SLOVENSKI STANDARD
oSIST prEN ISO 11963:2018

01-september-2018

Polimerni materiali - Plošče iz polikarbonata - Vrste, mere in značilnosti (ISO/DIS 11963:2018)

Plastics - Polycarbonate sheets - Types, dimensions and characteristics (ISO/DIS 11963:2018)

Kunststoffe - Tafeln aus Polycarbonat - Lieferformen, Abmessungen und charakteristische Eigenschaften (ISO/DIS 11963:2018)

Plastiques - Plaques en polycarbonate - Types, dimensions et caractéristiques (ISO/DIS 11963:2018)

Ta slovenski standard je istoveten z: **prEN ISO 11963**

ICS:

83.140.10	Filmi in folije	Films and sheets

oSIST prEN ISO 11963:2018 **en,fr,de**

DRAFT INTERNATIONAL STANDARD

ISO/DIS 11963

ISO/TC 61/SC 11 Secretariat: **JISC**

Voting begins on: **2018-06-05**

Voting terminates on: **2018-08-28**

Plastics — Polycarbonate sheets — Types, dimensions and characteristics

Plastiques — Plaques en polycarbonate — Types, dimensions et caractéristiques

ICS: 83.140.10

This document is circulated as received from the committee secretariat.

ISO/CEN PARALLEL PROCESSING

Reference number
ISO/DIS 11963:2018(E)

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Published in Switzerland

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

The committee responsible for this document is ISO/TC 61, *Plastics*, Subcommittee SC 11, *Products*.

This third edition cancels and replaces the second edition (ISO 11963:2012), which has been technically revised.

Plastics — Polycarbonate sheets — Types, dimensions and characteristics

1 Scope

This International Standard specifies the requirements for solid, flat extruded sheets of polycarbonate (PC) for general applications. It applies specifically to sheets made of poly(*p,p′*-isopropylidene-diphenyl carbonate). The sheets may be coloured or colourless, and they may be transparent, translucent or opaque. The sheets may also have a special weather-protective layer on one or both surfaces.

This International Standard applies only to thicknesses equal to or greater than 1,5 mm.

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.

ISO 62:2008, *Plastics — Determination of water absorption*

ISO 75-1, *Plastics — Determination of temperature of deflection under load — Part 1: General test method*

ISO 75-2:2004, *Plastics — Determination of temperature of deflection under load — Part 2: Plastics and ebonite*

ISO 179-1:2010, *Plastics — Determination of Charpy impact properties — Part 1: Non-instrumented impact test*

ISO 291, *Plastics — Standard atmospheres for conditioning and testing*

ISO 306:2004, *Plastics — Thermoplastic materials — Determination of Vicat softening temperature (VST)*

ISO 489:1999, *Plastics — Determination of refractive index*

ISO 527-1, *Plastics — Determination of tensile properties — Part 1: General principles*

ISO 527-2, *Plastics — Determination of tensile properties — Part 2: Test conditions for moulding and extrusion plastics*

ISO 877-1, *Plastics — Methods of exposure to solar radiation — Part 1: General guidance*

ISO 877-2, *Plastics — Methods of exposure to solar radiation — Part 2: Direct weathering and exposure behind window glass*

ISO 877-3, *Plastics — Methods of exposure to solar radiation — Part 3: Intensified weathering using concentrated solar radiation*

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

ISO 2818, *Plastics — Preparation of test specimens by machining*

ISO 2859-1, *Sampling procedures for inspection by attributes — Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection*

ISO 2859-10, *Sampling procedures for inspection by attributes — Part 10: Introduction to the ISO 2859 series of standards for sampling for inspection by attributes*

ISO 4892-1, *Plastics — Methods of exposure to laboratory light sources — Part 1: General guidance*

ISO 4892-2, *Plastics — Methods of exposure to laboratory light sources — Part 2: Xenon-arc lamps*

ISO 7391-1, *Plastics — Polycarbonate (PC) moulding and extrusion materials — Part 1: Designation system and basis for specifications*

ISO 8256:2004, *Plastics — Determination of tensile-impact strength*

ISO 11359-2, *Plastics — Thermomechanical analysis (TMA) — Part 2: Determination of coefficient of linear thermal expansion and glass transition temperature*

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

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

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

CIE 15, *Colorimetry*

CIE 85, *Solar spectral irradiance*

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp

4 Composition

4.1 The following type of PC is preferred for PC sheet extrusion:

Thermoplastics ISO 7391-PC,E,61-09

(see ISO 7391-1 for explanation of designation system for PC)

4.2 The sheet may contain colorants, additives, processing aids and stabilizers (e.g. UV-absorbers) up to a total mass content of 5 %.

4.3 Sheets of the type specified in Clause 4 may have a protective layer (on one or both surfaces) with a UV-absorber content higher than that of the substrate. The composition of the protective layer (e.g. polycarbonate and UV-absorber, or PMMA and UV-absorber, or other materials) and the application techniques (e.g. co-extrusion, coating, lamination, flow-coating, dipping) are not specified by this International Standard.

5 Requirements

5.1 Masking

The surface of the sheet as delivered shall be protected by plastic film or paper or a combination of both.

5.2 Appearance

Requirements concerning defects and optical quality shall be agreed upon between the interested parties.

5.3 Colour

The colorant(s) shall be homogeneously and uniformly distributed throughout the material, unless otherwise specified. For critical requirements, the degree of homogeneity shall be specified by the interested parties.

5.4 Dimensions

5.4.1 Conditions of measurement

Measurements should preferably be made under the standard conditions 23 °C ± 2 °C. For measurements made under ambient conditions, allowance shall be made for dimensional changes due to the differences in temperature at the place of measurement from the preferred temperature.

5.4.2 Length and width

The length and width of the sheets shall be agreed upon between the interested parties. The tolerances on length and width shall be as specified in Table 1.

Table 1 — Tolerances on length and width

Length or width mm	Tolerance
Up to 1 000	$^{+3}_{0}$ mm
From 1 001 to 2 000	$^{+6}_{0}$ mm
From 2 001 to 3 000	$^{+9}_{0}$ mm
3 001 and over	$^{+0,3}_{0}$ %

5.4.3 Deviation of shape from rectangular

The difference Δl between the lengths of the two diagonals of the rectangular sheet shall be less than $3{,}5 \times 10^{-3} \times b$ (where b is the width, in millimetres, of the sheet, measured perpendicular to the direction of extrusion), but need not be less than 2 mm.

5.4.4 Thickness

The tolerance on the thickness of the sheets shall be as specified in Table 2.

Table 2 — Tolerances on thickness

Thickness, d mm	Tolerance %
$1{,}5 \leq d \leq 5$	±10
$5 < d$	±5

5.5 Shrinkage

The maximum shrinkage (see 5.5.3) shall be as specified in Table 3.

Table 3 — Maximum shrinkage

Thickness, *d* mm	**Maximum shrinkage** **%**
1,5 ≤ *d* ≤ 5 5 < *d*	10 5

5.6 Basic properties

The basic mechanical, thermal and optical properties of transparent, colourless sheets shall be as specified in Table 5. For other grades, the required properties shall be agreed upon between the interested parties.

5.7 Weathering behaviour

Any requirements on natural- or artificial-weathering behaviour shall be agreed upon between the interested parties, as required.

5.8 Other properties

Other properties of transparent, colourless sheets, needed for specific applications, shall be agreed upon between the interested parties. Examples of, and test methods for, such properties are presented in Table 4.

Table 4 — Typical values of other properties of transparent, colourless sheets

	Unit	**Test method**	**Typical value**
Density	g/cm^3	ISO 1183-1	1,2
Coefficient of linear thermal expansion	K^{-1}	ISO 11359-2	65 × 10^{-6}
Refractive index, n_D^{20}		ISO 489:1999, method A	1,59
Haze (3 mm)	%	ISO 14782	1
Surface resistivity	Ω	IEC 60093	10^{15}
Water absorption (pre-conditioning: 50 °C/24 h; immersion time in water: 24 h)	mg	ISO 62:2008, method 1	16

For other grades, the required properties shall be agreed upon between the interested parties.

6 Test methods

6.1 General

6.1.1 Sampling

The sampling procedure shall be agreed upon between the interested parties. The procedures described in ISO 2859-1 and ISO 2859-10 are widely accepted and frequently used. Hence these are recommended for sampling.

