



Designation: F1449 – 20

# Standard Guide for Industrial Laundering Care and Maintenance of Flame Resistant or Arc Rated Clothing<sup>1</sup>

This standard is issued under the fixed designation F1449; 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 recommendations for the care and maintenance of clothing that is flame resistant or arc rated.

1.2 These recommendations address the industrial laundering process. Industrial laundering is an effective cleaning process for flame resistant or arc rated clothing; follow all label care instructions. The National Institute for Occupational Safety and Health (NIOSH) recommends leaving clothing soiled with hazardous chemicals at work to be laundered by the employer or, if such clothing is washed at home, to launder separately from the family wash.

1.2.1 This guide does not apply to dry cleaning of flame resistant or arc rated clothing. For more information on dry cleaning, follow label instructions or contact your garment supplier. Dry cleaning indicates cleaning by a professional dry cleaner.

1.2.2 This guide does not apply to home laundering of flame resistant or arc rated clothing. For more information on home laundering, follow label instructions or contact your garment supplier. Home laundering indicates laundering in a home laundering machine. For more information on home laundering, see Guide F2757.

1.3 It is important that potentially flammable contaminants are removed from garments during the wash process. If flammable contaminants are not removed, the flame resistance of the garment may be compromised. Effective cleaning and proper maintenance of the protective characteristics of flame resistant or arc rated clothing should include consideration of cleaning, repair, and replacement.

1.3.1 To reduce the potential of employees wearing garments contaminated with flammable substances, the end user should analyze the soil conditions to which a wearer may be exposed, along with the effectiveness of the industrial wash procedure. If it is deemed ineffective, effective solutions should be pursued (dry cleaning, surfactants, disposable FR coveralls, etc.).

<sup>1</sup> This guide is under the jurisdiction of ASTM Committee F23 on Personal Protective Clothing and Equipment and is the direct responsibility of Subcommittee F23.80 on Flame and Thermal.

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1.4 It is important that the processes and materials used to launder flame resistant garments are compatible with the FR materials to ensure that the FR protection of the garment is not compromised during the laundering process.

1.5 It is the responsibility of the end user to determine if their laundering method is the appropriate care and maintenance procedure for their application. (See Appendix X1 and X1.1.)

1.6 This guide does not apply to specialized protective garments such as specialized firefighter turnout gear and proximity firefighter ensembles.

1.7 This guide also identifies inspection criteria that are significant to the performance of flame resistant or arc rated clothing.

1.8 *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.*

1.9 *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. Referenced Documents

### 2.1 ASTM Standards:<sup>2</sup>

D123 Terminology Relating to Textiles

F1494 Terminology Relating to Protective Clothing

F2757 Guide for Home Laundering Care and Maintenance of Flame, Thermal and Arc Resistant Clothing

### 2.2 Other References:

Textile Laundering Technology Handbook—2005 Edition by Dr. Charles Riggs, Ph.D. and Michael Klipper  
NIOSH, Protecting Workers' Families, A Research Agenda

<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

### 3. Terminology

#### 3.1 Definitions:

3.1.1 *care and maintenance, n*—effective cleaning to remove soil and maximize use life of garments while maintaining (not removing) protective properties and procedures for inspection, repair, and removal from service.

3.1.2 *end user, n*—the entity or organization whose employees ultimately wear the flame resistant or arc rated clothing.

3.1.3 *finish, n*—a chemical or mechanical modification, or both, of the fabric for a specific performance result.

3.1.4 *finishing technique, n*—the mechanical means by which the garment is put in its final state (for example, pressing, drying, tunneling).

3.1.5 *laundry wash formula, n*—the details related to procedures, cycle times, temperatures, and chemicals used in the laundering process.

3.1.6 *processing launderer (processor), n*—the party performing the operation of cleaning or repairing, or both, of the flame resistant or arc rated clothing.

3.1.7 *soil, n*—foreign substances on garments which are not part of the garment construction or materials.

3.1.8 *soil level, n*—the amount of soil on a garment (very light, light, medium, heavy, and very heavy) are subjective categories of soil levels commonly used in the laundry industry; the definition of each category depends on the soils, fabric type, garment construction, and fabric release properties. (Refer to “The Textile Laundering Technology Handbook” in Section 2, Referenced Documents.)

### 4. Summary of Guide

4.1 This guide provides guidelines for use by suppliers of the flame resistant and arc rated clothing (including the fabric and fibers used in its construction), processors, and end users to effectively care for and maintain flame resistant or arc rated clothing. The guidelines include:

4.1.1 A listing of elements to consider when developing wash procedures and formulas for processor(s).

4.1.2 Recommendations for removing flame resistant or arc rated clothing from service.

4.1.3 Recommendations for the repair, modification, and fit of flame resistant and arc rated clothing.

### 5. Significance and Use

5.1 This guide identifies the responsibilities of the fiber, fabric, and clothing manufacturers, as well as the processor, the processor’s chemical supplier, and the end user.

5.2 This guide describes the key components involved in an industrial laundry program for the care and maintenance of flame resistant and arc rated clothing.

5.3 The guidelines in this standard will provide a processor assistance to develop a processing system that maintains the flame resistant or arc rated clothing during its useful service life.

5.3.1 The development of published formulas for each fabric and level of soiling is difficult at any given point in time due to ongoing, continuous improvement of flame resistant and arc rated clothing, including new fibers, fabrics, and laundering equipment and procedures.

5.4 The guide also provides suggestions as to when flame resistant or arc rated garments should be removed from service.

5.5 Flame resistant or arc rated protective clothing not processed by an industrial laundry supplier are subject to a home laundry process and are subject to Guide **F2757**.

5.5.1 When wearers choose to launder their flame resistant or arc rated protective clothing at home, the laundry supplier cannot be held responsible for the condition of the garments.

### 6. Procedure

6.1 Flame resistant or arc rated garment manufacturers, in consultation with fiber and fabric suppliers, are responsible for providing information on the performance characteristics and maintenance needs of their garments. The end user is responsible for understanding the hazards present in the workplace and selecting appropriate engineering controls and protective equipment and garments to address those hazards.

6.2 The processor should sort flame resistant or arc rated clothing by fabric type and soil level in consultation with the chemical supplier, and wash separately from all other clothing.

6.3 The processor, in consultation with the chemical supplier, should develop loading plans and wash formulas to remove soils, while maintaining the flame resistant and arc rated characteristics of the garments.

6.3.1 Laundry wash formulas should be developed by the processor and wash chemical supplier in collaboration with the clothing and fabric manufacturers based on the following criteria:

6.3.1.1 Washing machine type and volume:

- (1) Machine loading factor
- (2) Mechanical action
- (3) Extraction
- (4) Cycle times

6.3.1.2 Product classifications and material construction.

6.3.1.3 Soil types and soil level.

6.3.1.4 Sorting.

6.3.1.5 Wash room chemistry:

- (1) Water temperature
- (2) Water hardness
- (3) Detergent makeup
- (4) Additives

6.3.1.6 Finishing process:

- (1) Type finishing-drying, pressing, tunneling
- (2) Moisture retention
- (3) Finishing temperature
- (4) Finishing time

6.3.1.7 Special instructions prohibiting laundering (for example, “Dry Clean Only” or “Do Not Wash”). Do not use chlorine bleach, hydrogen peroxide, starch, fabric softeners, or detergents with chlorine bleach, hydrogen peroxide, or derivatives of chlorine bleach or hydrogen peroxide. Follow manufacturer’s instructions regarding pre-treatments.