



Designation: E 619 – 84 (Reapproved 1995)

## Standard Practice for Evaluating Foreign Odors in Paper Packaging<sup>1</sup>

This standard is issued under the fixed designation E 619; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

*This standard has been approved for use by agencies of the Department of Defense.*

### 1. Scope

1.1 This practice covers the evaluation of odors in paper packaging and establishes smelling and testing procedures for trained sensory panels.

1.2 This practice covers effective techniques for determining the type and source of the odor and establishing the severity of contamination.

1.3 The techniques used in this practice are applicable to all paper packaging products and to auxiliary components, such as coatings, inks, and adhesives, as well as plastic materials used in conjunction with paper.

1.4 *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. Summary of Practice

2.1 Under the leadership of the test supervisor, qualified and trained subjects individually examine sample specimens by one or more of the test procedures described in this practice. Subjects judge the intensity of a perceived off-odor in terms of a numerical rating scale and also attempt to give a qualitative description of the taint. The assembled observations are then interpreted by the supervisor.

### 3. Significance and Use

3.1 *Use*—This practice should be used by panelists, trained as described in ASTM STP 758<sup>2</sup>, under the direction of a knowledgeable supervisor.

3.2 *Significance*—This practice can be used to evaluate indigenous and foreign odors in paper packaging materials as to type and intensity. A knowledgeable supervisor may be able to determine the source of a foreign odor from the information obtained from this procedure.

### 4. Sensory Test Panel Selection and Training

4.1 *General*—Sensory panel selection and training are described in STP 758 and in references therein.

4.2 *Size*—The test panel on a specific odor problem should consist of at least five members and should render a minimum total of ten judgments per sample. A maximum of twelve subjects may be used, if available. When possible, the subjects should be drawn from a larger pool of qualified panelists.

4.3 *Selection*—The important criteria in panel selection are: (a) normal ability to detect and identify odors and flavors; (b) ability to discriminate differences, and reproduce results; and (c) interest in the testing work for which the panelists are to be trained. Usually a suitable panel can be recruited from available employees unless their number is limited. It is helpful if panel members have a scientific background, with some knowledge of chemistry or food technology; however, this should not be a criterion for selection. Nontechnical personnel have often proved to be excellent panel members after appropriate training. No willing and available person should be excluded from consideration. Panel members should be requalified periodically.

### 5. Testing Facilities and Apparatus

5.1 *General*—Appropriate physical conditions for sensory panel operations are described in STP 434.<sup>3</sup>

5.2 *Testing Room*—Detection of low levels of odor requires a working space in which individual members of the panel can concentrate on the task. The room should be comfortable as to temperature, humidity, and noise, and relatively free of laboratory industrial odors. If ambient odor levels are too high, testing of the samples must be transferred to another location. Interruptions and other distracting influences should be avoided.

5.3 *Sample Containers*—Clean, dry, closed, odor-free containers of appropriate sizes are needed for storing samples and for confining specimens to develop maximum odor intensity or to test for taste transfer. Laboratory glassware, capped glass jars, and glass battery jars with plate glass lids are suitable for this purpose. Rubber gaskets or stoppers should not be used.

<sup>1</sup> This practice is under the jurisdiction of ASTM Committee E-18 on Sensory Evaluation Materials and Products and is the direct responsibility of Subcommittee E18.05 on Sensory Applications—General.

Current edition approved Nov. 30, 1984. Published January 1985.

<sup>2</sup> *Guidelines for the Selection and Training of Sensory Evaluation Panels*, ASTM STP 758, ASTM, 1981.

<sup>3</sup> *Manual on Sensory Testing Methods*, ASTM STP 434, ASTM, 1968.



Closures should provide adequate protection and contribute no odors of their own. Samples for storage may be wrapped directly in clean, low-odor, aluminum foil.

## **6. Materials**

**6.1 Water**—Moistening of material to intensify odors or to develop potential odors is frequently necessary. Tap water may be used provided it is free of a chlorine smell or other residual odor. Bottled spring water or distilled water are suitable alternatives, if odorless. When necessary, water may be further purified by filtering through charcoal. In any case, the water should be smelled and tasted before use to assure its suitability.

**6.2 Fatty Materials**—Various materials containing oil or fat may be used to pick up certain types of odors in transfer tests such as those described in 7.4. Mineral oil (odorless), cream, butter, and milk chocolate are recommended.

**6.3 Standard Samples**—It is good practice to include reference materials if available. Commercially produced packaging material representing either satisfactory or maximum permissible levels of odor are suitable. However, maintenance of such standards is usually difficult, since age and storage conditions may drastically alter odor properties. As part of quality control practices, a schedule should be established for acquiring and discarding standard samples; when appropriate, this schedule should be accepted in advance by both manufacturer and purchaser. (When a product normally contains traces of specific solvents, gas chromatographic analysis is often used to help in selecting standards of uniform quality.)

## **7. Methods for Preparing Test Specimens for Examination**

**7.1 General**—A single method will not suffice for the preparation of test specimens because of the wide range of materials that may be tested and the many types of odors that may be present. The more common methods are described in this section. Each laboratory should select and standardize the particular preparation procedures that seem best for specific products with which it is concerned.

**7.2 Methods that Utilize Direct Examination**—There are two categories of direct testing methods: immediate examination without prior confinement and examination after samples have been confined appropriately in a closed container to enhance odor intensity.

**7.2.1 Direct Examination Without Confinement**—This approach is usual in the preliminary investigation of an odor problem. Testing may be done by one or two experienced persons rather than a full sensory panel. Typical useful techniques are as follows:

**7.2.1.1 Examining Single Sheets**—Crumple one or more individual sheets of the sample into a loose ball, then partially open and sniff immediately while holding up to the face. To sample a large roll, cut or tear a conveniently sized representative specimen and test in the same way.

**7.2.1.2 Examining Stacks of Sheets**—Riffle a stack of sheets to expose many fresh surfaces in rapid succession, while simultaneously sniffing at the edge of the stack.

**7.2.1.3 Examining Samples in Bundles**—When a stack or bundle of sample sheets is received appropriately wrapped in

aluminum foil, open one end temporarily and sniff while gently squeezing and releasing the package to expel puffs of air.

**7.2.1.4 Opening Fresh Surfaces**—Valuable information about the origin and severity of an odor contamination can often be obtained by exposing fresh surfaces at the instant of smelling. For example, coated paper board and corrugated sheets can be torn apart into two layers from a corner or edge; several layers may be separated sequentially from more complex laminar constructions; wax can be scraped with a knife; or glued joints can be broken open.

**7.2.2 Direct Examination After Confinement**—The following confinement methods have been used successfully in preparing paper packaging materials for odor examination:

**7.2.2.1 Confining in Glass Pint or Quart Jars**—Confine the sample for a standardized period (16 to 24 h) at room temperature (20 to 25°C) or for appropriate periods at 38°C in special situations like those indicated in Table 1. Alternatively, heat for 1 h at 52°C, cool, and test immediately. Restrict specimen size so as to maintain a minimum of 25 % head space in a jar. Normally, prepare a separate jar for each panelist. (If the amount of sample is limited, the same jar may be smelled twice, provided 1 h or more is allowed in-between for recovery.)

**7.2.2.2 Confining in Covered Glass Battery Jars**—Store in battery jars (or similar large containers) for a standardized period (16 to 24 h) at room temperature (20 to 25°C). Use a sample of appropriate size. Prepare one jar per sample; this will normally suffice for the whole panel.

**7.3 Methods That Involve Moistening of Samples**—Water brings out some types of odors. The following techniques may be used, and are particularly appropriate for products that normally may be subjected to moisture (see 5.1 for water quality):

**7.3.1 Examination After Dampening**—Sprinkle the sample lightly with water, and smell immediately or after confining for a standardized brief period (30 min to 2 h) at room temperature (20 to 25°C) or at 38°C.

**7.3.2 Examination After Confinement over Water**—Store the sample in a covered glass jar containing water adjacent to but not in direct contact with the sample. Smell after storage for a standardized period (16 to 24 h) at room temperature (20 to 25°C) or for 4 h at 38°C.

**7.4 Methods That Examine Transfer to an Oily Substance**—To aid in identifying off odors and in estimating their potential for contaminating fatty foods, the following are useful procedures:

**7.4.1 Examination for Transfer to Mineral Oil**—Place the specimen in a covered glass dish adjacent to, but not in contact with, 10 mL of odorless mineral oil in a 4-in. glass Petri dish for a standardized period (16 to 24 h) at room temperature (20 to 25°C). Oil soluble contaminants such as printing ink solvents, kerosene, etc., can be detected by smelling the oil and comparing with an oil reference sample.

**7.4.2 Examination for Transfer to Butter**—Prepare a sandwich consisting of a pat of butter between two pieces of the specimen, and place in a covered glass Petri dish or a suitable screw cap jar. (A single test sandwich is adequate for a panel of five to six people.) For a reference sample, place a similar pat