INTERNATIONAL STANDARD

ISO 7304-2

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Alimentary pasta produced from durum wheat semolina — Estimation of cooking quality by sensory analysis —

Part 2: Routine method

Pâtes alimentaires produites à partir de semoule de blé dur — Appréciation de la qualité de cuisson par analyse sensorielle —

Partie 2: Méthode de routine

Reference number
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Foreword

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ISO 7304-2 was prepared by Technical Committee ISO/TC 34, *Food products*, Subcommittee SC 4, *Cereals and pulses*.

ISO 7304 consists of the following parts, under the general title *Alimentary pasta produced from durum wheat semolina — Estimation of cooking quality by sensory analysis*:

— *Part 1: Reference method* [in preparation (revision of ISO 7304:1985)]

— *Part 2: Routine method*

Alimentary pasta produced from durum wheat semolina — Estimation of cooking quality by sensory analysis —

Part 2: Routine method

1 Scope

This part of ISO 7304 specifies a method for assessing, by sensory analysis, the quality of cooked alimentary pasta in the form of long, solid strands (e.g. spaghetti) or short, hollow strands (e.g. macaroni) produced from durum wheat semolina, expressed in terms of the starch release, liveliness and firmness characteristics (i.e. texture) of the pasta. It does not apply to pasta in the form of small strands usually consumed in soups.

The method may also be applied to alimentary pasta made from common wheat or a mixture of common wheat and durum wheat, as long as the appropriate national regulations allow these products to be used in alimentary pasta.

The method has been specifically developed to provide a procedure for the daily evaluation of pasta samples based on the use of reference samples.

The test result does not express a preference, but gives only an estimate of the cooking quality of the pasta after it has been cooked for the optimum cooking time.

2 Normative references

The following referenced documents are indispensable for the application 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 5492, *Sensory analysis — Vocabulary*

ISO 8586-1, *Sensory analysis — General guidance for the selection, training and monitoring of assessors — Part 1: Selected assessors*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5492 and the following apply.

3.1
starch release
release of starch from cooked pasta, indicating the state of surface breakdown of the pasta

NOTE The amount of starch released can be assessed by means of a tactile investigation which estimates the tackiness of the surface to the touch.

3.2
liveliness
ability of one strand of pasta to slide smoothly over another, which depends on the degree of strand-to-strand adhesion

NOTE 1 Liveliness is applicable only to pasta in the form of long strands.

NOTE 2 It depends on the geometry of the product, on the stickiness of the surface and on the firmness of the pasta.

3.3
firmness
resistance of cooked pasta to crushing when it is positioned on the distal phalanx of the index finger and crushed with the tip of the thumb

3.4
optimum cooking time
t
time after which the continuous white line visible at the centre of a strand of pasta during cooking disappears, as determined by crushing using a crushing plate (6.11) in the case of long, solid strands of pasta (e.g. spaghetti) or by cutting the strand at right angles with a blade (6.12) in the case of short, hollow strands of pasta (e.g. macaroni).

NOTE By convention, the white line is considered to have disappeared when it is visible only as a row of dots (see Annex A).

4 Principle

A test sample of pasta is cooked by a standard procedure and the starch release, liveliness and firmness assessed. The test sample is then rated in accordance with the results.

5 Reagents

5.1 Tap water.

The best results are obtained if the hardness of the water is brought to (1,5 ± 0,1) mmol Ca^{2+}/l (French hardness 15 ± 1) with a dedicated water softener (6.10).

NOTE It is also possible to control the water hardness using a commercially available kit.

6 Apparatus

6.1 Balance, capable of weighing to the nearest 0,01 g.

6.2 Steel pot, thick-bottomed, diameter about 17 cm, capacity 2,5 l, with a lid.

6.3 Electric hotplate, diameter about 19 cm, power output about 1 500 W.

6.4 Colander, for pasta, made of stainless steel, diameter about 25 cm to 30 cm.

6.5 Timer.

6.6 Flat white plates, diameter (24 ± 2) cm.

6.7 Fork.

6.8 Graduated cylinder, capacity 1 l.

6.9 Glass beaker, capacity 250 ml.

6.10 Water softener.

6.11 Plexiglass crushing plate, thickness 5 mm, dimensions 140 mm × 40 mm, in conformity with Figure 1.

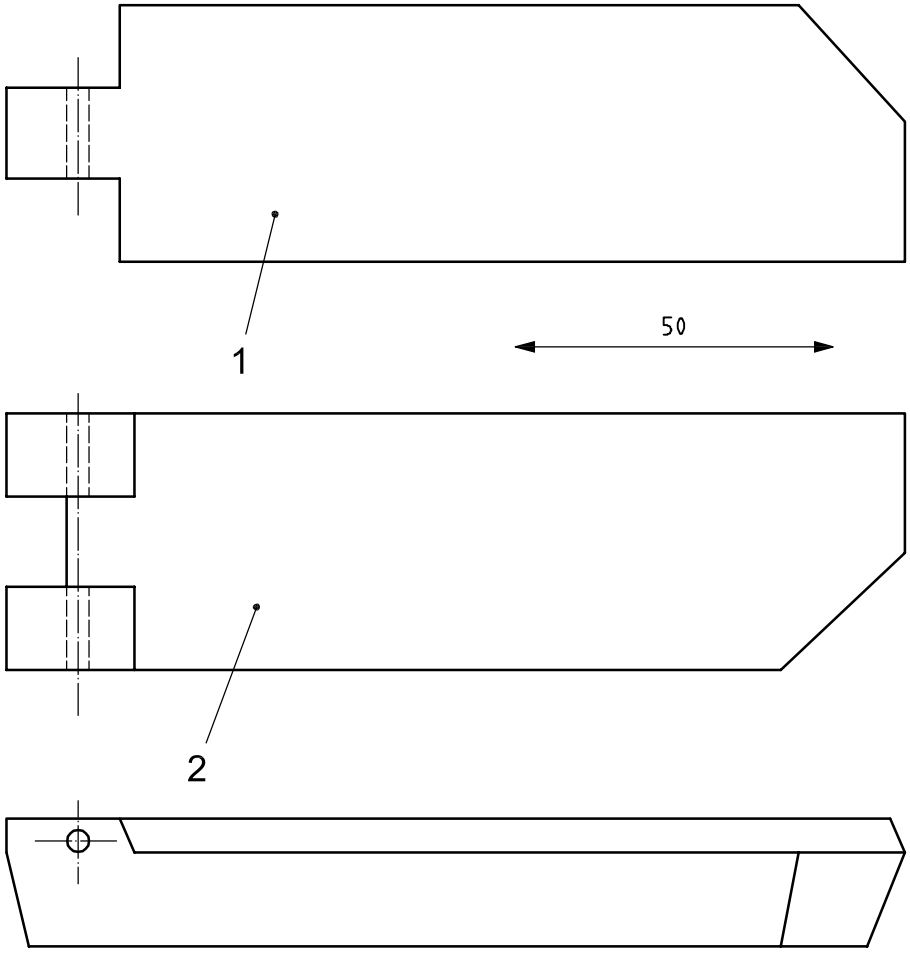
6.12 Cutter, with a sharp blade.

6.13 Micrometer suitable for measuring the thickness of short, hollow strands of pasta.

6.14 Micrometer suitable for measuring the thickness of long, solid strands of pasta.

6.15 Cup, volume about 200 ml.

Dimensions in millimetres



Key

1 cover
2 body

Figure 1 — Schematic diagram of crushing plate

7 Sampling

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

Sampling is not part of the method specified in this part of ISO 7304. A recommended sampling method is given in ISO 24333.

8 Cooking procedure

8.1 Determination of optimum cooking time (OCT), t

Determine the OCT before carrying out any tests, using the same cooking conditions as in 8.2, as follows.

Cook the pasta as described in 8.2, but two minutes before the estimated cooking time, usually written on the package by the manufacturer (or, if this is not the case, using a cooking time based on experience with pasta of similar thickness):

— with long, solid strands of pasta, remove a strand of pasta and crush it using the crushing plate (6.11);

— with short, hollow strands of pasta, remove a strand of pasta and cut it at right angles to the length with the cutter (6.12).

Repeat this operation every 30 s until the continuous white line, visible at the centre of the crushed strand or the cut section, disappears, as shown in Figures A.1 and A.2.

8.2 Sample preparation

Weigh out 100 g of pasta. With long, solid strands of pasta, break each strand into two halves (13 ± 2) cm long and eliminate any small bits before weighing.

Measure the thickness of each strand of pasta using the micrometer callipers (6.13 for short, hollow strands of pasta, 6.14 for long, solid strands of pasta).

Turn on the hotplate (6.3), always turning the control knob to the same position to ensure that the rate of cooking is always the same. Place the 2,5 l steel pot (6.2), containing 1 300 ml of tap water (5.1) measured using the graduated cylinder (6.8), on the hotplate. Boil the water. Keep the water close to boiling point so that it can be brought back to the boiling point as soon as the pasta is added.

Add the test sample of pasta to the pot and start the timer (6.5) at the same time. Cook the pasta for the time, t, determined in 8.1.

NOTE The OCT is the preferred cooking time, but different cooking times could be used for experimental purposes. Thus overcooking of the pasta could, for instance, be investigated by cooking the pasta for a time which is 25 % longer than the OCT.

For the first minute, keep the pot fully closed. For the remaining time, the lid shall be moved slightly to the side. While the pasta is cooking, mix it with a fork (6.7) three times for 10 s. Do this at one-quarter, one-half and three-quarters of the cooking time. When the pasta is cooked, cool the water by adding 200 ml of cold tap water to the pot using the beaker (6.9). Immediately pour the pasta into the colander (6.4) and allow to drain, gently hitting the colander three times within the first 5 s. Then put the whole test sample of pasta onto a plate (6.6), noting the time at which this was done. Leave the cooked pasta on the plate for 5 min.

Determine the characteristics of the pasta as described in Clause 9, beginning the assessment exactly 5 min after the pasta was put on the plate.

9 Evaluation procedure

9.1 General

Carry out the assessments in the order given in Table 1. Reference samples (see 9.5) may be included for comparison with the test sample when there are any doubts on the rating to be given. See also Annex B.

Table 1 — Assessment sequence

Long, solid strands	Short, hollow strands
Liveliness	—
Starch release	Starch release
Firmness	Firmness

9.2 Liveliness (only for long, solid strands of pasta)

To assess this characteristic, the assessor picks up the pasta with his/her naked hand and drops it back onto the plate to evaluate the liveliness, i.e. the degree of strand-to-strand adhesion, of the strands. This is done as follows:

— Put one hand in a cup (6.15) of cold tap water, remove it and shake off the excess water. Then wipe the hand dry.

— Pick up a handful of pasta from the plate and drop the pasta back onto the plate.

— Assess the way in which the strands of pasta separate from each other in the hand and the way they drop and settle on the plate, using the descriptions in Table 2.

— Repeat the procedure three times.

9.3 Starch release (all types of pasta)

To assess this characteristic, the assessor removes, with the naked hand, the material that covers the surface and evaluates the stickiness produced on his/her hand. This is done as follows:

— Put one hand in a cup (6.15) of cold tap water, remove it and shake off the excess water. Then wipe the hand dry.

— Place the hand on the pasta on the plate and rub it gently with the palm and fingers.

— Estimate the amount of starch coating the palm and fingers, using the descriptions in Table 2.

— Repeat the procedure three times.

9.4 Firmness

9.4.1 General

To assess this characteristic, the assessor evaluates the effort required to crush pasta strands completely between thumb and finger.

9.4.2 Long, solid strands (e.g. spaghetti)

Put one hand in a cup (6.15) of cold tap water, remove it and shake off the excess water. Then wipe the hand dry.

Place two strands of pasta over the distal phalanx of the index finger and press them with the thumb until both strands are fully crushed.

Assess the effort required to fully crush the strands, using the descriptions in Table 2.

Repeat the procedure 10 times.

9.4.3 Short, hollow strands (e.g. macaroni)

Put one hand in a cup (6.15) of cold tap water, remove it and shake off the excess water, leaving the hand just wet.

Press one strand of pasta, at a point halfway along the strand, between the distal phalanx of the index finger and the thumb, provided this is possible for the type of pasta being analysed.

Assess the effort required to fully crush the strand, using the descriptions in Table 2.

Repeat the procedure 10 times.

Table 2 — Rating scales

Liveliness	Starch release	Firmness
100 — very high	100 — very low	100 — very high
80 — high	80 — low	80 — high
60 — medium	60 — medium	60 — medium
40 — low	40 — high	40 — low
$\leqslant$ 20 — very low	$\leqslant$ 20 — very high	$\leqslant$ 20 — very low

9.5 Reference samples

Reference samples of pasta can be prepared from either good- or poor-quality semolina by drying at two different temperatures, one low and one high (for example 50 °C and 80 °C). Furthermore, the same sample can be cooked for different lengths of time (for example for the OCT and for a time which represents overcooking — see the Note to 8.2) in order to give additional reference samples.

The ratings for liveliness, starch release and firmness for each reference sample are defined by a panel of assessors, as described in Annexes B, C and D.

These reference samples are useful in training quality-control assessors (each assessor is required to be familiar with the evaluation scales given in Table 2) and are also used when there are any doubts as to the rating which should be given for a particular test sample.

10 Expression of results

Express the results, separately for each of the three characteristics, as a whole number on the rating scale defined for each of the characteristics (see Table 2).

11 Test report

The test report shall include the following information:

a) the sampling method used, if known;

b) a reference to this part of ISO 7304;

c) all information necessary for the complete identification of the sample and, in particular, the thickness of the uncooked strands of pasta;

d) the number of samples assessed;

e) the cooking time;

f) the results obtained;

g) the date and time of the test, and the ambient conditions under which testing was carried out;

h) the test location;

i) the number of assessors and their names;

j) details of any operations not specified in this part of ISO 7304 as well as all operations regarded as optional, together with details of any incidents which may have influenced the results.

Annex A
(informative)

Illustrations of strands of pasta after the optimum cooking time

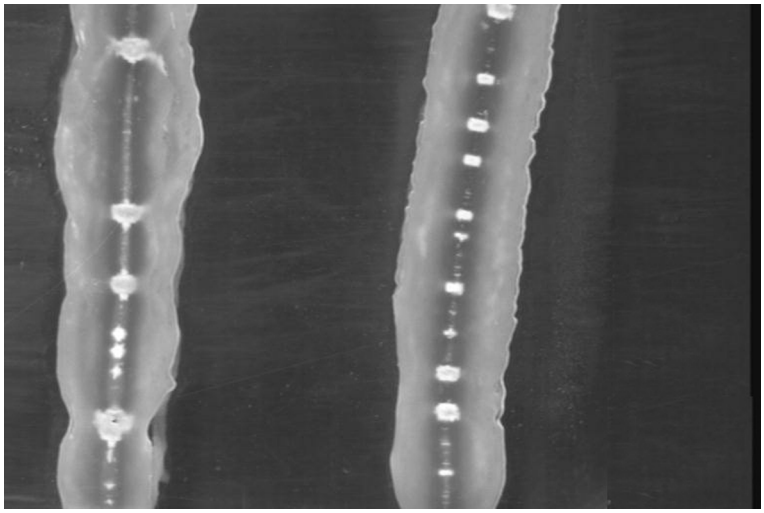


Figure A.1 — Example showing the disappearance of the continuous white line at the centre of a long, solid strand of pasta (e.g. spaghetti) after the optimum cooking time when the strand is crushed using the crushing plate

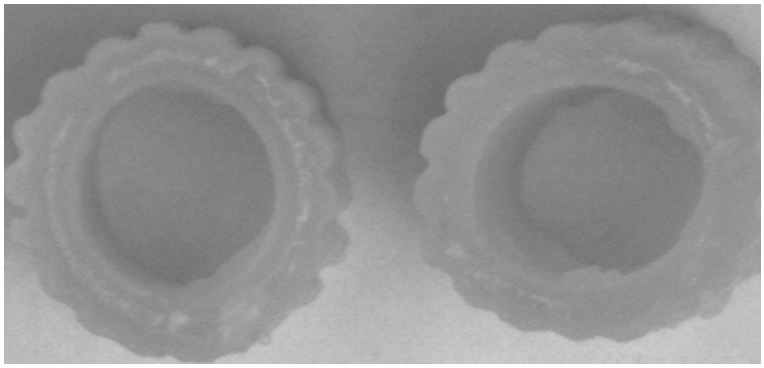


Figure A.2 — Example showing the disappearance of the continuous white line in a short, hollow strand of pasta (e.g. macaroni) after the optimum cooking time when the strand is cut at right angles with the cutter

Annex B
(normative)

Sensory analysis

B.1 General

B.1.1 Previous training shall be given to assessors in the estimation of texture, using test samples which have been cooked for the optimum cooking time, t, and undercooked or overcooked by various times in order to cover as wide a texture range as possible during several sessions of analysis.

B.1.2 The tests shall be carried out in a room which is specially designed for sensory analysis.

B.1.3 The panel shall consist of at least eight qualified assessors, selected in accordance with ISO 8586-1.

B.1.4 Each assessor shall be familiar with the report form (see Annex D).

B.1.5 The samples shall be presented in pairs to each assessor. No more than two plates shall ever be in front of an assessor at the same time.

B.1.6 The pairs shall be constituted in such a way that each test sample is presented with each of the others. There are, therefore, 10 combinations depending on cooking time when there are five samples to be evaluated and 15 combinations when there are six samples.

The order of presentation of the pairs shall be determined by drawing lots, as shall the right-hand/left-hand arrangement of the plates for each pair. Examples of orders of presentation of the test samples are given in Annex C for five samples.

B.1.7 Testing shall be carried out in the morning in artificial red or yellow light, presentations of a single series progressing regularly during the same morning.

B.2 Procedure

B.2.1 Each assessor shall be presented simultaneously with two flat white plates (6.6), each containing a designated pasta sample, in the same order (left/right) for all the assessors.

B.2.2 Each assessor shall operate exactly as described in the evaluation procedure, starting with the pasta in the left-hand plate, then assessing the pasta in the right-hand plate. The scores shall be expressed as a whole number from 0 to 100 (see Table 2).

B.2.3 Each test sample shall be given a rating within two minutes of the plate being placed in front of the assessor.

Annex C
(informative)

Examples of orders of presentation of test samples

Table C.1 gives examples of arrangements for the presentation of test samples for the case when five samples, designated A, B, C, D and E, are to be assessed after determining, by drawing lots, the order of presentation of the pairs of plates and the left-hand/right-hand arrangement of the plates (the first letter represents the left-hand plate and the second the right-hand plate).

Table C.1 — Examples of the order of presentation of five test samples

Order of presentation	First example	Second example	Third example
1	AB	AE	CA
2	CD	CB	CD
3	EA	AC	EB
4	BC	DE	BC
5	DE	DC	ED
6	CA	AD	BD
7	DB	EC	AD
8	CE	BA	CE
9	DA	DB	EA
10	EB	BE	BA

Annex D
(informative)

Example of report form

Sampling method: ISO 24333

Test Method: ISO 7304-2 Laboratory:

Test No. Date, time:

Ambient conditions:

Name of assessor:

Sample ID	Dimensions (mm)	Cooking time (s)	Ratings given to pasta (0 to 100)		
			Liveliness	Starch release	Firmness
1					
2					
3					
…					
…					
…					
n					

Notes:

Bibliography

[1] ISO 24333, *Cereals and cereal products — Sampling* [1)]

1) To be published. (Revision of ISO 6644:2002 and ISO 13690:1999)

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