



HPNW  
HEALTH PHYSICS NORTHWEST

April 8, 2021

Jarrold Parasmo  
President  
Protech Medical  
1360 North Killian Drive, Suite 2  
Lake Park, Florida 33403

Dear Jarrod:

Enclosed are the attenuation and lead equivalency results for the radiation attenuating protective gloves that were submitted to Health Physics Northwest. At your request these tests were performed in accordance with ASTM test Method F2547-18. The documentation on the following pages contains all of the information regarding this testing.

If you have any questions, please contact our office.

Sincerely,

Matt Brien, BS  
Medical Physicist

Encl.

## ASTM test Method F2547-18 14.2.1 Test Information

Dates of Testing	April 2, 2021 and April 8, 2021
Place of Testing	Health Physics Northwest
Name of Individual Performing the Testing	Matt Brien, BS Health Physics Northwest
Manufacturer and Model of X-ray Generator	Trex TM50 (G-9750A)
Manufacturer / Model of X-ray Tube	Varex Imaging Corporation / A-192

### Testing Parameters

Set kVp	60	90	122
Measured kVp	59.7	90.1	120.3
mAs	36	24	20
Half-Value Layer (mmAl)	2.91	4.35	6.31

All exposure and kVp measurements performed with an Unfors RaySafe X2 R/F sensor, Serial No.: 208238 calibrated March 5, 2021.

## ASTM test Method F2547-18 14.2.2 Sample Identification

Sample Designation	Proguard Classic
Model	PG1
Description of the Material Tested	Radiographic Protection Glove
Material Composition	Premium Lead, Natural Latex, Powder Free
Lot	032020
Locations of the Material Tested	Left Middle Finger (Palm Side) Left Palm (Palm Side) Left Cuff (Palm Side)
Glove Size	9
Number of Layers	1

Sample Designation	Proguard Classic
Model	PG2
Description of the Material Tested	Radiographic Protection Glove
Material Composition	Lead, Natural Rubber Latex, Powder Free
Lot	112018
Locations of the Material Tested	Left Middle Finger (Palm Side) Left Palm (Palm Side) Left Cuff (Palm Side)
Glove Size	7
Number of Layers	1

## ASTM test Method F2547-18 14.2.2 Sample Identification

Sample Designation	Proguard RR
Model	RR1
Description of the Material Tested	Radiographic Protection Glove
Material Composition	Premium Lead, Latex Free, Powder Free
Lot	092020
Locations of the Material Tested	Left Middle Finger (Palm Side) Left Palm (Palm Side) Left Cuff (Palm Side)
Glove Size	6.5
Number of Layers	1

Sample Designation	Proguard
Model	RR2
Description of the Material Tested	Radiographic Protection Glove
Material Composition	Lead, No Natural Rubber Latex, Powder Free
Lot	112017
Locations of the Material Tested	Left Middle Finger (Palm Side) Left Palm (Palm Side) Left Cuff (Palm Side)
Glove Size	6
Number of Layers	1

Sample Designation	Proguard
Model	RR3
Description of the Material Tested	Radiographic Protection Glove
Material Composition	Lead, No Natural Rubber Latex, Powder Free
Lot	052018
Locations of the Material Tested	Left Middle Finger (Palm Side) Left Palm (Palm Side) Left Cuff (Palm Side)
Glove Size	9
Number of Layers	1

## ASTM test Method F2547-18 14.2.2 Sample Identification

Sample Designation	Proguard ECO
Model	C1
Description of the Material Tested	Radiographic Protection Glove
Material Composition	Lead Free, Natural Latex, Powder Free
Lot	122019
Locations of the Material Tested	Left Middle Finger (Palm Side) Left Palm (Palm Side) Left Cuff (Palm Side)
Glove Size	9
Number of Layers	1

Sample Designation	Proguard ECO
Model	C2
Description of the Material Tested	Radiographic Protection Glove
Material Composition	Lead Free, Natural Latex, Powder Free
Lot	122019
Locations of the Material Tested	Left Middle Finger (Palm Side) Left Palm (Palm Side) Left Cuff (Palm Side)
Glove Size	9
Number of Layers	1

## ASTM test Method F2547-18 14.2.2 Sample Identification

Sample Designation	Proguard Elite
Model	Model 1
Made In	Malaysia
Description of the Material Tested	Radiographic Protection Glove
Material Composition	Latex Free
Lot	20001
Locations of the Material Tested	Left Middle Finger (Palm Side) Left Palm (Palm Side) Left Cuff (Palm Side)
Glove Size	6.5
Number of Layers	1

Sample Designation	Proguard Elite
Model	E1
Made In	India
Description of the Material Tested	Radiographic Protection Glove
Material Composition	Lead Free, Latex Free, Powder Free
Lot	032021
Locations of the Material Tested	Left Middle Finger (Palm Side) Left Palm (Palm Side) Left Cuff (Palm Side)
Glove Size	7.5
Number of Layers	1

## ASTM test Method F2547-18 14.2.3 Test Results

		Attenuation (and Mean Attenuation)		
Glove Designation	Region of Interest	60 kVp	90 kVp	120 kVp
Proguard Classic PG1	Left Middle Finger (1 Layer)	48.6%	34.4%	24.2%
	Left Palm (1 Layer)	41.9%	31.7%	22.3%
	Left Cuff (1 Layer)	45.0%	34.3%	23.1%
<b>Mean Attenuation:</b>		<b>45.2%</b> (Pass)	<b>33.5%</b> (Pass)	<b>23.2%</b> (Pass)

A radiation attenuation glove must attenuate per the minimum values shown in the following table at each kVp level (ASTM Standard D7866 – 14a, 5.2):

60 kVp	90 kVp*	120 kVp
29.0%	20.0%	15.0%

\*The ASTM Standard D7866 – 14a does not specify a minimum attenuation value at 90 kVp. Therefore, the minimum attenuation value at 90 kVp in the above table was extrapolated.

		Lead Equivalency (mm Pb)*		
Glove Designation	Region of Interest	60 kVp	90 kVp	120 kVp
Proguard Classic PG1	Left Middle Finger (1 Layer)	0.06	0.05	0.04
	Left Palm (1 Layer)	0.05	0.04	0.04
	Left Cuff (1 Layer)	0.05	0.05	0.04

\*The percent error for determining lead equivalency for samples with a low attenuation is significantly higher than the percent error for samples with higher attenuation.

## ASTM test Method F2547-18 14.2.3 Test Results

		Attenuation (and Mean Attenuation)		
Glove Designation	Region of Interest	60 kVp	90 kVp	120 kVp
Proguard Classic PG2	Left Middle Finger (1 Layer)	58.8%	45.0%	33.4%
	Left Palm (1 Layer)	56.7%	43.2%	31.3%
	Left Cuff (1 Layer)	58.4%	43.9%	32.6%
<b>Mean Attenuation:</b>		<b>58.0%</b> (Pass)	<b>44.0%</b> (Pass)	<b>32.4%</b> (Pass)

A radiation attenuation glove must attenuate per the minimum values shown in the following table at each kVp level (ASTM Standard D7866 – 14a, 5.2):

60 kVp	90 kVp*	120 kVp
29.0%	20.0%	15.0%

\*The ASTM Standard D7866 – 14a does not specify a minimum attenuation value at 90 kVp. Therefore, the minimum attenuation value at 90 kVp in the above table was extrapolated.

		Lead Equivalency (mm Pb)*		
Glove Designation	Region of Interest	60 kVp	90 kVp	120 kVp
Proguard Classic PG2	Left Middle Finger (1 Layer)	0.07	0.06	0.06
	Left Palm (1 Layer)	0.07	0.06	0.05
	Left Cuff (1 Layer)	0.07	0.06	0.06

\*The percent error for determining lead equivalency for samples with a low attenuation is significantly higher than the percent error for samples with higher attenuation.

## ASTM test Method F2547-18 14.2.3 Test Results

		Attenuation (and Mean Attenuation)		
Glove Designation	Region of Interest	60 kVp	90 kVp	120 kVp
Proguard RR RR1	Left Middle Finger (1 Layer)	44.6%	31.0%	21.6%
	Left Palm (1 Layer)	50.7%	38.0%	27.2%
	Left Cuff (1 Layer)	48.3%	36.1%	25.4%
<b>Mean Attenuation:</b>		<b>47.9%</b> (Pass)	<b>35.0%</b> (Pass)	<b>24.7%</b> (Pass)

A radiation attenuation glove must attenuate per the minimum values shown in the following table at each kVp level (ASTM Standard D7866 – 14a, 5.2):

60 kVp	90 kVp*	120 kVp
29.0%	20.0%	15.0%

\*The ASTM Standard D7866 – 14a does not specify a minimum attenuation value at 90 kVp. Therefore, the minimum attenuation value at 90 kVp in the above table was extrapolated.

		Lead Equivalency (mm Pb)*		
Glove Designation	Region of Interest	60 kVp	90 kVp	120 kVp
Proguard RR RR1	Left Middle Finger (1 Layer)	0.05	0.04	0.04
	Left Palm (1 Layer)	0.06	0.05	0.05
	Left Cuff (1 Layer)	0.06	0.05	0.04

\*The percent error for determining lead equivalency for samples with a low attenuation is significantly higher than the percent error for samples with higher attenuation.



## ASTM test Method F2547-18 14.2.3 Test Results

		Attenuation (and Mean Attenuation)		
Glove Designation	Region of Interest	60 kVp	90 kVp	120 kVp
Proguard RR2	Left Middle Finger (1 Layer)	51.1%	40.1%	28.8%
	Left Palm (1 Layer)	62.1%	48.1%	35.6%
	Left Cuff (1 Layer)	55.5%	42.0%	30.7%
<b>Mean Attenuation:</b>		<b>56.2%</b> (Pass)	<b>43.4%</b> (Pass)	<b>31.7%</b> (Pass)

A radiation attenuation glove must attenuate per the minimum values shown in the following table at each kVp level (ASTM Standard D7866 – 14a, 5.2):

60 kVp	90 kVp*	120 kVp
29.0%	20.0%	15.0%

\*The ASTM Standard D7866 – 14a does not specify a minimum attenuation value at 90 kVp. Therefore, the minimum attenuation value at 90 kVp in the above table was extrapolated.

		Lead Equivalency (mm Pb)*		
Glove Designation	Region of Interest	60 kVp	90 kVp	120 kVp
Proguard RR2	Left Middle Finger (1 Layer)	0.06	0.06	0.05
	Left Palm (1 Layer)	0.07	0.07	0.06
	Left Cuff (1 Layer)	0.07	0.06	0.05

\*The percent error for determining lead equivalency for samples with a low attenuation is significantly higher than the percent error for samples with higher attenuation.

## ASTM test Method F2547-18 14.2.3 Test Results

		Attenuation (and Mean Attenuation)		
Glove Designation	Region of Interest	60 kVp	90 kVp	120 kVp
Proguard RR3	Left Middle Finger (1 Layer)	64.0%	48.6%	36.4%
	Left Palm (1 Layer)	62.4%	49.6%	37.9%
	Left Cuff (1 Layer)	60.1%	45.4%	34.2%
<b>Mean Attenuation:</b>		<b>62.2%</b> (Pass)	<b>47.9%</b> (Pass)	<b>36.2%</b> (Pass)

A radiation attenuation glove must attenuate per the minimum values shown in the following table at each kVp level (ASTM Standard D7866 – 14a, 5.2):

60 kVp	90 kVp*	120 kVp
29.0%	20.0%	15.0%

\*The ASTM Standard D7866 – 14a does not specify a minimum attenuation value at 90 kVp. Therefore, the minimum attenuation value at 90 kVp in the above table was extrapolated.

		Lead Equivalency (mm Pb)*		
Glove Designation	Region of Interest	60 kVp	90 kVp	120 kVp
Proguard RR3	Left Middle Finger (1 Layer)	0.08	0.07	0.06
	Left Palm (1 Layer)	0.07	0.07	0.07
	Left Cuff (1 Layer)	0.07	0.06	0.06

\*The percent error for determining lead equivalency for samples with a low attenuation is significantly higher than the percent error for samples with higher attenuation.

## ASTM test Method F2547-18 14.2.3 Test Results

		Attenuation (and Mean Attenuation)		
Glove Designation	Region of Interest	60 kVp	90 kVp	120 kVp
Proguard ECO C1	Left Middle Finger (1 Layer)	43.2%	33.0%	22.7%
	Left Palm (1 Layer)	29.6%	21.9%	15.1%
	Left Cuff (1 Layer)	19.2%	14.8%	9.4%
<b>Mean Attenuation:</b>		<b>30.7%</b> (Pass)	<b>23.2%</b> (Pass)	<b>15.7%</b> (Pass)

A radiation attenuation glove must attenuate per the minimum values shown in the following table at each kVp level (ASTM Standard D7866 – 14a, 5.2):

60 kVp	90 kVp*	120 kVp
29.0%	20.0%	15.0%

\*The ASTM Standard D7866 – 14a does not specify a minimum attenuation value at 90 kVp. Therefore, the minimum attenuation value at 90 kVp in the above table was extrapolated.

**Note:** Collectively the radiation attenuation of this glove at the three evaluated energies are higher than the minimum values shown in the above table. However, the left cuff of this glove attenuates less than the recommended minimum values at all three evaluated energies.

		Lead Equivalency (mm Pb)*		
Glove Designation	Region of Interest	60 kVp	90 kVp	120 kVp
Proguard ECO C1	Left Middle Finger (1 Layer)	0.05	0.05	0.04
	Left Palm (1 Layer)	0.03	0.03	0.02
	Left Cuff (1 Layer)	0.02	0.02	0.01

\*The percent error for determining lead equivalency for samples with a low attenuation is significantly higher than the percent error for samples with higher attenuation.

## ASTM test Method F2547-18 14.2.3 Test Results

		Attenuation (and Mean Attenuation)		
Glove Designation	Region of Interest	60 kVp	90 kVp	120 kVp
Proguard ECO C2	Left Middle Finger (1 Layer)	39.7%	29.6%	21.9%
	Left Palm (1 Layer)	16.7%	12.3%	8.5%
	Left Cuff (1 Layer)	15.1%	10.9%	7.2%
<b>Mean Attenuation:</b>		<b>23.8%</b> (FAIL)	<b>17.6%</b> (FAIL)	<b>12.5%</b> (FAIL)

A radiation attenuation glove must attenuate per the minimum values shown in the following table at each kVp level (ASTM Standard D7866 – 14a, 5.2):

60 kVp	90 kVp*	120 kVp
29.0%	20.0%	15.0%

\*The ASTM Standard D7866 – 14a does not specify a minimum attenuation value at 90 kVp. Therefore, the minimum attenuation value at 90 kVp in the above table was extrapolated.

		Lead Equivalency (mm Pb)*		
Glove Designation	Region of Interest	60 kVp	90 kVp	120 kVp
Proguard ECO C2	Left Middle Finger (1 Layer)	0.05	0.04	0.04
	Left Palm (1 Layer)	0.02	0.01	0.01
	Left Cuff (1 Layer)	0.01	0.01	0.01

\*The percent error for determining lead equivalency for samples with a low attenuation is significantly higher than the percent error for samples with higher attenuation.

## ASTM test Method F2547-18 14.2.3 Test Results

		Attenuation (and Mean Attenuation)		
Glove Designation	Region of Interest	60 kVp	90 kVp	120 kVp
Proguard Elite Model 1 (Made in Malaysia)	Left Middle Finger (1 Layer)	52.4%	40.4%	31.4%
	Left Palm (1 Layer)	33.1%	25.6%	18.5%
	Left Cuff (1 Layer)	37.5%	28.7%	21.1%
<b>Mean Attenuation:</b>		<b>41.0%</b> (Pass)	<b>31.6%</b> (Pass)	<b>23.7%</b> (Pass)

A radiation attenuation glove must attenuate per the minimum values shown in the following table at each kVp level (ASTM Standard D7866 – 14a, 5.2):

60 kVp	90 kVp*	120 kVp
29.0%	20.0%	15.0%

\*The ASTM Standard D7866 – 14a does not specify a minimum attenuation value at 90 kVp. Therefore, the minimum attenuation value at 90 kVp in the above table was extrapolated.

		Lead Equivalency (mm Pb)*		
Glove Designation	Region of Interest	60 kVp	90 kVp	120 kVp
Proguard Elite Model 1 (Made in Malaysia)	Left Middle Finger (1 Layer)	0.06	0.06	0.05
	Left Palm (1 Layer)	0.04	0.03	0.03
	Left Cuff (1 Layer)	0.04	0.04	0.03

\*The percent error for determining lead equivalency for samples with a low attenuation is significantly higher than the percent error for samples with higher attenuation.

## ASTM test Method F2547-18 14.2.3 Test Results

		Attenuation (and Mean Attenuation)		
Glove Designation	Region of Interest	60 kVp	90 kVp	120 kVp
Proguard Elite E1 (Made in India)	Left Middle Finger (1 Layer)	36.9%	28.1%	18.7%
	Left Palm (1 Layer)	44.8%	34.1%	23.2%
	Left Cuff (1 Layer)	40.0%	28.6%	19.3%
<b>Mean Attenuation:</b>		<b>40.6%</b> (Pass)	<b>30.3%</b> (Pass)	<b>20.4%</b> (Pass)

A radiation attenuation glove must attenuate per the minimum values shown in the following table at each kVp level (ASTM Standard D7866 – 14a, 5.2):

60 kVp	90 kVp*	120 kVp
29.0%	20.0%	15.0%

\*The ASTM Standard D7866 – 14a does not specify a minimum attenuation value at 90 kVp. Therefore, the minimum attenuation value at 90 kVp in the above table was extrapolated.

		Lead Equivalency (mm Pb)*		
Glove Designation	Region of Interest	60 kVp	90 kVp	120 kVp
Proguard Elite E1 (Made in India)	Left Middle Finger (1 Layer)	0.04	0.04	0.03
	Left Palm (1 Layer)	0.05	0.05	0.04
	Left Cuff (1 Layer)	0.05	0.04	0.03

\*The percent error for determining lead equivalency for samples with a low attenuation is significantly higher than the percent error for samples with higher attenuation.