



NATIONAL FIRE PROTECTION ASSOCIATION

The leading information and knowledge resource on fire, electrical and related hazards

NFPA Technical Committee on Flash Fire Protective Garments (FLG-AAA)

MEETING AGENDA NFPA 2112 First Draft (A2022)

Microsoft Teams Meeting

October 6 – 7, 2020

1:00-4:00pm (ET)

To join the Meeting: Contact Jenny Depew at jdepew@nfpa.org

1. Call to Order. Steven Addington, Chair.
2. Introductions.
3. Approval of Meeting Minutes from September 6-8, 2016 (**Attachment A**)
4. Staff Updates. Elena Carroll, NFPA Staff
 - Staff Liaison Presentation
 - Committee Membership Roster (FLG-AAA) (**Attachment B**)
 - Review A2022 Revision Cycle (**Attachment C**)
5. Review and act on Public Input received on NFPA 2112. (**Attachment D**)
6. Other Business.
 - Discuss TIA Log No. 1513 (**Attachment E**)
7. Next Meeting.
8. Adjournment.

ATTACHMENT A

Technical Committee on Flash Fire Protective Garments (FLG-AAA)

Minutes of Meeting

Embassy Suites

220 West 43rd Street

Kansas City, MO 64111

I. Attendance

Principal Members/Staff:

Steven Corrado, *Chairman*, UL LLC

Eric Nette, *Staff Liaison*, NFPA, MA

Steven Addington, Eastman Chemical Company

James Dale, University of Alberta

Alec Feldman, Organisation for JOIFF-International

Pamela Kavalesky, Intertek Testing Services

Jill Kirby, ArcWear

Joshua Moody, Milliken & Company/Westex, Inc.

Roger Parry, The DuPont Company, Inc.

Mark Saner, Workrite Uniform Company, Inc.

Brian Shiels, PBI Performance Products, Inc.

Brian Spears, NFPA Industrial Fire Protection Section

Michael Stanhope, TenCate/Southern Mills, Inc.

Denise Statham, VF Imagewear/Bulwark Protective Apparel

David Wedge, Draper Knitting Company, Inc.

Alternate Members and Guests:

Dominique Adams, TenCate/Southern Mills, Inc.

Diane Hess, PBI Performance Products, Inc.

Elihu "Hugh" Hoagland, Arcwear.com/e-Hazard.com

Tricia Hock, ASTM/Safety Equipment Institute (SEI)

Amanda Newsom, UL LLC

Dana Hammer-Fritzinger, Ansell

Quentin Bonner, Carhart

Yann Sadier, Groupe CTT

Craig Tutterow, Mount Vernon Mills

Lori Nyllengren, Red Wing Shoe Co.

Jan Honnindson, Daletec

Bill Gorak, W.L. Gore

Jeffrey D. Stull, International Personnel Protection

Harry P Winer, H/P Consulting LLC

John Morton-Aslanis, NC State University

Roger Barker, TPass/ NC State University

II. Meeting Minutes:

- 1. Call to Order.** The meeting was called to order at 8:00 a.m. on September 6, 2016. The Chair welcomed the Technical Committee (TC) members and guests to the meeting.
- 2. Self-Introductions.** The TC members and guests introduced themselves and identified their affiliations.
- 3. Approval of Minutes.** The minutes of the November 4-6, 2014 First Draft meeting were approved as written.
- 4. Staff Liaison Report.** The staff liaison made a brief presentation on NFPA policies and procedures, the new standards process, reviewed the document revision timeline (Attachment A, A2017 Revision Cycle), and updated the TC on membership changes.
- 5. Old Business.**
 - a. ASTM F 1930 Task Group Report
 - i. A presentation of the Round Robin test results was given by Dr. John Morton-Aslanis
 - b. New Garment Task Group Report
- 6. New Business:**
 - a. **NFPA 2112.** The Committee reviewed and resolved all the public comments. The Committee responses to the public comment, second revisions and committee statements will be posted in the Second Revision Report to be posted no later than January 16, 2017. The Second Draft Report will be available via www.nfpa.org/2112.
 - b. **Shirts & Coveralls.** The Committee would like to address shirts and coveralls requiring long sleeves during the next revision cycle of NFPA 2113.
- 7. Follow up Teleconferences.** The committee was unable to finish processing all of the Public Comments in person and finished their work over 2 teleconferences hosted by NFPA on September 28, 2016 and October 12, 2016.
- 8. Next Meeting.** The next meeting will be the First Draft Meeting in the next revision cycle. The date and location is still to be determined.
- 9. Adjournment.** The meeting was adjourned at 3:35 p.m. October 12, 2016.

Attachment A. A2017 Revision Cycle for NFPA 2112

Action	Date
Second Draft Meeting	Sep 6-8, 2016
Posting of Second Draft	December 12, 2016
Notice of Intent to Make a Motion (NITMAM)	February 20, 2017
Issuance of Consent Standard	May 12, 2017
NFPA Annual Meeting with CAMS	June 4-7, 2017
Issuance of Standard - with CAMS	August 10, 2017

Attachment B. A2019 Revision Cycle for NFPA 2113

Action	Date
Public Input Closing	June 28, 2017
Final Date for TC First Draft Meeting	December 6, 2017
Posting of First Draft	February 28, 2018
Public Comment Closing	May 9, 2018
Final Date for Second Draft Meeting	November 7, 2018
Posting of Second Draft	January 23, 2019
Notice of Intent to Make a Motion (NITMAM)	February 20, 2019
Issuance of Consent Standard	April 18, 2019

ATTACHMENT B

Address List No Phone

09/01/2020

Heath Dehn

FLG-AAA

Flash Fire Protective Garments

Steven Addington	U 8/5/2009	Peter Clark	M 1/1/1999
Chair Eastman Chemical Company 100 Eastman Road, B54D Kingsport, TN 37662	FLG-AAA	Principal Apparel Solutions International Inc. 8708 - 106 Street, Suite 601 Edmonton, AB T6E 4J5 Canada Alberta Burn Rehabilitation Society	FLG-AAA
James Douglas Dale	RT 1/1/1999	Alec Feldman	SE 8/2/2010
Principal University of Alberta Department of Mechanical Engineering 116 St & 85 Avenue Edmonton, AB T6G 2R3 Canada Alternate: Stephen Paskaluk	FLG-AAA	Principal Fulcrum Consultants 47 Rathfarnham Park Dublin, D14 KX78 Ireland JOIFF-International Organisation for Industrial Hazard Management	FLG-AAA
Brian W. Focht	U 04/03/2019	Diane B. Hess	M 04/08/2015
Principal PECO Energy, An Exelon Company Gas Methods & Training 300 Front Street West Conshohocken, PA 19428	FLG-AAA	Principal PBI Performance Products, Inc. 9800D Southern Pine Boulevard Charlotte, NC 28273-5522 Alternate: Joshua Ingram	FLG-AAA
Darren D. Hewston	U 08/11/2014	Tricia L. Hock	RT 03/05/2012
Principal Freeport-McMoRan Oil & Gas 11450 Compaq Center Drive West Building 9, Suite 450 Houston, TX 77070	FLG-AAA	Principal ASTM/Safety Equipment Institute (SEI) 1307 Dolley Madison Blvd. Suite 3A McLean, VA 22101 Alternate: Robert Simmonds	FLG-AAA
Pamela A. Kavalesky	RT 10/28/2008	Bob Kopko	U 08/03/2016
Principal Intertek Testing Services 3933 US Route 11 Cortland, NY 13045-9717 Alternate: Jason L. Allen	FLG-AAA	Principal R A K Welding And Industrial Sales 15630 River View Place Perrysburg, OH 43551	FLG-AAA
Joshua D. Moody	M 4/14/2005	John Morton-Aslanis	RT 11/30/2016
Principal Milliken & Company/Westex, Inc. 122 West 22nd Street Oak Brook, IL 60523-1598 Alternate: James Cliver	FLG-AAA	Principal North Carolina State University Textile Protection and Comfort Center 1020 Main Campus Drive Campus Box 8301 Raleigh, NC 27695	FLG-AAA

Address List No Phone

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Flash Fire Protective Garments

Amanda H. Newsom	RT 10/20/2010	Jason P. Reason	SE 07/29/2013
Principal UL LLC 12 Laboratory Drive PO Box 13995 Research Triangle Park, NC 27709-3995	FLG-AAA	Principal Seam Group/Lewellyn Technology 2518 Thorium Drive, Apt 3 Greenwood, IN 46143	FLG-AAA
Indrajeet M Roy	M 08/08/2019	Paul Schiffelbein	M 04/02/2020
Principal The DuPont Company, Inc.- India Pvt Ltd Ei Dupont India Pvt Ltd Gurgaon, Haryana Gurgaon, HARYANA 122002 India	FLG-AAA	Principal Dupont Protection Solutions 5401 Jefferson Davis Highway Nomex(R) Business Center Richmond, VA 23234 Alternate: Caroline Holtzman	FLG-AAA
Brian P. Shields	RT 08/08/2019	Joel E. Sipe	SE 11/30/2016
Principal ArcWear 3018 Eastpoint Parkway Louisville, KY 40223 Alternate: Jill Kirby	FLG-AAA	Principal Exponent, Inc. 3824 Ardley Avenue Oakland, CA 94602 Alternate: Francesco Colella	FLG-AAA
Michael T. Stanhope	M 4/28/2000	Denise N. Statham	M 10/20/2010
Principal TenCate/Southern Mills, Inc. 6501 Mall Boulevard PO Box 289 Union City, GA 30291-1519 Alternate: Dominique Adams	FLG-AAA	Principal VF Imagewear/Bulwark Protective Apparel 545 Marriott Drive Nashville, TN 37214	FLG-AAA
Dominique Adams	M 04/04/2017	Jason L. Allen	RT 10/28/2008
Alternate Tencate 6501 Mall Boulevard Union City, GA 30291	FLG-AAA	Alternate Intertek Testing Services 3933 US Route 11 Cortland, NY 13045-9715 Principal: Pamela A. Kavalesky	FLG-AAA
Principal: Michael T. Stanhope			
James Cliver	M 04/08/2015	Francesco Colella	SE 12/06/2019
Alternate Milliken & Company/Westex, Inc. 920 Milliken Road, M147 Spartanburg, SC 29303-4906 Principal: Joshua D. Moody	FLG-AAA	Alternate Exponent, Inc. 9 Strathmore Road Natick, MA 01760-2418 Principal: Joel E. Sipe	FLG-AAA

Address List No Phone

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Flash Fire Protective Garments

Caroline Holtzman	M 08/17/2018	Joshua Ingram	M 12/06/2019
Alternate Dupont 5401 Jefferson Davis Highway Richmond, VA 23234 Principal: Paul Schiffelbein	FLG-AAA	Alternate PBI Performance Products 9800 Southern Pine Blvd Suite D Charlotte, NC 28273 Principal: Diane B. Hess	FLG-AAA
Jill Kirby	RT 04/05/2016	Stephen Paskaluk	RT 04/08/2015
Alternate ArcWear 3018 Eastpoint Parkway Louisville, KY 40223 Principal: Brian P. Shiels	FLG-AAA	Alternate University of Alberta 302 Human Ecology Building Edmonton, AB T6G 2N1 Canada Principal: James Douglas Dale	FLG-AAA
Robert Simmonds	RT 08/11/2020	Heath Dehn	7/2/2020
Alternate Safety Equipment Institute (SEI) 25 Spring Street McGraw, NY 13101 Principal: Tricia L. Hock	FLG-AAA	Staff Liaison National Fire Protection Association One Batterymarch Park Quincy, MA 02169-7471	FLG-AAA

ATTACHMENT C

A2022 REVISION CYCLE

- Public Input Stage (First Draft):
 - Public Input Closing Date: June 30, 2020
 - First Draft Meeting: October 6-7, 2020
 - Posting of First Draft for Public Comment: March 2, 2021
- Comment Stage (Second Draft):
 - Public Comment Closing Date: May 11, 2021
 - Second Draft Meeting: November 9, 2021
 - Posting of Second Draft for NITMAM: January 25, 2022
- Tech Session Preparation:
 - NITMAM Closing Date: February 22, 2022

ATTACHMENT D



Public Input No. 37-NFPA 2112-2020 [Global Input]

Associated definitions and requirements for the use of cloth face coverings should be addressed similar to a proposed Tentative Interim Amendment. The updated definitions and requirements should reflect the latest information provided about the use of these products, though specific criteria relative to their flame and heat resistance should be appropriately addressed within the revision of NFPA 2112.

Statement of Problem and Substantiation for Public Input

The need to provide source capture and minimal protective cloth face coverings should be addressed through the use of products for worker that require the wearing of flame-resistant protective clothing.

Submitter Information Verification

Submitter Full Name: Jeffrey Stull

Organization: International Personnel Protection, Inc.

Street Address:

City:

State:

Zip:

Submittal Date: Mon Jun 29 18:05:34 EDT 2020

Committee:

**Public Input No. 20-NFPA 2112-2020 [Section No. 2.3.2]****2.3.2 ASTM Publications.**

ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.

ASTM D6413/D6413M, *Standard Test Method for Flame Resistance of Textiles (Vertical Test)*, 2015.

ASTM D7138, *Standard Test Method to Determine Melting Temperature of Synthetic Fibers*, 2016.

ASTM F1358, *Standard Test Method for Effects of Flame Impingement on Materials Used in Protective Clothing Not Designated Primarily for Flame Resistance*, 2016.

ASTM F1930, *Standard Test Method for Evaluation of Flame Resistant Clothing for Protection Against Fire Simulations Using an Instrumented Manikin*, 2015 2018 .

ASTM F2700, *Standard Test Method for Unsteady-State Heat Transfer Evaluation of Flame Resistant Materials for Clothing with Continuous Heating*, 2008 (2013).

ASTM F2733, *Standard Specification for Flame Resistant Rainwear for Protection Against Flame Hazards*, 2009 2017 .

ASTM F2894, *Standard Test Method for Evaluation of Materials, Protective Clothing and Equipment for Heat Resistance Using a Hot Air Circulating Oven*, 2014 2019 .

Statement of Problem and Substantiation for Public Input

updates

Submitter Information Verification

Submitter Full Name: Marcelo Hirschler

Organization: GBH International

Street Address:

City:

State:

Zip:

Submittal Date: Tue Jun 23 18:33:00 EDT 2020

Committee: FLG-AAA



Public Input No. 6-NFPA 2112-2020 [New Section after 3.3.38]

3.3.39 Venting Material.

Fabric material used in a flame-resistant garment to aid in the transfer of air from outside the garment to the wearer.

Statement of Problem and Substantiation for Public Input

Venting materials are commonly used on garments to aide in the cooling of the wearer in hot environments. The application of test requirements within this standard is unclear. Adding definition so that it can be more clearly defined throughout the standard.

Related Public Inputs for This Document

<u>Related Input</u>	<u>Relationship</u>
<u>Public Input No. 5-NFPA 2112-2020 [Section No. 7.1.4 [Excluding any Sub-Sections]]</u>	
<u>Public Input No. 7-NFPA 2112-2020 [New Section after 6.2.1]</u>	
<u>Public Input No. 8-NFPA 2112-2020 [Section No. 7.1.2 [Excluding any Sub-Sections]]</u>	

Submitter Information Verification

Submitter Full Name: Amanda Newsom

Organization: UI Llc

Street Address:

City:

State:

Zip:

Submittal Date: Mon Jun 22 16:20:16 EDT 2020

Committee: FLG-AAA



Public Input No. 35-NFPA 2112-2020 [New Section after 4.3]

TITLE OF NEW CONTENT

Type your content here ...4.3. X The certification organization shall list all facility(s) and location(s) where inspections, evaluations, conditioning, and testing were conducted for each corresponding performance requirement listed in Chapter 7.

Statement of Problem and Substantiation for Public Input

Current language does not disclose whether data is generated at independent, third party labs. End users must make decisions based on data without the ability to discern the origin of that data.

Submitter Information Verification

Submitter Full Name: Scott Margolin

Organization: Tyndale

Street Address:

City:

State:

Zip:

Submittal Date: Mon Jun 29 16:51:14 EDT 2020

Committee: FLG-AAA

**Public Input No. 18-NFPA 2112-2020 [Section No. 4.3.9]****4.3.9** Recertification.**4.3.9.1**

Any change in the design, construction, or material of a compliant product shall require new inspection and testing to verify compliance with all applicable requirements of this standard that the certification organization determines can be affected by such change.

4.3.9.2 1.1

Recertification shall be conducted before labeling the modified products as being compliant with this standard.

4.3.9.2

Samples of products compliant to this standard shall undergo recertification on an annual basis. This recertification shall include the following:

- (1) Inspection and evaluation to all design requirements as required by this standard on all manufacturer models and components.
- (2) Testing to all performance requirements as required by this standard on all manufacturer models and components with the following protocol:
 - (3) Where a test method incorporates testing both before and after laundering conditioning specified in 8.1.3 and the test generates quantitative results, recertification testing shall be limited to the conditioning that yielded the worst-case test result during the initial certification for the model or component.
 - (4) Where a test method incorporates testing both before and after laundering conditioning specified in 8.1.3 and the test generates non-quantitative results (e.g., pass/fail for melt/drip), recertification shall be limited to a single conditioning procedure in any given year. Subsequent annual recertification testing shall cycle through the remaining conditioning procedures to ensure that all required conditionings are included over time.
 - (5) Where a test method requires the testing of three specimens, a minimum of one specimen shall be tested.
 - (6) Where a test method requires the testing of more than three specimens, a minimum of 2 specimens shall be tested.
 - (7) Manikin testing as specified in section 7.1.5 shall be performed on a minimum of one specimen within a 5 year period.

Statement of Problem and Substantiation for Public Input

Requirements for annual testing of textile products is commonly required within PPE standards as a way for the certification organizations to provide continuous monitoring of certified products. Since there is little oversight throughout the supply chain of finished clothing within this standard, annual testing is one way to demonstrate raw materials, which might be changed, do not impact final product performance. The majority of the annual testing being proposed is already conducted, where some of the specifications would actually reduce the amount of annual testing required.

Adding a requirement to test fabric materials for the manikin test within a 5 year period as way to reasonably capture updated technologies and testing procedures outside of a standard update or revision. By performing the manikin test within a 5 year period, manufacturers and test labs are able to spread testing over multiple years and make retesting more economical.

Submitter Information Verification

Submitter Full Name: Amanda Newsom

Organization: UI Llc

Street Address:

City:

State:

Zip:

Submittal Date: Tue Jun 23 13:51:51 EDT 2020

Committee: FLG-AAA

**Public Input No. 15-NFPA 2112-2020 [Sections 5.1.8, 5.1.9]****Sections****5.1.8**

~~5.1.9~~ 5.1.8

—

The following statement shall be printed legibly on the product label in letters at least 2.5 mm (0.10 in.) high:

THIS CLOTHING ITEM MEETS THE REQUIREMENTS OF NFPA 2112-2018. NFPA 2113 REQUIRES UPPER AND LOWER BODY COVERAGE.

2023.

5.1.9 _

The following information shall also be printed legibly on the product label in letters at least 1.6 mm (0.063 in.) high:

- (1) Model name, number, or design
- (2) Manufacturer's name, identification, or designation
- (3) Manufacturer's address
- (4) Country of manufacture
- (5) Manufacturer's garment identification number, lot number, or serial number
- (6) Size
- (7) Fiber content for each primary fabric layer including cold weather insulation materials but excluding interlinings and labels
- (8) "DO NOT REMOVE"
- (9) " NFPA 2113 REQUIRES UPPER AND LOWER BODY COVERAGE."

Statement of Problem and Substantiation for Public Input

The statement about NFPA 2113 more appropriately belongs within the list of other items required to be on the label. This allows the text to be placed in alternative locations on the label and also reduce it's size from 2.5 mm to 1.6 mm

Submitter Information Verification

Submitter Full Name: Amanda Newsom

Organization: UI LLC

Street Address:

City:

State:

Zip:

Submittal Date: Tue Jun 23 10:31:27 EDT 2020

Committee: FLG-AAA



Public Input No. 7-NFPA 2112-2020 [New Section after 6.2.1]

6.3 Venting Materials

6.3.1 Venting materials used on flame-resistant garments shall be covered by fabric meeting the requirements of this standard.

6.3.1.1 Where venting materials are used on flame-resistant garments and are not covered by fabric, those venting materials shall not exceed 72 in ² (465 cm ²) over the entire flame-resistant garment.

Statement of Problem and Substantiation for Public Input

Adding design requirements to limit the use of venting materials since they do not fulfill the complete Fabric material requirements.

Related Public Inputs for This Document

<u>Related Input</u>	<u>Relationship</u>
Public Input No. 6-NFPA 2112-2020 [New Section after 3.3.38]	
Public Input No. 5-NFPA 2112-2020 [Section No. 7.1.4 [Excluding any Sub-Sections]]	

Submitter Information Verification

Submitter Full Name: Amanda Newsom
Organization: UI Llc
Street Address:
City:
State:
Zip:
Submittal Date: Mon Jun 22 16:25:39 EDT 2020
Committee: FLG-AAA

**Public Input No. 34-NFPA 2112-2020 [Section No. 7.1.2 [Excluding any Sub-Sections]]**

Fabric and cold weather insulation material utilized in the construction of flame-resistant garments shall be tested for flame resistance as specified in Section 8.3, shall have a char length of not more than ~~400 mm~~ 150 mm (4 in.) and an afterflame of not more than 2 seconds, and shall not melt and drip.

Statement of Problem and Substantiation for Public Input

Char lengths below 150mm are not predictive of NFPA 2112 manikin test results, do not correlate to manikin test results, and what small correlation exists is negative. That is, some fabrics with low char lengths have relatively high body burn percentages, while other fabrics with higher char lengths have lower body percentages. This would also harmonize with ASTM F 1506 char length.

Submitter Information Verification

Submitter Full Name: Scott Margolin

Organization: Tyndale

Street Address:

City:

State:

Zip:

Submittal Date: Mon Jun 29 16:32:19 EDT 2020

Committee: FLG-AAA



Public Input No. 8-NFPA 2112-2020 [Section No. 7.1.2 [Excluding any Sub-Sections]]

Fabric and , linings, cold weather insulation material materials and venting materials utilized in the construction of flame-resistant garments shall be tested for flame resistance as specified in Section 8.3, shall have a char length of not more than 100 mm (4 in.) and an afterflame of not more than 2 seconds, and shall not melt and drip.

Statement of Problem and Substantiation for Public Input

Linings are defined in the standard, however are not referenced anywhere else. This adds clarification that linings that cover or partially cover the inside of the garment shall be tested for flame resistance. Also adding flame resistance requirements for a newly defined venting material.

Related Public Inputs for This Document

<u>Related Input</u>	<u>Relationship</u>
Public Input No. 6-NFPA 2112-2020 [New Section after 3.3.38]	

Submitter Information Verification

Submitter Full Name: Amanda Newsom
Organization: UI Llc
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jun 23 09:36:08 EDT 2020
Committee: FLG-AAA



Public Input No. 16-NFPA 2112-2020 [New Section after 7.1.2.2]

7.1.2.3

Reinforcements that are placed on the exterior of the garment shall be tested for flame resistance as specified in Section 8.3, shall have an afterflame of not more than 2 seconds, and shall not melt and drip.

Statement of Problem and Substantiation for Public Input

Reinforcements are defined in this standard, but there is no defined test requirements for those materials.

Submitter Information Verification

Submitter Full Name: Amanda Newsom

Organization: UI Llc

Street Address:

City:

State:

Zip:

Submittal Date: Tue Jun 23 10:50:16 EDT 2020

Committee: FLG-AAA

**Public Input No. 21-NFPA 2112-2020 [Section No. 7.1.3]****7.1.3**

Fabric utilized in the construction of flame-resistant garments, excluding manufacturers' labels, interlinings, and cold weather insulation materials, shall be individually tested for thermal shrinkage resistance as specified in Section 8.4, and shall not shrink more than ~~40 percent~~ 20 percent in any direction.

Statement of Problem and Substantiation for Public Input

Comment: 10% seems unnecessarily restrictive and is keeping some good materials like modacrylic from meeting compliance with this standard. There are many modacrylic rich materials meeting compliance with ASTM F1506 the standard for arc flash apparel, that many manufacturers seek to meet dual certification to with 2112. ASTM F1506 does not have requirements for the oven but does prove materials are capable of withstanding an arc flash. The only reason many 1506 fabrics are not compliant with 2112 is because of this 10% thermal shrink. I do still believe the oven test serves importance for preventing many melting materials from getting through to the manikin level (a mess no one wants to clean) but it appears to be unnecessarily restrictive.

Submitter Information Verification

Submitter Full Name: Jill Kirby

Organization: ArcWear

Street Address:

City:

State:

Zip:

Submittal Date: Wed Jun 24 14:34:09 EDT 2020

Committee: FLG-AAA



Public Input No. 5-NFPA 2112-2020 [Section No. 7.1.4 [Excluding any Sub-Sections]]

Fabric, linings, cold weather insulation materials, other textile materials, venting materials, reinforcements, and reflective striping, other than those items described in 7.1.4.2 and 7.1.4.3, used in the construction of flame-resistant garments shall be individually tested for heat resistance in their original form as specified in Section 8.4, and shall not melt and drip, separate, or ignite.

Statement of Problem and Substantiation for Public Input

It is unclear if venting materials are the same as other textile materials as defined by this standard. This proposal aims to clarify the requirement to test for heat resistance. Also adding linings and reinforcements since they were previously defined terms that had no performance requirements.

Related Public Inputs for This Document

<u>Related Input</u>	<u>Relationship</u>
Public Input No. 6-NFPA 2112-2020 [New Section after 3.3.38]	
Public Input No. 7-NFPA 2112-2020 [New Section after 6.2.1]	

Submitter Information Verification

Submitter Full Name: Amanda Newsom
Organization: UI Llc
Street Address:
City:
State:
Zip:
Submittal Date: Mon Jun 22 16:16:27 EDT 2020
Committee: FLG-AAA

**Public Input No. 32-NFPA 2112-2020 [Section No. 7.1.5 [Excluding any Sub-Sections]]**

Specimen garments shall be tested for overall fire exposure as specified in Section 8.5 as a qualification test for the material and shall have an average predicted body burn of not more than 50 percent with no single burn being equal to or greater than 55 percent based on the total surface area covered by sensors, excluding hands and feet.

-

Statement of Problem and Substantiation for Public Input

As currently written, a fabric could receive one or two burn injury predictions greater than 50%, while still allowing the fabric test results to average equal to or less than 50 percent. This change will ensure the end user that no single burn injury prediction was equal to or greater than 50%

Submitter Information Verification

Submitter Full Name: John Morton-Aslanis

Organization: North Carolina State University

Street Address:

City:

State:

Zip:

Submittal Date: Mon Jun 29 09:11:38 EDT 2020

Committee: FLG-AAA

**Public Input No. 33-NFPA 2112-2020 [Section No. 7.1.5 [Excluding any Sub-Sections]]**

Specimen garments shall be tested for overall fire exposure as specified in Section 8.5 as a qualification test for the material and shall have an average predicted body burn of not more than 50 percent based on the total surface area covered by sensors, excluding hands and feet.

Fabric break open shall not be greater than 1" in either the horizontal or vertical direction.

Statement of Problem and Substantiation for Public Input

Fabric break open can occur during flash fire manikin testing. This resulting characteristic of the fabric when exposed to flames has the potential for the results to not be reflected in the test results. This additional requirement would provide more safety to the end user.

Submitter Information Verification

Submitter Full Name: John Morton-Aslanis

Organization: North Carolina State University

Street Address:

City:

State:

Zip:

Submittal Date: Mon Jun 29 09:20:12 EDT 2020

Committee: FLG-AAA



Public Input No. 30-NFPA 2112-2020 [New Section after 7.1.5.2]

7.1.6 Garment fabrics shall be tested for overall fire exposure as specified in Section 8.9 and shall have an average total accumulated energy of not more than 10 kJ.

7.1.6.1 Where the flame-resistant garment consists of multiple layers intended to be worn separately, each wearable layer shall be tested separately. Where each wearable layer has been separately tested, the wearable combinations of these layers is not required to be tested.

7.1.6.2 Where the flame-resistant garment consists of multiple layers intended only to be worn together, garment fabrics consisting of the outer layer only shall be permitted to be tested.

Statement of Problem and Substantiation for Public Input

This proposed new Test Method allows for repeatable bench-scale evaluations of flash fire protective performance for garment materials. HTP only assesses response of flat swatches of materials when exposed to flash fire conditions. The flash fire manikin test exposes potential bias from variation in standard garment construction

Related Public Inputs for This Document

<u>Related Input</u>	<u>Relationship</u>
Public Input No. 23-NFPA 2112-2020 [New Section after 8.8.8.3]	
Public Input No. 23-NFPA 2112-2020 [New Section after 8.8.8.3]	

Submitter Information Verification

Submitter Full Name: Brian Shiels

Organization: ArcWear

Street Address:

City:

State:

Zip:

Submission Date: Fri Jun 26 15:15:40 EDT 2020

Committee: FLG-AAA



Public Input No. 26-NFPA 2112-2020 [New Section after 7.6.1]

7.6.2 Whole knitted gloves shall be tested for overall fire exposure as specified in Section 8.10 and shall have an average total accumulated energy of not more than 6 kJ.

Statement of Problem and Substantiation for Public Input

HTP specimens for cut and sewn gloves can easily be harvested from larger samples of the materials of construction. Flash Fire Manikin testing cannot be performed on gloves. For whole-knitted gloves it is almost always impossible to harvest a full 6"x6" specimen for testing. One option is to knit flat fabric in a similar construction to that used in a whole knitted glove, but that doesn't always provide a good representation of the actual glove. This proposed test method would allow for the testing of actual whole knitted gloves for thermal insulation and protective properties in a 2 cal/cm2 exposure to heat and flame.

Related Public Inputs for This Document

<u>Related Input</u>	<u>Relationship</u>
Public Input No. 24-NFPA 2112-2020 [New Section after 8.8.8.3]	
Public Input No. 24-NFPA 2112-2020 [New Section after 8.8.8.3]	

Submitter Information Verification

Submitter Full Name: Brian Shiels
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Submittal Date: Fri Jun 26 12:09:12 EDT 2020
Committee: FLG-AAA



Public Input No. 25-NFPA 2112-2020 [Section No. 7.6.1]

7.6.1

Gloves composites cut and sewn from flat materials shall be tested for heat transfer protective performance (HTP) as specified in Section 8.2, and shall have a “spaced” HTP rating of not less than 25 J/cm² (6.0 cal/cm²) and a “contact” HTP rating of not less than 12.6 J/cm² (3.0 cal/cm²).

Statement of Problem and Substantiation for Public Input

HTP specimens are nearly impossible to harvest from whole knitted gloves. PI-24 provides an alternative test method for whole knitted gloves.

Related Public Inputs for This Document

<u>Related Input</u>	<u>Relationship</u>
Public Input No. 28-NFPA 2112-2020 [New Section after 8.2.1]	
Public Input No. 29-NFPA 2112-2020 [New Section after 8.2.7.2]	
Public Input No. 28-NFPA 2112-2020 [New Section after 8.2.1]	
Public Input No. 29-NFPA 2112-2020 [New Section after 8.2.7.2]	

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Committee: FLG-AAA



Public Input No. 31-NFPA 2112-2020 [Section No. 8.1.3]

8.1.3* Washing and Drying Procedure.

Where required, specimens shall be subjected to the specified number of cycles of washing and drying in accordance with the following procedure:

- (1) ~~Each washing procedure shall be as specified in Table 8.1.3 .~~
- (2)* ~~When testing in accordance with 8.3.3.1 , the final two cycles shall be run without adding any detergent or chemicals.~~
- (3) ~~No bleach or softener shall be used during any portion of the laundry cycle.~~
- (4) ~~The machine shall be filled with water to the specified level prior to adding chemicals.~~
- (5) ~~The water level shall be determined by measuring inside the washing machine from the bottommost portion of the basket to the water surface.~~
- (6) ~~The water level measurement shall be 12.7 cm (5.0 in.) for the low setting and 25.4 cm (10 in.) for the high setting.~~
- (7) ~~Water hardness shall not exceed 25 ppm.~~
- (8) ~~The extraction cycle shall continue as specified in Table 8.1.3 or until water is no longer flowing to the drain.~~
- (9) ~~The load shall be removed immediately after the extraction cycle concludes.~~
- (10) ~~A full load of 9 kg (20 lb) shall be laundered.~~
- (11) ~~Fabric samples for washing shall be at least 1 m² (1 yd²) of each material.~~
- (12) ~~Garments shall be permitted for conditioning.~~
- (13) ~~A dummy load, if needed to make a full load, shall be of similar material as the test material.~~
- (14) ~~The machine type shall be a front loading, 16 kg (35 lb) capacity, industrial washer capable of performing the operations specified in Table 8.1.3 .~~
- (15) ~~Sample specimens shall be tumble dried.~~
- (16) ~~The dryer temperature shall be preset to provide a dryer exhaust temperature of 68°C ± 3°C (155°F ± 5°F) without a load.~~
- (17) ~~Wash water temperature shall be within ±3°C (±5°F) of the value in Table 8.1.3 .~~

Table 8.1.3 Washing Cycle Procedure

-- Temperature - Quantity per

Wash-Load Operations Time

(min) °C °F Water

Level g oz Break 10 66 150 Low -- -- Sodium metasilicate (or equivalent) ---- 17 0.6 -- Sodium tripolyphosphate ---- 11 0.4 -- Tergitol 15.S.9 or equivalent ---- 22 0.8 Drain 1 ---- Carryover* 5 66 150 Low -- Drain 1 ---- Rinse 2 57 135 High -- Drain 1 ---- Sodium silicofluoride ---- 6 0.2 Drain 1 ---- Extract 5 ----

*See 8.1.3.1.

8.1.3.1 --

In Table 8.1.3 , carryover shall be accomplished with agitation.
procedure described in ASTM WK69917.

Statement of Problem and Substantiation for Public Input

Existing procedures described in 8.1.3 are problematic and need complete overhaul. ASTM F23 Committee is working to develop a Standard Practice for lab-scale industrial laundry of FR clothing that can serve as a direct replacement for this section. The standard development effort aims to standardize equipment more completely than this existing section. It also aims to harmonize the chemistry with that which is used in actual industrial laundry settings.

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Committee: FLG-AAA



Public Input No. 28-NFPA 2112-2020 [New Section after 8.2.1]

8.2.1.1 Modifications to this test method for testing specimens from whole knitted gloves shall be as specified in 8.2.8.

Statement of Problem and Substantiation for Public Input

harvesting 6"x6" samples from whole knitted gloves is often impossible. The proposed modifications offer one potential solution for testing these products.

Related Public Inputs for This Document

<u>Related Input</u>	<u>Relationship</u>
Public Input No. 25-NFPA 2112-2020 [Section No. 7.6.1]	
Public Input No. 29-NFPA 2112-2020 [New Section after 8.2.7.2]	
Public Input No. 25-NFPA 2112-2020 [Section No. 7.6.1]	
Public Input No. 29-NFPA 2112-2020 [New Section after 8.2.7.2]	

Submitter Information Verification

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Committee: FLG-AAA



Public Input No. 29-NFPA 2112-2020 [New Section after 8.2.7.2]

8.2.8 Specific Requirements for Testing Specimens from Whole Knitted Gloves

8.2.8.1 The Specimen Holder Assembly specified in Section 6.9 of ASTM F2700 shall be modified such that the size of the 100 mm x 100 mm square hole is reduced to a 50 mm x 50mm square hole.

8.2.8.2 HTP testing shall be conducted on six specimens - three in the spaced configuration and 3 in the contact configuration - measuring 100mm +/- 5mm x 100 mm +/- 5 mm (4 in +/- 1/4 in. x 4 in. +/- 1/4 in.) and shall consist of all layers representative of the whole knitted glove to be tested.

8.2.8.3 Testing shall be performed as described in 8.2.2.2 through 8.2.7.

Statement of Problem and Substantiation for Public Input

The proposed change helps to facilitate the small sample size obtainable from whole knitted gloves.

Related Public Inputs for This Document

<u>Related Input</u>	<u>Relationship</u>
<u>Public Input No. 28-NFPA 2112-2020 [New Section after 8.2.1]</u>	
<u>Public Input No. 25-NFPA 2112-2020 [Section No. 7.6.1]</u>	
<u>Public Input No. 25-NFPA 2112-2020 [Section No. 7.6.1]</u>	
<u>Public Input No. 28-NFPA 2112-2020 [New Section after 8.2.1]</u>	

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Submission Date: Fri Jun 26 15:04:30 EDT 2020

Committee: FLG-AAA

**Public Input No. 38-NFPA 2112-2020 [New Section after 8.4]****Heat and Thermal Shrinkage Resistance Test II****8.x.x Application**

8.x.x.x This test method shall apply to flame-resistant garment

8.x.x Specimens**8.x.x.x**

Heat and thermal shrinkage resistance testing shall be conducted on all three specimens when conducting 8.5 Manikin Test

8.x.x.x Sample Preparation (see attached pdf)

8.x.x.x Apparatus

Laboratory shall use apparatus as called out in 8.5.5

8.x.x.x Procedure (see attached pdf)

8.x.x Report

The percent change in the width and length dimensions shall be calculated, and the results shall be reported as the average of all three specimens.

8.x.x Interpretation

The average percent change shall be used to determine pass/fail performance

-

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
MEASURING_DIMENSIONAL_CHANGE_ON_FLASH_FIRE_MANIKIN.pdf	This provides details on how to do the sample preparation and procedure to conduct Heat and Thermal Shrinkage Resistance Testing II when performing the manikin test in section 8.5	

Statement of Problem and Substantiation for Public Input

The current heat and thermal shrinkage test does not reflect the conditions that are seen in a flash fire. This additional test method reflects a more realistic requirement on a fabric that a user would see in a short duration thermal exposure from fire.

Submitter Information Verification

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Submittal Date:	Tue Jun 30 11:21:41 EDT 2020
Committee:	FLG-AAA

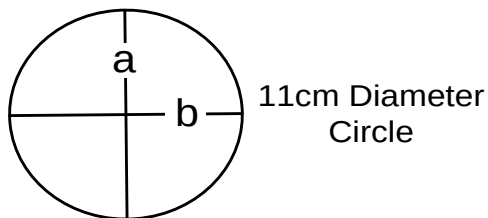
MEASURING DIMENSIONAL CHANGE ON FLASH FIRE MANIKIN

1. Place 11cm diameter circular markers on garments at locations shown in pictures and table below-
Recommend numbering circular markers before exposure to avoid confusion after cutting garment off of manikin

FRONT-INTERIOR OF GARMENT

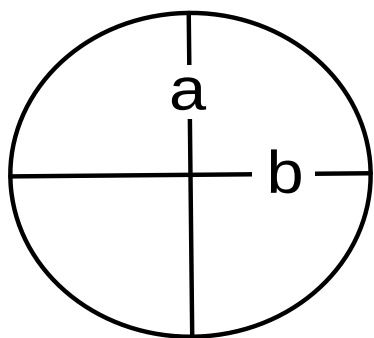


REAR-INTERIOR OF GARMENT



MEASURING DIMENSIONAL CHANGE ON FLASH FIRE MANIKIN

Circular Marker	Description	Circular Marker Location (center the marker between seams where applicable)	Circular Marker Placement of Lines “a” and “b”
1	Front, Upper-Right Chest	15 cm in from armpit seam, intersection of markers should be on same plane as armpit seam as shown in picture,	line “a” parallel with zipper direction, and line “b” orthogonal to zipper direction
2	Front, Lower Right Sleeve	20 cm from bottom of arm cuff seam	Line “a” orthogonal to arm cuff seam and line “b” parallel to arm cuff seam
3	Front, Mid-Right Leg	60 cm from bottom of leg cuff seam	line “a” parallel with side leg seam, and line “b” orthogonal with side leg seam as shown
4	Front, Lower Left Leg	20 cm from bottom of leg cuff seam	line “a” parallel with side leg seam, and line “b” orthogonal with side leg seam as shown
5	Rear, Mid Back	27 cm from bottom of mid seam	Line “a” orthogonal to mid seam, and line “b” parallel to mid seam
6	Rear, Lower Left Sleeve	20 cm from bottom of arm cuff seam	Line “a” orthogonal to arm cuff seam and line “b” parallel to arm cuff seam
7	Rear, Mid Left Leg	60 cm from bottom of leg cuff seam	line “a” parallel with side leg seam, and line “b” orthogonal with side leg seam as shown
8	Rear, Lower Right Leg	20 cm from bottom of leg cuff seam	line “a” parallel with side leg seam, and line “b” orthogonal with side leg seam as shown



11cm Diameter
Circle

Examples of Placement of Circular Markers on the Interior of Coverall

(Below is an example of the interior of a coverall with markers . Recommend numbering circular markers before exposure to avoid confusion after cutting garment off of manikin)



Measurement of Dimensional Change of Fabric Post Exposure

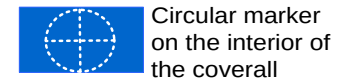
Fabric Blend	Exposure Time (s)	Recommended Method To Measure Thermal ShrinkagePost Exposure
FR Cotton	3	Remove entire garment from manikin, lay out on table and measure "a" and "b" dimensions
FR Cotton	4	Cut garment off as described below
PBI Blend	3	Remove entire garment from manikin, lay out on table and measure "a" and "b" dimensions
PBI Blend	4	Remove entire garment from manikin, lay out on table and measure "a" and "b" dimensions
Nomex Blend	3	Cut garment off as described below
Nomex Blend	4	Cut garment off as described below



Coverall-Front, Post Exposure



Coverall-Rear, Post Exposure



Recommended Method to Cut Garment Off of Manikin Post Exposure For Thermal Shrinkage Measurements



Step 1: Unzip Front of Coverall:



Step 2: Cut garment in $\frac{1}{2}$ following midseam



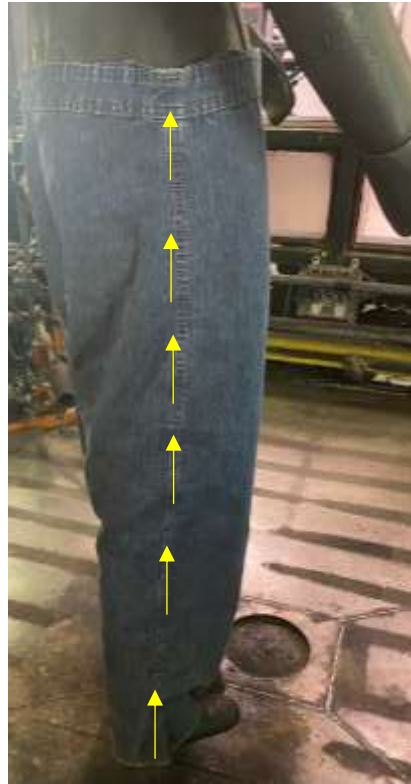
Step 3: Cut up from the right arm cuff and follow the outside arm seam sleeve, across the shoulder, and through the collar, repeat with the left sleeve



Step 4: Remove top half of the coverall from the manikin



Step 5: Remove bottom half of the



Step 6: Cut from the bottom outside coverall from the manikin right leg seam, up the side of the coverall to the midseam, repeat with the left side



Step 7: Remove bottom half of the coverall from the manikin

Step 8. Post exposure, measure dimensions a, b for each location and average % change over all 8 measurements

	Garment Identifier, Coverall Example	Dimensional Change on Flash Fire Manikin System		
Identifier	Measurement Location Description	a	b	Average
1	FRONT, UPPER RIGHT CHEST, 15 cm in from armpit seam	0.9%	4.5%	2.7%
2	FRONT, LOWER RIGHT SLEEVE, 20 cm from bottom of arm cuff seam	27.3%	18.2%	22.7%
3	FRONT, MID RIGHT LEG, 60 cm from bottom of leg cuff seam	13.6%	4.5%	9.1%
4	FRONT, LOWER LEFT LEG, 20 cm from bottom of leg cuff seam	21.8%	29.1%	25.5%
5	REAR, MID BACK, 27 cm from bottom of mid seam	1.8%	18.2%	10.0%
6	REAR, LOWER LEFT SLEEVE, 20 cm from bottom of arm cuff seam	12.7%	1.8%	7.3%
7	REAR, MID LEFT LEG, 60 cm from bottom of leg cuff seam	9.1%	4.5%	6.8%
8	REAR, LOWER RIGHT LEG, 20 cm from bottom of leg cuff seam	27.3%	18.2%	22.7%
Average % Change				13.4%

**Public Input No. 9-NFPA 2112-2020 [Section No. 8.4.1.6]****8.4.1.6 –**

~~Modifications to this test method for testing textile materials shall be as specified in 8.4.8.~~

Statement of Problem and Substantiation for Public Input

This is a duplicate requirement to 8.4.1.2

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Submittal Date: Tue Jun 23 09:47:08 EDT 2020

Committee: FLG-AAA

**Public Input No. 10-NFPA 2112-2020 [Section No. 8.4.1.7]****8.4.1.7 –**

~~Modifications to this test method for testing other flame-resistant materials, including reflective striping, shall be as specified in 8.4.9 .~~

Statement of Problem and Substantiation for Public Input

This is a duplicate requirement to 8.4.1.3

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Submittal Date: Tue Jun 23 09:48:34 EDT 2020

Committee: FLG-AAA

**Public Input No. 11-NFPA 2112-2020 [Section No. 8.4.12.3]****8.4.12.3**

Glove specimens shall be of a size such that they fit the following hand dimensions:

- (1) Hand length: ~~19.25 mm~~ 25 cm – ~~20.25 mm~~ 25 cm (7.58 in. – 7.97 in.)
- (2) Hand circumference: ~~19.25 mm~~ 25 cm – ~~23.25 mm~~ 25 cm (7.58 in. – 9.15 in.)

Statement of Problem and Substantiation for Public Input

correction to units as the measurements are related to cm instead of mm.

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Submittal Date: Tue Jun 23 09:50:07 EDT 2020

Committee: FLG-AAA

**Public Input No. 13-NFPA 2112-2020 [Section No. 8.4.12.6.1]****8.4.12.6.1**

A total of ~~50 mL~~ 75 mL (1.7 fl oz) of beads shall be ~~evenly distributed~~ proportionately distributed into the fingers.

Statement of Problem and Substantiation for Public Input

The amount of bead specified for the fingers are not adequate to fill the fingers of gloves meeting the hand dimensions specified in 8.4.12.3. Also, the beads should be distributed proportionately rather than evenly because different fingers have different lengths and therefore require a different amount of beads to fill.

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Public Input No. 12-NFPA 2112-2020 [Section No. 8.5.2.2]

8.5.2.2

Fabrics to be tested shall be used to construct the standard garment design specified in 8.3.2 of ASTM F1930, *Standard Test Method for Evaluation of Flame Resistant Clothing for Protection Against Fire Simulations Using an Instrumented Manikin - Manikin* with the following modifications:

- (1) The coverall shall have a collar
- (2) The full-length metal slide fastener shall be exposed on the exterior of the garment
- (3) The slide fastener tape shall be made with inherently flame-resistant fiber
- (4) The garment shall be constructed without pockets, sleeve cuffs, elastic or other hardware such as snaps or visibility markings

Statement of Problem and Substantiation for Public Input

Correction to reference since 8.3.2 does not exist in ASTM F1930 anymore. Also adding clarification to the standard coverall design in order to align this standard with revisions that are being proposed to ASTM F1930.

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Submittal Date: Tue Jun 23 09:52:59 EDT 2020

Committee: FLG-AAA

**Public Input No. 17-NFPA 2112-2020 [New Section after 8.5.4.1.2]****8.5.4.1.3**

The manikin shall be dressed according to 8.5.6.2.

Statement of Problem and Substantiation for Public Input

The standard does not currently specify whether or not undergarments should be used when performing the reference burns. This proposal intends to clarify that they should be used to be consistent with the actual testing of the test sample.

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Submittal Date: Tue Jun 23 13:45:26 EDT 2020

Committee: FLG-AAA

**Public Input No. 3-NFPA 2112-2020 [Section No. 8.5.6.2]****8.5.6.2**

The manikin shall be dressed in 170 g/m²(5.0 oz/yd²) (± 5 percent), jersey knit, 100 percent cotton underwear briefs and 140-g ~~155~~ g /m² (4.2-oz ~~6~~ oz /yd²) (±5 percent) jersey knit, 100 percent cotton short-sleeve crew-neck T-shirts before the garment specimen is placed on the manikin.

Statement of Problem and Substantiation for Public Input

The weight requirement for the Cotton Undershirt is too low and too tight. After weighing a few commercially available options, it was clear that most things were heavier than the requirements listed in this section. I contacted a few garment manufacturers and learned the following:

Gildan - lightest weight 100% Cotton Jersey tee is listed as 4.5oz/yd²

Fruit of the Loom - lightest weight 100% Cotton Jersey tee is listed as 4.7oz/yd²

Hanes - no response

With the target weight of two very popular and readily available products being 4.5 and 4.7oz, I propose targeting 4.6oz.

I am also proposing a wider tolerance on that weight. These products are not high-end precision products and it's very likely that their weight will vary greater than 5%.

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Submittal Date: Fri Apr 10 09:42:34 EDT 2020

Committee: FLG-AAA

**Public Input No. 14-NFPA 2112-2020 [Section No. 8.8.4.4]****8.8.4.4**

The horizontal portion of the specimen shall be not less than 50 mm (2 in.), and the vertical portion shall be not less than ~~150 mm~~ 100 mm (6-in 4 in .). The specimen shall be held at each end by spring clips under light tension, as shown in Figure 8.8.4.3.

Statement of Problem and Substantiation for Public Input

The vertical dimension contains a typo and should be 100 mm rather than 150 mm. Section 8.8.2.1 requires the test specimen to be 150 mm long. Therefore, the horizontal plus vertical position of the specimen during testing cannot be 50 mm plus 150 mm because that is 200 mm total. Also, this method is the same as the method used in NFPA 1971 and in that standard, the vertical dimension is 100 mm (see 8.4.4.4 of NFPA 1971-2018).

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Public Input No. 22-NFPA 2112-2020 [Section No. 8.8.5.8]

8.8.5.8

The specimen shall then be further examined for char length. The char length shall be determined by measuring the length of the tear through the center of the charred area as specified in 8.8.5.8.1 through 8.8.5.8.4.

8.8.5.8.1

The specimen shall be folded lengthwise and creased, by hand, along a line through the highest peak of the charred area.

8.8.5.8.2

A hook shall be inserted in the specimen or a hole that is 6 mm ($\frac{1}{4}$ in.) in diameter or less that is punched out for the hook, at one side of the charred area 6 mm ($\frac{1}{4}$ in.) from the adjacent outside edge at the point where the specimen contacted the steel rod, and 6 mm ($\frac{1}{4}$ in.) away in from the ~~lower end~~ point where the specimen contacted the steel rod in the 4 inch long direction, as shown in Figure 8.8.5.8.2.

****INSERT FIGURE 8.8.5.8. 2****

8.8.5.8. 3

A weight of sufficient size such that the weight and hook together shall equal the total tearing load required in Table 8.8.5.8.3 shall be attached to the hook. The specific load for determining char length applicable to the weight of the composite specimen shall be as listed in Table 8.8.5.8.3.

Table 8.8.5.8.3 Tearing Weights for Determining Charred Lengths

<u>Specified Weight of Material</u>		<u>Total Tearing Weight</u>		
<u>Before Any Fire-Retardant</u>		<u>for Determining</u>		
<u>Treatment or Coating</u>		<u>Charred Length</u>		
<u>g/m²</u>	<u>oz/yd²</u>			
		<u>=</u>	<u>kg</u>	<u>lb</u>
68–203	2.0–6.0	-	0.1	0.25
Over 203–508	Over 6.0–15.0	-	0.2	0.5
Over 508–780	Over 15.0–23.0	-	0.3	0.75
Over 780	Over 23.0	-	0.45	1.0

8.8.5.8.4

A tearing force shall be applied gently to the specimen by grasping the side of the material at the edge of the char opposite from the load as shown in Figure 8.8.5.8.2 and raising the specimen and weight clear of the supporting surface. The ~~end~~ ends of the tear shall be marked off on the edge, and the char length measurement shall be made along the undamaged edge.

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
NewFigure8.8.5.8.2.docx	Figure 8.8.5.8.2	

Statement of Problem and Substantiation for Public Input

The changes proposed intend to clarify how to apply the weight and lift the specimen when determining the char length.

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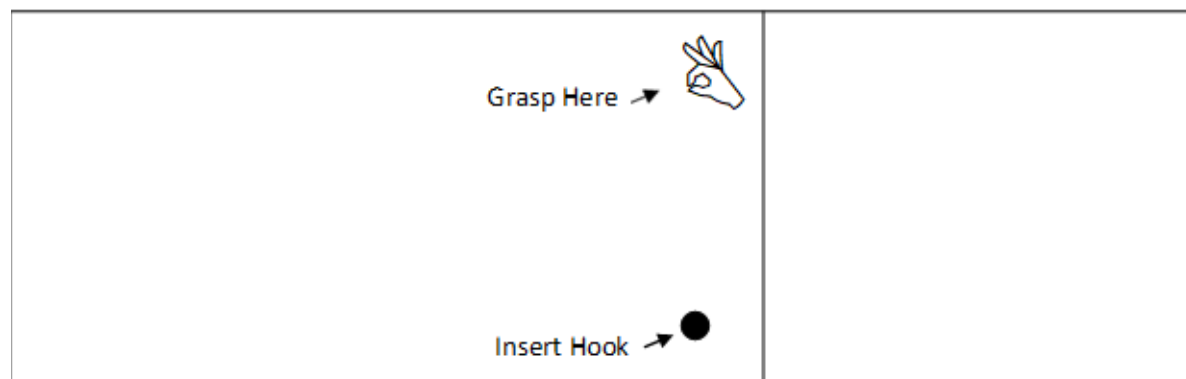
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Submittal Date: Thu Jun 25 12:09:14 EDT 2020
Committee: FLG-AAA



≥ 100 mm (4 in.)



≥ 50 mm (2 in.)



**Public Input No. 4-NFPA 2112-2020 [Section No. 8.8.5.8.2]****8.8.5.8.2**

A hook shall be inserted in the specimen or a hole that is 6 mm (¼ in.) in diameter or less that is punched out for the hook, at one side of the charred area 6 mm (¼ in.) from the adjacent outside edge at the point where the specimen contacted the steel rod, and 6 mm (¼ in.) in from the lower end, as shown in Figure X.
(insert figure below)

Statement of Problem and Substantiation for Public Input

Since this is not a Standard Test Method, and this char length in other parts of this document, it would be very helpful for test labs to have a visual representation of how this char length is to be determined.

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Committee: FLG-AAA



Public Input No. 23-NFPA 2112-2020 [New Section after 8.8.8.3]

8.9 Small Scale Flash Fire Exposure Test

8.9.1 Application.

8.9.1.1 This test method shall be applied to flame-resistant garment fabrics.

8.9.2 Specimens.

8.9.2.1 Five specimens shall be tested.

8.9.2.2 Specimens shall measure 335 mm ± 5mm × 290 mm ± 5mm (13.25 in. ± 0.25 in. × 11.5 in. ± 0.25 in.) and shall be fastened so that they form a cylindrical sleeve approximately 105mm (4 in.) in diameter and 290 mm (11.5 in.) tall.

8.9.2.3 Specimens shall consist of all layers used in the construction of the flame-resistant garment, excluding any areas with special reinforcements.

8.9.2.4* Specimens consisting of multiple layers shall be fastened together and shall be constructed so that the outermost layer receives all initial direct flame contact.

A.8.9.2.4 One method for fastening multiple layers is to staple each corner of the composite where the individual layers are uniformly flat.

8.9.3 Sample Preparation.

8.9.3.1 For fabrics that are designated on the product label to be washed, specimens shall be tested before and after three cycles of washing and drying as specified in 8.1.3.

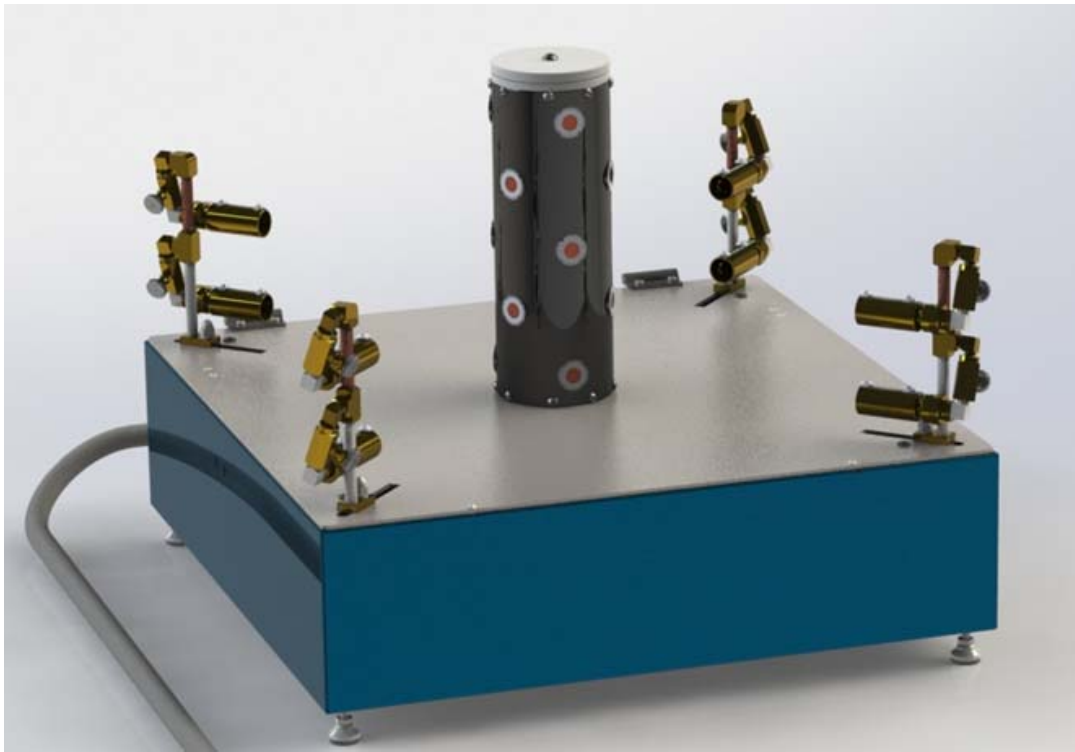
8.9.3.2 For fabrics that are designated on the product label to be dry cleaned, specimens shall be tested before and after three cycles of dry cleaning as specified in 8.1.4.

8.9.3.2 For fabrics that are designated on the product label to be either washed or dry cleaned, specimens shall be tested before and after three cycles of washing and drying as specified in 8.1.3, or before and after three cycles of dry cleaning as specified in 8.1.4.

8.9.4 Apparatus.

8.9.4.1* The test apparatus shall consist of an instrumented cylinder form, thermal energy sensors, fuel source, fuel delivery system, burners, base housing, electronics systems, data acquisition software, sensor calibration system, and optional specimen mounting hooks.

A.8.9.4.1 Prototype test equipment has been developed by Thermetrics. Figure A.8.9.4.1 show the apparatus in terms of the instrumented cylinder form, thermal energy sensors, fuel delivery system, burners, and base housing. The electronics system is separate along with the data acquisition software, sensor calibration system. The optional specimen mounting hooks are not shown. Additional equipment details, including the specifications of certain apparatus element will be provided prior the first draft meeting.



Statement of Problem and Substantiation for Public Input

This proposed new Test Method allows for repeatable bench-scale evaluations of flash fire protective performance for garment materials. HTP only assesses response of flat swatches of materials when exposed to flash fire conditions. The flash fire manikin test, used as a material assessment test, exposes potential bias from variation in standard garment construction, applied available test platforms at different testing laboratories. The new test device, pictured in Figure A.8.9.4.1, consists of an instrumented cylinder form with multiple thermal energy sensors that are exposed to an average heat flux of 84 kW/m² for 3 seconds. Data acquisition software calculates the total accumulated energy that passes through the material specimens as measured by the sensors and presents the data in an easily readable report. The results provide a more reliable indicator of how fabrics may perform in manikin testing as full garments.

Test development work is being concluded that will offer additional test platforms for future validation for the ability to apply this test method for consistently evaluating the insulating performance of industrial flame resistant workwear and garment fabrics. Additional details will be available on specific equipment attributes and procedures during the committee first draft meeting. Additionally, the results of preliminary testing effort will be used to inform the committee during the first draft meeting on the efficacy of the test method along with other pertinent data that can be applied to the preparation of a new performance criterion.

Related Public Inputs for This Document

<u>Related Input</u>	<u>Relationship</u>
Public Input No. 30-NFPA 2112-2020 [New Section after 7.1.5.2]	
Public Input No. 30-NFPA 2112-2020 [New Section after 7.1.5.2]	

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Committee: FLG-AAA



Public Input No. 24-NFPA 2112-2020 [New Section after 8.8.8.3]

8.10 Small Scale Flash Fire Test 2

8.10.1 Application.

8.10.1.1 This test method shall be applied to whole knitted flame-resistant gloves.

8.10.2 Specimens.

8.10.2.1 Five specimens shall be tested.

8.10.2.2 Specimens shall be whole knitted gloves, sized to fit the following hand dimensions.

_____ (1) Hand length: 18.6 cm (7.32 in.)

_____ (2) Hand circumference: 23.2 cm (9.13 in.)

8.10.2.3 Specimens shall consist of all layers used in the construction of the flame-resistant gloves, excluding any areas with special reinforcements.

8.10.3 Sample Preparation.

8.10.3.1 For gloves that are designated on the product label to be washed, specimens shall be tested before and after three cycles of washing and drying as specified in 8.1.3.

8.10.3.2 For gloves that are designated on the product label to be dry cleaned, specimens shall be tested before and after three cycles of dry cleaning as specified in 8.1.4.

8.10.3.2 For gloves that are designated on the product label to be either washed or dry cleaned, specimens shall be tested before and after three cycles of washing and drying as specified in 8.1.3, or before and after three cycles of dry cleaning as specified in 8.1.4.

8.10.4 Apparatus.

8.10.4.1* The test apparatus shall consist of an instrumented hand form, thermal energy sensors, fuel source, fuel delivery system, burners, base housing, electronics systems, data acquisition software, and sensor calibration system.

A.8.10.4.1 Prototype test equipment has been developed by Thermetrics. Figure A.8.10.4.1 show the apparatus in terms of the instrumented hand form, thermal energy sensors, fuel delivery system, burners, and base housing. The electronics system is separate along with the data acquisition software, sensor calibration system. Additional equipment details, including the specifications of certain apparatus element will be provided prior the first draft meeting.

Figure A.8.10.4.1 CAD Rendering Showing Key Components of the Test Apparatus.

8.10.4.1.1 The instrumented hand form shall consist of a vertically aligned hand/wrist and shall be constructed of flame-resistant, thermally stable, nonmetallic materials which will not contribute fuel to the combustion process if used.

8.10.4.1.2* The thermal energy sensors shall measure incident heat flux over a range of 0 to 175 kW/m² (4.18 cal/cm² sec). Nine sensors shall be spaced evenly about the palm, back of hand, and wrist areas.

A.8.10.4.1.2 An engineering diagram showing the placement of the sensors will be provided prior to the first draft meeting.

8.10.4.1.3 The fuel source shall be a tank containing liquefied petroleum (LP) with a minimum purity of 93%.

8.10.4.1.4 The fuel delivery system shall consist of a pressure regulator, solenoids, piping, and a pilot flame adjust system. The pressure regulator shall allow for a minimum of 275 kPa (40 psi). The pilot flame adjust system shall properly allow for needed adjustments to maintain the intensity of the pilot flames.

8.10.4.1.5 There shall be four burner tower assemblies with two burner nozzles each for a total of eight

burners. The burner tower assemblies shall be placed at a distance of 305 mm (12.0 in.) from the exact center of the instrumented hand form positioned at 90 ° intervals around the instrumented hand form. Each burner nozzle shall have the ability to be pointed ±45° in both the vertical and horizontal directions. A needle valve shall be placed directly in-line with each burner nozzle to control the flow of fuel to each burner nozzle.

8.10.4.1.6 The base housing shall sufficiently house the fuel delivery system and shall measure at least 610 mm x 610 mm (24 in. x 24 in.). The housing shall properly connect the thermal energy sensors to the electronics systems and shall provide a mounting surface for the instrumented hand form and the burners.

8.10.4.1.7 The electronics systems shall consist of the power source, data acquisition system, remote control, and connection to a computer with the data acquisition software. The electronics systems shall be contained in a separate housing than the base housing for the fuel delivery system. The remote control shall be used to initiate the flame exposure and shall be connected to the housing for the electronics system.

8.10.4.1.8 The data acquisition software shall control the operation of the fuel delivery system and shall receive data from the thermal energy sensors, show data in real time, perform calculations to determine the total accumulated energy, and provide an easily readable report showing the total accumulated energy over the test time and for fixed time intervals.

8.10.4.1.9 The sensor calibration system shall consist of a torch lamp capable of producing a reliable heat flux source, a water-fed cooler to prevent damage to the instrumented hand form, and a calibration enclosure to isolate each heat flux sensor for purposes of calibration.

8.10.5 Procedure.

8.10.5.1 The thermal energy sensors shall be calibrated prior to testing.

8.10.5.2 The software shall be used to reflect that the hand form is in the “nude” configuration and the flame exposure time shall be set to 3 seconds.

8.10.5.3 The system shall be calibrated by conducting a 3 second nude exposure to ensure a flame exposure with an average heat flux of $84 \text{ kW/m}^2 \pm 4.2 \text{ kW/m}^2$ ($2.0 \text{ cal/cm}^2 \text{ sec} \pm 0.1 \text{ cal/cm}^2 \text{ sec}$) and a spatial standard deviation of 21 kW/m^2 ($0.5 \text{ cal/cm}^2 \text{ sec}$). The data collected from the system calibration shall be saved as a calibration report.

8.10.5.4 The thermal energy sensors shall be cooled to an average temperature of 30 ° C (86 ° F)

8.10.5.5 The specimen glove shall be mounted onto the hand form in a manner consistent with normal use of the glove.

8.10.5.6 The software shall be used to reflect that the hand form is in the “clothed” configuration and the flame exposure time shall be set to 3 seconds.

8.10.5.7 The test exposure shall be initiated by the operator via the remote control.

8.10.5.8 The operator shall observe the specimen for any after-flame.

8.10.5.9 The operator shall remove the specimen glove from the hand form.

8.10.5.9 If a thermal shrinkage measurement is desired, the operator shall measure the dimensions of the specimen glove and calculate the thermal shrinkage.

8.10.6 Report.

8.10.6.1 The total accumulated energy for each specimen glove shall be reported.

8.10.6.2 The average total accumulated energy for all specimen gloves shall be calculated and reported.

8.10.6.3 Any afterflame or thermal shrinkage shall be reported.

8.10.7 Interpretation.

8.10.7.1 The average total accumulated energy shall be used to determined pass/fail performance for whole knitted gloves.

Statement of Problem and Substantiation for Public Input

HTP specimens for cut and sewn gloves can easily be harvested from larger samples of the materials of construction. Flash Fire Manikin testing cannot be performed on gloves. For whole-knitted gloves it is almost always impossible to harvest a full 6"x6" specimen for testing. One option is to knit flat fabric in a similar construction to that used in a whole knitted glove, but that doesn't always provide a good representation of the actual glove. This proposed test method would allow for the testing of actual whole knitted gloves for thermal insulation and protective properties in a 2 cal/cm2 exposure to heat and flame.

Related Public Inputs for This Document

<u>Related Input</u>	<u>Relationship</u>
Public Input No. 26-NFPA 2112-2020 [New Section after 7.6.1]	
Public Input No. 26-NFPA 2112-2020 [New Section after 7.6.1]	

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Public Input No. 36-NFPA 2112-2020 [New Section after A.4.2.5]

TITLE OF NEW CONTENT

Type your content here ...

Appendix 4.2.8: Testing that is conducted at a technically competent, independent, certified lab free from influence, or control by a product manufacturer or vendor is a reliable approach for material selection and certification.

Statement of Problem and Substantiation for Public Input

Users of NFPA 2112 should be made aware that data from independent, third party labs is reliable, and that when data offered by multiple sources is in conflict, the source should be considered.

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**Public Input No. 19-NFPA 2112-2020 [Section No. C.1.2.2]****C.1.2.2 ASTM Publications.**

ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.

ASTM D1424, *Standard Test Method for Tearing Strength of Fabrics by Falling Pendulum Type (Elmendorf) Apparatus*, 2009 (2013 2019).

ASTM D1683/D1683M, *Standard Test Method for Failure in Sewn Seams of Woven Apparel Fabrics*, 2011a 2017 (2018) .

ASTM D3776/D3776M, *Test Methods for Mass Per Unit Area (Weight) of Woven Fabric*, 2009a (2013 2017).

ASTM D3787, *Standard Test Method for Bursting Strength of Textiles: Constant-Rate-of-Transverse (CRT) Ball Burst Test*, 2016.

ASTM D5034, *Standard Test Method for the Breaking Strength Force and Elongation of Textile Fabrics (Grab Test)*, 2009 (2013 2017).

ASTM D6413/D6413M, *Standard Test Method for Flame Resistance of Textiles (Vertical Test)*, 2015.

ASTM F1731, *Standard Practice for Body Measurements and Sizing of Fire and Rescue Services Uniforms and Other Thermal Hazard Protective Clothing*, 1996 (2013).

ASTM F1930, *Standard Test Method for Evaluation of Flame Resistant Clothing for Protection Against Fire Simulations Using an Instrumented Manikin*, -2015 2018 .

Statement of Problem and Substantiation for Public Input

updates

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ATTACHMENT E

NFPA 2112-2018 Edition

Standard on Flame-Resistant Clothing for Protection of Industrial Personnel Against Short-Duration Thermal Exposures from Fire

TIA Log No: 1513

Reference: Various

Comment Closing Date: June 29, 2020

Submitter: Brian Shiels, ArcWear

www.nfpa.org/2112

1. Revise specific paragraphs in Chapter 1 to read as follows:

1.1 Scope. The standard shall specify the minimum design, performance, testing, and certification requirements and test methods for flame-resistant garments, shrouds/hoods/balaclavas, ~~and gloves,~~ and cloth face coverings for use in areas at risk from short-duration thermal exposure from fire.

1.2.1* This standard shall provide minimum requirements for the design, construction, evaluation, and certification of flame-resistant garments, shrouds/hoods/balaclavas, ~~and gloves,~~ and cloth face coverings for use by industrial personnel, with the intent of not contributing to the burn injury of the wearer, providing a degree of protection to the wearer, and reducing the severity of burn injuries resulting during egress from or accidental exposure to short-duration thermal exposure from fire.

1.3.1 This standard shall apply to the design, manufacturing, and certification of new flame-resistant garments, shrouds/hoods/balaclavas, and gloves and the design and manufacturing of new cloth face coverings.

1.3.4 The requirements of this standard shall not apply to accessories that might be attached to flame-resistant garments, shrouds/hoods/balaclavas, ~~or gloves,~~ or cloth face coverings unless specifically addressed herein.

1.4 Retroactivity. This standard shall apply only to garments, shrouds/hoods/balaclavas, ~~or gloves,~~ or cloth face coverings manufactured on or after the effective date of the standard.

2. Add new definition for cloth face covering, and associated annex item to read as follows:

3.3.X* Cloth Face Covering. An item of clothing, primarily covering the nose and mouth, designed to reduce the community spread of bioaerosols.

A.3.3.X Cloth Face Covering. Cloth face coverings are not shrouds/hoods/balaclavas because they are not designed to provide primary thermal protection to the wearer's head or neck, or both. Cloth face coverings provide primary thermal protection to the nose and mouth that is consistent with the performance levels that are applied for shrouds/hoods/balaclavas. These clothing items are primarily intended to attenuate the volume of bioaerosols that are exhaled or released during coughing and sneezing by the individual wearer to aid in lessening the transmission of airborne pathogens such as SARS-CoV-2, the virus responsible for COVID-19. These clothing items are not protective masks or medical masks and are not evaluated for their protective performance in accordance with this standard.

The selection of materials used in the construction of cloth face coverings should account for the ability of the material to filter bioaerosols and to offer levels of acceptable breathing resistance. Materials that are very porous can have low efficiencies to prevent the passage of

bioaerosols while tightly woven fabrics or multiple layers of fabrics could create resistance to breathing that forces the passage of inhaled and exhaled air around the edges of the cloth face covering rather than through the material. Useful measurements of bioaerosol filtration performance is performed in accordance with ASTM F2101, *Standard Test Method for Evaluating the Bacterial Filtration Efficiency (BFE) of Medical Face Mask Materials, Using a Biological Aerosol of Staphylococcus aureus*. The measurement of breathing resistance is can performed in accordance with Annex C of EN 14683, *Medical face masks—Requirements and test methods*. It is important to note that measurement of cloth face covering performance in accordance with these test methods do not connote that these clothing items are protective masks or medical masks but instead provide useful benchmarks for relevant areas of performance.

3. Add new reference in Chapter 2 to read as follows:

2.3.X ISEA Publications. International Safety Equipment Association, 1901 North Moore Street, Suite #808, Arlington, VA 22209-1762.

ANSI/ISEA 125, *American National Standard for Conformity Assessment of Safety and Personal Protective Equipment*, 2014.

4. Revise definitions in 3.3.27 and 3.3.35, and add associated annex items to read as follows:

3.3.27* Product. The compliant flame-resistant garment, shrouds/hoods/balaclavas, or gloves.

A.3.3.27 Product. Cloth face coverings are intentionally omitted from the definition of product because they are exempt from many requirements that are imposed on products throughout this standard.

3.3.35* Shroud/Hood/Balaclava. An item of clothing designed to provide protection to the wearer's head or neck, or both, less the face opening.

A.3.3.35 Shroud/Hood/Balaclava. Shrouds/hoods/balaclavas that incorporate mouth and nose coverage that is intended to provide primary thermal protection are still to be considered as shrouds/hoods/balaclavas and not cloth face coverings.

5. Revise/add new specific paragraphs in Chapter 4, and add associated annex items to read as follows:

4.1.1* All flame-resistant garments, shrouds/hoods/balaclavas, and gloves that are labeled as being compliant with this standard shall meet or exceed all applicable requirements specified in this standard and shall be certified.

A.4.1.1 Cloth face coverings are intentionally omitted from several sections pertaining to certification because they are not intended to be certified products. Where applicable, certain language around compliance and components might include reference to cloth face coverings.

4.1.1.1 All flame-resistant cloth face coverings that are labeled as compliant with this standard shall be constructed of compliant components that meet or exceed all applicable requirements specified in this standard and in Chapter 4 with the following exceptions:

(1) Certification program requirements in Section 4.2 shall not apply to flame-resistant cloth face coverings.

(2) Inspection and testing requirements in Section 4.3 shall not apply to flame-resistant cloth face coverings.

(3) Manufacturer quality assurance program requirements for third-party audits shall not apply to flame-resistant cloth face coverings.

4.1.1.2* All flame-resistant cloth face coverings that are labeled as compliant with this standard shall be constructed of compliant components that meet the Level 2 conformity assessment requirements specified in Chapter 7 of ANSI/ISEA 125, *American National Standard for Conformity Assessment of Safety and Personal Protective Equipment*, with the exception of paragraph 7.1.

A.4.1.1.2 Given the nature of the flame-resistant cloth face coverings and their intended widespread use for national health emergencies including pandemics, the conformity assessment approach applied for this clothing is a self-declaration in accordance with the criteria established in ANSI/ISEA 125, *American National Standard for Conformity Assessment of Safety and Personal Protective Equipment*, that includes conformance testing, corrective and preventive actions, recordkeeping, and the supplier's Declaration of Conformity.

4.1.2 All test data used to determine compliance of flame-resistant garments, shrouds/hoods/balaclavas, ~~and gloves,~~ and cloth face coverings with this standard shall be provided by an accredited testing laboratory.

4.1.3.1 All flame-resistant cloth face coverings shall be labeled.

4.1.4.1 All flame-resistant cloth face coverings shall have a label that meets the requirements of Section 5.1.

6. *Revise/add new specific paragraphs in Chapter 5, and add associated annex items to read as follows:*

5.1.1.1* All flame-resistant cloth face coverings shall have a label or labels permanently and conspicuously attached to each flame-resistant cloth face covering.

A.5.1.1.1 By definition, cloth face coverings are excluded from product requirements and are exempted from many product label requirements. Therefore, they should have a label as opposed to a product label.

5.1.4.1 Flame-resistant cloth face coverings shall be exempt from the requirements of 5.1.4.

5.1.5 All worded portions of the required label or product label shall be printed in English. Supplementary languages, in addition to English, shall be permitted.

5.1.6 Symbols and other pictorial graphic representations shall be permitted to be used to supplement worded statements on the label or product label ~~or labels~~.

5.1.8.1 The following statement shall be printed legibly on the flame-resistant cloth face covering label in letters at least 2.5 mm (0.10 in.) high:

THIS CLOTH FACE COVERING MEETS THE
REQUIREMENTS OF NFPA 2112-2018.

5.1.9.1* At a minimum, the following information shall also be printed legibly on the flame-resistant cloth face covering label in letters at least 1.6 mm (0.063 in.) high:

- (1) Model name, number, or design
- (2) Manufacturer's name, identification, or designation

(3) Manufacturer's garment identification number, lot number, or serial number

(4) "DO NOT REMOVE"

A.5.1.9.1 The reduced minimum label information for flame-resistant cloth face coverings is intended to minimize the size of the label relative to the inherently small size of the item. Additional label information is permitted if requested by the end-user.

7. *Revise title of section 6.1 to read as follows:*

6.1 Garments, Shrouds/Hoods/Balaclavas, ~~and Gloves,~~ and Cloth Face Coverings.

8. *Revise paragraph 7.4 and add new paragraph 7.4.1 to read as follows:*

7.4 Label Requirement. Specimen labels used in the construction of flame-resistant ~~clothing items~~ garments, shrouds/hoods/balaclavas, and gloves shall be tested, as specified in Section 8.7, for printing durability and shall remain legible and in place.

7.4.1 Specimen labels used in the construction of flame-resistant cloth face coverings shall be exempt from the requirements of Section 7.4.

9. *Add new section 7.7 addressing performance requirements for cloth face coverings to read as follows:*

7.7 Cloth Face Covering Requirements.

7.7.1 Fabric components used in the construction of cloth face coverings shall be compliant with all fabric requirements in Section 7.1.

7.7.2 Sewing thread components used in the construction of cloth face coverings shall be compliant with the thread requirements in Section 7.2.

7.7.3 Hardware components used in the construction of cloth face coverings shall be compliant with the hardware requirements in Section 7.3.

10. *Revise specific paragraphs in Chapter 8 to read as follows:*

8.2.1 Application. This test method shall apply to flame-resistant garment, shroud/hood/balaclava, ~~and glove,~~ and cloth face covering fabrics.

8.2.2.1 HTP testing shall be conducted on six specimens — three in the spaced configuration and three in the contact configuration — measuring 150 mm ± 5 mm × 150 mm ± 5 mm (6 in. ± 1/4 in. × 6 in. ± 1/4 in.) and shall consist of all layers representative of the garment, shroud/hood/balaclava, ~~and glove,~~ and cloth face covering to be tested.

8.2.2.2 Specimens shall consist of all layers used in the construction of the flame-resistant garment, shroud/hood/balaclava, ~~and glove,~~ and cloth face covering excluding any areas with special reinforcements.

8.2.3 Sample Preparation.

8.2.3.1 For fabrics that are designated on the flame-resistant garment, shroud/hood/balaclava, ~~and glove,~~ and cloth face covering labels to be washed, specimens shall be tested before and after three cycles of washing and drying as specified in 8.1.3.

8.2.3.2 For fabrics that are designated on the flame-resistant garment, shroud/hood/balaclava, ~~and glove,~~ and cloth face covering labels to be dry-cleaned, specimens shall be tested before and after three cycles of dry cleaning as specified in 8.1.4.

8.2.3.3 For fabrics that are designated on the flame-resistant garment, shroud/hood/balaclava, ~~and glove~~, and cloth face covering labels to be either washed or dry-cleaned, specimens shall be tested before and after three cycles of washing and drying as specified in 8.1.3, or after three cycles of dry cleaning as specified in 8.1.4.

8.3.1.1 This test method shall apply to each flame-resistant garment, ~~and shroud/hood/balaclava~~, and cloth face covering fabric layer.

8.3.3.1 For fabrics, cold weather insulation materials, ~~and shroud/hood/balaclava~~, and cloth face covering materials that are designated on the product label to be washed, specimens shall be tested before and after 100 cycles of washing and drying as specified in 8.1.3.

8.3.3.2 For fabrics, cold weather insulation materials, ~~and shroud/hood/balaclava~~, and cloth face covering materials that are designated on the product label to be dry-cleaned, specimens shall be tested before and after 100 cycles of dry cleaning as specified in 8.1.4.

8.3.3.3 For fabrics, cold weather insulation materials, ~~and shroud/hood/balaclava~~, and cloth face covering materials that are designated on the product label to be either washed or dry-cleaned, specimens shall be tested before and after 100 cycles of washing and drying as specified in 8.1.3, or before and after 100 cycles of dry cleaning as specified in 8.1.4.

8.4.1.1 This test method shall apply to flame-resistant garment, shroud/hood/balaclava, ~~and glove~~, and cloth face covering components, hardware, and cold weather insulation materials.

8.4.2.2 Both heat and thermal shrinkage resistance testing shall be conducted on a minimum of three specimens for each flame-resistant garment, ~~and shroud/hood/balaclava~~, and cloth face covering fabric.

8.4.3.1 For fabrics, cold weather insulation materials, ~~and shroud/hood/balaclava~~ materials, and cloth face covering fabrics that are designated on the product label to be washed, specimens shall be tested before and after three cycles of washing and drying as specified in 8.1.3.

8.4.3.2 For fabrics, cold weather insulation materials, ~~and shroud/hood/balaclava~~ materials, and cloth face covering fabrics that are designated on the product label to be dry cleaned, specimens shall be tested before and after three cycles of dry cleaning as specified in 8.1.4.

8.4.3.3 For fabrics, cold weather insulation materials, ~~and shroud/hood/balaclava~~ materials, and cloth face covering fabrics that are designated on the product label to be either washed or dry cleaned, specimens shall be tested before and after three cycles of washing and drying as specified in 8.1.3, or before and after three cycles of dry cleaning as specified in 8.1.4.

8.4.9 Specific Requirements for Testing Other Flame-Resistant Garments ~~and~~, Shroud/Hood/Balaclava, Cloth Face Coverings, and Materials (Including Reflective Striping).

8.6.1 Application. The thread heat resistance test method shall apply to each type of thread used in the construction of the flame-resistant garment, shroud/hood/balaclava, ~~and gloves,~~ and cloth face coverings other than embroidery.

11. Add the following new references to Annex C to read as follows:

C.1.2.X ASTM Publications. ...

ASTM F2101, Standard Test Method for Evaluating the Bacterial Filtration Efficiency (BFE) of Medical Face Mask Materials, Using a Biological Aerosol of Staphylococcus aureus, 2019.

C.1.2.X CENELEC Publications. CENELEC, European Committee for Electrotechnical Standardization, CEN-CENELEC Management Centre, Avenue Marnix 17, 4th Floor, B-1000 Brussels, Belgium.

EN 14683, Medical face masks—Requirements and test methods, 2019.

C.1.2.X ISEA Publications. International Safety Equipment Association, 1901 North Moore Street, Suite #808, Arlington, VA 22209-1762.

ANSI/ISEA 125, American National Standard for Conformity Assessment of Safety and Personal Protective Equipment, 2014.

Substantiation: The current COVID-19 pandemic is changing how the workplace operates. Given the need for industrial workers to potentially wear masks in the performance of their duties as dictated by Federal, state, or local authorities, or as mandated by the organization or employer, it is important the wearing of such masks not contribute to worker hazards faced as part of their normal occupational tasks. The inclusion of flame-resistant cloth face covering is intended to aid in the safe wearing of masks under the circumstances of a national health emergency that includes pandemics involving airborne pathogens. The specific requirements have been written to apply the same criteria that are normally established for shrouds, hoods, and balaclavas. To enable the rapid dissemination of these products, self-declaration is specified in lieu of third party certification but with specific caveats associated for ensuring a high level of data quality by the use of laboratories accredited to ISO 17025 for this testing in addition to other conformity assessment requirements specified in a separate industry standard.

Emergency Nature: The proposed TIA intends to offer to the public a benefit that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation.