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**Plastics — Liquid epoxy resins  
— Determination of tendency to  
crystallize**

*Plastiques — Résines époxydes liquides — Détermination de la  
tendance à la cristallisation*



Reference number  
ISO 4895:2014(E)

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## Foreword

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

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 61, *Plastics*, Subcommittee SC 12, *Thermosetting materials*.

This third edition cancels and replaces the second edition (ISO 4895:1997), which has been technically revised.

## Introduction

The tendency of liquid epoxy resins to crystallize varies depending on factors such as basic composition, purity, additives, homogeneity and water content, in addition to external factors such as storage history and ambient temperature.

As it is rather difficult to indicate the tendency quantitatively by observation and comparison, the tendency is therefore to express the results by observing, at intervals, the changes in fluidity and appearance of samples.



# Plastics — Liquid epoxy resins — Determination of tendency to crystallize

**SAFETY STATEMENT** — Persons using this document should be familiar with normal laboratory practice, if applicable. This document does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user to establish appropriate safety and health practices and to ensure compliance with any regulatory requirements.

## 1 Scope

This International Standard specifies a method for determining the tendency of liquid epoxy resins to crystallize. The tendency to crystallize is determined by observing, at specified time intervals, changes in fluidity and the onset of crystallization.

## 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 6353-2:1983, *Reagents for chemical analysis — Part 2: Specifications — First series*

ISO 6353-3:1987, *Reagents for chemical analysis — Part 3: Specifications — Second series*

## 3 Principle

Calcium carbonate powder is mixed with the liquid epoxy resin dissolved in ethanol. The mixture is kept at a specified low temperature and observed at specified time intervals to compare the changes in fluidity and crystallization.

## 4 Reagents

**4.1 Calcium carbonate**, as specified in ISO 6353-3:1987, R 53.

**4.2 Ethanol**, as specified in ISO 6353-2:1983, R 11.

## 5 Apparatus

**5.1 Refrigerator or cold enclosure**, maintained at  $(10 \pm 2)$  °C.

**5.2 Glass test tube**, of capacity approximately 100 ml, 40 mm in diameter and 80 mm in height, with a polyethylene-covered stopper.

**5.3 Glass rod**, of hard glass, approximately 10 mm in diameter.

**5.4 Oven**.

**5.5 Analytical balance**, accurate to 0,01g.

5.6 **Constant temperature room** maintained at  $(23 \pm 5)^\circ\text{C}$ .

## 6 Procedure

6.1 Weigh 20 g of liquid epoxy resin into the test tube (5.2).

6.2 Stopper the test tube and place it in the oven (5.4) at  $(60 \pm 2)^\circ\text{C}$  for 16 h.

6.3 Cool the test tube to room temperature  $[(23 \pm 5)^\circ\text{C}]$  in the constant temperature room (5.6), add 20 g of calcium carbonate (4.1) and 2 g of ethanol (4.2), and mix the sample thoroughly with the glass rod for 2 min.

6.4 Stopper the test tube again and place it in the vertical position in the refrigerator or cold enclosure (5.1) at  $(10 \pm 2)^\circ\text{C}$ .

6.5 Observe the sample twice a day at a specified time (for example at an interval of 8 h during the day and 16 h during the night):

- to start at 9 am;
- to carry out first observation at 5 pm;
- to carry out second observation at 9 am (next day);
- to carry out third observation at 5 pm (next day);
- to carry out fourth observation at 9 am (the day after).

Observe the sample in the following way.

Allow the test tube to warm to room temperature  $[(23 \pm 5)^\circ\text{C}]$  in the constant temperature room (5.6), then place it in the horizontal position and leave it for 1 min.

- When the distance of movement of the liquid surface tip (L in Figure 1) is 10 mm and more, record “a”.
- When the distance of movement of the liquid surface tip (L in Figure 1) is less than 10 mm, record “b”.
- When the sample has completely solidified due to crystallization, record “c”.

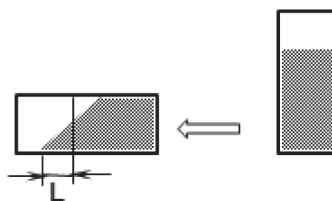
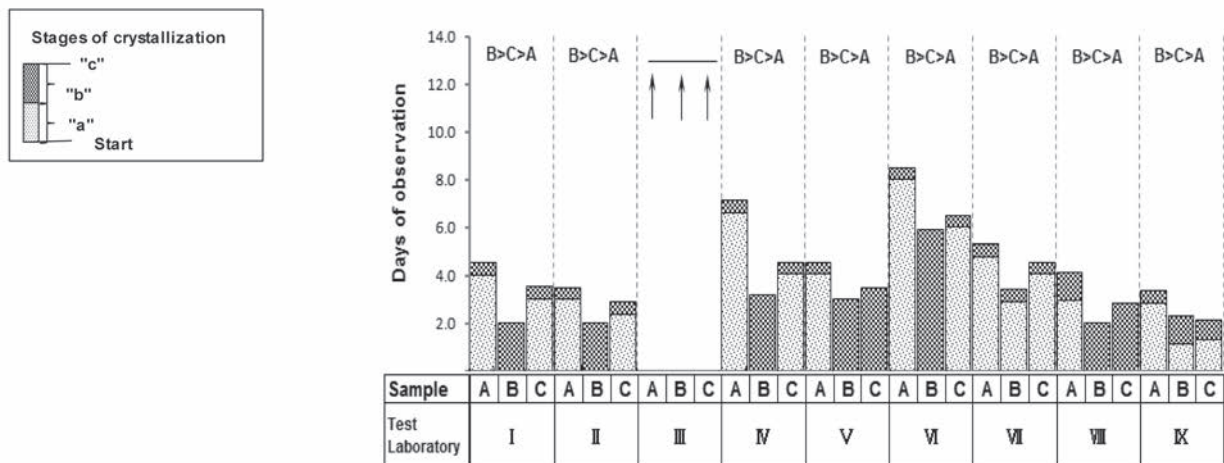


Figure 1 — Observation of samples

After each observation, if the sample has not yet crystallized, mix thoroughly with the glass rod for 2 min and place into refrigerator until next observation.

Record the number of days which elapse to each stage of crystallization (see Figure 2).





### Key

An arrow ↑ indicates the time when the test was discontinued because of no further change.

**Figure 2 — Results of the interlaboratory tests**

## 7 Expression of results

The tendency of a liquid epoxy resin to crystallize is expressed as the number of days which elapse until each stage specified in 6.5, "a", "b" and "c", is reached.

## 8 Precision

Precision in the generally accepted sense of the term for test methods cannot be determined here since it is a tendency which is being assessed.

However, interlaboratory tests conducted in Japan have shown that this method is currently more reliable and environmentally more acceptable than the previous edition (ISO 4895:1987).

## 9 Test report

The test report shall include the following particulars:

- a reference to this International Standard, i.e. ISO 4895;
- all details necessary for identification of the sample tested;
- the results of the test;
- the date of the test;
- any deviation, by agreement or otherwise, from the specified procedure.

