



Designation: D4009 – 92 (Reapproved 2023)

## Standard Guide for Foam Stability of Hand Dishwashing Detergents<sup>1</sup>

This standard is issued under the fixed designation D4009; 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.

### 1. Scope

1.1 This guide provides guidelines for several techniques of measuring the foam stability of light-duty hand dishwashing detergent products in the presence of artificially applied test-food soils. It is intended as a laboratory screening test to aid in the formulation of products, for quality control and as a basis between the formulator and supplier in standardizing foam stability of the detergents.

1.2 *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. 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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.3 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

### 2. Summary of Guide

2.1 Soiled dinner plates are washed by hand in solutions of hand dishwashing detergents under standardized conditions until an end point of near-disappearance of the foam is reached, after which the number of plates washed is compared to the number of plates washed using a standard product.

### 3. Significance and Use

3.1 The guide, as now constituted, is not suitable for ranking of hand dishwashing products, since no basis is available at this time for correlation of the foam stability of these products

<sup>1</sup> This guide is under the jurisdiction of ASTM Committee D12 on Soaps and Other Detergents and is the direct responsibility of Subcommittee D12.16 on Hard Surface Cleaning.

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using any particular food soil or combination of soils with consumers' ranking of performance.

3.2 The relative foam stability ranking of hand dishwashing detergent products will vary greatly depending on the type of food soils used in the test. Therefore, selection of the standard food soil to be used in a test shall be made by agreement between the interested parties on the basis of experience.

3.3 This laboratory screening guide includes flexibility in several areas so as to allow its use by the maximum number of laboratories, without purchase of significant additional equipment. It should be recognized, therefore, that differences in specific equipment may result in a reduced level of interlaboratory and inter-operator precision, and such results must be evaluated with caution.

### 4. Recommended Conditions

4.1 **Water Hardness**—If only one test is to be made, hard water (150 ppm, about 9 grains per gallon (gpg)) is suggested. To produce a more complete picture of product foam stability, test at two or three additional hardness levels: soft water (35 ppm, 2 gpg); moderately hard water (100 ppm, 6 gpg); or very hard water (260 ppm, 15 gpg).

4.1.1 **Calcium/Magnesium Ratio** (as  $\text{CaCO}_3$ )—It is suggested that this ratio be adjusted for different water hardness as follows:

| Water Hardness Range,<br>ppm (gpg) | Calcium/Magnesium<br>Ratio |
|------------------------------------|----------------------------|
| 0 to 60 (0 to 3.5)                 | 4:1                        |
| 61 to 120 (3.6 to 7.0)             | 3:1                        |
| 121 and over (7.1 and over)        | 2:1                        |

4.2 **Water Temperature**—The water temperature at the start of the test should be adjusted to 47 °C (117 °F).

### 5. Materials

5.1 **Plain White Glazed Dinner Plates in Sound Condition**—200 mm to 230 mm (8 in. to 9 in.) in diameter, with 160 mm to 165 mm (6 1/4 in. to 6 1/2 in.) indented bottom.

5.2 **Dishpan (conventional)**—Bottom diameter = 280 mm (11 in.), top diameter = 370 mm (14 1/2 in.), depth = 140 mm (5 1/2 in.). Sheet metal or plastic are suitable materials.

5.3 **Dishcloth (any conventional brand), Dish Mop, or Disposable Dishcloths**—Enough clean dish cloths (or dish mops) should be available to ensure the use of a fresh cloth (or