

THE ENGINEERING EQUIPMENT AND MATERIALS USERS ASSOCIATION

SPECIFICATION FOR PRODUCTION TESTING OF VALVES PART 1 – BALL VALVES

PUBLICATION No 170 : 1991

(Reprinted 2001 incorporating Amendments No 1, April 1996, and other, minor changes)

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THE ENGINEERING EQUIPMENT AND MATERIALS USERS ASSOCIATION

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FOREWORD

Aim

This Specification, developed by the EEMUA Valves Technical Committee, is the first of a suite of four* aimed at achieving improvement in the ex-works quality of production valves intended for use in the energy, process, oil and gas industries. The present document applies to ball valves designed and manufactured to BS, API and other recognised standards.

Use of Language

In this document the words 'will', 'may', 'should', 'shall' and 'must', when used in the context of actions by the purchaser or others, have specific meanings as follows.—

- i) 'Will' is used normally in connection with an action by the purchaser, rather than by a manufacturer or supplier.
- ii) 'May' is used to indicate that the manufacturer or supplier is permitted to do something, or the purchaser reserves the right to do something, according to context.
- iii) 'Should' is used where a provision is preferred.
- iv) 'Shall' is used where a provision is mandatory.
- v) 'Must' is used only where a provision is a UK statutory requirement.

Units

This specification employs SI units, but additionally includes imperial units where appropriate to common usage. *Note:* 'bar' signifies bar gauge.

Note on 2001 Reprint

This reprint of the original edition incorporates Amendments No 1, April 1996, and includes certain changes in wording aimed at improving clarity and achieving consistency with its companion publications*. References to national standards have also been updated. There are no additional technical changes.

* The other parts of the *Specification for Production Testing of Valves* are:
Part 2—Plug Valves (Pub.171)
Part 3—Gate Valves (Pub. 172)
Part 4—Butterfly and Globe Valves (Pub. 173)

1 SCOPE

This Specification sets out the production test requirements to be applied to each valve unless otherwise stated by the purchaser. Tests of an optional nature are also included.

The Specification is applicable to flanged, butt weld, socket weld, extended weld and threaded end steel ball valves with soft or hard seats, from Class 150 (PN 20) to Class 2500 (PN 420) ratings and nominal bore sizes from $\frac{1}{4}$ in (DN 8) to 36 in (DN 900), or larger at the discretion of the purchaser. When invoked by the purchase order, this Specification replaces entirely the production tests of the valve standards referenced in the order (such as BS 6755 Pt 1 as applied to BS 5351 for ball valves, and Section 5 plus Appendix C of API Spec 6D as applied to pipeline ball valves).

Tests outside the scope of this Specification include material sampling and non-destructive testing of valve materials to verify their physical properties, chemical composition and quality. Type approval tests, fire tests, high pressure gas tests, and tests at high and low temperature, are also excluded.

2 REFERENCES

This EEMUA Specification makes reference to the publications listed below. Unless otherwise specified, the latest editions of these publications including all addenda and revisions shall apply.

2.1 British Standards

BS 5351	Specification for Steel Ball Valves for the Petroleum, Petrochemical and Allied Industries
BS 6755	Testing of Valves—Part 1: Specification for Production Pressure Testing Requirements
BS EN 837-1	Pressure Gauges—Part 1: Bourdon Tube Pressure Gauges. Dimensions, Metrology, Requirements and Testing
BS EN 30012-1 (formerly BS 5781: Part 1)	Quality Assurance Requirements for Measuring Equipment—Part 1: Metrological Confirmation System for Measuring Equipment

2.2 American Petroleum Institute

API Spec 6D	Pipeline Valves (Gate, Plug, Ball, and Check Valves)
API Std 598	Valve Inspection and Testing

2.3 American National Standards: American Society of Mechanical Engineers

ASME* B16.5	Pipe Flanges and Flanged Fittings, Steel, Nickel Alloy and Other Special Alloys
ASME* B16.34	Valves—Flanged, Threaded and Welding End
* Previously ANSI	

2.4 International Organization for Standardization

ISO 5208	Industrial Valves—Pressure Testing of Valves
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2.5 Manufacturers' Standardization Society of the Valves & Fittings Industry

MS SP-72	Ball Valves with Flanged or Butt-Welding Ends for General Service
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3 DEFINITIONS

- 3.1 **Bi-directional Valve.**— A valve designed to seal against flow or pressure from either direction.
- 3.2 **Floating (Seat Supported) Valve.**— A valve in which the ball is supported by the seat rings, without a bottom trunnion, i.e. a downstream seated ball valve.
- 3.3 **Hard Seated Valve.**— A valve having primary seats manufactured from metallic, ceramic, hard graphite or other non-resilient material.
- 3.4 **Purchaser.**— The user or his contractor.
- 3.5 **Purchaser's Inspector.**— An inspection engineer employed by the purchaser, or the inspection authority appointed by the purchaser.
- 3.6 **Sealant Injection.**— The injection of a sealant, by means of a suitable facility, to the stem and/or seat area of a valve to form a secondary and emergency seal in the event of excessive leakage in service.
- 3.7 **Soft Seated Valve.**— A valve having primary seats manufactured from polymers, elastomers or similar resilient or semi-resilient material.
- 3.8 **Trunnion Mounted Valve.**— A valve in which the ball is held in position at the top and bottom by trunnions and bearings.
- 3.9 **Twin Seated Valve.**— A valve with two seats such that when the closed valve is pressurised from one side, the downstream seal is designed to seal if the upstream seat should fail to seal.
- 3.10 **Uni-directional Valve.**— A valve designed to seal against flow or pressure from one direction only.
- 3.11 **Upstream Seated Valve.**— A valve that when closed seals by the line pressure acting on the upstream seat ring: e.g. a trunnion mounted ball valve, but not applicable to a floating (seat supported) ball valve, which is a downstream seated valve.
- 3.12 **Valve Rated Pressure (VRP).**— The maximum allowable working pressure at ambient temperature as stated in ASME B16.34 (or ASME B16.5) for the valve body material, or in API Spec 6D, Table 2.1, whichever is the higher.

Note.— Valves to BS 5351 in classes 300 and 600 have ambient seat pressure ratings significantly lower than in API Spec 6D and ASME B16.34. Where valves to BS 5351 are specified, valve seat rated pressures in accordance with BS 5351 may be used subject to agreement between manufacturer and purchaser.

4 TEST EQUIPMENT AND FACILITIES

4.1 General

- 4.1.1 The manufacturer shall supply all labour, tools and materials required to perform the tests and inspections.
- 4.1.2 The manufacturer shall be able to demonstrate to the satisfaction of the purchaser the adequacy of the methods and equipment used to carry out and monitor the testing.
- 4.1.3 The manufacturer shall be responsible for the safety and design of test equipment and for providing adequate safeguards for personnel in the areas of the test.
- 4.1.4 The valve shall be adequately illuminated and accessible for inspection.
- 4.1.5 The test equipment and method of pressurising the valve shall ensure that all pressure containing parts of the valve are strength tested and that axial loads are not reduced by the method adopted to blank the ends. (See Note 1 below.)

Approved methods of blanking valve ends for pressure sealing are:

- a) blank flanges or covers for flanged end valves
- b) weld end caps with or without pups for weld end valves
- c) screwed plugs for threaded end valves.

Alternative pressure sealing methods may be used when agreed in writing by the purchaser, provided the validity of the valve design has been proven by prototype testing with blank ends attached to the valve. (See Note 2.)

Note 1.— When blank ends are attached to a valve then maximum longitudinal tensile stresses are developed when the valve is internally pressurised. This will assist in detecting cracks in the valve materials and weaknesses in bolted joints and other connecting parts.

Note 2.— A reduction in longitudinal stresses in the valve body can result from some alternative pressure sealing methods, e.g. clamping valve ends in a press and internally sealing valve bores with 'floating bungs'. The ends of valve bores sealed by 'floating bungs' will not be subjected to the test pressure and may require supplementary NDT.

- 4.1.6 The test facilities shall permit complete (and demonstrable) isolation of the valve from the pressure source.
- 4.1.7 The accuracy and sensitivity of measuring devices to meet the requirements of this Specification shall be demonstrable. The calibration of volumetric devices shall be performed with the same test fluid and at the same temperature within the tolerances permitted as for the tests.

Note.— Guidance on measurement and calibration systems can be found in BS EN 30012-1.

- 4.1.8 Valid, uniquely identifiable calibration certificates shall be available for and traceable to each item of measuring equipment used for testing. Calibration shall have been carried out, with the results recorded, not more than three months prior to use.