

**Plastics - Determination of the tendency of compounds and products based on vinyl chloride homopolymers and copolymers to evolve hydrogen chloride and any other acidic products at elevated temperatures - Part 4: Potentiometric method**

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## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN ISO 182-4:2001 sisaldab Euroopa standardi EN ISO 182-4:2000 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 16.02.2001 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN ISO 182-4:2001 consists of the English text of the European standard EN ISO 182-4:2000.</p> <p>This document is endorsed on 16.02.2001 with the notification being published in the official publication of the Estonian national standardisation organisation.</p> <p>The standard is available from Estonian standardisation organisation.</p>
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<p><b>Käsitlusala:</b></p> <p>This part of EN ISO 182 specifies a method for the determination of the thermal stability at elevated temperature of compounds and products based on vinyl chloride homopolymers and copolymers (in the following text abbreviated as PVC) which undergo dehydrochlorination (the evolution of hydrogen chloride).</p>	<p><b>Scope:</b></p> <p>This part of EN ISO 182 specifies a method for the determination of the thermal stability at elevated temperature of compounds and products based on vinyl chloride homopolymers and copolymers (in the following text abbreviated as PVC) which undergo dehydrochlorination (the evolution of hydrogen chloride).</p>
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**Võtmesõnad:** castings, chlorides, high temperature tests, plastics, plastics products, polymers, polyvinyl chloride, potentiometric methods, quality control, stability, testing, thermal properties of materials, thermal stability, thermal testing, thermodynamic pr, vinyl chloride

**English version**

Plastics

Determination of the tendency of compounds and products based on vinyl chloride homopolymers and copolymers to evolve hydrogen chloride and any other acidic products at elevated temperatures

Part 4: Potentiometric method

(ISO 182-4 : 1993)

Plastiques – Détermination de la tendance des compositions à base d'homopolymères et copolymères du chlorure de vinyle à dégager du chlorure d'hydrogène et éventuellement d'autres produits acides à températures élevées – Partie 4: Méthode potentiométrique (ISO 182-4 : 1993)

Kunststoffe – Bestimmung der Neigung von Formmassen und Erzeugnissen auf der Basis von Vinylchlorid-Homopolymeren und -Copolymeren, bei erhöhten Temperaturen Chlorwasserstoff und andere saure Produkte abzugeben – Teil 4: Potentiometrisches Verfahren (ISO 182-4 : 1993)

This European Standard was approved by CEN on 2000-09-08.

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 Central Secretariat or to any CEN member.

The European Standards exist 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 Central Secretariat has the same status as the official versions.

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

**CEN**

European Committee for Standardization  
Comité Européen de Normalisation  
Europäisches Komitee für Normung

**Central Secretariat: rue de Stassart 36, B-1050 Brussels**

## Foreword

International Standard

ISO 182-4 : 1993 Plastics – Determination of the tendency of compounds and products based on vinyl chloride homopolymers and copolymers to evolve hydrogen chloride and any other acidic products at elevated temperatures – Part 4: Potentiometric method,

which was prepared by ISO/TC 61 'Plastics' of the International Organization for Standardization, has been adopted by Technical Committee CEN/TC 249 'Plastics', the Secretariat of which is held by IBN, as a European Standard.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, and conflicting national standards withdrawn, by March 2001 at the latest.

In accordance with the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard:

Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom.

## Endorsement notice

The text of the International Standard ISO 182-4 : 1993 was approved by CEN as a European Standard without any modification.

NOTE: Normative references to international publications are listed in Annex ZA (normative).

**WARNING — The use of this part of ISO 182 may involve hazardous materials, operations and equipment. This part of ISO 182 does not purport to address all of the safety problems associated with its use. It is the responsibility of the user of this part of ISO 182 to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.**

## 1 Scope

**1.1** This part of ISO 182 specifies a method for the determination of the thermal stability at elevated temperature of compounds and products based on vinyl chloride homopolymers and copolymers (in the following text abbreviated as PVC) which undergo dehydrochlorination (the evolution of hydrogen chloride).

**1.2** The method may be used as a quality control test during manufacture and conversion of PVC compounds. It may also be used for the characterization of PVC compounds and products, especially with regard to the effectiveness of their heat-stabilizing systems.

It is suitable for coloured PVC compounds and products for which a discolouration test under the action of heat may be unsatisfactory.

**1.3** The method is recommended for compounded PVC materials and products only, although it can be used for polymers in powder form under appropriate conditions to be agreed upon between the interested

parties. The method is not recommended for PVC compounds in the form of dry blends, since such materials may not be sufficiently homogeneous.

**1.4** PVC compounds and products may evolve other decomposition products in addition to hydrogen chloride at elevated temperatures. A limited number of these products, originating from the decomposition of certain comonomers (such as vinyl esters of organic acids) or of plasticizers, stabilizers and other additives, may effect the pH or the conductivity of an aqueous solution when they are absorbed. Consequently, the results obtained for different products by the methods described in Parts 2 and 3 of ISO 182 may not be comparable with those obtained using the method described in the present part of ISO 182.

**1.5** This part of ISO 182 specifies a potentiometric method for the determination of chloride ion ( $\text{Cl}^-$ ) concentration (expressed as pCl) in an absorbing solution, independent of the presence of other ions. The value pCl is defined as  $-\lg c_{\text{Cl}}$ , where  $c_{\text{Cl}}$  is the molar concentration of chloride ions. This method is, therefore, particularly recommended for plasticized PVC compounds and copolymers.

**1.6** This method may also be applied to other plastics materials that can evolve hydrogen chloride when heated under the conditions prescribed by the relevant specifications, or as agreed upon between the interested parties.

## 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 182. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 182 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 182-2:1990, *Plastics — Determination of the tendency of compounds and products based on vinyl chloride homopolymers and copolymers to evolve hydrogen chloride and any other acidic products at elevated temperatures — Part 2: pH method*.

ISO 182-3:1993, *Plastics — Determination of the tendency of compounds and products based on vinyl chloride homopolymers and copolymers to evolve hydrogen chloride and any other acidic products at elevated temperatures — Part 3: Conductometric method*.

ISO 565:1990, *Test sieves — Metal wire cloth, perforated metal plate and electroformed sheet — Nominal sizes of openings*.

ISO 4793:1980, *Laboratory sintered (fritted) filters — Porosity grading, classification and designation*.

ISO 5725:1986, *Precision of test methods — Determination of repeatability and reproducibility for a standard test method by inter-laboratory tests*.

ISO 6353-2:1983, *Reagents for chemical analysis — Part 2: Specifications — First series*.

## 3 Definition

For the purposes of this part of ISO 182, the following definition applies.

**3.1 stability time,  $t_s$ :** Time, measured by reference to a predetermined change in the pCl of an absorbing solution, required for a certain amount of hydrogen chloride to be evolved when a prescribed mass of PVC compound or product is maintained at an elevated temperature under the test conditions specified in this part of ISO 182.

## 4 Principle

A test portion of the PVC compound or product is maintained at an agreed temperature in a nitrogen gas stream and the hydrogen chloride evolved is absorbed in a given amount of an appropriate solution. The amount of hydrogen chloride evolved is determined potentiometrically in relation to the recorded change in pCl of the absorbing solution.

## 5 Reagents

During the test, use only reagents of recognized analytical grade in accordance with ISO 6353-2.

**5.1 Pure nitrogen**, containing less than 6 ppm oxygen and less than 0,1 ppm carbon dioxide by volume. The purity shall be such that when the gas is passed through the absorbing solution for 1 h at a rate of  $7,2 \text{ l/h} \pm 0,1 \text{ l/h}$ , the conductivity of the water remains unchanged.

The gas shall be dried by passing it through a suitable drying agent and the flow-rate through the dehydrochlorination cell adjusted by means of a needle valve and measured using a suitable flowmeter.

**5.2 Hydrochloric acid**, aqueous solution,  $c(\text{HCl}) = 0,01 \text{ mol/l}$ .

**5.3 Distilled or demineralized water.**

**5.4 Potassium nitrate ( $\text{KNO}_3$ ), potassium sulfate ( $\text{K}_2\text{SO}_4$ )** or other salts, for the preparation of the absorbing solution (see 10.4).

## 6 Apparatus

The general arrangement of the apparatus, shown in figure 1, includes a re-usable dehydrochlorination cell A. This cell may be replaced by a disposable cell B.

### 6.1 Dehydrochlorination cells.

**6.1.1 Cell A** (re-usable), with shape and dimensions as shown in figure 2.

A recommended procedure for cleaning the cell is given in annex A.