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Dimensional Changes on Drycleaning in Perchloroethylene: Machine Method

Developed in 1978 by AATCC Committee RA43; editorially revised and reaffirmed 1979, 1985, 1995, 2011; editorially revised 1986, 1991, 1993, 2004, 2008, 2010; reaffirmed 1990, 2000, 2005, 2016. Partly equivalent to ISO 3175.

Foreword

Drycleaning, a process for cleaning textiles in an organic solvent, dissolves oils and fats and disperses particulate dirt substantially without the swelling and creasing associated with washing or wet cleaning. Small quantities of water and surfactant may be incorporated in the solvent to obtain better soil and stain removal. Some moisture-sensitive articles are preferably drycleaned without the addition of water to the solvent but a surfactant can be used in order to assist soil removal and prevent graying. Different solvents can be used for drycleaning, of which perchloroethylene (tetrachloroethylene) is the most common in many countries. For this reason, the present method prescribes the use of perchloroethylene. Drycleaning is normally followed by an appropriate restorative finishing procedure. In most cases, this comprises some form of steam treatment and/or hot pressing. Dimensional change on drycleaning and steaming and/or pressing is progressive, and in some cases a single treatment may give little indication of the extent of dimensional change that may arise after repeated treatments. Generally, most of the potential dimensional change is released after 3-5 drycleaning and finishing treatments.

1. Purpose and Scope

1.1 This test method specifies a drycleaning procedure, using a commercial drycleaning machine, for the determination of dimensional change of fabrics and garments after drycleaning in perchloroethylene. It comprises processes for normal materials and sensitive materials (see 13.1).

1.2 Very sensitive materials, which can be cleaned only when special precautions are taken, are excluded from the scope of this method (see 13.1).

1.3 The test method is intended only for the assessment of dimensional changes undergone by a specimen subjected to a single drycleaning and finishing operation. When it is desired to determine the amount of progressive dimensional change, the method may be repeated a specified number of times, normally not exceeding five cycles.

2. Principle

2.1 Conditioned fabrics or garments are marked and measured, then subjected to a drycleaning procedure, followed by an appropriate finishing procedure. They are afterwards conditioned and measured. The dimensional change is expressed as a percentage of the original dimensions.

3. Terminology

3.1 **dimensional change,** n.—a generic term for variation in length or width of a garment or fabric specimen subjected to specified conditions.

3.2 **drycleaning,** n.—the cleaning of fabrics with organic solvents such as petroleum solvent, perchloroethylene or fluorocarbon.

NOTE: The process also includes adding detergent and moisture to the solvent, up to 75% RH, and hot tumble drying to 71°C (160°F).

4. Safety Precautions

NOTE: These safety precautions are for information purposes only. The precautions are ancillary to the testing procedures and are not intended to be all inclusive. It is the user's responsibility to use safe and proper techniques in handling materials in this test method. Manufacturers MUST be consulted for specific details such as material safety data sheets and other manufacturer's recommendations. All OSHA standards and rules must be consulted and followed.

4.1 Good laboratory practices should be followed. Wear safety glasses in all laboratory areas.

4.2 All chemicals should be handled with care.

4.3 Perchloroethylene is toxic by inhalation, by repeated contact with the skin and by ingestion; it should be used only in a well vented atmosphere. Toxicology studies with laboratory animals have shown evidence of cancer in rats and mice exposed to perchloroethylene vapors at 100-400 ppm concentrations for prolonged times. Fabric saturated with this solvent should be dried in an adequately ventilated hood. Use chemical goggles or face shield, impervious gloves and an impervious apron when handling perchloroethylene.

4.4 An eyewash/safety shower should be located nearby and an organic vapor respirator should be readily available for emergency use.

4.5 The drycleaning apparatus should be ventilated to the outside atmosphere in accordance with the manufacturer's instructions.

4.6 Exposure to chemicals used in this procedure must be controlled at or below levels set by governmental authorities (e.g., Occupational Safety and Health Administration's [OSHA] permissible exposure limits [PEL] as found in 29 CFR 1910.1000; see web site: www.osha.gov for latest version). In addition, the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs) comprised of time weighted averages (TLV-TWA), short term exposure limits (TLV-STEL) and ceiling limits (TLV-C) are recommended as a general guide for air contaminant exposure which should be met (see 13.2).

5. Reagents

5.1 Perchloroethylene (commercial), $CCl_2 = CCl_2$, drycleaning grade.

5.2 Sorbitan mono-oleate (a typical chemical is Span 80).

6. Apparatus and Materials

6.1 Drycleaning machine. This shall consist of a commercial rotating cage type, totally enclosed machine for use with perchloroethylene. The diameter of the rotating cage shall be not less than 600 mm and not more than 1080 mm. Its depth shall be not less than 300 mm. It shall be fitted with three or four lifters. The speed shall be such as to give a g-factor (see 13.3) between 0.5 and 0.8 for cleaning and between 35 and 120 for extraction. The machine shall be equipped with a thermometer for the measurement of the solvent temperature. The machine shall have suitable facilities so that the emulsion can be introduced gradually into the solvent between the inner and outer cages below the level of the solvent. The machine may be of the single-unit washer/dryer type or a separate dryer may be used. Both types of dryers shall be equipped with temperature control of either the incoming or the outgoing air during the drying cycle. (Information on

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