International Standard 5208

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Industrial valves — Pressure testing for valves

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Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 5208 was developed by Technical Committee ISO/TC 153, *Valves*, and was circulated to the member bodies in December 1980.

It has been approved by the member bodies of the following countries :

Austria	France	Norway
Belgium	Germany, F. R.	Poland
Brazil	India	Romania
Canada	Iraq	Sweden
Denmark	Italy	Switzerland
Egypt, Arab Rep. of	Japan	United Kingdom
Finland	Netherlands	USA

The member bodies of the following countries expressed disapproval of the document on technical grounds :

Australia
South Africa, Rep. of
USSR

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Industrial valves — Pressure testing for valves

0 Introduction

The aim of this International Standard is the establishment of certain basic requirements for the production testing of industrial valves in order to ensure that uniform tests and methods are adopted. In general, this International Standard must be considered in conjunction with any specific requirements in the development of standards appropriate to the individual type of valves.

1 Scope and field of application

This International Standard specifies tests to confirm the pressure integrity of the shell of an industrial valve under pressure, and tests verifying the degree of tightness and pressure-retaining adequacy of the valve seat and closure mechanism.

2 Definitions

2.1 test pressure : The internal pressure, expressed in bars[1] to which the valve under test is subjected.

2.2 test fluid : At the discretion of the manufacturer, either :

a) **liquid** : Water which may contain a corrosion inhibitor, kerosene, or other suitable liquid having a viscosity not greater than that of water;

or :

b) **gas** : Air or other suitable gas.

3 Test pressure

3.1 Shell test

A shell test using fluid shall be performed at a minimum pressure of 1,5 times the maximum permissible working pressure (MPWP) at 20 °C, or, for valves up to and including DN 50 in the pressure range up to and including PN 50 using gas at a test pressure of 6 bar (600 kPa).

3.2 Seat test

A seat test shall be performed in accordance with table 1.

Table 1 — Seat test pressures

DN	PN	Seat test
Up to and including DN 80	All	1,1 × maximum permissible working pressure at 20 °C Liquid or 6 bar (600 kPa) gas
DN 100 up to and including DN 200	Up to and including PN 50	
	PN 100 and greater	1,1 × maximum permissible working pressure at 20 °C Liquid
DN 250 and greater	All	

3.3 Pressure differential limitations

Valves conforming to this International Standard in all respects, except that they are designed for operating conditions that have the pressure differential across the obturator limited to values less than the nominal pressure rating and have obturators and/or actuating devices (direct, mechanical, fluid or electrical) that would be subject to damage at high differential pressures, shall be tested as described above except that the closure test requirement may be reduced to 1,1 times the maximum specified closed position differential pressure.

This exception may be exercised by agreement between the manufacturer and purchaser. The manufacturer's nameplate data shall include reference to any such limitations.

4 Tests

4.1 General considerations

4.1.1 The valve shall be essentially freed of air when testing with a liquid.

4.1.2 Valves shall not be painted or otherwise coated with materials capable of sealing against leakage before shell pressure tests are completed, except that internal linings and non-pressure sealing chemical corrosion protection treatments are permitted. If pressure tests in the presence of a representative of the purchaser are specified, painted valves from stock may be re-tested without removal of paint.

4.1.3 Test equipment shall not subject the valve to externally applied stresses which may affect the results of the tests.

1) 1 bar = 10^5 Pa

4.1.4 When equipment such as volume loss devices are used for test, the manufacturer shall be capable of demonstrating equivalence of the system with the requirements of this International Standard.

4.2 Shell test

4.2.1 The shell test shall be performed by applying pressure inside the assembled valve with the ends capped or plugged, the valve partially closed and the packing gland sufficiently tight to maintain test pressure, thereby testing the packing chamber portion of the structure.

Packing leakage during the shell test shall not be cause for rejection if the manufacturer demonstrates that the valve will not leak at the rated pressure of the valve.

4.2.2 Visually detectable leakage through the pressure-retaining walls is not acceptable. Test durations shall not be less than specified in table 2.

Table 2 — Minimum durations for shell tests

Nominal valve size DN	Minimum test duration s
Up to and including DN 50	15
DN 65 up to and including DN 200	60
DN 250 and greater	180

4.3 Seat test

4.3.1 The seat test shall be made with seats clean and free of oil. However, if necessary to prevent galling, the seats may be coated with a film of oil of viscosity not greater than that of kerosene. This requirement does not apply to a valve in which a lubricant provides the primary seal.

4.3.2 The valves shall be seat tested by closing the obturator in the normal manner.

The method of seat leakage testing must result in the application of the full differential pressure across the seat or seats in the direction for which they are designed. Tests for typical types of valves shall be as follows :

Gate valves Ball valves Plug valves	The bonnet cavity must be filled with the test fluid. Pressure shall be applied successively to each side of the closed valve and subsequently checked for leakage. Valves with independent double seating (such as two-piece obturator or double-seated valves) may be tested by applying pressure between the seats and each side of the closed valve checked for leakage.
Globe valves Diaphragm valves (including angle globe types and Y types)	Pressure shall be applied to the obturator in the direction producing the most adverse seating condition. For example, a globe valve shall be tested with pressure in the direction to unseat the obturator.
Butterfly valves	Pressure shall be applied in the most adverse direction; valves with symmetrical seating may be tested in either direction.
Check valves	Pressure shall be applied in the direction tending to close the obturator with the opposite side checked for leakage.

4.3.3 Any valve designed to be sold and marketed as a unidirectional flow valve shall be tested in the specified flow direction only.

4.3.4 The minimum duration for seat tests shall be in accordance with table 3.

Table 3 — Minimum duration for seat tests

Nominal valve size DN	Minimum test duration s
Up to and including DN 50	15
DN 65 up to and including DN 200	30
DN 250 up to and including DN 450	60
DN 500 and greater	120

4.3.5 At the time of manufacture, the maximum allowable seat test leakage rate shall be in accordance with table 4.

Table 4 — Maximum allowable seat test leakage rate

Seat test leakage rates[1)2)]		
Rate 1[3)]	Rate 2[4)]	Rate 3[5)]
0,1 $mm^3/s \times DN$ when testing with liquid	0,01 $mm^3/s \times DN$ when testing with liquid	No visible leakage for the duration of the test (see 4.3.4)
30 $mm^3/s \times DN$ when testing with a gas	0,3 $mm^3/s \times DN$ when testing with a gas	

1) The rate or rates of seat test leakage for each valve type shall be as specified in the valve product standard.

2) These leakage rates only apply when discharging to atmosphere.

3) Leakage rate 1 is intended to apply to metal seated valves produced for internal stock, sale via a stockist, or a warehousing operation.

4) Leakage rate 2 is intended to apply to metal seated valves on more critical services.

5) Leakage rate 3 is intended to apply, for example, to "elastomeric or polymeric" (soft seat) seated valves.