INTERNATIONAL STANDARD

ISO 7884-1

First edition
1987-12-15

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION
ORGANISATION INTERNATIONALE DE NORMALISATION
МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ

Glass — Viscosity and viscometric fixed points —

Part 1 :
Principles for determining viscosity and viscometric fixed points

Reference number
ISO 7884-1 : 1987 (E)

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 7884-1 was prepared by Technical Committee ISO/TC 48, *Laboratory glassware and related apparatus*.

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.

Printed in Switzerland

Glass — Viscosity and viscometric fixed points —

Part 1 : Principles for determining viscosity and viscometric fixed points

0 Introduction

International Standard ISO 7884, *Glass — Viscosity and viscometric fixed points*, consists of the following separate parts:

Part 1: Principles for determining viscosity and viscometric fixed points.

Part 2: Determination of viscosity by rotation viscometers.

Part 3: Determination of viscosity by fibre elongation viscometer.

Part 4: Determination of viscosity by beam bending.

Part 5: Determination of working point by sinking bar viscometer.

Part 6: Determination of softening point.

Part 7: Determination of annealing point and strain point by beam bending.

Part 8: Determination of (dilatometric) transformation temperature.

1 Scope and field of application

This part of ISO 7884 gives rules for characterizing glass as a liquid (or liquid-analogue deformable) material with respect to its dynamic viscosity η and viscosity-temperature relationship, if it behaves as a Newtonian fluid.

NOTE — Non-Newtonian behaviour may be observed sometimes in opaque glasses, vitreous enamels or highly crystallizing glasses (glass ceramics).

2 Reference

IEC Publication 584-1, *Thermocouples — Part 1: Reference tables.*

* $1\ \text{dPa·s} = 1\ \frac{\text{dN·s}}{\text{m}^2} = 1\ \text{P}$

(P is the symbol for poise)

3 Definitions

For the purposes of this part of ISO 7884, the following definitions apply.

3.1 viscosity: The property of resistance to flow under stress. In the case of Newtonian behaviour, the rate of deformation is proportional to the stress.

Following internationally used convention, the preferred unit for the viscosity of glass is the SI sub-unit decipascal second (dPa·s)*.

3.2 Ranges of viscosity

With respect to practical application, three ranges of viscosity measurement can be distinguished:

a) **melting range**: up to 10^3 dPa·s

b) **working range**: about 10^3 to 10^8 dPa·s

c) **annealing range**: about 10^{13} to 10^{15} dPa·s

3.3 Viscometric fixed points

It is convenient to specify the following five temperatures to characterize the viscosity-temperature behaviour of a glass.

NOTE — The expression "fixed point" does not denote any relationship to thermodynamical fixed points.

3.3.1 working point ϑ_{f1}: The temperature corresponding to a viscosity

$$\eta_{f1} = 10^4\ \text{dPa·s}$$

to be determined by one of the methods described in ISO 7884-2 or ISO 7884-5.

3.3.2 softening point ϑ_{f2}: The temperature determined by the method described in ISO 7884-6. The corresponding viscosity is estimated by the following equation:

$$\eta_{f2} = 2{,}1 \times 10^7 \times \left(\varrho - \frac{\sigma}{520}\right) \qquad \ldots (1)$$