



OCCUPATIONAL PROTECTIVE GLOVES FOR FIRE-FIGHTING

TEST REPORT

Sample As Received	Reference: 2161.6:2003	Last Revised: 19/10/2016
Report No: 160707(ii)		Order #: -
Date Received: 4/07/2016		Date Completed: 4/10/2016, final submission 7/12/2018
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This test report supersedes report numbered 160707(i), (Re-testing performed)

Test Description	Method
Assessment	AS/NZS 2161.6:2014

Sample Description: Glove 49, PBI Structural glove, Double face knit Kevlar with Silicon Carbon coating, PBI Gold with heat absorber over knuckles, Senso lining system, Kevlar lining, Crosstech moisture barrier and outer shell, Nomex knitted cuff.

4 Design Requirements

Clause	Description	Requirement	Result	Compliance
4.1	Component Assembly	Gloves shall consist of a component assembly meeting the performance requirements Shall be permitted to be configured as a continuous or joined single layer	-	N/A
		OR		
		Shall be permitted to be configured as a continuous or joined multiple layers	Yes	Compliance
4.2	Glove Body Length	Shall extend circumferentially beyond the wrist crease not less than 25 mm	> 25 mm	Compliance
4.3	Wristlet or Cuff	Gloves shall be permitted to be provided with either a cuff or a wristlet or both	Cuff and wristlet	Compliance
	Provided	Shall extend circumferentially at least 50 mm beyond the wrist crease with consideration for Clause 4.2	70 mm	Compliance
	Not Provided	Shall extend circumferentially at least 50 mm beyond the wrist crease which is a 25mm addition to Clause 4.2	-	N/A
		Shall be designed to restrict the entry of embers or foreign particles through the glove openings.	Yes	Compliance
4.4	Glove Sizing			
4.4.1	Minimum Sizing			
		Gloves shall be provided in a minimum of 8 unique and distinct sizes	Yes	Compliance
		Manufacturer shall indicate the range in hand circumference as determined in 4.4.2.	Yes	Compliance
		Manufacturer shall indicate the range in hand length as determined in 4.4.2.	Yes	Compliance

6 Performance Requirements

Clause	Description	Requirement	Result	Compliance
6.1	General Requirements	Shall meet:		
		Flame Resistance	-	Compliance
		Heat transfer (flame exposure)	-	Compliance
		Heat transfer (radiant exposure)	-	Compliance
		Heat transfer (conductive exposure)	-	Compliance
		Heat resistance	-	Compliance
		Abrasion resistance	-	Compliance
		Cut Resistance	-	Compliance
		Tear resistance	-	Compliance
		Puncture resistance	-	Compliance
		Leather chromium VI content	-	Compliance
		Water penetration resistance	-	Compliance
		Liquid penetration resistance	-	Compliance
		Whole glove integrity	-	Compliance
		Ergonomic requirements	As per test report 181203	Compliance
6.2	Thermal Requirements			
6.2.1	Flame Resistance			
	Material Samples Pre-Treatment 5.4.2	Shall meet the following requirement		
		Not exhibit hole formation in any layer	No holes	Compliance
		Not produce flaming or molten debris	No flaming or molten debris	Compliance
		Mean value of After flame shall be ≤ 2s	0 Secs	Compliance
		Afterglow shall not spread from the carbonized area to the undamaged area after the cessation of flaming.	No afterglow spread	Compliance
	Whole Glove Samples Pre-Treatment 5.4.2	Shall meet the following requirement		
		Not exhibit hole formation in any layer	No holes	Compliance
		Not produce flaming or molten debris	No flaming or molten debris	Compliance
		Mean value of After flame shall be ≤ 2s	0 Secs	Compliance
		Afterglow shall not spread from the carbonized area to the undamaged area after the cessation of flaming.	No afterglow spread	Compliance



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TEST REPORT

Clause	Description	Requirement	Result	Compliance
6.2.1 Cont.	Wristlet Samples Pre-Treatment 5.4.2	Shall meet the following requirement		
		Not exhibit hole formation in any layer	No holes	Compliance
		Not produce flaming or molten debris	No flaming or molten debris	Compliance
		Mean value of After flame shall be $\leq 2s$	0 Secs	Compliance
		Afterglow shall not spread from the carbonized area to the undamaged area after the cessation of flaming.	No afterglow spread	Compliance
	Seam Area Samples Pre-Treatment 5.4.2	Shall meet the following requirement		
		Not exhibit hole formation in any layer	No holes	Compliance
		Not produce flaming or molten debris	No flaming or molten debris	Compliance
		Mean value of After flame shall be $\leq 2s$	0 Secs	Compliance
		Afterglow shall not spread from the carbonized area to the undamaged area after the cessation of flaming.	No afterglow spread	Compliance
6.2.2	Heat Transfer (Flame) Pre-Treatment 5.4.2			
	Palm	HTI ₂₄ $\geq 17s$ (HTI ₂₄ - HTI ₁₂) $\geq 6s$	34 s 10 s	Compliance Compliance
	Back	HTI ₂₄ $\geq 17s$ (HTI ₂₄ - HTI ₁₂) $\geq 6s$	39 s 15 s	Compliance Compliance
	Pre-Treatment 5.4.1 & 5.4.2			
	Palm	HTI ₂₄ $\geq 17s$ (HTI ₂₄ - HTI ₁₂) $\geq 6s$	38 s 13 s	Compliance Compliance
	Back	HTI ₂₄ $\geq 17s$ (HTI ₂₄ - HTI ₁₂) $\geq 6s$	68 s 20 s	Compliance Compliance
6.2.3	Heat Transfer (Radiant) Pre-Treatment 5.4.2			
	Palm	t ₂ $\geq 33s$ (t ₂₄ - t ₁₂) $\geq 10s$ Mean transmission factor $\leq 60\%$	33 s 10 s 45%	Compliance Compliance Compliance
	Back	t ₂ $\geq 33s$ (t ₂₄ - t ₁₂) $\geq 10s$ Mean transmission factor $\leq 60\%$	46 s 12 s 42%	Compliance Compliance Compliance
	Pre-Treatment 5.4.1 & 5.4.2			
	Palm	t ₂ $\geq 33s$ (t ₂₄ - t ₁₂) $\geq 10s$ Mean transmission factor $\leq 60\%$	37 s 10 s %	Compliance Compliance Compliance
	Back	t ₂ $\geq 33s$ (t ₂₄ - t ₁₂) $\geq 10s$ Mean transmission factor $\leq 60\%$	57 s 16 s 38%	Compliance Compliance Compliance
6.2.4	Heat Transfer (Conductive) Pre-Treatment 5.4.2			
	Palm	t _t $\geq 14s$	21 s	Compliance
	Back	t _t $\geq 14s$	21 s	Compliance
	Pre-Treatment 5.4.1 & 5.4.2			
	Palm	t _t $\geq 14s$	22 s	Compliance
	Back	t _t $\geq 14s$	22 s	Compliance
	Pre-Treatment 5.4.1 & 5.4.3			
	Palm	t _t $\geq 14s$	19 s	Compliance
	Back	t _t $\geq 14s$	21 s	Compliance



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6.2.5	Heat Resistance – Complete Gloves				
Clause	Description	Requirement	Result	Compliance	
	Palm Area Pre-Treatment 5.4.2	Shall not			
		Melt	No melting	Compliance	
		Separate	No separation	Compliance	
		Ignite	No ignition	Compliance	
		Pass performance at 260 °C , Shrinkage ≤ 5%	2%	Compliance	
	Back Area Pre-Treatment 5.4.2	Shall not			
		Melt	No melting	Compliance	
		Separate	No separation	Compliance	
		Ignite	No ignition	Compliance	
		Pass performance at 260 °C , Shrinkage ≤ 5%	0%	Compliance	
	Palm Area Pre-Treatment 5.4.1	Shall not			
		Melt	No melting	Compliance	
		Separate	No separation	Compliance	
		Ignite	No ignition	Compliance	
		Pass performance at 260 °C , Shrinkage ≤ 5% (Length)	0%	Compliance	
	Back Area Pre-Treatment 5.4.1	Shall not			
		Melt	No melting	Compliance	
		Separate	No separation	Compliance	
		Ignite	No ignition	Compliance	
		Pass performance at 260 °C , Shrinkage ≤ 5%	1%	Compliance	
	Heat Resistance –Inner Gloves				
	Pre-Treatment 5.4.2	Shall not			
		Melt	No melting	Compliance	
		Separate	No separation	Compliance	
		Ignite	No ignition	Compliance	
		Pass performance at 260 °C , Shrinkage ≤ 5 %	0%	Compliance	
	Pre-Treatment 5.4.1	Shall not			
		Melt	No melting	Compliance	
		Separate	No separation	Compliance	
		Ignite	No ignition	Compliance	
		Pass performance at 260 °C , Shrinkage ≤ 5%	0%	Compliance	
6.3.1	Abrasion Resistance				
	Pre-Treatment 5.4.2				
		Palm			
		No wear-through after 6,000 cycles	> 6000 cycles	Compliance	
		Remainder of body of the glove			
		No wear-through after 3,000 cycles	> 3,000 cycles	Compliance	
6.3.2	Cut Resistance				
	Pre-Treatment 5.4.2				
		Palm			
		≥ 4 N	11 N	Compliance	
		Back			
		≥ 4 N	11.5 N	Compliance	
		Glove cuff			
		≥ 4 N	-	N/A	
		Glove wristlet			
		≥ 4 N	10 N	Compliance	
	Pre-Treatment 5.4.3				
		Palm			
		≥ 4 N	11.5 N	Compliance	
		Back			
		≥ 4 N	12.5 N	Compliance	
		Glove cuff			
		≥ 4 N	-	N/A	
		Glove wristlet			
		≥ 4 N	10 N	Compliance	



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Clause	Description	Requirement	Result	Compliance
6.3.3	Tear Resistance			
	Pre-Treatment 5.4.2			
		Palm		
		≥ 50 N	69.2 N	Compliance
		Back		
		≥ 50 N	182.3 N	Compliance
6.3.4	Puncture Resistance			
	Pre-Treatment 5.4.2			
		Body of Glove		
		≥ 120 N	125.0 N	Compliance
	Pre-Treatment 5.4.3			
		Body of Glove		
		≥ 120 N	128.0	Compliance
		Palm		
		≥ 120 N	127.0 N	Compliance
		Back		
		≥ 120 N	121.0 N	Compliance
6.3.5	Leather Chromium VI content	Shall have a Cr(VI) content < 3 mg/kg	Not detected	Compliance
6.4	Barrier Requirements			
6.4.1	Water Penetration Resistance			
	Pre-Treatment 5.4.1			
		No appearance of water drops	No appearance of water drops	Compliance
	Pre-Treatment 5.4.2			
		No appearance of water drops	No appearance of water drops	Compliance
6.4.2	Liquid Penetration			
	Pre-Treatment 5.4.1			
	40% Sodium Hydroxide at 20°C	No Penetration of any liquid for at least one hour	No Penetration	Compliance
	36% Hydrochloric Acid at 20°C	No Penetration of any liquid for at least one hour	No Penetration	Compliance
	37% Sulphuric Acid at 20°C	No Penetration of any liquid for at least one hour	No Penetration	Compliance
	O-xylene 100% at 20°C	No Penetration of any liquid for at least one hour	No Penetration	Compliance
6.4.3	Whole Glove Integrity			
	Pre-Treatment 5.4.1			
		No Leakage	No leakage	Compliance
6.5	Ergonomic Requirements			
6.5.1	Dexterity			
	Pre-Treatment 5.4.1	As per ASTM F2010/F2010M-10		
			Bare Hand Average	48.2
			Test Subjects Average	35.7
			Standard Deviation	12.5
6.5.2	Grip			
	Pre-Treatment 5.4.1	Shall have a weight pulling capacity not less than 80% of bare hand	As per test report 181203	
			86%	Compliance
	Pre-Treatment 5.4.3	Shall have a weight pulling capacity not less than 80% of bare hand	As per test report 181203	
			82%	Compliance
6.5.3	Donning			
	Pre-Treatment 5.4.1	Specimen gloves when tested in accordance with Annex "C" after the pre-treatment specified in 5.4.1, shall not have a donning time exceeding the baseline donning time plus 20 seconds.	8.1 S	Compliance
7	Marking	Shall have a label permanently and conspicuously attached, marked with this standard	Evident	Compliance
		General Marking Requirements as specified in ISO 13688	Evident	Compliance
		Pictogram shall be evident.	Evident	Compliance
		Glove size shall be indicated on the label	Evident	Compliance
		After pre-treatment 5.4.1 labels shall be legible at a distance of at least 30cm	Evident	Compliance
		Labels or accessories shall not adversely affect the performance or present a hazard to the wearer.	No	Compliance
8	Manufacturer's Information			
		Manufacturer's Information shall be given as specified in ISO 13688	Complies	Compliance



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