
**Glass hollowware in contact with food —
Release of lead and cadmium —**

**Part 1:
Test method**

*Vaisselle creuse en verre en contact avec les aliments — Émission
de plomb et de cadmium —
Partie 1: Méthode d'essai*

ISO 7086-1:2000

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Printed 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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

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 part of ISO 7086 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 7086-1 was prepared by Technical Committee ISO/TC 166, *Ceramic ware, glassware and glass ceramic ware in contact with food*.

This second edition cancels and replaces the first edition (ISO 7086-1:1982), which has been technically revised.

ISO 7086 consists of the following parts, under the general title *Glass hollowware in contact with food — Release of lead and cadmium*:

— *Part 1: Test method*

ISO 7086-1:2000

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— *Part 2: Permissible limits*

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Introduction

Lead and cadmium release from glassware surfaces is an issue which requires effective means of control to ensure the protection of the population against possible hazards arising from the use of improperly formulated and/or processed glassware used for the preparation, serving and storage of food and beverages. As a secondary consideration, different requirements from country to country for the control of the release of toxic materials from the surfaces of glassware present non-tariff barriers to international trade in these commodities. Accordingly, there is a need to maintain internationally accepted methods of testing glassware for lead and cadmium release, and to define permissible limits for the release of these toxic heavy metals.

The limits for lead and cadmium release specified in this part of ISO 7086 are not intended to be regarded as the maximum amount of these metals to which exposure can be considered safe. They are levels which are consistent with good manufacturing practice in the respective industries, harmonize regulatory levels in principal world markets and reflect a general objective of reducing overall exposure to these metals.

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Glass hollowware in contact with food — Release of lead and cadmium —

Part 1: Test method

1 Scope

This part of ISO 7086 specifies a test method for the release of lead and cadmium from glass hollowware that is intended to be used in contact with food.

This part of ISO 7086 is applicable to glass hollowware intended for use in the preparation, cooking, serving and storage of food and beverages, excluding glass ceramic ware, glass flatware and all articles used in food manufacturing industries or those in which food is sold.

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2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 7086. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 7086 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 385-2:1984, *Laboratory glassware — Burettes — Part 2: Burettes for which no waiting time is specified.*

ISO 648:1977, *Laboratory glassware — One-mark pipettes.*

ISO 1042:1998, *Laboratory glassware — One-mark volumetric flasks.*

ISO 3585:1998, *Borosilicate glass 3.3 — Properties.*

ISO 3696:1987, *Water for analytical laboratory use — Specification and test methods.*

3 Terms and definitions

For the purposes of this part of ISO 7086, the following terms and definitions apply.

3.1

atomic absorption spectrometry (AAS)

spectroanalytical method for qualitative determination and quantitative evaluation of element concentrations. The technique determines these concentrations by measuring the atomic absorption of free atoms

3.2

atomic absorption

absorption of electromagnetic radiation by free atoms in the gas phase where a line spectrum is obtained which is specific for the absorbing atoms

3.3
bracketing technique

analytical method consisting of bracketing the measured absorption or machine reading of the sample between two measurements made on calibration solutions of neighbouring concentrations within the optimum working range

3.4
calibration function

function relating atomic absorption instrument readings, either in absorption or in other machine units, to the concentration of lead or cadmium which generated the instrument reading

3.5
direct method of determination

analytical method consisting of inserting the measured absorption or machine reading into the calibration function and deducing the concentration of the analyte

3.6
drinking rim

20 mm wide section of the external surface of a drinking vessel, measured downwards from the upper edge along the wall of the vessel

3.7
extraction solution

acetic acid, 4 % (V/V), recovered after the extraction test and which is analysed for lead and cadmium concentration

3.8
flame atomic absorption spectrometry (FAAS)

atomic absorption spectrometry that uses a flame to create free atoms of the analyte in the gas phase

3.9
flatware

glassware having an internal depth not exceeding 25 mm, measured from the lowest point to the horizontal plane passing through the point of overflow

3.10
foodware

articles which are intended to be used for the preparation, cooking, serving and storage of food or drinks

3.11
glass ceramic

inorganic material produced by the complete fusion of raw materials at high temperatures into a homogeneous liquid which is then cooled to a rigid condition and temperature treated in such a way as to produce a mostly micro crystalline body

3.12
glassware

glass articles that are intended to be used in contact with foodstuffs

3.13
glass

inorganic material produced by the complete fusion of raw materials at high temperature into a homogeneous liquid which is then cooled to a rigid condition, essentially without crystallization

NOTE The material may be clear, coloured or opaque.

3.14
hollowware

glassware having an internal depth greater than 25 mm, measured from the lowest point to the horizontal plane passing through the point of overflow

NOTE Hollowware is subdivided into three categories based on volume:

- small: hollowware with a capacity of less than 600 ml;
- large: hollowware with a capacity between 600 ml and 3 l;
- storage: hollowware with a capacity of 3 l or greater.

3.15

optimum working range

range of concentrations of an analyte over which the relationship between absorption and concentration is practically linear

3.16

reference surface area

the area that is intended to come into contact with foodstuffs in normal use

3.17

test solution

the solvent used in the test to extract lead and cadmium from the glassware (acetic acid, 4 % (V/V))

4 Principle

Silicate surfaces are placed in contact with 4 % (V/V) acetic acid solution for 24 h, at 22 °C to extract lead and/or cadmium, if present, from the surfaces of the articles or test specimens.

The amounts of extracted lead and cadmium are determined by flame atomic absorption spectrometry (FAAS). In routine tests other equivalent analysis methods may be used.

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5 Reagents and materials

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5.1 Reagents

All reagents shall be of recognized analytical grade. Distilled water or water of equivalent purity (grade 3 water complying with the requirements of ISO 3696) shall be used throughout.

5.1.1 Acetic acid, (CH₃COOH), glacial, $\rho = 1,05$ g/ml.

5.1.2 Acetic acid test solution, 4 % (V/V), add 40 ml of acetic acid (5.1.1) to distilled water, and dilute to 1 l. This solution shall be freshly prepared for use. Proportionately greater quantities may be prepared.

5.1.3 Lead stock solution, prepare analytical stock solutions containing 1 000 mg/l \pm 1 mg/l of lead in the test solution (5.1.2). Alternatively, an appropriate commercially available standardized lead AAS solutions may be used.

5.1.4 Cadmium stock solution, prepare analytical stock solutions containing 1 000 mg/l \pm 1 mg/l of cadmium in the test solution (5.1.2). Alternatively, an appropriate commercially available standardized cadmium AAS solution may be used.

5.1.5 Lead standard solution, dilute the lead stock solution (5.1.3) ten-fold with test solution (5.1.2) to produce a lead standard solution which is 100 mg/l Pb, or 0,1 g/l of lead.

5.1.6 Cadmium standard solution, dilute the cadmium stock solution (5.1.4) 100-fold with test solution (5.1.2) to produce a cadmium standard solution which is 10 mg/l Cd, or 0,01 g/l of cadmium.