



**SLOVENSKI STANDARD**  
**oSIST prEN ISO 10399:2017**  
**01-oktober-2017**

---

**Senzorična analiza - Metodologija - Preskus "duo-trio" (ISO/FDIS 10399:2017)**

Sensory analysis - Methodology - Duo-trio test (ISO/FDIS 10399:2017)

Analyse sensorielle - Méthodologie - Essai duo-trio (ISO/FDIS 10399:2017)

**Ta slovenski standard je istoveten z: prEN ISO 10399**

---

**ICS:**

67.240 Sensorična analiza / Sensory analysis

**oSIST prEN ISO 10399:2017**

**en**



FINAL  
DRAFT

INTERNATIONAL  
STANDARD

ISO/FDIS  
10399

ISO/TC 34/SC 12

Secretariat: IRAM

Voting begins on:  
**2017-08-17**

Voting terminates on:  
**2017-11-09**

## Sensory analysis — Methodology — Duo-trio test

*Analyse sensorielle — Méthodologie — Essai duo-trio*

iTeh Standards  
(<https://standards.iteh.ai>)  
Document Preview

SIST EN ISO 10399:2018

<https://standards.iteh.ai/catalog/standards/sist/9a857fdd-8d88-4b0c-afb5-709d38085d2b/sist-en-iso-10399-2018>

RECIPIENTS OF THIS DRAFT ARE INVITED TO SUBMIT, WITH THEIR COMMENTS, NOTIFICATION OF ANY RELEVANT PATENT RIGHTS OF WHICH THEY ARE AWARE AND TO PROVIDE SUPPORTING DOCUMENTATION.

IN ADDITION TO THEIR EVALUATION AS BEING ACCEPTABLE FOR INDUSTRIAL, TECHNOLOGICAL, COMMERCIAL AND USER PURPOSES, DRAFT INTERNATIONAL STANDARDS MAY ON OCCASION HAVE TO BE CONSIDERED IN THE LIGHT OF THEIR POTENTIAL TO BECOME STANDARDS TO WHICH REFERENCE MAY BE MADE IN NATIONAL REGULATIONS.

**ISO/CEN PARALLEL PROCESSING**



Reference number  
ISO/FDIS 10399:2017(E)

© ISO 2017

iTeh Standards  
(<https://standards.iteh.ai>)  
Document Preview

SIST EN ISO 10399:2018

<https://standards.iteh.ai/catalog/standards/sist/9a857fdd-8d88-4b0c-afb5-709d38085d2b/sist-en-iso-10399-2018>



**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2017, Published in Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
Ch. de Blandonnet 8 • CP 401  
CH-1214 Vernier, Geneva, Switzerland  
Tel. +41 22 749 01 11  
Fax +41 22 749 09 47  
[copyright@iso.org](mailto:copyright@iso.org)  
[www.iso.org](http://www.iso.org)

# Contents

Page

<b>Foreword</b> .....	<b>iv</b>
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Terms and definitions</b> .....	<b>1</b>
<b>4 Principle</b> .....	<b>2</b>
<b>5 General test conditions and requirements</b> .....	<b>3</b>
<b>6 Assessors</b> .....	<b>3</b>
6.1 Qualification.....	3
6.2 Number of assessors.....	3
<b>7 Procedure</b> .....	<b>4</b>
<b>8 Analysis and interpretation of results</b> .....	<b>5</b>
8.1 When testing for a difference.....	5
8.2 When testing for similarity.....	5
<b>9 Test report</b> .....	<b>5</b>
<b>10 Precision and bias</b> .....	<b>6</b>
<b>Annex A (normative) Tables</b> .....	<b>7</b>
<b>Annex B (informative) Examples</b> .....	<b>13</b>
<b>Bibliography</b> .....	<b>21</b>

iTeh Standards  
(<https://standards.iteh.ai>)  
Document Preview

SIST EN ISO 10399:2018

<https://standards.iteh.ai/catalog/standards/sist/9a857fdd-8d88-4b0c-afb5-709d38085d2b/sist-en-iso-10399-2018>

## ISO/FDIS 10399:2017(E)

## 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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 34, *Food products*, Subcommittee SC 12, *Sensory analysis*.

This third edition cancels and replaces the second edition (ISO 10399:2004), of which it constitutes a minor revision. The references have been updated, the definition for [3.6](#) has been replaced and an expression in [A.3](#) has been corrected.

SIST EN ISO 10399:2018

<https://standards.iteh.ai/catalog/standards/sist/9a857fdd-8d88-4b0c-afb5-709d38085d2b/sist-en-iso-10399-2018>

# Sensory analysis — Methodology — Duo-trio test

## 1 Scope

This document specifies a procedure for determining whether a perceptible sensory difference or similarity exists between samples of two products. The method is a forced-choice procedure. The method is applicable whether a difference exists in a single sensory attribute or in several attributes.

The method is statistically less efficient than the triangle test (described in ISO 4120) but is easier to perform by the assessors.

The method is applicable even when the nature of the difference is unknown (i.e. it determines neither the size nor the direction of difference between samples, nor is there any indication of the attribute(s) responsible for the difference). The method is applicable only if the products are fairly homogeneous.

The method is effective for

- a) determining that
  - 1) either a perceptible difference results (duo-trio testing for difference), or
  - 2) a perceptible difference does not result (duo-trio testing for similarity) when, for example, a change is made in ingredients, processing, packaging, handling or storage, and
- b) for selecting, training and monitoring assessors.

Two forms of the method are described:

- the constant-reference technique, used when one product is familiar to the assessors (e.g. a sample from regular production);
- the balanced-reference technique, used when one product is not more familiar than the other.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 8589, *Sensory analysis — General guidance for the design of test rooms*

## 3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

## ISO/FDIS 10399:2017(E)

### 3.1 alpha-risk $\alpha$ -risk

probability of concluding that a perceptible *difference* (3.3) exists when one does not

Note 1 to entry: This is also known as Type I error, significance level or false positive rate.

### 3.2 beta-risk $\beta$ -risk

probability of concluding that no perceptible *difference* (3.3) exists when one does

Note 1 to entry: This is also known as Type II error or false negative rate.

### 3.3 difference

situation in which *samples* (3.5) can be distinguished based on their sensory properties

Note 1 to entry: The proportion of assessments in which a perceptible difference is detected between the two products is given the symbol  $p_d$ .

### 3.4 product

material to be evaluated

### 3.5 sample

unit of *product* (3.4) prepared, presented and evaluated in the test

### 3.6 sensitivity

< statistic> statistical parameters that measure the performance characteristics of the test

Note 1 to entry: In statistical terms, the sensitivity of the test is defined by the values of  $\alpha$ ,  $\beta$  and  $p_d$ .

### 3.7 similarity

situation in which any perceptible *differences* (3.3) between the *samples* (3.5) are so small that the *products* (3.4) can be used interchangeably

### 3.8 triad

three *samples* (3.5) given to an assessor in the duo-trio test

Note 1 to entry: In the duo-trio test, one sample is labelled as the reference, the other two are marked with different codes. One of the coded samples is the same product as the reference; the other coded sample is the other product in the test.

## 4 Principle

The number of assessors is chosen based on the sensitivity desired for the test (see 6.2 and the discussion in A.3).

Assessors receive a set of three samples (i.e. a triad), one sample of which is labelled as a reference and the other two samples have different codes. The assessors are informed that one of the coded samples is the same as the reference and that one is different. Based on their training and the instructions given prior to the test, the assessors report either which of the coded samples they believe to be same as the reference, or which of the coded samples they believe to be different from the reference.

The number of correct responses is counted and the significance is determined by reference to a statistical table.



## 5 General test conditions and requirements

**5.1** Clearly define the test objective in writing.

**5.2** Carry out the test under conditions that prevent communication among assessors until all the evaluations have been completed using facilities and booths that conform with ISO 8589.

**5.3** Prepare the samples out of sight of the assessors and in an identical manner (i.e. same apparatus, same vessels, same quantity of product).

**5.4** Assessors shall not be able to identify the samples from the way in which they are presented. For example, in a taste test, avoid any differences in appearance. Mask any irrelevant colour differences using light filters and/or subdued illumination.

**5.5** Code the vessels containing the samples in a uniform manner, preferably using three-digit numbers, chosen at random for each test. Each triad is composed of three samples, one labelled as the reference and two labelled with different codes. Preferably, different codes should be used for each assessor during a session. However, the same two codes may be used for all assessors within a test, provided that each code is used only once per assessor during a test session (e.g. if several duo-trio tests on different products are being conducted in the same session).

**5.6** The quantity or volume served shall be identical for the three samples in each triad, just as that of all the other samples in a series of tests on a given type of product. The quantity or volume to be evaluated may be imposed. If it is not, the assessors should be told to take quantities or volumes that are always similar whatever the sample.

**5.7** The temperature of the three samples in each triad shall be identical, just as that of all the other samples in a series of tests on a given type of product. It is preferable to present the samples at the temperature at which the product is generally consumed.

**5.8** The assessors shall be told whether or not they are to swallow the samples or whether they are free to do as they please. In this latter case, they shall be requested to proceed in the same manner for all samples.

**5.9** During the test sessions, avoid giving information about product identity, expected treatment effects, or individual performance until all testing is completed.

## 6 Assessors

### 6.1 Qualification

All assessors should possess the same level of qualification, this level being chosen on the basis of the test objective (see ISO 8586 for guidance). Experience and familiarity with the product may improve the performance of an assessor and, therefore, may increase the likelihood of finding a significant difference. Monitoring the performance of assessors over time may be useful for increased sensitivity.

All assessors shall be familiar with the mechanics of the duo-trio test (i.e. the format, task and evaluation procedure).

### 6.2 Number of assessors

Choose the number of assessors so as to obtain the sensitivity required for the test (see discussion in [A.3](#)). Using large numbers of assessors increases the likelihood of detecting small differences between the products. However, in practice, the number of assessors often is determined by material conditions

## ISO/FDIS 10399:2017(E)

(e.g. duration of the experiment, number of available assessors, quantity of product). When testing for a difference, the typical number of assessors is between 32 and 36. When testing for no meaningful difference (i.e. similarity), twice as many assessors (i.e. approximately 72) are needed for equivalent sensitivity.

Avoid replicate evaluations by the same assessor whenever possible. However, if replicate evaluations are needed to produce a sufficient number of total evaluations, every effort should be made to have each assessor perform the same number of replicate evaluations. For example, if only 12 assessors are available, have each assessor evaluate 3 triads to obtain a total of 36 evaluations.

**NOTE** Treating 3 evaluations performed by 12 assessors as 36 independent evaluations is not valid when testing for similarity using [Table A.2](#). However, the test for difference using [Table A.1](#) is valid even when replicate evaluations are performed[9],[10] Recent publications[7],[8] on replicated discrimination tests suggest alternative approaches for analysing replicated evaluations in discrimination tests.

## 7 Procedure

**7.1** If the product is familiar to the assessors (e.g. a control sample from the production line), use the constant reference technique. If neither product is more familiar than the other, use the balanced-reference technique

- a) **Constant-reference technique:** Prepare worksheets and scoresheets (see [B.2](#)) in advance of the test so as to utilize an equal number of the two possible sequences of two products, A and B:

A-REF AB A-REF BA

Distribute these at random in groups of two among the assessors (i.e. use each sequence once among the first two assessors; use each sequence once again among the next two assessors, etc.) This will minimize the imbalance that results if the total number of assessors is not an even number.

- b) **Balanced-reference technique:** Prepare worksheets and scoresheets (see [B.1](#)) in advance of the test so as to utilize an equal number of the four possible sequences of two products, A and B:

A-REF AB A-REF BA

B-REF AB B-REF BA

where the first two triads contain product A as the reference (i.e. A-REF) and the last two triads contain product B as the reference (i.e. B-REF). Distribute these at random in groups of four among the assessors (i.e. use each sequence once among the first group of four assessors; use each sequence once again among the next group of four assessors, etc.). This will minimize the imbalance that results if the total number of assessors is not a multiple of four.

**7.2** Present the three samples of each triad simultaneously if possible, following the same spatial arrangement for each assessor (e.g. on a line to be sampled always from left to right, in a triangular array). Within the triad, assessors are generally allowed to make repeated evaluations of each sample as desired (if, of course, the nature of the product allows for repeated evaluations).

**7.3** Instruct the assessors to evaluate the reference sample first, then evaluate the two coded samples in the order in which they were presented. Inform the assessors that one of the coded samples is the same as the reference and that one is different from the reference. Instruct the assessors to indicate either which of the two coded samples is the same as the reference, or which of the two coded samples is different from the reference.