Designation: E 2164 – 01

Standard Test Method for Directional Difference Test[1]

This standard is issued under the fixed designation E 2164; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This Test Method covers a procedure for comparing two products using a two-alternative forced-choice task.

1.2 This method is sometimes referred to as a paired comparison test or as a 2-AFC (alternative forced choice) test.

1.3 A directional difference test determines whether a difference exists in the perceived intensity of a specified sensory attribute between two samples.

1.4 Directional difference testing is limited in its application to a specified sensory attribute and does not directly determine the magnitude of the difference for that specific attribute. Assessors must be able to recognize and understand the specified attribute. A lack of difference in the specified attribute does not imply that no overall difference exists.

1.5 This test method does not address preference.

1.6 A directional difference test is a simple task for assessors, and is used when sensory fatigue or carryover is a concern. The directional difference test does not exhibit the same level of fatigue, carryover, or adaptation as multiple sample tests such as triangle or duo-trio tests. For detail on comparisons among the various difference tests, see referencess. **(1)**, **(2)**, and **(3)**.[2]

1.7 The procedure of the test described in this document consists of presenting a single pair of samples to the assessors.

1.8 *This 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 standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*

E 253 Termninology Relating to Sensory Evaluation of Materials and Products[3]

E 456 Terminology Relating to Quality and Statitstics[4]

E 1871 Practice for Serving Protocol for Sensory Evaluation of Foods and Beverages[3]

2.2 *ASTM Publications:*

Manual 26 Sensory Testing Methods, 2nd Edition

STP 758 Guidelines for the Selection and Training of Sensory Panel Members

STP 913 Guidelines. Physical Requirements for Sensory Evaluation Laboratories

2.3 *ISO Standard:*

ISO 5495 Sensory Analysis—Methodology—Paired Comparison

3. Terminology

3.1 For definition of terms relating to sensory analysis, see Terminology E 253, and for terms relating to statistics, see Terminology E 456.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 α *(alpha) risk*—the probability of concluding that a perceptible difference exists when, in reality, one does not (also known as type I error or significance level).

3.2.2 β *(beta) risk*—the probability of concluding that no perceptible difference exists when, in reality, one does (also known as type II error).

3.2.3 *one-sided test*—a test in which the researcher has an a priori expectation concerning the direction of the difference. In this case, the alternative hypothesis will express that the perceived intensity of the specified sensory attribute is greater (that is, A>B) (or lower (that is, A<B)) for a product relative to the other.

3.2.4 *two-sided test*—a test in which the researcher does not have any a priori expectation concerning the direction of the difference. In this case, the alternative hypothesis will express that the perceived intensity of the specified sensory attribute is different from one product to the other (that is, A≠B).

3.2.5 *common responses*—for a one-sided test, the number of assessors selecting the sample expected to have a higher intensity of the specified sensory attribute. Common responses could also be defined in terms of lower intensity of the attribute if it is more relevant. For a two-sided test, the larger number of assessors selecting sample A or B.

3.2.6 P_{max}—A test sensitivity parameter established prior to testing and used along with the selected values of α and β to determine the number of assessors needed in a study. P_{max} is the proportion of common responses that the researcher wants the test to be able to detect with a probability of 1 β. For

[1] This test method is under the jurisdiction of ASTM Committee E18 on Sensory Evaluation of Materials and Products and is the direct responsibility of Subcommittee E18.04 on Fundamentals of Sensory.

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[2] The boldface numbers in parentheses refer to the list of references at the end of this standard.

[3] *Annual Book of ASTM Standards,* Vol. 15.08

[4] *Annual Book of ASTM Standards,* Vol. 14.02

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