
**Plastics — Film and sheeting —
Guidance on the testing of thermoplastic
films**

*Plastiques — Film et feuille — Lignes directrices pour les essais de
films thermoplastiques*

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Contents

Page

Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	3
4 Specimen preparation and conditioning	3
4.1 Polymer properties	3
4.2 Specimen preparation	4
4.3 Specimen conditioning	4
5 Test requirements	4
6 Presentation of results	5
Bibliography	8

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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 document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 23559 was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 11, *Products*.

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Introduction

This International Standard has been prepared to provide guidance in the testing of plastic films for producers and users.

Although there are existing standards that provide this guidance for a number of film products, these are quite specific in respect to the materials covered and do not address many commercial films that are produced as blends or as multi-layer structures. In some cases, the existing standards are limited to only one process technique for producing the film.

It is also recognized that, because of the multitude of commercial processes used to produce films and the different processing parameters required for different materials, blends and/or structures, the concept of general standardization of film specimen preparation is not realistic at this time. On the other hand, it is possible to standardize specimen preparation for well-defined materials and fabrication processes but this is not within the scope or intent of this document.

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Plastics — Film and sheeting — Guidance on the testing of thermoplastic films

SAFETY STATEMENT — Persons using this document should be familiar with normal laboratory practice, if applicable. This document does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user to establish appropriate safety and health practices and to ensure compliance with any regulatory requirements.

1 Scope

This International Standard identifies specific test procedures to assist producers and users in the selection and characterization of thermoplastic films in single- or multi-layer form. It is intended to serve as a guide for those films for which there are no existing standards or specifications.

NOTE Because of the range of materials used and the wide variety of processes available to produce various film constructions, this document does not address specimen preparation.

If an International Standard exists for a specific film product, the requirements of that standard shall take precedence over this document.

There are many national, regional and industrial standards that address the requirements for specific applications. Since this International Standard is intended to provide general guidance, it is not within the scope to address these.

The significance of the data and fitness for use shall be determined by the user.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 307, *Plastics — Polyamides — Determination of viscosity number*

ISO 527-3, *Plastics — Determination of tensile properties — Part 3: Test conditions for films and sheets*

ISO 1133, *Plastics — Determination of the melt mass-flow rate (MFR) and the melt volume-flow rate (MVR) of thermoplastics*

ISO 1183-1, *Plastics — Methods for determining the density of non-cellular plastics — Part 1: Immersion method, liquid pycnometer method and titration method*

ISO 1183-2, *Plastics — Methods for determining the density of non-cellular plastics — Part 2: Density gradient column method*

ISO 1183-3, *Plastics — Methods for determining the density of non-cellular plastics — Part 3: Gas pycnometer method*

ISO 23559:2007(E)

ISO 2813, *Paints and varnishes — Determination of specular gloss of non-metallic paint films at 20°, 60° and 85°*

ISO 4589-1, *Plastics — Determination of burning behaviour by oxygen index — Part 1: Guidance*

ISO 4589-2, *Plastics — Determination of burning behaviour by oxygen index — Part 2: Ambient-temperature test*

ISO 4592, *Plastics — Film and sheeting — Determination of length and width*

ISO 4593, *Plastics — Film and sheeting — Determination of thickness by mechanical scanning*

ISO 6383-1, *Plastics — Film and sheeting — Determination of tear resistance — Part 1: Trouser tear method*

ISO 6383-2, *Plastics — Film and sheeting — Determination of tear resistance — Part 2: Elmendorf method*

ISO 7765-1, *Plastics film and sheeting — Determination of impact resistance by the free-falling dart method — Part 1: Staircase methods*

ISO 7765-2, *Plastics film and sheeting — Determination of impact resistance by the free-falling dart method — Part 2: Instrumented puncture test*

ISO 8256, *Plastics — Determination of tensile-impact strength*

ISO 8295, *Plastics — Film and sheeting — Determination of the coefficients of friction*

ISO 8296, *Plastics — Film and sheeting — Determination of wetting tension*

ISO 9773, *Plastics — Determination of burning behaviour of thin flexible vertical specimens in contact with a small-flame ignition source*

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ISO 11357-2, *Plastics — Differential scanning calorimetry (DSC) — Part 2: Determination of glass transition temperature*

ISO 11357-3, *Plastics — Differential scanning calorimetry (DSC) — Part 3: Determination of temperature and enthalpy of melting and crystallization*

ISO 11443, *Plastics — Determination of the fluidity of plastics using capillary and slit-die rheometers*

ISO 11501, *Plastics — Film and sheeting — Determination of dimensional change on heating*

ISO 11502, *Plastics — Film and sheeting — Determination of blocking resistance*

ISO 13468-1, *Plastics — Determination of total luminous transmittance of transparent materials — Part 1: Single-beam instrument*

ISO 13468-2, *Plastics — Determination of total luminous transmittance of transparent materials — Part 2: Double-beam instrument*

ISO 14782, *Plastics — Determination of haze for transparent materials*

ISO 15105-1, *Plastics — Film and sheeting — Determination of gas-transmission rate — Part 1: Differential-pressure methods*

ISO 15105-2, *Plastics — Film and sheeting — Determination of gas-transmission rate — Part 2: Equal-pressure method*

ISO 15106-1, *Plastics — Film and sheeting — Determination of water vapour transmission rate — Part 1: Humidity detection sensor method*

ISO 15106-2, *Plastics — Film and sheeting — Determination of water vapour transmission rate — Part 2: Infrared detection sensor method*

ISO 15106-3, *Plastics — Film and sheeting — Determination of water vapour transmission rate — Part 3: Electrolytic detection sensor method*

ISO 15989, *Plastics — Film and sheeting — Measurement of water-contact angle of corona-treated films*

IEC 60093, *Methods of test for volume resistivity and surface resistivity of solid electrical insulating materials*

IEC 60112, *Method for the determination of the proof and the comparative tracking indices of solid insulating materials*

IEC 60243-1, *Electrical strength of insulating materials — Test methods — Part 1: Tests at power frequencies*

IEC 60250, *Recommended methods for the determination of the permittivity and dielectric dissipation factor of electrical insulating materials at power, audio and radio frequencies including metre wavelengths*

ASTM D 882, *Standard Test Method for Tensile Properties of Thin Plastic Sheeting*

ASTM D 5458, *Standard Test Method for Peel Cling of Stretch Wrap Film*

ASTM D 5459, *Standard Test Method for Machine Direction Elastic Recovery and Permanent Deformation and Stress Retention of Stretch Wrap Film*

ASTM D 5748, *Standard Test Method for Protrusion Puncture Resistance of Stretch Wrap Film*

ASTM F 88, *Standard Test Method for Seal Strength of Flexible Barrier Materials*

ASTM F 1921, *Standard Test Method for Hot Seal Strength (Hot Tack) of Thermoplastic Polymers and Blends Comprising the Sealing Surfaces of Flexible Webs*

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3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

film

sheeting having a nominal thickness not greater than 0,25 mm

NOTE 1 Although not specifically defined in ISO 472, a limit of 0,25 mm is noted. ASTM D 883 specifically defines film as $\leq 0,25$ mm.

NOTE 2 Sheetting with a nominal thickness of greater than 0,25 mm may be too rigid for test methods more suited to thinner structures to be utilized.

4 Specimen preparation and conditioning

4.1 Polymer properties

There are a number of polymer properties that are of interest to producers and users of film products because of their relationship to characterizing product processability and yield. Included among these properties are density (product yield), flow properties (processing) and thermal properties (conversion properties).