



SLOVENSKI STANDARD SIST EN ISO 27971:2023

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Nadomešča:
SIST EN ISO 27971:2015

Žito in proizvodi iz žita - Navadna pšenica (*Triticum aestivum* L.) - Določevanje alveografskih lastnosti testa pri stalnem dodajanju vode iz običajnih komercialnih ali preskusnih mok in preskus postopka mletja (ISO 27971:2023)

Cereals and cereal products - Common wheat (*Triticum aestivum* L.) - Determination of alveograph properties of dough at constant hydration from commercial or test flours and test milling methodology (ISO 27971:2023)

Getreide und Getreideerzeugnisse - Weichweizen (*Triticum aestivum* L.) - Bestimmung der Eigenschaften von Teig bei konstanter Flüssigkeitszufuhr zu handelsüblichen Mehlen oder Versuchsmehlen bei gleichen Versuchsmahlverfahren mittels Alveograph (ISO 27971:2023)

Céréales et produits céréaliers - Blé tendre (*Triticum aestivum* L.) - Détermination des propriétés alvéographiques d'une pâte à hydratation constante de farine industrielle ou d'essai et méthodologie pour la mouture d'essai (ISO 27971:2023)

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Cereals and cereal products - Common wheat (*Triticum aestivum* L.) - Determination of alveograph properties of dough at constant hydration from commercial or test flours and test milling methodology (ISO 27971:2023)

Céréales et produits céréaliers - Blé tendre (*Triticum aestivum* L.) - Détermination des propriétés alvéographiques d'une pâte à hydratation constante de farine industrielle ou d'essai et méthodologie pour la mouture d'essai (ISO 27971:2023)

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This European Standard was approved by CEN on 4 May 2023.

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European foreword

This document (EN ISO 27971:2023) has been prepared by Technical Committee ISO/TC 34 "Food products" in collaboration with Technical Committee CEN/TC 338 "Cereal and cereal products" the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by December 2023, and conflicting national standards shall be withdrawn at the latest by December 2023.

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**Cereals and cereal products —
Common wheat (*Triticum aestivum*
L.) — Determination of Alveograph
properties of dough at constant
hydration from commercial or test
flours and test milling methodology**

Céréales et produits céréaliers — Blé tendre (Triticum aestivum L.) — Détermination des propriétés alvéographiques d'une pâte à hydratation constante de farine industrielle ou d'essai et méthodologie pour la mouture d'essai

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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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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 document 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).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 34, *Food products*, Subcommittee SC 4, *Cereals and pulses*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 338, *Cereal and cereal products*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This third edition cancels and replaces the second edition (ISO 27971:2015), which has been technically revised.

The main changes are as follows:

- the oldest instruments (before AlveoNG) have been removed;
- the latest instruments (AlveoPC and Alveolab) have been added.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

The end-use value of wheat is determined by a number of properties that are useful in the manufacture of baked products such as bread, rusks and biscuits.

Such properties include the important viscoelastic (rheological) properties of dough formed as a result of flour hydration and kneading. An Alveograph is used to study the main parameters by subjecting a dough test piece to biaxial extension (producing a dough bubble) by inflating it with air, which is similar to the deformation to which it is subjected during bread dough fermentation.

Recording the pressure generated inside the bubble throughout the deformation of the dough test piece until it ruptures provides information on the following:

- a) The resistance of the dough to deformation, or its stiffness. It is expressed by the maximum pressure parameter, P .
- b) The extensibility or the possibility of inflating the dough to form a bubble. It is expressed by the mean of the abscissa value at rupture, L , converted to the swelling index, G .
- c) The elasticity of the dough during biaxial extension. It is expressed by the elasticity index, I_e .
- d) The work required to deform the dough bubble until it ruptures, or its strength, which is proportional to the area of the Alveogram (sum of the pressures throughout the deformation process). It is expressed by the parameter, W .

The P/L ratio is a measurement of the balance between stiffness and extensibility.

Alveographs are commonly used throughout the wheat and flour industry, for the following purposes:

- selecting and assessing different varieties of wheat and marketing batches of wheat;
- blending different batches of wheat or flour to produce a batch with given values for the Alveographic criteria (W , P , and L) complying with the proportional laws of blending;
- assessing the proteolytic activity in wheat or flour to detect possible contamination (see [Annex H](#) for more details).

Alveographs are used both on the upstream side of the industry for marketing, selecting and assessing the different wheat varieties and on the downstream side throughout the baking industries (see References [\[9\]](#), [\[11\]](#), [\[12\]](#) and [\[13\]](#)).

Cereals and cereal products — Common wheat (*Triticum aestivum* L.) — Determination of Alveograph properties of dough at constant hydration from commercial or test flours and test milling methodology

1 Scope

This document specifies a method of determining, using an Alveograph, the rheological properties of different types of dough obtained from common wheat flour (*Triticum aestivum* L.) produced by industrial milling or laboratory milling.

It describes the Alveograph test and how to use a laboratory mill to produce flour in two stages:

- stage 1: preparation of the wheat grain for milling to make it easier to separate the bran from the endosperm;
- stage 2: the milling process, including breaking between three fluted rollers, reduction of particle size between two smooth rollers and the use of a centrifugal sieving machine to grade the products.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 835, *Laboratory glassware — Graduated pipettes*

ISO 712, *Cereals and cereal products — Determination of moisture content — Reference method*

ISO 1042, *Laboratory glassware — One-mark volumetric flasks*

ISO 12099, *Animal feeding stuffs, cereals and milled cereal products — Guidelines for the application of near infrared spectrometry*

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

4 Principle

The behaviour of dough obtained from a mixture of flour and salt water is evaluated during deformation. A dough disk (patty) is subjected to a constant air flow. At first it withstands the pressure. Subsequently, it inflates into a bubble, according to its extensibility, and ruptures. The change in the dough is measured and recorded in the form of a curve called an “Alveogram”.

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5 Reagents

Unless otherwise specified, use only reagents of recognized analytical grade, and only distilled or demineralized water or water of equivalent purity.

5.1 Sodium chloride solution, obtained by dissolving $(25 \pm 0,2)$ g of sodium chloride (NaCl) in water and then making the volume up to 1 000 ml. This solution shall not be stored for more than 15 days and its temperature shall be (20 ± 2) °C when used.

5.2 Refined vegetable oil, low in polyunsaturates, such as peanut oil. It is possible to use olive oil if its acid value is less than 0,4 (determined in accordance with ISO 660^[1]). Store in a dark place in a closed container and replace regularly (at least every three months).

Alternatively, **liquid paraffin** (also known as “soft petroleum paraffin”), with an acid value of less than or equal to 0,05 and the lowest possible viscosity [maximum 60 mPa·s (60 cP) at 20 °C].

5.3 Cold degreasing agent, optimum safety.

6 Apparatus

The usual laboratory apparatus and, in particular, the following shall be used.

6.1 Mechanical cleaner, fitted with sieves for wheat cleaning, in accordance with the manufacturer's instructions.

6.2 Conical or riffle sample divider.

6.3 Analytical balance, accurate to 0,01 g.

6.4 Glass burette, of 50 ml in capacity, graduated in 1 ml divisions.

6.5 Rotary blender¹⁾, for grain conditioning and flour homogenization, including the following components:

6.5.1 Constant speed stirrer.

6.5.2 Two worm screws integral with the flask, possibly via the stopper (one for wheat preparation, the other for flour homogenization).

6.5.3 Several wide-necked plastic flasks, 2 l capacity.

6.6 Test mill (laboratory mill)²⁾, manually or automatically operated (see [Annex A](#)).

1) The CHOPIN Technologies MR2L rotary blender is an example of a suitable product available commercially. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO of this product.

2) The CHOPIN Technologies Chopin-Dubois CD1 test mill is an example of a suitable product available commercially. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO of this product.

6.7 Complete Alveograph system (see [Table 1](#) for specifications and characteristics of the accessories) including the devices given in [6.7.1](#) to [6.7.3](#).

6.7.1 Kneading machine (see [Figure 1](#) for the AlveoNG and AlveoPC models, and [Figure 2](#) for the Alveolab model³⁾), with accurate temperature control, for dough sample preparation.

6.7.2 Dedicated software, to record the pressure curve as a function of time, perform the calculations and store the tests or other registration systems such as the Alveolink.

NOTE For details concerning the use of the different registration systems, see the manufacturer's instructions.

6.7.3 Alveograph³⁾, for measuring the biaxial deformation of the dough test pieces (see [Figure 1](#) for the AlveoNG and AlveoPC models, and [Figure 2](#) for the Alveolab model), including accurate temperature control and hygrometry control for the Alveolab model, and having two rest chambers (three for the Alveolab), each containing five plates on which the dough test pieces can be arranged to rest prior to deformation.

6.8 Burette with stopcock, supplied with the apparatus (only for the AlveoNG and AlveoPC models), 160 ml capacity, graduated in divisions of 0,1 % of moisture content.

NOTE Throughout this document, "content" is expressed as a "mass fraction" (see ISO 80000-9^[8]), i.e. the ratio of the mass of substance in a mixture to the total mass of the mixture.

6.9 Thermohydrograph for recording the test environment conditions (temperature and relative air humidity) as specified in [9.1](#) and [10.1](#). In the case of the Alveolab, the test conditions (temperature and humidity) around the swelling bubble are automatically checked and controlled by the device.

6.10 Volumetric flask, 1 000 ml capacity, conforming to the requirements of ISO 1042, class A.

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6.11 Pipette, 25 ml capacity, graduated in divisions of 0,1 ml, conforming to the requirements of ISO 835, class A.

3) The methods specified in this document are based on the use of the AlveoNG, AlveoPC and Alveolab models of the CHOPIN Technologies Alveograph, which are examples of suitable products available commercially. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO of these products.