BS ISO 16779:2015

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Sensory analysis — Assessment (determination and verification) of the shelf life of foodstuffs

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A list of organizations represented on this committee can be obtained on request to its secretary.

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Sensory analysis — Assessment (determination and verification) of the shelf life of foodstuffs

Analyse sensorielle — Évaluation (détermination et vérification) de la durée de conservation des produits alimentaires

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Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
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Foreword

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The committee responsible for this document is ISO/TC 34, *Food products*, Subcommittee SC 12, *Sensory analysis*.

Introduction

Measurements of product changes over time provide a basis for the determination and verification of the shelf life of foodstuffs (best before date and use by date).

INTERNATIONAL STANDARD ISO 16779:2015(E)

Sensory analysis — Assessment (determination and verification) of the shelf life of foodstuffs

1 Scope

This International Standard specifies methods for the determination and verification of the shelf life of foodstuffs by means of sensory tests. Sensory characteristics to be evaluated are changes in appearance, odour, flavour, taste, trigeminal sensation, and texture during assumed preservation periods.

It is intended to support the development of individual approaches.

This International Standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this International Standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

NOTE For the purposes of calculating the shelf life, before microbiological, chemical and physical investigation results are used in addition to sensory testing.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable to its application. 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*

3 Terms and definitions

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

3.1
best before date
date of minimum durability (best before date) which signifies the end of the period under any stated storage conditions during which the product will remain marketable and will retain any specific quality for which claims have been made

Note 1 to entry: Date before the product may still be perfectly satisfactory.

3.2
use by date
date which signifies the end of the estimated period under any stated storage conditions, after which the product probably will not have the quality attributes normally expected by consumers

Note 1 to entry: After this date, the food should not be regarded as marketable.

3.3
specified storage condition
specified environmental parameter kept constant over a defined period of time

3.4
not specified storage condition
environmental parameter which arise depending on the environment and may change over time

3.5
storage condition intended to accelerate product changes
environmental parameter applied to accelerate changes of the specific characteristics of a product

3.6
sampling plan
specification of the starting point, the test period, the test intervals, the expected endpoint, the suitable test method, the number and amount of test samples and reference samples, and the storage conditions

3.7
starting point
first date of test, beginning of the test series

3.8
test period
period of time over which the product-specific characteristics are investigated

3.9
test interval
defined period of time between the individual sensory tests within the test period

3.10
endpoint
last date of test, end of the test series

3.11
test method
suitable method (sensory and, if relevant, physical, chemical and/or microbiological) for verification shelf life assessment

3.12
reference sample
product with which the product to be tested is compared

4 Procedure

4.1 General

A sampling plan comprising the specification of a starting point, the test period and the intended test intervals is prepared in accordance with 4.4. The test and reference samples are selected in accordance with 4.2. Then the test samples are subjected to a systematic storage (see 4.3). The sensory test is performed within the test intervals, up to the end point, applying the suitable test methods. Afterwards the results are evaluated.

4.2 Selection of the test and reference samples

4.2.1 Test samples

Test samples used for the determination and/or verification of the shelf life shall be representative for the respective product as far as recipe, manufacturing process and packaging technique are concerned.

The samples should be present in the packaging intended to be used for distribution. For the purposes of orienting preliminary tests, the test samples may also have been produced on test plants or on the laboratory scale. When examining the shelf life, the test samples may also be taken from among commercially available products.

If necessary, the test samples may be subjected to typical storage and distribution conditions (e.g. exposure to light, temperature and humidity variations, shaking or vibration, respectively).

4.2.2 Reference samples

The test samples should be compared with the respective reference sample.

A reference sample can be any of the following:

a) the standard used so far and descriptive data obtained in previous sensory tests and available at the starting point, e.g. results of the investigation of profiles or of descriptive tests;

b) a representative reference sample freshly produced for each test interval;

c) a reference sample stored under conditions minimizing changes of the specific product characteristics during the assessment period, such as storage under colder conditions or under a modified atmosphere.

The reference samples can be complemented by data obtained in consumer surveys.

4.2.3 Number and amount of the required test and reference samples

Number and amount of the test and the reference samples required over the whole test period depend on the test intervals specified in the sampling plan, the sensory test method, the test set-up, the nature of foodstuff and the storage conditions.

4.3 Storage conditions

4.3.1 Specified storage conditions

The storage conditions shall be specified in order to, for example, reproduce the channel of distribution of a product and to include changes of temperature, humidity, light, atmospheric pressure and the simulation of seasonal changes of the weather (temperature variations), packaging-related behaviour (migration, permeability to oxygen, water vapour barrier, perforation, etc.).

Specified storage conditions shall be recorded.

4.3.2 Not specified storage conditions

Not specified conditions are conditions which can arise during proper storage, as a result of the environmental conditions. They shall meet the product-related requirements and correspond with the storage conditions encountered in practice.

The conditions of not specified storage or their changes, respectively, shall be recorded.

4.3.3 Storage conditions intended to accelerate product changes

Accelerating storage conditions is intended to promote faster changes in characteristic attributes for products of long shelf life and use by date.

In cases of products with a longer shelf life (such as frozen fully preserved food and dried foodstuffs) shortening of the test period by means of accelerating product changes may be advisable.

Accelerating storage conditions shall be adapted to the product.

Accelerating storage conditions can be both specified and not specified and shall be recorded.

In the absence of prior data that would suggest otherwise, an estimation of how to shorten the test period, the Arrhenius law may be useful when the shelf life of a product is linked to water activity.

An increase of the storage temperature can save time with regard to the determination or verification of the shelf life of certain products; however, the values thus obtained only approximately reflect the product's behaviour under normal storage conditions.

For certain products, higher temperatures may result in negative changes, e.g. appearance which would not arise under normal conditions and which are not necessarily directly associated with the shelf life.

4.3.4 Examples of application when the reaction/rate/temperature (RRT) is equal to 2

a) Storage temperature of 20 °C:

Predicted or expected shelf life of 20 months: equal to the full period.

b) Storage temperature of 30 °C:

Predicted or expected shelf life of 10 months equal to half of the full period.

That means: after half of the full period, a conditional conclusion is possible.

c) Storage temperature of 40 °C:

Predicted or expected shelf life of 5 months equal to a quarter of the full period.

That means: after a quarter of the full period, a conditional conclusion is possible.

4.4 Preparation of a sampling plan

4.4.1 Specification of the starting point

The first step in preparing a sampling plan consists in the specification of a starting point. The starting point can be any of the following:

a) the time immediately following production;

b) the dispatch time;

c) the time when the product usually arrives to the consumer;

d) the time when the product ingredients have reached equilibrium (e.g. unfolding of aroma following sterilization, etc.).

4.4.2 Specification of the test period

Once a starting point has been chosen, the shelf life to be expected is estimated. The basis for the estimated shelf life can be any of the following:

a) a shelf life already documented on the basis of available data obtained with similar products which are already established;

b) the declared shelf life for similar products manufactured by national or international competitors;

c) the shelf life required for marketing schedules, distribution systems or other logistical activities;

d) the shelf life to be expected when using novel packaging materials or packaging systems;

e) the shelf life to be expected when testing and/or integrating novel, sensible or sensitive ingredients.

The test period may be longer than the estimated shelf life by 50 % or 100 % for products having a shelf life of less than 60 days and by about 25 %, for those with a shelf life of more than 60 days. The test period should be planned after the estimated shelf life to be sure to achieve the shelf life and to observe the sensory characteristics of a spoiled product.

4.4.3 Test steps

For testing, appropriate evaluation steps are specified within which assessment takes place. In the case of samples which are subject to accelerating storage conditions, the proposed test intervals refer to the assessment period shortened accordingly.

EXAMPLE 1: For a product of unknown shelf life or for a product for which there are no values available obtained with similar products, assessment should take place in the following intervals:

0 %; 25 %; 50 %; 75 %; 100 %; 125 % and/or 150 %

of the estimated shelf life.

EXAMPLE 2: For a product which changes mostly during the final phase of its shelf life, assessment should take place in the following intervals:

0 %; 50 %; 65 %; 80 %; 90 %; 100 %; 110 % and 125 % or 150 %

of the estimated shelf life.

EXAMPLE 3: For a product which changes mostly during the initial phase of its shelf life, assessment should take place in the following intervals:

0 %; 10%; 25%; 50 %; 75%; 100 and 125 %

of the estimated shelf life.

5 Test methods

5.1 General

The test methods shall be selected on the basis of specified criteria or criteria to be agreed upon.

Analytical or hedonic tests are suitable sensory test methods.

5.2 Discrimination tests

Discrimination tests shall be applied to determine from which time on there is a statistically verified difference between the test sample and the reference sample.

Examples of discrimination tests are as follows:

— Triangle test (see ISO 4120);

— Paired comparison test (see ISO 5495);

— Duo-trio test (see ISO 10399).

Discrimination tests are not suitable for very obviously visual heterogeneous products.

5.3 Descriptive tests

Descriptive tests shall be applied when changes of one or more of the product's characteristic attributes define the end of the shelf life and/or very heterogeneous products are to be assessed. (see ISO 13299).

Statistical significance by itself should not be used to define the end of shelf life. Instead a meaningful change in sensory properties (verified by statistical significance, when available) should be applied.

5.4 Hedonic tests

Hedonic tests require surveys among a sufficiently large group of consumers (see ISO 11136).

Hedonic tests shall be continued at least until a level of acceptance is reached.

5.5 Combination of test methods

A combination of the given test methods may be useful, e.g. if the discrimination test results in a statistically significant difference between the test and the reference samples, the impact of the difference on sensory properties can be determined by descriptive tests and consumer acceptance by hedonic testing.

6 Evaluation of results

Data analysis should be performed so as to be adapted to both the test set-up and the chosen test method.

Deviations with regard to the time schedule as well as differences between products within a period of time shall be included.

Determining factors, such as accelerated storage conditions, shall be taken into account in the evaluation.

The final specification of the shelf life shall be based upon a comparison between the sensory results and the results of the microbiological and chemical measurement methods.

7 Test report

The test report shall contain the following information:

a) a reference to this International Standard, (i.e. ISO 16779);

b) methods/standard(s) taken as a basis;

c) test purpose;

d) test sample type;

d) number and amount of the test samples;

e) reference sample type;

f) number and amount of the reference samples;

g) specification of the starting point, the test period, the test intervals and the end point to be expected;

h) storage conditions;

i) test method(s) used;

j) results of the test;

k) number of test persons and their qualification;

l) deviations from the test schedule, if relevant;

m) name of the test manager(s);

n) date of test;

o) signature.

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