

ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO RECOMMENDATION R 1110

PLASTICS

ACCELERATED CONDITIONING
OF TEST SPECIMENS OF POLYAMIDE 66, 610 AND 6

1st EDITION

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BRIEF HISTORY

The ISO Recommendation R 1110, *Plastics – Accelerated conditioning of test specimens of polyamide 66, 610 and 6*, was drawn up by Technical Committee ISO/TC 61, *Plastics*, the Secretariat of which is held by the American National Standards Institute (ANSI).

Work on this question led to the adoption of a Draft ISO Recommendation.

In May 1967, this Draft ISO Recommendation (No. 1274) was circulated to all the ISO Member Bodies for enquiry. It was approved, subject to a few modifications of an editorial nature, by the following Member Bodies :

Austria	India	Romania
Belgium	Iran	South Africa, Rep. of
Bulgaria	Israel	Spain
Czechoslovakia	Japan	Sweden
France	Korea, Dem. P. Rep. of	Switzerland
Germany	Korea, Rep. of	Turkey
Greece	Netherlands	U.A.R.
Hungary	Poland	U.S.A.

Three Member Bodies opposed the approval of the Draft :

Canada
Italy
United Kingdom

The Draft ISO Recommendation was then submitted by correspondence to the ISO Council, which decided, in September 1969, to accept it as an ISO RECOMMENDATION.

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INTRODUCTION

Relative humidity has a remarkable influence on various characteristics of polyamides, and these characteristics can often only be defined as a function of the moisture content.

At room temperature, the speed of water absorption of polyamide test specimens is very low, in particular at heavy sections. A test specimen of 1 mm thickness, from polyamide 66, for instance, would need about 30 days for obtaining its equilibrium moisture content at a relative humidity of 65 % and a temperature of 20 °C. Therefore, it is necessary to use an accelerated conditioning treatment, if tests are to be made on equilibrated materials.

The method described in this ISO Recommendation is based on the use of aqueous solutions of potassium acetate in various concentrations, depending on the polyamide type and on the relative humidity. Increased temperatures are applied to accelerate the conditioning treatment.

The present method can be used to obtain, in an accelerated way, a conditioning equal to the conditioning by storage during a long period of time in ambient air, either at a relative humidity of 50 % and a temperature of 23 °C, or a relative humidity of 65 % at a temperature of 20 or 27 °C (see ISO Recommendation R 291, *Standard atmospheres for conditioning and testing*).

The values of the mechanical properties obtained by conditioning according to this method may not be the same as those which are obtained by storing the specimens at room temperature during a long period, because of recrystallization phenomena.

1. SCOPE

- 1.1 This ISO Recommendation describes a method for the accelerated conditioning of test specimens of polyamide 66, 610 and 6.
- 1.2 The method is only intended for polyamide types 66, 610 and 6 provided that no fillers, plasticizers, stabilizers, additives, etc. migrate into the aqueous solution of potassium acetate. The method is not valid for polyamide 6 containing more than 2 % extractable matter.

The method can be used to condition specimens for the determinations of mechanical or thermal properties, but since residual salt may affect the result, it is not recommended for specimens to be used for the measurement of electrical properties.

2. PRINCIPLE OF METHOD

Test specimens are kept in an aqueous solution of potassium acetate at a high temperature (about 100 °C) for a specified period. The concentration of the potassium acetate in the solution depends on the type of polyamide and on the specified relative humidity. The time required for the conditioning depends mainly on the thickness of the test specimens and on the type of polyamides.

Because of possible degradation due to hydrolysis and oxidation, the thickness of the test specimen should not exceed 4 mm and the conditioning temperature should not exceed 100 °C. Under these conditions deterioration will normally be negligible.

3. REAGENTS

3.1 *Potassium acetate*, anhydrous, analytically pure.

3.2 *Distilled water*.

4. APPARATUS

4.1 *Round-bottomed flask*, with ground glass stopper, with sufficient capacity to contain the test specimens and the potassium acetate solution.

A reflux cooler is mounted on top of the flask to keep the concentration of the solution constant.

4.2 *Boiling-water vessel or thermostated bath*.

5. PROCEDURE

5.1 Preparation of the required potassium acetate solution

The concentration (c) of potassium acetate in water (g/100 ml) and the relative density (d) of the solution at 20 °C are shown in Table 1 for each polyamide type, for the two relative humidities (65 % and 50 %).

TABLE 1

Relative humidity	Polyamide 66		Polyamide 610		Polyamide 6	
	c	d_{20}^{20}	c	d_{20}^{20}	c	d_{20}^{20}
%	g/100 ml		g/100 ml		g/100 ml	
65	80	1.240	100	1.277	60	1.200
50	100	1.277	140	1.329	70	1.220