United States
CONSUMER PRODUCT SAFETY COMMISSION
Washington, D.C. 20207

MEMORANDUM

DATE: JAN 11 1999

TO : The Commission
Sadye E. Dunn, Secretary

Through: Jeffrey S. Bromme, General Counsel
Pamela Gilbert, Executive Director

FROM : Ron Medford, Assistant Executive Director RM
Office of Hazard Identification and Reduction
Margaret L. Neily, Project Manager, ESME
504-0508 Ext. 1293

SUBJECT: Briefing Package Supplement: Laundering/Detergent Update for Flammable Fabrics Act Standards--The Soap and Detergent Association (SDA) Laundering Procedure

The staff recently transmitted to the Commission a briefing package recommending publication of an NPR to update laundering procedures and the standard detergent specified in several Flammable Fabrics Act standards. Very recently, the staff received suggestions and back-up information from SDA for a different laundering procedure than that recommended by the staff in the briefing package (AATCC 124-1996). Copies of this material are attached with a staff evaluation. The SDA attempts to reproduce the "average" consumer laundering practice in the United States in their method. For example, SDA suggests lower wash and rinse water temperatures than those specified in AATCC 124-1996 (90°F vs. 140°F wash temperature; 60°F vs. <85°F rinse temperature).

This project is not intended to develop a new laundering method. The purpose of the amendments recommended by the staff is to modify the current procedure only as necessary to reflect the existence of modern equipment and detergent. A review of the laundering method suggested by SDA, does not convince the staff to change their recommendation for adopting AATCC 124-1996 in the current briefing package. While it is important to be aware of trends in the industry and in consumer practice, the AATCC test method (with its higher water temperatures) represents real, not necessarily average, laundering conditions and practices of today's consumers.

Attachment(s)

NOTE: This document has not been reviewed or accepted by the Commission.
Initial ___ Date 1/11/99

CPSA 6 (b)(1) Cleared
No Mfrs/PrvtLblrs or Products Identified
___ Excepted by ___
___ Firms Notified.

United States
**CONSUMER PRODUCT SAFETY COMMISSION**

**Washington, D.C. 20207**

**MEMORANDUM**

**DATE:** December 23, 1998

**TO** : Margaret Neily, Project Manager
Directorate of Engineering Sciences

**Through:** Andrew G. Ulsamer, Ph. D., Associate Executive Director, Directorate of Laboratory Sciences AGU

Robert T. Garrett, Director
Division of Engineering

**FROM** : Gail Stafford, Textile Technologist
Division of Engineering

**SUBJECT:** Soap and Detergent Association Proposed Laundering Procedure

As discussed in the Laboratory Sciences (LS) memo of August 1998, the Commission needs to decide whether to amend its flammability regulations because the laundering method referenced in the regulations has changed. The laundering method currently used by the Commission in its flammability regulations is the American Association of Textile Chemists and Colorists (AATCC) Test Method 124: "Appearance of Durable Press Fabric after Repeated Home Launderings". The 1967, 1969 and 1982 versions of Test Method 124 are referenced in the carpet/rug, children's sleepwear and mattress/mattress pad regulations respectively. The standard phosphate detergent specified in those versions of Test Method 124 is no longer available. Similarly, the washing machines and dryers specified in the current CPSC flammability regulations are no longer available. In order to better reflect current consumer laundering practices, the AATCC updated its Test Method 124. The 1996 version of Test Method 124 specifies a standard nonphosphate detergent as well as washer and dryer conditions that represent the types of products available to consumers today.

In order to determine if any other textile laundering standards are relevant to the Commission's flammability regulations, the Division of Engineering (LSE) identified a

number of textile laundering standards and evaluated them.[1] Fourteen laundering procedures, including the updated 1996 version of the AATCC Test Method 124, were evaluated for their appropriateness for laundering children's sleepwear, mattress pads, flokati carpets/rugs and machine washable carpets/rugs. Except for the AATCC Test Method 124-1996, almost all of the other standards evaluated were found not to be relevant. Since LSE's evaluation of textile laundering standards, the Soap and Detergent Association (SDA) submitted to the CPSC a protocol for laundering children's sleepwear. This memorandum briefly describes and evaluates that laundering protocol.

## SOAP AND DETERGENT ASSOCIATION (SDA)

Standard Laboratory Practice for Machine Laundering Fabrics Prior to Flammability Testing: SDA Recommended Wash Conditions Effect of Detergent and/or Fabric Conditioners on Fabric Flammability of Children's Sleepwear, Developed by SDA Committee in 1998.

This laundering protocol recommends a standard laboratory practice to determine the effect of 50 home launderings on the flammability performance of children's sleepwear. Features specified in the procedure are: water hardness, wash/rinse water temperatures, degree of agitation, drying cycle, detergent, volume of water, wash load weight and number of cycles. The warm wash water temperature specified is 32°C (90°F) and the cold rinse water temperature specified is 16°C (60°F) using the Normal/Cotton Sturdy washer setting, while the drying cycle uses the dryer setting High (71°C [160°F]). A standard nonphosphate detergent (AATCC Standard Reference Detergent 1993) is recommended. An option to use commercial detergents is provided, but the protocol does not distinguish between liquid or powder. The protocol also offers the choice to launder with detergent only or in combination with fabric softeners (either rinse or dryer added). Fifty wash/dry cycles are recommended.

## DISCUSSION

Currently the flammability regulations reference older versions (1967, 1969 and 1982) of AATCC Test Method 124. These older versions offer a choice of three machine wash temperatures and two drying alternatives, while all washes use the AATCC standard (phosphate) detergent 124. The current laundering provisions in the flammability regulations specify the hot water wash (60±3°C [140±5°F]) alternative from the AATCC 124 with a warm water rinse (41±3°C [105±5°F]) using the Normal wash setting as well as the Normal tumble dry cycle (with exhaust temperature

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[1]Superscript refers to references on page 4.

of 60-71°C [140-160°F]). The updated version of AATCC 124-1996, specifies a standard nonphosphate detergent (1993), three machine washing temperature alternatives (41±3°C [105±5°F], 49±3°C [120±5°F], 60±3°C [140±5°F]) and four drying alternatives (Tumble, Line, Drip and Screen); while all machine wash alternatives specify a cold water (≤29°C [≤85°F]) rinse.

Washing machines today have a hot wash/cold rinse setting. For washing machines tested at Laboratory Sciences, the temperature of the hot water entering the machine at the hot wash setting was the same as water from the tap. Electric hot water heaters are shipped from the factory with the thermostat set at 52°C (125°F).[2] Gas water heaters are shipped with the thermostat set on the lowest setting, but the instruction manual recommends that the thermostat be set at 49°C (120°F). Higher temperatures are possible for both kinds of water heaters. Therefore, consumers have hotter wash water available to them than the 32°C (90°F) that the SDA protocol specifies. By specifying a hot water wash (at 60±3°C [140±5°F]) and a cold water rinse, the proposed changes to the flammability regulations mimic wash conditions that are available to consumers.

Water hardness and laundry additives, such as fabric softeners, are variables in the SDA laundering protocol that need further evaluation. Water hardness can adversely affect the flammability performance of certain flame resistant fabrics depending on the type of detergent and the flame retardant (FR) treatment used. Fabric softeners may affect the flammability performance of certain fabrics. Both liquid and sheet fabric softener packages contain labels stating that they are not for use on garments labeled as flame resistant. More information is needed, however, to determine the appropriateness of including a water hardness criteria and the use of fabric softeners in the laundering provisions of the CPSC flammability regulations.

## CONCLUSION

At this time the CPSC is only updating the aspects of the laundering provisions in the flammability regulations that are completely outdated based on today's detergents, laundering equipment and consumer practices. The updated version of AATCC Test Method 124 reflects current consumer practice by specifying a detergent as well as washer and dryer conditions that are representative of the types of products available to and used by consumers today. Therefore, the AATCC Test Method 124-1996 still appears to be the most relevant to the CPSC's flammability regulations.

## REFERENCES


1. Memorandum to Margaret Neily, ES, From Gail Stafford, LSE, Textile Laundering Standards, August 1998, U. S. Consumer Product Safety Commission.

2. LS personal communication with Donald Switzer, December 1998, Directorate for Engineering Sciences, U. S. Consumer Product Safety Commission.

SDA The Soap and Detergent Association

Margaret Neily
Technical Program Coordinator
Office of Executive Director
Consumer Product Safety Commission
Room 704, East-West Towers
4330 East-West Highway
Bethesda, MD 20814

September 15, 1998

Dear Ms. Neily,

Many flammability tests and regulations have a laundering requirement either to determine the durability of the flame resistant performance or to establish the flame resistant classifications of textiles. See 16 C.F.R. §§ 1610.4(a), 1610.4(e), and 1615.4(g)(4). In the case of children's sleepware, the laundering requirements incorporate AATCC Test Method 124-1969. See 16 C.F.R. § 1615.4(g)(4).

The Soap and Detergent Association has developed a protocol regarding recommended washing conditions for fabric flammability of children's sleepware. The attached protocol addresses various conditions, such as wash temperature, dryer time and detergent type that reflect more closely the actual washing conditions of consumers. The protocol reflects the most updated knowledge of U.S. consumer's laundry practices, conditions and habits. The protocol suggests methods for washing garments pursuant to 16 C.F.R. §1615.4(g)(4) to determine the affects of various laundry procedures on flammability performance.

The attached table is simply a summary of current consumer laundering conditions. The data contained in the table was used in developing the laundering protocol.

If you have any further questions, please feel free to contact me at SDA .

Sincerely,

Jenan Al-Atrash, Dr. PH
Director, Human Health & Safety

cc: G. Stafford

475 Park Avenue South, New York, N.Y. 10016 • (212) 725-1262 • Fax (212) 213-0685

# SDA Recommended Wash Conditions for CFR 1615.4
# Effect of Detergent and/or Fabric Conditioners on Fabric Flammability of Children's Sleepwear

| Wash Condition | Recommendation | Comments |
|---|---|---|
| Water Hardness | 6 gpg | Blend streams of natural water ion source to achieve hardness. Hardness concentrate added to soft water is an option. |
| Wash Temperature | 90°F | |
| Rinse Temperature | 60°F | No colder than 60 F |
| Rinse Added Softener | | Manufacturers' Recommended dosage |
| Wash Cycle | Normal 12 minute cycle | |
| Gallons of Water Fill | 18 ± 1 gallons | |
| Load Weight | 6 pounds | Ballast and test sample fabrics to equal a total load weight of 6 lbs. |
| Ballast composition | 50/50 cotton/polyester blend | |
| Detergent type | Marketed or Test Detergent | Control Detergent will be AATCC 1993 Nil-P WB Detergent referenced in AATCC method 124-1996 |
| Detergent amount | Manufacturer Recommended amount | Control Detergent amount is 66 grams. Dictated by Reference detergent |
| Dryer Temperature | High Cotton Sturdy | Should result in 140-160°F |
| Dryer Time | 45 minutes | If ballast load not dry at 45 minutes, continue until dry (eg. 50 min). Repeat other cycles for same drying time. |
| Dryer Added Softener* | 1 sheet | |
| Total Cycles | 50 cycles washed and dryed. | Optional whether to evaluate intermediate points of 10, 30 cycles. 50 must be finished. |
| Fabric Samples for Testing | All polyester, consisting of :<br>terry knit<br>jersey knit<br>fleece<br>and other fabric types currently popular with children's sleepwear | Total of 4-6 fabric types will be tested, consisting of the three recommended fabrics plus others dictated by current market. Fabric swatches will be evaluated, not actual children's garments. Swatches to be washed entire 50 cycles before cutting for burn test. |

*Use either Rinse Added Softener or Dryer Added Softener, not both, for laundry additive tests. For detergent only testing, neither softener product will be added.

# Standard Laboratory Practice for Machine Laundering Fabrics Prior to Flammability Testing
# SDA Recommended Wash Conditions
# Effect of Detergent and/or Fabric Conditioners on Fabric Flammability of Children's Sleepwear

**Developed in 1998 by SDA Committee**

1. **Purpose and Scope**

1.1 This monograph recommends a standard laboratory practice to determine the effect of 50 home launderings on the flammability performance of children's sleepwear. The protocol offers the option to test with detergent only or in combination with laundry additives. It is not intended as a guideline for cleaning those items sold as flame resistant. Many flammability tests and regulations have a laundering requirement either to determine the durability of the flame resistant performance or to establish the flammability classifications of textiles (16 CFR Part 1610) before and after laundering (see 4.1). Some of these tests or regulations incorporate one AATCC procedure or another. Organizations have established different procedures, often not well documented. Hence the need for an SDA recommended protocol which allows the test method to match the consumers' habits and practices.

1.2 This laboratory practice is intended to represent typical home laundering conditions. Consequently, 32C (90F) is selected as the laundering temperature and 16C (60F) as the rinse temperature. AATCC 1993 Standard Detergent WB, nil-phosphate, is recommended as the control detergent for testing.

1.3 Additives may be incorporated if the parties agree (4.3). Consistent with the typical home laundering cycle concept, a drying cycle set on High (71C 160F) is specified after each wash cycle.

2. **Recommended Practice**

2.1 Fill washer with 18 ± 1 gallons of water at 32±2C(90±2F). Select a cold rinse setting of 16±1C(60±2F).

2.2 Water hardness should be in the range of 6 to 7 gpg.

2.3 Add detergent (see 4.5). For the control AATCC 1993 detergent, use 66 g of product. For marketed or test detergents, use manufacturers' recommended amount.

2.4 Add the fabric(s) to be tested along with ballast load to bring the load weight to 2.7 ± 0.1 kg (6 ± 0.2 lbs). (see 4.8) Keeping load weight constant is necessary for testing the effects of products such as detergent and laundering additives. Ballast composition should be 50/50 cotton/polyester blend.

2.5 Set the timer dial on the washer for a Normal or Cotton/Sturdy 12 min. cycle, and start the cycle (see 4.4).

2.6 If Rinse Added Fabric Softeners are to be tested, they should be added per the manufacturer's instructions at the beginning of the rinse cycle.

2.7 Upon completion of the entire wash cycle, place the load (test fabrics and ballast) in a home type dryer (see 4.6). Dry at the High setting, 71C (160F) for 45 minutes and time the cycle. When dryer sheets are being used as the softener type, place the recommended number of sheets per load in the dryer at this time. If the clothes are not dry at 45 minutes, continue until dry (50 min.). Note the total time and repeat other cycles for this time.

2.8 A total of 50 laundering sequences should be run. 50 cycles have been shown to be the typical useful life expectancy of a garment. (see 4.7)

3. **Additives**

3.1 The effects of laundry additives on flammability performance may be evaluated by using this standard practice. Additives should be appropriate for the fabric to be evaluated.

3.2 Follow manufacturer's recommended usage for product amount and when to add (see 4.9 and attached table for details).

3.3 Test each additive separately in conjunction with section 2

4. **Notes**

4.1 The Consumer Product Safety Commission regulates clothing and textile flammability under the Flammable fabrics Act. This voluntary industry standard was mandated as CS191-53 and was codified as 16 CFR 1610.

4.2 With modified hot water heaters in the home, typical hot water temperature is a maximum of 120F.

4.3 This procedure may be used to evaluate the effect of any home laundering additive on fabric flammability performance and may be used as the basis for home laundering recomm-endations with regard to such additives. In the event a home laundering recommendation has been made for a flame resistant fabric, regarding either use, or non-use, of any home laundering additive, that recommendation shall be followed in the application of this standard practice.

4.4 Kenmore Automatic Washers have been accepted as standard machines and are available from Sears, Roebuck & Co. Any other washer known to give comparable results may be used.

4.5 Oversudsing detergent can create excess suds and combine with the fabric softener to form an undesirable residue in the rinse.

4.6 Kenmore Automatic dryers have been accepted as the standard machines. Temperature controls are designed so that either the gas or electric model should give equivalent results. Any other dryer known to give comparable results may be used.

4.7 Optional whether to evaluate test fabric swatches at intermediate points of 10, 30 cycles. Samples must be washed 50 cycles before cutting for burn testing.

4.8 Fabric swatches will be evaluated, not actual children's garments. A total of 4-6 polyester fabric types is recommended, to include terry knit, jersey knit and fleece.

SDA The Soap and Detergent Association

November 12, 1998

Ms. Margaret Neily
Technical Program Coordinator
Office of Executive Director
Consumer Product Safety Commission
4330 East-West Highway
Bethesda, MD 20814

Dear Ms. Neily:

In response to your recent inquiry regarding SDA "Recommended Wash Conditioning for CFR1615-4-Effect of Detergent and/or Fabric Conditioners on Fabric Flammability of Children's Sleepwear", I would like to submit the following comments for your consideration.

1. The wash conditions recommended in SDA's protocol reflects current consumer habits and practices in the U.S. As reflected in market research data (see attachment), the average wash temperature in 1994 was 88° F, down from 95° F in 1979 due to the impact of energy-saving trends. This is the major reason why the recommended temperatures in SDA's protocol differs from that of the AATCC 124-1996 protocol.

2. Given that the test requires the performance of 50 wash cycles, it is important that the wash conditions be more representative of actual use conditions rather than conditions more appropriate for an accelerated use test.

3. In an effort to standardize the test and to obtain reproducible and consistent results, a number of variables, including water hardness, were considered in SDA's protocol.

4. The water hardness of 6-7 gpg reflected in SDA's protocol represents median values for the U.S.

I hope this answers your concerns. If I can be of further assistance, please feel free to contact me.

Sincerely,

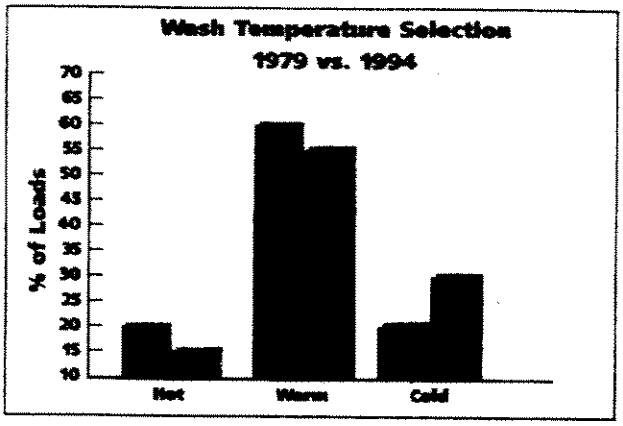
JA:em
Enc.

Jenan Al-Atrash, Dr. PH
Human Health & Safety Director

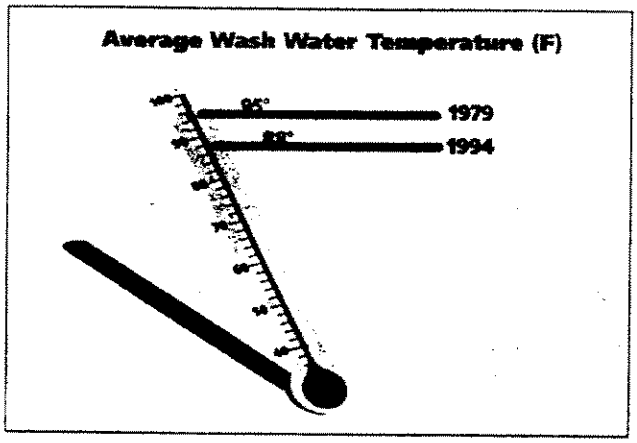
475 Park Avenue South, New York, N.Y. 10016 • (212) 725-1262 • Fax (212) 213-0685

***What impact has the energy-saving trend had on laundry products?***

Wash water temperatures have continued to decline on average, with only about 15% of all washes in 1994 done in hot water and nearly 30% done in cold. Also, to save energy, washing machine manufacturers have decreased their "warm" water temperatures by adding more cold water to the mix. Today, warm water is typically



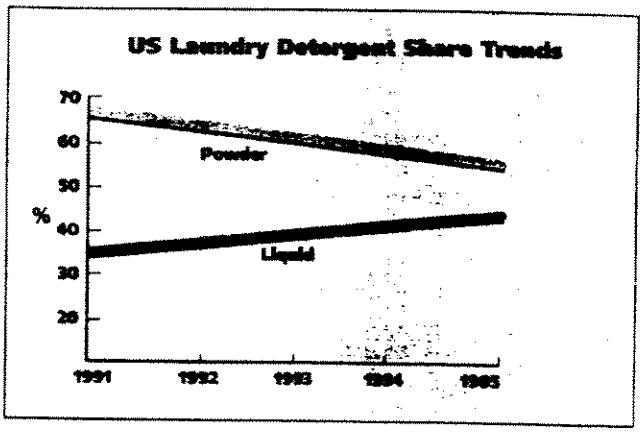

made by blending hot and cold water in the machine at a 40/60 ratio instead of 50/50 as in older washers. The end result is that in 1994, the average wash temperature was 88°F, down from 95°F in 1979.




Lower water temperatures make it more difficult to separate dirt from fabrics and more difficult to dissolve and disperse detergents. Manufacturers have reformulated products over the years to try to compensate for this decrease in wash temperature.

***What about some other trends in laundry products? Are liquid detergents becoming more popular?***

Yes. Liquid detergents are now used in nearly 50% of all washes, but we see regional differences. In parts of the northeast, for example, liquid detergents now account for almost 90% of all wash loads. The liquids' dissolution properties, convenience and use as pretreaters contribute to their acceptability.




***We know consumer demand for more effective products often leads to a change in ingredients. What are some ingredient trends?***

Manufacturers are using more weight-effective ingredients in their formulations. Now there are improved enzymes, such as proteases for better cleaning of protein stains like grass and blood, and lipases for improved oily soil removal.

While perborate bleach has been used in laundry detergents for decades, the addition of activators to allow the bleach to work more effectively at lower wash temperatures is new.

Since we're talking about ingredients, I should mention phosphates. Although phosphates are excellent detergent builders, concerns about excess nutrients entering water bodies led to their reduction and eventual elimination from major detergent brands. With extensive research and development, non-phosphate premium products now equal or surpass the old phosphate products for cleaning.



The Soap & Detergent Association
Cleaning Products... In Our Home In Our Environment
Video Conference Proceedings, April 17, 1997