

ArcWear

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Arc Testing Scouting Report (NOT AN ARC RATING)

Date: September 17, 2019

Report #: 1908P49

Client: Testing Client

At request of: Testing Client for Sharing

Samples Evaluated were Identified As:

- Mfg. 3M, Style 8212, N95, Particulate Welding Respirator with Foam Face Seal, Tested and Marketed for Flame Resistance to Modified ASTM 2859-96
- Mfg. 3M, Style 8514, Particulate Respirator with Carbon Filter, Tested and Marketed for Flame Resistance to Modified ASTM 2859-96
- Mfg. 3M, Style 8210 Particulate Respirator with Nose Foam Strip, White
- Mfg. 3M, Aura, Style 9211, Particulate Respirator N95

Samples received on: 8-9-19

Test Procedure:

The samples were evaluated for melting, dripping, and probability of ignition (partial testing) using the set-up of in ASTM F1959/F1959M-14e1 *Standard Test Method for Determining the Arc Rating of Materials for Clothing*. This report provides a summary of results at specified incident energy exposures.

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Sample Identification:	Observations:
<p>Mfg. 3M, Style 8212, N95, Particulate Welding Respirator with Foam Faceseal, Tested and Marketed for Flame Resistance to Modified ASTM 2859-96</p>	<p>30 specimens were evaluated to determine a probability of ignition; there was insufficient samples to complete the analysis, but the estimated result is that the 50% probability of ignition on this product, using 30 data points and the logistic regression of ASTM F1959, is approximately 13.6 cal/cm². With the limited data set, the 95% probability of ignition was 9.7 cal/cm². This is ignition with melting and dripping but the sample in this test set up is closer to the arc flash than measured so the number should be conservative.</p> <p>In exposures between 8.9 cal/cm² and 20.5 cal/cm² measured at 12 inches away (the back of the samples were at that distance but the mask protruded from that panel level), the strap securing the respirator melted and/or ignited at all exposure levels. Ignition and melting and dripping of the mask was indicated at exposure levels of 17 cal/cm², 20.5 cal/cm², and 20.5 cal/cm². Afterflame was difficult to measure as the respirators dropped out of camera view when the straps melted, resulting in the specimens falling to the ground. For the last two shots, the straps were covered with an FR material to maintain placement in testing for recording. The data table summarizing the 30 data points is shown in Figure 1 below.</p>
<p>Mfg. 3M, Style 8514, Particulate Respirator with Carbon Filter, Tested and Marketed for Flame Resistance to Modified ASTM 2859-96, White</p>	<p>One shot was performed at an exposure level ranging from 10.2 cal/cm²- 11.4 cal/cm². 6 specimens were evaluated, and no ignition was observed. Straps were covered in all of these exposures.</p>
<p>Mfg. 3M, Style 8210 Particulate Respirator with Nose Foam Strip, White, NOT listed as a flame-resistant model</p>	<p>One shot was performed at an exposure level ranging from 9.9 cal/cm²- 11.2 cal/cm². 6 specimens were evaluated. Melting, dripping, sticking, and ignition were observed on all samples. None of the specimen remained on the panel for images after testing, and the respirators melted and stuck to the control fabric used as a backing.</p>
<p>Mfg. 3M, Aura, Style 9211, Particulate Respirator N95, NOT listed as a flame-resistant model</p>	<p>One shot was performed at an exposure level ranging from 8.8 cal/cm²- 10.1 cal/cm². 6 specimens were evaluated. Melting, dripping, sticking, and ignition were observed on all samples.</p>

Figure 1. Summary of 30 specimens of Respirator Style 8212

See Data for This sample on Page 4.

While none of the items would be considered flame-resistant in an arc flash hazard, respirator styles 8212 and 8514 performed more favorably in the arc flash exposure than Styles 8210 and 9211 (which are not marketed as flame resistant to small scale testing). There is a risk of ignition on all products tested at some level, but the need for a respirator may outweigh the risk of an accidental arc flash. In such cases, it is recommended to use the style 8212 or 8514 with a

faceshield or balaclava to further protect from ignition, melting, and dripping. If worn without additional protection the two "flame treated" samples did appear to provide a difference in ignition, melting and dripping but the standard cited by 3M is not for flame resistant PPE and the standard is quite dated. The strap used to secure the respirator to the head melted in nearly all cases causing the respirator to fall to the ground (when not covered with an FR material by testing staff). This would be expected in a real-life exposure. If an arc flash hazard is present, use of Styles 8210 and 9211 are not recommended, as these specimens ignited, melted, dripped, and stuck to the cover material in an exposure near 11 cal/cm². Respirators are not currently covered by a specification for the thermal effects of an arc flash hazard and many contain parts that are flammable in some exposure; however, the use of them may be required due to particulate hazards. Safety professionals will need to assess risk and the hazard to make a reasonable determination on PPE requirements. NFPA 70E has language making for allowances for an AHJ to make exceptions for PPE that must be used when an arc rated option is not available.

This document is for internal use and not a final arc rating report. Photos, videos and raw data are available in your password protected folder at www.arcwearonline.com.

Signed for the Company by:



Hugh Hoagland
President

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Date: August 12, 2019

Summary of Measured Energy and Observations Testing Performed Using Test Set up of ASTM F1959/F1959M-14e1 Testing Performed at Kinetrics High Current Lab for ArcWear Testing
Report # K352148-1908P49-R00

Sample Description: Testing Client, Mfg. 3M, Style 8212, N95, Particulate Welding Respirator with Foam Face Seal, Tested and Marketed for Flame Resistance to Modified ASTM 2859-96, White, ArcWear# 1908P49

Test Number	Panel Sample	Test Current (A)	Cycles of 60Hz	Ei cal/cm ²	Ignition	Comments
K-352148-5183	A1	8220	11.2	9.8	N	No ignition of mask, mask fell due to melting of the strap.
K-352148-5183	B1	8220	11.2	8.9	N	No ignition of mask, mask fell due to melting of the strap.
K-352148-5183	C1	8220	11.2	9.7	N	No ignition of mask.
K-352148-5183	A2	8220	11.2	9.8	N	No ignition of mask, mask fell due to melting of the strap.
K-352148-5183	B2	8220	11.2	8.9	N	No ignition of mask, mask fell due to melting of the strap.
K-352148-5183	C2	8220	11.2	9.7	N	No ignition of mask.
K-352148-5183	A3	8220	11.2	9.8	N	No ignition sample fell due to melting of strap
K-352148-5183	B3	8220	11.2	8.9	N	No ignition sample fell due to melting of strap
K-352148-5183	C3	8220	11.2	9.7	N	No ignition sample fell due to melting of strap
K-352148-5184	A1	7997	25.2	17	Y	Ignition on all Samples and straps. Melting and Dripping of Mask
K-352148-5184	B1	7997	25.2	20.5	Y	Ignition on all Samples and straps. Melting and Dripping of Mask
K-352148-5184	C1	7997	25.2	19.2	Y	Ignition on all Samples and straps. Melting and Dripping of Mask
K-352148-5184	A2	7997	25.2	17	Y	Ignition on all Samples and straps. Melting and Dripping of Mask
K-352148-5184	B2	7997	25.2	20.5	Y	Ignition on all Samples and straps. Melting and Dripping of Mask
K-352148-5184	C2	7997	25.2	19.2	Y	Ignition on all Samples and straps. Melting and Dripping of Mask
K-352148-5184	A3	7997	25.2	17	Y	Ignition on all Samples and straps. Melting and Dripping of Mask
K-352148-5184	B3	7997	25.2	20.5	Y	Ignition on all Samples and straps. Melting and Dripping of Mask

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Test Number	Panel Sample	Test Current (A)	Cycles of 60Hz	Ei cal/cm ²	Ignition	Comments
K-352148-5184	C3	7997	25.2	19.2	Y	Ignition on all Samples and straps. Melting and Dripping of Mask
K-352148-5185	A1	8058	20.2	13.3	N	No ignition, Did not fall. (Straps covered)
K-352148-5185	B1	8058	20.2	15.8	Y	Strap melted, dripped and fell
K-352148-5185	C1	8058	20.2	16	Y	Ignition and fell
K-352148-5185	A2	8058	20.2	13.3	N	No ignition, Did not fall. (Straps covered)
K-352148-5185	B2	8058	20.2	15.8	Y	Ignition and fell
K-352148-5185	C2	8058	20.2	16	Y	Ignition, melt and drip, did not fall.
K-352148-5186	A1	8061	10.2		N	Did not fall, no melt or drip (Straps covered)
K-352148-5186	B1	8061	11.7		Y	Ignition
K-352148-5186	C1	8061	10.1		N	Did not fall, no melt or drip (Straps covered)
K-352148-5186	A2	8061	10.2		N	Did not fall, no melt or drip (Straps covered)
K-352148-5186	B2	8061	11.7		Y	Ignition
K-352148-5186	C2	8061	10.1		N	Did not fall, no melt or drip (Straps covered)

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