

**Plastics - Injection moulding of test specimens of thermosetting powder moulding compounds (PMCs) - Part 1: General principles and moulding of multipurpose test specimen**

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## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN ISO 10724-1:2002 sisaldab Euroopa standardi EN ISO 10724-1:2001 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 14.02.2002 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 10724-1:2002 consists of the English text of the European standard EN ISO 10724-1:2001.</p> <p>This document is endorsed on 14.02.2002 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 standard specifies the general principles to be followed when injection moulding test specimens of thermosetting powder moulding compounds (PMCs) and gives details of mould designs for preparing one type of specimen for use in establishing reproducible moulding conditions.</p>	<p><b>Scope:</b></p> <p>This standard specifies the general principles to be followed when injection moulding test specimens of thermosetting powder moulding compounds (PMCs) and gives details of mould designs for preparing one type of specimen for use in establishing reproducible moulding conditions.</p>
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**ICS** 83.080.10

**Võtmesõnad:** castings, definitions, general conditions, heat resistance, injection moulding, materials, mouldings (shaped section), plastics, resins, specimen preparation, test specimens, thermo setting, thermoplastic, thermoplastic polymers, use

English version

Plastics

Injection moulding of test specimens of  
thermosetting powder moulding compounds (PMCs)

Part 1: General principles and moulding of multipurpose test specimens  
(ISO 10724-1 : 1998)

Plastiques – Moulage par injection  
d'éprouvettes en compositions  
de poudre à mouler (PMC)  
thermodurcissables – Partie 1:  
Principes généraux et moulage  
d'éprouvettes à usages multiples  
(ISO 10724-1 : 1998)

Kunststoffe – Spritzgießen von  
Probekörpern aus duroplastischen  
rieselfähigen Formmassen (PMC) –  
Teil 1: Allgemeine Grundlagen und  
Herstellung von Vielzweckprobe-  
körpern (ISO 10724-1 : 1998)

This European Standard was approved by CEN on 2001-06-11.

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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.

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**CEN**

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

**Management Centre: rue de Stassart 36, B-1050 Brussels**

## Foreword

International Standard

ISO 10724-1 : 1998 Plastics – Injection moulding of test specimens of thermosetting powder moulding compounds (PMCs) – Part 1: General principles and moulding of multipurpose test specimens,

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 February 2002 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 10724-1 : 1998 was approved by CEN as a European Standard without any modification.

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## Introduction

Many factors in the injection-moulding process which can influence the properties of moulded test specimens and hence the measured values obtained when the specimens are used in a test method. The thermal and mechanical properties of such specimens are in fact strongly dependent on the conditions of the moulding process used to prepare the specimens. Exact definition of each of the main parameters of the moulding process is a basic requirement for reproducible and comparable operating conditions.

It is important in defining moulding conditions to consider any influence the conditions may have on the properties to be determined. Thermosets may show differences in orientation and length of anisotropic fillers such as short fibres and in curing. Residual ("frozen-in") stresses in the moulded test specimens may also influence properties. Due to the crosslinking of thermosets, molecular orientation is of less influence on mechanical properties than it is for thermoplastics. Each of these phenomena must be controlled to avoid fluctuation of the numerical values of the measured properties.

## 1 Scope

This part of ISO 10724 specifies the general principles to be followed when injection moulding test specimens of thermosetting powder moulding compounds (PMCs) and gives details of mould designs for preparing one type of specimen for use in establishing reproducible moulding conditions. Its purpose is to promote uniformity in describing the main parameters of the moulding process and also to establish uniform practice in reporting moulding conditions. The particular conditions required for the reproducible preparation of test specimens which will give comparable results will vary for each material used. These conditions are given in the International Standard for the relevant material or are to be agreed upon between interested parties.

NOTE ISO round-robin tests with phenolic (PF), urea-formaldehyde (UF), melamine (MF), melamine phenolic (MP) and unsaturated-polyester (UP) injection-moulding materials have shown that mould design is an important factor in the reproducible preparation of test specimens.

## 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 10724. 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 10724 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 294-1:1996, *Plastics — Injection moulding of test specimens of thermoplastic materials — Part 1: General principles, and moulding of multipurpose and bar test specimens.*

ISO 294-2:1996, *Plastics — Injection moulding of test specimens of thermoplastic materials — Part 2: Small tensile bars.*

ISO 294-3:1996, *Plastics — Injection moulding of test specimens of thermoplastic materials — Part 3: Small plates.*

ISO 472:—<sup>1)</sup>, *Plastics — Vocabulary.*

ISO 2577:1984, *Plastics — Thermosetting moulding materials — Determination of shrinkage.*

ISO 3167:1993, *Plastics — Multipurpose test specimens.*

ISO 10350-1:1998, *Plastics — Acquisition and presentation of comparable single-point data — Part 1: Moulding materials.*

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1) To be published. (Revision of ISO 472:1988)

ISO 10724-2:1998, *Plastics — Injection moulding of test specimens of thermosetting materials — Part 2: Small plates.*

ISO 11403-1:1994, *Plastics — Acquisition and presentation of comparable multipoint data — Part 1: Mechanical properties.*

ISO 11403-2:1995, *Plastics — Acquisition and presentation of comparable multipoint data — Part 2: Thermal and processing properties.*

ISO 11403-3:—<sup>2)</sup>, *Plastics — Acquisition and presentation of comparable multipoint data — Part 3: Environmental influences on properties.*

### 3 Definitions

For the purposes of this part of ISO 10724, the definitions given in ISO 472 as well as the following apply.

**3.1 mould temperature,  $T_C$ :** The average temperature of the mould cavity surfaces measured after the system has attained thermal equilibrium and immediately after opening the mould.

It is expressed in degrees Celsius ( $^{\circ}\text{C}$ ).

**3.2 melt temperature,  $T_M$ :** The temperature of the plasticized material in a free shot.

It is expressed in degrees Celsius ( $^{\circ}\text{C}$ ).

**3.3 melt pressure,  $p$ :** The pressure of the plastic material in front of the screw at any time during the moulding process (see Figure 1).

It is expressed in megapascals (MPa).

The melt pressure, which is generated hydraulically for instance, can be calculated from the force  $F_S$  acting longitudinally on the screw using equation (1):

$$p = \frac{4 \times 10^3 \times F_S}{\pi \times D^2} \quad (1)$$

where

$p$  is the melt pressure, in megapascals (MPa);

$F_S$  is the longitudinal force, in kilonewtons (kN), acting upon the screw;

$D$  is the screw diameter, in millimetres (mm).

**3.4 hold pressure,  $p_H$ :** The melt pressure during the hold time (see Figure 1).

It is expressed in megapascals (MPa).

**3.5 moulding cycle:** The complete sequence of operations in the moulding process required for the production of one set of test specimens (see Figure 1).

**3.6 cycle time,  $t_T$ :** The time required to carry out a complete moulding cycle.

It is expressed in seconds (s).

The cycle time is the sum of the injection time  $t_I$ , the cure time  $t_{CR}$  and the mould-open time  $t_O$ .

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2) To be published.