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Sensory analysis — General guidance for the selection, training and monitoring of assessors —

Part 1:
Selected assessors

Analyse sensorielle — Guide général pour la sélection, l'entraînement et le contrôle des sujets —

Partie 1: Sujets qualifiés

Reference number
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Contents

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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.

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 8586-1 was prepared by Technical Committee ISO/TC 34, *Agricultural food products*, Sub-Committee SC 12, *Sensory analysis*.

ISO 8586 consists of the following parts, under the general title *Sensory analysis — General guidance for the selection, training and monitoring of assessors*:

— *Part 1: Selected assessors*

— *Part 2: Experts*

Annex A forms an integral part of this part of ISO 8586. Annexes B and C are for information only.

Introduction

A sensory analysis panel constitutes a true "measuring instrument", and consequently the results of the analyses conducted will depend on its members.

The recruitment of persons willing to participate in a panel therefore needs to be carried out with care and to be considered as a real investment, both in time and financially.

Sensory assessment may be made by three types of assessor:

— "assessors",

— "selected assessors", and

— "experts".

Assessors can be "naïve assessors" who do not have to meet any precise criterion, or "initiated assessors" who have already participated in sensory tests.

"Selected assessors" are assessors who have been selected and trained.

"Experts" can be "expert assessors" who have already demonstrated particular acuity in panel work and have developed a good long-term memory, or "specialized expert assessors" who draw on additional knowledge gained in particular fields.

This part of ISO 8586 concerns only the recruitment, selection, training and monitoring of candidates intended to become selected assessors. The recruitment, selection, training and monitoring of candidates intended to become experts will form the subject of ISO 8586-2.

The selection and training methods to be employed depend on the tasks which one intends to give the selected assessors. It should be pointed out that these methods sometimes only constitute a way of choosing the better candidates among those who are available, rather than those who satisfy predetermined criteria. This is particularly the case when it is necessary to constitute internal panels.

A preliminary selection of candidates has to be undertaken at the recruitment stage, in order to eliminate those who would be unsuited for sensory analysis. However, the final selection can only be made after training and the completion of the envisaged tasks.

The recommended procedure involves

a) recruitment and preliminary screening of naïve assessors;

b) training of naïve assessors who will become initiated assessors;

c) selection of initiated assessors according to ability to perform particular tests; they will then become selected assessors;

d) selection following the performance of an actual sensory assessment (useful in the case of descriptive analyses);

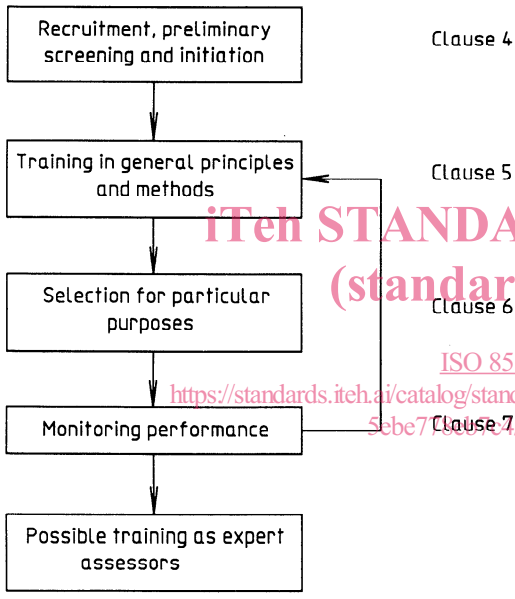
e) possible training of selected assessors to become expert assessors.

In certain cases (especially for descriptive sensory analysis), the panel may be divided into specialized sub-groups.

The exact procedures covered by a) and b) and the nature of the tests performed in c) and d) depend on the tasks which the panel is to perform.

The performance of selected assessors should be monitored regularly to ensure that the criteria by which they were initially selected continue to be met.

The entire process is illustrated in the following diagram.



Sensory analysis — General guidance for the selection, training and monitoring of assessors —

Part 1:
Selected assessors

1 Scope

This part of ISO 8586 specifies criteria for the selection and procedures for the training and monitoring of selected assessors. It supplements the information given in ISO 6658.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 8586. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 8586 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 4120:1983, *Sensory analysis — Methodology — Triangular test.*

ISO 4121:1987, *Sensory analysis — Methodology — Evaluation of food products by methods using scales.*

ISO 5492:1992, *Sensory analysis — Vocabulary.*

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

3 Definitions

For the purposes of this part of ISO 8586, the definitions given in ISO 5492 apply.

4 Recruitment, preliminary screening and initiation

Recruitment is an important starting point in forming a panel of selected assessors. Different recruitment methods and criteria are available and there are various tests that can be used for screening candidates for suitability for further training.

4.1 Principle

To recruit candidates and to select those most suitable for training as selected assessors.

4.2 Recruitment

The following three questions arise when recruiting persons to form a sensory analysis panel:

— where should one look for the people who will constitute the group?

— how many people shall be selected?

— how shall the people be selected?

4.2.1 Types of recruitment

Two types of recruitment are available to organizations:

— recruit through the personnel department of the organization (internal recruitment), or

— recruit people from outside the organization (external recruitment).

It is possible to constitute a mixed panel made up of both types of recruitment.

4.2.1.1 Internal recruitment

The candidates are recruited from amongst the office, plant or laboratory staff. It is advisable to avoid those persons who are too personally involved with the products being examined, in particular those involved at the technical or commercial level, because they may cause the results to be biased.

In this type of recruitment, it is vital that the organization's general management and hierarchy provide their support and make it known that sensory analysis is considered as forming part of everyone's work. This can be made known at the hiring stage of the personnel.

4.2.1.2 External recruitment

The recruitment is conducted outside the organization.

The most commonly used means for this purpose are:

— recruitment through classified advertisement in the local press, in specialized publications, or in newspapers which are distributed free of charge, etc. (in this case, all types of people will reply and it will be necessary to carry out a selection);

— opinion poll institutes; certain of these institutes can provide the names and addresses of persons likely to be interested;

— in-house "consumer" files, compiled as a result of advertizing campaigns or complaints;

— persons visiting the organization;

— personal acquaintances.

4.2.1.3 Mixed panel

A mixed panel may be formed using internal and external recruitment, in variable proportions.

4.2.2 Advantages and disadvantages of internal and external recruitment

Organizations may wish to use independent internal or external panels for different tasks.

4.2.2.1 Internal recruitment

4.2.2.1.1 Advantages

The advantages are that

— the people are on the spot;

— it is not necessary to make provision for any payment (however, in order to maintain interest, it may be desirable to offer small presents or perks);

— a better confidentiality *vis-à-vis* the results is ensured, which is particularly important if it is a question of research work; and

— there is better stability of the panel with time.

4.2.2.1.2 Disadvantages

The disadvantages are that

— candidates are influenced in their judgements (by knowledge of the products);

— it is difficult to allow for the evolution of the organization's products (people are influenced by their familarization with the organization's products);

— replacement of candidates is more difficult (limited number of persons in small organizations);

— lack of availability.

4.2.2.2 External recruitment

4.2.2.2.1 Advantages

The advantages are that

— there is a wide range of choice;

— there is subsequent supply of new persons by word of mouth;

— there are no problems with hierarchy;

— selection is much easier, without the risk of offending people if they are unsuitable;

— easy availability.

4.2.2.2.2 Disadvantages

The disadvantages are that

— the method is expensive (remuneration, paperwork);

— this method is better suited to urban communities where there is a sufficient number of inhabitants; however, in rural areas, advantage can be taken of co-operatives (e.g. milk, wine);

— since it is necessary that the individuals are available, one sometimes encounters an inordinate number of (old age) pensioners or unemployed women or even students; it is more difficult to recruit working people; and

— after having paid for the selection and training, one risks people leave at a moment's notice.

4.2.3 Number of persons to be selected

Experience has shown that, after the recruitment, the selection procedures eliminate approximately half the people for reasons such as gustative sensitivity, material conditions, etc.

The number of persons to be recruited will vary depending on the following elements:

- the financial means and the requirements of the organization;
- the types and frequency of tests to be conducted;
- whether or not it is necessary to interpret the results statistically.

It is not desirable for a panel to operate with less than 10 selected assessors. It is necessary to recruit at least two to three times the number of persons actually required to constitute the final panel. For example, in order to obtain a panel of 10 persons, it is necessary to recruit 40 and to select 20.

For specialized purposes, a higher level of recruitment will be required.

4.3 Background information

Background information on the candidates may be obtained by submitting them to a combination of clearly understood questionnaires coupled with interviews by persons experienced in sensory analysis. The aspects specified in 4.3.1 to 4.3.8 shall be explored.

4.3.1 Interest and motivation

Candidates who are interested in sensory analysis and the product or products to be investigated are likely to be more motivated and hence are likely to become better assessors than those without such interest and motivation.

4.3.2 Attitudes to foods

Strong dislikes for certain foods and beverages, in particular those which it is proposed to assess, together with any cultural, ethnic or other reasons for not consuming certain foods or beverages, should be determined. Candidates who are venturesome in their eating habits often make good assessors for descriptive analyses.

4.3.3 Knowledge and aptitude

The initial sensory perceptions of the candidates have to be interpreted and expressed, requiring certain physical and intellectual abilities, in particular the capacity to concentrate and to remain unaffected by external influences. If the candidate is then required to evaluate only one type of product, knowledge of all aspects of that product may be beneficial. It is then possible to choose expert assessors from amongst those candidates who have shown an aptitude for sensory analysis of this product.

4.3.4 Health

The candidates shall be in good general health. They shall not suffer from any disabilities which may affect their senses, or from any allergies or illnesses, and shall not take medication which might impair their sensory capacities and thus affect the reliability of their judgements. It may be useful to know whether the candidates have dental protheses, since they can have an influence in certain types of evaluation involving texture or flavour.

Colds or temporary conditions (for instance, pregnancy) should not be a reason for eliminating a candidate.

4.3.5 Ability to communicate

The ability of candidates to communicate and describe the sensations they are perceiving when assessing is particularly important when considering candidates for descriptive analyses. This ability can be determined at the interview and again during screening tests (see 4.4.6).

4.3.6 Availability

Candidates shall be available to attend both training and subsequent assessments. Personnel who travel frequently or have continual heavy work-loads are often unsuited for sensory work.

4.3.7 Personality characteristics

Candidates shall show interest and motivation for the tasks and shall be willing to persevere with tasks demanding prolonged concentration. They shall be punctual in attending sessions and shall be reliable and honest in their approach.

4.3.8 Other factors[1)]

Other information which may be recorded during recruitment are name, age group, sex, nationality, educational background, current occupation and experience in sensory analysis. Information on smoking habits may also be recorded, but candidates who smoke shall not be excluded on these grounds.

1) It is necessary that any files on individual persons comply with the legal requirements of the country concerned.

4.4 Screening

Various tests which may be used for screening purposes are described below.

The choice of the tests and of the materials to be used is conducted on the basis of the envisaged applications and of the properties to be assessed.

4.4.1 Types of screening tests

All the tests described have the dual function of familiarizing the candidates with both the methods and the materials used in sensory analysis. They are divided into three types as follows:

a) those aimed at determining impairment;

b) those aimed at determining sensory acuity;

c) those aimed at evaluating a candidate's potential for describing and communicating sensory perceptions.

Tests, the results of which will be used to aid selection, should only be carried out after previous experience followed by familiarization.

The tests shall be conducted in the actual environment in which products are evaluated and in an appropriate environment in accordance with the recommendations given in ISO 8589. They shall be followed by interviews. Several tests described in this part of ISO 8586 are based on those described in ISO 6658.

The selection of assessors should take into account the intended application, the performance of the candidates at the interviews and their potential rather than their current performance. Candidates with high success rates are to be expected to be more useful than others, but those showing improving results with repetition are likely to respond well to training.

4.4.2 Colour vision

Candidates with abnormal colour vision are unsuitable for tasks involving judgement or matching of colours. Assessment of colour vision can be carried out by a qualified optician or, in the absence of such a person and associated equipment, by using an effective test, for example the Ishihara[2] test.

4.4.3 Ageusia and anosmia

It is desirable that candidates be tested to determine their sensitivity to substances which may be present in small concentrations in products, in order to detect ageusia, anosmia or possible lack of sensitivity (see ISO 3972).

Table 1 — Examples of materials and concentrations for matching tests

Taste or odour	Material	Concentration in water at room temperature g/l	Concentration in ethanol[1] at room temperature g/l
Taste			
Sweet	Sucrose	16	
Acid	Tartaric acid or citric acid	1	
Bitter	Caffeine	0,5	
Salty	Sodium chloride	5	
Astringent	Tannic acid[2] or quercitin or potassium aluminium sulfate (alum)	1 0,5 0,5	
Metallic	Ferrous sulfate, hydrated, $FeSO_4 \cdot 7H_2O$[3]	0,01	
Odour			
Lemon, fresh	Citral ($C_{10}H_{16}O$)	—	1×10^{-3}
Vanilla	Vanillin ($C_8H_8O_3$)	—	1×10^{-3}
Thyme	Thymol ($C_{10}H_{14}O$)	—	5×10^{-4}
Floral, lily of the valley, jasmine	Benzyl acetate ($C_8H_{12}O_2$)	—	1×10^{-3}

1) Stock solutions are prepared with ethanol, but the final dilution is made with water and shall not contain more than 2 % of alcohol.

2) This material is not very soluble in water.

3) To avoid the appearance of a yellow coloration due to oxidation, it is necessary to use a solution freshly prepared from neutral or slightly acid water. However, if a yellow coloration occurs, present the solutions in closed opaque containers or under dim or coloured light.

4.4.4 Matching test

Samples of sapid and/or olfactory materials (see table 1) at well above threshold levels are prepared. Each sample is attributed a different, random, three-digit code number. Candidates are presented with one sample of each type and are allowed to familiarize themselves with them (see ISO 6658).

2) See ISHIHARA, S. *Tests for colour blindness*. Kanahara Shuppan Co. Ltd., Tokyo-Kyoto, Japan, 1971.

They are then presented with a series of the same materials labelled with different random numbers. They are asked to match each of them to one of the original set and to describe the sensation they are experiencing.

Approximately twice as many new samples as original samples shall be presented. None of the samples shall be so intense as to produce strong carry-over effects and hence to influence subsequent tasting. Odourless flavourless water shall be made available for cleansing the palate between samples.

Examples of materials that may be used are given in table 1. For these substances and concentrations, it is generally accepted that candidates who make fewer than 80 % correct matches should not be chosen as selected assessors. A correct description of the sensations produced by the samples is desirable but less important.

4.4.5 Acuity and discriminating ability

The two following tests are recommended.

4.4.5.1 Tests for detection of a stimulus

These tests are based on the triangular test; see ISO 4120.

One material at a time is tested. Two samples of the test material and one sample of water or other neutral medium, or one sample of the test material and two of water or other neutral medium, are presented to each candidate. The concentration of the test material shall be at the supra-threshold level.

The test materials, their concentrations and the neutral medium (if used) shall be chosen by the organizer in relation to the types of assessment for which the candidates will be used. Preferably candidates should have 100 % correct responses.

An inability to detect differences after several repetitions indicates unsuitability for this type of test.

Examples of materials which may be used in detection tests are given in table 2.

Table 2 — Examples of materials which may be used in detection tests

Material	Concentration in water at room temperature
Caffeine	0,27 g/l
Citric acid	0,60 g/l
Sodium chloride	2 g/l
Sucrose	12 g/l
cis-3-Hexen-1-ol	0,4 ml/l

4.4.5.2 Tests for discrimination between levels of intensity of a stimulus

These tests are based on the ranking test described in ISO 8587. The tests are carried out using stimuli for taste, odour (only for very small concentrations), texture (mouth and hand), and colour.

For each test, four samples having different intensities of the property are presented in a random order to the candidates, who are required to put them in order of increasing intensity. This random order shall be the same for all candidates, to ensure that comparisons of their performance are not influenced by the effects of different orders of presentation.

A satisfactory level of success in this task can be specified only in relation to the particular intensities used.

Examples of products that may be used are given in table 3; for these concentrations, candidates who invert the order of more than one adjacent pair of samples shall be considered unsuitable as selected assessors for this type of analysis.

Table 3 — Examples of products which may be used in discrimination tests

Test	Product[1)]	Concentration in water at room temperature
Taste discrimination	Citric acid	0,1 g/l; 0,15 g/l; 0,22 g/l; 0,34 g/l;
Odour discrimination	Isoamyl acetate	5 ppm; 10 ppm; 20 ppm; 40 ppm;
Texture discrimination	To suit the industry concerned (e.g. cream cheese, purée, gelatine)	—
Colour discrimination	Cloth, colour scales, etc.	Intensity of a colour ranging, for example, from dark red to light red

1) Other appropriate products showing a graduation in characteristics may also be used.

4.4.6 Descriptive ability

These tests are aimed at determining a candidate's ability to describe sensory perceptions. Two tests are advocated, one covering odour stimuli and the other textural stimuli. The tests are conducted as combined assessments and interviews.