



Designation: D 2960 – 98

Standard Test Method for Controlled Laundering Test Using Naturally Soiled Fabrics and Household Appliances¹

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1. Scope

1.1 This test method covers a testing technique that may be used for comparing the cleaning and whitening or brightening performance of home laundering products or home laundering procedures. This testing is done on naturally soiled family items in home laundering equipment in a laboratory under controlled conditions on a paired comparison basis. As many as four detergents have been put into order by evaluating the set of matched garments two at a time.

1.2 There is no single assessment that will give the overall performance of laundry product. A single test can only predict how products compare under the particular conditions chosen for evaluation and cannot be expected to reflect their comparative performance under the many other possible conditions of use. A series of assessments is always necessary in order to evaluate the many aspects of product performance. While there are laboratory methods of measuring individual aspects of performance (for example, redeposition, solubility), it is necessary to conduct confirming tests under controlled but practical home laundering conditions to simulate consumer experience more closely.

1.2.1 Among the variables that can affect the performance of home laundering products or procedures and that shall be considered in designing tests for their evaluation are: type of fiber, fabric construction, fabric finish, types of items to be washed, load size, kind and level of soils or stains, water hardness, water temperature, pretreatments, the presence of various laundering aids, the concentration of products in the laundering solution, sequence of addition of products, water, laundry, wash time, rate and type of agitation, spin speed, drying or ironing methods, and conditions under which the items are judged.

1.3 *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 appro-*

priate safety and health practices and determine the applicability of regulatory limitations prior to use.

2. Referenced Documents

2.1 ASTM Standards:

D 1729 Practice for Visual Appraisal of Colors and Color Differences of Diffusely Illuminated Opaque Materials²

D 3050 Guide for Measuring Soil Removal from Artificially Soiled Fabrics (Not Suitable for Detergent Ranking)³

E 97 Test Method for Directional Reflectance Factor, 45-deg, 0-deg, of Opaque Specimens by Broad-Band Filter Reflectometry²

E 179 Guide for Selection of Geometric Conditions for Measurements of Reflection and Transmission Properties of Materials²

E 284 Terminology of Appearance²

E 313 Practice for Calculating Yellowness and Whiteness Indices from Instrumentally Measured Color Coordinates²

2.2 ANSI Standards:⁴

L14.175 Reflectance, Blue and Whiteness of Bleached Fabric

Z224.1 (AHAM HLW-1) AHAM Household Washer Performance Evaluation Procedure

3. Summary of Test Method

3.1 This test method consists of comparing matched loads of laundry through a series of soiling and washing cycles. The washings are performed by using predetermined concentrations of the two or more detergents or two or more laundry additives, or both, and predetermined but identical water temperatures and water hardness conditions in the same machine or in matched machines. If more than one machine is used, it is recommended that the loads and machines be rotated. The laundry bundle from each family is separated into two or more matched loads. All loads are to have been soiled in the same time period by each family. A judgment of relative performance is made at the end of each laundering cycle. It is

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² Annual Book of ASTM Standards, Vol 06.01.

³ Annual Book of ASTM Standards, Vol 15.04.

⁴ Available from American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.

generally necessary to continue for at least ten cycles to ascertain whether or not a significant difference exists.

3.2 This multicycle test may minimize or exaggerate the true relationship of the several detergents. Repeat tests shall be made to confirm or deny results that are questionable for any reason whatsoever.

3.3 Gross inconsistencies in soiling and staining by panelists, dye transfer from one item to others during the wash, inconsistencies in washing due to machine failure, and other such aberrations shall be watched for and reported. If they occur, they may necessitate removal of the garments or repeat tests.

4. Significance and Use

4.1 This test method defines a minimum combination of conditions to provide a reasonable basis for the visual evaluation of cleaning and whitening or brightening performance of home laundering products or procedures. To provide a more predictive and broader scope of evaluation or to assess special product types or end uses, testing should be augmented by extending specific variables.

4.2 This test method is suited to the evaluation of the cleaning, whitening or brightening properties of laundry products. This test method does not address the evaluation of some other important performance aspects of products such as: the effect on fabric life or home laundry appliances, or the physical properties such as pourability, dustiness, or solubility. However, the effect on color, feel, or odor of fabrics may be evaluated by appropriate and relatively minor changes in procedure.

5. Laundry Panel

5.1 The laundry panel shall be composed of family units consisting of an adult male, an adult female, and two or more children, with the family units being adjusted based on the number of products. The more family units involved, the greater the statistical validity is likely to be and the smaller the difference that can be distinguished. Experience suggests that ten family units can be reasonably predictive. Extra family units should be included to provide for attrition during the test period, for example, if the base is to be ten families, the test should be started with twelve families.

5.2 The families chosen for the panel should live close enough to the testing laboratory so that the soiled laundry can be brought to the testing laboratory and returned to the families' homes preferably during the same day.

5.3 Such demographic factors as age of family members, occupations, local, and type of dwelling should be recorded. This information could be important to evaluate the reproducibility of the test or to correlate this test with others.

6. Laundry Load

6.1 The load weight shall be compatible with the capacity of the test washer(s). For most top-loading automatic washers, a 5 to 7-lb (2.3 to 3.2-kg) load is satisfactory. (The U.S. median weight of all loads washed in top-loading automatics is about 6 lb.). For more than two products, extra care in recruiting panelists is needed because of the large number of articles.

6.2 Use new, moderately priced national brand garments and household items typical of the washable items found in the home. Assembling matched sets of items is extremely important. Use only items that match visually (and instrumentally if desired). The weight and composition of the bundles shall be maintained. If there is a loss of any item for any reason, replace the matched pair.

6.3 Select the loads to fit the needs of the panel so that each matched set is used during each use cycle with the objective of obtaining approximately equal soiling.

6.4 Include primarily white items to maximize sensitivity to cleaning and redeposition effects. Any colored items should be colorfast under conditions chosen for laundering. Dye transfer will interfere with evaluation of deposition, redeposition, or detergent colorant staining effects.

6.5 The test load should represent typical items found in a current family wash. Make an effort to balance the fiber content between cotton, polyester/cotton blends and man-made fibers (for example, 100 % nylon and 100 % polyester). This may change depending on test objective. Fluctuations in fiber availability and changing textile trends make it difficult to specify precise fiber contents and fabric constructions for specific items. In interlaboratory work a standard load should be agreed upon by the participating laboratories. Record and report the actual fiber composition of the items in the test load. A typical test load for each product that would allow use of some items by each person in a four member family might include:

1	twin-size bottom sheet (polyester/cotton)
4	pillow cases (polyester/cotton)
4	terry face cloths (cotton)
4	terry hand towels (cotton)
3	T-shirts (polyester/cotton)
2	man-made fiber slips, nightgowns, or pajamas
2	men's dress shirts (polyester/cotton)

6.5.1 Add extra new items if needed to bring the load up to the desired weight. For this two to four product test as described here, provide each family with two to four identical loads of the items listed in 6.5 or similar items.

7. Apparatus

7.1 *Household Automatic Washer in Good Working Condition*—Test the physical performance characteristics of any machine used in a test program to be sure the machine is operating properly. This should include an examination of water volume (fill level), timer control, rate of agitation, and spin. This is particularly important if more than one machine is involved as in interlaboratory testing. Any malfunction of a machine or any difference between machines of the same model could completely alter the results of a laundry treatment comparison. A separate test is necessary to obtain valid evaluation of product performance in other types of washers.

7.1.1 The “regular” or “normal” cycle with a 12-min wash is suggested as typical. Monitor the fill, volume, temperature, and time for each wash.

7.2 *Household Automatic Clothes Dryer in Good Working Condition*—As with washers, the physical performance characteristics of the dryer (inlet and outlet temperatures and timer operation) should be tested to be sure of proper operation. It is