



# SLOVENSKI STANDARD SIST EN ISO 14616:2004

01-oktober-2004

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Plastics - Heatshrinkable films of polyethylene, ethylene copolymers and their mixtures - Determination of shrinkage stress and contraction stress (ISO 14616:1997)

Kunststoffe - Wärmeschrumpf-Folien aus Polyethylen, Ethylen-Copolymeren und deren Mischungen - Bestimmung der Schrumpfspannung und Kontraktionsspannung (ISO 14616:1997)

(standards.iteh.ai)

Plastiques - Films thermorétractables en polyéthylène, en copolymères d'éthylène et leurs mélanges - Détermination des contraintes de rétraction et de contraction (ISO 14616:1997)

Ta slovenski standard je istoveten z: EN ISO 14616:2004

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**ICS:**

83.140.10      Filmi in folije                      Films and sheets

**SIST EN ISO 14616:2004**                      en,fr,de

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN ISO 14616**

July 2004

ICS 83.140.10

English version

**Plastics - Heatshrinkable films of polyethylene, ethylene copolymers and their mixtures - Determination of shrinkage stress and contraction stress (ISO 14616:1997)**

Plastiques - Films thermorétractables en polyéthylène, en copolymères d'éthylène et leurs mélanges - Détermination des contraintes de rétraction et de contraction (ISO 14616:1997)

This European Standard was approved by CEN on 21 June 2004.

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.

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 Central Secretariat has the same status as the official versions.

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



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

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**EN ISO 14616:2004 (E)****Foreword**

The text of ISO 14616:1997 has been prepared by Technical Committee ISO/TC 61 "Plastics" of the International Organization for Standardization (ISO) and has been taken over as EN ISO 14616:2004 by Technical Committee CEN/TC 249 "Plastics", the secretariat of which is held by IBN.

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 2005, and conflicting national standards shall be withdrawn at the latest by January 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, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

**Endorsement notice**

The text of ISO 14616:1997 has been approved by CEN as EN ISO 14616:2004 without any modifications.

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INTERNATIONAL  
STANDARD

ISO  
14616

First edition  
1997-07-01

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**Plastics — Heatshrinkable films of  
polyethylene, ethylene copolymers and  
their mixtures — Determination of  
shrinkage stress and contraction stress**

*Plastiques — Films thermorétractables en polyéthylène, en copolymères  
d'éthylène et leurs mélanges — Détermination des contraintes de réfraction  
et de contraction*

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Reference number  
ISO 14616:1997(E)

**ISO 14616:1997(E)****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.

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.

International Standard ISO 14616 was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 11, *Products*.

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# Plastics — Heatshrinkable films of polyethylene, ethylene copolymers and their mixtures — Determination of shrinkage stress and contraction stress

## 1 Scope

The purpose of this standard is to describe a conventional method for measuring the shrinking and contracting forces of heatshrinkable films made from polyethylene, ethylene copolymers and their mixtures.

The method described in this standard can possibly be applied to other materials under proper operating conditions.

NOTE 1 This method also allows a shrinkage ratio to be assessed. However, the reference method for measuring the shrinkage ratio is ISO 11501, Plastics - Film and sheeting - Determination of dimensional change on heating.

## 2 Definitions

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For the purposes of this standard, the following definitions apply:

**2.1 heatshrinkable film:** Film which is extruded and stretched (hot drawn) during manufacture and which remains in this state after cooling down.

NOTE 2 When this film is again brought up to the temperature at which the stress was induced and then fixed during its manufacture, this stress is liberated and the film shrinks back.

Depending on the treatment applied, the film can be

- either heatshrinkable both lengthwise and crosswise: this film is called "biaxially oriented",
- or mainly heatshrinkable lengthwise: this film is called "uniaxially oriented".

**2.2 shrinkage ratio:** Decrease in the length of the specimen when it is brought up to the shrinkage temperature, expressed as a percentage of the initial specimen length.

**2.3 shrinking force,  $F_r$ :** Force developed by the film when it reaches the temperature corresponding to that at which the stress was induced at the time of manufacture.

A high film shrinkage is linked to this small force.

This small force and this high shrinkage permit the film to gently shrink down on the load.

**2.4 contracting force,  $F_c$ :** Force developed by the film during its cooling process.

This force, much greater than the shrinkage force, ensures the fastening of the load.

**2.5 reference temperature,  $\theta_r$ :** Air temperature measured by the probe located 5 mm adjacent to the force measurement specimen 45 s after mounting in the heating hood. Under these conditions, it is considered that sufficient time is allowed for the thermocouple used for the measurement to reach the temperature.

### 3 Principle of the measurement

Specimens connected to a force meter or to a displacement transducer are rapidly brought up to the shrinkage temperature, then cooled in the open air to an ambient temperature of  $23^\circ\text{C} \pm 2^\circ\text{C}$ .

A device continuously records the reference temperature, the force and possibly the displacement. The recording of these measurements allows one to determine the optimal shrinking conditions.

### 4 Apparatus

**4.1** Heating hood, vertically mobile, equipped with heating elements and with a regulating device capable of maintaining the air temperature at the specified temperature.

**4.2** T-shaped bracket allowing the fixing of the specimen.

**4.3** Force meter, allowing the measurement of the shrinkage and contraction forces within a force range of at least 20 N with an accuracy of  $\pm 2\%$ .

**4.4** Displacement transducer, capable of measuring a displacement with an accuracy of  $\pm 1$  mm.

**4.5** Multichannel acquisition device, allowing the continuous recording of the different variables: times, forces, displacement, ...

**4.6** Thermocouple probe, having a diameter of 1,5 mm (max), capable of measuring the air temperature 5 mm off the force measurement specimen with an accuracy of  $\pm 2^\circ\text{C}$ .



The thermocouple tip shall be oriented towards the middle of the specimen.

This thermocouple is used for determining the reference temperature  $\theta_r$ .

Depending on the heating resistors and on the location of the apparatus (influence of the environment), the performance characteristics of each individual testing apparatus may differ slightly.

It is therefore necessary to determine the relationship between the temperature  $\theta_r$  (45 s after mounting the heating hood, see 2.5) and that displayed by the regulating device.

Plot the correlation curve between  $\theta_r$  and the settings of the hood temperature regulating device.

This operation shall be repeated at regular intervals in order to detect any possible drift.

NOTE 3 In general, this correlation curve is determined for a range of temperatures  $\theta_r$  between 100 °C and 230 °C.

4.7 Thickness gauge, capable of measuring to an accuracy of 1  $\mu\text{m}$ .

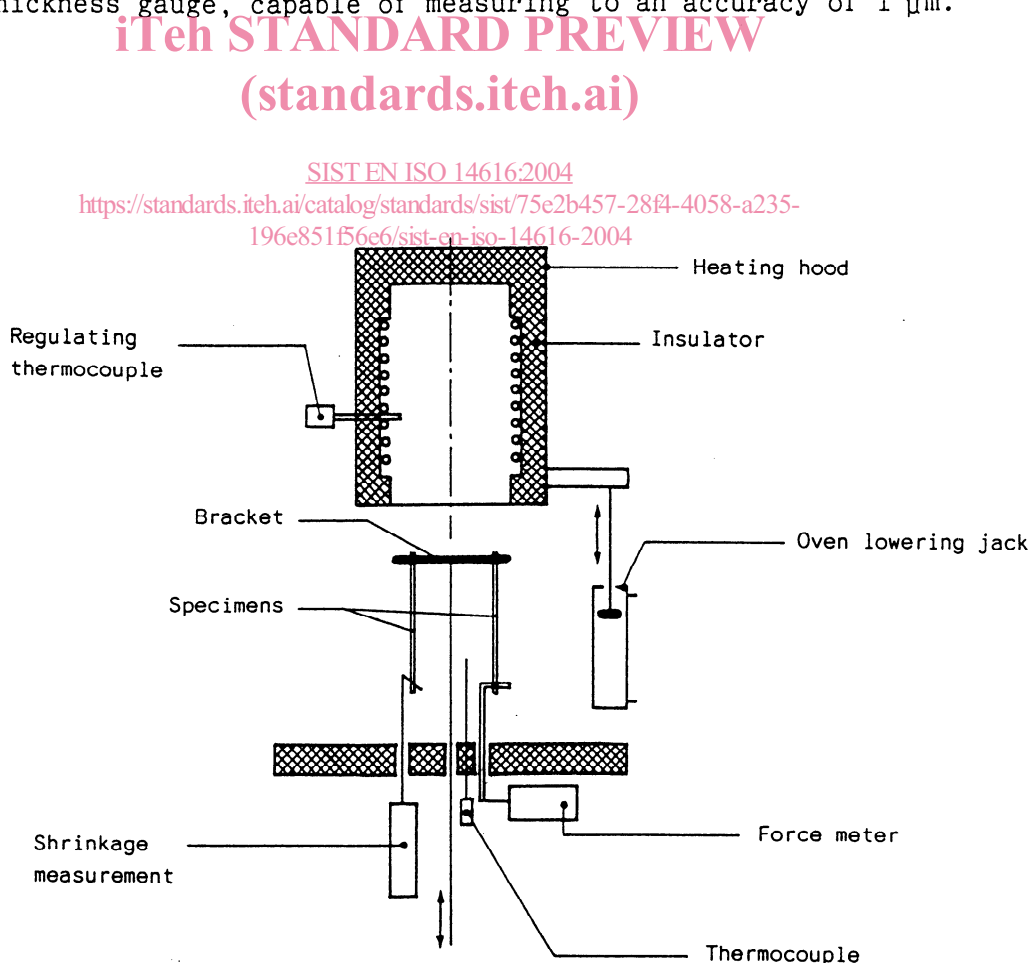


Figure 1 - Example of apparatus