SLOVENSKI STANDARD

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Plastics piping systems for hot and cold water installations - Polypropylene (PP) - Part 2: Pipes (ISO 15874-2:2003)

ICS 23.040.20; 91.140.60

Referenčna številka
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English version

Plastics piping systems for hot and cold water installations - Polypropylene (PP) - Part 2: Pipes (ISO 15874-2:2003)

Systèmes de canalisations en plastique pour les installations d'eau chaude et froide - Polypropylène (PP) - Partie 2: Tubes (ISO 15874-2:2003)

Kunststoff-Rohrleitungssysteme für die Warm- und Kaltwasserinstallation - Polypropylen (PP) - Teil 2: Rohre (ISO 15874 -2:2003)

This European Standard was approved by CEN on 14 March 2003.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This document (EN ISO 15874-2:2003) has been prepared by Technical Committee CEN/TC 155 "Plastics piping systems and ducting systems", the secretariat of which is held by NEN, in collaboration with Technical Committee ISO/TC 138 "Plastics pipes, fittings and valves for the transport of fluids".

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2004, and conflicting national standards shall be withdrawn at the latest by December 2005.

NOTE 1 This standard was submitted for CEN enquiry as prEN 12202-2:1995.

This standard is part of a System Standard for plastics piping systems of a particular material for a specified application. There are a number of such System Standards.

System Standards are based on the results of the work undertaken in ISO/TC 138 "Plastics pipes, fittings and valves for the transport of fluids", which is a Technical Committee of the International Organization for Standardization (ISO).

They are supported by separate Standards on test methods to which references are made throughout the System Standard.

The System Standards are consistent with general standards on functional requirements and recommended practices for installation.

EN 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* (the present standard)
- *Part 3: Fittings*
- *Part 5: Fitness for purpose of the system*
- Part 7: *Guidance for the assessment of conformity* (CEN ISO/TS 15874-7).

This Part of EN ISO 15874 includes the following:

- Annex A (informative): Derivation of $S_{calc,max}$
- Bibliography

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

EN ISO 15875, *Plastics piping systems for hot and cold water installations — Crosslinked polyethylene (PE-X) (ISO 15875:2003)*

EN ISO 15876, *Plastics piping systems for hot and cold water installations — Polybutylene (PB) (ISO 15876:2003)*

EN ISO 15877, *Plastics piping systems for hot and cold water installations — Chlorinated poly(vinyl chloride) (PVC-C) (ISO 15877:2003)*

For pipes and fittings which have conformed to the relevant national standard before 1st November 2003, as shown by the manufacturer or by a certification body, the national standard may continue to apply until 30th November 2005.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

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1) This System Standard does not incorporate a Part 4 *Ancillary equipment* or a 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 2, 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:

— This standard provides no information as to whether the product may be used without restriction in any of the Member States of the EU or EFTA;

— It should be noted that, while awaiting the adoption of verifiable European criteria, 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 Part 1 and Part 3 of EN ISO 15874:2003. Characteristics for fitness for purpose (mainly for joints) are covered in Part 5. Part 7 (CEN ISO/TS 15874-7:2003) gives guidance for the assessment of conformity.

This part of EN ISO 15874 specifies the characteristics of pipes.

1 Scope

This part of EN ISO 15874 specifies the characteristics 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 Table 1 of EN ISO 15874-1:2003).

This standard 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 1of Part 1, this standard does 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 standard.

In conjunction with the other parts of EN ISO 15874 (see Foreword) it 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

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).

EN 578, *Plastics piping systems — Plastics pipes and fittings — Determination of the opacity*

EN 743:1994, *Plastics piping and ducting systems — Thermoplastics pipes — Determination of the longitudinal reversion*

EN 921:1994, *Plastics piping systems — Thermoplastics pipes — Determination of resistance to internal pressure at constant temperature*

EN ISO 15874-1:2003, *Plastics piping systems for hot and cold water installations — Polypropylene (PP) — Part 1: General (ISO 15874-1:2003)*

EN ISO 15874-5, *Plastics piping systems for hot and cold water installations — Polypropylene (PP) — Part 5: Fitness for purpose of the system (ISO 15874-5:2003)*

EN ISO 3126, *Plastics piping systems — Plastics components — Measurement of dimensions (ISO 3126:2003)*

EN ISO 9080, *Plastics piping and ducting systems — Determination of the long-term hydrostatic strength of thermoplastics materials in pipe form by extrapolation (ISO 9080:2003)*

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

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

ISO 9854-2, *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*

3 Terms and definitions, symbols and abbreviated terms

For the purposes of this standard the terms and definitions, symbols and abbreviated terms given in EN ISO 15874-1:2003 apply.

4 Material

4.1 Pipe material

The material from which the pipe is made shall be polypropylene (PP).

4.2 Evaluation of σ_{LCL}-values

The pipe material shall be evaluated in accordance with EN ISO 9080 or equivalent where internal pressure tests are made in accordance with EN 921:1994 to find the σ_{LCL}-values. The σ_{LCL}-value thus determined shall at least be as high as the corresponding values of the reference curves given in Figure 1, 2 or 3, over the complete range of times in Figure 1, 2 or 3.

NOTE 1 One equivalent way of evaluation is to calculate the σ_{LCL} -value for each temperature (for example 20 °C, 60 °C and 95 °C) individually.

NOTE 2 The reference curves in Figures 1, 2 and 3 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 and 3)

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

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

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

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

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

for PP-B: $$\log t = -13{,}699 + \frac{6970{,}3}{T} - 3{,}82 \log \sigma \quad (5)$$

for PP-R: $$\log t = -19{,}98 + \frac{9507}{T} - 4{,}11 \log \sigma \quad (6)$$

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 tempeatures given, at least three failure times fall in each of the following time intervals:

Tempertures 20; 60-70; 95; °C;

Time intervals 10-100 h, 100-1000 h,1000-8760 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 can be considered as the failure time. Testing should be carried out in accordance with EN 921:1994.

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.

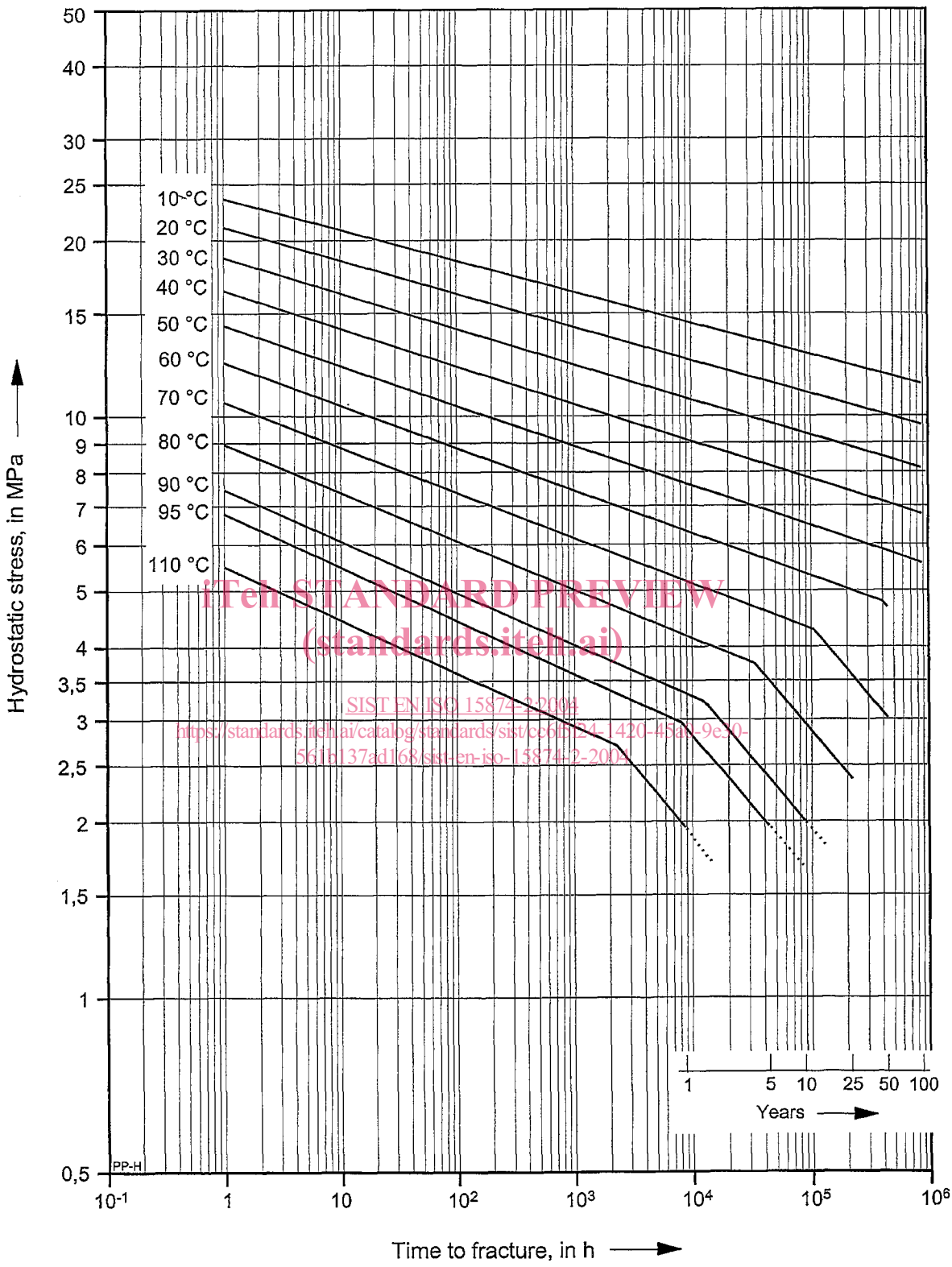

Figure 1 — Reference curves for expected strength of polypropylene homopolymer

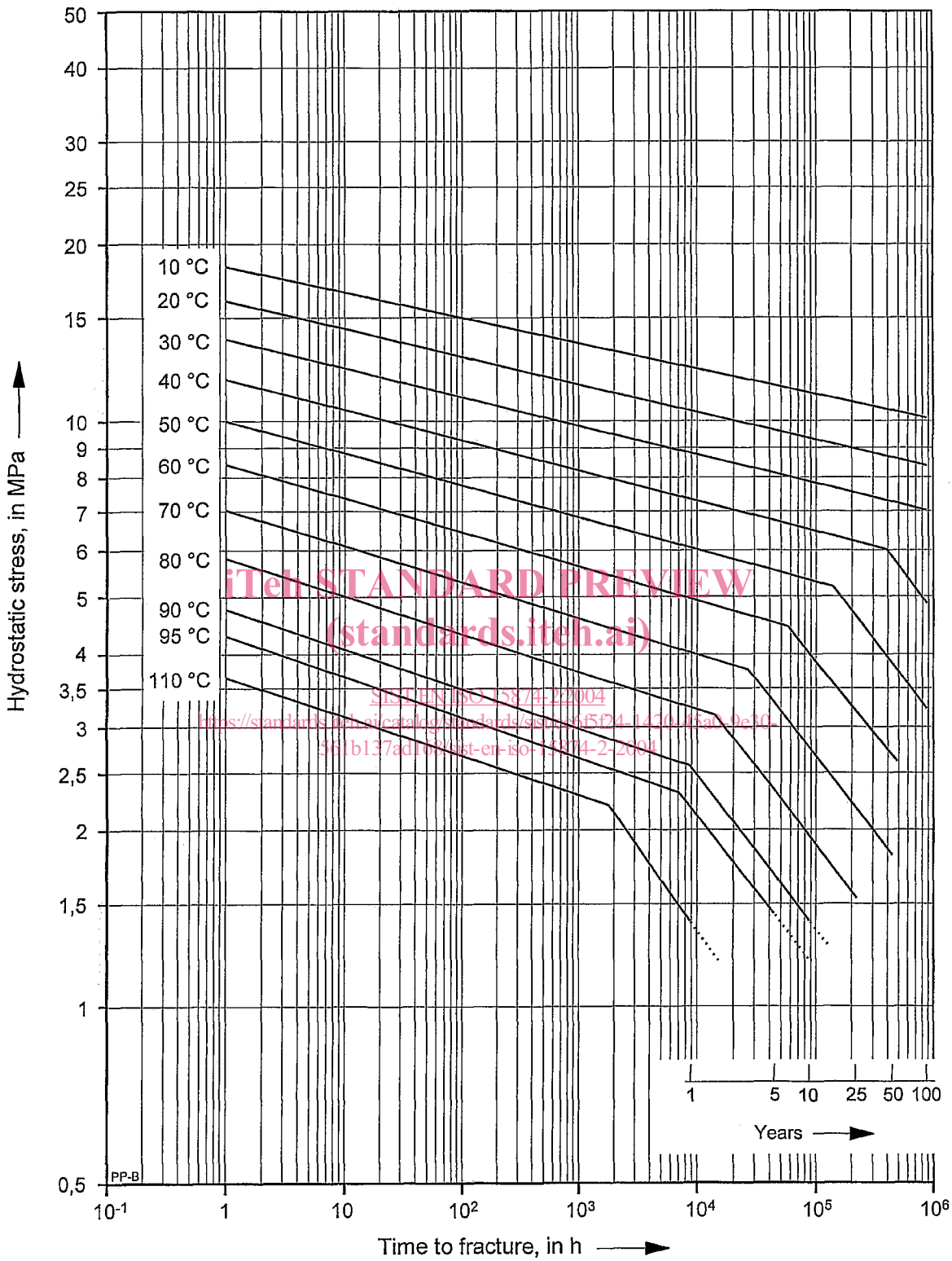

Figure 2 — Reference curves for expected strength of polypropylene block copolymer

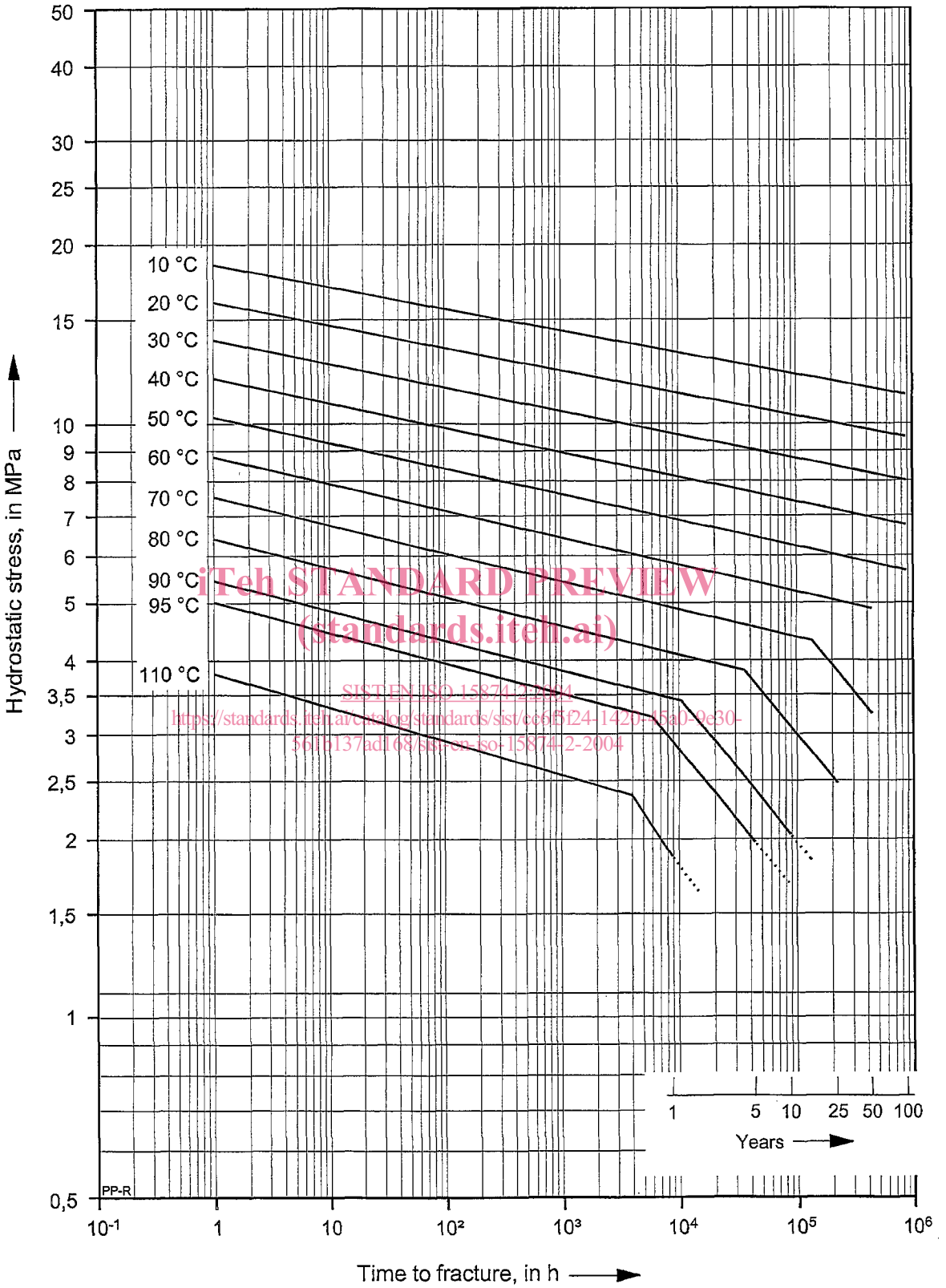

Figure 3 — Reference curves for expected strength of polypropylene random copolymer