INTERNATIONAL STANDARD

ISO 15874-2

Second edition
2013-02-15

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

Part 2: Pipes

Systèmes de canalisations en plastique pour les installations d'eau chaude et froide — Polypropylène (PP) —
Partie 2: Tubes

Reference number
ISO 15874-2:2013(E)

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 15874-2 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 15874-2:2003 and ISO 15874-2:2003/Amd 1:2007), which has been technically revised. In Clause 6, 6.2.2, Table 5, the material PP-RCT has been included, and Annex A, Table A.6, pipe dimensions have been extended to 160 mm.

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 when made from polypropylene (PP). The piping system is intended to be used for hot and cold water installations.

Regarding potential adverse 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;

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

Requirements and test methods for material and components, other than pipes, are specified in ISO 15874-1 and ISO 15874-3. 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 pipes.

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 2: Pipes

1 Scope

This part ISO 15874 specifies the requirements of pipes made from polypropylene (PP) for 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 operating pressures and temperatures appropriate to the class of application (see ISO 15874-1:2013, Table 1).

This part of ISO 15874 covers a range of service conditions (application classes), design pressures and pipe dimension 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 1 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 test 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 PP pipes, their joints and to joints with components of PP, other plastics and non-plastics materials intended to be used for hot and cold water installations.

It is applicable to pipes with or without (a) barrier layer(s).

NOTE 2 In the case of plastics pipes provided with a thin barrier layer, e.g. to prevent or greatly diminish the diffusion of gases and the transmission of light into or through the pipe wall, the design stress requirements are totally met by the base polymer (PP).

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

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 2505 *Thermoplastics pipes — Longitudinal reversion — Test methods and parameters*

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

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

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 9854-1:1994 *Thermoplastics pipes for the transport of fluids — Determination of pendulum impact strength by the Charpy method — Part 1: General test method*

ISO 9854-2:1994, *Thermoplastics pipes for the transport of fluids — Determination of pendulum impact strength by the Charpy method — Part 2: Test conditions for pipes of various materials*

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

ISO 15874-3, *Plastics piping systems for hot and cold water installations — Polypropylene (PP) — Part 3: Fittings*

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

3 Terms and definitions, symbols and abbreviated terms

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

4 Material

4.1 Pipe material

The pipe material from which the pipe is made shall comply with ISO 15874-1:2013, 5.1.

4.2 Evaluation of σ_{LPL}-values

The pipe material shall be evaluated in accordance with ISO 9080 or equivalent where internal pressure tests are made in accordance with ISO 1167-1 and ISO 1167-2 to find the σ_{LPL}-values. The σ_{LPL}-value thus determined shall at least be as high as the corresponding values of the reference curves given in Figure 1, 2, 3 or 4.

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.

The reference curves in Figures 1, 2, 3 and 4 in the temperature range of 10 °C to 95 °C are derived from the following equations:

First branch (i.e. the left hand portion of the lines as shown in Figures 1, 2 ,3 and 4)

$$\text{for PP-H: } \log t = -46{,}364 - \frac{9601{,}1 \log \sigma}{T} + \frac{20381{,}5}{T} + 15{,}24 \log \sigma \quad (1)$$

$$\text{for PP-B: } \log t = -56{,}086 - \frac{10157{,}8 \log \sigma}{T} + \frac{23971{,}7}{T} + 13{,}32 \log \sigma \quad (2)$$

$$\text{for PP-R: } \log t = -55{,}725 - \frac{9484{,}1 \log \sigma}{T} + \frac{25502{,}2}{T} + 6{,}39 \log \sigma \quad (3)$$

$$\text{for PP-RCT: } \log t = -119{,}546 + 52176{,}696 \frac{1}{T} + 31{,}279 \log(\sigma) - 23738{,}797 \frac{\log \sigma}{T} \quad (4)$$

Second branch (i. e. the right hand portion of the lines as shown in Figures 1, 2 and 3)

$$\text{for PP-H: } \log t = -18{,}387 + \frac{8918{,}5}{T} - 4{,}1 \log \sigma \quad (5)$$

$$\text{for PP-B: } \log t = -13{,}699 + \frac{6970{,}3}{T} - 3{,}82 \log \sigma \quad (6)$$

$$\text{for PP-R: } \log t = -19{,}98 + \frac{9507}{T} - 4{,}11 \log \sigma \tag{7}$$

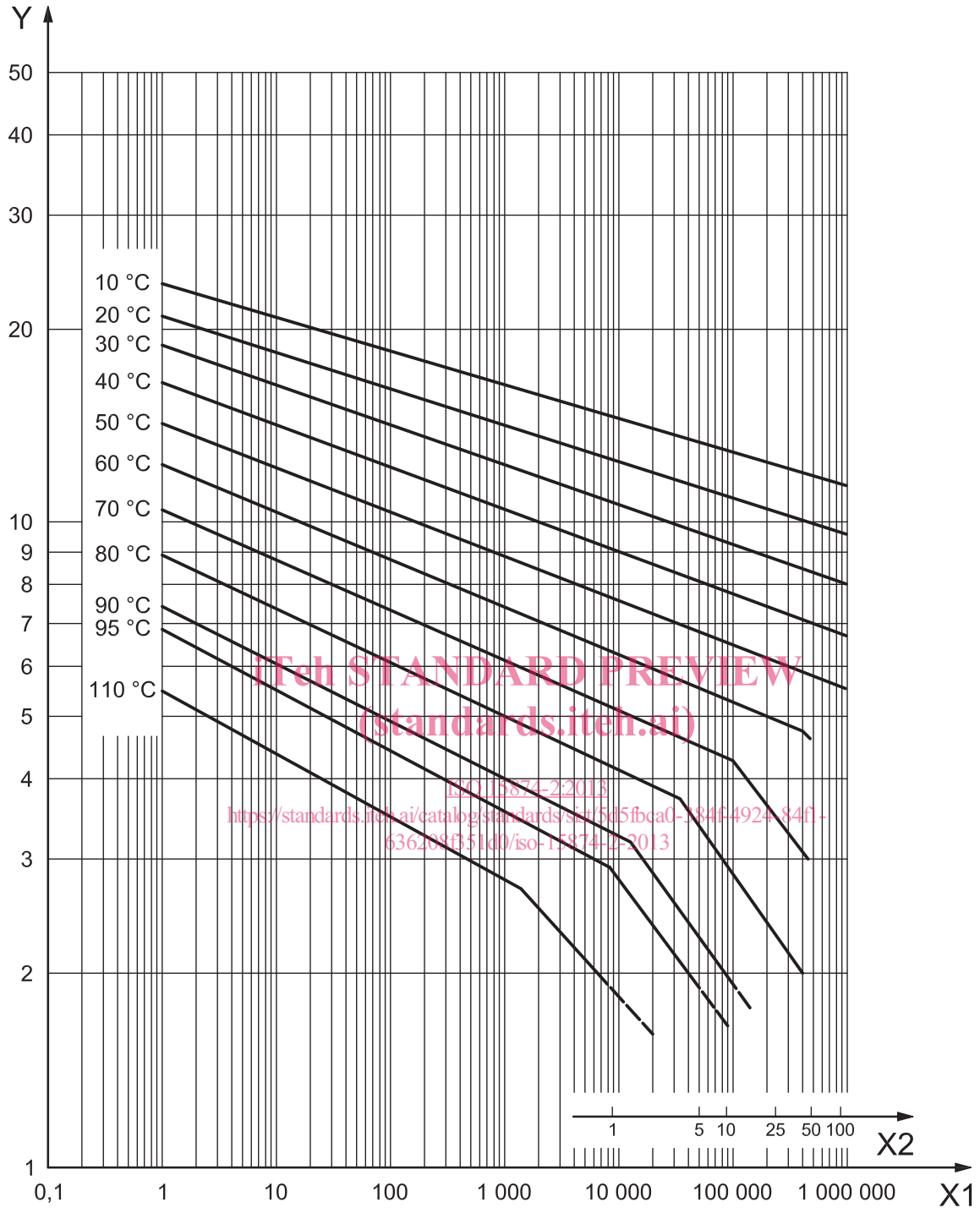
To demonstrate conformance to the reference lines pipe samples should be tested at following temperatures and at various hoop stresses such that, at each of the temperatures given, at least three failure times fall in each of the following time intervals:

Temperatures 20 °C; 60 °C to 70 °C; 95 °C;

Time intervals 10 h to 100 h, 100 h to 1000 h,1000h to 8760 h and above 8760 h.

In tests lasting more than 8760 h, once failure is reached at a stress and time at least on or above the reference line, any time after that may be considered as the failure time. Testing should be carried out in accordance with ISO 1167-1 and -2.

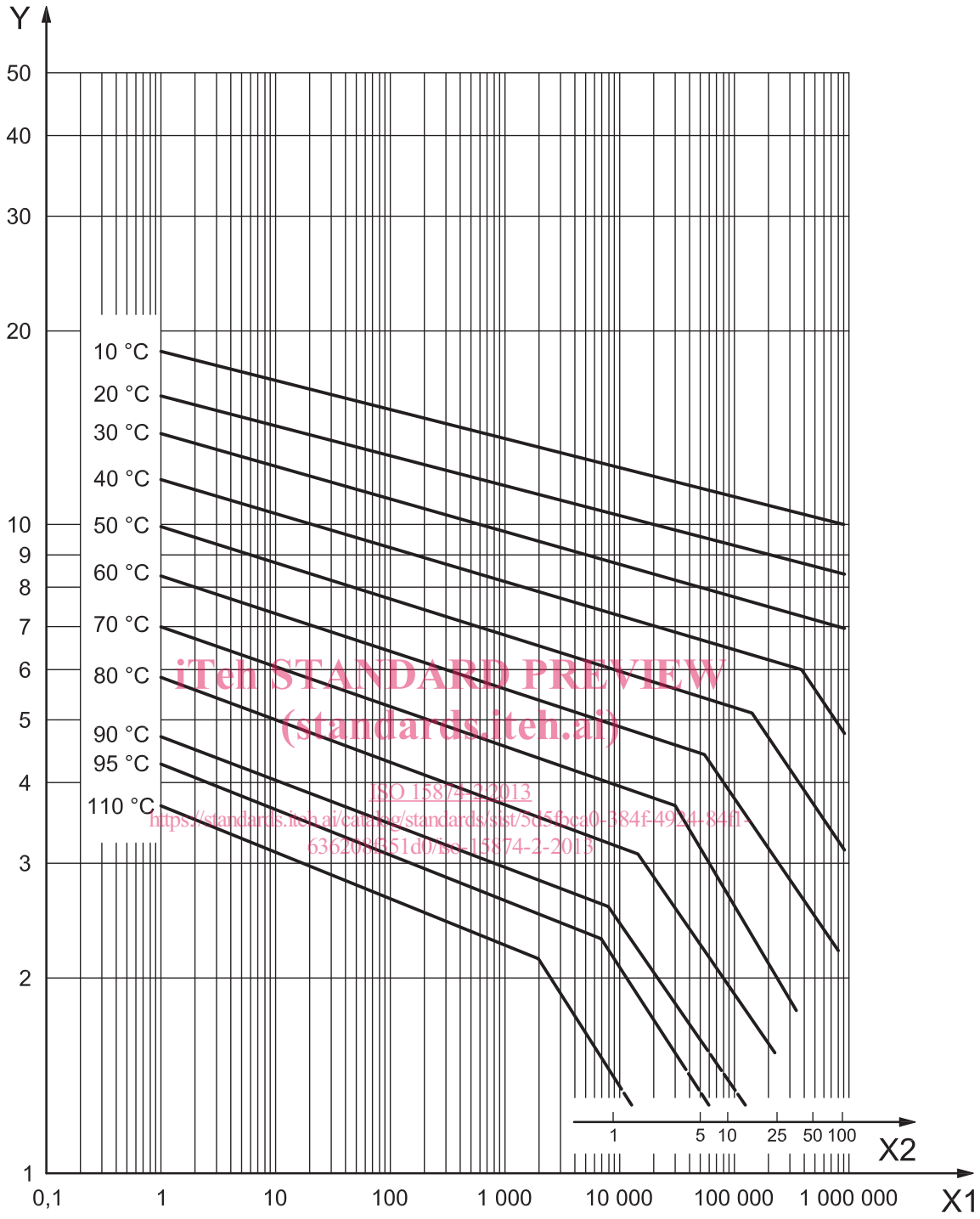
Conformance with the reference lines should be demonstrated by plotting the individual experimental results on the graph. At least 97,5% of them should lie on or above the reference line.



Key

X1	time, t_1, to fracture, in hours
X2	time, t_2, to fracture, in years
Y	hoop stress, σ, in megapascal

Figure 1 — Reference curves for expected strength of PP-H



Key

X1	time, t_1, to fracture, in hours
X2	time, t_2, to fracture, in years
Y	hoop stress, σ, in megapascal

Figure 2 — Reference curves for expected strength of PP-B