

## Denim Face Mask: Key Performance characteristics

Performance of the Denim Face Mask against the functional particle filtration and breathability performance requirements of popular standards for Face Masks has been independently determined as follows:

	FFP2	CWA 17553:2020 - Level 90%
<b>Filtration</b> EN 149:2001+A1:2009, Clause 8.11 & AFNOR-SPEC-S76-001:2020, Reference to EN13274-7: 2019 Modified	PASS	PASS
<b>Breathability</b> EN 149:2001+A1:2009, Clause 8.9 & EN ISO 9237-1995	PASS	PASS

### Testing against FFP2 functional performance requirements

The Denim Face Mask has been independently tested by NTEK against the functional performance requirements of the FFP2 standard and determined to have the following key characteristics when new:

Requirement	Result*
<b>Penetration of Filter Material</b> (EN 149:2001+A1:2009, Clause 8.11)	<i>Maximum penetration of test aerosol:</i> Sodium chloride @ 95 L/m ≤ 6% Paraffin oil @ 95 L/m ≤ 6% Sodium chloride ≤ 2.53% Paraffin oil ≤ 4.5%
<b>Breathing Resistance</b> (EN 149:2001+A1:2009, Clause 8.9)	<i>Maximum permitted resistance (mbar):</i> Inhalation @ 30 L/min ≤ 0.7 Inhalation @ 95 L/min ≤ 2.4 Exhalation @ 160 L/min ≤ 3.0 Inhalation @ 30 L/min ≤ 0.35 Inhalation @ 95 L/min ≤ 1.22 Exhalation @ 95 L/min ≤ 0.86
<b>Total Inward Leakage</b> (EN 149:2001+A1:2009 Clause 8.5)	Total inward leakage ≤ 8% Total inward leakage < 8%

\*NTEK test reports included as appendix

## Testing for conformity with CWA 17553:2020

Additionally, the Denim Face Mask has been independently tested by Intertek according to commonly used standards of Particle Filtration Efficiency (PFE) both new and after 25 60°C machine wash cycles and determined to have the following key characteristics:

	Requirement	New*	After 25 washes*
<b>Particulates Filtration Efficiency (PFE)</b> (AFNOR-SPEC-S76-001:2020, Reference to EN13274-7: 2019 Modified)	Level 90%: $\geq 90\%$ Level 70: $\geq 70\%$	> 99.7% (Average) PASS - Level 90%	> 92% (Average) PASS - Level 90%

\* Intertek test reports included as appendix

In addition to NTEK's measurement of Breathing Resistance according to EN 149:2001 + A1:2009 Intertek have measured Air Permeability according to EN ISO 9237-1995 and with a test pressure of 100 Pa and a test area of 20 cm<sup>2</sup> the Denim was determined to have an Air Permeability of 103.0 L/s/m<sup>2</sup> when new, comfortably in excess of the CWA 17553:2020 requirement of greater than or equal to 96 L/s/m<sup>2</sup>.

The test results for the Denim Face Mask are presented on the following pages.

**Flashbay**  
June 2021

**Test Report**

Number: GZHT02410825-S1

<b>Report Ref:</b>	GZHT02410825-S1	THIS IS TO SUPERSEDE REPORT NO. GZHT02410825 DATED Apr 26, 2021	
<b>Date received:</b>	Apr 09, 2021	<b>Date Issued:</b>	Apr 27, 2021

<b>Company Name:</b>	FLASHBAY ELECTRONICS
<b>Address:</b>	BUILDING 2,JIXUN INDUSTRIAL PARK DONG'AO VILLAGE, SHATIAN TOWN HUIYANG DISTRICT, HUIZHOU CITY GUANGDONG PROVINCE, P.R.CHINA
<b>Contact Name:</b>	Levin

The Following Sample Was Submitted And Identified By/On Behalf Of The Applicant As:	
End Uses	: Face Mask
Ratings	: -
Sample Name	: Face Mask
No. Of Sample	: One(80 pieces)
Size	: -
Colour	: Black
Standard	: -
Date received/ Test Started	: Apr 09, 2021
Ref	: Denim-DN

Test was conducted on specific items, at our client's request.

Prepared And Checked By:  
For Intertek Testing Services Shenzhen Ltd. Guangzhou Branch

Lin Lin  
General Manager



qin / hilaryxu

**Intertek Testing Services Shenzhen Ltd. Guangzhou Branch**

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**Original Sample Photo**



Prepared And Checked By:  
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General Manager

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**Test Report**

Number: GZHT02410825-S1

Tests Conducted (As Requested By The Applicant)

1 Penetration Test As Received (AFNOR-SPEC-S76-001:2020, Reference to EN 13274-7: 2019 Modified):

Aerosol Particle	Test Parameters	Unit	Result	
Sodium Chloride	Flow Rate: 6 cm/s Sampling Time: 1 min Temperature: 21.1°C Relative Humidity: 47.0% RH Test Area: 60 cm <sup>2</sup> Particle Size: Limit of 3 µm	%	#1	99.8
			#2	99.8
			#3	99.7
Paraffin Oil*	Flow Rate: 6 cm/s Sampling Time: 1 min Temperature: 21.3°C Relative Humidity: 38% RH Test Area: 56.7 cm <sup>2</sup> Particle Size: Limit of 3 µm	%	#1	99.74
			#2	99.74
			#3	99.82
			#4	99.75
			#5	99.80
			Average	99.77

Remark: \* The test was performed by an approved third party subcontractor laboratory.

qin / hilaryxu

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**Test Report**

Number: GZHT02410825-S1

Tests Conducted (As Requested By The Applicant)

## 2 Bacterial Filtration Efficiency (BFE)

**Test Method:** EN 14683: 2019+AC: 2019 Annex B**Summary of Test Method:**

A specimen of the mask material is clamped between a six-stage cascade impactor and an aerosol chamber. The bacterial aerosol is introduced into the aerosol chamber using a nebulizer and a culture suspension of *Staphylococcus aureus*. The aerosol is drawn through the medical face mask material using a vacuum attached to the cascade impactor. The six-stage cascade impactor uses six agar plates to collect aerosol droplets which penetrate the medical face mask material. Control samples are collected with no test specimen clamped in the test apparatus to determine the upstream aerosol counts. The agar plates from the cascade impactor are incubated for (20 to 52) h and counted to determine the number of viable particles collected.

The bacterial filtration efficiency (BFE) of the mask is given by the number of colony forming units passing through the medical face mask material expressed as a percentage of the number of colony forming units present in the challenge aerosol.

**Conditioning of the Specimens:** 4 h at  $(21 \pm 5) ^\circ\text{C}$  and  $(85 \pm 5) \%$  relative humidity**Test Condition:**Biological Aerosol: *Staphylococcus aureus* (ATCC 6538)

Testing side: Inside of the test specimen was facing towards the challenge aerosol

Test area:  $78 \text{ cm}^2$ 

Flow rate: 28.3 L/min

The average plate count results of the positive controls:  $2.1 \times 10^3$  CFUThe average plate count results of the negative controls:  $< 1$  CFUMean particle size (MPS):  $2.7 \mu\text{m}$ Incubation condition:  $(37 \pm 2) ^\circ\text{C}$  for (20 to 52) h

Number of test specimens: 5

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**Test Report**

Number: GZHT02410825-S1

Tests Conducted (As Requested By The Applicant)

**Test Procedure:**

1. Preparation of the bacterial challenge: Dilute the culture in peptone water to achieve a concentration of approximately  $5 \times 10^5$  CFU/mL.
2. Deliver the challenge to the nebulizer using a peristaltic or syringe pump. Connect tubing to nebulizer and peristaltic pump and into the challenge suspension; purge tubing and nebulizer of air bubbles.
3. Perform a positive control run without a test specimen clamped into the test system to determine the number of viable aerosol particles being generated.
4. Initiate the aerosol challenge by turning on the air pressure and pump connected to the nebulizer.
5. Immediately begin sampling the aerosol using the cascade impactor. Adjust the flow rate through the cascade impactor to 28.3 L/m.
6. Time the challenge suspension to be delivered to the nebulizer for 1 min.
7. Time the air pressure and cascade impactor to run for 2 min.
8. At the conclusion of the positive control run, remove plates from the cascade impactor.
9. Place new agar plates into the cascade impactor and clamp the test specimen into the top of the cascade impactor, with the inside oriented toward the challenge as intended.
10. Repeat the challenge procedure for each test specimen and positive control sample.
11. Perform a negative control sample by collecting a 2 min sample of air from the aerosol chamber. No bacterial challenge should be pumped into the nebulizer during the collection of the negative control sample.
12. Incubate agar plates at  $(37 \pm 2)$  °C for (20 to 52) h.
13. Count each of the six-stage plates of the cascade impactor.
14. Total the counts from each of the six plates for the test specimens and positive controls. Calculate the filtration efficiency percentages.

**Calculation:**

The Bacterial Filtration Efficiency (BFE), was calculated as a percentage using the following equation:

$$\% \text{ BFE} = (C-T)/C \times 100$$

where,

$C$  = Average plate counts total for test controls;

$T$  = Plate count total for the test specimen.

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**Test Report**

Number: GZHT02410825-S1

Tests Conducted (As Requested By The Applicant)

**Test Result:**

Tested Specimen	Result	
	The Total Plate Count (T) (CFU)	Bacterial Filtration Efficiency (BFE) (%)
Specimen (1)	38	98.2
Specimen (2)	32	98.5
Specimen (3)	23	98.9
Specimen (4)	27	98.7
Specimen (5)	18	99.1

Remarks:

CFU = Colony Forming Unit

This item was conducted in Caipin Road, Guangzhou Science City, GETDD, Guangzhou, Guangdong.

3 Air Permeability As Received (EN ISO 9237-1995):

103.0 l/s/m<sup>2</sup>

Remark: Test Pressure = 100Pa  
Test Area = 20cm<sup>2</sup>

End of Report

*This report is made solely on the basis of your instructions and/or information and materials supplied by you. It is not intended to be a recommendation for any particular course of action. Intertek does not accept a duty of care or any other responsibility to any person other than the Client in respect of this report and only accepts liability to the Client insofar as is expressly contained in the terms and conditions governing Intertek's provision of services to you. Intertek makes no warranties or representations either express or implied with respect to this report save as provided for in those terms and conditions. We have aimed to conduct the Review on a diligent and careful basis and we do not accept any liability to you for any loss arising out of or in connection with this report, in contract, tort, by statute or otherwise, except in the event of our gross negligence or wilful misconduct. No copy of the test report(except for full text copy) shall be made without the written approval by Intertek.*

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To : FLASHBAY ELECTRONICS  
Attention : Levin

Date : Apr 27, 2021

Re : Report Revision Notification

Labtest Report Number GZHT02410825 date APR 26, 2021

Please be informed that all the content recorded in the above captioned report will be void. This captioned report is now superseded by a revised Labtest Report, Number GZHT02410825-S1 , issued on Apr 27, 2021 .

Thank you for your attention

Prepared And Checked By:  
For Intertek Testing Services Shenzhen Ltd. Guangzhou Branch

Lin Lin  
General Manager

**Intertek Testing Services Shenzhen Ltd. Guangzhou Branch**  
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## Test Report

Number: GZHT02423801

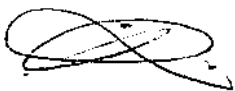
<b>Report Ref:</b>	GZHT02423801		
<b>Date received:</b>	May 13, 2021	<b>Date Issued:</b>	Jun 08, 2021

<b>Company Name:</b>	FLASHBAY ELECTRONICS		
<b>Address:</b>	BUILDING 2,JIXUN INDUSTRIAL PARK DONG'AO VILLAGE,SHATIAN TOWN HUIYANG DISTRICT,HUIZHOU CITY GUANGDONG PROVINCE,P.R.CHINA		
<b>Contact Name:</b>	Levin		

The Following Sample Was Submitted And Identified By/On Behalf Of The Applicant As:			
End Uses	:	Face Mask	
Ratings	:	-	
Sample Name	:	Face Mask	
No. Of Sample	:	One (80 pieces)	
Size	:	-	
Colour	:	Blue	
Manufacturer	:	Flashbay Electronics	
Standard	:	-	
Date received/ Test Started	:	May 13, 2021	
Ref	:	Denim - DN (After 25 times Washed)	

Test was conducted on specific items, at our client's request.

Prepared And Checked By:  
For Intertek Testing Services Shenzhen Ltd. Guangzhou Branch



Lin Lin  
General Manager



Page 1 Of 6

AL / hilaryxu

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**Original Sample Photo**



Prepared And Checked By:  
For Intertek Testing Services Shenzhen Ltd. Guangzhou Branch

Lin Lin  
General Manager

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**Test Report**

Number: GZHT02423801

Tests Conducted (As Requested By The Applicant)

1 Penetration Test As Received (AFNOR-SPEC-S76-001:2020, Reference to EN 13274-7: 2019 Modified):

Aerosol Particle	Test Parameters	Unit		Result	
Sodium Chloride	Flow Rate: 6 cm/s Sampling Time: 1 min Temperature: 22.2°C Relative Humidity: 47.0% RH Test Area: 60 cm <sup>2</sup> Particle Size: Limit of 3 µm	%		#1	97.6
				#2	97.3
				#3	97.5
Paraffin Oil*	Flow Rate: 6 cm/s Sampling Time: 1 min Temperature: 21.4°C Relative Humidity: 37% RH Test Area: 56.7 cm <sup>2</sup> Particle Size: Limit of 3 µm	%		#1	93.59
				#2	91.46
				#3	91.50
				#4	92.45
				#5	91.00
				Average	92.00

Remark: \*The test was performed by an approved third party subcontractor laboratory.

2 Bacterial Filtration Efficiency (BFE)

**Test Method:** With reference to EN 14683: 2019+AC: 2019 Annex B

**Summary of Test Method:**

A specimen of the mask material is clamped between a six-stage cascade impactor and an aerosol chamber. The bacterial aerosol is introduced into the aerosol chamber using a nebulizer and a culture suspension of Staphylococcus aureus. The aerosol is drawn through the medical face mask material using a vacuum attached to the cascade impactor. The six-stage cascade impactor uses six agar plates to collect aerosol droplets which penetrate the medical face mask material. Control samples are collected with no test specimen clamped in the test apparatus to determine the upstream aerosol counts. The agar plates from the cascade impactor are incubated for (20 to 52) h and counted to determine the number of viable particles collected. The bacterial filtration efficiency (BFE) of the mask is given by the number of colony forming units passing through the medical face mask material expressed as a percentage of the number of colony forming units present in the challenge aerosol.

**Conditioning of the Specimens:** 4 h at (21 ± 5) °C and (85 ± 5) % relative humidity

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**Test Report**

Number: GZHT02423801

Tests Conducted (As Requested By The Applicant)

**Test Condition:**

Biological Aerosol: *Staphylococcus aureus* (ATCC 6538)  
Testing side: Inside of the test specimen was facing towards the challenge aerosol  
Test area: 78 cm<sup>2</sup>  
Flow rate: 28.3 L/min  
The average plate count results of the positive controls: 2.0x10<sup>3</sup> CFU  
The average plate count results of the negative controls: < 1 CFU  
Mean particle size (MPS): 2.7 μm  
Incubation condition: (37 ± 2) °C for (20 to 52) h  
Number of test specimens: 5

**Test Procedure:**

1. Preparation of the bacterial challenge: Dilute the culture in peptone water to achieve a concentration of approximately 5x10<sup>5</sup> CFU/mL.
2. Deliver the challenge to the nebulizer using a peristaltic or syringe pump. Connect tubing to nebulizer and peristaltic pump and into the challenge suspension; purge tubing and nebulizer of air bubbles.
3. Perform a positive control run without a test specimen clamped into the test system to determine the number of viable aerosol particles being generated.
4. Initiate the aerosol challenge by turning on the air pressure and pump connected to the nebulizer.
5. Immediately begin sampling the aerosol using the cascade impactor. Adjust the flow rate through the cascade impactor to 28.3 L/m.
6. Time the challenge suspension to be delivered to the nebulizer for 1 min.
7. Time the air pressure and cascade impactor to run for 2 min.
8. At the conclusion of the positive control run, remove plates from the cascade impactor.
9. Place new agar plates into the cascade impactor and clamp the test specimen into the top of the cascade impactor, with the inside oriented toward the challenge as intended.
10. Repeat the challenge procedure for each test specimen and positive control sample.
11. Perform a negative control sample by collecting a 2 min sample of air from the aerosol chamber. No bacterial challenge should be pumped into the nebulizer during the collection of the negative control sample.
12. Incubate agar plates at (37 ± 2) °C for (20 to 52) h.
13. Count each of the six-stage plates of the cascade impactor.
14. Total the counts from each of the six plates for the test specimens and positive controls. Calculate the filtration efficiency percentages.

AL / hilaryxu

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**Test Report**

Number: GZHT02423801

Tests Conducted (As Requested By The Applicant)

**Calculation:**

The Bacterial Filtration Efficiency (BFE), was calculated as a percentage using the following equation:

$$\% \text{ BFE} = (C-T)/C \times 100$$

where,

*C* = Average plate counts total for test controls;*T* = Plate count total for the test specimen.**Test Result:**

Tested Specimen	Result	
	The Total Plate Count (T) (CFU)	Bacterial Filtration Efficiency (BFE) (%)
Specimen (1)	238	88.3
Specimen (2)	224	89.0
Specimen (3)	255	87.5
Specimen (4)	177	91.3
Specimen (5)	258	87.3

## Remarks:

CFU = Colony Forming Unit

This item was conducted in Caipin Road, Guangzhou Science City, GETDD, Guangzhou, Guangdong.

AL / hilaryxu

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**Intertek Testing Services Shenzhen Ltd. Guangzhou Branch**

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**Test Report**

Number: GZHT02423801

Tests Conducted (As Requested By The Applicant)

## 3 Air Permeability As Received (EN ISO 9237-1995):

109.9 L/s/m<sup>2</sup>Remark: Test Pressure = 100 Pa  
Test Area = 20cm<sup>2</sup>

End of Report

*This report is made solely on the basis of your instructions and/or information and materials supplied by you. It is not intended to be a recommendation for any particular course of action. Intertek does not accept a duty of care or any other responsibility to any person other than the Client in respect of this report and only accepts liability to the Client insofar as is expressly contained in the terms and conditions governing Intertek's provision of services to you. Intertek makes no warranties or representations either express or implied with respect to this report save as provided for in those terms and conditions. We have aimed to conduct the Review on a diligent and careful basis and we do not accept any liability to you for any loss arising out of or in connection with this report, in contract, tort, by statute or otherwise, except in the event of our gross negligence or wilful misconduct. No copy of the test report(except for full text copy) shall be made without the written approval by Intertek.*

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# Test Report

**Applicant:** Flashbay Electronics  
**Address:** Building 2, Jixun Industrial Park, Xinjiao, Dong'ao Village, Shatian Town,  
Huiyang District, Huizhou City, Guangdong Province, P.R.China

**The following sample(s) was/were submitted and identified on behalf of the client as:**

Product name: Face Mask  
Model: Denim(DN)  
Trade mark: /  
Manufacturer: Flashbay Electronics  
Address: Building 2, Jixun Industrial Park, Xinjiao, Dong'ao Village, Shatian Town,  
Huiyang District, Huizhou City, Guangdong Province, P.R.China  
Classification: FFP2 NR  
Sample quantity: 40 Pcs  
Sample Received Date: May. 12, 2021  
Testing Period: May. 12, 2021~ May. 14, 2021

**Test Requirement:**

According to the requirement of the client, the test item(s) of the sample is referring to the standard EN 149:2001+A1:2009.

**Test Result(s):** Please refer to the following page(s)

**Test Method:** Please refer to the following page(s)

Compiled by: \_\_\_\_\_

Reviewed by: \_\_\_\_\_

Approved by: \_\_\_\_\_

Date: \_\_\_\_\_

2021-05-17



## Test Result

### Clause 7.9.2 Penetration of Filter Material

(EN 149:2001+A1:2009, Clause 8.11)

Test Requirement			Results
The penetration of the filter of the particle filtering half mask shall meet the requirements of the following table.			Detail refer to Appendix 1
Classification	Maximum penetration of test aerosol(%)		
	Sodium chloride test 95 L/min	Paraffin oil test 95 L/min	
FFP1	20	20	
FFP2	6	6	
FFP3	1	1	

### Appendix 1: Summarization of Test Data

Aerosol	Condition	Sample No.	Penetration (%)	
			Average in 30s after 3 min	Max. during exposure
Sodium chloride test	A.R.	11#	2.02	/
		12#	2.23	/
		13#	2.53	/
Paraffin oil test	A.R.	14#	4.26	/
		15#	4.17	/
		16#	4.50	/

Flow rate of test aerosol: 95.0 L/min

**Clause 7.9.1 Total Inward Leakage**

(EN 149:2001+A1:2009 Clause 8.5)

Test Requirement	Results
<p>For particle filtering half masks fitted in accordance with the manufacturer's information, at least 46 out of the 50 individual exercise results (i.e. 10 subjects x 5 exercises) for total inward leakage shall be not greater than:</p> <p style="padding-left: 40px;">25% for FFP1 11% for FFP2 5% for FFP3</p> <p>and, in addition, at least 8 out of the 10 individual wearer arithmetic means for the total inward leakage shall be not greater than:</p> <p style="padding-left: 40px;">22% for FFP1 8% for FFP2 2% for FFP3</p>	<p>Detail refer to Appendix 2</p>

**Appendix 2: Summarization of Test Data**

Subject	Sample	Condition	Normal Breathing (%)	Head Side/Side (%)	Head Up/Down (%)	Speak Loudly (%)	Normal Breathing (%)	Mean (%)
Zhang	1#	A.R.	7.3	7.7	7.8	8.1	7.2	7.62
Fan	2#	A.R.	5.5	5.8	6.0	6.3	5.3	5.78
Yang	3#	A.R.	6.1	6.4	6.6	6.9	6.2	6.44
Huang	4#	A.R.	5.2	5.6	5.9	6.3	5.3	5.66
Yan	5#	A.R.	6.4	6.8	7.0	7.4	6.5	6.82
Shi	6#	A.R.	5.7	6.1	6.3	6.7	5.8	6.12
Huang	7#	A.R.	6.4	6.7	6.9	7.4	6.3	6.74
Chen	8#	A.R.	5.8	6.2	6.4	6.8	5.9	6.22
Lei	9#	A.R.	7.4	7.8	7.9	8.3	7.5	7.78
Shen	10#	A.R.	6.8	7.1	7.2	7.6	6.9	7.12

Facial Dimension:

Subject	Length of Face ( mm )	Width of Face ( mm )	Depth of Face ( mm )	Width of Mouth ( mm )
Zhang	120	175	115	57
Fan	120	155	115	55
Yang	125	165	120	55
Huang	116	137	126	57
Yan	104	163	115	52
Shi	110	144	117	46
Huang	115	135	123	57
Chen	111	137	121	53
Lei	112	138	119	54
Shen	112	134	120	53

**Clause 7.16 Breathing Resistance**

EN 149:2001+A1:2009, Clause 8.9)

Test Requirement				Results			
The breathing resistances apply to valved and valveless filtering half masks and shall meet the requirements as the following table.				Detail refer to Appendix 3			
Classification	Maximum permitted resistance (mbar)						
	Inhalation		Exhalation				
	30 L/min	95 L/min	160 L/min				
FFP1	0.6	2.1	3.0				
FFP2	0.7	2.4	3.0				
FFP3	1.0	3.0	3.0				

**Appendix 3: Summarization of Test Data**

Specimen	Condition	Inhalation(mbar)		Exhalation resistance(mbar)				
		At 30 L/min	At 95 L/min	At 160 L/min				
				A	B	C	D	E
17#	A.R.	0.34	1.21	0.84	0.85	0.84	0.85	0.86
18#		0.35	1.22	0.85	0.86	0.85	0.86	0.86
19#		0.34	1.22	0.86	0.85	0.85	0.85	0.86

A: facing directly ahead; B: facing vertically upwards; C: facing vertically downwards; D: lying on the left side; E: lying on the right side

Test	Uncertainty
Penetration of filter material (NaCl)	1.60 %
Penetration of filter material (Paraffin Oil)	1.78 %
Total inward leakage	6.40 %
Breathing resistance (30 L/min)	3.60 %
Breathing resistance (95 L/min)	2.20 %
Breathing resistance (160 L/min)	2.00 %

**Sample photo(s):**

Fig.1





Fig.2

\*\*\*\*End of Report\*\*\*\*

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