INTERNATIONAL STANDARD

ISO 11502

Second edition
2018-11

Plastics — Film and sheeting — Determination of blocking resistance

Plastiques — Film et feuille — Détermination du pouvoir bloquant

Reference number
ISO 11502:2018(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).

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

For an explanation of the voluntary nature of standards, 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 www.iso.org/iso/foreword.html.

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

This second edition cancels and replaces the first edition (ISO 11502:1995), of which it constitutes a minor revision. The changes compared to the previous edition are as follows:

— Clause 2 has been updated;

— the document has been editorially revised.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Plastics — Film and sheeting — Determination of blocking resistance

1 Scope

This document specifies two methods for assessing the tendency of flexible plastic films and sheets to adhere to one another when left in contact for some time, at a specified temperature and under light pressure. One method is qualitative and the other is quantitative.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 291, *Plastics — Standard atmospheres for conditioning and testing*

3 Terms and definitions

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

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

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

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

3.1
blocking
unintentional adherence between materials

4 Method A: Qualitative method

4.1 Principle

Pieces of film or sheeting are kept in contact with one another for a minimum of 24 h at 50 °C under a pressure of 7 kPa. Blocking is considered to have occurred if the surfaces suffer damage when they are separated or if the forte of adherence between them is sufficient to lift a given weight.

Alternative times, temperatures and pressures may be used depending on the nature of the plastic film or sheeting under test and the proposed end use of the material.

4.2 Apparatus

4.2.1 **Glass plates**, measuring 100 mm × 76 mm and approximately 2 mm thick.

4.2.2 **Strips of filter paper**, measuring 150 mm × 76 mm.

4.2.3 **Oven**, capable of being maintained at 50 °C ± 2 °C, with provision for placing the test assemblies on shelves so that they are no less than 50 mm from each other and from the sides of the oven.

4.2.4 **Weights**, of mass 5,4 kg.

4.2.5 **Metal bars**, of rectangular cross-section, 15 mm wide × 76 mm long, weighing 50 g and 100 g.

4.2.6 **Metal clip**, with arms approximately 100 mm long .

4.2.7 **Double-sided adhesive tape**, approximately 12,5 mm wide.

4.3 Test specimens

4.3.1 Shape and dimensions

The specimens shall consist of strips measuring 150 mm × 76 mm. In the case of film or sheeting with a printed or embossed surface, this side shall be known as the face. The opposite side is called the back. If there is no print or embossing, one side shall be called the face and marked accordingly.

4.3.2 Preparation

Six specimens shall be taken, provided that, for printed or coloured film or sheet, these include all the colours or colour combinations of the print and base sheeting. If this requirement is not satisfied, additional specimens shall be taken. In the case of rolls, all specimens shall be taken at least 100 mm from the edge and more than 1 m from the beginning or the end of the roll. The minimum time between manufacture and testing shall be 16 h.

4.4 Procedure

4.4.1 Condition the specimens, together with the glass plates (4.2.1) and strips of filter paper (4.2.2) in one of the standard atmospheres defined in ISO 291 for a period of 24 h.

4.4.2 Stack two specimens, strips of filter paper and glass plates on top of each other in the following order: glass plate, strip of filter paper, specimen with face uppermost, specimen with face downwards, strip of filter paper, glass plate.

Align the components of the assembly along one of their 76 mm edges so that the specimens and strips of filter paper extend 50 mm beyond the glass plates at the opposite edge, in order to facilitate handling (see Figure 1).

Prepare two more assemblies in the same way, except that in the second the specimens shall be back to back and in the third back to face.

4.4.3 Place each assembly in the oven (4.2.3) and load each with a weight of mass 5,4 kg (4.2.4) to give a uniform pressure of 7 kPa over the area under test. Maintain the oven temperature at 50 °C ± 2 °C for 24 h, after which time the weights shall be removed, and the assemblies taken from the oven and kept at standard atmospheric conditions for not less than 2 h but not more than 24 h.

4.4.4 Carefully remove each pair of specimens from its assembly and lay them flat on a plane horizontal surface.

Attach a metal bar (4.2.5) of mass 50 g or 100 g, depending on the surface of the specimens under test, to the free end of the lower specimen of each pair by double-faced adhesive tape (4.2.7) and allow it to rest freely on the horizontal surface (see Figure 2).

For unprinted surfaces, use a 50 g metal bar.

For printed surfaces, use a 100 g metal bar.

Test sunken or sandwich print sheeting as unprinted surfaces.

Insert the free end of the upper specimen into a metal clip (4.2.6) so that the whole width of the specimen is held in the clip and raise the clip manually at a uniform rate of 25 mm/s ± 2,5 mm/s until the specimens have completely separated. Note whether or not the metal bar is lifted off the horizontal surface.

Examine the surfaces of the specimens that were in contact with one another for visible signs of damage.

4.4.5 Blocking shall be considered to have occurred if, during separation of the specimens, the metal bar is lifted off the horizontal surface or if the separated specimens show surface damage.

4.5 Test report

The test report shall include the following information:

a) a reference to this document, i.e. ISO 11502:2018, and to the method used (method A);

b) all details necessary for identification of the material tested;

c) the metal bar used;

d) whether or not blocking occurred, the damage observed, if any, and the surfaces involved in eah case; and

e) the date of the test.

5 Method B: Quantitative method

5.1 Principle

Specimens of film or sheeting are kept in contact with each other under specified conditions of time, temperature and pressure. The specimens are then fixed between two platens mounted in a universal testing machine, and the force necessary to separate them is determined.

5.2 Apparatus

5.2.1 Constant-speed tensile-testing machine, having a pair of 100 mm × 100 mm aluminium blocks mounted on the top and bottom jaws by means of suitable adapters.

5.2.2 Glass plates, measuring 100 mm × 76 mm and approximately 2 mm thick.

5.2.3 Strips of filter paper, measuring 100 mm × 76 mm.

5.2.4 Weights, of mass 2,3 kg.

5.2.5 Oven, capable of being maintained at 50 °C ± 2 °C.

5.2.6 Double-sided adhesive tape.

5.3 Test specimens

5.3.1 Shape and dimensions

Specimens shall consist of strips measuring 150 mm × 76 mm, cut so that the longest side coincides with the machine direction of the film or sheeting.

5.3.2 Preparation

Ten specimens shall be taken from several locations across the width of the material. In the case of rolls, all specimens shall be taken at least 100 mm from the edge and more than 1 m from the beginning or the end of the roll. The minimum time between manufacturing and testing shall be 16 h.

5.4 Procedure

5.4.1 Condition the specimens, together with the glass plates (5.2.2) and strips of filter paper (5.2.3) in one of the standard atmospheres defined in ISO 291 for a period of 24 h.

5.4.2 Prepare five assemblies, each containing two specimens held between strips of filter paper and glass plates in the same way as described in method A, but aligning the edges of the layers as shown in Figure 3. The orientation of the specimen surfaces with respect to each other in the assemblies is left to the discretion of the user (it may, for instance, depend in the results of testing using the qualitative method), but it shall be the same in each of the five assemblies. Place a weight of mass 2,3 kg (equivalent to 3 kPa) on each assembly and heat them in the oven (5.2.5) for 3 h at 50 °C ± 2 °C. After this time, remove the weights and take the assemblies from the oven. Carefully remove each pair of specimens from its assembly and keep at standard atmospheric conditions for not less than 2 h but not more than 24 h.

5.4.3 Using a wide-bladed knife or spatula, transfer one of the pairs of specimens carefully to the lower block in the tensile-testing machine, placing it so that its ends project out equally on each side of the block (see Figure 4).

5.4.4 Raise the lower block until the upper block is resting on the specimen directly above the lower block.

5.4.5 Carefully separate the ends of the pair of specimens using the sharp edge of the knife blade and peel back to the edges of the blocks on each side.

5.4.6 Using the double-sided adhesive tape (5.2.6), fix the two ends of the upper specimen to the upper block and the two ends of the lower specimen to the lower block (see Figure 5).

5.4.7 Adjust the chart speed to 50 mm/min and the crosshead speed to 5 mm/min.

5.4.8 Start the chart and crosshead travel and allow the testing machine to record the force required to separate the two layers completely.

5.4.9 Repeat the process for the four other pairs of specimens.

5.4.10 Note the maximum force for each pair of specimens, and calculate the average of the five determinations.

NOTE This method can be used to measure the force necessary to separate already blocked items. However, since the conditions under which blocking occurred will not be known, and can differ from the conditions specified in this method, direct comparison with the results obtained by the above method is not possible.

5.5 Precision

The precision of this test method is not known because interlaboratory data are not available. When interlaboratory data are obtained, a precision statement will be added at the following revision.

5.6 Test report

The test report shall include the following information:

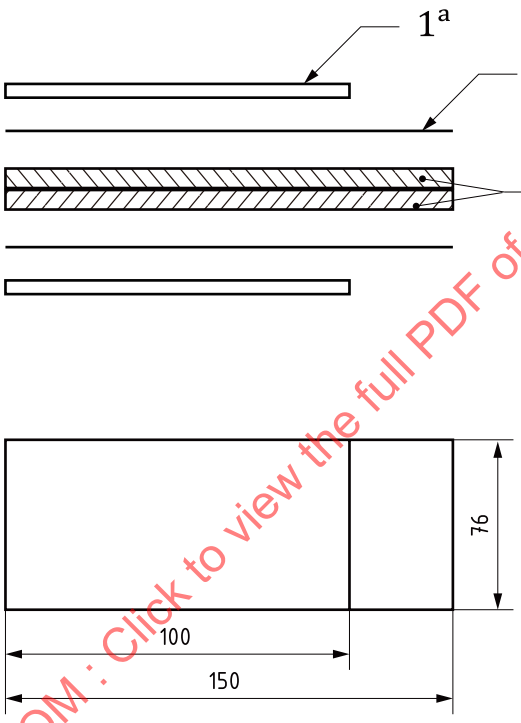
a) a reference to this document, i.e. ISO 11502:2018, and to the method used (method B);

b) all details necessary for identification of the material tested;

c) whether or not blocking occurred, the damage observed, if any, and the two surfaces involved;

d) the average force, in newtons, necessary to separate the layers; and

e) the date of the test.



Key

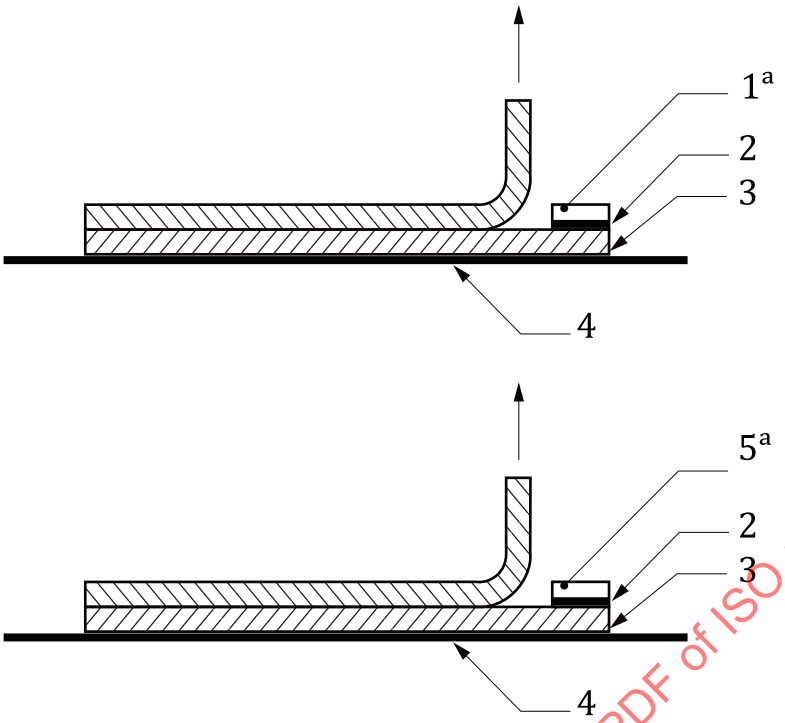
1 glass plate (100 mm × 76 mm)

2 filter paper (150 mm × 76 mm)

3 specimens (150 mm × 76 mm)

a Approximately 2 mm thick.

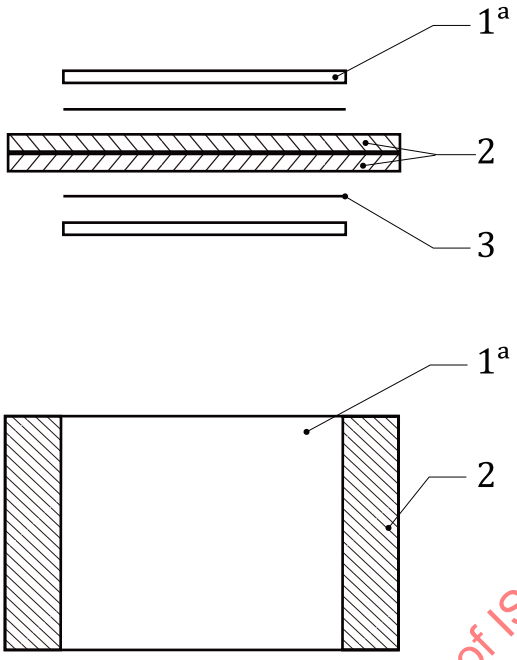
Figure 1 — Assembly of specimens for qualitative method (method A)



Key

1 50 g metal bar
2 double-faced adhesive tape
3 lower specimen
4 horizontal plane surface
5 100 g metal bar
a For unprinted surfaces.

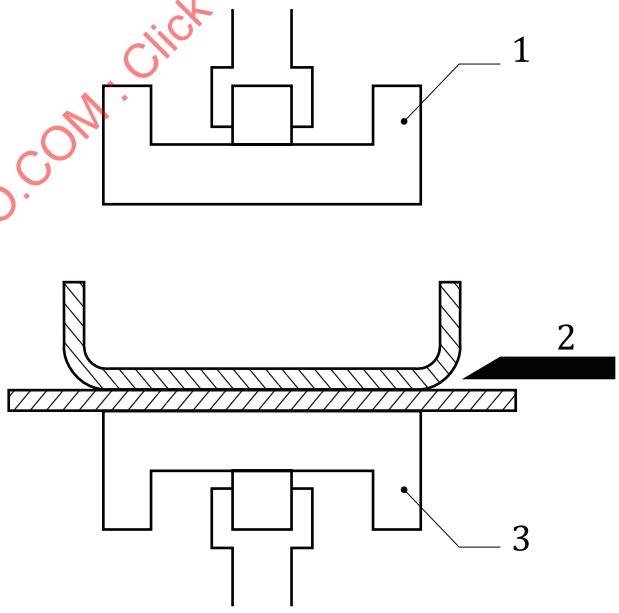
Figure 2 — Separation of specimens in qualitative method (method A)



Key

1 glass plate (100 mm × 76 mm)
2 specimens (150 mm × 76 mm)
3 filter paper
a Approximately 2 mm thick.

Figure 3 — Assembly of specimens for quantitative method (method B)



Key

1 upper aluminium block (100 mm × 100 mm)
2 knife or spatula
3 lower aluminium block (100 mm × 100 mm)

Figure 4 — Fixing blocked specimens to aluminium blocks in quantitative method (method B)