INTERNATIONAL STANDARD

ISO 9311-2

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Adhesives for thermoplastic piping systems —

Part 2: Determination of shear strength

Adhésifs pour réseaux de tuyauteries en matières thermoplastiques —

Partie 2: Détermination de la résistance au cisaillement

Reference number
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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.

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.

Attention is drawn to the possibility that some of the elements of this part of ISO 9311 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 9311-2 was prepared by the European Committee for Standardization (CEN) in collaboration with Technical Committee ISO/TC 138, *Plastics pipes, fittings and valves for the transport of fluids*, Subcommittee SC 5, *General properties of pipes, fittings and valves of plastic materials and their accessories — Test methods and basic specifications*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

Throughout the text of this document, read "...this European Standard..." to mean "...this International Standard...".

ISO 9311 consists of the following parts, under the general title *Adhesives for thermoplastic piping systems*:

— *Part 1: Determination of film properties*

— *Part 2: Determination of shear strength*

— *Part 3: Test method for the determination of resistance to internal pressure*

Contents

Foreword

This document (EN ISO 9311-2:2002) has been prepared by Technical Committee CEN/TC 193 "Adhesives", the secretariat of which is held by AENOR, in collaboration with Technical Committee ISO/TC 61 “Plastics".

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 January 2003, and conflicting national standards shall be withdrawn at the latest by January 2003.

This European Standard is one of a series of standards as listed below :

- prEN ISO 9311-1 Adhesives for thermoplastic piping systems - Part 1 : Determination of film properties (ISO/FDIS 9311-1:2001).

- prEN ISO 9311-2 Adhesives for thermoplastic piping systems - Part 2 : Determination of shear strength (ISO/FDIS 9311-2:2001).

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, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

The aim of this European Standard is to describe a method to characterize adhesives for thermoplastic piping systems by measuring the shear strength of a bonded joint using a test specimen prepared as described. The results obtained with this method should not be extrapolated into the resistance of a different specimen – perhaps the real life article – to destructive shear forces.

1 Scope

This part of EN ISO 9311 specifies a method for the determination of the shear strength of joints made with adhesives for thermoplastic piping systems.

2 Normative references

This European 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 European 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 923, *Adhesives — Terms and definitions*

EN 1066, Adhesives — Sampling

EN 1067, *Adhesives — Examination and preparation of samples for testing*

3 Terms and definitions

For the purposes of this part of EN ISO 9311 the terms and definitions given in EN 923 apply.

4 Principle

Obtaining test joints of given dimensions from pipes and fittings.

Measurement of the shear strength of a joint made with this pipes and fittings, but bonded with an adhesive under examination, under specified test conditions.

5 Safety

Persons using this standard shall be familiar with normal laboratory practice.

This standard does not purport to address all the safety problems, if any, associated with its use.

It is the responsibility of the user to establish safety and health practices and to ensure compliance with any European or national regulatory conditions.

6 Apparatus

6.1 A tensile or press testing machine, able to move the jaws at a uniform and steady rate of (5 ± 0,5) mm/min.

6.2 A jig, to connect the test assembly to the machine (suitable arrangements are illustrated in Figures 1, 2 and 3).

7 Sampling

Take a representative sample of the adhesive to be tested as described in EN 1066 and examine and prepare it for testing as described in EN 1067.

8 Procedure

8.1 Use pipe and fitting materials appropriate to the application of the adhesive, for example PVC-U pipe and fitting for an adhesive intended for jointing PVC-U systems.

8.2 For each test prepare five test assemblies each one made of a pipe length 75 mm, external diameter 40 mm, and a fitting with a joint contact depth of 20 mm minimum. The assembly shall be of a suitable total wall thickness to withstand the force applied during the test. The clearance diameter shall be obtained by means of a lathe on the internal fitting surface and never on the pipe external diameter.

8.3 Prepare the pipe and fitting contact surfaces following the adhesive manufacturer recommendations. Remove any swarf and other debris from the joining surfaces of the fitting and pipe.

8.4 Condition the test pieces at (23 ± 2) ºC and (50 ± 5) % relative humidity for at least 6 h.

8.5 Apply the adhesive as recommended by the adhesive manufacturer.

8.6 Maintain the test assemblies under the curing conditions (23 ± 2) ºC and (50 ± 5) % relative humidity unless otherwise specified.

8.7 Place the test assembly in the appropriate jig at the required test temperature and apply a force by separation or compression at a rate of (5 ± 0,5) mm/min.

8.8 Record the maximum force required that causes failure of the bonded assembly.

8.9 If the force required to cause failure exceeds the maximum load of the testing equipment, reduce the bonded area by cutting a ring of width 10 mm from the bonded area of the test assembly (Figure 2).

9 Expression of results

Calculate the shear strength, *S*, in Megapascals (MPa) of each test assembly using the equation:

$$S = \frac{F}{\pi d l}$$

F is the force required to cause failure, in Newtons

d is the internal diameter of the fitting, in millimetres

l is the length of the joint, in millimetres

The shear strength is the arithmetic mean of the results obtained for the five test assemblies.

No result shall be discarded and no correction shall be applied to apparently doubtful results without a justification based on experimental, technical or other evident grounds, which should be clearly stated.

10 Test report

The test report shall include, at least, the following information :

a) a reference to this European Standard;

b) type and identification (batch number, date of manufacture or other code) of the adhesive tested;

c) the method used to prepare the test pieces and their joint contact surfaces;

d) the shear strength of the individual tests, the arithmetic means, together with the information about discarded results;

e) diametral clearance between pipe and fitting;

f) the curing conditions;

g) the required setting time;

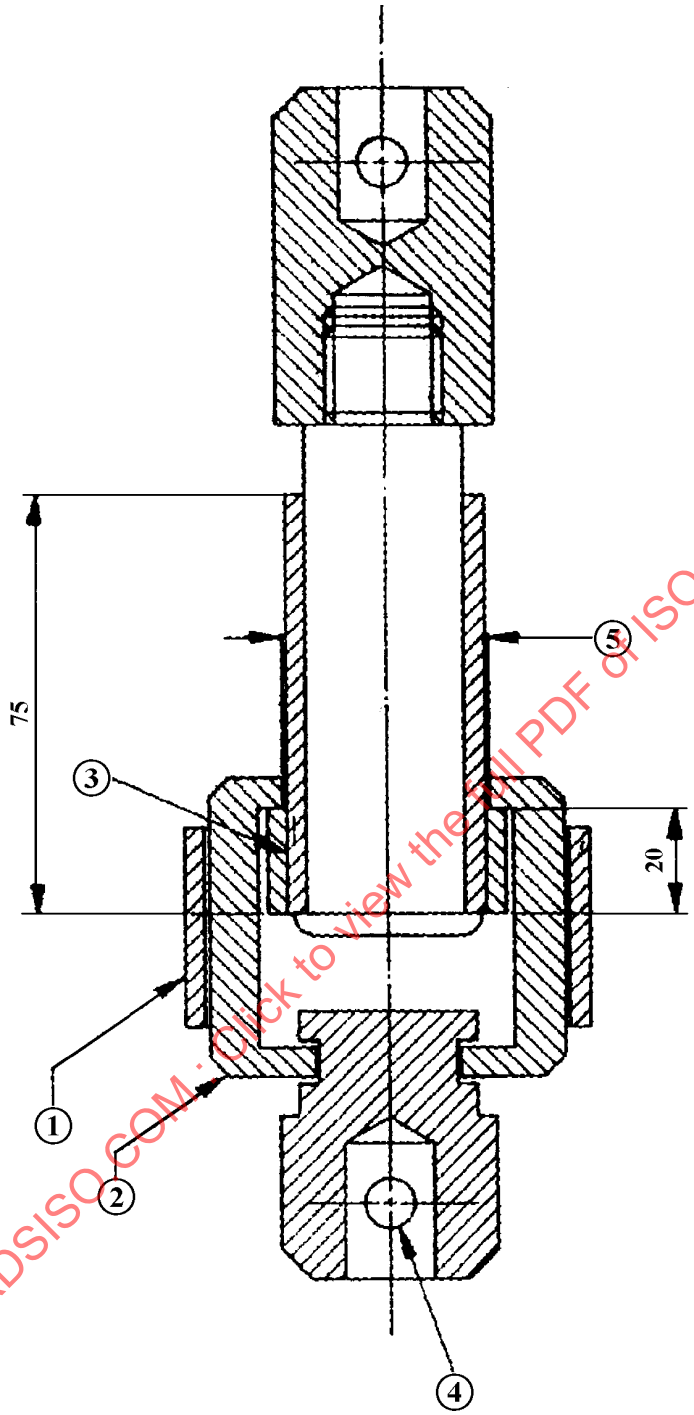
h) the test temperature;

i) the complete identification and reference of pipes and fittings used and their dimensions;

j) any modification to the procedure described in this part of EN ISO 9311 and any circumstances which may have affected the results;

k) the date of test.

Dimensions in millimetres



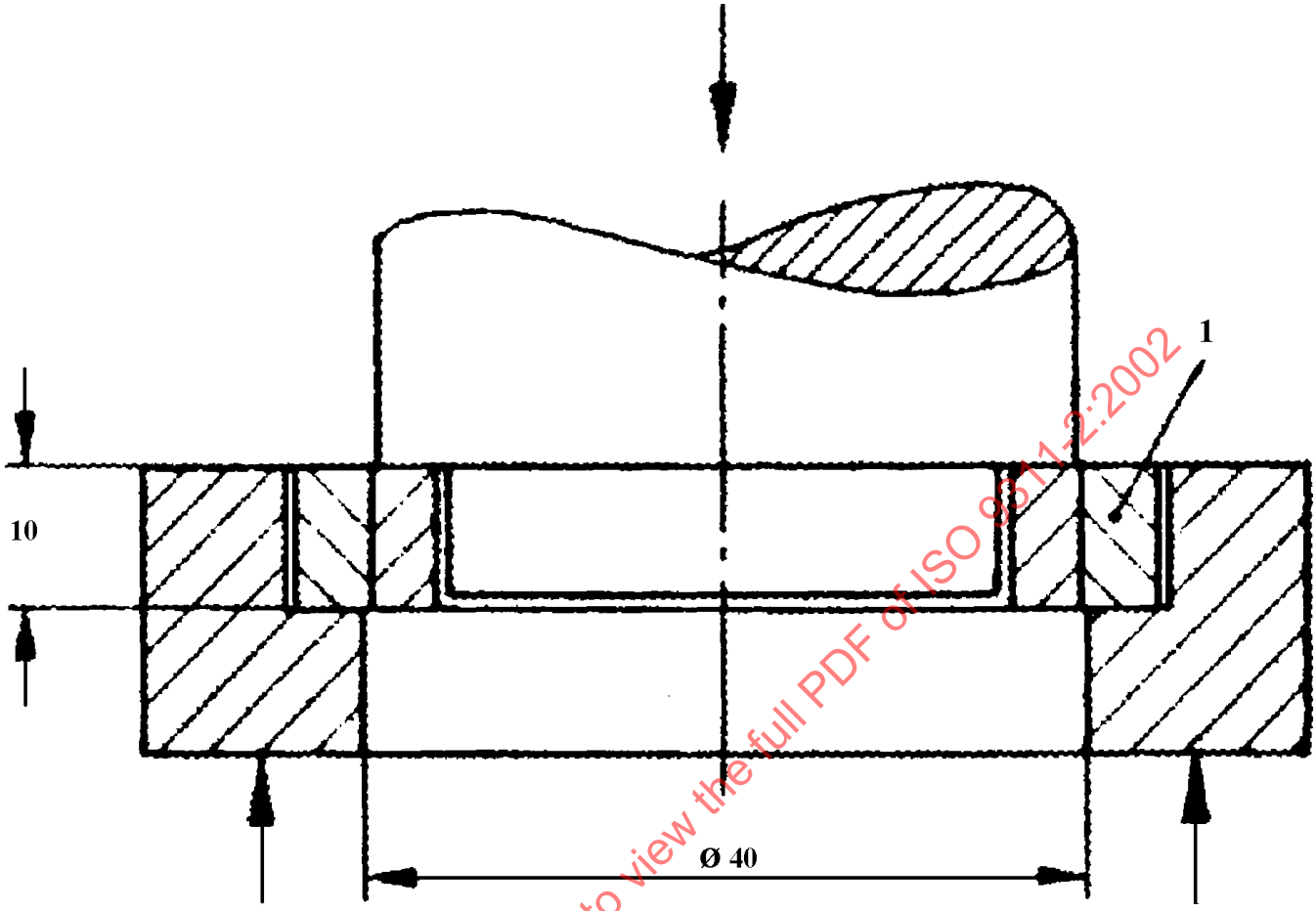
Key

1	Retaining ring	5	Collar [a]
2	Split collar		
3	Bonded assembly		
4	Connection to tensile machine		

[a] Internal diameter of collar shall not be less than the outside diameter of the pipe

Figure 1

Dimensions in millimetres



Key

1 Test piece

Figure 2