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Cereals and milled cereal products — Determination of the viscosity of flour — Method using an amylograph

*Céréales et produits de mouture des céréales — Détermination de la
viscosité de la farine — Méthode utilisant un amylographe*



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Foreword

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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.

International Standard ISO 7973 was prepared by Technical Committee ISO/TC 34, *Agricultural food products*, Sub-Committee SC 4, *Cereals and pulses*.

This International Standard takes into account Standard No. 126 of the International Association for Cereal Science and Technology (ICC).

Annex A forms an integral part of this International Standard. Annexes B and C are for information only.

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Cereals and milled cereal products — Determination of the viscosity of flour — Method using an amylograph

1 Scope

This International Standard specifies a method using an amylograph for determining the viscosity of a suspension of flour in water, in which the starch is gelatinized by heating, in order to assess the conditions of gelatinization of the flour and so judge whether there is any alpha-amylase activity.

This method is applicable to wheat and rye flour and also to wheat and rye grain.

NOTES

1 This International Standard has been prepared on the basis of the Brabender-type amylograph.

2 This method applies strictly to an amylograph and not to a viscograph, since an amylograph possesses the following characteristics:

- it is possible to change the torque-measuring head;
- the heating coils are located around the bowl of the apparatus and at the bottom;
- there is no cooling rod for lowering the gel temperature.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 712:1985, *Cereals and cereal products — Determination of moisture content (Routine reference method)*.

ISO 3093:1982, *Cereals — Determination of falling number*.

3 Definition

For the purposes of this International Standard, the following definition applies.

3.1 amylograph viscosity: Maximum viscosity reached by a suspension of flour and water which is gelatinized by heating under the conditions set out in this International Standard.

It is expressed as an arbitrary unit: amylograph unit (AU).

4 Principle

Preparation of a suspension of flour in water, followed by recording of the viscosity of the suspension which is heated at a constant rate from 30 °C to the temperature corresponding to the moment at which viscosity starts to decrease, having reached its maximum (approximately 95 °C).

The increase in viscosity due to gelatinization of the starch is dependent upon the increase in temperature, the mechanical action of stirring and the activity of alpha-amylase already present or added to the flour.

5 Reagent

5.1 Distilled water, or water of equivalent purity.

6 Apparatus

Usual laboratory equipment and, in particular, the following.

6.1 Amylograph, having the following characteristics:

Speed of rotation of the spindle	$(75 \pm 1) \text{ rev/min}$
Torque exerted per amylograph unit (AU), using a standard measuring cartridge	$(6,86 \pm 0,14) \times 10^{-5} \text{ N.m/AU}$ $[(0,700 \pm 0,015) \text{ gf.cm/AU}]$
Rate of temperature rise	$(1,50 \pm 0,03) \text{ }^{\circ}\text{C/min}$
Linear speed of the recorder	$(0,50 \pm 0,01) \text{ cm/min}$

Position the sensing pins and the pins of the bowl so that they penetrate freely into the jig provided by the manufacturer.

Adjust the pressure of the pen on the paper as follows. Remove the pen, fill it with ink and weigh it. At the end of the arm which normally holds the pen, place a mass 0,5 g to 1 g less than that of the completely filled pen. Adjust the position of the counterweight to obtain equilibrium then remove the mass and replace the pen.

6.2 Analytical balance, accurate to within 0,1 g.

6.3 Burette, of 450 ml capacity, with an automatic zeroing system.

6.4 Shallow beaker, of capacity 600 ml to 1000 ml, or a **conical flask** with **stopper**.

6.5 Spatula, with a rubber or plastic end.

6.6 Mill¹⁾, complying with the requirements of ISO 3093 in the case of wheat and rye grains; i.e. capable of grinding a product of moisture content up to 30 % (*m/m*) and with adjustment to obtain a meal meeting the requirements of table 1.

Table 1 — Particle size requirements

Mesh opening of sieve μm	Meal passing through the sieve %
710	100
500	95 to 100
210 to 200	80 or less

1) Kamas Slogo 200 A and Falling Number type KT 120 mills are examples of suitable commercially available products. This information is given for the convenience of users of this International Standard and does not constitute an endorsement by ISO of the products named. Equivalent products may be used if they can be shown to lead to the same results.

7 Sampling

It is important that the laboratory receive a sample which is truly representative and has not been damaged or changed during transport and storage.

Sampling is not part of the method specified in this International Standard. Recommended sampling methods are given in ISO 950 (for grains) and ISO 2170 (for milled products).

8 Procedure

8.1 Preparation of test sample

8.1.1 Flour

Use the laboratory sample as provided, after thorough mixing, taking test samples as required.

8.1.2 Grain

Remove dust and coarse impurities from the laboratory sample and then take approximately 300 g of grain.

Grind the sample carefully in the mill (6.6), avoiding heating or overloading.

Continue grinding for 30 s to 40 s after the last of the sample has been fed into the mill. Bran particles up to 1 % remaining on the screen may be discarded.

Thoroughly mix the milled product.

8.2 Preliminary operations

8.2.1 Determination of the moisture content of the test sample

Determine the moisture content of the test sample (8.1) in accordance with ISO 712.

8.2.2 Adjustment of the amylograph and no-load test

Manually adjust the starting temperature of the temperature regulator to 30 °C, with the clutch in the neutral position. Fill the pen with ink. Place the spindle in the bowl, connect the spindle to the shaft and lower the amylograph head into position. Start the motor and check that the pen moves over the baseline of the recording paper. If necessary, adjust the position of the pen on its arm. Stop the motor, disconnect the spindle, lift and turn the head of the apparatus. Remove the spindle.