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Designation: F 1449 – 92 (Reapproved 2000)^{e1}



Standard Guide for Care and Maintenance of ~~Flame Resistant~~ Flame, Thermal and Thermally Protective Arc Resistant Clothing¹

This standard is issued under the fixed designation F 1449; 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 (ε) indicates an editorial change since the last revision or reapproval.

~~ε¹ NOTE—Keywords were added editorially in June 2000.~~

¹ This guide is under the jurisdiction of ASTM Committee F23 on Protective Clothing and is the direct responsibility of Subcommittee F23.80 on Flame and Thermal. Current edition approved ~~Oct. 15, 1992; November 10, 2001.~~ Published ~~February 1993; January 2002.~~ Originally published as F 1449 – 92. Last previous edition F 1449 – 92(00)^{ε1}.

1. Scope

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

NOTE 1—~~Ther~~ Therm focus of this standard is the ~~la~~ landering process. More detailed information on decontamination, inspection, storage and repair is available in NFPA 2113.

1.2 ~~These suggestions cover processing by laundering.~~ recommendations address the Industrial laundering process.

1.2.1 This guide does not provide detailed suggestions for dry cleaning. For more information contact your processor; his/her dry cleaning equipment supplier and solvent supplier; and the fiber, fabric, and garment manufacturers.

1.2.2 This guide does not apply to home laundering of ~~protective garments: flame, thermal, and arc resistant clothing.~~ Follow label directions or contact garment supplier. For best cleaning results and proper maintenance of the protective characteristics of flame, thermal, and arc resistant clothing the services of a professional processor is recommended. (See X1.1.)

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

1.3 This guide also identifies inspection criteria that are significant to ~~proper the~~ the performance of ~~protective flame, thermal, and arc resistant clothing.~~

2. Referenced Documents

2.1 *ASTM Standards:*

D 123 Terminology Relating to Textiles²

F-1002 Performance Specification for 1494 Terminology Relating to Protective Clothing³

2.2 *Other Standard:*

NFPA 2113 Standard for Use by Workers Exposed to Specific Molten Substances and Related Thermal Hazards² Care of Stationhouse Gear

² Annual Book of ASTM Standards, Vol 11.03, 01.06.

³ Annual Book of ASTM Standards, Vol 11.03.

3. Terminology

3.1 *Definitions of Terms Specific to This Standard*—The following terms have been defined specifically as they relate to this guide:

3.1.1 *care and maintenance*, *n*—effective cleaning to remove soil—procedures for cleaning, sterilization, decontamination, and maximize use life storage of garments while maintaining (not removing) protective properties. flame, thermal, and arc resistant clothing.

3.1.2 *end user*, *n*—~~the entity or organization whose employees ultimately wear the purpose of this guide, this term is used to identify specifically the party requiring protective clothing (for example, the employer of the person wearing the garment).~~ 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*—~~as applies to laundry and dry cleaning procedures, the~~ the mechanical means by which the garment is put in its final state (for example, pressing, drying, wrinkle removal, etc.) and so forth.

3.1.5 *laundry wash formula*, *n*—~~a list of chemicals, amounts,~~ the details related to procedures, cycle times, temperatures, and procedures chemicals used in a laundry operation. ~~the laundering process.~~

3.1.6 *processor maintenance*, *n*—~~the procedures a for inspection, repair, and res-tmo-gval from service of~~ flame, thermal, and arc resistant clothing.

3.1.7 *processing launderer (processor)*, *n*— the party performing the operation of cleaning or repairing, or both of the flame, thermal, and maintenance operation. ~~arc resistant clothing.~~

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 the end user to effectively maintain protective flame, thermal, and arc resistant clothing and to provide a means of determining when such items should be removed from service. This ~~guide~~ includes the following:

4.1.1 Classification of g flame, thermal, and arc resistants clothing by fiber, fabric, and finish.

4.1.2 ~~Classification~~

4.1.2 Listing of garments by degree and type of soil:

4.1.3 Recommendation of processing method (laundry or dry clean) (see 1.2.1):

4.1.3.1 Recommendation of laundry formula elements to employ:

4.1.4 Recommendation of finishing technique:

4.1.5 Recommendations consider when developing wash formulas

4.1.3 Recommendations for removing-g flame, thermal, and arc resistants clothing from service.

5. Significance and Use

5.1 This guide identifies the responsibilities of ~~both the processor~~ fiber, fabric, and clothing manufacturers, as well as the processor, the processor's chemical supplier, the fiber supplier and fabric suppliers, the end user, and the ~~garment manufacturers.~~ user.

5.2 This guide ~~provides category designations~~ has been developed to describe the key components involved in a program for the care and maintenance of flame, thermal, and arc resistant clothing.

5.2.1 New fibers, fabrics and construction techniques are continually being developed to improve flame, thermal, and arc resistant clothing.

5.3 The guidelines in this standard will provide a processor guidance to develop a processing system that maintains the flame, thermal, and arc resistant characteristics of-s the clothing during their useful service life.

5.3.1 New chemistry and washer controls are continually being developed as well.

5.4 It is this changing environment that makes the development of-use specific formulas for-p each fabric and soil type difficult to make absolute at any given point in time.

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

6. Procedure

6.1 The fiber, fabric, and garment manufacturers ~~should~~ are responsible to provide advice information on the performance characteristics and maintenance needs. The end user is responsible to determine the compatibility of the performance characteristics with the intended use and maintenance needs. ~~use.~~

6.2 The processor ~~and, if appropriate, and~~ the processor's chemical supplier and the end user should classify ~~g flame, thermal, and arc resistants clothing~~ by fiber, fabric, and finish (see Table 1). based upon information provided by the garment supplier.

6.3 This guide establishes the following categories for segregating ~~g flame, thermal, and arc resistants clothing~~ by fiber and fabric characteristics significant to maintenance:

6.3.1 GType A—Flame, thermal, and arc resistants clothing constructed exclusively of fabric made from inherently flame-resistant fibers that are tolerant to high-laundry and finishing temperatures. (See X1.2.)

6.3.2 GType B—Flame, thermal, and arc resistants clothing constructed exclusively of fabrics made from inherently

flame-resistant fibers that are not tolerant to high-laundry have limitations on the maximum temperature for laundering and finishing temperatures:

6.3.3 Garments finishing. (See X1.3.)

6.3.3 Type C—Flame, thermal, and arc resistant clothing constructed exclusively of fabrics that are chemically treated to produce the for arc, thermal, and flame resistance.

6.3.4 Type D—Flame, thermal, and thermal-resistant characteristic.

6.3.4 Garments arc resistant clothing constructed of mixtures a combination of fabrics of one or more of the above types.

6.3.5 Garments Type A, and/or B, and/or C.

6.3.5 Type X—Flame, thermal, and arc resistant clothing with specific label instructions prohibiting laundering, (for example, “Dry Clean Only”, “Do Not Wash”, “Do Not Dry Clean”). Wash”).

6.4 The processor, and if appropriate the processor’s chemical supplier and end-user, should consider user are responsible to determine if the garment degree and type methods which need to be utilized for proper cleaning of soiling and its compatibility with the cleaning system utilized to flame, thermal, and arc resistant clothing will maintain the protective flame, thermal, and arc resistant characteristics originally established for of the garment.

6.5 This practice suggests clothing.

6.4.1 Laundry wash procedures for formulas should be developed by the processor; and if appropriate, the processor’s wash chemical supplier in collaboration with the clothing and end user to employ for garment processing. (See Table 2, Table 3, and Table 4.)

6.5.1 If garment cannot fabric manufacturers based on the following criteria:

- (1) Water Temperature
- (2) Drying Temperature
- (3) Water Hardness
- (4) Mechanical Action
- (5) Machine Load Factor
- (6) Soil Sorting
- (7) Wash Room Chemistry
- (8) Finishing Temperature
- (9) Alkalinity of Detergents
- (10) Souring
- (11) Extraction
- (12) Cycle Times

6.4.2 Based on the preceding criteria the following processes may, but not necessarily be cleaned using included in a heavy-duty wash, wash formula. When selecting a presoak operation processor the end user should be considered as an optional part inquire if the processor is capable of a wash operation.

6.5.2 Using performing the appropriate table, select following procedures.

6.4.2.1 Flush—A high-level bath for a wash procedure short period of time prior to meet the maintenance requirements.

6.5.3 Using break. Flushes generally are used for conditioning textiles before subsequent baths and for removing debris and loose soil.

6.4.2.2 Break (break suds)—The first wash chemical bath. In light and medium-soil formulas, all of the appropriate table, select surfactant/detergent and alkali to be used in the chemical entire formula is generally added to use the washer in the w break bath. The break is the single most important step in the laundering proceduss from the standpoint of 6.5.2.

6.5.4 Using Table 1, select soil removal.

6.4.2.3 Suds—A bath occurring between the finishing technique break and ensuing steps. Suds baths are carried out at low water levels, usually with hot or tempered water. If alkali or detergent isn’t added on these additional suds baths, they are referred to as carryover.

6.4.2.4 Carryover (carryover suds) —A cleaning step in a laundry formula in which no supplies are added, but supplies previously added are retained for use.

6.5.4.2.5 Rinse—High water-level bath or baths following the bleach and preceding the sour or finishing bath. During rinsing the final portions of loosened soil are removed along with the data from Tables 1-4 should be governed by recognition that bulk of the information presented therein is strictly an example washing compounds used in laundering. Except for antichlors, chemicals are usually not added to illustrate conditions that have been employed rinse.

6.4.2.6 Sour bath—Normally the final bath in specific instances; the laundering process. The sequence purpose for the sour (or acid) bath is to neutralize the alkalinity of operations, times, and temperatures are cited as sample values.

6.5.6 Since the water in the textiles before removing them from the machine for finishing.

6.4.3 Since proper loading of the washer is essential to effective processing of protective garments flame, thermal, and arc resistant clothing appropriate consideration of load size should be coordinated with the machine manufacturer in cooperation with the processor, processor’s chemical supplier and fiber, fabric, and garment clothing manufacturers.

6.65 Determination of when flame, ther-gmal, and armc resistant clothing should be removed from service.

~~6.6.1 For most practical purposes garments may be removed from service for reasons as determined by inspection based on subjective evaluation. The shall be the ultimate responsibility for removal is with of the end user.~~

~~6.6.2 The inspection criteria include the~~

~~6.5.1 The following identifiable items (but not limited to) which may diminish the protective function of the flame, thermal, and arc resistant clothing can be determined by visual examination:~~

~~6.65.21.1 Worn Out—Thin spots, holes, excessive wear at edges, stains, or color loss.~~

~~6.65.21.2 Mechanical Damage—Evidence of cuts, rips, tears, open seams, and nonfunctional closures.~~

~~6.65.21.3 Repairs—If feasible, flame, thermal, and arc resistant clothing removed from service may be repaired and returned to service. Repairs shall be made using fabrics and components, which are equivalent to those, used in the original manufacturing.~~

~~6.5.1.4 Fit—GThe flame, thermal, and arc resistant clothing no longer fits the wearer. Garment may be assigned to another wearer if it meets all appropriate usability requirements.~~

~~6.65.21.45 Modification— Alteration to garment that differs significantly from original design or function.~~

~~6.6.2.4.1 Repairs—If feasible, garments removed from service for reasons in accordance with 6.6.2 may be repaired and returned to service. Repairs must be made only with materials equivalent in all respects to those used in the original fabrication.~~

~~6.6.2.5—~~

~~6.5.1.6 Contamination—A g Flame, thermal, and arc resistant clothing contaminated by materials that represent a flammability risk, health, or which are otherwise hazardous other safety risk to the wearer should be immediately removed from service by the end user.~~

APPENDIX

(Nonmandatory Information)

X1.7 Θ

~~X1.1 There may be circumstances under which home laundering of flame, thermal, and arc resistant garments should be avoided by the end user since home laundering cleaning conditions may not recommended except where be sufficient to remove contaminants that reduce the flame, thermal, and arc resistant characteristics (see Note X1.1). In addition, the end user determines there are extenuating circumstances requiring more detailed information about must ensure the cleaning process used in home laundering follow the manufacturers recommended laundering procedures. The individual(s) providing the home laundering must be adequately informed of the proper cleaning processes needed to insure the flame, thermal, and flammability arc resistant characteristics of protective clothing are maintained, for example, if chlorine bleach is used in service.~~

~~6.7.1 Flammability home laundering, the flame, thermal, and strength testing require samples arc resistant characteristics of some types of FR clothing can be taken from a garment that is removed from service. It should be recognized that compromised or eliminated.~~

~~NOTE X1.1—Some soils containing potentially flammable materials such tests are destructive in nature as solvents, oil, and the garment will have to other petroleum products may not be replaced:~~

~~6.7.2 For garments removed from service for testing by home laundering. Home laundering indicates laundering by the following tests apply:~~

~~6.7.2.1 Strength Loss (See Table 1 employee.~~

~~X1.2 An example of Performance Specification F 1002)—When tested in accordance with procedures specified in the reference document, remove garments from service when measured tensile Type A fabrics is Aramid.~~

~~X1.3 An example of Type B fabrics is FR acrylic.~~

~~X1.4 These examples are for illustrative purposes only and tear strengths are 50% not to be inclusive or less exclusive of the specified value any other fabrics whose characteristics might place them in Table 1 of Performance Specification F 1002.~~

~~6.7.2.2 Flammability (See Table 1 of Performance Specification F 1002)—When tested in accordance with procedures specified in the reference document, remove garments from service when they no longer meet the original specified value.~~

7. Keywords

~~7.1 care and maintenance; flame resistant; protective clothing; thermally protective clothing these categories.~~

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