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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*

(Revision of first edition of ISO 15874-3:2003 and of ISO 15874-3:2003/FDAmD.1)

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This draft has been developed within the European Committee for Standardization (CEN), and processed under the **CEN-lead** mode of collaboration as defined in the Vienna Agreement.

This draft is hereby submitted to the ISO member bodies and to the CEN member bodies for a parallel five-month enquiry.

Should this draft be accepted, a final draft, established on the basis of comments received, will be submitted to a parallel two-month approval vote in ISO and formal vote in CEN.

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Foreword

ISO 15874-3 was prepared by Technical Committee ISO/TC 138, *Plastics pipes and fittings for water supplies*, Subcommittee SC 2, and by Technical Committee CEN/TC 155, *Plastics piping systems and ducting systems* in collaboration.

This second edition cancels and replaces the first edition (ISO 15874-2:2003), wherein clause 4 / subclause 4.1.1. / Table 1 (The material PP-RCT has been included), clause 6 / subclause 6.2.1. / Figure 1 (has been simplified), Table 3 and 4 (The socket length and socket dimensions of socket fusion fittings have been adjusted), clause 6 / subclause 6.2.2. / Table 5 (The Socket dimensions for electrofusion fittings have been extended to 160 mm) and clause 7 / subclause 7.4 / Tables 6, 7 and 8 (Values have been adjusted) have been technically revised.

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 (the present standard)
- Part 5: Fitness for purpose of the system
- Part 7: Guidance for the assessment of conformity (published as ISO/TS 15874-7).

This Part of ISO 15874 includes a Bibliography.

At the date of publication of this standard, System Standards for piping systems of other plastics materials used for the same application include the following:

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)*

For pipes and fittings which have conformed to the relevant national standard before **[DAV]**, as shown by the manufacturer or by a certification body, the national standard may continue to apply until **[DAV + 24 months]**.

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¹⁾ This System Standard does not incorporate Part 4 *Ancillary equipment* or Part 6 *Guidance for installation*. 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 ENV 12108 ^[1].

Introduction

The System Standard, of which this is Part 3, specifies the requirements for a piping system when made from polypropylene (PP). The piping system is intended to be used for hot and cold water installations.

In respect of potential adverse effects on the quality of water intended for human consumption, caused by the product covered by this standard:

- no information is provided as to whether the product may be used without restriction;
- 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 Part 1 and Part 2 of ISO 15874. Characteristics for fitness for purpose (mainly for joints) are covered in Part 5 and Part 7 (ISO/TS) gives guidance for the assessment of conformity.

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

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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 Table 1 of ISO 15874-1).

This standard 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 Part 1 of this standard does 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 standard.

In conjunction with the other parts of ISO 15874 (see Foreword) it 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 and whereby the joints conform to the requirements of ISO 15874-5.

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

This standard is applicable to fittings of the following types:

- socket fusion fittings
- electrofusion fittings
- mechanical fittings
- fittings with incorporated inserts

2 Normative references

This standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to, or revisions of, any of these publications apply to this standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

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 piping components — Measurement of dimensions.*

ISO 1133, *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 1167-2 *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 7686, *Plastics piping systems — Plastics pipes and fittings — Determination of the opacity*

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

ISO 12092, *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.*

ISO 15874-1, *Plastics piping system for hot and cold water installations — Polypropylene (PP) — Part 1: General*

ISO 15874-2, *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 1254-3:1998, *Copper and copper alloys — Plumbing fittings — Part 3: Fittings with compression ends for use with plastics pipes.*

EN 10088-1:2005, *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 threads — Dimensions, tolerances and designation.*

EN 12107, *Plastics piping systems — Injection-moulded thermoplastics fittings, valves and ancillary equipment — Determination of long-term hydrostatic strength of thermoplastics materials for injection moulding of piping components.*

3 Terms and definitions, symbols and abbreviated terms

For the purposes of this standard, terms and definitions, symbols and abbreviations given in EN ISO 15874-1 apply together with the following terms and definitions:

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

electrofusion 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 electrofusion

4 Material characteristics

4.1 Plastics fitting material

4.1.1 Fitting material identical to the PP pipe compound

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 -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 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) and values of hydrostatic stress, σ_F , corresponding to the temperature and time control points given in Table 2.

NOTE 1 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.