriate certification that verifies its suitability to withstand the minimum and maximum pressures and temperatures in the testing environment.