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# International Standard



# 1776

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## **Glass — Resistance to attack by hydrochloric acid at 100 °C — Flame emission or flame atomic absorption spectrometric method**

*Verre — Résistance à l'attaque par l'acide chlorhydrique à 100 °C — Méthode de détermination par spectrométrie d'absorption atomique de flamme ou d'émission de flamme*

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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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 1776 was prepared by Technical Committee ISO/TC 48, *Laboratory glassware and related apparatus*.

It cancels and replaces ISO Recommendation R 1776-1970, of which it constitutes a technical revision.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

# Glass — Resistance to attack by hydrochloric acid at 100 °C — Flame emission or flame atomic absorption spectrometric method

## 1 Scope

This International Standard specifies flame emission spectrometric (FES) and flame atomic absorption spectrometric (FAAS) methods for determining the amounts of alkali metal oxides released from the surfaces of glassware when subjected to attack by an aqueous solution of hydrochloric acid at 100 °C. The amount of alkali metal oxides determined is a measure of the acid resistance of the glass.

## 2 Field of application

This International Standard applies to pieces of glass, preferably flat but, if necessary, curved, cut from articles of laboratory glassware, from components of glass plant, pipeline or fittings or from any other articles used for purposes which may be described as "chemical".

The acid resistance of glass "as delivered", i.e. the acid resistance of the original fire-polished surfaces, may be determined when the surface area of the cut and smoothed edges does not exceed 10 % of the total surface area of the sample.

The acid resistance of the glass "as a material" may be determined when the original surface has been removed by the hydrofluoric acid treatment described in 7.3. This preliminary acid treatment shall be applied to all samples of borosilicate glass 3.3 taken from components of glass plant, pipeline or fittings.

The distinction between the acid resistance of glass "as delivered" and "as a material" may be of importance in cases where articles have been given a surface treatment during or after production.

## 3 References

ISO 719, *Glass — Hydrolytic resistance of glass grains at 98 °C — Method of test and classification.*

ISO 720, *Glass — Hydrolytic resistance of glass grains at 121 °C — Method of test and classification.*

ISO 835/2, *Laboratory glassware — Graduated pipettes — Part 2: Pipettes for which no waiting time is specified.*

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

ISO 1773, *Laboratory glassware — Boiling flasks (narrow-necked).*

ISO 3585, *Glass plant, pipeline and fittings — Properties of borosilicate glass 3.3.*

ISO 3696, *Water for laboratory use — Specifications.*<sup>1)</sup>

ISO 3819, *Laboratory glassware — Beakers.*<sup>1)</sup>

ISO 6955, *Analytical spectroscopic methods — Flame emission, atomic absorption, and atomic fluorescence — Vocabulary.*

## 4 Principle

The method is a test for glass "as delivered" or for glass "as a material".

Attacking of sample pieces of 30 to 40 cm<sup>2</sup> by an aqueous hydrochloric acid solution,  $c(\text{HCl}) = 6 \text{ mol/l}$ , at 100 °C for 3 h.

Determination of the amount of alkali metal oxides extracted per unit area by flame emission or flame atomic absorption spectrometric methods.

## 5 Reagents

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

**5.1 Grade 2 water**, complying with the requirements of ISO 3696.

**5.2 Hydrochloric acid**, solution,  $c(\text{HCl}) = 6 \pm 0,2 \text{ mol/l}$ , prepared by adding 1 volume of concentrated hydrochloric acid solution ( $\rho = 1,18 \text{ g/ml}$ ) to 1 volume of grade 2 water (5.1). The alkali ( $\text{Na}_2\text{O}$  and  $\text{K}_2\text{O}$ ) contents of this solution shall be less than 0,2 µg/ml per oxide.

<sup>1)</sup> At present at the stage of draft.