INTERNATIONAL STANDARD

ISO 7884-7

First edition
1987-12-15

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

Glass — Viscosity and viscometric fixed points —

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

Reference number
ISO 7884-7 : 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 7884-7 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 7 : Determination of annealing point and strain point by beam bending

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

This part of ISO 7884 specifies a method of determining the annealing point and the strain point of a glass by beam bending. These values have been found useful for specifying the cooling programme in the production of glassware. The annealing point and strain point include a well-defined temperature decrease during the measurement.

At temperatures corresponding to the annealing and strain points, the viscosity of glass is highly time dependent. Hence, any viscosities that might be derived or inferred from measurements carried out according to this part of ISO 7884 cannot be assumed to represent equilibrium structural conditions. Therefore, the insertion of the strain point into the VFT-equation (see ISO 7884-1) is always impossible. The insertion of the annealing point causes in some cases marked failures.

NOTE — The annealing and strain points by beam bending can also be determined using devices as specified in ISO 7884-4, but these devices are more expensive and the procedures lead to some viscosity-temperature and viscosity-time relationships besides the fixed points. In this part of ISO 7884, however, the device and procedure are restricted to the fixed-point determination.

2 Field of application

This method is applicable to all glasses of normal bulk-production compositions, unless the preparation of suitable test specimens is hindered by special reasons. The method is particularly suited for glasses that for one reason or another are not adaptable for flame-working.

Generally, the annealing point and strain point fall into a range of temperature between 300 and 800 °C, depending on the type of glass.

3 Reference

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

4 Definitions

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

4.1 annealing range : The range of temperature in which stresses in glass articles can be relieved at a commercially desirable rate.

For purposes of comparing glasses, the annealing range is assumed to correspond to the temperatures between the annealing point ϑ_{f3} and the strain point ϑ_{f4}. This range corresponds to viscosities around 10^{13} dPa·s* and somewhat higher (see also ISO 7884-1).

4.2 annealing point, ϑ_{f3} : The temperature at which internal stresses in a glass are substantially relieved in a matter of minutes.

During a test in accordance with the requirements of this part of ISO 7884, the rate of viscous deflection of the midpoint of the test beam is measured by an extensometer with suitable magnification during cooling at a rate of (4 ± 1) °C/min. The

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

(P is the symbol for poise)