



Designation: E2892 – 15

Standard Test Method for Odor and Flavor Transfer from Materials in Contact with Municipal Drinking Water¹

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1. Scope

1.1 This test method describes procedures for measuring odor and flavor properties of new products which may come into direct contact with municipal drinking water. For this method, “drinking water” will be considered water from the source (for example, river, lake, reservoir) through the municipal distribution system (that is, not including in-home or in-business taps). The focus of this test method is the evaluation of the materials in terms of their potential to transfer odors, flavors, or both to water.

1.2 This test method provides sample preparation procedures, methods of sensory evaluation, and a process for interpretation of results.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. All materials that come into contact with drinking water are required to be approved through testing by accredited laboratories using NSF/ANSI Standard 61. 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:²

E253 Terminology Relating to Sensory Evaluation of Materials and Products

E544 Practices for Referencing Suprathreshold Odor Intensity

E1885 Test Method for Sensory Analysis—Triangle Test

E1870 Test Method for Odor and Taste Transfer from Polymeric Packaging Film

¹ This test method is under the jurisdiction of ASTM Committee E18 on Sensory Evaluation and is the direct responsibility of Subcommittee E18.06 on Food and Beverage Evaluation.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

2.2 Other Standards:

NSF/ANSI Standard 61 Drinking Water System Components – Health Effects³

3. Terminology

3.1 *Definitions*—See Terminology E253.

4. Summary of Test Method

4.1 The inherent odor and flavor level of the material is estimated from the intensities developed upon exposure to water. This method defines the procedure for preparation and evaluation of the material using four steps: (1) Preparation of component sample; (2) Leaching of sample in extraction water; (3) Sensory analysis; and (4) Data analysis and interpretation.

5. Significance and Use

5.1 Many materials that come into contact with drinking water have the potential of impacting the aesthetic quality of the water. Some of these diverse materials include: storage reservoirs, concrete or metal piping, or both, sealants, synthetic reservoir covers and liners, mending adhesives, gaskets, paints, and plastics. Though NSF Standard 61 provides testing for health effects, it does not address taste and odor implications. A Utility Quick Test, Ref (1),⁴ has been proposed, but has not been adopted as an official test standard. Taste and odor problems have been reported as a result of organic compounds leaching from approved materials into water. Materials only need to be tested if they come into direct contact with drinking water.

6. Testing Facilities and Personnel

6.1 All personnel involved in any aspect of the testing should take precautions to refrain from using personal products (for example, perfume, cologne, scented soaps, food products) which may introduce extraneous odors.

6.2 Guidelines for optimal sensory testing location criteria are detailed in Ref (2). At a minimum, all testing should be

³ Available from NSF International, P.O. Box 130140, 789 N. Dixboro Rd., Ann Arbor, MI 48113-0140, http://www.nsf.org.

⁴ The boldface numbers in parentheses refer to a list of references at the end of this standard.

conducted in a location that is odor-free, quiet, temperature controlled, and not used for chemical testing.

6.3 This test method is intended for use by trained panels under leadership of a sensory professional. For discussions on training panelists, see Refs (2-4).

7. Materials

7.1 *Blank Water*, as odorless and tasteless as possible. Bottled spring water should be assessed by the panel prior to use in testing. If noticeable odor(s) or taste(s) are present, obtain a different lot or brand of water until a suitable product is identified.

7.2 *Glass Vessel*, beaker or equivalent, large enough to hold volume as determined in Section 10.

7.3 *Aluminum Foil*, uncoated.

7.4 *Glass Bottles*, 1-L with PTFE-lined screw cap for storing samples prior to sensory analysis.

7.5 *Plastic Cups*, 5 or 6 oz, brand that has been predetermined not to impart any interfering odors or flavors to water they will contain. Do not use wax coated or paper cups.

7.6 *Watch Glasses*, large enough to cover the cups used in the method.

8. Cleaning Glassware

8.1 Use new, clean glassware for each evaluation. This glassware must be odor-free and shown not to impart any taste or odor to the sample during testing. Any caps or liners not made of glass must be discarded after use since these cannot be sufficiently clean for reuse.

8.2 If it is not economically practical to use new glassware each time, ensure the glassware is clean and odor-free prior to each use.

8.3 If glassware must be reused, rinse with water immediately after completion of testing. Cleaning should then be completed by washing with commercial, unscented glassware washing detergent to remove any residue. Test the glassware for cleanliness by rinsing with distilled water and observing how the water rinses from the surface. The water should sheet off of the surface rather than form droplets. The exact glassware cleaning procedure used must be tested to confirm the glassware will not impart any taste or odor during testing.

8.4 Store all glassware in a closed cabinet away from chemical odors to protect from contamination. Glassware stored upside down or with foil over any openings will prevent dust from settling on surfaces.

9. Sample Preparation and Cleaning

9.1 A representative sample of the material shall be tested. The sample should include all components as intended in the final use. Test pieces may be either factory made products or site-applied products. The material should be tested in triplicate (that is, three separate samples of material).

9.2 Samples of the test material shall be kept intact as much as possible (that is, not cut into fine pieces). Whole components should be used when practical. If component must be cut, only

the areas that will be in contact with drinking water should be exposed to the test water.

9.3 For large components, such as tanks and reservoirs, material samples may be evaluated on behalf of the finished product. Concrete surrogate samples may be evaluated on behalf of concrete lined pipes and other concrete-based products.

9.4 Site applied products include coatings, linings, paints, sealants, and solvent cements. These products applied to an appropriate substrate may be evaluated on behalf of components whose entire water contact surface is covered by the coating. The manufacturer shall provide detailed application instructions, including: (1) Surface preparation; (2) Mix ratios and mixing method; (3) Method of application; (4) Minimum cure temperature, time, and conditions; (5) Product film thickness; and (6) Associated products, for example, primers and undercoats.

9.5 Remove any surface materials (labels, tape, etc); do not use soaps or solvents.

9.6 Rinse with blank water.

9.7 Condition the material to be tested by soaking it in blank water for a defined period of time depending on the material and its use. See NSF/ANSI 61 and Refs (5 and 6).

9.8 Disinfection:

9.8.1 Note that disinfection may impact the sensory analysis. Conduct aroma analysis on the sample prior to disinfection.

9.8.2 Disinfect sample by soaking for three hours in aqueous solution (using blank water) of 50 mg/L chlorine; rinse with blank water until wash water contains <0.5 mg/L chlorine.

9.8.3 Repeat the aroma analysis on the disinfected sample. If the aroma characteristics are significantly different from the original sample, the user must determine if this test is appropriate for their purposes.

9.8.4 If the aroma analysis on the disinfected and non-disinfected sample are comparable, proceed with flavor analysis.

10. Exposure Method

10.1 Use blank water as defined in 7.1 for all leaching procedures.

10.2 A method blank shall be processed in the same manner as the samples, using the same blank water, but without addition of the test material.

10.3 All samples should be prepared in triplicate (that is, three separate pieces of material to be leached in three containers of blank water).

10.4 The test shall be conducted using a 24-h exposure period. Alternate exposure times may be used to better replicate operational use of the product.

10.5 Surface area to volume ratio should be at least 15 cm²/L or greater. For guidance on proper surface to volume ratios for particular material types, see NSF/ANSI Standard 61 and Refs (1, 5 and 6). The entire surface of the sample should be covered by the extraction water. The extraction vessel