

INTERNATIONAL STANDARD

ISO
4422-2

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Pipes and fittings made of unplasticized poly(vinyl chloride) (PVC-U) for water supply — Specifications —

Part 2:

Pipes (with or without integral sockets)

*Tubes et raccords en poly(chlorure de vinyle) non plastifié (PVC-U) pour
l'adduction d'eau — Spécifications —*

Partie 2: Tubes (avec ou sans emboîtures incorporées)



Reference number
ISO 4422-2:1996(E)

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.

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.

International Standard ISO 4422-2 was prepared by 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*.

Together with the other parts, this part of ISO 4422 cancels and replaces ISO 4422:1990, which has been technically revised.

ISO 4422 consists of the following parts, under the general title *Pipes and fittings made of unplasticized poly(vinyl chloride) (PVC-U) for water supply — Specifications*:

- Part 1: General
- Part 2: Pipes (with or without integral sockets)
- Part 3: Fittings and joints
- Part 4: Valves and ancillary equipment
- Part 5: Fitness for purpose of the system

ISO 4422 is one of a series of system standards for plastics piping systems which are being prepared within ISO/TC 138. Each system standard is based on a specific material for a specific application.

They conform to a standard multi-part format, each part dealing with a specific aspect of the overall system.

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NOTE 1 At the present time, the reference document for the installation code is ISO/TR 4191, and this document will ultimately form part 6 of this International Standard.

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Pipes and fittings made of unplasticized poly(vinyl chloride) (PVC-U) for water supply — Specifications —

Part 2:

Pipes (with or without integral sockets)

1 Scope

This part of ISO 4422 specifies the characteristics and properties of extruded pipes made of unplasticized poly(vinyl chloride) (PVC-U), with or without sockets (integral or not), and intended to be used for buried water mains and services and for water supplies above ground, both inside and outside buildings.

The pipes covered by this part of ISO 4422 are intended for the conveyance of cold water under pressure at temperatures up to approximately 20 °C, for general purposes and for the supply of drinking water. This part of ISO 4422 is also applicable to water up to and including 45 °C (see figure 1).

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 4422. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 4422 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 161-1:1996, *Thermoplastics pipes for the conveyance of fluids — Nominal outside diameters and nominal pressures — Part 1: Metric series.*

ISO 727:1985, *Fittings of unplasticized polyvinyl chloride (PVC-U), chlorinated polyvinyl chloride (PVC-C) or acrylonitrile/butadiene/styrene (ABS) with plain sockets for pipes under pressure — Dimensions of sockets — Metric series.*

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

ISO 1628-2:1988, *Plastics — Determination of viscosity number and limiting viscosity number — Part 2: Poly(vinyl chloride) resins.*

ISO 2045:1988, *Single sockets for unplasticized poly(vinyl chloride) (PVC-U) and chlorinated poly(vinyl chloride) (PVC-C) pressure pipes with elastic sealing ring type joints — Minimum depths of engagement.*

ISO 2505-1:1994, *Thermoplastics pipes — Longitudinal reversion — Part 1: Determination methods.*

ISO 2505-2:1994, *Thermoplastics pipes — Longitudinal reversion — Part 2: Determination parameters.*

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

ISO 2507-2:1995, *Thermoplastics pipes and fittings — Vicat softening temperature — Part 2: Test conditions for unplasticized poly(vinyl chloride) (PVC-U) or chlorinated poly(vinyl chloride) (PVC-C) pipes and fittings and for high impact resistance poly(vinyl chloride) (PVC-HI) pipes.*

ISO 3126:1974, *Plastics pipes — Measurement of dimensions*.

ISO 3127:1994, *Thermoplastics pipes — Determination of resistance to external blows — Round-the-clock method*.

ISO 3474:1976, *Unplasticized polyvinyl chloride (PVC) pipes — Specification and measurement of opacity*.

ISO 3606:1976, *Unplasticized polyvinyl chloride (PVC) pipes — Tolerances on outside diameters and wall thicknesses*.

ISO 4065:1996, *Thermoplastics pipes — Universal wall thickness table*.

ISO 4422-1:1996, *Pipes and fittings made of unplasticized poly(vinyl chloride) (PVC-U) for water supply — Specifications — Part 1: General*.

ISO/TR 9080:1992, *Thermoplastics pipes for the transport of fluids — Methods of extrapolation of hydrostatic stress rupture data to determine the long-term hydrostatic strength of thermoplastics pipe materials*.

ISO 9852:1995, *Unplasticized poly(vinyl chloride) (PVC-U) pipes — Dichloromethane resistance at specified temperature (DCMT) — Test method*.

ISO 11673:—¹⁾, *Determination of the fracture toughness of unplasticized poly(vinyl chloride) (PVC-U) pipes*.

ISO 11922-1:—²⁾, *Thermoplastics pipes for the transport of fluids — Dimensions and tolerances — Part 1: Metric series*.

ISO 12162:1995, *Thermoplastics materials for pipes and fittings for pressure applications — Classification and designation — Overall service (design) coefficient*.

Guidelines for drinking water quality, Vol. 1: Recommendations, (WHO, Geneva, 1984).

3 Definitions

For the purposes of this part of ISO 4422, the definitions given in ISO 4422-1 apply.

NOTE 2 See also clause 5.

1) To be published.

2) To be published. (Revision of ISO 3606:1976, ISO 3607:1977, ISO 3608:1976 and ISO 3609:1977)

4 Material

4.1 The material from which the pipes are made shall conform to the applicable requirements specified in ISO 4422-1 in addition to those specified in 4.2.

4.2 The material from which the pipes are made shall have a minimum required strength (MRS) of not less than 25 MPa, when determined in accordance with ISO/TR 9080 and ISO 12162 (see also 3.6 and 3.7 of ISO 4422-1:1996).

NOTE 3 As a general guide, it will be found that the material used to manufacture pipes to conform to this part of ISO 4422 will need to be based on a PVC-U resin having a viscosity number greater than 64 when tested in accordance with ISO 1628-2.

5 Nominal pressures and overall service (design) coefficient

5.1 The nominal pressure PN of a pipe is related to the pipe series S values given in tables 1 and 2 by the following equation:

$$PN = 10 \times \frac{\sigma_s}{S}$$

NOTE 4 When the design stress σ_s is expressed in megapascals, the value of the nominal pressure PN corresponds to a pressure in bars.

5.2 The design stress shall be based on the value of the lower confidence limit σ_{LCL} of the long-term hydrostatic strength for the resistance to internal pressure as determined in accordance with ISO/TR 9080. This value of σ_{LCL} shall be converted into a minimum required strength (MRS) in accordance with ISO 12162. The MRS shall be divided by an overall service (design) coefficient C to give the design stress σ_s which is expressed by the following equation:

$$\sigma_s = \frac{MRS}{C}$$

5.3 The overall service (design) coefficient for PVC-U pipes shall be equal to 2,5 for pipes of nominal outside diameter 90 or less, and 2,0 for pipes of nominal outside diameter 110 and above, resulting in a design stress σ_s of 10 MPa or 12,5 MPa, respectively.