
**Plastics piping systems for water supply
and for buried and above-ground
drainage and sewerage under pressure —
Unplasticized poly(vinyl chloride)
(PVC-U) —**

**Part 2:
Pipes**

*Systèmes de canalisations en plastique pour l'alimentation en eau, pour
branchements et collecteurs d'assainissement enterrés et aériens avec
pression — Poly(chlorure de vinyle) non plastifié (PVC-U) —*

Partie 2: Tubes



Reference number
ISO 1452-2:2009(E)

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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 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 1452-2 was prepared by the European Committee for Standardization (CEN) Technical Committee CEN/TC 155, *Plastics piping systems and ducting systems*, in collaboration with ISO Technical Committee ISO/TC 138, *Plastics pipes, fittings and valves for the transport of fluids*, Subcommittee SC 2, *Plastics pipes and fittings for water supplies*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This first edition cancels and replaces ISO 4422-2:1996 and ISO 2045, which have been technically revised.

ISO 1452 consists of the following parts, under the general title *Plastics piping systems for water supply and for buried and above-ground drainage and sewerage under pressure — Unplasticized poly(vinyl chloride) (PVC-U)*:

- *Part 1: General*
- *Part 2: Pipes*
- *Part 3: Fittings*
- *Part 4: Valves*
- *Part 5: Fitness for purpose of the system*

Guidance for the assessment of conformity is to form the subject of a part 7.

Introduction

The System Standard, of which this is Part 2, specifies the requirements for a piping system and its components made from unplasticized poly(vinyl chloride) (PVC-U). The piping system is intended to be used for water supply and for buried and above-ground drainage and sewerage under pressure.

In respect of potential adverse effects on the quality of water intended for human consumption, caused by the products covered by this part of ISO 1452, the following are relevant.

- a) This part of ISO 1452 provides no information as to whether or not the products can be used without restriction.
- b) Existing national regulations concerning the use and/or the characteristics of these products remain in force.

Requirements and test methods for material and components, other than pipes, are specified in ISO 1452-1, ISO 1452-3 and ISO 1452-4. Characteristics for fitness for purpose (mainly for joints) are established in ISO 1452-5.

This part of ISO 1452 specifies the characteristics of pipes.

Guidance for installation is given in ISO/TR 4191^[1].

Guidance for assessment of conformity is provided in ENV 1452-7^[2].

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Plastics piping systems for water supply and for buried and above-ground drainage and sewerage under pressure — Unplasticized poly(vinyl chloride) (PVC-U) —

Part 2: Pipes

1 Scope

This part of ISO 1452 specifies the characteristics of solid-wall pipes made from unplasticized poly(vinyl chloride) (PVC-U) for piping systems intended for water supply and for buried and above-ground drainage and sewerage under pressure.

It also specifies the test parameters for the test methods referred to in this part of ISO 1452.

In conjunction with ISO 1452-1 and ISO 1452-5, it is applicable to extruded PVC-U pipes without a socket and pipes with a socket (integral or not), intended to be used for the following:

- a) water mains and services buried in the ground;
- b) conveyance of water above ground for both outside and inside buildings;
- c) buried and above-ground drainage and sewerage under pressure.

It is applicable to piping systems intended for the supply of water under pressure up to and including 25 °C (cold water) intended for human consumption and for general purposes as well as for waste water under pressure.

This part of ISO 1452 specifies pipes for the conveyance of water and waste water up to and including 45 °C. For temperatures between 25 °C and 45 °C, Figure A.1 applies.

NOTE 1 The producer and the end-user can come to agreement on the possibilities of use for temperatures above 45 °C on a case-by-case basis.

This part of ISO 1452 specifies a range of pipe sizes and pressure classes, and gives requirements concerning colours.

NOTE 2 It is the responsibility of the purchaser or specifier to make the appropriate selections from these aspects, taking into account their particular requirements and any relevant national regulations and installation practices or codes.

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 1167-1, *Thermoplastics pipes, fittings and assemblies for the conveyance of fluids — Determination of the resistance to internal pressure — Part 1: General method*

ISO 1167-2, *Thermoplastics pipes, fittings and assemblies for the conveyance of fluids — Determination of the resistance to internal pressure — Part 2: Preparation of pipe test pieces*

ISO 1183-1:2004, *Plastics — Methods for determining the density of non-cellular plastics — Part 1: Immersion method, liquid pyknometer method and titration method*

ISO 1452-1:2009, *Plastics piping systems for water supply and for buried and above-ground drainage and sewerage under pressure — Unplasticized poly(vinyl chloride) (PVC U) — Part 1: General*

ISO 1452-5, *Plastics piping systems for water supply and for buried and above-ground drainage and sewerage under pressure — Unplasticized poly(vinyl chloride) (PVC U) — Part 5: Fitness for purpose of the system*

ISO 2505, *Thermoplastics pipes — Longitudinal reversion — Test method and parameters*

ISO 2507-1:1995, *Thermoplastics pipes and fittings — Vicat softening temperature — Part 1: General test method*

ISO 3126, *Plastics piping systems — Plastics components — Determination of dimensions*

ISO 6259-1, *Thermoplastics pipes — Determination of tensile properties — Part 1: General test method*

ISO 6259-2, *Thermoplastics pipes — Determination of tensile properties — Part 2: Pipes made of unplasticized poly(vinyl chloride) (PVC-U), chlorinated poly(vinyl chloride) (PVC-C) and high-impact poly(vinyl chloride) (PVC-HI)*

ISO 7387-1, *Adhesives with solvents for assembly of PVC-U pipe elements — Characterization — Part 1: Basic test methods*

ISO 7686, *Plastics pipes and fittings — Determination of opacity*

ISO 9311-1, *Adhesives for thermoplastic piping systems — Part 1: Determination of film properties*

ISO 9852, *Unplasticized poly(vinyl chloride) (PVC-U) pipes — Dichloromethane resistance at specified temperature (DCMT) — Test method*

ISO 18373-1, *Rigid PVC pipes — Differential scanning calorimetry (DSC) method — Part 1: Measurement of the processing temperature*

EN 681-1:1996, *Elastomeric seals — Materials requirements for pipe joint seals used in water and drainage applications — Part 1: Vulcanized rubber*

EN 744:1995, *Plastics piping and ducting systems — Thermoplastics pipes — Test method for resistance to external blows by the round-the-clock method*

3 Terms, definitions, symbols and abbreviated terms

For the purposes of this document, the terms, definitions, symbols and abbreviated terms given in ISO 1452-1 and the following apply:

L length of socket

m depth of engagement

4 Material

4.1 Pipe material

The material to be used shall conform to ISO 1452-1 and to the requirements given in 4.2 and 4.3.

4.2 Density

The density, ρ , at 23 °C of the pipe, when measured in accordance with ISO 1183-1, shall be within the following limits:

$$1\,350\text{ kg/m}^3 \leq \rho \leq 1\,460\text{ kg/m}^3$$

4.3 MRS-value

The pipe material shall have a minimum required strength, MRS, as defined in ISO 1452-1:2009, 4.4.1, of at least 25 MPa.

The manufacturer of the compound or formulation shall confirm the MRS by testing as described in ISO 1452-1:2009, 4.4.1 or 4.4.2, respectively.

5 General characteristics

5.1 Appearance

When viewed without magnification the internal and external surfaces of pipes shall be smooth, clean and free from scoring, cavities and other surface defects to an extent that would prevent conformity to this part of ISO 1452. The material shall not contain any impurities visible without magnification. The ends of the pipe shall be cut cleanly and square to the axis of the pipe.

5.2 Colour

The colour of the pipes shall be either grey, blue or cream for water supply, and grey or brown for drainage and sewerage under pressure. The colour of the pipes shall be uniform throughout the wall.

NOTE Attention is drawn to the fact that the colouring of pipes for the supply of water for human consumption can be part of national regulation.

5.3 Opacity of pipes intended for the above-ground conveyance of water

The wall of the pipe shall be opaque and shall not transmit more than 0,2 % of visible light when measured in accordance with ISO 7686.

6 Geometrical characteristics

6.1 Measurement of dimensions

Dimensions shall be measured in accordance with ISO 3126.

6.2 Nominal outside diameters

The nominal outside diameter, d_n , of a pipe shall conform to Table 1.