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Standard Guide for Industrial Laundering of Flame, Thermal, and Arc Resistant Clothing¹

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1. Scope

1.1 This guide provides recommendations for the care and maintenance of clothing that is flame, thermal, and arc resistant.

1.2 These recommendations address the Industrial Laundering process.

NOTE 1—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, thermal, and arc resistant clothing. For more information on dry cleaning, follow label instructions or contact your garment supplier.

NOTE 2—Dry cleaning indicates cleaning by a professional dry cleaner.

1.2.2 This guide does not apply to home laundering of flame, thermal, and arc resistant clothing. For more information on home laundering, follow label instructions or contact your garment supplier.

NOTE 3—Home laundering indicates laundering in a home laundering machine.

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 will be compromised. (See [Note 1](#).)

NOTE 4—Effective cleaning and proper maintenance of the protective characteristics of flame, thermal and arc resistant protective clothing should include consideration of the services a professional processor can supply.

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, thermal, and arc resistant clothing.

2. Referenced Documents

2.1 *ASTM Standards*:²

D123 [Terminology Relating to Textiles](#)

F1494 [Terminology Relating to Protective 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 Report of the Workers' Family Protection Task Force – February, 2002](#)

¹ 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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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at 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, thermal, and arc resistant 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, thermal, and arc resistant clothing.

3.1.7 *soil, n*—foreign substances that may be 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 22. Referenced Documents)

4. Summary of Guide

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

4.1.3 Recommendations for the repair, modification and fit of flame, thermal and arc resistant 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 a program for the care and maintenance of flame, thermal, and arc resistant clothing.

5.3 The guidelines in this standard will provide a processor assistance to develop a processing system that maintains the flame, thermal, and arc resistant characteristics of the 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, thermal and arc resistant clothing, including new fibers, fabrics, and laundering equipment and procedures.

5.4 The guide also provides suggestions as to when flame, thermal, and arc resistant garments should be removed from service.

6. Procedure

6.1 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, thermal, and arc resistant clothing by fiber, fabric, finish, 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 and thermal protective 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:

(1) *Washing Machine Type and Volume*

Machine Loading Factor

Mechanical Action

Extraction

Cycle Times