

SLOVENSKI STANDARD

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Materiali in predmeti v stiku z živilu - Polimerni materiali - 3. del: Preskusne metode za celotno migracijo v vodne modelne raztopine s popolno potopitvijo

Materials and articles in contact with foodstuffs - Plastics - Part 3: Test methods for overall migration into aqueous food simulants by total immersion

Werkstoffe und Gegenstände in Kontakt mit Lebensmitteln - Kunststoffe - Teil 3: Prüfverfahren für die Gesamtmigration in wässrige Prüflebensmittel durch völliges Eintauchen

[SIST EN 1186-3:2002](http://standards.iteh.ai/SIST/1186-3-2002)
Matériaux et objets en contact avec les denrées alimentaires - Matière plastique - Partie 3: Méthodes d'essai pour la migration globale dans les simulants aqueux par immersion totale

Ta slovenski standard je istoveten z: EN 1186-3:2002

ICS:

67.250	Materiali in predmeti v stiku z živilu	Materials and articles in contact with foodstuffs
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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 1186-3

April 2002

ICS 67.250

Supersedes ENV 1186-3:1994

English version

**Materials and articles in contact with foodstuffs - Plastics - Part
3: Test methods for overall migration into aqueous food
simulants by total immersion**

Matériaux et objets en contact avec les denrées
alimentaires - Matière plastique - Partie 3: Méthodes
d'essai pour la migration globale dans l'huile d'olive par
immersion totale

Werkstoffe und Gegenstände in Kontakt mit Lebensmitteln
- Kunststoffe - Teil 3: Prüfverfahren für die
Gesamtmigration in wässrige Prüflebensmittel durch
völliges Eintauchen

This European Standard was approved by CEN on 4 January 2002.

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 Management Centre 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 Management Centre has the same status as the official versions.

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



EUROPEAN COMMITTEE FOR STANDARDIZATION
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Foreword

This document EN 1186-3:2002 has been prepared by Technical Committee CEN/TC 194 "Utensils in contact with food", the secretariat of which is held by BSI.

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 October 2002, and conflicting national standards shall be withdrawn at the latest by October 2002.

This document supersedes ENV 1186-3:1994.

This European Standard is one of a series of methods of test for plastics materials and articles in contact with foodstuffs.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EC Directive(s).

For relationship with EC Directive(s), see informative annex ZA, which is an integral part of this document.

At the time of preparation and publication of this standard the European Union legislation relating to plastics materials and articles intended to come into contact with foodstuffs is incomplete. Further Directives and amendments to existing Directives are expected which could change the legislative requirements which this standard supports. It is therefore strongly recommended that users of this standard refer to the latest relevant published Directive(s) before commencement of any of the test or tests described in this standard.

EN 1186-3 should be read in conjunction with EN 1186-1.
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Further Parts of this standard have been prepared concerned with the determination of overall migration from plastics materials into food simulants.

Their titles are as follows:

EN 1186 - Materials and articles in contact with foodstuffs - Plastics –

Part 1	Guide to the selection of conditions and test methods for overall migration
Part 2	Test methods for overall migration into olive oil simulants by total immersion
Part 4	Test methods for overall migration into olive oil by cell
Part 5	Test methods for overall migration into aqueous food simulants by cell
Part 6	Test methods for overall migration into olive oil using a pouch
Part 7	Test methods for overall migration into aqueous food simulants using a pouch
Part 8	Test methods for overall migration into olive oil by article filling
Part 9	Test methods for overall migration into aqueous food simulants by article filling
Part 10	Test methods for overall migration into olive oil (modified method for use in cases where incomplete extraction of olive oil occurs)
Part 11	Test methods for overall migration into mixtures of ¹⁴ C-labelled synthetic triglyceride

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Part 12	Test methods for overall migration at low temperatures
Part 13	Test methods for overall migration at high temperatures
Part 14	Test methods for 'substitute tests' for overall migration from plastics intended to come into contact with fatty foodstuffs using test media iso-octane and 95 % ethanol
Part 15	Alternative test methods to migration into fatty food simulants by rapid extraction into iso-octane and/or 95 % ethanol

Annex A is informative.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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1 Scope

This Part of this European Standard specifies test methods for the determination of the overall migration into aqueous based food simulants from plastics which are intended to come into contact with foodstuffs, by total immersion of test specimens in a selected food simulant at test temperatures up to reflux for selected test times.

This method is most suitable for plastics in the form of films and sheets, but can be applied to a wide range of articles or containers from which test pieces of suitable size can be cut.

2 Normative references

This European Standard incorporates by dated and undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to and revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 1186-1:2002, *Materials and articles in contact with foodstuffs – Plastics – Part 1: Guide to the selection of conditions and test methods for overall migration*.

EN 10088-1:1995, *Stainless steels - Part 1: List of stainless steels*.

EN ISO 8442-2:1997, *Materials and articles in contact with foodstuffs – Cutlery and table holloware – Part 2: Requirements for stainless steel and silver-plated cutlery (ISO 8442-2:1997)*.

ISO 4788, *Laboratory glassware - Graduated measuring cylinders*.

3 Method A - overall migration into aqueous food simulants by total immersion in an oven or incubator or refrigerator

3.1 Principle

The overall migration of non-volatile substances from a sample of the plastics is determined as the mass of non-volatile residue after evaporation of the food simulant following immersion.

The selection of the conditions of test and the food simulant(s) shall be determined by the conditions of use; see clauses 4, 5 and 6 of EN 1186-1:2002.

Test specimens of approximately 1 dm², see clause 8 of EN 1186-1:2002, are immersed in the food simulant for the exposure time at temperatures up to and including the temperature of reflux. At the end of the test period, each test specimen is removed from the food simulant. The food simulant from each test specimen is evaporated to dryness, the mass of the non-volatile residue is determined gravimetrically and expressed as milligrams per square decimetre of surface area of test specimen.

Overall migration is reported as the mean of three determinations on separate test specimens.

3.2 Reagents

NOTE For details of preparation and quality of these reagents, see clause 4 of EN 1186-1:2002.

3.2.1 Distilled water or water of equivalent quality (simulant A)

3.2.2 Acetic acid 3 % (w/v) in aqueous solution (simulant B)

3.2.3 Ethanol 10 % (v/v) in aqueous solution (simulant C)

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3.2.4 Alcoholic simulants for liquids or beverages of an alcoholic strength exceeding 10 % (v/v).

NOTE In the case of materials and articles intended to come into contact with liquids or beverages of an alcoholic strength exceeding 10 % (v/v) the test is carried out with aqueous solutions of ethanol of a similar strength.

3.3 Apparatus

3.3.1 Cutting slab, clean smooth glass, metal or plastics slab of suitable area to prepare test specimens, 250 mm × 250 mm is suitable.

3.3.2 Tweezers, stainless steel, blunt nosed.

3.3.3 Cutting implement, scalpel, scissors or sharp knife or other suitable device.

3.3.4 Metal template, (100 mm ± 0,2 mm) × (100 mm ± 0,2 mm) (square).

3.3.5 Rule or template, 25 mm ± 1 mm wide.

3.3.6 Rule, graduated in mm, and with an accuracy of 0,1 mm.

3.3.7 Analytical balance capable determining a change in mass of 0,1 mg.

3.3.8 Specimen supports, constructed of stainless steel with cross arms attached by welding or silver soldering, or of glass. Stainless steel X4 CrNi 18 10 according to EN 10088-1: 1995 or of composition, chromium 17 %, nickel 9 %, carbon 0,04 %, is suitable. Before initial use thoroughly clean the stainless steel supports. The use of a degreasing solvent and then dilute nitric acid has been found to be suitable. For the aqueous acetic acid food simulant, use supports constructed out of glass, as there is a tendency for the acetic acid to corrode stainless steel supports, particularly if the joints are silver soldered.

NOTE 1 However stainless steel supports can be used for acetic acid if it can be demonstrated that when immersed on their own in simulant, for the test period, at the test temperature, the residue after evaporating the simulant to dryness and drying in an oven or incubator or refrigerator to constant mass at 105 °C to 110 °C is less than 5mg/l, see 4.1 of EN 1186-1:2002.

NOTE 2 The method has been written for the supports shown in Figure C.1 of EN 1186-1:2002 which have been found to be suitable for holding thin film and sheet test pieces. However other supports can be used providing they are capable of holding and keeping the test pieces apart and at the same time ensuring complete contact with the simulant. For rigid samples, supports with a single cross arm may be used.

3.3.9 Gauze, pieces of fine stainless steel gauze, with a mesh size of 1 mm have been found to be suitable, approximately 25 mm × 100 mm or, glass rods, 2 mm to 3 mm in diameter and approximately 100 mm long to be used with the acetic acid food simulant, for insertion between the test pieces. Before initial use thoroughly clean the gauze, first with a degreasing solvent and then with dilute nitric acid.

3.3.10 Glass tubes, ground neck, for retaining the food simulant and test specimens. Tubes with an internal diameter of approximately 35 mm and length of between 100 mm and 200 mm, excluding the ground neck (see 7.2 of EN 1186-1:2002) have been found to be satisfactory.

3.3.11 Glass beads, 2 mm to 3 mm diameter or glass rods, 2 mm to 3 mm in diameter and approximately 100 mm long (see 7.2 of EN 1186-1:2002).

3.3.12 Thermostatically controlled oven or incubator or refrigerator capable of maintaining the set temperature within the tolerances specified in Table B.2 of EN 1186-1:2002.

3.3.13 Dishes, stainless steel, nickel, platinum, platinum alloy, gold 50 mm to 90 mm diameter and maximum mass 100 g, for evaporation of food simulants and weighing of residues. Glass, glass ceramic or ceramic dishes may be used provided that the surface characteristics are such that the masses of the dishes after evaporation of any specified food simulants followed by conditioning in the desiccator used achieves a constancy of ± 0,5 mg. Stainless steel and nickel dishes are suitable only for distilled water and ethanol solutions. Glass, glass ceramic, glazed ceramic, platinum or, platinum alloy or gold dishes are suitable for all three simulants.

3.3.14 Steam bath, hot plate, distillation apparatus or rotary evaporator for evaporation of food simulant at the end of test period.

3.3.15 Desiccator with anhydrous calcium chloride or self indicating silica gel.

3.3.16 Measuring cylinder, 100 ml, complying with the minimum requirements of ISO 4788.

3.4 Preparation of test specimens

3.4.1 General

It is essential that test specimens are clean and free from surface contamination (many plastics can readily attract dust due to static charges). Before preparing test specimens, remove any surface contamination from the sample by gently wiping it with a lint free cloth, or by brushing with a soft brush. Under no circumstances wash the sample with water or solvent. If it is specified in the instructions for use of the article that it should be washed or cleaned before use see 8.1 of EN 1186-1:2002. Minimise handling of the samples and where necessary, wear cotton gloves.

To ensure that test pieces are well separated and that the surfaces are freely exposed to the food simulant during the period of the test, for thin films, insert a piece of fine stainless steel gauze, or glass rods with the acetic acid simulant, between the test pieces or for thick samples not placed on the supports, insert glass rods between the test pieces after immersion in the food simulant. Where specimen supports are used, label the supports with a tag bearing the test specimen identification.

When preparing test specimens measure the surface area according to 8.3 of EN 1186-1:2002.

3.4.2 Number of test specimens

Three test specimens are required for samples, in the form of thin films, sheets, cut sections from containers or similar articles. Five test specimens, similar dimensionally one to another, are required for samples of articles of irregular shape. These test specimens are utilized as follows:

- a) three test specimens for the migration test;
- b) two test specimens for determination of the surface area, in the case of samples of irregular shape (3.4.5).

3.4.3 Films and sheets

Lay the sample on the cutting slab (3.3.1) and cut the test specimens of 1 dm² (see 9.3 of EN 1186-1:2002), using the 100 mm × 100 mm template (3.3.4). Check, using the rule (3.3.6), that the dimensions of the specimen are within the specified tolerance (± 1 mm).

Cut each test specimen into four test pieces 25 mm × 100 mm using the rule (3.3.5). Assemble one test specimen onto the support (3.3.8) by piercing suitable holes in the test pieces and placing two test pieces on each side of the cross arms of the support. Repeat this procedure for all remaining test specimens.

3.4.4 Containers and other articles

Cut sections from the walls of the container or article to give test specimens each of area approximately 1 dm². For articles with individual areas less than 1 dm², use a number of articles to provide each test specimen. Measure the dimensions of each test specimen to the nearest 1 mm, using the rule. Calculate only the surface area of the sample which is intended to come into contact with foodstuffs, see 8.3 of EN 1186-1:2002.

Calculate the area of each test specimen to the nearest 0,01 dm² and record. If necessary, cut each test specimen into smaller pieces to enable them to fit into the glass tubes (3.3.10). The test specimens or pieces are placed on the specimen supports if these are appropriate or, if the test specimens or pieces are sufficiently rigid, they can be tested unsupported.