Test Report

Report No.: VIC20200320-SHH32-CE-S

Applicant: Shandong Honghui Labor Protection Products Co.,Ltd.

Product: KN95 Mask

Standard(s): EN 149:2001+A1:2009

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TEST REPORT
EN 149:2001+A1:2009
Respiratory protective devices
Filtering half masks to protect against particles
Requirements, testing, marking

Report Number.....:	VIC20200320-SHH32-CE-S
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Manufacturer's name.....:	Shandong Honghui Labor Protection Products Co.,Ltd.
Address.....:	No.2 Dongmouxi Village Gaomi Economic Development Zone,Weifang City,Shandong Province ,China
Test specification:	
Standard.....:	EN 149:2001+A1:2009
Test procedure.....:	CE
Non-standard test method.....:	-
Test item description.....:	KN95 Mask
Trade Mark.....:	-
Model/Type reference.....:	KN95 Mask

Summary of testing:

Tests performed (name of test and test clause):

Full tests of the following standard:

- EN 149:2001+A1:2009

The submitted samples were found to comply with the requirements of above standards.

Possible test case verdicts:

- test case does not apply to the test object.....: N/A

- test object does meet the requirement.....: P (Pass)

- test object does not meet the requirement.....: F (Fail)

General remarks:

Throughout this report a ☒ comma / ☐ point is used as the decimal separator.

General product information:

The product is intended to be used as respiratory protective device which filter half masks to protect against particles.

EN 149:2001+A1:2009			
Clause	Requirement + Test	Result - Remark	Verdict
5	**Classification**		P
	Particle filtering half masks are classified according to their filtering efficiency and their maximum total inward leakage.		P
	There are three classes of devices..... :	FFP2	P
	The protection provided by an FFP2 - or FFP3 - device includes that provided by the device of lower class or classes.		P
	In addition, particle filtering half masks are classified as single shift use only or as re-usable (more than one shift).	Single shift use only.	P
6	**Designation**		P
	Particle filtering half masks meeting the requirements of this European Standard shall be designated in the following manner:	EN 149:2001+A1:2009	P
	Particle filtering half mask EN 149, year of publication, classification, option (where "D" is an option for a non re-useable particle filtering half mask and mandatory for re-useable particle filtering half mask).		P
	Particle filtering half mask EN 149:2001 FFP1 NR D		P
7	**Requirements**		P
7.1	In all tests all test samples shall meet the requirements.		P
7.2	Nominal values and tolerances		P
	Unless otherwise specified, the values stated in this European Standard are expressed as nominal values.		P
	Except for temperature limits, values which are not stated as maxima or minima shall be subject to a tolerance of ± 5 %.	Tolerance: ± 2 %.	P
	Unless otherwise specified, the ambient temperature for testing shall be (16 - 32) °C, and the temperature limits shall be subject to an accuracy of ± 1 °C.	22 °C± 2 °C	P
7.3	Visual inspection		P
	The visual inspection shall also include the marking and the information supplied by the manufacturer.		P
7.4	Packaging		P

EN 149:2001+A1:2009			
Clause	Requirement + Test	Result - Remark	Verdict
	Particle filtering half masks shall be offered for sale packaged in such a way that they are protected against mechanical damage and contamination before use.	Testing was done in accordance with 8.2.	P
7.5	Material		P
	Materials used shall be suitable to withstand handling and wear over the period for which the particle filtering half mask is designed to be used.		P
	After undergoing the conditioning described in 8.3.1 none of the particle filtering half masks shall have suffered mechanical failure of the face piece or straps.		P
	Three particle filtering half masks shall be tested.	3 specimens.	
	When conditioned in accordance with 8.3.1 and 8.3.2 the particle filtering half mask shall not collapse.		P
	Any material from the filter media released by the air flow through the filter shall not constitute a hazard or nuisance for the wearer.	Testing was done in accordance with 8.2.	P
7.6	Cleaning and disinfecting	Single shift use only.	N/A
	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."		N/A
	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		P
	The particle filtering half mask shall undergo practical performance tests under realistic conditions.		P
	These general tests serve the purpose of checking the equipment for imperfections that cannot be determined by the tests described elsewhere in this standard.		P
	Where practical performance tests show the apparatus has imperfections related to wearer's acceptance, the test house shall provide full details of those parts of the practical performance tests which revealed these imperfections.	Testing was done in accordance with 8.4.	P
7.8	Finish of parts	Testing was done in accordance with 8.2.	P
	Parts of the device likely to come into contact with the wearer shall have no sharp edges or burrs.	Non-woven protective mask.	P
7.9	Leakage		P

EN 149:2001+A1:2009			
Clause	Requirement + Test	Result - Remark	Verdict
7.9.1	Total inward leakage	Testing was done in accordance with 8.5.	P
	The laboratory tests shall indicate that the particle filtering half mask can be used by the wearer to protect with high probability against the potential hazard to be expected.		P
	The total inward leakage consists of three components: face seal leakage, exhalation valve leakage (if exhalation valve fitted) and filter penetration.		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
	• ..... 25 % for FFP1 ..... :	FFP2	N/A
	• ..... 11 % for FFP2 ..... :	7,9 %	P
	• ..... 5 % for FFP3 ..... :	FFP2	N/A
	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
	22 % for FFP1	FFP2	N/A
	8 % for FFP2	5,1 %	P
	2 % for FFP3.	FFP2	N/A
7.9.2	Penetration of filter material		P
	The penetration of the filter of the particle filtering half mask shall meet the requirements of Table 1.		P
	Penetration of filter material:		P
	• ..... Maximum penetration of test aerosol, Sodium chloride test 95 l/min:	10,2 %	P
	• ..... Maximum penetration of test aerosol, Paraffin oil test 95 l/min:	11,9 %	P
	A total of 9 samples of particle filtering half masks shall be tested for each aerosol.	9 specimens	P
	Testing in accordance with 8.11 using the Penetration test according to EN 13274-7, shall be performed on:		P
	• ..... 3 samples as received;		P
	• ..... 3 samples after the simulated wearing treatment described in 8.3.1.		P

EN 149:2001+A1:2009			
Clause	Requirement + Test	Result - Remark	Verdict
	Testing in accordance with 8.11 using the Exposure test with a specified mass of test aerosol of 120 mg, and for particle filtering devices claimed to be re-usable additionally the Storage test, according to EN 13274-7, shall be performed:	Non-re-usable	P
	•..... for non-re-usable devices on:		P
	3 samples after the test for mechanical strength in accordance with 8.3.3 followed by temperature conditioning in accordance with 8.3.2.		P
	•..... for re-usable devices on:	Non-re-usable	N/A
	3 samples after the test for mechanical strength in accordance with 8.3.3 followed by temperature conditioning in accordance with 8.3.2.		N/A
	and followed by one cleaning and disinfecting cycle according to the manufacturer's instruction.		N/A
7.10	Compatibility with skin	Testing was done in accordance with 8.4 and 8.5.	P
	Materials that may come into contact with the wearer’s skin shall not be known to be likely to cause irritation or any other adverse effect to health.		P
7.11	Flammability		P
	The material used shall not present a danger for the wearer and shall not be of highly flammable nature.	Without high flammable nature.	P
	When tested, the particle filtering half mask shall not burn or not to continue to burn for more than 5 s after removal from the flame.	7 s	P
	The particle filtering half mask does not have to be usable after the test.		P
	Testing shall be done in accordance with 8.6.		P
7.12	Carbon dioxide content of the inhalation air		P
	The carbon dioxide content of the inhalation air (dead space) shall not exceed an average of 1,0 % (by volume).	0,63 %	P
	Testing shall be done in accordance with 8.7.		P
7.13	Head harness		P
	The head harness shall be designed so that the particle filtering half mask can be donned and removed easily.		P

EN 149:2001+A1:2009			
Clause	Requirement + Test	Result - Remark	Verdict
	The head harness shall be adjustable or self-adjusting and shall be sufficiently robust to hold the particle filtering half mask firmly in position and be capable of maintaining total inward leakage requirements for the device.		P
	Testing shall be done in accordance with 8.4 and 8.5.		P
7.14	Field of vision	Testing was done in accordance with 8.4.	P
	The field of vision is acceptable if determined so in practical performance tests.		P
7.15	Exhalation valve(s)	No exhalation valve.	N/A
	A particle filtering half mask may have one or more exhalation valve(s), which shall function correctly in all orientations.		N/A
	Testing shall be done in accordance with 8.2 and 8.9.1.		N/A
	If an exhalation valve is provided it shall be protected against or be resistant to dirt and mechanical damage and may include any other device that may be necessary for the particle filtering half mask to comply with 7.9.		N/A
	Testing shall be done in accordance with 8.2.		N/A
	Exhalation valve(s), if fitted, shall continue to operate correctly after a continuous exhalation flow of 300 l/min over a period of 30 s.		N/A
	Testing shall be done in accordance with 8.3.4.		N/A
	When the exhalation valve housing is attached to the faceblank, it shall withstand axially a tensile force of 10 N applied for 10 s.		N/A
	Testing shall be done in accordance with 8.8.		N/A
7.16	Breathing resistance	Testing was done in accordance with 8.9.	P
	The breathing resistances apply to valved and valveless particle filtering half masks and shall meet the requirements of Table 2.		P
	Breathing resistance:		P
	• ..... Maximum permitted resistance (mbar), inhalation, 30 l/min.....:	0,37	P
	• ..... Maximum permitted resistance (mbar), inhalation, 95 l/min.....:	1,2	P
	• ..... Maximum permitted resistance (mbar), exhalation, 160 l/min..... :	1,9	P
7.17	Clogging		P

EN 149:2001+A1:2009			
Clause	Requirement + Test	Result - Remark	Verdict
7.17.1	For single shift use devices, the clogging test is an optional test.	Single shift use device.	P
	For re-usable devices the test is mandatory.		N/A
	Devices designed to be resistant to clogging, shown by a slow increase of breathing resistance when loaded with dust, shall be subjected to the treatment described in 8.10.		P
	The specified breathing resistances shall not be exceeded before the required dust load of 833 mg·h/m^3 is reached.		P
7.17.2	Breathing resistance		P
7.17.2.1	Valved particle filtering half masks		P
	After clogging the inhalation resistances shall not exceed		P
	•..... FFP1: 4 mbar	FFP2	N/A
	•..... FFP2: 5 mbar	3,9 mbar	P
	•..... FFP3: 7 mbar	FFP2	N/A
	at 95 l/min continuous flow;		N/A
	The exhalation resistance shall not exceed 3 mbar at 160 l/min continuous flow.		N/A
	Testing shall be done in accordance with 8.9.		N/A
7.17.2.2	Valveless particle filtering half masks		P
	After clogging the inhalation and exhalation resistances shall not exceed		P
	•..... FFP1: 3 mbar	FFP2	N/A
	•..... FFP2: 4 mbar	2,1 mbar	P
	•..... FFP3: 5 mbar	FFP2	N/A
	at 95 l/min continuous flow.	95 l/min	P
	Testing shall be done in accordance with 8.9.		P
7.17.3	Penetration of filter material		P
	All types (valved and valveless) of particle filtering half masks claimed to meet the clogging requirement shall also meet the requirements given in 7.9.2.		P
	For the Penetration test according to EN 13274-7, after the clogging treatment.		N/A
	Testing shall be done in accordance with 8.11 using EN 13274-7		P
7.18	Demountable parts	No any demountable parts.	N/A
	All demountable parts (if fitted) shall be readily connected and secured, where possible by hand.		N/A

EN 149:2001+A1:2009			
Clause	Requirement + Test	Result - Remark	Verdict
	Testing shall be done in accordance with 8.2.		N/A

8	**Testing**		P
8.1	If no special measuring devices and methods are specified, commonly used devices and methods shall be used.		P
	Before performing tests involving human subjects account should be taken of any national regulations concerning the medical history, examination or supervision of the test subjects.		P
8.2	Visual inspection		P
	The visual inspection is carried out where appropriate by the test house prior to laboratory or practical performance tests.		P
8.3	Conditioning		P
8.3.1	Simulated wearing treatment		P
	Conditioning by simulated wearing treatment shall be carried out by the following process.		P
	A breathing machine is adjusted to 25 cycles/min and 2,0 l/stroke.	25 cycles/min; 2,0 l/stroke.	P
	The particle filtering half mask is mounted on a Sheffield dummy head.		P
	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.		P
	The air shall be 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 shall be inclined so that the water runs away from the mouth and is collected in a trap.	37 °C ± 2 °C	P
	The breathing machine is brought into operation, the saturator switched on and the apparatus allowed to stabilize.		P
	The particle filtering half mask under test shall then be mounted on the dummy head.		P
	During the test time at approximately 20 min intervals the particle filtering half mask shall be completely removed from the dummy head and refitted such that during the test period it is fitted ten times to the dummy head.		P
8.3.2	Temperature conditioning		P

EN 149:2001+A1:2009			
Clause	Requirement + Test	Result - Remark	Verdict
	Expose the particle filtering half masks to the following thermal cycle:		P
	a).....for 24 h to a dry atmosphere of (70 ± 3) °C;	70 °C ± 2 °C	P
	b).....for 24 h to a temperature of (-30 ± 3) °C;	-30 °C ± 2 °C	P
	and allow to return to room temperature for at least 4 h between exposures and prior to subsequent testing.		P
	The conditioning shall be carried out in a manner which ensures that no thermal shock occurs.		P
8.3.3	Mechanical strength	Conditioning was done in accordance with EN 143.	P
8.3.4	Flow conditioning		P
	A total of 3 valved particle filtering half masks shall be tested, one as received and two temperature conditioned in accordance with 8.3.2.	Not valved particle filtering half mask.	P
8.4	Practical performance		P
8.4.1	A total of 2 particle filtering half masks shall be tested: both as received.		
	All tests shall be carried out by two test subjects at ambient temperature and the test temperature and humidity shall be recorded.		P
	Prior to the test there shall be an examination to assure that the particle filtering half mask is in good working condition and that it can be used without hazard.		P
	Examination shall be done in accordance with 8.2.		P
	For the test, persons shall be selected who are familiar with using such or similar equipment.		P
	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:		P
	a).....head harness comfort;		P
	b).....security of fastenings;		P
	c).....field of vision;		P
	d).....any other comments reported by the wearer on request.		P
8.4.2	Walking test		P
	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.	Regular rate: 6 km/h.	P
	The test shall be continuous, without removal of the particle filtering half mask, for a period of 10 min.		P

EN 149:2001+A1:2009			
Clause	Requirement + Test	Result - Remark	Verdict
8.4.3	Work simulation test		P
	The particle filtering half mask shall be tested under conditions which can be expected during normal use.		P
	During this test the following activities shall be carried out in simulation of the practical use of the particle filtering half mask.		P
	The test shall be completed within a total working time of 20 min.	20 min.	P
	The sequence of activities is at the discretion of the test house.		P
	The individual activities shall be arranged so that sufficient time is left for the comments prescribed.		P
	a).....walking on the level with headroom of (1,3 ± 0,2) m for 5 min;	1,3 m ± 0,1 m; 5 min	P
	b).....crawling on the level with headroom of (0,70 ± 0,05) m for 5 min;	0,70 m ± 0,03 m; 5 min	P
	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.		P
	The subject shall stoop or kneel as he wishes and fill the basket with chippings.		P
	He shall then lift the basket and empty the contents back into the hopper.		P
	This shall be done 20 times in 10 min.	20 times within 10 min.	P
8.5	Leakage		P
8.5.1	General test procedure		P
8.5.1.1	Total inward leakage		P
	A total of 10 test specimens shall be tested: 5 as received and 5 after temperature conditioning in accordance with 8.3.2.	10 specimens	P
	The total inward leakage shall be tested using sodium chloride aerosol.		P
	Prior to the test there shall be an examination to ensure that the particle filtering half mask is in good working condition and that it can be used without hazard.		P
	Examination shall be done in accordance with 8.2.		P
	For the test, persons shall be selected who are familiar with using such or similar equipment.		P

EN 149:2001+A1:2009			
Clause	Requirement + Test	Result - Remark	Verdict
	A panel of ten clean-shaven persons (without beards or sideburns) shall be selected covering the spectrum of facial characteristics of typical users (excluding significant abnormalities).		P
	It is to be expected that exceptionally some persons cannot be satisfactorily fitted with a particle filtering half mask. Such exceptional subjects shall not be used for testing particle filtering half masks.		P
	In the test report the faces of the ten test subjects shall be described (for information only) by the four facial dimensions (in mm) illustrated in Figure 2.		P
8.5.1.2	Test equipment		P
	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.	Flow rate: 0,25 m/s	P
	The concentration of the test agent inside the effective working volume shall be checked to be homogeneous.		P
	The flow rate should be measured close to the subject's head.		P
	A level treadmill is required capable of working at 6 km/h.	Capable: 12 km/h.	P
8.5.1.3	Test procedure		P
	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.		P
	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.		N/A
	Inform the test subjects that if they wish to adjust the particle filtering half mask during the test they may do so.		P
	However if this is done, repeat the relevant section of the test, having allowed the system to resettle.		N/A
	The test subjects shall have no indication of the results as the test proceeds.		P
	After fitting the particle filtering half mask, ask each test subject 'Does the mask fit'.		P
	If the answer is 'Yes', continue the test.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	If the answer is 'No', take the test subject off the panel, report the fact and replace with another test subject.		P
	The test sequence shall be as follows:		P
	a).....Ensure the test atmosphere is OFF.		P
	b).....Place the test subject in the enclosure. Connect up the facepiece sampling probe. Have the test subject walk at 6 km/h for 2 min. Measure the test agent concentration inside the particle filtering half mask to establish the background level.		P
	c).....Obtain a stable reading.		P
	d).....Turn the test atmosphere ON.		P
	e).....The subject shall continue to walk for a further 2 min or until the test atmosphere has stabilized.		P
	f).....Whilst still walking the subject shall perform the following exercises:		P
	1).....walking for 2 min without head movement or talking;	2 min	P
	2).....turning head from side to side (approx. 15 times), as if inspecting the walls of a tunnel for 2 min;	2 min	P
	3).....moving the head up and down (approx. 15 times), as if inspecting the roof and floor for 2 min;	2 min	P
	4).....reciting the alphabet or an agreed text out loud as if communicating with a colleague for 2 min;	2 min	P
	5).....walking for 2 min without head movement or talking.	2 min	P
	g).....Record		P
	1).....enclosure concentration;		P
	2).....the leakage over each exercise period.		P
	h).....Turn off the test atmosphere and when the test agent has cleared from the enclosure remove the subject.		P
	After each test, replace the particle filtering half mask by a new sample.		P
8.5.2	Method		P
8.5.2.1	Principle		P
	The subject wearing the particle filtering half mask under test walks on a treadmill over which is an enclosure.		P

EN 149:2001+A1:2009			
Clause	Requirement + Test	Result - Remark	Verdict
	Through this enclosure flows a constant concentration of NaCl aerosol.		P
	The air inside the particle filtering half mask is sampled and analysed during the inhalation phase of the respiratory cycle to determine the NaCl content.		P
	The sample is extracted by punching a hole in the particle filtering half mask and inserting a probe through which the sample is drawn.		P
	The pressure variation inside the particle filtering half mask is used to actuate a change-over valve so that inhaled air only is sampled.		P
	A second probe is inserted for this purpose.		P
8.5.2.2	Test equipment		P
8.5.2.2.1	Aerosol generator		P
	The NaCl aerosol shall be generated from a 2 % solution of reagent grade NaCl in distilled water.	2,0 %	P
	An atomizer equivalent to the type described should be used.		P
	This requires an air flow rate of 100 l/min at a pressure of 7 bar.	Air flow rate: 100 l/min.	P
	The atomizer and its housing shall be fitted into a duct through which a constant flow of air is maintained.		P
	It may be necessary to heat or dehumidify the air in order to obtain complete drying of the aerosol particles.		P
8.5.2.2.2	Test agent		P
	The mean NaCl concentration within the enclosure shall be (8 ± 4) mg/m^3 and the variation throughout the effective working volume shall be not more than 10 %.	9,1 mg/m^3	P
	The particle size distribution shall be 0,02 µm to 2 µm equivalent aerodynamic diameter with a mass median diameter of 0,6 µm.	Distribution: 0,9 µm to 1,6 µm.	P
8.5.2.2.3	Flame photometer		P
	A flame photometer shall be used to measure the concentration of NaCl inside the particle filtering half mask.		P
	Essential performance characteristics for a suitable instrument are:		P
	a).....It should be a flame photometer specifically designed for the direct analysis of NaCl aerosol;		P

EN 149:2001+A1:2009			
Clause	Requirement + Test	Result - Remark	Verdict
	b).....It should be capable of measuring concentrations of NaCl aerosol between 15 mg/m^3 and 5 ng/m^3;	6,2 mg/m^3	P
	c).....The total aerosol sample required by the photometer should not be greater than 15 l/min;		P
	d).....The response time of the photometer, excluding the sampling system, should not be greater than 500 ms;	< 500 ms	P
	e).....It is necessary to reduce the response to other elements, particularly carbon, the concentration of which will vary during the breathing cycle.		P
	This will be achieved by ensuring that the band pass width of the interference filter is no greater than 3 nm and that all necessary side-band filters are included.		P
8.5.2.2.4	Sample selector		P
	A system is required which will switch the sample to the photometer only during the inhalation phase of the respiratory cycle.		P
	During the exhalation phase clean air shall be fed to the photometer.		P
	The essential elements of such a system are:		P
	a).....An electrically operated valve with a response time of the order of 100 ms.		P
	The valve should have the minimum possible dead space compatible with straight-through, unrestricted flow when open;		P
	b).....A pressure sensor which is capable of detecting a minimum pressure change of approx. 0,05 mbar and which can be connected to a probe inserted in the cavity of the particle filtering half mask.	0,05 mbar	P
	The sensor shall have an adjustable threshold and be capable of differential signalling when the threshold is crossed in either direction.		P
	The sensor shall work reliably when subjected to the accelerations produced by the head movements of the subject;		P
	c).....An interfacing system to actuate the valve in response to a signal from the pressure sensor;		P
	d).....timing device to record the proportion of the total respiratory cycle during which sampling took place.		P

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Clause	Requirement + Test	Result - Remark	Verdict
8.5.2.2.5	Sampling probe		P
	The probe shall be fitted securely in an airtight manner to the particle filtering half mask as near as possible to the centre line of the particle filtering half mask.	Fitted securely in an airtight manner to the particle filtering half mask。	P
	A multiple hole sampling probe is strongly recommended.		P
	Measures shall be taken to prevent the influence of condensation in the sampling probe on the measurement (by supplying dry air).		P
	The probe is adjusted so that it just touches the wearer's lips.		P
	Care shall be taken to ensure that the probe does not disturb the normal fit or shape of the mask.		P
8.5.2.2.6	Sample pump		P
	If no pump is incorporated into the photometer an adjustable flow pump is used to withdraw an air sample from the particle filtering half mask under test.		P
	This pump is so adjusted as to withdraw a constant flow of 1 l/min from the sample probe.	Flow: 1,0 l/min	P
	Dependent on the type of photometer it may be necessary to dilute the sample with clean air.		P
8.5.2.2.7	Sampling of enclosure concentration		P
	The enclosure aerosol concentration is monitored during the tests using a separate sampling system, to avoid contamination of the particle filtering half mask sampling lines.		P
	It is preferable to use a separate flame photometer for this purpose.		P
	If a second photometer is not available, sampling of the enclosure concentration using a separate sampling system and the same photometer may be made.		N/A
	However, time will then be required to allow the photometer to return to a clean background.		P
8.5.2.2.8	Pressure detection probe		P
	A second probe is fitted near to the sample probe and is connected to the pressure sensor.		P
8.5.2.3	Expression of results		P
8.6	Flammability		P
	A total of four particle filtering half masks shall be tested: two in the state as received and two after temperature conditioning in accordance with 8.3.2.		P

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	The single burner test is carried out according to the following procedure.		P
	The facepiece 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.	62,7 mm/s	P
	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 facepiece (when positioned directly over the burner) shall be set to (20 ± 2) mm.	21 mm	P
	A burner described in ISO 6941 has been found suitable.		P
	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.	0,25 bar	P
	By means of a needle valve and fine adjustments to the supply pressure, the flame heigt shall be set to (40 ± 4) mm.	41 mm	P
	This is measured with a suitable gauge.		P
	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.	820 °C	P
	Failure to meet the temperature requirement indicates that a fault such as a partially blocked burner exists.		P
	This shall be rectified before testing.		P
	The head is set in motion and the effect of passing the facepiece once through the flame shall be noted.		P
	The test shall be repeated to enable an assessment to be made of all materials on the exterior of the device.		P
	Any one component shall be passed through the flame once only.		P
8.7	Carbon dioxide content of the inhalation air		P
	A total of 3 particle filtering half masks shall be tested: all 3 as received.		P
	The apparatus consists essentially of a breathing machine with solenoid valves controlled by the breathing machine, a connector, a CO_2 flowmeter and a CO_2 analyser.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	The apparatus subjects the particle filtering half mask to a respiration cycle by the breathing machine.		P
	For this test the particle filtering half mask shall be fitted securely in a leak-tight manner but without deformation to a Sheffield dummy head.		P
	Air shall be supplied to it from a breathing machine adjusted to 25 cycles/min and 2,0 l/stroke and the exhaled air shall have a carbon dioxide content of 5 % by volume.	25 cycles/min; 2,0 l/stroke.	P
	If the design of the test equipment causes a CO_2 build-up a CO_2 absorber shall be used in the inhalation branch between solenoid valve and breathing machine.		N/A
	The CO_2 is fed into the breathing machine via a control valve, a flowmeter, a compensating bag and two non-return valves.		P
	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 CO_2 analyser.		P
	To measure the CO_2 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 CO_2 analyser.		P
	The total dead space of the gas path (excluding the breathing machine) of the test installation should not exceed 2000 ml.	< 2000 ml.	P
	Measure the carbon dioxide content of the inhaled air and record continuously.		P
	Test conditions are ambient atmospheric conditions.		P
	The ambient carbon dioxide level is measured 1 m in front of and level with the tips of the nose of the dummy head.		P
	The ambient level is measured once a stabilized level for carbon dioxide in the inhalation air has been attained.		P
	Alternatively, the ambient level of carbon dioxide may be measured at the sampling tube with the carbon dioxide supply turned off.		N/A
	Results are deemed acceptable only if the measured value of the ambient level of carbon dioxide is less than 0,1 %.	< 0,1 %.	P
	The laboratory ambient carbon dioxide level shall be subtracted from the measured value.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	The air flow from the front shall be 0,5 m/s.	Air flow: 0,5 m/s.	P
	The test shall be performed until a constant carbon dioxide content in the inhalation air is achieved.		P
8.8	Strength of attachment of exhalation valve housing		P
	A total of three particle filtering half masks shall be tested: one as received, one temperature conditioned in accordance with 8.3.2 and one after the test described for mechanical strength in EN 143.		P
	Mount the particle filtering half mask securely to a fixture as shown in Figure 9.		P
	Apply an axial tensile force of 10 N to the valve (housing) for 10 s, and note the results.	Tensile force: 10 N	P
8.9	Breathing Resistance		P
8.9.1	Test samples and fixture		P
8.9.1.1	Valveless particle filtering half masks		P
	A total of 9 valveless particle filtering half masks shall be tested:	9 specimens	P
	3 as received, 3 after temperature conditioning in accordance with 8.3.2 and 3 after the test for simulated wearing in accordance with 8.3.1.		P
8.9.1.2	Valved particle filtering half masks		P
	A total of 12 valved particle filtering half masks shall be tested: 3 as received, 3 after temperature conditioning in accordance with 8.3.2, 3 after the test for simulated wearing in accordance with 8.3.1and 3 after the flow conditioning in accordance with 8.3.4.		P
	The particle filtering half mask shall be fitted securely in a leaktight manner but without deformation on the Sheffield dummy head.		P
	The flow rate at which the resistance is measured shall be corrected to 23°C and 1 bar absolute.	23 °C; 1 bar	P
8.9.2	Exhalation resistance		P
	Seal the particle filtering half mask on the Sheffield dummy head.		P
	Measure the exhalation resistance at the opening for mouth of the dummy head using the adapter shown in Figure 6 and a breathing machine adjusted to 25 cycles/min and 2.0 l/stroke or a continous flow 160 l/min. Use a suitable pressure transducer.	25 cycles/min; 2.0 l/stroke.	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Measure the exhalation resistance with the dummy head successively placed in 5 defined positions:		P
	•..... facing directly ahead		P
	•..... facing vertically upwards		P
	•..... facing vertically downwards		P
	•..... lying on the left side		P
	•..... lying on the right side		P
8.9.3	Inhalation resistance		N/A
	Test the inhalation resistance at 30 l/min and 95 l/min continuous flow.		N/A
8.10	Clogging		P
8.10.1	Principle		P
	The test aerosol shall be dolomite.		P
	A total of 3 particle filtering half masks shall be tested: 1 as received and 2 after temperature conditioning in accordance with 8.3.2.		P
	The test consists of subjecting the particle filtering half mask to a sinusoidal breathing simulation, whilst the sample is surrounded by a known concentration of dolomite dust in air.		P
	Following the exposure, the breathing resistance and the filter penetration of the sample particle filtering half mask are measured.		P
8.10.2	Test equipment		P
	A scheme of a typical apparatus is given in Figure 10.		P
	The working area of the test chamber has a suggested square section of 650 mm × 650 mm.	Square section: 650 mm × 650 mm.	P
	The breathing machine has a displacement of 2,0 l/stroke.	2,0 l/stroke.	P
	The exhaled air shall pass a humidifier in the exhaled air circuit, such that the exhaled air temperature, measured at the position of the sample particle filtering half mask is (37 ± 2) °C and 95 % R.H. minimum.	35 °C and 95 % R.H.	P
8.10.3	Test conditions		P
	•..... Dust: DRB 4/15 dolomite		P
	The size distribution of dolomite dust is given in Table 3.		P
	The particle size distribution of the airborne dust at the working area of the dust chamber is given in Figure 11.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	This characteristic is an essential parameter, which shall be verified especially if the geometry of the test chamber is somewhat different from the model described as follows:		P
	•..... Continuous flow through the dust chamber: 60 m^3/h, linear velocity 4 cm/s;	Flow: 60 m^3/h; Linear velocity: 4 cm/s.	P
	•..... Sinusoidal flow through the particle filtering half mask is delivered by a breathing machine adjusted to 15 cycles/min and 2,0 l/stroke; the exhaled air shall be saturated in humidity;	15 cycles/min; 2,0 l/stroke.	P
	•..... Concentration of the dust: (400 ± 100) mg/m^3;	430 mg/m^3	P
	•..... Temperature of the air: (23 ± 2) °C;	23 °C	P
	•..... Relative humidity of the air: (45 ± 15) %;	51,7 %	P
	•..... Testing time: Until the product of measured dust concentration and exposure time is 833 mg•h/m3 or until:		P
	1).....for valved particle filtering half masks the peak inhalation resistance (corresponding to a continuous flow of 95 l/min) has reached 4 mbar for class FFP1 or 5 mbar for class FFP2 or 7 mbar for class FFP3, or until the peak exhalation resistance has reached a 1,8 mbar (corresponding to 3 mbar at a continuous flow of 160 l/min);	Valveless particle filtering half mask.	N/A
	2).....for valveless particle filtering half masks the peak inhalation or the peak exhalation resistance has reached 3 mbar for class FFP1 or 4 mbar for class FFP2 or 5 mbar for class FFP3.	FFP2	P
8.10.4	Test procedure		P
	Convey dust from the distributor to the dust chamber where it is dispersed into the air stream of 60 m^3/h.	Air stream: 60 m^3/h.	P
	Fit the sample particle filtering half mask in a leaktight manner to a dummy head or a suitable filter holder located in the dust chamber.		P
	Connect the breathing machine and humidifier to the sample and operate for the specified testing time.		P
	The concentration of dust in the test chamber may be measured by drawing air at 2 l/min through a sampling probe equipped with a pre-weighed, high efficiency filter (open face, diameter 37 mm) located near the test sample.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Calculate the dust concentration from the weight of dust collected, the flow rate through the filter and the time of collection.		P
	Other suitable means may be used.		P
8.10.5	Assessment of clogging		P
	Following the exposure, measure the breathing resistance of the particle filtering half mask using clean air.		P
	Then measure the filter penetration in accordance with 8.11.		P
8.11	Penetration of filter material	Testing of penetration, exposure and storage shall were done in accordance with EN 13274-7.	P
	The device shall be mounted in a leaktight 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.		P
9	**Marking**		P
9.1	Packaging		P
	The following information shall be clearly and durably marked on the smallest commercially available packaging or legible through it if the packaging is transparent.		P
9.1.1	The name, trademark or other means of identification of the manufacturer or supplier.	Shandong Honghui Labor Protection Products Co.,Ltd.	P
9.1.2	Type-identifying marking.		P
9.1.3	Classification		P
	The appropriate class (FFP1, FFP2 or FFP3) followed by a single space and then:	FFP2	P
	•..... "NR" if the particle filtering half mask is limited to single shift use only. Example: FFP3 NR, or	FFP2 NR	P
	•..... "R" if the particle filtering half mask is re-usable.		N/A
9.1.4	The number and year of publication of this European Standard.		P
9.1.5	At least the year of end of shelf life.		P
	The end of shelf life may be informed by a pictogram as shown in Figure 12a, where yyyy/mm indicates the year and month.	 202201	P

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Clause	Requirement + Test	Result - Remark	Verdict
9.1.6	The sentence 'see information supplied by the manufacturer', at least in the official language(s) of the country of destination, or by using the pictogram as shown in Figure 12b.		P
9.1.7	The manufacturer's recommended conditions of storage (at least the temperature and humidity) or equivalent pictogram, as shown in Figures 12c and 12d.		P
9.1.8	The packaging of those particle filtering half masks passing the dolomite clogging test shall be additionally marked with the letter "D".		P
	This letter shall follow the classification marking preceded by a single space.		P
9.2	Particle filtering half mask		P
	Particle filtering half masks complying with this European Standard shall be clearly and durably marked with the following:		P
9.2.1	The name, trademark or other means of identification of the manufacturer or supplier.		P
9.2.2	Type-identifying marking.	60P/140mm*75mm	P
9.2.3	The number and year of publication of this European Standard.	EN 149:2001+A1:2009	P
9.2.4	Classification		P
	The appropriate class (FFP1, FFP2 or FFP3) followed by a single space and then:	FFP2	P
	•..... "NR" if the particle filtering half mask is limited to single shift use only. Example: FFP3 NR, or	FFP2 NR	P
	•..... "R" if the particle filtering half mask is re-usable.		N/A
9.2.5	If appropriate the letter D (dolomite) in accordance with clogging performance. This letter shall follow the classification marking preceded by a single space.		N/A
9.2.6	Sub-assemblies and components with considerable bearing on safety shall be marked so that they can be identified.		N/A

10	**Information to be supplied by the manufacturer**		P
10.1	Information supplied by the manufacturer shall accompany every smallest commercial available package.		P
10.2	Information supplied by the manufacturer shall be at least in the official language(s) of the country of destination.		P

EN 149:2001+A1:2009			
Clause	Requirement + Test	Result - Remark	Verdict
10.3	The information supplied by the manufacturer shall contain all information necessary for trained and qualified persons on		P
	•..... application/limitations;		P
	•..... the meaning of any colour coding;		P
	•..... checks prior to use;		P
	•..... donning, fitting;		P
	•..... use;		P
	•..... maintenance (e.g. cleaning, disinfecting), if applicable;		N/A
	•..... storage;	Store in cool and dry place.	P
	•..... the meaning of any symbols/pictograms used of the equipment.		P
10.4	The information shall be clear and comprehensible. If helpful, illustrations, part numbers, marking shall be added.		P
10.5	Warning shall be given against problems likely to be encountered, for example:		P
	•..... fit of particle filtering half mask (check prior to use);		P
	•..... it is unlikely that the requirements for leakage will be achieved if facial hair passes under the face seal;		P
	•..... air quality (contaminants, oxygen deficiency);		P
	•..... use of equipment in explosive atmosphere.		P
10.6	The information shall provide recommendations as to when the particle filtering half mask shall be discarded.		P
10.7	For devices marked "NR", a warning shall be given that the particle filtering half mask shall not be used for more than one shift.	FFP2 NR	P

Photo document

Fig. 1 Overview

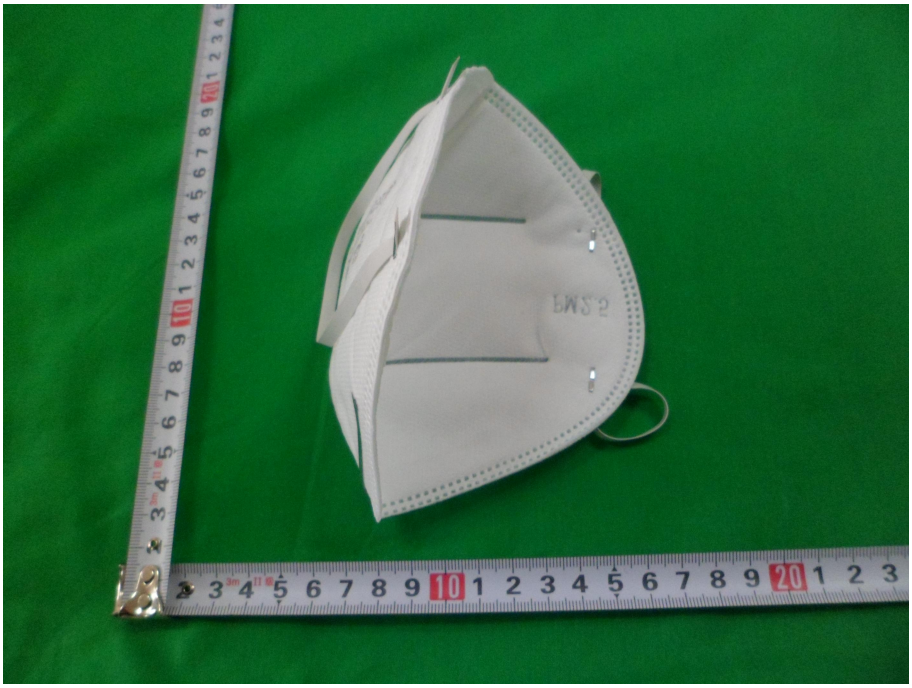

Fig. 2 Overview

--- End of report ---

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