INTERNATIONAL STANDARD

ISO 12092

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Fittings, valves and other piping system components made of unplasticized poly(vinyl chloride) (PVC-U), chlorinated poly(vinyl chloride) (PVC-C), acrylonitrile-butadiene-styrene (ABS) and acrylonitrile-styrene-acrylester (ASA) for pipes under pressure — Resistance to internal pressure — Test method

Raccords, robinets et autres composants de systèmes de canalisation en poly(chlorure de vinyle) non plastifié (PVC-U), poly(chlorure de vinyle) chloré (PVC-C), acrylonitrile-butadiène-styrène (ABS) et acrylonitrile-styrène-ester acrylique (ASA) pour canalisations sous pression — Résistance à la pression interne — Méthode d'essai

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

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 International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 12092 was prepared by Technical Committee ISO/TC 138, *Plastics pipes, fittings and valves for the transport of fluids*, Subcommittee SC 5, *General properties of pipes, fittings and valves of plastic materials and their accessories — Test methods and basic specifications*.

Annex A of this International Standard is for information only.

Fittings, valves and other piping system components made of unplasticized poly(vinyl chloride) (PVC-U), chlorinated poly(vinyl chloride) (PVC-C), acrylonitrile-butadiene-styrene (ABS) and acrylonitrile-styrene-acrylester (ASA) for pipes under pressure — Resistance to internal pressure — Test method

1 Scope

This International Standard specifies methods for testing the resistance to internal pressure of piping components, such as fittings and valves, made of unplasticized poly(vinyl chloride) (PVC-U), chlorinated poly(vinyl chloride) (PVC-C), acrylonitrile-butadiene-styrene (ABS) and acrylonitrile-styrene-acrylester (ASA) and intended for use, respectively, with PVC-U, PVC-C, ABS and ASA pipes under pressure, irrespective of the type and design of the component or the method of assembly used.

NOTE Throughout this International Standard the term “fitting” is to be understood to represent any PVC-U, PVC-C, ABS or ASA piping component.

2 Normative reference

The following normative document contains provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, this publication do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent edition of the normative document indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 1167:1996, *Thermoplastics pipes for the conveyance of fluids — Resistance to internal pressure — Test method*.

3 Principle

Test pieces, each comprising a single fitting with its sealing devices or a pipe-fitting assembly, are conditioned and then subjected to a specified constant internal hydrostatic pressure for a specified period of time or until the test pieces fail.

Throughout the test, the test pieces are filled with water and are kept in an environment at a specified constant temperature which may be water (“water-in-water” test) or air (“water-in-air” test).

4 Apparatus

4.1 Pressure-tight devices

4.1.1 General

The pressure-tight devices shall be capable of connecting the fittings with the pressurizing equipment and, if applicable, between test pieces.

The devices shall not prevent the free parts of fittings, between joints, from deforming under the action of internal pressure at any time during the test.

External reinforcing rings may be used to prevent any leakage from the joint for the required duration of the test. The external reinforcing rings and the internal seal shall be located within the area of the socket.

The devices shall conform to the requirements given in 4.1.2.1, 4.1.2.2 or 4.1.2.3, if applicable, or shall be one of types described in 4.1.2.4 or 4.1.3.

4.1.2 Components with plain sockets

4.1.2.1 **Joints made using a solvent adhesive** (see Figure 1)

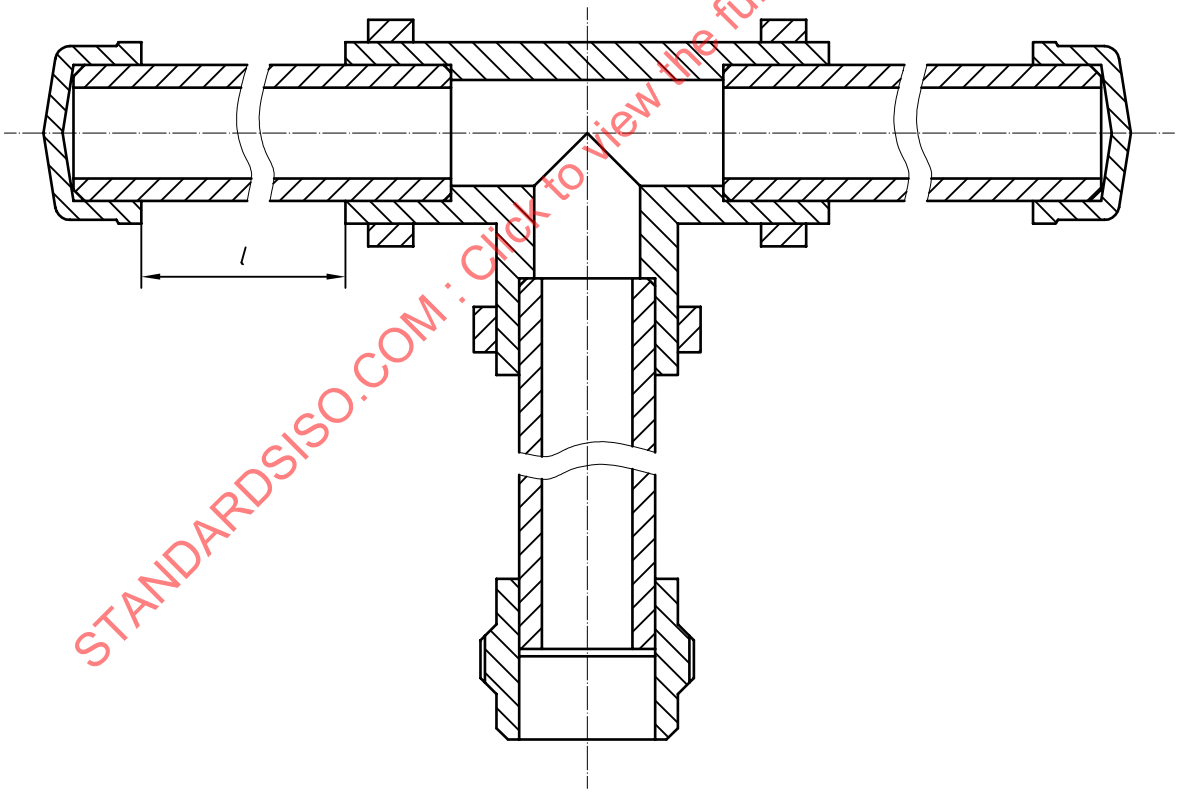


Figure 1 — Example of a pressure-tight test piece assembly with solvent adhesive joints and with hydrostatic end thrust

Each of the sockets of the fitting shall be joined, by means of solvent adhesive, to a portion of pipe of the series for which the fitting is designed. All pipe ends shall be chamfered. The minimum length *l* of the pipe portion (see Figure 1) shall be such that the connectors can be fixed without difficulty. Care shall be taken that no additional stress is caused in the solvent-cemented joint by the pressure-tight devices.

A storage period of at least 10 days is required (see clause 7) to ensure satisfactory drying of the joint.

4.1.2.2 Mechanical joints made using external milled grooves or threads (see Figure 2)

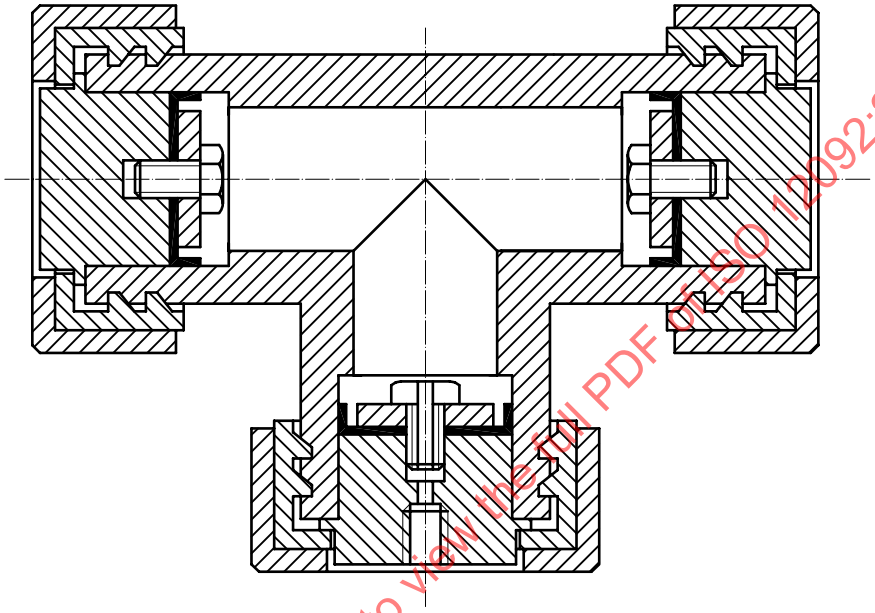


Figure 2 — Example of a pressure-tight test piece assembly with mechanical joints involving external milled grooves and with hydrostatic end thrust

The closing device is attached to the test piece by virtue of the fact that its ribs engage in the machined grooves in the test piece. Sealing is ensured by cup-shaped seals inside the socket of the test piece.

NOTE Machining of the grooves or threads should be carried out with great care, taking into consideration the notch sensitivity of the plastics material concerned. The number of grooves should preferably be at least two in the case of fittings designed for pipes of nominal external diameter 90 or less, and at least three for fittings designed for larger pipes.

4.1.2.3 Mechanical joints made using compression by means of ribbed half-segments (see Figure 3)

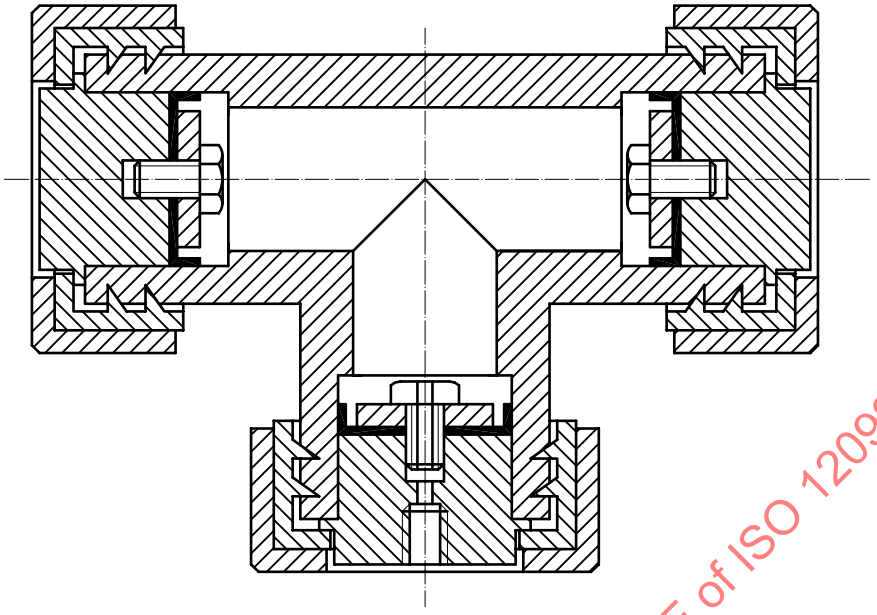


Figure 3 — Example of a pressure-tight test piece assembly with mechanical compression joints and with hydrostatic end thrust

The grooves in the test piece are formed by pressing the ribs of the half shells of the closing device into the test piece. The closing device is held to the test piece by virtue of the fact that the ribs engage in the grooves. Sealing is ensured by cup-shaped seals inside the socket of the test piece.

NOTE 1 The number of ribs on the clamping jaw (half-segments) should preferably be at least two in the case of fittings designed for pipes of nominal external diameter 90 or less and at least three for fittings designed for larger pipes. The height of the ribs should preferably be approximately 0,8 mm.

NOTE 2 The principle of the joint shown in Figure 3 is perhaps preferable to that shown in Figure 2, because it avoids machining and reduces the risk of defects due to the production of the grooves.

4.1.2.4 Joints made using internal metal pins to prevent expulsion of the connectors (see Figure 4)

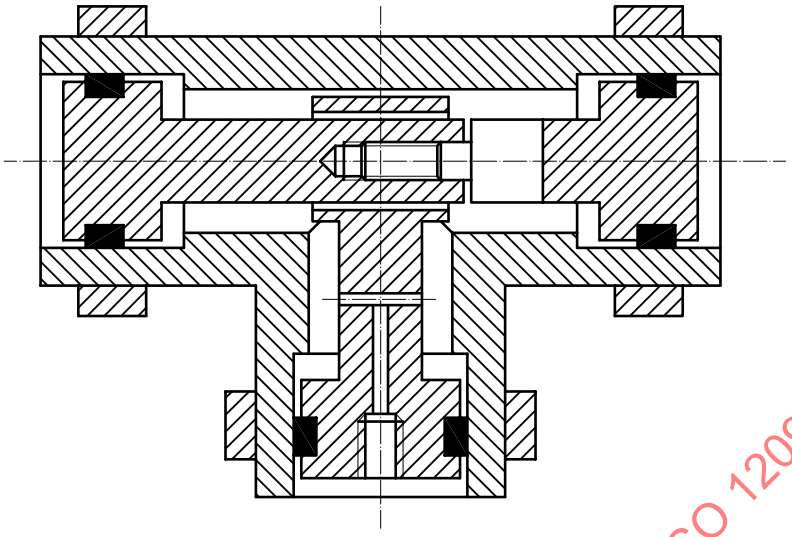


Figure 4 — Example of a pressure-tight test piece assembly with internally pinned joints and ring seals and without hydrostatic end thrust

The internally located closing pistons are held together by an appropriate coupling design. Sealing is ensured by ring seals inside the socket of the test piece.

NOTE The advantage of the principle illustrated in Figure 4 is the complete absence of any influence of notches caused by the gripping or retaining devices. The disadvantage is a possible influence on the deformation of the free parts and the existence of additional forces due to the rigidity of the metal pins.

4.1.3 Components with socket and gasket

4.1.3.1 Joints made using an elastomer gasket and internal metal pins to prevent expulsion of the connectors (see Figure 5)

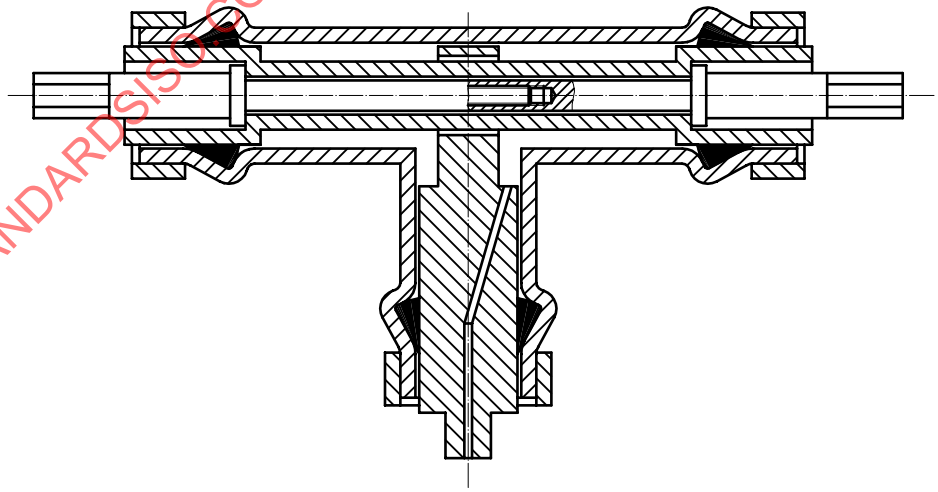


Figure 5 — Example of a pressure-tight test piece assembly with internally pinned joints and gasket seals and without hydrostatic end thrust

The internally located closing pistons are held together by an appropriate coupling design. Sealing is ensured by ring seals inside the push-fit socket of the test piece. The seals are supplied with the product.

NOTE Care should be taken that no additional stress is induced in the test piece by forces resulting from the piston arrangement.

4.1.3.2 Joints made using an elastomer gasket and an external frame (see Figure 6)

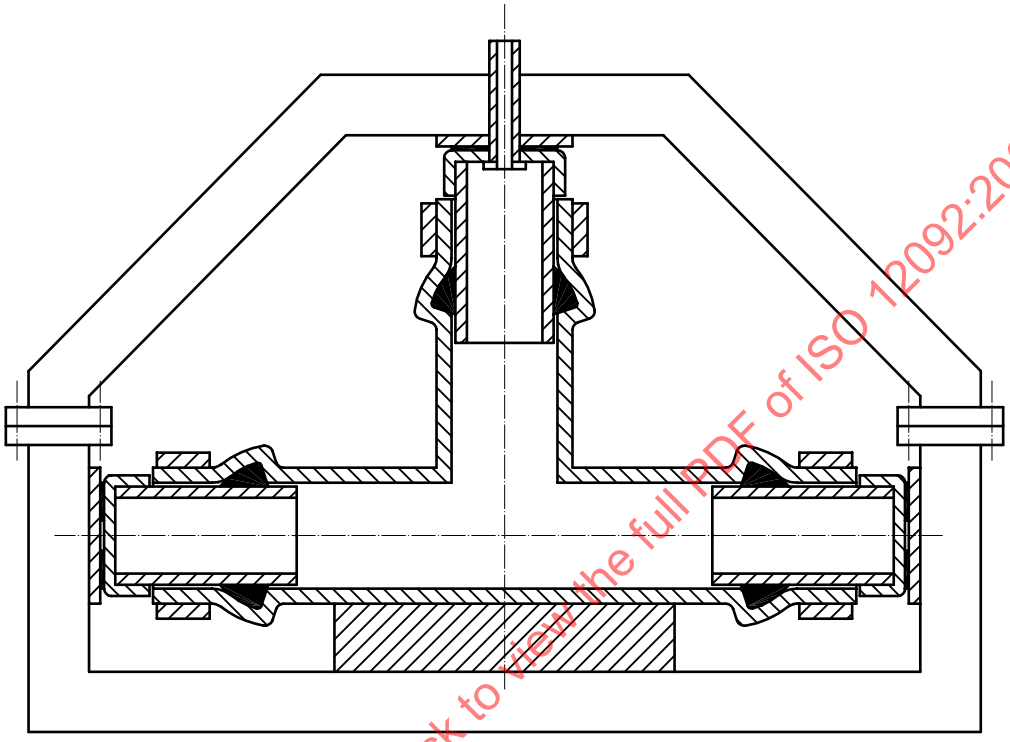


Figure 6 — Example of a pressure-tight assembly using an external frame and without hydrostatic end thrust

The internally located closing pistons are held together by an appropriate coupling design (external frame). Sealing is ensured by ring seals inside the push-fit socket of the test piece. All pipe ends in the test piece shall be chamfered. The seals are supplied with the product.

NOTE Care should be taken that no additional stress is induced in the test piece by forces resulting from the piston arrangement or the support.

4.1.3.3 Joints made using an elastomeric gasket and compression by means of two half-segments (see Figure 7)

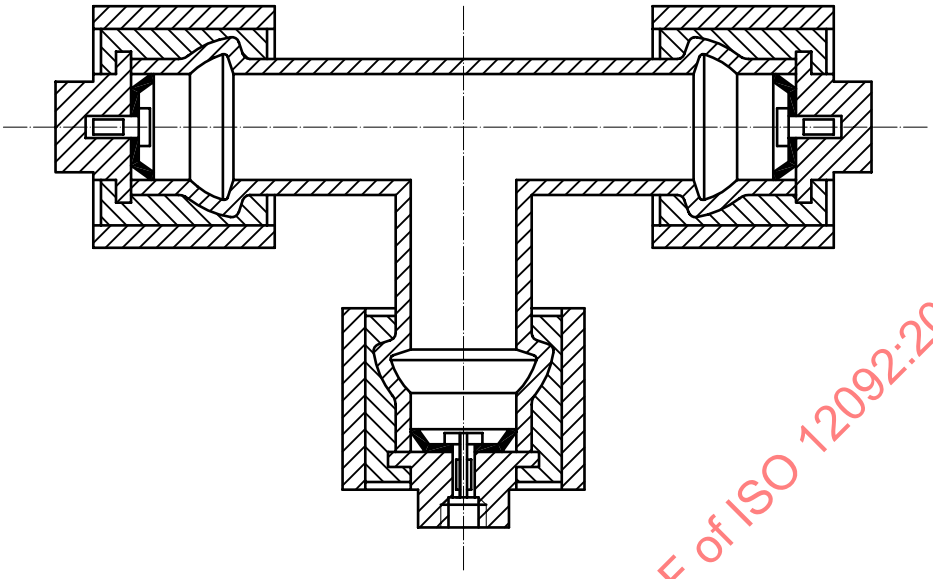


Figure 7 — Example of a pressure-tight test piece assembly using devices with external half-segments for jointing and with hydrostatic end thrust

The closing device is attached to the test piece by virtue of the fact that the ribs of the test piece engage in the half-segments. Sealing is ensured by cup-shaped seals inside the socket of the test piece.

NOTE The internal pressure helps seal the test piece. Sealing may be critical at low pressures.

4.1.4 Closing devices for valves

4.1.4.1 Ball valve with union connection

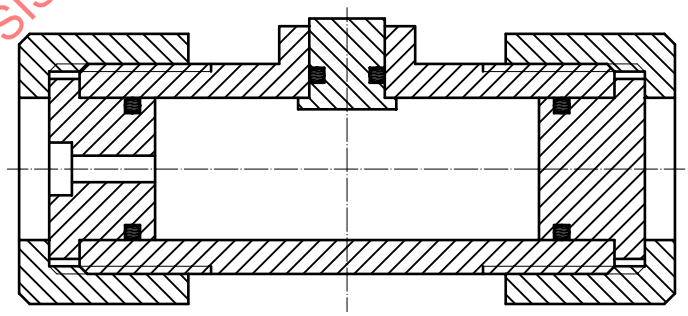
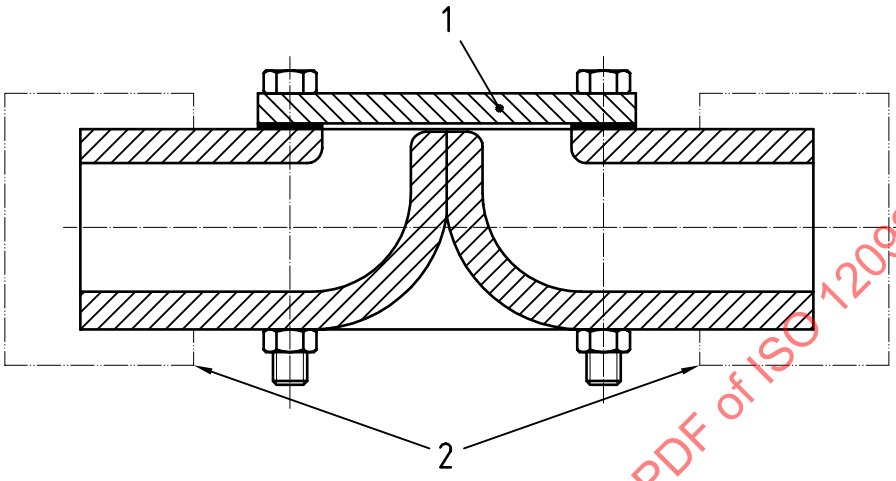


Figure 8 — Example of a pressure-tight device using metal plugs and nuts on a ball valve body

All openings are closed by plugs and O-rings. Special metal nuts can be used instead of the original plastics nuts to keep the plugs in place.

NOTE The plugs should preferably not be inserted deeper into the valve body than the original components in an assembled valve.

4.1.4.2 Diaphragm valves with spigots



Key

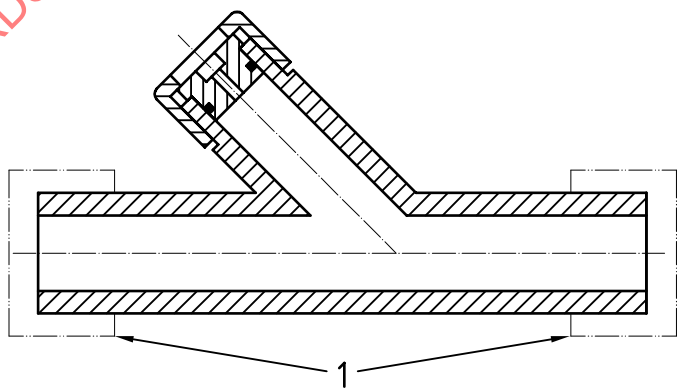
1 Metal plate and seal
2 Closing devices as for fittings

Figure 9 — Example of a pressure-tight device on a diaphragm valve body

The diaphragm, which is usually the limiting valve component with regard to internal pressure and temperature, may be replaced by a metal plate and a sealing gasket. To close the inlet and outlet of the valve body, the same types of closing device may be used as for fittings.

NOTE This arrangement does not exactly simulate the stress situation in an assembled valve. It does, however, allow a pressure test to be carried out on the valve body irrespective of the diaphragm used. The real performance of an assembled valve can only be assessed on an assembled valve.

4.1.4.3 Seat valves with spigots



Key

1 Closing devices as for fittings

Figure 10 — Example of a pressure-tight device on a seat valve body

The actuator openings are closed off by a plug, an O-ring and a metal nut. To close off the inlet and outlet of the valve body, the same types of closing device may be used as for fittings.

NOTE 1 The plugs should preferably not be inserted deeper into the valve body than the original components in an assembled valve.

NOTE 2 This arrangement does not exactly simulate the stress situation in an assembled valve. It does, however, allow a pressure test to be carried out on the valve body irrespective of the closing mechanism used. The real performance of an assembled valve can only be assessed on an assembled valve.

4.1.4.4 Butterfly valves

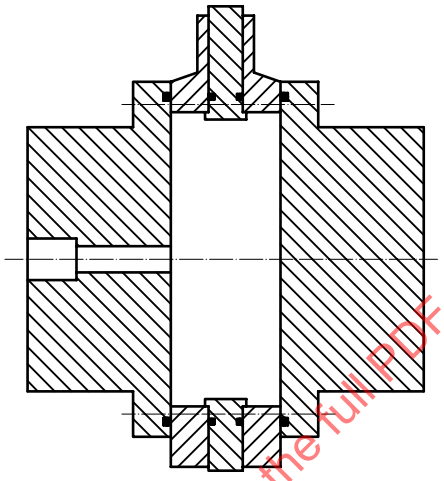


Figure 11 — Example of a pressure-tight device for a butterfly valve body

The openings for the valve shaft are closed off by metal plugs, with shoulders to prevent a blow-out, and O-rings. The inlet and outlet can be closed off by blind flanges and seals. The type of bolt used for the assembly of the blind flanges should preferably be of the same type as that used for actual installation of an assembled valve.

NOTE 1 The plugs should preferably not be inserted deeper into the valve body than the original components in an assembled valve.

NOTE 2 This arrangement does not exactly simulate the stress situation in an assembled valve. It does, however, allow a pressure test to be carried out on the body irrespective of the type of seal used. The real performance of a valve can only be assessed on an assembled valve.

4.1.5 Assembled valves

The obturator of the valve should preferably be in such a position that all the seals in the valve will be subjected to the test pressure. The inlet and outlet of the valve should be closed off in such a way that the required level of safety is ensured without any negative effect on the test results. The pressure-tight devices should produce the same stress situation as in an assembled product.

4.1.6 Pressure-bearing components of other products

The openings in the pressure-bearing component should preferably be closed off in such a way that the required level of safety is ensured without any negative effect on the test results. The pressure-tight devices should produce the same stress situation as in an assembled product.

4.2 Temperature-controlled environment

This shall conform to ISO 1167:1996, subclause 6.2.

4.3 Devices for positioning the test piece

This shall conform to ISO 1167:1996, subclause 6.3.

4.4 Pressurizing equipment

This shall conform to ISO 1167:1996, subclause 6.4.

4.5 Pressure measurement devices

This shall conform to ISO 1167:1996, subclause 6.5.

4.6 Thermometer or equivalent

This shall conform to ISO 1167:1996, subclause 6.6.

4.7 Timer

This shall conform to ISO 1167:1996, subclause 6.7.

4.8 Equipment for measuring dimensions

This shall conform to ISO 1167:1996, subclauses 6.8 and 6.9.

5 Test pieces

5.1 Sampling

Carry out sampling as specified in the applicable product standard.

5.2 Preparation of test pieces

Test pieces shall comprise a complete fitting, valve body or other pressure-bearing component, of a given type and nominal diameter, together with its connectors and, where applicable, held by a frame (see 4.1.3.2).

5.3 Number of test pieces

The number of test pieces shall be as specified in the applicable product standard.

NOTE It is recommended that at least three test pieces be tested.

6 Calibration of the apparatus

Carry out calibration in conformity with ISO 1167:1996, subclause 8.1.

7 Conditioning

Carry out conditioning in conformity with ISO 1167:1996, clause 9.

For joints made using solvent adhesive, leave the test piece to dry at room temperature for at least 10 days.

NOTE The manufacturer's product information for the use of the adhesive should be taken into consideration.