~~INTERNATIONAL WORKSHOP AGREEMENT~~

PRF IWA 43

ISO/TMBG

Secretariat: ISO

Date: 2023-~~06-16~~08-14

Glass types — Crystal glass, crystal and lead crystal — Specifications and test methods

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: + 41 22 749 01 11
EmailE-mail: copyright@iso.org
Website: www.iso.orgwww.iso.org

Published in Switzerland

Contents

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 document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directiveswww.iso.org/directives).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents.www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

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.htmlwww.iso.org/iso/foreword.html.

International Workshop Agreement IWA 43 was approved at a workshop hosted by the Association française de normalisation (Afnor), held in La Plaine Saint Denis, France, on 16 June 2023.

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.htmlwww.iso.org/members.html.

Introduction

This International Workshop Agreement (IWA)This document is intended to provide specifications and test methods for three crystal glass types (crystal glass, crystal, lead crystal) used in consumer goods in relation to tableware, containers, furniture, home decor, jewellery and any other decorative components in consumer goods. It will permitThe purpose is to promote a global understanding of consumer quality requirements, together with a corresponding methodmethods to measure the specifications.

The three crystal glass types are determined alongbased on three criteria: chemical composition, refractionrefractive index and density. A maximum lead content criterion is added for crystal and crystal glass.

The refractive index depends on the chemical composition of glass. While lead oxide remains the most efficient constituent to obtain a high refractionrefractive index because it favours general qualities (mass purity, high transparency for non-coloured glass), other components such as calcium oxide, barium oxide, zinc oxide may also contribute to a high refractive index.

Glass types — — — Crystal glass, crystal and lead crystal — — Specifications and test methods

1 Scope

This International Workshop Agreement (IWA) sets forthdocument provides the specifications and specifies the requirements for the designationsdesignation of three specific types of glass namely crystal glass, crystal, and lead crystal, according to their chemical compositions, densitiescomposition, density and refractive indecesindex. This IWAdocument also detailsdescribes the testing methodologiestest methods to measure the respective specificationscharacteristics of these crystal glass types.

Given the potential lead contamination concerns in crystal glass and crystal, the IWAthis document additionally stipulates a maximum permissible limit for lead content.

This IWAdocument is notably applicable to the use of the designated crystal glass types used as tableware, containers (e.g. bottles, decanters, perfume jars), giftware, home decor and any decorative components in consumer goods (e.g. glass components and/or parts used in jewellery, textile applications, and electrical and electronic equipment), furniture and luminaries.

This IWAdocument does not apply to the use of these crystal glass types used within the spheresareas of construction, healthcare and laboratories, and other technical uses of glass.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

No terms and definitions are listed in this document.

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

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

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

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

4 Specifications

4.1 General

The determination of the three crystal glass types is based on the following criteria:

— metal oxides composition;

— density;

— refractive index (n_D);

— a maximum lead (Pb) content for crystal glass and crystal.

For a recapitulative tablesummary of crystal glass types specifications, see Annex A.Annex A.

The intentional addition of lead oxides is prohibited in batch compositions for both crystal glass and crystal. However, due to the omnipresence of lead ions in naturethe natural environment, some lead ions

are present in the glass matrix from trace elements in specific raw materials used for crystal glass or crystal production, or through cross-contamination. Consequently, a maximum permissible limit for lead content is established to accommodate this unavoidable occurrence.

4.2 Specifications for crystal glass

Crystal glass shall have:

— metal oxides composition: ~~Zinc~~zinc oxide (ZnO), ~~Barium~~barium oxide (BaO), ~~Potassium~~potassium oxide (K_2O), ~~Strontium~~strontium oxide (SrO), ~~Aluminium~~aluminium oxide (Al_2O_3), ~~Titanium~~titanium oxide (TiO_2), ~~Zirconium~~zirconium oxide (ZrO_2), ~~Antimony~~antimony oxide (Sb_2O_3), singly or together ~~≥~~ ≥ 10 %;

— density ~~≥~~ ≥ 2,45 g/cm³;

— refractive index n_D ~~≥~~ ≥ 1,520;

— maximum permissible lead (Pb) content: 100 ppm[1].

For glass to be defined as crystal glass, all these criteria shall be fulfilled.

4.3 Specifications for crystal

Crystal shall have:

— metal oxides composition: ~~Zinc~~zinc oxide (ZnO), ~~Barium~~barium oxide (BaO), ~~Potassium~~potassium oxide (K_2O), ~~Strontium~~strontium oxide (SrO), ~~Aluminium~~aluminium oxide (Al_2O_3), ~~Titanium~~titanium oxide (TiO_2), ~~Zirconium~~zirconium oxide (ZrO_2), ~~Antimony~~antimony oxide (Sb_2O_3), ~~Calcium~~calcium oxide (CaO), singly or together ~~≥~~ ≥ 24 %;

— density ~~≥~~ ≥ 2,67 g/cm³;

— refractive index n_D ~~≥~~ ≥ 1,535;

— maximum permissible lead (Pb) content: 500 ~~ppm.~~ppm[1)].

For glass to be defined as crystal, all these criteria shall be fulfilled.

4.4 Specifications for lead crystal

Lead crystal shall have:

— lead oxide (PbO) ~~≥~~ ≥ 24 ~~%;~~ %;

— density ~~≥~~ ≥ to 2,90 g/cm³;

— refractive index n_D ~~≥~~ ≥ 1,545.

For glass to be defined as lead crystal, all these criteria shall be fulfilled.

[1] Parts per million.

5 Test methods

5.1 Chemical composition

Tests aimed at determining the chemical composition of crystal glass, crystal and lead crystal can be carried out ~~along~~using either of the following ~~methodologies:~~ methods.

— Inductively ~~Coupled Plasma Optical Emission Spectrometry~~coupled plasma optical emission spectrometry (ICP-OES), using

  — DIN 51086-2.

NOTE A reference material can be used to validate the ICP-OES method ~~(~~[e.g. according to EUR-8137-EN (BCR-126) ~~[7])~~[7]].

— X-ray ~~Fluorescence~~fluorescence (XRF) spectrometry, using either

  — DIN 51001 or

  — ASTM E1621.

Any other comparable testing methodology can be used.

In the event of dispute, ICP-OES based method shall be employed.

5.2 Physical determinations

5.2.1 Density

The density shall be measured by hydrostatic balance method with an accuracy of ~~±~~ ± 0,01 g/cm^3.

A sample is weighed in air and weighed immersed in distilled water at 20 °C.

For density, the measurement can be performed~~,~~ in accordance with one of the following~~:~~ methods:

— ASTM C693~~-93~~;

— ASTM C729~~-11~~;

— use of a pycnometer.

NOTE 1 ASTM C729~~-11~~ does not impose minimum sample weight restrictions.

NOTE 2 A reference material can be used to validate the method for measuring the density ~~(~~[e.g. according to EUR-8137-EN (BCR-126) ~~[7]).~~[7]].

5.2.2 Refractive index

The refractive index measurement is performed at 589,3 nm wavelength at ~~an~~ ambient temperature with an accuracy of ~~±~~ ± 0,001. An appropriate measurement method according to ASTM C1648 can be used ~~such as~~ , e.g. using an Abbe refractometer or a prism coupler~~, along ASTM C1648-12~~.

NOTE A reference material can be used to validate the method for measuring the refractive index ~~(~~[e.g. according to EUR-8137-EN (BCR-126) ~~[7]).~~[7]].

Annex A
(informative)

Crystal glass types specifications

~~Table A.1: Recapitulative table~~Table A.1 provides a summary of crystal glass types specifications.

Table A.1 — Summary of crystal glass types specifications

~~Description of category~~ Designation	Characteristics			
	Metal oxides composition	Density ~~(~~ g/cm^3~~)~~	Refractive index	Pb content
Crystal glass	ZnO, BaO, K_2O, SrO, Al_2O_3, TiO_2, ZrO_2, Sb_2O_3, singly or together ≥ 10 %	≥ 2,45	n_D ~~≥~~ ≥ 1,520	No intentional addition of lead oxides. Maximum Pb content of 100 ppm.
Crystal	ZnO, BaO, K_2O, SrO, Al_2O_3, TiO_2, ZrO_2, Sb_2O_3, CaO, singly or together ~~≥~~ ≥ 24 %	≥ 2,67	n_D ~~≥~~ ≥ 1,535	No intentional addition of lead oxides. Maximum Pb content of 500 ppm.
Lead ~~Crystal~~ crystal	PbO ~~≥~~ ≥ 24 %	≥ 2,90	n_D ~~≥~~ ≥ 1,545	N/A
ppm = parts per million.				