TEST REPORT

EN 149:2001 + A1:2009

Particle Filtering Half Masks

Client:	HEMU (Shandong) Medical Instrument Technology Co., Ltd
Manufacturing Address:	3/F, C Area, Blue Venture Valley, Longhai Road North, Keji Road North, Nanhai New District, Weihai City, Shandong, CHINA
Model (s):	N1 FFP2 NR without valve
Sample received on:	April 07, 2020
Report Number:	NPT/20040712665
Elaborated by:	Ashley Madison
Place and date of issue:	Sheridan, WY April 25, 2020

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TEST RESULT DETAILS (EN 149:2001 + A1:2009)

7.4 Packaging (EN 149:2001 + A1:2009 clause 8.2)	
The masks were not packaged as offered for sale. Manufacturer to certify regarding the final packaging to be used.	*NAs*
The masks were packaged in sealed plastic bags, in larger plastic bags inside a large cardboard box that gave some protection against mechanical damage or contamination before use.	*Passed*

7.5 Material (EN 149:2001 + A1:2009 clause 8.2, 8.3.1, 8.3.2)	
The materials used were able to withstand handling and wear during the limited laboratory testing carried out.	*Passed*
The effect on materials from "in-use" environmental factors could not be evaluated during laboratory tests. Manufacturer to certify regarding such factors.	*NAs*
Samples were conditioned in accordance with 8.3.1. None of the specimens conditioned suffered mechanical failure or collapse.	*Passed*
Samples were conditioned in accordance with 8.3.2. None of the specimens conditioned suffered collapse.	*Passed*

7.6 Cleaning and Disinfecting (EN 149:2001 + A1:2009 clause 8.4, 8.5, 8.11)	
If the particle filtering half mask is designed to be re-usable, the materials used shall withstand the cleaning and disinfecting agents and procedures to be specified by the manufacturer. With reference to 7.9.2, after cleaning and disinfecting the re-usable particle filtering half mask shall satisfy the penetration requirement of the relevant class.	*N/A*

7.7 Practical Performance (EN 149:2001 + A1:2009 clause 8.4)	
See tested reference number PPT-001	*Passed*

7.8 Finish of Parts (EN 149:2001 + A1:2009 clause 8.2)	
None of the specimens used in laboratory testing showed evidence of sharp edges or burrs.	*Passed*

7.9.1 Total Inward Leakage (EN 149:2001 + A1:2009 clause 8.5)	
See tested reference number TIL-001	*Passed*

7.9.2.a Penetration of Filter Material-Sodium Chloride (EN 149:2001 + A1:2009 clause 8.11 & EN 13274-7:2019)	
See tested reference number SCT-001	*Passed*
7.9.2.b Penetration of Filter Material-Paraffin Oil (EN 149:2001 + A1:2009 clause 8.11 & EN 13274-7:2019)	
See tested reference number POT-001	*Passed*

7.10 Compatibility with skin (EN 149:2001 + A1:2009 clause 8.4, 8,5)	
No problems were encountered during practical performance testing.	*Passed*
No problems were encountered during total inward leakage testing.	*Passed*
The likelihood of materials in contact with the skin causing irritation or other adverse effect on health was not assessed. Manufacturer to certify.	*NAs*

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7.11 Flammability (EN 149:2001 + A1:2009 clause 8.6)	
See tested reference number FT-001	*Passed*

7.12 Carbon dioxide content of the inhalation air (EN 149:2001 + A1:2009 clause 8.7)	
See tested reference number CDT-001	*Passed*

7.13 Head harness (EN 149:2001 + A1:2009 clause 8.4, 8.5)	
The head harness was designed to allow the particle filtering half-mask to be donned and removed easily during limited practical performance and total inward leakage testing.	*Passed*
The head harness was adjustable and there were no adverse comments regarding security following limited practical performance and total inward leakage testing.	*Passed*
The product satisfied the total inward leakage requirements.	*Passed*

7.14 Field of vision (EN 149:2001 + A1:2009 clause 8.4)	
There were no adverse comments following practical performance tests.	*Passed*

7.15 Exhalation Valve (EN 149:2001 + A1:2009 clause 8.2, 8.3.4, 8.8, 8.9.1)	
Not applicable	*N/A*

7.16 Breathing Resistance (EN 149:2001 + A1:2009 clause 8.9)	
See tested reference number BRT-001	*Passed*

7.17 Clogging (EN 149:2001 + A1:2009 clause 8.9, 8.10)	
This is optional test and not desired by client.	*NAs*

7.18 Demountable Parts (EN 149:2001 + A1:2009 clause 8.2)	
No demountable parts.	*N/A*

8.3 Conditioning	
See tested reference number CS-001	*Passed*

Passed	*Requirement satisfied.*
NCR	*Requirement not satisfied. Refer to the "Result details" section for more information.*
NAs	*Assessment not carried out.*
N/A	*Requirement not applicable.*

Conclusion:

Model	***Recommendation Level***
N1	*FFP2 NR*

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Test Standard: EN 149:2001+A1:2009 / EN 13274-5:2001
Name of tests: Conditioning of Samples
Reference no: CS-001

Simulated wearing treatment

Conditioning by simulated wearing treatment has been carried out by the following process. A breathing machine is adjusted to 25 cycles/min and 2,0 l/stroke. The particle filtering half mask was mounted on a Sheffield dummy head. For testing, a saturator is incorporated in the exhalation line between the breathing machine and the dummy head, the saturator being set at a temperature in excess of 37 °C to allow for the cooling of the air before it reaches the mouth of the dummy head. The air has been saturated at (37 ± 2) °C at the mouth of the dummy head.

In order to prevent excess water spilling out of the dummy's mouth and contaminating the particle filtering half mask the head has been inclined so that the water runs away from the mouth and is collected in a trap. The breathing machine was brought into operation, the saturator switched on and the apparatus allowed to stabilize. The particle filtering half mask under test has then been mounted on the dummy head. During the test time at approximately 20 min intervals the particle filtering half mask has been completely removed from the dummy head and refitted such that during the test period it is fitted ten times to the dummy head.

Temperature conditioning

Unless otherwise specified, the ambient temperature for testing has been between 16 °C and 32 °C and the temperature limits has been subject to an accuracy of ±1 °C.

In order to ensure that there is no thermal shock during the conditioning of the specimens, the temperature gradient has been less than 2 °C/min between phases at different temperatures, or between the beginning and the end of a thermal cycle.

Expose the particle filtering half masks to the following thermal cycle:
a) for 24 h to a dry atmosphere of (70 ± 3) °C;
b) for 24 h to a temperature of (-30 ± 3) °C; and allow to return to room temperature for at least 4 h between exposures and prior to subsequent testing. The conditioning has been carried out in a manner which ensures that no thermal shock occurs

Mechanical strength

The apparatus consists of a steel case (K) which is fixed on a vertically moving piston (S), capable of being lifted up 20 mm by a rotating cam (N) and dropping down onto a steel plate (P) under its own mass as the cam rotates. The mass of the steel case shall be more than 10 kg. The weight of the steel plate onto which the steel case falls should be (at least) 10 times the weight of the steel case. This may be achieved by bolting the base plate to a hard solid floor.

Test results:

The test results obtained are given in the tables as follows

No	*Conditioning Area*	*Samples Number*
1	Simulated wearing treatment	1-2-3-4-5-6 (As Received)
2	Temperature conditioning	7-8-9-10-11-12 (Sample after test of Mechanical Strength)
		13-14-15-16-17-18-19-20-21-22 (As Received)
3	Mechanical strength	7-8-9-10-11-12 (As Received)

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Test Standard: EN 149:2001+A1:2009 / EN 13274-2:2001
Name of tests: Practical Performance Testing
Reference no: PPT-001

Test Purpose:
This test method is used to determine practical performance when its purpose is fitted by subjects during use in the simulated application, it subjectively evaluates certain features, characteristics and functions of the device that cannot be evaluated by experiments described in other standards.

Sampling method:
A total of two particle filtering half masks have been tested: two in the state as received.

Testing methods used:
A test method for determining practical performance in accordance with standard EN 13274-2:2001 + EN 149:2001 + A1:2009 clause 7.7/8.4

Test conditions:
The test has been carried out in a normally lit area with a temperature of 16 ° C to 32 ° C and a relative humidity of 30% to 80%. The actual temperature and humidity conditions and noise level have been recorded.

Test Principle:
A total of 2 particle filtering half masks have been tested: both as received. All tests have been carried out by two test subjects at ambient temperature and the test temperature and humidity have been recorded. Prior to the test there has been an examination to assure that the particle filtering half mask is in good working condition and that it can be used without hazard. For the test, persons have been selected who are familiar with using such or similar equipment.

Test Equipment:
A small basket (approximate volume = 8 l) with chippings or other suitable material from a hopper

Test Procedure:
General: During the tests the particle filtering half mask shall be subjectively assessed by the wearer and after the test, comments on the following shall be recorded: a) head harness comfort; b) security of fastenings; c) field of vision; d) any other comments reported by the wearer on request.

Walking test: The subjects wearing normal working clothes and wearing the particle filtering half mask shall walk at a regular rate of 6 km/h on a level course. The test shall be continuous, without removal of the particle filtering half mask, for a period of 10 min.

Work simulation test: The particle filtering half mask shall be tested under conditions which can be expected during normal use. During this test the following activities shall be carried out in simulation of the practical use of the particle filtering half mask. The test shall be completed within a total working time of 20 min. The sequence of activities is at the discretion of the test house. The individual activities shall be arranged so that sufficient time is left for the comments prescribed.

a) walking on the level with headroom of (1,3 ± 0,2) m for 5 min;
b) crawling on the level with headroom of (0,70 ± 0,05) m for 5 min;
c) filling a small basket (see Figure 1, approximate volume = 8 l) with chippings or other suitable material from a hopper which stands 1,5 m high and has an opening at the bottom to allow the contents to be shovelled out and a further opening at the top where the basket full of chippings is returned. The subject shall stoop or kneel as he wishes and fill the basket with chippings. He shall then lift the basket and empty the contents back into the hopper. This shall be done 20 times in 10 min.

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Test results:
The test results obtained are given in the tables as follows

Number of sample: 39 (A.R), 40 (A.R)

Assessed elements	*Positive Assessment*	*Negative Assessment*	*Requirements in accordance with EN 149:2001+A1:2009*	*Assessment of Test Result Conformity / Nonconformity*
1. The face piece fitting	2	0	Filtering half masks should not have imperfections related to wearer's acceptance	Filtering half masks fulfill requirements of the standard EN 149:2001 + A1:2009 given in 7.7 No imperfections
2. Head harness comfort	2	0		
3. Security of fastenings	2	0		
4. Speech clearness	2	0		
5. Field of vision	2	0		
6. Materials compatibility with skin	2	0		

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Test Standard: EN 149:2001+A1:2009 / EN 13274-1:2001
Name of tests: Total Inward Leakage Testing
Reference no: TIL-001

Test Purpose:
This test method is used to determine the total inward leakage in respiratory protective devices.

Sampling method:
A total of ten particle filtering half masks have been tested: five in the state as received and five after temperature conditioning.

Testing methods used:
A test method for determining total inward leakage in accordance with standard EN 13274-1:2001 + EN 149:2001 + A1:2009 clause 7.9.1/8.5.

Test conditions:
The five test samples were conditioned in accordance with temperature conditioning.

Test Principle:
The total inward leakage has been tested using sodium chloride aerosol. Prior to the test there has been an examination to ensure that the particle filtering half mask is in good working condition and that it can be used without hazard.
For the test, persons has been selected who are familiar with using such or similar equipment. A panel of ten clean-shaven persons (without beards or sideburns) has been selected covering the spectrum of facial characteristics of typical users (excluding significant abnormalities). It is to be expected that exceptionally some persons cannot be satisfactorily fitted with a particle filtering half mask. Such exceptional subjects has not been used for testing particle filtering half masks.

Test Equipment:
The test atmosphere shall preferably enter the top of the enclosure through a flow distributor, and be directed downwards over the head of the test subject at a minimum flow rate of 0,12 m/s. The concentration of the test agent inside the effective working volume shall be checked to be homogeneous. The flow rate should be measured close to the subject's head. A level treadmill is required capable of working at 6 km/h.

Test Procedure:
Ask the test subjects to read the manufacturer's fitting information and if more than one size of particle filtering half mask is manufactured, ask the test subject to select the size deemed by him to be the most appropriate. If necessary the test supervisor shall show the test subjects how to fit the particle filtering half mask correctly in accordance with the fitting information. Inform the test subjects that if they wish to adjust the particle filtering half mask during the test they may do so. However if this is done, repeat the relevant section of the test, having allowed the system to resettle. The test subjects shall have no indication of the results as the test proceeds.

After fitting the particle filtering half mask, ask each test subject 'Does the mask fit?' If the answer is 'Yes', continue the test. If the answer is 'No', take the test subject off the panel, report the fact and replace with another test subject.

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Test results:
The test results obtained are given in the tables as follows

Test Subject	No of sample	Cond.	1. Walk (%)	Head side/ side (%)	Head up/down (%)	Talk (%)	2. Walk (%)	Mean (%)
1	32	A.R.	4,95	5,20	4,85	5,16	4,88	5,01
2	33	A.R.	4,89	5,30	4,95	5,25	4,95	5,07
3	34	A.R.	4,94	5,55	4,95	5,61	5,05	5,22
4	35	A.R.	4,69	5,61	4,89	5,55	4,85	5,12
5	36	A.R.	4,93	5,61	4,78	5,45	4,81	5,12
6	16	T.C.	5,16	5,50	5,12	5,38	5,11	5,25
7	17	T.C.	5,31	5,53	5,25	5,31	5,15	5,31
8	18	T.C.	5,16	5,11	5,16	5,36	5,13	5,18
9	19	T.C.	5,22	5,40	5,26	5,64	5,23	5,35
10	20	T.C.	5,19	5,33	5,25	5,25	5,24	5,25
Maximum permitted			All individual exercise results were not greater than 11 %					Not greater than 8%

Requirements in accordance with EN 149:2001+A1:2009	*Assessment of Test Result Conformity / Nonconformity*
at least 46 out of the 50 individual results shall be not greater than 25 % for FFP1 11 % for FFP2 5 % for FFP3 and at least 8 out of the 10 individual wearer means shall be not greater than 22 % for FFP1 8 % for FFP2 2 % for FFP3	Passed Filtering half masks fulfil requirements of the standard EN 149:2001 + A1:2009 given in 7.9.1 in range of the first, the second and the third protection class (FFP1, FFP2, FFP3)

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Test Standard: EN 149:2001+A1:2009 / EN 13274-7:2019
Name of tests: Penetration of filter material Sodium Chloride Testing
Reference no: SCT-001

Test Purpose:
This test method is used to measure that the penetration of the filter of the particle filtering half mask shall meet the requirements of Table 1 in 7.9.2.

Sampling method:
A total of nine particle filtering half masks have been tested: three in the state as received, three the simulated wearing treatment and three samples after the mechanical strength test and temperature conditioning.

Testing methods used:
A test method for determining penetration of filter material sodium chloride testing in accordance with standard EN 13274-7:2019 / EN 149:2001 + A1:2009 clause 7.9.2

Test conditions:
The six test samples were conditioned in accordance with mechanical strength test and temperature conditioning, simulated wearing treatment.

Test Principle:
The Sodium Chloride Aerosol Challenge test is able to determine filtration efficiency measurements up to 99.999% l. The sample is placed into the filter holder. Cone or molded masks and respirators are mounted to a test fixture and sealed into a cylinder filter holder to ensure that the mask is properly sealed.
Samples are subjected to aerosolized NaCl. The concentration of NaCl is measured before and after impact with the sample. The amount of NaCl that passes through the sample is used to calculate the filtration efficiency of the sample.

Test Equipment:
The test equipment consists four modules sodium chloride aerosol generator flow control, filter test chamber, flame photometer aerosol detector. Sodium chloride aerosol is detected before and after the filtering device under test by flame photometry.

Test Procedure:
The device shall be mounted in a leak tight manner on a suitable adaptor and subjected to the test(s), ensuring that components of the device that could affect filter penetration values such as valves and harness attachment points are exposed to the challenge aerosol.
In order to carry out tests on the filtration efficiency of the filter material against particulates, a 1.0% NaCl solution based on demineralized water is used.
From the above solution using a Collison atomizer, an aerosol is generated with a particle diameter of 600 nm and an average concentration of 8 mg / m3
The aerosol is passed through the tested complete filtering half mask, sealed in the test chamber, with an air flow rate of 95 l / min. The test aerosol concentration is determined before and after the test sample using flame photometry. Comparison of determined concentrations allows to determine the filtration efficiency of the tested sample in the range from 0.00001% to 100%.

Test results:
The test results obtained are given in the tables as follows

No. of Sample	*Condition*	*Penetration of Sodium Chloride in accordance with EN 13274-7:2019 [%] Flow rate 95 l/min*	*Requirements in accordance with EN 149:2001+A1:2009*	*Assessment of Test Result Conformity / Nonconformity*
23	As received	3,76	FFP1 ≤ 20 % FFP2 ≤ 6 % FFP3 ≤ 1 %	Passed Filtering half masks fulfil the requirements of the standard EN 149:2001+A1:2009 given in 7.9.2 in range of the first and the second protection class (FFP1, FFP2)
24		3,81		
25		3,90		
1	Simulated wearing treatment	3,89		
2		4,10		
3		4,16		
7	Mechanical strength + Temperature conditioned	4,46		
8		4,55		
9		4,24		

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Test Standard: EN 149:2001+A1:2009 / EN 13274-7:2019
Name of tests: Penetration of filter material Paraffin Oil Testing:
Reference no: POT-001

Test Purpose:
This test method is used to measure that the penetration of the filter of the particle filtering half mask shall meet the requirements of Table 1 in 7.9.2.

Sampling method:
A total of nine particle filtering half masks have been tested: three in the state as received, three the simulated wearing treatment and three samples after the mechanical strength test and temperature conditioning.

Testing methods used:
A test method for determining penetration of filter material sodium chloride testing in accordance with standard EN 13274-7:2019 / EN 149:2001 + A1:2009 clause 7.9.2

Test conditions:
The six test samples were conditioned in accordance with mechanical strength test and temperature conditioning, simulated wearing treatment.

Test Principle:
An aerosol of paraffin oil droplets is generated by atomising paraffin oil. The concentration of this aerosol is measured before and after the filter under test by means of a light scattering aerosol photometer. Determinations have been possible in the range < 0.001% to 100% filter penetration.

Test Equipment:
The test equipment consists four modules paraffin oil mist aerosol generator flow control, filter test chamber, scattered light aerosol detector. The aerosol mass concentration and particle size distribution has been measured within the filter test chamber.

Test Procedure:
Tests on the efficiency of filtration against liquid particles are carried out using a paraffin oil mist generated using a CP 27 DAB paraffin oil atomizer heated to 1000C. The liquid aerosol thus generated has an average concentration of 20 mg / m3 and an average particle diameter of 400 nm. The aerosol thus generated is passed through the tested complete filtering half mask, sealed in the test chamber, with an air flow rate of 95 l / min.
The concentration of the test aerosol before and after the sample is determined by means of laser photometry. Comparison of determined concentrations allows to determine the filtration efficiency test sample for liquid aerosols in the concentration range from 0.0001% to 100%.

Test results:
The test results obtained are given in the tables as follows

No. of Sample	*Condition*	*Penetration of Paraffin Oil Mist in accordance with EN 13274-7:2019 [%] Flow rate 95 l/min*	*Requirements in accordance with EN 149:2001+A1:2009*	*Assessment of Test Result Conformity / Nonconformity*
26	As received	4,16	FFP1 ≤ 20 % FFP2 ≤ 6 % FFP3 ≤ 1 %	Passed Filtering half masks fulfil the requirements of the standard EN 149:2001+A1:2009 given in 7.9.2 in range of the first and the second protection class (FFP1, FFP2)
27		4,23		
28		4,13		
4	Simulated wearing treatment	3,98		
5		3,95		
6		3,88		
10	Mechanical strength + Temperature conditioned	4,10		
11		3,96		
12		4,15		

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Test Standard: EN 149:2001+A1:2009 / EN 13274-4:2001
Name of tests: Flammability Testing
Reference no: FT-001

Test Purpose:
This test method is used to measure that the materials used in the device are not dangerous for the person using the device and do not possess highly flammable nature.

Sampling method:
A total of four particle filtering half masks have been tested: two in the state as received and two after temperature conditioning.

Testing methods used:
A test method for determining Flammability in accordance with standard EN 13274-4:2001 + EN 149:2001 + A1:2009 clause 7.11/8.6.

Test conditions:
The two test samples were conditioned in accordance with temperature conditioning.

Test Principle:
The filtering face pieces subjected to the test, are passed one by one through a flame with a temperature of 800°C +/- 50°C and at a speed of 6 cm/s. The respirators must not go on burning for more than 5 s after removal from the flame.

Test Equipment:
The test rig consists mainly of a propane cylinder with flow control device, pressure gauge, flash back arrester, specimen support, rotation motor with speed controller, and burner. The burner has been either be in accordance with 6.2 or with ISO 6941. The purity of the propane has been a minimum of 95 %.

Test Procedure:
The face piece is put on a metallic dummy head which is motorized such that it describes a horizontal circle with a linear speed, measured at the tip of the nose, of (60 ± 5) mm/s. The head is arranged to pass over a propane burner the position of which can be adjusted. By means of a suitable gauge, the distance between the top of the burner, and the lowest part of the face piece (when positioned directly over the burner) shall be set to (20 ± 2) mm.

With the head turned away from the area adjacent to the burner, the propane gas is turned on, the pressure adjusted to between 0,2 bar and 0,3 bar and the gas ignited. By means of a needle valve and fine adjustments to the supply pressure, the flame height had been set to (40 ± 4) mm. This is measured with a suitable gauge.

The temperature of the flame measured at a height of (20 ± 2) mm above the burner tip by means of a 1,5 mm diameter mineral insulated thermocouple probe, shall be (800 ± 50) °C. Failure to meet the temperature requirement indicates that a fault such as a partially blocked burner exists. This had been rectified before testing. The head is set in motion and the effect of passing the face piece once through the flame has been noted.

The test has been repeated to enable an assessment to be made of all materials on the exterior of the device. Any one component has been passed through the flame once only

Test results:
The test results obtained are given in the tables as follows

No. of Sample	*Condition*	*Visual inspection*	*Requirements in accordance with EN 149:2001+A1:2009*	*Assessment of Test Result Conformity / Nonconformity*
32	As received	1,5	Filtering half mask shall not burn or not continue to burn for more than 5 s after removal from the flame	Passed Filtering half masks fulfill requirements of the standard EN 149:2001 + A1:2009 given in 7.1
33		1,4		
21	Temperature conditioned	1,2		
22		1,3		

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Test Standard: EN 149:2001+A1:2009 / EN 13274-6:2001
Name of tests: Carbon dioxide content of the inhalation air Testing
Reference no: CDT-001

Test Purpose:
This test method is used to determine carbon dioxide content of the inhalation air.

Sampling method:
A total of three particle filtering half masks have been tested: all three in the state as received.

Testing methods used:
A test method for determining carbon dioxide content of the inhalation air in accordance with standard EN 13274-6:2001 + EN 149:2001 + A1:2009 clause 7.12/8.7.

Test conditions:
The atmosphere where the temperature is from 16 ° C to 32 ° C and the relative humidity is 20% to 80%.

Test Principle:
The device is attached to the Sheffield mannequin head / body as described in the device standard; In the case of complete hardware testing, an air supply is operated under the manufacturer's lowest conditions, unless otherwise specified in the relevant standard. Air containing carbon dioxide at a certain concentration is supplied from the respirator to the mannequin head / body at a given flow rate. The inhaled air is analysed for its carbon dioxide content. The measured carbon dioxide level provides information on the assessment of the "dead volume" of the facial protective part rather than a "real" measurement of the carbon dioxide level in the inhaled air.

Test Equipment:
The test rig consists Breathing apparatus, Auxiliary lung, Solenoid valve, Sheffield Mannequin head, Non-return valve, Sampling pipe for breathing air, Flow meter, Carbon dioxide absorber, Balancer, Carbon dioxide supply, Carbon dioxide analyzer

Test Procedure:
The apparatus subjects the particle filtering half mask to a respiration cycle by the breathing machine. For this test the particle filtering half mask has been fitted securely in a leak-tight manner but without deformation to a Sheffield dummy head. Air has been supplied to it from a breathing machine adjusted to 25 cycles/min and 2,0 l/stroke and the exhaled air has a carbon dioxide content of 5 % by volume. If the design of the test equipment causes a CO2 build-up a CO2 absorber has been used in the inhalation branch between solenoid valve and breathing machine. The CO2 is fed into the breathing machine via a control valve, a flowmeter, a compensating bag and two non-return valves. Immediately before the solenoid valve a small quantity of exhaled air is preferably continuously withdrawn through a sampling line and then fed into the exhaled air via a CO2 analyser.

To measure the CO2 content of the inhaled air, 5 % of the stroke volume of the inhalation phase of the breathing machine is drawn off at the marked place by an auxiliary lung and fed to a CO2 analyser. The total dead space of the gas path (excluding the breathing machine) of the test installation should not exceed 2000 ml. Measure the carbon dioxide content of the inhaled air and record continuously. Test conditions are ambient atmospheric conditions. The ambient carbon dioxide level is measured 1 m in front of and level with the tips of the nose of the dummy head. The ambient level is measured once a stabilized level for carbon dioxide in the inhalation air has been attained. Alternatively, the ambient level of carbon dioxide may be measured at the sampling tube with the carbon dioxide supply turned off. Results are deemed acceptable only if the measured value of the ambient level of carbon dioxide is less than 0,1 %.

Test results:
The test results obtained are given in the tables as follows;

No. of Sample	*Condition*	*CO_2 content of the inhalation air [%] by volume*	*An average CO_2 content of the inhalation air [%] by volume*	*Requirements in accordance with EN 149:2001+A1:2009*	*Assessment of Test Result Conformity / Nonconformity*
41	As received	0,90	0,85	CO_2 content of the inhalation air shall not exceed an average of 1,0% by volume	Passed Filtering half masks fulfill requirements of the standard EN 149:2001 + A1:2009 given in 7.12
42		0,85			
43		0,81			

Note: The results given in this Test Report apply only to the sample tested by our laboratory!

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Test Standard: EN 149:2001+A1:2009 / EN 13274-3:2001
Name of tests: Breathing Resistance Testing-Inhalation/Exhalation Resistance
Reference no: BRT-001

Test Purpose:
This test method is used to measure that inhalation and exhalation resistance values.

Sampling method:
A total of nine particle filtering half masks have been tested: three in the state as received, three the simulated wearing treatment and three samples after the temperature conditioning.

Testing methods used:
A test method for determining inhalation and exhalation resistance testing in accordance with standard EN 13274-3:2001 / EN 149:2001 + A1:2009 clause 7.16

Test conditions:
The six test samples were conditioned in accordance with temperature conditioning and simulated wearing treatment.

Test Principle:
The device is placed on a support as specified in the relevant device standard and connected to the respirator adjusted to the respiratory volume at the specified minute.
While respiratory resistance is reported, If the pressure inside the facial part is negative compared to atmospheric pressure during the inhalation resistance test, no sign is put in front of the result, and when the relative pressure inside the face protector is positive, a "+" sign is placed in front of the result.

Test Equipment:
A sinus-shaped breathing apparatus. Device support as described in the relevant device standard, for example, Sheffield mannequin head with attachments or mannequin body with attachments.
Calibrated within the appropriate range and the accuracy of the breathing resistance limit specified in the relevant device standard pressure gauge which is better than 10% of its value.

Test Procedure:
The respirator is adjusted in accordance with its shape to deliver the respiratory volume in the minute specified in the relevant device standard.
One mouth of the pressure meter is connected to the pressure mouth of the support of the device and the other mouth to the environment. The pressure gauge is connected to the recorder device.
The device is leakproofly mounted on the support without any deformity. For headers that seal the neck circumference, the relevant fitting should be used. The "zero" reading of the pressure gauge is noted. The breathing machine switch is opened and the device is operated as described in the relevant device standard and the peak pressure is recorded.

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Test results:
The test results obtained are given in the tables as follows

Inhalation Resistance

No. of Sample	Condition	Inhalation Resistance (mbar)				
		Flow rate 30 l/min	Requirements in accordance with EN 149:2001+A1:2009	Flow rate 95 l/min	Requirements in accordance with EN 149:2001+A1:2009	Assessment of Test Result Conformity / Nonconformity
29	As received	0,5	FFP1 ≤ 0,60 FFP2 ≤ 0,70 FFP3 ≤ 1,0	1,3	FFP1 ≤ 2,10 FFP2 ≤ 2,40 FFP3 ≤ 3,00	Passed
30		0,4		1,3		Passed
31		0,4		1,4		Passed
1	Simulated wearing treatment	0,6		1,2		Passed
2		0,6		1,5		Passed
3		0,5		1,5		Passed
13	Temperature conditioned	0,6		1,7		Passed
14		0,6		1,6		Passed
15		0,5		1,7		Passed

Exhalation Resistance

No. of Sample	Condition	Flow rate	Facing directly	Facing vertically upwards	Facing vertically downwards	Lying on the left side	Lying on the right side	Requirements in accordance with EN 149:2001+A1:2009	Assessment of Test Result Conformity / Nonconformity
29	As received	160l/min	2,1	2,1	2,1	2,0	2,1	FFP1 ≤ 3,0 FFP2 ≤ 3,0 FFP3 ≤ 3,0	Passed
30			2,0	2,0	2,1	2,1	2,0		Passed
31			2,1	2,2	2,0	2,2	2,0		Passed
1	Simulated wearing treatment		2,2	2,2	2,0	2,2	2,1		Passed
2			2,0	2,0	2,3	2,1	1,9		Passed
3			2,2	2,0	1,9	2,1	2,0		Passed
13	Temperature conditioned		2,0	2,2	2,2	2,2	2,0		Passed
14			2,1	2,1	2,1	2,2	2,1		Passed
15			2,0	2,3	1,9	2,1	2,0		Passed

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