BS ISO 17885:2015

Plastics piping systems — Mechanical fittings for pressure piping systems — Specifications

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National foreword

This British Standard is the UK implementation of ISO 17885:2015. It supersedes BS ISO 10838-1:2000 and BS ISO 10838-2:2000 and BS ISO 10838-3:2001 which are withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PRI/88/2, Plastics piping for pressure applications.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Plastics piping systems — Mechanical fittings for pressure piping systems — Specifications

Systèmes de canalisations en plastiques — Raccords mécaniques pour les canalisations sous pression — Spécifications

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 138, *Plastics pipes, fittings and valves for the transport of fluids*, Subcommittee SC 4, *Plastics pipes and fittings for the supply of gaseous fuels* in close collaboration with Subcommittee SC 2, *Plastics pipes and fittings for water supplies* and Subcommittee SC 3, *Plastics pipes and fittings for industrial applications*.

This first edition cancels and replaces ISO 10838-1:2000, ISO 10838-2:2000, ISO 10838-3:2001, and ISO 14236:2000, which have been technically revised.

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Introduction

This International Standard specifies the requirements for mechanical fittings for joining plastic piping systems for the supply of gaseous fuels, the supply of water for human consumption and other purposes, as well as for industrial application.

It provides a unified set of test methods to check the performance of the fittings, depending on their intended use.

It is the responsibility of the purchaser or specifier to select the appropriate fitting, taking into account their particular requirements and any relevant national guidance or regulations and installation practices or codes.

Products must comply, when existing, with national regulations and testing arrangements that ensure fitness for purpose.

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Plastics piping systems — Mechanical fittings for pressure piping systems — Specifications

1 Scope

This International Standard specifies the requirements and test methods for mechanical fittings intended to join plastic pressure piping systems including transition fittings to metal pipes for the following:

— supply of gaseous fuels (GAS);

— supply of water for human consumption (W), including raw water prior to treatment and for the supply of water for general purpose, as well as underground drainage and sewerage under pressure (P);

— supply of water for irrigation (I);

— industrial applications (IS).

This International Standard is applicable only to mechanical fittings with operating-temperature and pressure limits as indicated in the relevant systems standards.

NOTE A list of International Standard for plastic pipes for which mechanical fittings can be used can be found in Annex A.

Flanges are not covered by this International Standard.

Mechanical fittings for hot and cold water systems inside buildings, as well as for district heating applications, are not covered by this International Standard.

2 Normative references

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

ISO 7-1, *Pipe threads where pressure-tight joints are made on the threads — Part 1: Dimensions, tolerances and designation*

ISO 75-2, *Plastics — Determination of temperature of deflection under load — Part 2: Plastics and ebonite*

ISO 228-1, *Pipe threads where pressure-tight joints are not made on the threads — Part 1: Dimensions, tolerances and designation*

ISO 306, *Plastics — Thermoplastic materials — Determination of Vicat softening temperature (VST)*

ISO 307, *Plastics — Polyamides — Determination of viscosity number*

ISO 472, *Plastics — Vocabulary*

ISO 580:2005, *Plastics piping and ducting systems — Injection-moulded thermoplastics fittings — Methods for visually assessing the effects of heating*

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

ISO 1133-1, *Plastics — Determination of the melt mass-flow rate (MFR) and melt volume-flow rate (MVR) of thermoplastics — Part 1: Standard method*

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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 1167-3, *Thermoplastics pipes, fittings and assemblies for the conveyance of fluids — Determination of the resistance to internal pressure — Part 3: Preparation of components*

ISO 1167-4, *Thermoplastics pipes, fittings and assemblies for the conveyance of fluids — Determination of the resistance to internal pressure — Part 4: Preparation of assemblies*

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

ISO 2507-2, *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 3451-4:1998, *Plastics — Determination of ash — Part 4: Polyamides*

ISO 3458, *Plastics piping systems — Mechanical joints between fittings and pressure pipes — Test method for leak tightness under internal pressure*

ISO 3459, *Plastic piping systems — Mechanical joints between fittings and pressure pipes — Test method for leaktightness under negative pressure*

ISO 3501, *Plastics piping systems — Mechanical joints between fittings and pressure pipes — Test method for resistance to pull-out under constant longitudinal force*

ISO 3503, *Plastics piping systems — Mechanical joints between fittings and pressure pipes — Test method for leaktightness under internal pressure of assemblies subjected to bending*

ISO 4437-1:2014, *Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) — Part 1: General*

ISO 4633, *Rubber seals — Joint rings for water supply, drainage and sewerage pipelines — Specification for materials*

ISO 6509, *Corrosion of metals and alloys — Determination of dezincification resistance of brass*

ISO 6957, *Copper alloys — Ammonia test for stress corrosion resistance*

ISO 6993-1, *Buried, high-impact poly(vinyl chloride) (PVC-HI) piping systems for the supply of gaseous fuels — Part 1: Pipes for a maximum operating pressure of 1 bar (100 kPa)*

ISO 6993-2, *Buried, high-impact poly(vinyl chloride) (PVC-HI) piping systems for the supply of gaseous fuels — Part 2: Fittings for a maximum operating pressure of 200 mbar (20 kPa)*

ISO 6993-3, *Buried, high-impact poly(vinyl chloride) (PVC-HI) piping systems for the supply of gaseous fuels — Part 3: Fittings and saddles for a maximum operating pressure of 1 bar (100 kPa)*

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

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

ISO 10147, *Pipes and fittings made of crosslinked polyethylene (PE-X) — Estimation of the degree of crosslinking by determination of the gel content*

ISO 12162, *Thermoplastics materials for pipes and fittings for pressure applications — Classification, designation and design coefficient*

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ISO 13783, *Plastics piping systems — Unplasticized poly(vinyl chloride) (PVC-U) end-load-bearing double-socket joints — Test method for leaktightness and strength while subjected to bending and internal pressure*

ISO 13844, *Plastics piping systems — Elastomeric-sealing-ring-type socket joints for use with plastic pressure pipes — Test method for leaktightness under negative pressure, angular deflection and deformation*

ISO 13845, *Plastics piping systems — Elastomeric-sealing-ring-type socket joints for use with thermoplastic pressure pipes — Test method for leaktightness under internal pressure and with angular deflection*

ISO 13951, *Plastics piping systems — Test method for the resistance of plastic pipe/pipe or pipe/fitting assemblies to tensile loading*

ISO 16010, *Elastomeric seals — Material requirements for seals used in pipes and fittings carrying gaseous fuels and hydrocarbon fluids*

ISO 16486-1:2012, *Plastics piping systems for the supply of gaseous fuels - Unplasticized polyamide (PA-U) piping systems with fusion jointing and mechanical jointing — Part 1: General*

ISO 17456:2006, *Plastics piping systems — Multilayer pipes — Determination of long-term strength*

ISO 17467-1:2012, *Plastics piping systems for the supply of gaseous fuels — Unplasticized polyamide (PA-U) piping systems jointed by solvent cement — Part 1: General*

ISO 17778, *Plastics piping systems — Fittings, valves and ancillaries — Determination of gaseous flow rate/pressure drop relationships*

ISO 19899, *Plastics piping systems — Polyolefin pipes and mechanical fitting assemblies — Test method for the resistance to end load (AREL test)*

ISO 23711, *Elastomeric seals — Requirements for materials for pipe joint seals used in water and drainage applications — Thermoplastic elastomers*

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

EN 681-2, *Elastomeric seals — Materials requirements for pipe joint seals used in water and drainage applications — Part 2: Thermoplastic elastomers*

EN 682, *Elastomeric seals — Materials requirements for seals used in pipes and fittings carrying gas and hydrocarbon fluids*

EN 1982, *Copper and copper alloys — Ingots and castings*

EN 10208-1, *Steel pipes for pipelines for combustible fluids — Technical delivery conditions — Part 1: Pipes of requirement class A*

EN 10213, *Steel castings for pressure purposes*

EN 10216-1, *Seamless steel tubes for pressure purposes — Technical delivery conditions — Part 1: Non-alloy steel tubes with specified room temperature properties*

EN 10216-3, *Seamless steel tubes for pressure purposes — Technical delivery conditions — Part 3: Alloy fine grain steel tubes*

EN 10216-5, *Seamless steel tubes for pressure purposes — Technical delivery conditions — Part 5: Stainless steel tubes*

EN 10217-1, *Welded steel tubes for pressure purposes — Technical delivery conditions — Part 1: Non-alloy steel tubes with specified room temperature properties*

EN 10217-3, *Welded steel tubes for pressure purposes — Technical delivery conditions — Part 3: Alloy fine grain steel tubes*

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EN 10224, *Non-alloy steel tubes and fittings for the conveyance of aqueous liquids including water for human consumption — Technical delivery conditions*

EN 10296-2, *Welded circular steel tubes for mechanical and general engineering purposes — Technical delivery conditions — Part 2: Stainless steel*

EN 12164, *Copper and copper alloys — Rod for free machining purposes*

EN 12165, *Copper and copper alloys — Wrought and unwrought forging stock*

EN 12449, *Copper and copper alloys — Seamless, round tubes for general purposes*

CEN/TS 13388, *Copper and copper alloys — Compendium of compositions and products*

3 Terms, definitions, symbols and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 472, ISO 1043-1, and the following apply.

3.1.1
mechanical fitting
fitting for assembling plastics pipes with each other or with a metal pipe or fitting, which includes one or more compression zones to provide pressure integrity, leak tightness and resistance to end loads

3.1.2
full-end-load resistance
combination of component and joint design and characteristics such that under any load condition the plastic pipe will fail first

3.1.3
end-load resistance
resistance to end load transmitted via the connecting pipe and generated by internal pressure, pipeline external interference, and thermally induced pipe stresses in any combination

3.1.4
non-end-load resistance
lack of resistance to axial loads without additional external mechanical axial support

3.1.5
lower confidence limit of predicted hydrostatic strength
σ_{LPL}
quantity, with the dimensions of stress, which represents the 97,5 % lower confidence limit of the predicted hydrostatic strength at a temperature θ and time t

Note 1 to entry: It is expressed in megapascals.

Note 2 to entry: Temperature, θ, is expressed in degrees Celsius and time, t, is expressed in years.

[SOURCE: ISO 12162:2009, 3.2]

3.1.6
minimum required strength
MRS
value of σ_{LPL} at 20 °C and 50 years, rounded down to the next smaller value of the R10 series when σ_{LPL} is below 10 MPa, or to the next lower value of the R20 series when σ_{LPL} is 10 MPa or greater

Note 1 to entry: The R10 series conforms to ISO 3[1] and the R20 series conforms to ISO 497[2].

[SOURCE: ISO 4437-1:2014, 3.3.2]

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3.1.7
design coefficient
C
coefficient with a value greater than 1, which takes into consideration service conditions, as well as properties of the components of a piping system other than those represented in the lower confidence limit

[SOURCE: ISO 12162:2009, 3.5]

3.1.8
design stress
σ_S
allowable stress for a given application at 20 °C, that is derived from the MRS by dividing it by the coefficient C, i.e.:

$$\sigma_S = \frac{\text{MRS}}{C}$$

Note 1 to entry: It is expressed in megapascals.

[SOURCE: ISO 4437-1:2014, 3.3.3]

3.1.9
gaseous fuel
any fuel which is in the gaseous state at a temperature of 15 °C and a pressure of 1 bar

Note 1 to entry: 1 bar = 0,1 MPa = 10^5 Pa; 1 MPa = 1 N/mm^2.

[SOURCE: ISO 4437-1:2014, 3.4.1]

3.1.10
standard dimension ratio
SDR
numerical designation of a pipe series, which is a convenient round number, approximately equal to the dimension ratio of the nominal outside diameter, d_n, and the nominal wall thickness, e_n

[SOURCE: ISO 4437-1:2014, 3.1.15]

3.1.11
maximum operating pressure
MOP
maximum effective pressure of gas in a piping system, expressed in bar, which is allowed in continuous use

Note 1 to entry: It takes into account the physical and the mechanical characteristics of the components of the piping system (and the influence of the gas on these characteristics) and it is calculated using the following formula:

$$\text{MOP} = \frac{20 \times \text{MRS}}{C \times (\text{SDR} - 1)}$$

3.1.12
nominal pressure
PN
numerical designation, which is a convenient rounded number for reference purposes

Note 1 to entry: For plastic piping systems conveying water, it corresponds to the maximum continuous operating pressure, expressed in bar, which can be sustained with water at 20 °C, based on the minimum design coefficient.

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3.1.13
virgin material
material in a form such as granules or powder that has not been subjected to use or processing other than that required for its manufacture and to which no reprocessable or recyclable materials have been added

3.1.14
own reprocessable material
material, of the same grade, prepared from clean rejected unused components, that will be reprocessed in a manufacturer's plant after having been previously processed by the same manufacturer in the production of same components by, for example, injection moulding

3.1.15
recycled material
material comprising one of the following:

a) material from used pipes or fittings which have been cleaned and crushed or ground

b) material from used thermoplastic products other than pipes or fittings which have been cleaned and crushed or ground

3.2 Symbols and abbreviated terms

3.2.1 Materials

3.2.1.1 Plastics

ABS	acrylonitrile-butadiene-styrene
ECTFE	ethylene chlorotriflourethylene
PA	polyamide
PB	polybutene
PE	polyethylene
PE-RT	polyethylene of raised temperature resistance
PE-X	crosslinked polyethylene
POM	polyoxymethylene, polyformaldehyde
PP-B	polypropylene block-copolymer
PP-H	polypropylene homopolymer
PP-R	polypropylene random-copolymer
PP-RCT	polypropylene random-copolymer with modified crystallinity
PPSU	poly(phenylene sulfone)
PSU	polysulfone
PVC-C	chlorinated poly(vinyl chloride)
PVC-HI	high-impact poly(vinyl chloride)
PVC-O	oriented unplasticized poly(vinyl chloride)

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PVC-U unplasticized poly(vinyl chloride)

PVDF poly(vinylidene fluoride)

3.2.1.2 Metals

Al aluminium

Cu copper

Cu-DHP phosphorus deoxidized copper

Cu-OF oxygen-free copper

Fe iron

Pb lead

Sn tin

Zn zinc

3.2.1.3 Other

As arsenic

C carbon

GF glass fibre

3.2.2 Applications

GAS supply of gaseous fuels

W supply of water for human consumption, including raw water prior to treatment and for the supply of water for general purpose

P supply of underground drainage and sewerage under pressure

I supply of water for irrigation

IS industrial applications

NOTE Symbols taken from CEN/TR 15438.[3]

4 Manufacturers declaration for the field of application

The manufacturer shall declare, depending on the intended use, the medium supplied, the nominal pressure (PN), the pipe material(s) to be jointed, the use of a stiffener, the end load resistance class, the corrosion resistance, ash content for glass reinforced materials, installation and operating temperature limits, as applicable, of the mechanical fittings. This declaration shall be included in the products technical file.

NOTE MOP for GAS is dependent on the design coefficient (C) and applied by the network engineer.

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