INTERNATIONAL STANDARD

ISO 9393-2

Second edition
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Thermoplastics valves for industrial applications — Pressure test methods and requirements —

Part 2: Test conditions and basic requirements

Robinets en matières thermoplastiques pour les applications industrielles — Méthodes d'essai de pression et exigences —

Partie 2: Conditions d'essai et exigences de base

Reference number
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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 9393-2 was prepared by Technical Committee ISO/TC 138, *Plastics pipes,fittings and valves for the transport of fluids*, Subcommittee SC 7, *Valves and auxiliary equipment of plastics materials*.

This second edition cancels and replaces the first edition (ISO 9393-2:1997), which has been technically revised. It also incorporates the Technical Corrigendum ISO 9393-2:1997/Cor 1:1997.

ISO 9393 consists of the following parts, under the general title *Thermoplastics valves for industrial applications — Pressure test methods and requirements*:

— *Part 1: General*

— *Part 2: Test conditions and basic requirements*

Thermoplastics valves for industrial applications — Pressure test methods and requirements —

Part 2: Test conditions and basic requirements

1 Scope

This part of ISO 9393 specifies the test parameters and conditions for hydrostatic-pressure tests on valves made of the following thermoplastic materials:

— ABS, as defined in ISO 15493

— PE 80, as defined in ISO 15494

— PE 100, as defined in ISO 15494

— PP-H, as defined in ISO 15494

— PP-B, as defined in ISO 15494

— PP-R, as defined in ISO 15494

— PP-R-GF

— PVC-C, as defined in ISO 15493

— PVC-U, as defined in ISO 15493

— PVDF, as defined in ISO 10931

NOTE Materials designation according to ISO 1043-1 and ISO 1043-2 for reinforcing materials.

The tests cover the following aspects:

— the material used for manufacturing valves;

— the pressurized valve components;

— the complete valve.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 5208, *Industrial valves — Pressure testing of valves*

IS0 9080, *Plastics piping and ducting systems — Determination of the long-term hydrostatic strength of thermoplastics materials in pipe form by extrapolation*

ISO 9393-1:2004, *Thermoplastics valves for industrial applications — Pressure test methods and requirements — Part 1: General*

ISO 10931 [1)], *Plastics piping systems for industrial applications — Poly(vinylidene fluoride) (PVDF) — Specifications for components and the system*

ISO 15493:2003*, Plastics piping systems for industrial applications — Acrylonitrile-butadiene-styrene (ABS), unplasticized poly(vinyl chloride) (PVC-U) and chlorinated poly(vinyl chloride) (PVC-C) — Specifications for components and the system — Metric series*

ISO 15494, *Plastics piping systems for industrial applications — Polybutene (PB), polyethylene (PE) and polypropylene (PP) — Specifications for components and the system — Metric series*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 9393-1 apply.

4 Materials test

4.1 The material shall be tested in accordance with the conditions and requirements given in ISO 9080 or equivalent.

4.2 It is not necessary to retest material which has already been tested by the material supplier.

5 Shell test

5.1 Test conditions

The test specimen described in ISO 9393-1:2004, 5.2, shall be subjected to the applicable test conditions as given in Table 1.

5.2 Requirements

The test specimen shall be considered satisfactory if no leakage from the valve is noted, and no rupture or other visible failure occurs during the test period. The test specimen shall be regarded as unsatisfactory if the valve body bursts before the end of the test period.

If a pipe or a connection fails, the test shall be considered null and void and shall be repeated using a different specimen.

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1) To be published. (Revision of ISO 10931-1:1997, ISO 10931-2:1997, ISO 10931-3:1996, ISO 10931-4:1997 and ISO 10931-5:1998)

Table 1 — Conditions for shell test

Material	Min. test time	Test pressure [a] p_{test}	Design stress σ_s	Temperature	Test fluid	
	h	bar [b]	MPa	°C	inside	outside
ABS	1	3,12 × PN	8	20 ± 2	Water	Water or air [c]
PE 100	100	1,55 × PN				
PE 80		1,59 × PN	6,3			
PP-H and PP-R-GR	1	4,2 × PN	5			
PP-B		3,2 × PN				
PP-R		3,2 × PN				
PVC-C		3,4 × PN	10			
PVC-U		4,2 × PN				
PVDF		2,0 × PN	16			

[a] The test pressures, p_{test}, are calculated from the following equation:

$$p_{test} = (\sigma_t/\sigma_s) \times PN$$

where

σ_t is the induced stress under the test conditions;

σ_s is the design stress (MPa).

[b] 1 bar = 0,1 MPa = 0,1 N/mm^2 = 10^5 N/m^2.

[c] In case of dispute, water shall be used.

6 Long-term behaviour test on the complete valve

6.1 Test conditions

The test specimen described in ISO 9393-1:2004, 5.3, shall be subjected to the applicable test conditions given in Table 2.

6.2 Requirements

The test specimen shall be considered satisfactory if no leakage from the valve is noted, and no rupture or other visible failure occurs during the test period. The test specimen shall be regarded as unsatisfactory if the valve assembly bursts before the end of the test period.

If a pipe or a connection fails, the test shall be considered null and void shall be repeated using a different specimen.

Table 2 — Conditions for long-term behaviour test

Material	Min. test time	Test pressure [a] p_{test}	Temperature	Test fluid	
	h	bar [b]	°C	inside	outside
ABS	1 000	0,55 × PN	60 ± 2	Water	Water or air [c]
PE 100		1,5 × PN	20 ± 2		
PE 80		1,5 × PN			
PP-H		2,16 × PN			
PP-B		1,5 × PN			
PP-R and PP-R-GF		1,52 × PN			
PVC-C		0,39 × PN	80 ± 2		
PVC-U		0,37 × PN	60 ± 2		
PVDF		1,45 × PN	20 ± 2		
For diaphragm valves, the test shall be carried out at 20 °C and the maximum pressure shall not exceed 1,5 × PN bar.					

[a] The test pressures, p_{test}, are calculated from the following equation:

$$_{test} = (\sigma_t/\sigma_s) \times PN$$

where

σ_t is the induced stress under the test conditions;

σ_s is the design stress (MPa).

[b] 1 bar = 0,1 MPa = 0,1 N/mm^2 = 10^5 N/m^2

[c] In case of dispute, water shall be used.

7 Seat and packing tests

7.1 Test conditions

The test conditions, for which the general criteria are to be taken from ISO 5208, shall be the same for all the different valve materials. Test specimens (complete valves) shall be subjected to the test described in ISO 9393-1:2004, 7.4.2 and 7.4.3, using the test conditions given in Table 3, as applicable.

The valve shall be opened/closed with the torque specified in the product standard.

7.2 Requirements

The test specimen shall be considered satisfactory if there is no leakage occurs through the valve seat and packing during the test period.

Table 3 — Conditions for seat and packing tests

Test	Min. test time	Test pressure p_{test}	Temperature	Test fluid	
	s	bar [a]	°C	**inside**	**outside**
Seat test (valve closed)	60	0,5	20 ± 2	Air	Water
	DN ⩽ 200: 15 DN > 200: 30	1,1 × PN [b]		Water [c]	Air
Packing test (valve opened)	DN ⩽ 50: 15 DN > 50: 30	1,5 × PN [b]		Water [c]	Air

[a] 1 bar = 0,1 MPa = 0,1 N/mm^2 = 10^5 N/m^2.

[b] Maximum test pressure (PN + 5) bar.

[c] Or air inside at (6 ± 1) bar and water outside; in case of dispute, water inside and air outside shall be used.

Bibliography

[1] ISO 1043-1, *Plastics — Symbols and abbreviated terms — Part 1: Basic polymers and their special characteristics*

[2] ISO 1043-2, *Plastics — Symbols and abbreviated terms — Part 2: Fillers and reinforcing materials*

[3] ISO 4422-3:1996, *Pipes and fittings made of unplasticized poly(vinyl chloride) (PVC-U) for water supply — Specifications — Part 3: Fittings and joints*

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