

Special Equipment and Materials Used in AATCC Test Methods

It is the policy of AATCC to include in AATCC test methods and evaluation procedures commercial names and specific products of only those items supplied directly from AATCC, deemed generic, or products for which there is only one known source. Equipment and materials listed below will be referred to the on-line *AATCC Buyers Guide* for more information concerning potential sources of equipment and materials. AATCC does not qualify, or in any way approve, endorse or certify that any of the listed equipment or materials meets the requirements in its test methods.

<i>Item</i>	<i>Source</i>	<i>Item</i>	<i>Source</i>
AATCC Chromatic Transference Scale (for various colorfastness tests)		Detergent	
9-Step Chromatic Transference Scale	A	1993 AATCC Standard Reference Detergent	
AATCC Gray Scale Viewing Stand (various colorfastness tests)	A	(Methods 61, 88B, 88C, 96, 124, 130, 135, 142, 143, 150, 179) per 25 lb	A
AATCC Red 40 Stain Scale (Method 175)	A	1993 AATCC Standard Reference Detergent WOB	
AATCC Standard Sandals (Method 134)	A	(Methods 23, 61, 167, 172, 188, 190) per 25 lb....	A
AATCC Static Protected and Static Unprotected Carpet (set of 2) (Method 134)	A	AATCC Detergent 171 (Methods 137, 138, 171)	A
AATCC Wrinkle Tester (Method 128)	A	2003 AATCC Standard Reference Liquid Detergent	
Accelerated Laundering Machine (Methods 61, 86, 132, 190)	D	(Methods 61, 88B, 88C, 124, 143)	A
Stainless Steel Cylinder, 3 × 5 in. each	D	2003 AATCC Standard Reference Liquid Detergent WOB (Methods 61, 130, 172, 188, 190)	A
Stainless Steel Cylinder, 3.5 × 8 in. each	D	Bleach Activator (Method 190)	A
Stainless Steel Ball, 0.25 in., per 250	D	Sodium Perborate Monohydrate (Method 190)	A
White Synthetic Rubber Balls, 3.8 in. dia., 70 Durometer hardness	D	Dispersibility of Disperse Dyes: Filter Test	
Accelerator, Model AB-7 (Method 93)	C	Filter Residue Scale (Method 146)	A
Acrylic Static Control Carpet (Method 134)	A	Stainless Steel Ring (Method 146)	A
Ballast Fabric (Methods 88B, 88C, 96, 124, 130, 135, 142, 143, 150, 172, 179, 188, 191)	D	Drycleaning Cylinder (Method 162)	D
Barré Scales (set of 9) (Method 178)	A	Drycleaning Colorfastness (Method 132)	
Basic Dyes (Method 141)	A	Stainless Steel Discs, per doz.	D
Blotting Paper, White AATCC Textile (Methods 8, 15, 35, 42, 70, 116, 118, 125, 130, 157, 165, 183, 190, 193, 195) 20 × 40 in.		Cotton Twill Cloth, Undyed (available by the yard or as ready-cut pieces)	D
1/4 ream (125 sheets) or more, per cwt	A	Dust Generating Device (Method 184)	D
(Paper can be ordered in 10 × 10, 6 × 9 or 6 × 6-inch sizes at an additional charge)		Dye Dusting Test Apparatus (Method 170)	A
No shipment made of less than 1/4 ream		Dye Dusting Paper Collar (Method 170)	A
Chlorine Test Control Fabric 162; 50 × 105 cm (Method 162)	A	Dye Dusting Photographic Rating Scale (Method 170)	A
Chromatic Transference Scale (for various colorfastness tests)		Dynamic Absorption Tester complete with jar (Method 70)	D
9-Step Chromatic Transference Scale	A	Stainless Steel Jar	D
Conditioning Racks, Drawings (Methods 96, 135, 150, 172, 179, 188)	A	Electrostatic Clinging of Fabrics (Method 115)	
Cotton Fabric; 80 × 80 print cloth (carded yarns) 44 in. wide, desized and bleached; no bluing, optical bleach or finishing material present	D	Kit including Metal Test Plate, Grounding Plate, Wood Rubbing Block and Urethane Foam	A
Cotton Sateen, Greige (Method 27)	D	Rubbing Nylon Fabric	D
Cotton Skeins, Greige, 5-gram (Methods 17, 43, 89) ..	D	Rubbing Polyester Fabric	D
Crease Appearance Replicas (Methods 88C, 143), set of 5	A	Fading Apparatus	
Crockmeter with Counter (Methods 8, 165)	D	Carbon-Arc Lamp (Method 16)	D
Crockmeter, Motorized, with shutdown Counter (Method 8)	D	Outdoor Exposure Rack (Method 16)	D
Crockmeter, Rotary Vertical (Method 116)	D	UV Light (Method 186)	D
Crockmeter Cloth (Methods 8, 61, 116, 165), 80 × 84 (combed yarns) 44 in. wide, desized and bleached; no bluing, optical bleach or finishing material present	D	Xenon-Arc Lamp (Methods 16, 125)	D
		Filter Residue Scale (Methods 146, 166)	A
		Flock Rating Chart (Method 142)	A
		Flood Lamp, 500 Watt DXC (RFL-2) (Methods 88C, 143)	A
		Gas Fading Standard (Methods 23, 164)	
		20 yds of dyed ribbon and a swatch of the Standard of Fading	B
		Gas Fading Test Chamber (Method 23)	
		small scale, blueprint only	A
		Glassine Paper, 150 ft × 12 in., per roll (Method 130) ..	A
		Gray Scale for Color Change including Intermediate Steps (all colorfastness tests)	A
		Gray Scale for Staining (various colorfastness methods)	
		Heating Device (Methods 92, 114, 117, 133)	D
		Hydrostatic Head Tester (Method 127)	D
		Hydrostatic Pressure Tester (Method 127)	

<i>Item</i>	<i>Source</i>	<i>Item</i>	<i>Source</i>
Impact Penetration (Method 42)		Smoothness Appearance Replicas (Methods 124, 143), (set of 6).....	A
Spray Head.....	A	Soap, Neutral Granular (Method 89)	
Clip and Plate Unit.....	A	12 lb.....	
Complete Apparatus Type I Tester (includes Spray Test Apparatus).....	A	Soil Release test (Method 130)	
Complete Apparatus Type II Tester.....	A	5 lb. weight.....	A
Jute Underlay (Method 134), (set of 2).....	A	Glassine Paper, 150 ft. × 12 in., per roll.....	A
Lightfastness Standards L2, L4, L5 (Method 16)		Sole material: Neolite, approx. 14 × 14 in.	
Each Standard, 50 × 75 cm.....	A	(Method 134).....	A
Standard of Fading for Lightfastness		Spray Nozzle (Method 22).....	A
Standard L2.....	A	Spray Test Apparatus, complete (Method 22).....	A
Standard of Fading for Lightfastness		Spray Test Unit: Hoop and Rating Chart	
Standard L4.....	A	(Method 22).....	A
Microscopy Supplies (Method 20).....	A	Stain Release Replica.....	A
Microscopy Cross-section Kit.....	A	Stain Resistance: Pile Floor Coverings (Method 175) .	A
Yarn Holder and Fabric Holder.....	A	AATCC Red 40 Stain Scale.....	A
Razor Blades, 1 Box of 100.....	A	FD&C Red 40 (50 g).....	A
Cross-section Slides, 50.....	A	AATCC Stain Cup and Ring (2 sets).....	A
Black and White Filler Yarn.....	A	Standard Sandals (Method 134).....	A
Cashmere/Wool Standard Reference Fibers.....	A	Static Jute Underlay (Method 134), (set of 2).....	A
Moisture Management Tester.....	C	Static Protected and Static Unprotected Carpet	
Multifiber Test Fabric containing filament		(Method 134), (set of 2).....	A
acetate, bleached cotton, spun nylon 6,6,		Tiles for Rug Back Staining (Method 137)	
spun silk, spun viscose, worsted wool (8mm)		3 in. × 3 in., per 40 tiles.....	A
(Methods 15, 61, 101, 106, 107, 132, 163).....	D	Uniformity Reference Scales (Barré) (Method 178),	
Multifiber Test Fabric containing filament		(set of 9).....	A
acetate, bleached cotton, spun nylon 6,6,		Washer and Dryer (various laundering methods).....	A
spun Dacron 54, spun Orlon 75, worsted wool		Wringer, Motorized Laboratory (Methods 8, 15, 70,	
(8 mm) (Methods 15, 61, 106, 107, 132).....	D	92, 106, 107, 137, 138, 162).....	D
Multifiber Test Fabric containing filament		Wrinkle Recovery Plastic Replicas (Method 128),	
acetate, bleached cotton, spun nylon 6,6,		(set of 5).....	A
spun silk, spun viscose, worsted wool		Wrinkle Tester (Method 128).....	A
(15 mm) (Methods 61, 117, 132).....	D	Xenon Reference Fabric (Method 16).....	A
Ozone Fading Control Standard No. 109 and		XRF-1, Standard of Fading (Method 16).....	A
Standard of Fading No. 109 (Method 109).....	B		
Ozone Fading Control No. 129 and Standard			
of Fading No. 129 (Method 129).....	A		
Ozone Test Chamber Blueprint (Method 129).....	A		
Perspiration Tester, horizontal and vertical			
(Methods 15, 106, 107, 163).....	D		
Test Rack.....	D		
Weight.....	D		
Photographs for Seams, Single and Double Needle			
(Methods 88B, 143).....	A		
Pleating Test Specimen Holder (Method 131).....	D		
Quickwash Plus System (Method 187).....	D		
Rain Tester (Method 35).....	A		
Ring, Stainless Steel (Method 146).....	A		
Shrinkage Scale and Marking Pens (Methods 96,			
135, 150, 179, 187).....	A		
Shrinkage Scale (Methods 96, 135, 150, 179, 187).....	A		

SOURCES OF SUPPLY

- A AATCC, P.O. Box 12215, Research Triangle Park NC 27709; telephone 919/549-8141 Ext. 226; fax: 919/549-8933; e-mail: orders@aatcc.org. Contact AATCC for pricing and shipping information or see our web site at www.aatcc.org.
- B Testfabrics Inc., P.O. Box 26, 415 Delaware St., W. Pittston PA 18643; telephone 570/603-0432; fax: 570/603-0433; e-mail: testfabric@aol.com; web site: www.testfabrics.com.
- C SDL Atlas L.L.C., 3934 Airway Drive, Rock Hill SC 29732-9200; tel: 803/329-2110; fax: 803/329-2133; e-mail: info@sdlatlas.com; web site: www.sdlatlas.com.
- D For potential equipment information pertaining to this test method, please visit the online AATCC Buyer's Guide at <http://www.aatcc.org/bg>. AATCC provides the possibility of listing equipment and materials sold by its Corporate members, but AATCC does not qualify, or in any way approve, endorse or certify that any of the listed equipment or materials meets the requirements in its test methods.

1993 AATCC Standard Reference Detergent and Laundry Detergents in General

Developed in 1995 by AATCC Committee RA88; revised 1981/1982, 1991, 1998 (with title change), 2005.

1. Background/History

1.1 AATCC Standard Reference Detergent 124 was chosen to represent the type of washing product used for home laundering in the 1960s. The composition of this particular detergent, when adopted, was, except for suds level, typical of commercial laundry products used by most persons for home laundering. A variant formulation, AATCC Standard Reference Detergent WOB (without optical brightener), was the same but without a fluorescent whitener for use in colorfastness to laundering tests.¹ However, the proliferation of detergent formula variations and even of new types of detergent since 1970 have made Standard Reference Detergents 124 and WOB obsolete. The following paragraphs provide some perspective concerning the current laundry detergent situation and the current use of 1993 AATCC Standard Reference Detergent.

1.2 From the early 1950s until 1970 there was little change in U.S. laundry detergents in regard to product form and general composition. Practically all of the detergent products intended for clothes washing were phosphate-built synthetic detergents varying primarily in kind of surfactant (anionic or nonionic), suds level and, to a lesser extent, in phosphate level. At that time almost all industry detergent products contained phosphates in amounts corresponding to 12-14% calculated as elemental phosphorus. Most brands were in powder form but there were also some heavy duty liquids. Other types, collectively comprising less than 10% market share, were detergent pellets, a few brands of true soap products and unbuilt detergent powders (e.g., formulated with surfactant and inert filler).

1.3 A growing ecological concern with U.S. water quality during the late 1960s resulted in considerable social and political pressure for eliminating the use of phosphate in detergent products. By the end of the decade, vast changes in deter-

gent formulation began which, at this writing, have not yet ceased.

2. Current and Future Trends in the Detergent Industry

2.1 In contrast to the period when high phosphate, low phosphate and nonphosphate detergents were sold simultaneously, the marketed laundry detergents today include: (a) nonphosphate carbonate-built powders, some of which may contain aluminosilicates (zeolites); (b) citrate-built heavy duty liquids; and (c) nonbuilt heavy duty liquids. Thus, the national brands are divided into three basic categories all of which are nonphosphate. Most detergents contain, besides surfactants and builders, ingredients to reduce caking (powders), fluorescent whiteners, antiredeposition agents, colorants, perfumes, suds control ingredients, and anti-corrosives. Some of them may also contain enzymes, bleaches, bleach alternative ingredients and softeners (now rare). The market share for liquids vs. powders in the late 90s is approximately a 49/51 split with liquids showing a steady rise. This trend is expected to continue.

2.2 In the longer term, the detergent market will continue to change due to: availability and cost of materials, product costs, energy conservation, and environmental concerns (in both end use and manufacturing). Packaging and product dosage will also constantly change. Consumers will continue to use laundry aids such as chlorine and non-chlorine bleaches, laundry boosters, pretreating/prespotting agents, softeners (both rinse cycle and dryer types), borax, bluing, etc. The laundry products market will constantly undergo subtle changes in all areas beyond the year 2000.

3. Rationale for Using 1993 AATCC Standard Reference Detergent

3.1 With this background and especially the environmental concerns with the use of phosphates, it had become apparent that a change in the formulation of the AATCC Standard Reference Detergent was needed. Because all existing industry test data relative to effects of home laundering on commercial textiles are based on Standard Reference Detergents 124 and WOB, comparisons were made using a concentrated carbonate built powder with no enzymes or phosphates. The

concentrated carbonate built powder formulation is representative of the types of products on the market in 1993. Enzymes were not added to the formula due to possible changes of enzyme strength over the storage life of the product.

3.2 Laboratory comparisons of Standard Reference Detergents 124 and WOB and the concentrated carbonate built powders both with and without optical brighteners indicated that no significant differences between the detergent formulations were seen except for oily stain removal. The new concentrated carbonate built formulas, named 1993 AATCC Standard Reference Detergent and 1993 AATCC Standard Reference Detergent WOB, were not as effective in removal of oily stains. This has been noted in the applicable test methods. Laboratory comparisons between 1993 AATCC Standard Reference Detergents and currently marketed products would likely show differences in washing performance. However, comparison among currently marketed products could also show differences of similar or even greater magnitude.

3.3 One of the factors leading to possible differences between results using the 1993 AATCC Standard Reference Detergents and current detergent products is water hardness. In hard water situations, the 1993 AATCC Standard Reference Detergents may give better soil removal results because they are more effective across a broader range of hardness than most commercially available products.

3.4 Users of standard test methods involving laundering need to be aware that other Standard Reference Detergents are used in various ISO test methods. These detergents are specified in methods designed for home laundering equipment sold in other parts of the world.

4. Rationale for Use of Reference Detergents in Laboratory Testing

4.1 Many fabric attributes critical to consumer use and acceptability, such as dimensional change, surface or smoothness appearance, colorfastness, soil release, and flammability resistance performance are influenced by the manner in which textile products are laundered. The textile industry has adopted standard detergents and laundering conditions to allow for the prediction of the acceptability of textile products to judge the perfor-

¹ Absorption of fluorescent whitener on a textile material changes its visual appearance and consequently interferes with the evaluation of color change and/or staining.

mance of their products. The standard detergents have been designed to represent a cross section of market detergents.

4.2 The use of locally purchased national brands of detergents in testing labs is a fairly common practice. This practice has been driven by several factors: a) care labeling considerations, b) inaccurate assumption that the same detergent brand has the same composition from location to location and from one year to the next one, c) the convenience of buying locally, and d) price. The use of “off the shelf”

detergents in laboratory testing adds an element of variability that use of standard test methods and detergents intends to control. The percentage of optical brightener or fluorescent brightener agents has a definite effect on colorfastness evaluations. The amount of optical brightener or fluorescent brightening agents is known to vary within a single brand of detergent sold for consumer use.

4.3 Detergent producers have developed detergents with other cleaning components such as non-chlorine color safe

bleach systems. AATCC now has full-scale (washing machine) methods and accelerated standard procedure for determination of colorfastness using such products. They are AATCC Method 172, Colorfastness to Powdered Non-Chlorine Bleach in Home Laundering, and AATCC Method 190, Colorfastness to Home Laundering with Activated Oxygen Bleach Detergent: Accelerated.

4.4 It should be noted that different standard laundering equipment and detergents are used in Europe and Asia.

2003 AATCC Standard Reference Liquid Laundry Detergent

Developed in 2003 by AATCC Committee RA88; revised 2005.

1. Background on Standard Reference Detergents

1.1 The AATCC and other testing and development groups have used standard reference detergents since the 1960s. AATCC Standard Reference Detergent 124 and AATCC Standard Reference Detergent WOB (without optical brightener) were the first formulations adopted by the AATCC to represent typical home laundry products of that era, primarily phosphate-built powder detergents.

1.2 During the 1970s, due to environmental pressures to eliminate the use of phosphates in detergents, a major shift in the composition of marketed laundry detergents began.

1.3 By the 1980s, the composition of the detergent market had moved from being predominantly phosphate-built, powder detergents to ~50% carbonate-built powder detergents and ~50% citrate-built heavy-duty liquid detergents.

1.4 Consequently, in 1993 the AATCC adopted a new standard reference detergent that was more representative of powder laundry products of the 1990s.

2. Trends in the Laundry Detergent Industry

2.1 Over the past decade, powder detergent sales have fallen while liquid detergent sales have experienced steady growth. In the mid 1990s, the powder and liquid detergent split was ~50/50. In 2001, the market split was closer to 40/60 in favor of liquid laundry detergents, with additional growth expected in that category. Other product forms (tablets, pouches, bags) make up a small percentage of the market. In the U.S., there has been increased activity with the tablet and pouch forms; their impact on the overall detergent market is to be determined.

2.2 The detergent market will continue to evolve as the demands of the consumer and chemical industries change. Detergents of the future will be impacted by many factors, including environmental concerns, conservation efforts, chemical availability, raw material costs, performance benefits, consumer needs, etc. There is therefore a need to ensure that reference detergents are reflective of marketed products and should be updated after major shifts in the detergent industry are noted.

3. Comparison of Powder and Liquid Laundry Detergents

3.1 Both powder and liquid laundry detergents are primarily composed of surfactants and builders (except non-built liquid detergents which contain primarily surfactants). They both also contain processing or delivery aids for product stability and can contain many optional ingredients to provide performance or aesthetic benefits, such as fluorescent brighteners, enzymes, bleaches, anti-redeposition agents, fiber and dye protective agents, perfumes, suds control agents, etc.

3.2 A key difference between powder and liquid laundry detergents is their builder system. Powder detergents are typically better built than liquid laundry detergents, have a carbonate-builder system, often contain aluminosilicates (zeolites) for added builder capacity, and perform optimally at higher pHs (pH~10). Heavy-duty liquid laundry detergents are typically citrate-built and perform optimally at lower pHs (pH~8.5).

4. Rationale for 2003 AATCC Standard Reference Liquid Laundry Detergent

4.1 Based on market share, the inclusion of a reference liquid laundry detergent for standard and developmental testing in the textile area is long overdue. For the past 10 years, liquid laundry detergents have made up at least ~50% of the U.S. detergent market and now make up nearly 60%. To be able to test and develop products that are relevant to the current laundry market, a reference liquid laundry detergent is needed.

4.2 Although powder and liquid detergents are designed to provide cleaning and stain removal, they achieve these objectives differently. A key difference is the pH regime in which the two product forms operate. Powder detergents perform optimally at higher pHs (pH~10). This higher pH is a relatively hostile environment for stains making powder detergents very effective at stain removal; however, the higher pH also tends to negatively impact fibers and dyes. Over the years, technologies have been developed to deliver benefits under high pH conditions and powder detergents have been able to overcome many of their initial disadvantages.

4.3 Liquid detergents perform optimally at lower pHs (pH~8.5). Because this pH is closer to neutrality, liquid laun-

dry detergents tend to be less harsh on fabrics and dyes. Over the years, technologies have been developed to help liquid laundry detergents deliver stronger cleaning benefits while maintaining the less harsh fabric and dye profiles. Since there are significant formulation differences between powder and liquid laundry detergents, different reference detergents are needed to fairly represent them.

4.4 The performance of the 2003 AATCC Standard Reference Liquid Laundry Detergent was compared to five nationally marketed products in the areas of cleaning (stain removal), color care, and fabric appearance. The standard reference liquid detergent is representative of the U.S. market.

4.4.1 Overall and on individual stains, the cleaning (stain removal) profile of the 2003 AATCC Standard Reference Liquid Laundry Detergent falls within the performance of the five nationally marketed liquid laundry detergents. ASTM Method D 4265-98 (Volume 15.04) was used under full-scale, median wash conditions (wash water at 90°F, 6 gpg hardness, 12 min wash cycle). Stain removal was assessed instrumentally and reported in SRI (stain removal index).

4.4.2 The colorfastness to washing of the 2003 AATCC Standard Reference Liquid Laundry Detergent is comparable to a nationally marketed liquid laundry detergent. AATCC Method 135, Dimensional Changes of Fabrics after Home Laundering, was used under full-scale, median wash conditions and taken to 30 wash cycles. Fabrics were assessed instrumentally (ΔE_{CIE}) and visually (Gray Scale). Using either assessment scale, the relative ranking of color change was similar between the 2003 AATCC Standard Reference Liquid Laundry Detergent and the nationally marketed product. Due to the very large size of this testing, the reference detergent was compared to only one nationally marketed product that is similar in composition.

4.4.3 In conjunction with the colorfastness testing, the impact of the 2003 AATCC Standard Reference Liquid Laundry Detergent on fabric appearance was also assessed and found to be similar to a nationally marketed liquid laundry detergent. AATCC Method 135 was used under full-scale, median wash conditions and taken to 30 wash cycles. Fabrics were assessed visually (color, pilling/abrasion).

4.4.4 The 2003 AATCC Standard Reference Liquid Laundry Detergent was

also compared to the powder 1993 AATCC Standard Reference Detergent for shape retention and color care profile. The performance results for these standards fall within their general market counterparts.

4.5 AATCC technical committees will incorporate the standard reference liquid detergent into appropriate test methods as they are developed and come up for reaffirmation.

4.6 This 2003 Liquid Standard is available without brighteners (referred to as “2003 AATCC Standard Reference Liquid Laundry Detergent WOB”) and with brighteners (referred to as “2003 AATCC Standard Reference Liquid Laundry Detergent”).

5. Rationale for Use of Reference Detergents in Laboratory Testing

5.1 Many fabric attributes critical to consumer use and acceptability, such as

dimensional change, surface or smoothness appearance, colorfastness, soil release, and flammability resistance performance are influenced by the manner in which textile products are laundered. The textile industry has adopted standard detergents and laundering conditions to allow for the prediction of the acceptability of textile products to judge the performance of their products. The standard detergents have been designed to represent a cross section of market detergents.

5.2 The use of locally purchased national brands of detergents in testing labs is a fairly common practice. This practice has been driven by several factors: a) care labeling considerations, b) inaccurate assumption that the same detergent brand has the same composition from location to location and from one year to the next one, c) the convenience of buying locally, and d) price. The use of “off the shelf” detergents in laboratory testing adds an element of variability that use of standard

test methods and detergents intends to control. The percentage of optical brightener or fluorescent brightener agents has a definite effect on colorfastness evaluations. The amount of optical brightener or fluorescent brightening agents is known to vary within a single brand of detergent sold for consumer use.

5.3 Detergent producers have developed detergents with other cleaning components such as non-chlorine color safe bleach systems. AATCC now has full-scale (washing machine) methods and accelerated standard procedure for determination of colorfastness using such products. They are AATCC Method 172, Colorfastness to Powdered Non-Chlorine Bleach in Home Laundering, and AATCC Method 190, Colorfastness to Home Laundering with Activated Oxygen Bleach Detergent: Accelerated.

5.4 It should be noted that different standard laundering equipment and detergents are used in Europe and Asia.