INTERNATIONAL STANDARD

ISO 15874-3

Second edition
2013-02-15

Plastics piping systems for hot and cold water installations — Polypropylene (PP) —

Part 3: Fittings

Systèmes de canalisations en plastique pour les installations d'eau chaude et froide — Polypropylène (PP) —

Partie 3: Raccords

Reference number
ISO 15874-3:2013(E)

COPYRIGHT PROTECTED DOCUMENT

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

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.

ISO 15874-3 was prepared by Technical Committee CEN/TC 155, *Plastics piping systems and ducting systems*, in collaboration with Technical Committee ISO/TC 138, *Plastics pipes, fittings and valves for the transport of fluids*, and 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 second edition cancels and replaces the first edition (ISO 15874-3:2003 and ISO 15874-3:2003/Amd 1:2007), which has been technically revised.

The following material has been revised:

— in 4.1.1, Table 1, the material PP-RCT has been included;

— in 6.2.1, Figure 1 has been simplified, and in Tables 3 and 4, the socket length and socket dimensions of socket fusion fittings have been adjusted;

— in 6.2.2, Table 5, the socket dimensions for electrofusion fittings have been extended to 160 mm; and

— in 7.4, Tables 6, 7 and 8, values have been adjusted.

ISO 15874 consists of the following parts[1)] under the general title *Plastics piping systems for hot and cold water installations — Polypropylene (PP)*:

— *Part 1: General*

— *Part 2: Pipes*

— *Part 3: Fittings*

— *Part 5: Fitness for purpose of the system*

— *Part 7: Guidance for the assessment of conformity* [Technical specification]

1) For ancillary equipment separate standards can apply. Guidance on installation of plastics piping systems made from different materials intended to be used for hot and cold water installations is given by CEN/TR 12108 [1].

Introduction

This part of ISO 15874 specifies the requirements for a piping system and its components when made from polypropylene (PP). The piping system is intended to be used for hot and cold water installations.

Regarding potential undesirable effects on the quality of water intended for human consumption, caused by the product covered by ISO 15874

— no information is provided as to whether the product can be used without restriction, and

— existing national regulations concerning the use and/or the characteristics of this product remain in force.

Requirements and test methods for materials and components, other than fittings, are specified in ISO 15874-1 and ISO 15874-2. Characteristics for fitness for purpose (mainly for joints) are covered in ISO 15874-5. ISO/TS 15874-7 gives guidance for the assessment of conformity.

This part of ISO 15874 specifies the characteristics of the fittings.

At the date of publication of this part of ISO 15874, the following system International Standards for piping systems of other plastics materials used for the same application are

— ISO 15875, *Plastics piping systems for hot and cold water installations — Crosslinked polyethylene (PE-X)*

— ISO 15876, *Plastics piping systems for hot and cold water installations — Polybutylene (PB)*

— ISO 15877, *Plastics piping systems for hot and cold water installations — Chlorinated poly(vinyl chloride) (PVC-C)*

— ISO 22391, *Plastics piping systems for hot and cold water installations — Polyethylene of raised temperature resistance (PE-RT)*

The International Organization for Standardization (ISO) draws attention to the fact that it is claimed that compliance with this document may involve the use of a patent.

ISO takes no position concerning the evidence, validity and scope of this patent right.

The holder of this patent right has assured ISO that they are willing to negotiate licences under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statement of the holder of this patent right is registered with ISO. Information may be obtained from:

Borealis AG

Wagramerstrasse 17-19, A-1220,

Vienna, Austria

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

ISO (www.iso.org/patents) and IEC (http://patents.iec.ch) maintain on-line databases of patents relevant to their standards. Users are encouraged to consult the databases for the most up to date information concerning patents.

Plastics piping systems for hot and cold water installations — Polypropylene (PP) —

Part 3: Fittings

1 Scope

This part of ISO 15874 specifies the characteristics of fittings for polypropylene (PP) piping systems intended to be used for hot and cold water installations within buildings for the conveyance of water, whether or not intended for human consumption (domestic systems) and for heating systems under design pressures and temperatures according to the class of application (see ISO 15874-1:2013, Table 1).

It covers a range of service conditions (application classes) and design pressure classes. For values of T_D, T_{max} and T_{mal} in excess of those in Table 1 of ISO 15874-1:2013 do not apply.

NOTE 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.

It also specifies the parameters for the test methods referred to in this part of ISO 15874.

In conjunction with the other parts of ISO 15874, this part of ISO 15874 is applicable to fittings made from PP and to fittings made from other materials which are intended to be fitted to pipes conforming to ISO 15874-2 for hot and cold water installations, whereby the joints conform to the requirements of ISO 15874-5.

This part of ISO 15874 is applicable to fittings of the following types:

— socket fusion fittings;

— electro fusion fittings;

— mechanical fittings;

— fittings with incorporated inserts.

It is also applicable to fittings made from alternative materials which when fitted to pipes conforming to ISO 15874-2, conform to the requirements of ISO 15874-5.

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

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

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

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 1167-3 *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 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 15874-1:2013, *Plastics piping systems for hot and cold water installations — Polypropylene (PP) — Part 1: General*

ISO 15874-2:2013, *Plastics piping system for hot and cold water installations — Polypropylene (PP) — Part 2: Pipes*

ISO 15874-5, *Plastics piping system for hot and cold water installations — Polypropylene (PP) — Part 5: Fitness for purpose of the system*

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 1254-3, *Copper and copper alloys — Plumbing fittings — Part 3: Fittings with compression ends for use with plastics pipes.*

EN 10088-1, *Stainless steels — Part 1: List of stainless steels.*

EN 10226-1, *Pipe threads where pressure-tight joints are made on the threads — Part 1: Taper external threads and parallel internal treads — Dimensions, tolerances and designation.*

3 Terms and definitions, symbols and abbreviated terms

For the purposes of this document, the terms and definitions, symbols and abbreviations given in ISO 15874-1 and the following apply

3.1
fitting
component of a piping system, which connects two or more pipes and/or fittings together, without any further function

3.2 Mechanical fittings

3.2.1
compression fitting
fitting in which the joint is made by the compression of a ring or sleeve on the outside wall of the pipe with or without additional sealing elements and with internal support

3.2.2
crimped fitting
fitting in which the joint is made by crimping of the fitting and/or a ring on the outside wall of the pipe by means of a special tool

3.2.3
flanged fitting
fitting in which the pipe connection consists of two mating flanges which are mechanically pressed together and sealed by the compression of an elastomeric sealing element between them

3.2.4
flat seat union fitting
fitting in which the pipe connection consists primarily of two components, at least one of which normally incorporates a flat sealing surface, which are mechanically pressed together by means of screwed nut or similar and sealed by the compression of an elastomeric sealing element between them

3.3 Fittings for fusion

3.3.1
socket fusion fitting
fitting in which the joint with the pipe is made by melting together the outer part of the pipe with the inner part of the fitting by means of heat induced by heated tool

3.3.2
electro fusion fitting
fitting in which the joint with the pipe is made by melting together the outer part of the pipe and the inner part of the fitting by means of heat induced by current flowing in an appropriate resistor inserted in the fitting body

3.4
fitting with incorporated inserts
fitting in which the joint is made by means of connecting threads or other outlets, inserted in the plastics body combined with fusion ends for socket fusion or electro fusion

4 Material characteristics

4.1 Plastics fitting material

4.1.1 Fitting material identical to the PP pipe compound

The PP compound shall comply with ISO 15874-1:2013, 5.1.

The material shall be tested in form of tubular test pieces.

When tested in accordance with the test methods specified in Table 1, using the indicated parameters, the test pieces shall withstand the hydrostatic test pressure, p_F, given in Table 6, 7, 8 or 9 without bursting or leakage.

Table 1 — Mechanical characteristic of tubular test pieces made of PP by injection moulding

Characteristic	Requirement	Test parameters for the individual tests				Test method
Resistance to internal pressure	No bursting or leakage during the test period	**PP-H**				ISO 1167-1 and ISO 1167-3
		Hydrostatic (hoop) stress MPa	**Test temp.** °C	**Test period** h	**Number of test pieces**	
		21,0	20	1	3	
		3,6	95	1000	3	
		PP-B				
		Hydrostatic (hoop) stress MPa	**Test temp.** °C	**Test period** h	**Number of test pieces**	
		16,0	20	1	3	
		2,6	95	1000	3	
		PP-R				
		Hydrostatic (hoop) stress MPa	**Test temp.** °C	**Test period** h	**Number of test pieces**	
		16,0	20	1	3	
		3,5	95	1000	3	
		PP-RCT				
		Hydrostatic (hoop) stress MPa	**Test temp.** °C	**Test period** h	**Number of test pieces**	
		15,0	20	1	3	
		3,8	95	1000	3	
		Test parameters for all tests				
		Sampling procedure		[a]		
		Type of end cap		Type A		
		Orientation of test piece		Not specified		
		Type of test		Water-in–water		

[a] The sampling procedure is not specified. For guidance see ISO/TS 15874-7 [2].

4.1.2 PP Fitting material not identical to the PP pipe compound

4.1.2.1 Evaluation of σ_{LPL}-values and control points

The fitting material in form of injection-moulded or extruded tubular test pieces shall be evaluated by using the method given in ISO 9080 or equivalent where internal pressure tests are made in accordance with ISO 1167-1 and ISO 1167-3 to find the σ_{LPL}-values. The σ_{LPL}-values thus determined shall be used to determine the design stress, σ_{DF}, (see Annex A of ISO 15874-2:2013) and values of hydrostatic stress, σ_F, corresponding to the temperature and time control points given in Table 2.

NOTE One equivalent way of evaluation is to calculate the σ_{LPL}-value for each temperature (for example 20 °C, 60 °C and 95 °C) individually.

If evaluation using the method given in ISO 9080 or equivalent is available from long-term internal pressure tests relative to extruded pipes of the same compound as used for the fitting, the relevant test temperature shall be equal to or higher than the maximum design temperature, T_{max}, for the service condition class.

