
**Plastics — Phenolic resins —
Determination of reactivity on a
B-transformation test plate**

*Plastiques — Résines phénoliques — Méthodes d'évaluation de la
réactivité sur plaque d'essai de transformation au stade B*



Reference number
ISO 8987:2005(E)

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Foreword

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The main task of technical committees is to prepare International Standards. 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.

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ISO 8987 was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 12, *Thermosetting materials*.

This third edition cancels and replaces the second edition (ISO 8987:1995), which had been revised to allow the temperature of the test plate to be controlled by melting salts.

Plastics — Phenolic resins — Determination of reactivity on a B-transformation test plate

1 Scope

This International Standard specifies methods for the determination of the B-transformation time of phenolic resins at a specified temperature and under specified conditions on a heated test plate.

Two methods are described, each with a different test plate:

Method A — plate with depressions in the form of segments of spheres;

Method B — flat plate without depressions.

2 Principle

The condensation of the phenolic resin is carried out to the B-stage on one of two types of test plate, depending on the method.

3 Method A: Determination on a plate with depressions

3.1 Apparatus

3.1.1 Thermostatic control device, permissible temperature variation $\pm 0,5$ °C.

3.1.2 Hotplate, on which the test plate can be fixed in a suitable manner to obtain optimum heat transfer.

NOTE No hotplate is necessary if a test plate with an integral heater is used.

3.1.3 Glass rod, 5 mm in diameter, tapering to about 2 mm in diameter at one end.

3.1.4 Balance, scale interval 0,01 g.

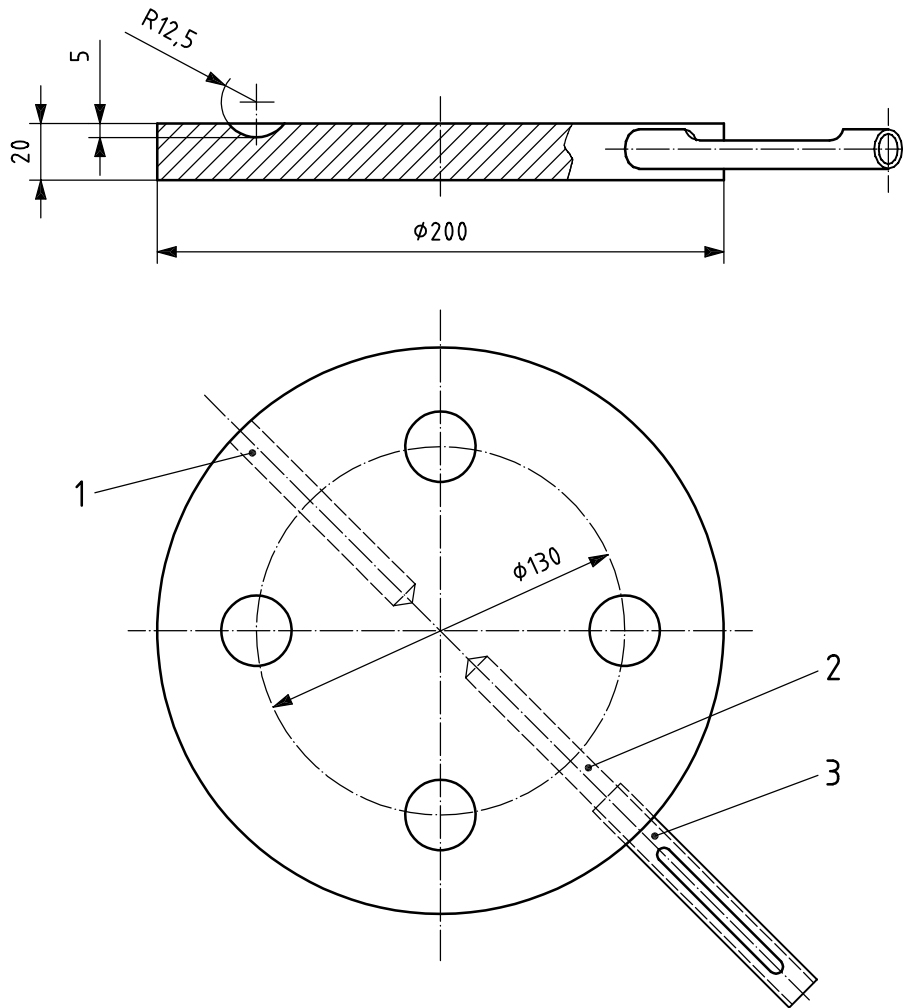
3.1.5 Syringe.

3.1.6 Stopwatch, with at least 1 s sub-divisions.

3.1.7 B-transformation test plate, with depressions as shown in Figure 1, with or without an integral heater. Suitable melting salts may be used for accurate control of the heater.

3.2 Number of tests

Conduct one or more tests, depending on the requirements of the appropriate International Standard or as agreed between the parties concerned.



Key

- 1 hole for temperature sensor of thermostatic control device
- 2 hole for thermometer stem
- 3 protective metal tube for thermometer

Figure 1 — B-transformation test plate

3.3 Procedure

Bring the B-transformation test plate (3.1.7) to the required temperature and place a box, open on top, round the test plate to provide protection against draughts. Pour $(0,5 \pm 0,05)$ g of phenolic resin into one of the depressions in the test plate and start the stop watch (3.1.6) when the resin touches the plate. Liquid resins or phenolic resin solutions may be placed in the depression with a syringe (3.1.5). Stir the resin with the glass rod (3.1.3), using short circular movements from the edge of the depression towards the middle.

For longer B-transformation times, stir initially for one minute and then at one-minute intervals for 10 s. If the B-transformation point is reached within a one-minute interval, repeat the test, knowing the approximate test time, to give an accurate determination.

Towards the end of the test, when the resin becomes viscous, stir continuously. Briefly raise the rod and observe if the resin is drawn out in a thread. The B-transformation point is reached when the thread breaks when the rod is briefly raised. When the resin reaches this state, stop the stopwatch. Report the measured time in minutes and seconds.

4 Method B: Determination on a flat plate without depressions

4.1 Apparatus

4.1.1 Thermostatic control device, permissible temperature variation $\pm 0,5$ °C.

4.1.2 Hotplate, on which the test plate can be fixed in a suitable manner to obtain optimum heat transfer.

NOTE No hotplate is necessary if a test plate with an integral heater is used.

4.1.3 Spatula, about 10 cm long and 1,25 cm wide.

4.1.4 Balance, scale interval 0,01 g.

4.1.5 Syringe.

4.1.6 Stopwatch, with at least 1 s sub-divisions.

4.1.7 B-transformation test plate, measuring approximately 15 cm \times 15 cm, with a hard, chromium-plated surface and fitted with a thermometer in a thermometer well, with or without an integral heater. Suitable melting salts may be used to control the temperature.

4.2 Number of tests

Conduct one or more tests, depending on the requirements of the appropriate International Standard or as agreed between the parties concerned.

4.3 Procedure

Bring the test plate (4.1.7) to the required temperature. Pour $(0,5 \pm 0,05)$ g of resin onto the test plate. If the resin is in powder form, take a 1 cm high heap on the end of the spatula (4.1.3). If it is liquid, or in solution, place it on the test plate using the syringe (4.1.5). Start the stop watch (4.1.6) at the same time as the resin touches the hotplate. As quickly as possible, distribute the resin uniformly over an area of 4 cm \times 7,5 cm, stroking the material back and forth with the flat end of the spatula. Keep the leading edge of the spatula up slightly and, using gentle pressure, continue the stroking action at the rate of one stroke every 3 s, reversing the direction at the end of each stroke. Do not remove the spatula completely from the curing resin until the test is completed.

Continue stroking until the material shows the characteristics of a set, i.e. it no longer strings out and has gelled to a rubbery state or has become hard and stiff.

At this point, stop the stopwatch and record the elapsed time in minutes and seconds. Scrape the cured resin off the plate at once. Take care not to scratch the surface of the plate.

5 Precision (test error)

Repeatability: ± 4 %

Reproducibility: ± 10 %

6 Test report

The test report shall include the following information:

- a) a reference to this International Standard and the method used (method A or B);
- b) all details necessary for complete identification of the sample tested;
- c) the temperature of the test plate;
- d) the B-transformation time (individual values and mean value);
- e) the date of the determination.

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