

INTERNATIONAL STANDARD

**ISO
10629**

First edition
1996-07-01

ANSI Internat Doc Sec

Raw optical glass — Resistance to attack by aqueous alkaline solutions at 50 °C — Test method and classification

*Verre d'optique brut — Résistance à l'attaque par des solutions aqueuses
alcalines à 50 °C — Méthode d'essai et classification*



Reference number
ISO 10629:1996(E)



Documents
Document Sharing Hub

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.

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.

International Standard ISO 10629 was prepared by Technical Committee ISO/TC 172, *Optics and optical instruments*, Subcommittee SC 3, *Optical materials and components*.

Annex A of this International Standard is for information only.

© ISO 1996

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

International Organization for Standardization
Case Postale 56 • CH-1211 Genève 20 • Switzerland

Printed in Switzerland

Raw optical glass — Resistance to attack by aqueous alkaline solutions at 50 °C — Test method and classification

1 Scope

This International Standard specifies a method for testing the resistance of raw optical glasses to attack by aqueous alkaline solutions at 50 °C and a classification of optical glasses according to the aqueous alkaline resistance (alkali resistance) determined by this method.

This International Standard is applicable to samples of raw optical glasses.

NOTE 1 The test method may also be used for other types of glasses.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 2768-1:1989, *General tolerances — Part 1: Tolerances for linear and angular dimensions without individual tolerance indications*.

ISO 3585:1991, *Borosilicate glass 3.3 — Properties*.

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

3 Principle

Attack on polished glass by a test solution (sodium hydroxide 0,01 mol/l solution) at 50 °C for specified times. Weighing to determine the loss in mass and calculation of depth of attack based on the density of the glass. Comparison of the time required for an apparent attack to a depth of 0,1 µm with time scales given in a classification table to obtain the alkali resistance class.

4 Reagents

During the test, unless otherwise stated, use only reagents of recognized analytical grade.

4.1 Water, complying with the grade 2 requirements of ISO 3696.

4.2 Test solution.

Sodium hydroxide solution of concentration $c(\text{NaOH}) = 0,01 \text{ mol/l}$ obtained by diluting the sodium hydroxide solution (4.4) with water. Prepare a carbonate-free solution. Control the pH-value and adjust, if necessary, to pH 12.

4.3 Nitric acid (HNO_3), analytical grade.

Dilute to $\text{pH } 4,5 \pm 0,1$.

4.4 Sodium hydroxide solution, $c(\text{NaOH}) \approx 0,1 \text{ mol/l}$.

4.5 2-Propanol (C₃H₇OH)

After evaporation of 100 ml of the alcohol, no residue shall be visible. If this is not the case, re-distill 2-propanol.

5 Apparatus

Usual laboratory equipment, and

5.1 Test vessel, cylindrical with a flat base, made of stainless steel, having an internal diameter of 150 mm, a height of 200 mm and a close-fitting lid (see figure 2). The lid has a wide neck and is equipped on the bottom with two hooks from which to suspend the samples. The neck is fitted with a bung of suitable inert material which has previously been boiled in sodium hydroxide solution (4.4) for 60 min, and through which a stirrer can be inserted. Where a gasket is required to ensure an adequate joint between the lid and the body of the vessel, it shall be made of a material which remains inert under the test conditions.

5.2 Stirrer, about 350 mm long, having a 10 mm diameter stainless steel shaft, or a 15 mm diameter polytetrafluoroethylene (PTFE) shaft (see figure 3).

5.3 Platinum or **silver wires**, less than 0,1 mm in diameter, or **cages**, of the same material to receive one sample.

5.4 Heating bath, gas or electrically heated, with a capacity of 30 l to 40 l, thermostatically controlled to maintain the temperature of 50,0 °C ± 0,2 °C.

5.5 Analytical balance, accurate to ± 0,1 mg or better.

5.6 Desiccator, using a 2:1 mixture of silica gel (for H₂O absorption) and soda-lime (for CO₂ absorption) with indicator for regeneration.

5.7 Tongs, protected with inert smooth material, for example plastics.

5.8 Measuring instruments, suitable for measuring lengths and diameter to an accuracy of ± 1 %.

5.9 Ultrasonic equipment for laboratory use, filled with water, which can be heated to at least 50 °C.

5.10 Beakers, made of borosilicate glass 3.3 complying with the requirements of ISO 3585, having a capacity of 100 ml and 250 ml.

5.11 pH-measuring electrode.

6 Preparation of the samples

6.1 General

Cut pieces of the annealed glass (see ISO 9802) to be tested so that after the polishing has been completed the dimensions are nominally 30 mm × 30 mm × 2 mm. Apply the following polishing procedure to all surfaces of the samples using slurry made with water (4.1).

6.1.1 Fine grinding

The fine grinding shall be achieved by using loose abrasive alumina or silicon carbide with the following grain size distribution by mass:

- grains larger than 10,5 µm: ≈ 50 %
- grains larger than 15 µm: < 5 %
- grains larger than 18 µm: None

6.1.2 Polishing

The polishing shall be achieved by using cerium(IV) oxide abrasive having grains smaller than 2 µm and polyurethane LP 26 polisher. The rotation speed for the tool shall be between 50 r/min and 250 r/min and the rotation speed for the sample shall be between 20 r/min and 100 r/min. The pressure (for polishing, not for flatness) shall be between 10 kPa and 40 kPa. The polishing time shall be less than 30 min.

Flatten the sharp edges by a slight polishing (chamfer).

Store the samples in the desiccator (5.6) until they are needed for further processing.

NOTE 2 Soda-lime may attack the glass surface. Great care should be exercised in removing the desiccator lid so as not to disturb any dust.

6.2 Calculation of total surface area

Measure all dimensions to the nearest 0,2 mm and calculate the actual total surface area to an accuracy of 2 %.

NOTE 3 For this purpose, take linear measurements to an accuracy of ± 1 %.

Record the value obtained.

6.3 Cleaning

Samples shall be cleaned as soon as possible after polishing. For this purpose, place three 100 ml beakers (5.10) in the ultrasonic water bath (5.9), containing water heated to 45 °C ± 3 °C. Each beaker shall contain sufficient 2-propanol (4.5) to cover completely any samples which are to be cleaned.