

Test Report of Non-powered air-purifying particle respirator

Test Article: Layfield 95PFE-L3 Black Mask Lot Number: C0015813
Respirator Type: Non-powered Air-purifying Respirator
Color(s) tested: Black
Size(s) tested: One
Manufacture: Layfield Canada Ltd.
11120 Silversmith Place, Richmond BC V7A 5E4 Canada
Study Number: 20230509001
Study Received Date: 2023-05-15
Condition: In intact package under ambient temperature
Testing Facility: Canadian Standard Testing Center
3800 Wesbrook Mall Vancouver BC Canada V6S 2L9
Test Procedure(s): WI-780-022A
Test Date: 2023-05-15 to 2023-06-01
Deviation(s): None

Photos of the test article



Summary: The test was conducted in accordance with Chinese National standard GB 2626-2019 “Respiratory protection--Non-powered air-purifying particle respirator”.

Test Items include Basic requirement, Visual Inspection, Filter Efficiency, Total Inward Leakage, Inhalation Resistance, Exhalation Resistance, Dead Space, Visual Field, Head Harness, Flammability, Practical performance.

Test Conclusion:

All test method criteria were met. The respirator meets the GB 2626-2019 KN95 technical requirements.

Study Director

Dr. David Lin

2023-06-01

Study Completion Date

Test Result Summary						
No.	Test Items	Standard Requirements		Test Results	Assessment	Remark
1	Basic requirement	Materials	Parts that may directly contact wearer's face shall not be harmful to skin; Filter material shall not be harmful to people;	Filter material and parts directly contact face are not harmful	Pass	
			Materials used should have sufficient strength, and there shall be no damage or distortion in the normal life cycle.	Materials used have sufficient strength		
			shall not cause apparent pain or irritation when in use.	Not cause apparent pain or irritation when in use		
		Structure	1) structural disaggregation shall not likely occur, and the design, components and assembly shall not be harmful to the user. 2) The design of head harness shall be elastic or self-adjustable and facilitate for donning and doffing and be able to fix the facepiece on wearer's face securely without apparent pressure and hurt feeling. The head harness used on replaceable half facepiece and full facepiece shall be replaceable; 3) shall not affect visual field significantly 4) Disposable facepiece shall provide proper face seal, shall not deform during normal use.	Meet the requirements		
			5) the visor of full facepiece shall not fog and affecting vision when in use; 6) replaceable filter elements, valves and head harness shall be facilitating for replacement and facial seal check when in use; 7) breathing hose shall not limit head and body movement, shall not affect face seal or limit and block air flow; 8) exhalation valve shall be protected from front direction with such a design that either a dedicated valve protective component or other component(s) with said function are acceptable. 9) components of replaceable facepiece (except filter element) shall be washable.	/		

Test Result Summary						
No.	Test Items	Standard Requirements		Test Results	Assessment	Remark
2	Visual Inspection	The sample surface shall not be damaged, deformation, or with other obvious defects		No damage, deformation and other obvious defects	Pass	/
		The component materials and structure should be able to stand normal use conditions and possible temperature, humidity and mechanical impact that may encounter		Meet the requirements		
		After temperature and humidity pretreatment and mechanical strength pretreatment, the components shall not fall off, be damaged or deformation.		After pretreatment, no fall off, damage and deformation		
3	Filter Efficiency	KN	≥90.0% (KN90);	/		Pass
			≥95.0% (KN95);	As Received	Temperature and Humidity Conditioning	
				98.9%	98.9%	
				98.7%	98.6%	
				99.0%	99.0%	
				98.6%	98.7%	
				98.9%	99.0%	
				■ As Received □ Mechanical Strength Conditioning	■ As Received □ Cleaning and disinfecting Conditioning	
			99.0%	99.0%		
			98.7%	98.6%		
			98.7%	98.5%		
			98.5%	98.5%		
			98.5%	98.6%		
≥99.97% (KN100)。	/					
Ambient temperature:(25±5)°C Relative humidity:(30±10) % NaCl testing particle concentration: ≤200 mg/m ³ airflow rate: (85±4) L/min		24°C 38% 135 mg/m ³ 85 L/min				

Test Result Summary

No.	Test Items	Standard Requirements	Test Results	Assessment	Remark																																																																																								
3	Filter Efficiency	≥90.0% (KP90) ;	/	/	/																																																																																								
		≥95.0% (KP95) ;	/																																																																																										
		≥99.97% (KP100) .	/																																																																																										
		Ambient temperature:(25±5)°C oil testing particle concentration: ≤200 mg/m ³ airflow rate: (85±4) L/min	/																																																																																										
4	Total Inward Leakage (TIL) (Disposable Respirator)	When TIL of each action is taken as basis of evaluation (10 people x 5 actions), TIL of at least 46 actions of the 50 should <13% (KN90/KP90) <11% (KN95/KP95) <5% (KN100/KP100) And, When the overall TIL of a person is taken as basis for evaluation, the total TIL of at least 8 people of the 10 subjects should <10% (KN90/KP90) <8% (KN95/KP95) <2% (KN100/KP100)	<table border="1"> <thead> <tr> <th>% subjects</th> <th>Head Still</th> <th>Side to Side</th> <th>Up and Down</th> <th>Talking</th> <th>Head Still</th> <th>Avg.</th> </tr> </thead> <tbody> <tr> <td>A.R.</td> <td>JH</td> <td>1.5</td> <td>2.2</td> <td>2.0</td> <td>2.9</td> <td>2.2</td> <td>2.2</td> </tr> <tr> <td></td> <td>XL</td> <td>2.5</td> <td>5.5</td> <td>7.2</td> <td>3.4</td> <td>2.5</td> <td>4.2</td> </tr> <tr> <td></td> <td>JC</td> <td>2.3</td> <td>2.5</td> <td>4.9</td> <td>5.6</td> <td>4.1</td> <td>3.9</td> </tr> <tr> <td></td> <td>BS</td> <td>5.5</td> <td>8.3</td> <td>9.6</td> <td>7.3</td> <td>4.5</td> <td>7.0</td> </tr> <tr> <td></td> <td>JZ</td> <td>5.5</td> <td>7.5</td> <td>9.9</td> <td>5.2</td> <td>5.8</td> <td>6.8</td> </tr> <tr> <td>T.H.C.</td> <td>DL</td> <td>6.8</td> <td>6.5</td> <td>7.8</td> <td>7.4</td> <td>6.2</td> <td>6.9</td> </tr> <tr> <td></td> <td>JH</td> <td>2.2</td> <td>2.8</td> <td>3.5</td> <td>4.2</td> <td>3.5</td> <td>3.2</td> </tr> <tr> <td></td> <td>BZ</td> <td>5.6</td> <td>6.7</td> <td>8.6</td> <td>6.5</td> <td>6.2</td> <td>6.7</td> </tr> <tr> <td></td> <td>RC</td> <td>4.1</td> <td>6.8</td> <td>6.4</td> <td>6.3</td> <td>4.7</td> <td>5.7</td> </tr> <tr> <td></td> <td>FW</td> <td>2.4</td> <td>8.9</td> <td>5.5</td> <td>9.8</td> <td>5.9</td> <td>6.5</td> </tr> </tbody> </table>	% subjects	Head Still	Side to Side	Up and Down	Talking	Head Still	Avg.	A.R.	JH	1.5	2.2	2.0	2.9	2.2	2.2		XL	2.5	5.5	7.2	3.4	2.5	4.2		JC	2.3	2.5	4.9	5.6	4.1	3.9		BS	5.5	8.3	9.6	7.3	4.5	7.0		JZ	5.5	7.5	9.9	5.2	5.8	6.8	T.H.C.	DL	6.8	6.5	7.8	7.4	6.2	6.9		JH	2.2	2.8	3.5	4.2	3.5	3.2		BZ	5.6	6.7	8.6	6.5	6.2	6.7		RC	4.1	6.8	6.4	6.3	4.7	5.7		FW	2.4	8.9	5.5	9.8	5.9	6.5	TIL values of all the 50 actions are less than 10%; Overall TIL values of all the 10 subjects are less than 8% (A.R.: Sample as Received T.H.C.: Temperature and Humidity Conditioning)	Pass	KN95
			% subjects	Head Still	Side to Side	Up and Down	Talking	Head Still	Avg.																																																																																				
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			4-1	Inward Leakage (IL) (Replaceable Half facepiece Respirator)	When the IL of each action is taken as basis of evaluation (that is, 10 people x 5 actions), the IL of at least 46 actions of the 50 actions <5%.	/	/	/																																																																																					
When the overall IL of a person is taken as basis for evaluation, the total IL of at least 8 people of the 10 subjects <2%																																																																																													
4-2	Inward Leakage (IL) (Replaceable Full facepiece Respirator)	When the IL of each action is taken as basis of evaluation (that is, 10 people x 5 actions), the IL of each action < 0.05%	/	/	/																																																																																								

Test Result Summary									
No.	Test Items	Standard Requirements			Test Results		Assessment	Remark	
5	Inhalation Resistance	Type of facepiece	Inhalation Resistance /Pa			<input checked="" type="checkbox"/> As Received <input type="checkbox"/> Cleaning and disinfecting Conditioning	Temperature and Humidity Conditioning	Pass	KN95
			<input type="checkbox"/> KN/KP90	<input checked="" type="checkbox"/> KN/KP95	<input type="checkbox"/> KN/KP100				
		<input checked="" type="checkbox"/> Disposable, w/o valve	≤170	≤210	≤250	85 Pa	86 Pa		
		<input type="checkbox"/> Disposable, w/ valve	≤210	≤250	≤300	86 Pa	87 Pa		
<input type="checkbox"/> Replaceable Half facepiece and full facepiece w/ filter element(s) in place	≤250	≤300	≤350						
6	Exhalation Resistance	Type of facepiece	Exhalation Resistance /Pa			As Received	Temperature and Humidity Conditioning	Pass	KN95
			<input type="checkbox"/> KN/KP90	<input checked="" type="checkbox"/> KN/KP95	<input type="checkbox"/> KN/KP100				
		<input checked="" type="checkbox"/> Disposable, w/o valve	≤170	≤210	≤250	81 Pa	80 Pa		
		<input type="checkbox"/> Disposable, w/ valve	≤150			79 Pa	79 Pa		
<input type="checkbox"/> Replaceable Half facepiece and full facepiece w/ filter element(s) in place									
7	Exhalation valve leakage	The allowable leakage air flowrate of exhalation valve of each respirator shall not be greater than 30 ml/min; where multiple exhalation valves are in use, the allowable leakage air flowrate shall be averaged.			As Received	Temperature and Humidity Conditioning	/	/	
					/	/			
		Normal temperature, normal pressure relative humidity < 75%			/				
8	Exhalation valve protection	The exhalation valve cap of the disposable facepiece is subjected to an axial tensile force of 10N for 10 seconds, and should not slide, break and distort.			/		/	/	
		The exhalation valve cap of the replaceable facepiece is subjected to an axial tensile force of 50N for 10 seconds, and should not slide, break and distort.			/				
9	Dead Space	The average test result of dead space shall not larger than 1%.			0.50%		Pass	/	
		Ambient temperature: (16~32)°C。			24°C				

Test Result Summary							
No.	Test Items	Standard Requirements		Test Results	Assessment	Remark	
10	Visual field	Disposable or half facepiece		Down direction $\geq 35^\circ$;	75°	Pass	/
				overlapped $\geq 65\%$;	87%		
		full facepiece	Single visor	Down direction $\geq 35^\circ$;	/		
				total $\geq 70\%$;	/		
				overlapped $\geq 55\%$;	/		
		full facepiece	Twin visor	Down direction $\geq 35^\circ$;	/		
				total $\geq 65\%$;	/		
				overlapped $\geq 24\%$;	/		
11	Head Harness	Each head harness, buckling and other adjustable components of the disposable facepiece should not slip or break when it is subjected to a tensile force of 10N for 10s.		10N tensile force pulling for 10s without slippage or break	Pass	/	
		Each head harness, buckling and other adjustable components of the replaceable half facepiece should not slip or break when it is subjected to a tensile force of 50N for 10s.		/			
		Each head harness, buckling and other adjustable components of the full facepiece should not slip or break when it is subjected to a tensile force of 150N for 10s.		/			
12	Connection and connector	All the connections and connecting parts between the replaceable filter element and the half facepiece should not be no slide, break or distortion when subjected to an axial tensile force of 50N for 10s.		/	/	/	
		All connections and connection parts between the replaceable filter element and the full facepiece, and between the breathing hose and the filter element and the full facepiece should not be no slide, break or distortion when subjected to an axial tensile force of 250N for 10s.		/			

Test Result Summary

No.	Test Items	Standard Requirements	Test Results	Assessment	Remark	
13	Visor (Full facepiece)	No eyeglass of the sample shall be broken or in crack;	/	/	/	
		The negative pressure drop in each sample within 60s should not be greater than 100Pa;	As Received			/
						/
						/
						/
The visor shall not cause visual deformations;	/					
		If visor is used with cover film for transparent maintenance, or is designed with anti-fogging application, the anti-fogging agent shall be known as harmful substance to human; when used with cover film or anti-fogging agent, sight deformation and blur shall not be caused, and the anti-fogging agent shall not cause irritation and other discomfort to user.	/			
14	Air Tightness (Full facepiece)	The negative pressure drop in each sample within 60s should not be greater than 100Pa	/	/	/	
15	Flammability	If the device is not designed flame resistant, the requirements set in Information Supplied by the Manufacturer shall be met.	/	Pass	/	
		If the device is designed to be flame resistant, After being removed from the flame, Various parts exposed to the flame should not burn; if burned, the after burning time should not exceed 5s.	As Received			Temperature and Humidity Conditioning
			0.6 s			0.6 s
0.4 s	0.5 s					
16	Cleaning and disinfecting	If it is claimed that the filter element(s) are subject to cleaning and/or disinfection for reuse, the reusable facepiece material shall withstand cleaning or disinfecting treatment recommended by the manufacturer. and the filter element(s) shall be tested to meet filter efficiency, leakage and breathing resistance requirements after being washed or disinfected in accordance with the methods recommended by the manufacturer. The method provided by the manufacture for user to determine whether the washed or disinfected filter may be continually effective for reuse shall be correct and effective.	/	/	/	

Test Result Summary

No.	Test Items	Standard Requirements	Test Results	Assessment	Remark
17	Practical performance	Under the conditions of simulated use, the respirator shall pass the practicability test; The subjects provide subjective evaluation and score (best (5 points) \ moderate (3 points) \ difficult to accept (1 point))	Both subjects successfully completed all simulation experiments without discomfort, and their subjective evaluation was 5 points	Pass	/
		Ambient temperature:16°C~32°C; Relative humidity:30%~80%。	24°C 45%		
18	Information supplied by the manufacturer	Be supplied to the smallest distribution package;	/	Pass	/
		There shall be Chinese explanation;	N/A		
		Contain all information necessary for the user that shall include: 1) application scope and limitations, 2) use method for replaceable filter elements with full facepiece or half facepiece, and to provide indication to multi-filters; 3) assembling for replaceable facepiece; 4) check prior to use; 5) methods of donning and conducting wearer face seal check; 6) method to evaluate end of service of disposable facepiece; 7) suggestion about when filter and face piece replacement for replaceable face piece respirator; 8) maintenance method (such as cleaning and disinfecting), if applicable; 9) storage; 10) meaning of any symbol or mark used;			

Test Result Summary					
No.	Test Items	Standard Requirements	Test Results	Assessment	Remark
18	Information supplied by the manufacturer	If it is claimed that the filter element(s) are subject to wash and/or disinfection for reuse, information shall include: 1) the specific type/scope of particle that is applicable; 2) the maximum times that the filter(s) shall be allowed for wash and/or disinfection; 3) method to evaluate whether filter element(s) is continually effective after wash/disinfect or need replace.	Pass	/	/
		warnings to problems that to be likely encountered, such as: 1) user face fit with respirator facepiece; 2) leakage caused by facial hair under the face seal; 3) air quality (contaminants, oxygen deficiency, etc.);	Pass		
		information supplied shall be precise, illustrations, part numbers, marking shall be added if helpful.	Pass		
19	Marking	Marking on the device shall include: a) Name, trademark or other means of identification of the manufacturer or supplier; b) Model or size (if applicable); c) The number and year of publication of this standard, filter classification on each filter element. Filter classification shall be marked in a way of combining both number of this standard and filter type and class.	Pass	Pass	/
		The following information shall be clearly and durable marked on the smallest commercially available packaging or legible through it if the packaging is transparent: a) The name, trademark or other means of identification of the manufacturer or supplier; b) Type of facepiece, model and size (if applicable); c) The number and year of publication of this standard, filter classification on each filter element. Filter classification shall be marked in a way of combining both number of the standard and filter type and class; d) The product license number or approval information (if applicable);	Pass		

Test Result Summary					
No.	Test Items	Standard Requirements	Test Results	Assessment	Remark
19	Marking	e) Manufacture date or lot number, and shelf life; f) The sentence “see information supplied by the manufacturer”; g) The manufacturer’s recommended conditions of storage.	Pass	Pass	/
Main Test Equipment		Equipment No.	Equipment Name	Verification Period	
		CSTC-201	High and Low Temperature Humidity Test Chamber SH-641	2023.03.19~2024.03.19	
		CSTC-108	TSI8130A Filtration Efficiency Tester	2023.03.10~2024.03.16	
		CSTC-121	Inward leakage test cabin	2023.03.20~2024.03.20	
		CSTC-109	TSI9306A Aerosol Generator	2023.03.20~2024.03.20	
		CSTC-122	TSI8587A Aerosol Photometer	2023.03.15~2024.03.15	
		CSTC-123	Dead Space Test Device	2023.03.19~2024.03.19	
		CSTC-105	Face Mask Flammability Rig	2023.03.07~2024.03.07	
		CSTC-104	Breathing Resistance Test Device	2023.03.20~2024.03.20	
		CSTC-126	Microcomputer Controlled Universal Testing Machine	2023.03.06~2024.03.06	

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