SLOVENSKI STANDARD
SIST EN 374-4:2014

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Varovalne rokavice za zaščito pred kemikalijami in mikroorganizmi - 4. del: Ugotavljanje odpornosti proti razkroju zaradi kemikalij

Protective gloves against chemicals and micro-organisms - Part 4: Determination of resistance to degradation by chemicals

Schutzhandschuhe gegen Chemikalien und Mikroorganismen - Teil 4: Bestimmung des Widerstandes gegen Degradation von Chemikalien

Gants de protection contre les produits chimiques et les micro-organismes - Partie 4: Détermination de la résistance à la dégradation par des produits chimiques

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English Version

Protective gloves against chemicals and micro-organisms - Part 4: Determination of resistance to degradation by chemicals

Gants de protection contre les produits chimiques et les micro-organismes - Partie 4: Détermination de la résistance à la dégradation par des produits chimiques

Schutzhandschuhe gegen Chemikalien und Mikroorganismen - Teil 4: Bestimmung des Widerstandes gegen Degradation durch Chemikalien

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Foreword

This document (EN 374-4:2013) has been prepared by Technical Committee CEN/TC 162 “Protective clothing including hand and arm protection and lifejackets”, the secretariat of which is held by DIN.

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of an identical text or by endorsement, at the latest by May 2014 and conflicting national standards shall be withdrawn at the latest by May 2014.

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This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

EN 374 consists of the following parts under the general title, *Protective gloves against chemicals and micro-organisms:*

— *Part 1: Terminology and performance requirements;*

— *Part 2: Determination of resistance to penetration;*

— *Part 3: Determination of resistance to permeation by chemicals;*

— *Part 4: Determination of resistance to degradation by chemicals.*

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This European Standard specifies the test method for the determination of the resistance of protective glove materials to degradation by dangerous chemicals with continuous contact.

NOTE Annex A gives information on interlaboratory test results on this method.

Other tests used to evaluate chemical resistance such as permeation resistance and penetration resistance may not provide sufficient information on the physical property changes affecting a glove during exposure to a chemical. It is necessary that the outside surface of the glove be exposed to the chemical.

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.

EN 374-1:2003, *Protective gloves against chemicals and micro-organisms - Part 1: Terminology and performance requirements*

EN 388:2003, *Protective gloves against mechanical risks*

EN 420:2003+A1:2009, *Protective gloves - General requirements and test methods*

3 Terms and definitions

For the purposes of this document, the terms and definition given in EN 374-1:2003 and EN 420:2003+A1:2009 apply.

4 Test principles

The resistance of a protective glove material to degradation by a liquid chemical is determined by measuring the puncture resistance change of the glove material after a continuous contact with the external surface with the challenge test chemical. The test is applicable to gloves made of natural or synthetic polymer. Lined gloves may produce unusable measurement results.

5 Test methods, Puncture resistance test

5.1 Sampling

Select three gloves for testing. Condition the gloves at (23 ± 2) °C, (50 ± 5) % relative humidity for at least 24 hours.

In the case of irregular and/or multiple construction, one sample shall be tested from each area. Using the appropriate circular die of 20 mm, cut 6 specimens of each glove for a total of 18 test specimens. For each glove, 3 specimens will be exposed to the challenge chemical and 3 specimens will be unexposed.

Select specimens so that they are homogeneous and representative of the glove's primary construction. Avoid embossed patterned areas or other areas of varying thickness or composition when cutting these specimens.

If a glove is constituted of several unbounded layers, only the layer giving the chemical protection shall be tested.

The sample shall be tested according to the method described in 5.3. An additional non-mandatory informative test method is given as an example in Annex B.

For lined gloves, if it is not possible to separate the liner from the glove (and if the liner is too thick), the test may not be feasible, because it is not possible to seal the vial and the sample is moving. For certain samples, if there is a thick liner, it may not be necessary to use the septa to have a correct vial sealing. In this case, the liner will ensure the leakproofness.

5.2 Apparatus

The following equipment shall be used:

a) (20 ± 1) mm diameter cutting die;

b) (12 ± 1) mm diameter cutting die (for cutting a hole to the centre of each septum);

c) 20 ml crimp top vials (opening (12,5 ± 0,5) mm of diameter);

d) 20 mm diameter septa (e.g. made from chlorobutyl rubber without polytetrafluoroethylene (PTFE) layer);

e) 20 mm open centre aluminium crimp seals;

f) hand crimper;

g) hand decapper;

h) samples holder with 18 holes of 20 mm diameter;

i) 150 ml beaker;

j) transfer pipette, 2 ml;

k) dynamometer with a puncture stylus according to EN 388:2003, 6.4 and a cell to measure compression forces with a precision of ± 1 %;

l) sample vial support.

5.3 Procedure

5.3.1 Test conditions

The test shall be conducted at (23 ± 2) °C (preparation, chemical, time exposure to chemical, puncture test).

5.3.2 Pre-testing measurements

Place the challenge chemical into the 150 ml beaker. Using the transfer pipette, place about 2 ml of challenge chemical into one of the crimp top vials.

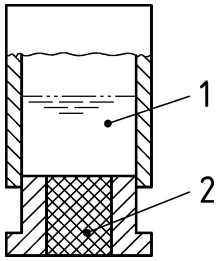
Seat a septum in an open centre aluminium crimp seal cap. Using the (12 ± 1) mm cutting die, make a centred hole in the septum.

Place a glove specimen on top of the septum with its normal external surface facing towards the interior of the vial. Place the aluminium cap with the sample on top of the vial. Seal the vial using the hand crimper and invert it so that the challenge chemical is in contact with the specimen (see Figure 1). Record the time. Place the vial in the punched-out sample holder.

NOTE The punched-out sample holder has a twofold purpose. 1) It allows air to circulate under the sample film, and 2) if the pressure from the challenge chemical forces the sample into a convex shape, the flask will still stand.

Repeat the procedure in the above paragraph for each of the remaining eight specimens that are to be exposed. Time these actions so that the exposures on succeeding specimens begin at three-minute intervals. At the end of the one-hour exposure period (±5 min), examine each test vial to confirm coverage of the specimen with the challenge chemical. If the chemical is not covering the specimen, discard the specimen and repeat the test using a larger quantity of challenge chemical.

Mount the nine unexposed specimens in the remaining vials in the same manner, except that no chemical is placed in the vial.

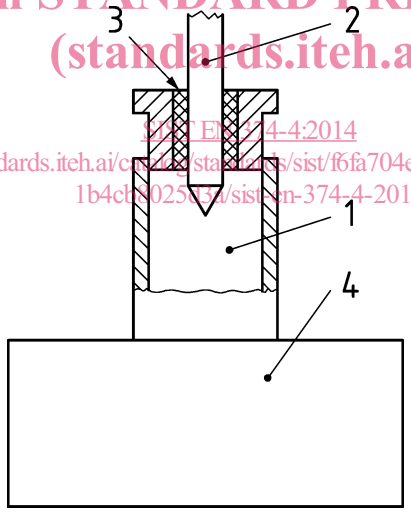


Key

1 challenge chemical

2 outer surface of the glove sample which is in contact with the challenge chemical, it is a circular area of (12,5 ± 0,5) mm diameter

Figure 1 — Position of the vial during contact time between the sample and the dangerous chemical



Key

1 20 ml crimp vial

2 puncture stylus

3 sample

4 vial carrier (to be maintain by the dynamometre jaw)

Figure 2 — Position of the vial during puncture test

5.3.3 Puncture testing

Install the puncture stylus on the dynamometer load cell. Set the carriage speed to 100 mm/min and screw the vial support onto the table.

Place a vial into the support. Puncture the specimen and record the peak force required (see Figure 2).

Repeat for each of the specimens; test each of the exposed specimens one hour after the exposure on that specimen was started.

Test specimens shall be examined for any changes to their physical properties during and after the test (after drying). Any changes such as swelling, shrinking, brittleness, hardening, softening, flaking, disintegration, colour change/bleeding, delaminating shall be noted and described on the test report for information.

5.3.4 Expression of results

Determine the degradation for each of the three glove specimens against each specific chemical or chemical mixture using the formula:

$$DRx = \frac{(OPx - RPx)}{OPx} X\ 100 \quad (1)$$

where

DRx is the degradation of the x glove specimen against challenge chemical tested, in %;

OPx is the average puncture force on the three unexposed test specimens from the x glove specimen; units shall be same as RPx;

RPx is the average puncture force on the three exposed test specimens from the x glove specimen; units shall be same as OPx .

Determine the degradation of the sample against the challenge chemical using the following Formula (2):

$$DR = \frac{(DR1 + DR2 + DR3)}{3} \quad (2)$$

where

DR is the degradation of the test sample against challenge chemical tested, in %;

$DR1$ is the degradation of the first glove specimen against challenge chemical tested, in %;

$DR2$ is the degradation of the second glove specimen against challenge chemical tested, in %;

$DR3$ is the degradation of the third glove specimen against challenge chemical tested, in %.

Determine the standard deviation (SD) of the degradation for the three gloves.

6 Test report

For each protective glove material tested, a report shall include the following information:

a) Report the manufacturer's reference for the glove tested including the material, style, and lot number.

b) Report the name of the test chemical, its purity, and if it is in a mixture, its concentration and other components.

c) Make reference to this European Standard.

d) Report the date of the test.