
**Sensory analysis — Methodology —
General guidance for establishing a
sensory profile**

*Analyse sensorielle — Méthodologie — Directives générales pour
l'établissement d'un profil sensoriel*

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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

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Introduction

The purpose of this International Standard is to serve as guidance on those steps that are common to all sensory profiling. Reference is given in Clause 4 to existing and planned International Standards describing a part of the process (e.g. the choice of descriptors or of scales) or describing specific types of sensory profiling (e.g. texture or flavour profiles).

A sensory profile is a descriptive analysis of a sample by a panel. The sample may be a product (e.g. a food, beverage, tobacco product, cosmetic, textile or paper). It could also be a sample of air or water being tested for pollutants. Profiling can be carried out in a number of ways. Over the years, a few of these have been formalized and codified as descriptive procedures by professional societies or by groups of producers and users for the purpose of improving communication between themselves. The purpose of this International Standard is to provide agreed guidelines for such descriptive procedures.

Sensory profiling is based on the concept that the sensory impression made by the sample consists of a number of identifiable sensory attributes (descriptors), each of which is present to a larger or smaller degree. The list of all relevant sensory descriptors, each with its intensity value, is the sensory profile. Some sensory profiles take a view across all of the senses; others (partial profiles) concentrate in detail on particular senses. Two samples may be different yet have the same partial profile. Usually the attributes are listed in the order of perception.

Three factors need particular attention when establishing a profile:

- that assessors differ in their sensitivity and thresholds by which they sense individual attributes;
- that assessors may lack awareness or cognizance of certain attributes of a sample; and
- that in most samples there exists a “complex” or “background” of attributes that are not easily identified or separated.

The impact of these factors can be greatly reduced, but not entirely eliminated, by putting more effort into the selection of descriptors, and by using larger numbers of repeat tests by larger numbers of sensitive and highly trained assessors.

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Sensory analysis — Methodology — General guidance for establishing a sensory profile

1 Scope

This International Standard describes the overall process for developing a sensory profile. Sensory profiles can be established for products such as foods and beverages, and can also be useful in studies of human cognition and behaviour. Some applications of sensory profiling are as follows:

- to develop or change a product;
- to define a product, production standard or trading standard in terms of its sensory attributes;
- to study and improve shelf-life;
- to define a reference “fresh” product for shelf-life testing;
- to compare a product with a standard or with other similar products on the market or under development;
- to map a product's perceived attributes for the purpose of relating them to factors such as instrumental, chemical or physical properties, and/or to consumer acceptability;
- to characterize by type and intensity the off-odours or off-tastes in a sample of air or water (e.g. in pollution studies).

NOTE 1 Sensory profiles can also be established for non-alimentary products or samples which are evaluated by the senses of sight, odour, taste, touch or hearing.

NOTE 2 Some International Standards dealing with aspects of establishing a sensory profile are given in Clauses 2 and 4.

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 4121, *Sensory analysis — Methodology — Evaluation of food products by methods using scales*

ISO 5492, *Sensory analysis — Vocabulary*

ISO 5496, *Sensory analysis — Methodology — Initiation and training of assessors in the detection and recognition of odours*

ISO 6564, *Sensory analysis — Methodology — Flavour profile methods*

ISO 6658:1985, *Sensory analysis — Methodology — General guidance*

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

ISO 8586-2, *Sensory analysis — General guidance for the selection, training and monitoring of assessors — Part 2: Experts*

ISO 8589, *Sensory analysis — General guidance for the design of test rooms*

ISO 11035, *Sensory analysis — Identification and selection of descriptors for establishing a sensory profile by a multidimensional approach*

ISO 11036, *Sensory analysis — Methodology — Texture profile*

ISO 11056, *Sensory analysis — Methodology — Magnitude estimation method*

3 Terms and definitions

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

3.1 sensory profile
description of the sensory properties of a sample, comprising the sensory attributes in the order of perception, and with assignment of an intensity value for each attribute

NOTE This is a generic term for any type of profile, whether full or partial, trademarked or not.

3.2 partial sensory profile
profile comprising certain selected attributes, with their intensity values

EXAMPLES Odour profile, flavour profile and texture profile.
<https://standards.iteh.ai/catalog/standards/sist/d73bb16f-58a4-4cab-9ee7-20a120d5997a/iso-13299-2003>

3.3 conventional sensory profile
profile obtained by statistical treatment of data issued from several assessors using a single list of attributes

3.4 consensus sensory profile
profile obtained by consensus after discussion by a group of assessors, each of them having assessed the product according to his/her own criteria before the discussion

3.5 free-choice sensory profile
profile in which each assessor chooses his/her own attributes to describe a group of samples and in which consensus space is derived statistically, for example by generalized Procrustes analysis

3.6 time-intensity sensory profile
profile that describes the intensity of a given attribute as it changes over a period of time, following a single application of the stimulus

4 Principles

Table 1 presents points to consider in the choice of technique.

Steps in establishing a sensory profile are common to all methods of sensory profiling and are set out in Table 2.

Table 1 — Suggested area of application of different profiling techniques

Technique	Principle	Area of application	Advantages	Disadvantages	Illustrative examples
Conventional profiling	Assessors, seated in booths, score each sample on a preselected set of attributes and scales.	The most-used technique. Suitable for routine applications and for research, e.g. in development and quality control of consumer goods. Various procedures exist for choosing descriptors, see Table 3.	Generally the most reliable technique. Profiles are reproducible within a panel and over time. If sufficient training is given and enough reference standards are used, profiles are also reproducible between panels.	Relatively expensive because fairly large panels and good booth areas are required. Panel selection and training are relatively time-consuming.	Standard textbooks, e.g. references [1] to [5] in Bibliography.
Consensus profiling	Through consensus discussion the panel, seated around a table, develops its own terminology and scores pertaining to the sample set presented.	Suitable for routine sensory evaluation of a variety of miscellaneous products such as those offered in a supermarket. Also useful for non-recurring sets of e.g. 3 to 10 similar items.	Many samples can be tested at relatively low cost in samples and assessors' time.	Profiles obtained are unique to a given panel and set of samples. The quality of the data is very dependent on the experience and ability of the panel leader.	See reference [1].
Free-choice profiling	Assessors, seated in booths, are free to each choose their own terminology and scale. A profile is derived statistically, e.g. via generalized Procrustes analysis.	Can be used with experienced assessors as a preliminary step to develop terms for consideration as descriptors. Alternative procedure in consumer testing of a group of products, avoiding the need with naive assessors to develop a set of attributes and scales.	Minimum training is required. No need to spend time on the development of reference standards.	Profiles obtained are unique to a given panel. Profiles are expressed in terms of multivariate equations that require interpretation by the panel leader. Preparation and data processing are time consuming for the panel leader.	See reference [6] for a description and review.
Time-intensity profiling	Assessors, seated in booths, record the intensity of an attribute over time.	Recommended in studies of attributes that change with time in the mouth, on the skin, etc., after the moment of ingestion or application.	The only technique available to describe attributes that change with time, e.g. lingering aftertastes.	Only one attribute (or at most two) can be studied. Training of assessors required. Technique is time-consuming.	See reference [7] for a description and review.

Table 2 — Steps in establishing a sensory profile and relevant International Standard

Step No.	Action	Relevant International Standard
1. Establish a sensory facility	Establish booth area, preparation area, etc.	ISO 8589 (Design of test rooms)
2. Select products that illustrate the range of attributes to be encountered	One or two technical experts obtain many products and select approx. 6 to 10 if possible.	Use experts trained per ISO 8586-2 (Expert assessors)
3. Select and train assessors for the project	Panel leader assembles a group of candidates and trains them, using the products from step 2.	ISO 8586-1 (Selected assessors) ISO 5496 (Recognition of odours)
4. Select descriptors (attributes) suitable for the application (can be combined with step 3)	Panel leader chooses from existing terms, or assessors evaluate the products from step 2 and propose a number of descriptors. Selection is made by consensus or by multivariate analysis. Suitable reference standards are selected with which the descriptors can be demonstrated.	ISO 5492 (Vocabulary) ISO 6564 (Flavour profiles) ISO 11035 (Identification of descriptors) ISO 11036 (Texture profile)
5. Determine the order of perception of the attributes in the profile (if needed)	Panel leader works with the assessors during steps 3 and 4.	
6. Select the scale or scales of intensity to be used with the descriptors	Panel leader selects the most appropriate scale(s).	ISO 4121 (Evaluation using scales) ISO 11056 (Magnitude estimation)
7. Train the assessors to use the selected descriptors and scale(s)	Panel leader works with the assessors to improve their sensitivity, repeatability and the agreement between them (the latter does not apply in free-choice profiling).	ISO 8586-1 (Selected assessors) and ISO 1586-2 (Expert assessors)
8. Conduct the test(s)	Assessors evaluate the test samples.	ISO 6658 (General guidance) ISO 6564 (Flavour profiles)
9. Report the results	Analyse the data statistically and present the results in the form of tables and diagrams; draw the conclusion(s).	See 7.5 ISO 6564 (Flavour profiles) ISO 11036 (Texture profile)

5 General test conditions

5.1 Test room

Carry out sensory profiling in booths under the conditions as described in ISO 8589. For consensus profiling and for the initial phases of the identification and selection of descriptors, arrange to have assessors seated around a central table, on which reference substances may be available; see ISO 8589.

5.2 Apparatus and sampling

Select the number of samples and their mode of presentation so as not to bias the results in any way; see ISO 6658.

5.3 Preliminary discussion and test

See ISO 6658:1985, Clause 4. Ascertain that the assessors are fully familiar with any particular characteristic to be studied and with the mechanics of the test. If necessary, arrange a preliminary general discussion concerning the test problem and the nature of the samples. Present and discuss a few samples typical of the series to be analysed. Limit the number to two or three. If the test concerns the description of off-flavours, include in the preliminary test a sample free from any off-flavours, and/or a demonstration of the off-flavour to be described. Present typical samples and direct the discussion in a manner that will not influence future judgements.

5.4 Number of assessors

Descriptive panels usually have 8 to 12 assessors, or maybe more. They may have as few as 4 (e.g. in consensus profiling). They may have as many as 20 or 30 when the purpose includes testing for taints to which only a minority may be sensitive. Specific instructions regarding panel size are not appropriate because of the many factors that have to be considered. Larger panels are required if there are more than slight differences between the panel members as regards sensitivity and/or training.

6 Selection, training and monitoring of the assessors

See ISO 8586-1 and ISO 8586-2 for descriptions of the selection, training and monitoring of assessors. Recruit candidates through talks, circulars or personal contact. Interview and screen two to three times the number of assessors required. The important characteristics are the following:

- interest and motivation;
- ability to memorize and communicate sensory impressions;
- availability for panel sessions;
- capacity to concentrate and honesty in reporting sensations;
- promptness;
- good health;
- ability to discriminate the specific characteristics studied;
- engagement for the duration of the study.

Sensory acuity is less important provided panel members balance each other's strengths and weaknesses, which is often the case with panels of 10 to 15 or more.

Include in screening procedures the products or samples for which the panel will be used. Follow with a training programme using the product itself and the terminology selected according to 7.1. Include samples chosen, produced or modified to cover the range of each attribute likely to be encountered in future panel work. Note that the training programme and the selection of terminology may to some extent be combined into a single activity. A panel may be trained for more than one type of product, but it is important, for each type, that the panel has a good appreciation of the range of attributes that it may encounter.

Monitor the performance of selected assessors at appropriate regular intervals (e.g. by giving them coded samples of known characteristics or by introducing replicates). It is the panel leader's responsibility to organize retraining of any assessor whose performance has dropped from the level which permitted admission to the panel.

7 Procedure

7.1 Choosing the optimal attributes (descriptors)

7.1.1 General

At the discretion of the panel leader, use one of the three approaches set out in Table 3 or any combination thereof for this important step. The purpose is to identify and select a set of non-overlapping attributes that, as far as possible, permit a complete descriptive analysis of the samples under study.

7.1.2 Order of perception

In addition to detecting the attributes of a sample and then scaling each attribute, panels can often detect differences among products in the order in which attributes are perceived and in the duration of the sensation. In certain products (e.g. beverages), the order of perception of certain attributes is as characteristic of the product profile as the individual flavour notes and their respective intensities. In other products, the order of perception can change, for example in accordance with textural or physical properties, or with changes during the evaluation.

EXAMPLES A piece of chocolate which melts; a facial tissue which is moistened.

The order of perception should determine the order in which attributes are evaluated. Aftertaste or afterfeel should be evaluated last; these are attributes which can still be perceived after the sample has been consumed or used. Aftertaste or afterfeel need not imply a defect or a negative characteristic. For example, the cool aftertaste of a mouthwash and the spicy afterheat of a curry are desirable flavour notes. In oral texture and in skinfeel and fabric feel applications, the order of perception can be predetermined by the way the product is handled. By controlling the manipulation (one chew, one manual squeeze), the panel leader determines which attributes are allowed to be perceived first.

7.1.3 Overall evaluation <https://standards.iteh.ai/catalog/standards/sist/d73bb16f-58a4-4cab-9ee7-28a126d3999a/iso-13299-2003>

As a part of a profiling session, usually at the end, assessors may be asked to provide one or more overall evaluations. Examples are

- overall fruitiness or spiciness,
- amplitude (overall flavour intensity),
- degree of presence of agreed defects, and
- overall non-hedonic score (e.g. by a particular system of grading or rating).

CAUTION Hedonic evaluations by trained sensory panels can be biased. If they are used to guide new product development, its aim or goal should first be set by consumer tests in which respondents are selected to represent various prospective customer groups, and are asked to grade products on a scale of acceptability or intent-to-purchase. Sensory assessors have been trained to be objective in describing food products and may, consciously or unconsciously, adopt different measures for what is high or low quality.