Shenzhen Toby Technology Co., Ltd.

10/F., A Block, Jiada R & D Bldg., No.5 Songpingshan Road,
Science & Technology Park, Nanshan District, Shenzhen, China

CERTIFICATE OF CONFORMITY

Certificate No.: TB11010165

Applicant	:	Shenyang Baoerfu Technology Co., Ltd.
Address	:	Room 1510, No.51, Wulihe Street, Heping District, Shenyang, China
Manufacturer	:	Shenyang Baoerfu Technology Co., Ltd.
Address	:	Room 1510, No.51, Wulihe Street, Heping District, Shenyang, China
Product	:	Powered Air Purifying Respirators
Models	:	PRF-103, PRF-102R, PRF-101

Test Standard:

EN 12942: 1998+A1:2002

The EUT described above has been tested by us with the listed standards and found in compliance with the Council PPE Directive 89/686/EEC. It is possible to use CE marking to demonstrate the compliance with this PPE Directive.

The certificate applies to the tested sample above mentioned only and shall not imply an assessment of the whole production. It is only valid in connection with the test report number: TB-PPE110198.

CE

SHENZHEN TOBY TECHNOLOGY CO., LTD.

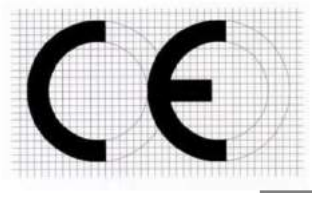
Justin Zhang
(Manager)
Jan. 21, 2018

TEST REPORT

For

Powered Air Purifying Respirators

Model Number: PRF-103, PRF-102R, PRF-101



Prepared for	:	Shenyang Baoerfu Technology Co., Ltd. Room 1510, No.51, Wulihe Street, Heping District, Shenyang, China
Prepared by	:	Shenzhen Toby Technology Co., Ltd. 10/F., A Block, Jiada R & D Bldg., No.5 Songpingshan Road, Science & Technology Park, Nanshan District, Shenzhen, China
TEL	:	0086-18925263335

Report Number	:	TB-PPE110198
Date of Test	:	Jan. 17-19, 2018
Date of Report	:	Jan. 19-20, 2018

CERTIFICATION

APPLICANT----------:	Shenyang Baoerfu Technology Co., Ltd.
ADDRESS----------:	Room 1510, No.51, Wulihe Street, Heping District, Shenyang, ChinaN
FACTORY----------:	Shenyang Baoerfu Technology Co., Ltd.
ADDRESS----------:	Room 1510, No.51, Wulihe Street, Heping District, Shenyang, China
PRODUCT----------:	Powered Air Purifying Respirators
MODELS----------:	PRF-103, PRF-102R, PRF-101

Test Standards
EN 12942: 1998+A1:2002 Respiratory protective devices — Power assisted filtering devices incorporating full face masks, half masks or quarter masks — Requirements, testing, marking

This report shows that the product technically complies with the Directive 89/686/EEC requirements.

The test report is valid for above tested sample only and shall not be reproduced in part without written approval of the laboratory.

Report by :	Victor Chen (Victor Chen)	Date :	Jan. 20, 2018
Checked by :	Ethen Chen (Ethen Chen)	Date :	Jan. 20, 2018
Approved by :	Justin Zhang (Justin Zhang)	Date :	Jan. 21, 2018

EN 12942: 1998+A1:2002
Respiratory protective devices — Power assisted filtering devices incorporating full face masks, half masks or quarter masks — Requirements, testing, marking

Testing laboratory----------:	Shenzhen Toby Technology Co., Ltd.
Address----------:	10/F., A Block, Jiada R & D Bldg., No.5 Songpingshan Road, Science & Technology Park, Nanshan District, Shenzhen, China
Testing location----------:	Shenzhen Toby Technology Co., Ltd.
Applicant----------:	Shenyang Baoerfu Technology Co., Ltd.
Address----------:	Room 1510, No.51, Wulihe Street, Heping District, Shenyang, China
Standard----------:	EN 12941: 1998+A1:2003+A2:2008
Test result----------:	Compliance with the requirements.
Procedure deviation----------:	N.A.
Non-standard test method---:	N.A.
Trademark----------:	N.A.
Type of test object----------:	Powered Air Purifying Respirators
Models/Type reference-------:	PRF-103, PRF-102R, PRF-101
Rating----------:	12.6VDC, 1000mA
Factory----------:	Shenyang Baoerfu Technology Co., Ltd.
Address----------:	Room 1510, No.51, Wulihe Street, Heping District, Shenyang, China

Test item particulars:	
Operating condition----------:	Continuous
Class of equipment ----------:	Class III
Protection against ingress of water-----:	IPX0

Possible test case verdicts:
Test case does not apply to the object----------:N
Test object does meet the requirement ----------: P
Test object does not meet the requirement----------: F

General product information:
Unless otherwise specified, test are carried out in a draught-proof room at (25 ± 5) °C.

General remarks:
1.”（see remark #）” refers to a remark appended to the report.

2. Throughout this report a point is used as the decimal separator.

3. The test results presented in this report relate only to the object tested.

4. All the models in the model list are identical in structure, schematic circuit and critical components except for different model number, different power and different size. Therefore, test with model PRF-103 represent all models in the model list.

5. This report shall not be reproduced except in full without the written approval of the Shenzhen TOBY.

6. If client has any objection to the testing results, please advise us within 15 working days after publish, otherwise claims will not be accepted.

Artwork of Marking Label

Model list: PRF-103, PRF-102R, PRF-101.

EN 12942: 1998+A1:2002			
Clause	Requirement -test	Result--Remark	Verdict
6	Requirements		P
6.1	Materials		P
6.1.1	General		P
	The device shall be made of suitable materials to withstand normal usage and exposure to those temperatures, humidities and corrosive environments that are likely to be encountered.		P
	Testing shall be done in accordance with 7.2.		P
6.1.2	Compatibility with skin		P
	Materials that can come into contact with the wearer's skin shall not be known to be likely to cause skin irritation or any other adverse effect to health.		P
6.1.3	Cleaning and disinfection		P
	The materials used in the construction of the device shall withstand the cleaning and disinfection agents and the methods recommended by the manufacturer.		P
	Testing shall be done in accordance with 7.2 and 7.3.5.15.		P
6.1.4	Surface finish		P
	The finish of any part of the device likely to be in contact with the !user when donning, doffing or when worn" shall be free from sharp edges and burrs.		P
	Testing shall be done in accordance with 7.2.		P
6.2	Resistance to temperature		P
	After conditioning in accordance with 7.1, the complete device excluding filters shall show no appreciable deformation of major components, nor shall these components separate in the complete device.		P
	The requirements of 6.3 to 6.10 and 6.12 to 6.17 shall continue to be met.		P
	Testing shall be done in accordance with 7.1.		P
6.3	Facepiece		P
6.3.1	General		P
	Where the facepiece is fitted with the standard thread connection as defined in prEN 148-1:1998 it shall comply with the requirements of EN 136:1998 or EN 140:1998 as appropriate.		P

EN 12942: 1998+A1:2002			
Clause	Requirement -test	Result--Remark	Verdict
	Additions to the equipment specified by the manufacturer shall not impair the respiratory protective performance of the equipment complying with this European Standard.		P
	Where the facepiece is designed solely for use as part of a power-assisted filtering device it shall not be fitted with the standard thread connection to prEN 148-1:1998 and shall meet the requirements of 6.3.2 or 6.3.3 of EN 136:1998 or EN 140:1998 as appropriate.		P
6.3.2	Full face masks (other than those complying with EN 136:1998)		P
6.3.2.1	Connection to full face mask		P
	The connection to the full face mask shall be leaktight.		P
	When tested in accordance with 5.7 of EN 136:1998 it shall withstand a tensile force of (500 ± 50) N applied axially for (10 ± 1) s whilst the facepiece is held by the faceblank.		P
	All demountable connections shall be readily connected and secured, where possible by hand. Any means of sealing used shall be retained in position when the connection is disconnected during normal maintenance.		P
	Testing shall be done in accordance with 7.2.		P
6.3.2.2	Exhalation means		P
6.3.2.2.1	A full face mask shall have a means of allowing the escape of exhaled air and, where applicable, any excess air delivered by the air supply.		P
6.3.2.2.2	Exhalation means shall be such that they can be readily maintained and correctly replaced.		P
	Testing shall be done in accordance with 7.2.		P
6.3.2.2.3	Exhalation means shall function correctly in orientations specified in 7.6.3.		P
	Testing shall be done in accordance with 7.6.3.		P
6.3.2.2.4	Exhalation means shall be protected against or shall be resistant to dirt and mechanical damage. It may be shrouded or include any other device that may be necessary to comply with 6.4.		P

EN 12942: 1998+A1:2002			
Clause	Requirement -test	Result--Remark	Verdict
6.3.2.2.5	Exhalation means shall operate correctly as assessed by the procedures of 7.2, 7.3 and 7.6 after a continuous exhalation flow of (300 ± 15) l/min for a period of (60 ± 6) s.		P
6.3.2.2.6	When the housing of the exhalation means is attached to the faceblank it shall withstand axially a tensile force of (150 ± 15) N for a period of (10 ± 1) s. The test is repeated 10 times at 10 s intervals.	No damage.	P
6.3.2.3	Head harness		P
	The head harness shall be designed so that the facepiece can be donned and removed easily.		P
	The head harness shall be adjustable and shall hold the facepiece firmly and comfortably in position.		P
	Testing shall be done in accordance with 7.2, !7.3 and 7.4."		P
	Each strap shall withstand a tensile force of (150 ± 10) N for (10 ± 1) s in the direction of pull when the full face mask is donned.	No damage.	P
6.3.2.4	Oculars and visor(s)		P
6.3.2.4.1	Visors shall not distort vision nor shall any misting occur which significantly affects vision as subjectively determined in the course of testing in accordance with 7.3 and 7.4.		P
6.3.2.4.2	Where anti-misting compounds are used or specified by the manufacturer they shall be compatible with eyes, skin and the device under the foreseeable conditions of use.		P
	— the effective field of vision of a full face mask fitted with a single visor shall be not less than 70 % related to the natural field of vision, and the overlapped field of vision related to the natural overlapped field of vision shall be not less than 80 %;		P
	— a full face mask with two eyepieces shall be designed so that the effective field of vision shall be not less than 70 % and the overlapped field of vision shall be not less than 20 %		P
6.3.2.4.3	If it is intended additionally to fit protection against certain types of non-ionizing radiation then the protection shall comply with the appropriate clauses of EN 166:1995, EN 169:1992, EN 170:1992, EN 171:1992 or EN 379:1994 as appropriate.		P

EN 12942: 1998+A1:2002			
Clause	Requirement -test	Result--Remark	Verdict
	If the means of protection against non-ionizing radiation is integral with the equipment covered by this European Standard then the field of vision shall be measured as described in 5.8 of EN 136:1998 and reported for information only and the device shall comply with the appropriate clauses of EN 166:1995, EN 169:1992, EN 170:1992 or EN 171:1992, or EN 379:1994 as appropriate.		P
6.3.2.4.4	When tested in accordance with 5.9 of EN 136:1998, but using two samples only, the oculars or visor shall not be damaged in any way that causes the facepiece to fail to meet the requirements of 6.4 of this European Standard.		P
6.3.2.5	Speech diaphragm		P
	Where the facepiece includes a speech diaphragm it shall be protected against mechanical damage and shall withstand a positive pressure of 15 mbar and a negative pressure of 80 mbar (static pressure).		P
	When a speech diaphragm can be subjected to an external force it shall withstand axially a tensile force of 150 N applied for 10 s. The test shall be repeated 10 times at 10 s intervals.		P
6.3.3	Half masks and quarter masks (other than those complying with EN 140:1998)		P
6.3.3.1	Facepiece connector		P
	All demountable connections shall be readily connected and secured, where possible by hand. Any means of sealing used shall be retained in position when the connection is disconnected during normal maintenance.		P
	Testing shall be done in accordance with 7.2.		P
	The connection to the half mask or quarter mask shall be leaktight. It shall withstand a tensile force of (50 ± 5) N applied axially, for (10 ± 1) s whilst the facepiece shall be held by the faceblank.		P
	Testing shall be done in accordance with 5.7 of EN 140:1998.		P
6.3.3.2	Exhalation means		P
6.3.3.2.1	A half mask or quarter mask shall have a means of allowing the escape of exhaled air and, where applicable, any excess air delivered by the air supply.		P
6.3.3.2.2	Any exhalation means shall be such that it can be readily maintained and correctly replaced.		P
	Testing shall be done in accordance with 7.2.		P

EN 12942: 1998+A1:2002			
Clause	Requirement -test	Result--Remark	Verdict
6.3.3.2.3	Exhalation means shall function correctly in orientations specified in 7.6.3.		P
	Testing shall be done in accordance with 7.6.3.		P
6.3.3.2.4	Exhalation means shall be protected against or be resistant to dirt and mechanical damage.		P
	It may be shrouded or include any other device that can be necessary to comply with 6.4.		P
6.3.3.2.5	Exhalation means shall continue to operate correctly as assessed by the procedures of 7.2, 7.3 and 7.6 after a continuous exhalation flow of (300 ± 15) l/min for a period of (60 ± 6) s.		P
6.3.3.2.6	The housing of the exhalation means shall be attached to the facepiece such that it can withstand axially a tensile force of (50 ± 5) N for a period of (10 ±1) s.		P
6.3.3.3	Head harness		P
	The head harness shall be so designed that the half mask or quarter mask can be donned and removed easily.		P
	The head harness shall be adjustable and shall hold the half mask or quarter mask firmly and comfortably in position.		P
	Testing shall be done in accordance with 7.2 and 7.4.		P
	Each strap shall withstand a tensile force of (50 ± 5) N for (10 ± 1) s in the direction of pulling when the half mask or quarter mask is donned.		P
6.3.3.4	Field of vision		P
	The field of vision is acceptable if determined so in the practical performance test.		P
	If comparative testing of the field of vision is carried out the method described in 5.8 of EN 140:1998 shall be used with the complete device		P
6.4	Inward leakage		P
6.4.1	Power-on		P
	The device shall be tested at the manufacturer’s minimum design condition during which the inward leakage of the test substance for each of the exercises shall not exceed the levels given in the appropriate class from column 4 of Table 1, for each of the ten test subjects.		P
	Testing shall be done in accordance with 7.3.		P
6.4.2	Power-off		P

EN 12942: 1998+A1:2002			
Clause	Requirement -test	Result--Remark	Verdict
	For three of the ten test subjects and after the power-on test, without removing the device, the inward leakage shall be tested in the power-off state during which the inward leakage shall be not greater than the levels given in the appropriate class from column 5 of Table 1, for each of the three test subjects.		P
	Testing shall be done in accordance with **7.3**.		P
6.5	Breathing resistance		P
6.5.1	General		P
	The breathing resistances as specified in 6.5.2 and 6.5.3 shall be met before and after the clogging test specified in 7.9.		P
6.5.2	Inhalation resistance		P
	When tested in accordance with 7.6.1, the peak inhalation resistance shall not exceed 11 mbar. When tested in accordance with 7.6.2 and 7.6.4, the peak inhalation resistance shall not exceed 3,5 mbar.		P
6.5.3	Exhalation resistance		P
	When tested in accordance with 7.6.3, the peak exhalation resistance shall not exceed 7 mbar.		P
6.6	Air supply		P
6.6.1	The performance of the complete device shall equal or exceed the performance of the manufacturer's minimum design condition for the manufacturer's stated design duration which shall be not less than 4 h. Testing shall be carried out at ambient temperature in accordance with 7.7.		P
	Where the manufacturer's minimum design condition is a manufacturer's minimum design flow rate the determination of the air supply flow rate shall be as given in 7.8.		P
	The flow rate and distribution of the air under the facepiece shall not cause distress to the wearer (for example by excessive local cooling of the head and face or by causing eye irritation) when assessed in accordance with 7.3 and 7.4.		P
6.6.2	It shall not be possible to switch off the air supply inadvertently as assessed during the practical performance test.		P

EN 12942: 1998+A1:2002			
Clause	Requirement -test	Result--Remark	Verdict
6.6.3	If a means is provided to adjust the air supply to give a particular classification, it shall not be possible to change the classification during use. The mechanism which adjusts the flow rate shall simultaneously indicate the appropriate reference to the selected classification (see Table 1) as specified in the manufacturer's information. The mechanism shall be so designed that it is not possible inadvertently to change the air flow.		P
	A means for adjusting the airflow during use within a classification may be provided.		P
	Testing shall be done in accordance with 7.2 and 7.4.		P
6.7	Checking facilities		P
	A facility shall be provided to check directly or indirectly that the manufacturer's minimum design condition is exceeded prior to each use. The facility shall be tested to ensure that it operates at or in excess of the manufacturer's minimum design condition.		P
6.8	Resistance to clogging		P
	Where particle or combined filters (including special filters) are fitted then the device shall be tested for clogging in accordance with 7.9.		P
	On completion of this test the device shall meet the breathing resistance requirements defined in 6.5 and the performance shall equal or exceed the manufacturer's minimum design condition, and the filter(s) shall meet the appropriate penetration requirements of columns 6 and 7 of Table 1, when tested in accordance with 7.14 at a flow rate that corresponds to the peak value of the interactive flow rate measured in 7.12.		P
6.9	Electrical components		P
	Electrical components shall be so designed that it is not possible inadvertently to reduce or reverse the air flow.		P
	Testing shall be done in accordance with 7.4.		P
	If the device is claimed to be intrinsically safe for use in potentially explosive atmospheres it shall comply with the appropriate requirements of EN 50014:1992 and EN 50020:1994.		P
	If the power supply is a battery it shall be a non-spillable type.		P
	Protection against the effects of an occurrence of a short circuit shall be provided for the battery.		P
	Testing shall be done in accordance with 7.2.		P
6.10	Breathing hose		P

EN 12942: 1998+A1:2002			
Clause	Requirement -test	Result--Remark	Verdict
6.10.1	Any breathing hose shall permit free head movement without danger of being caught up as subjectively assessed by test subjects involved in tests in accordance with 7.3 and 7.4.		P
6.10.2	When the breathing hose is compressed, the peak inhalation resistance shall not be changed by more than 0,5 mbar and shall not exceed 3,5 mbar. In addition, there shall be no distortion 5 min after removal of the compression load.		P
6.10.3	Hoses and couplings shall meet the requirements given in Table 2 and shall not become disconnected or physically damaged. Where multiple hoses are fitted to the device each hose shall meet the requirements given in Table 2.		P
	Testing shall be done in accordance with 7.11.		P
6.11	Filters		P
6.11.1	Penetration and capacity		P
6.11.1.1	Particle filters		P
	Power assisted particle filtering devices shall be classified according to the maximum particle filter penetration as given in columns 6 and 7 of Table 1 when tested in accordance with 7.14 at a flow rate that corresponds to the peak value of the interactive flow rate measured in 7.12. Three levels are specified and shall be described in the form: TMyP		P
	The protection provided by a class 2 or class 3 filter includes that provided by the corresponding filter of lower class or classes.		P
6.11.1.2	Gas filters		P
	Power assisted gas filtering devices shall be classified according to their application and protection capacity when tested in accordance with 7.14 at a flow rate that corresponds to the average value of the interactive flow measured in 7.12. Filters shall be described in the form: TMyGasz		P
	The gas capacity provided by a class 2 or class 3 filter includes that provided by the corresponding filter of lower class or classes.		P
6.11.1.3	Combined filters		P
	A combined filter shall be specified and described as separate entities in accordance with 6.11.1.1 and 6.11.1.2, that is: TMyGaszP		P
6.11.2	Filter requirements		P

EN 12942: 1998+A1:2002			
Clause	Requirement -test	Result--Remark	Verdict
6.11.2.1	Construction		P
	The connection between filter(s) and mating part of the device shall be robust and leaktight.		P
	The connection between filter and mating part can be achieved by a permanent or special type of connection or by a screw thread connection (including threads other than the standard thread).		P
	The standard thread is defined in prEN 148-1:1998.		P
	Filters other than prefilters shall be designed to be irreversible and shall be readily replaceable without use of special tools.		P
	The particle filter of combined filters shall be on the influent side of the gas filter.		P
	Testing shall be done in accordance with 7.2.		P
6.11.2.2	Materials		P
	Internally the filter shall withstand corrosion by the filtering media.		P
	Material from the filter media released by the air flow through the filter shall not constitute a hazard or nuisance for the wearer.		P
6.11.2.3	Mechanical strength		P
	After testing in accordance with 7.13 filters shall show no mechanical defects. After a visual inspection they shall meet the performance requirements given in 6.11.2.4.		P
6.11.2.4	Protection efficiency/capacity		P
6.11.2.4.1	Particle filters		P
	When tested in accordance with 7.14.1 and 7.14.2 particle filters shall comply with the requirements given in columns 6, or 6 and 7, of Table 1.		P
	Filters for use against solid and liquid aerosols shall be tested against sodium chloride and paraffin oil.		P
	Filters only for use against solid and water-based aerosols shall be tested against sodium chloride only.		P
6.11.2.4.2	Gas filters type A, B, E and K and combined filters		P
	When tested in accordance with 7.14.1, 7.14.3.1 and 7.14.3.2 the filters shall comply with the requirements given in Table 3.		P
	Where such a gas filter is combined with a particle filter, the combined filter shall comply with the penetration requirement for the particle filter given in Table 1 in addition to the requirements of Table 3.		P

EN 12942: 1998+A1:2002			
Clause	Requirement -test	Result--Remark	Verdict
6.11.2.4.3	Special filters		P
	When tested in accordance with 7.14.1, 7.14.3.1 and 7.14.3.3 special filters shall comply with the requirements of Table 4 and the penetration requirements for the particle filter given in Table 1.		P
6.11.2.4.4	AX filters		P
	When tested in accordance with 7.14.1, 7.14.3.1 and 7.14.3.4 AX filters shall comply with the requirements of Table 5 and if applicable with the penetration requirements for the particle filter given in Table 1.		P
6.11.2.4.5	SX filters		P
6.11.2.4.5.1	Sorption. When tested in accordance with 7.14.1, 7.14.3.1 and 7.14.3.5 SX filters shall have a breakthrough time of not less than 20 min.		P
6.11.2.4.5.2	Desorption. When tested in accordance with 7.14.1, 7.14.3.1 and 7.14.3.5 the effluent concentration from SX filters shall not be greater than 5 ml/m3 of the test gas at any time during the test.		P
6.11.2.4.5.3	Where such a gas filter is combined with a particle filter, the combined filter shall comply with the penetration requirement for the particle filter given in Table 1 in addition to the requirements of 6.11.2.4.5.1 and 6.11.2.4.5.2.		P
6.11.2.4.6	Multiple filters		P
	Where the device employs multiple filters through which the flow is proportioned, the flow through the filters shall be balanced. The flow through multiple filters is considered to be balanced if the filter resistances conform with the following expression: $\left(\frac{\lvert\Delta\text{flow resistance}\rvert - \text{max}}{\text{mean flow resistance}}\right) \leq 0{,}2$		P
	To assess this balance, the resistance of the filters shall be measured at a flow rate which is given by either the peak or the average interactive flow rate divided by the number of filters through which the air flow is proportioned.		P
6.12	Noise level		N
	The noise generated by the device shall not exceed 75 dBA.		N
	Testing shall be done in accordance with 7.16.		N
6.13	Carbon dioxide content of the inhalation air (dead space)		P

EN 12942: 1998+A1:2002			
Clause	Requirement -test	Result--Remark	Verdict
	When tested in accordance with 7.5 the carbon dioxide content shall not exceed:		P
	1) an average of 1 % by volume in the “power-on” state;		P
	2) an average of 2 % by volume in the “power-off” state.		P
6.14	Resistance to flame		P
	No part of the device shall continue to burn after testing in accordance with 7.15.		P
	The device is not required to meet other requirements of this European Standard after being tested in accordance with 7.15.		P
6.15	Attachments to the facepiece		P
6.15.1	Full face mask		P
	The total mass of all attachments (including filters) externally and directly fitted to a full face mask and supported by the full face mask shall not exceed 500 g		P
6.15.2	Half mask and quarter mask		P
	The total mass of all attachments (including filters) externally and directly fitted to a half mask or quarter mask and supported by the half mask or quarter mask shall not exceed 300 g.		P
6.16	Total mass of device		P
	The total mass of the device shall not be greater than 5 kg of which not more than 1,5 kg shall be carried on the head.		P
6.17	Practical performance		P
	The device shall undergo practical performance tests under realistic conditions. These general tests serve the purpose of checking the device for imperfections that cannot be determined by the tests described elsewhere in this European Standard.		P
	Where, in the opinion of the testing authority, approval is not granted because practical performance tests show the device has imperfections related to the wearer’s acceptance, the test laboratory shall describe the tests which revealed these imperfections. This will enable other test houses to duplicate the tests and assess the results thereof.		P
	Testing shall be done in accordance with 7.4.		P
7	Testing		P

EN 12942: 1998+A1:2002			
Clause	Requirement -test	Result--Remark	Verdict
	Before performing tests involving human subjects account shall be taken of any national regulations concerning the medical history, examination or supervision of the test subjects.		P
7.1	Conditioning		P
7.1.1	General		P
	All tests on complete devices shall be carried out on two samples. One shall be tested “as received” and the other after conditioning in accordance with 7.1.2. Except where otherwise indicated, filters used in the tests with complete devices shall be “as received”.		P
7.1.2	Complete device		P
	Store the complete device for (72 ± 1) h at one of the extremes of temperature and humidity given in the manufacturer’s information. Allow the device to return to ambient conditions for at least 4 h and then store for (72 ± 1) h at the other extreme of temperature and humidity given by the manufacturer.		P
7.1.3	Filters		P
7.1.3.1	Aerosol penetration and gas capacity		P
	Four filters shall be tested for each gas or aerosol. Two filters “as received” shall be subjected to the mechanical strength test prior to aerosol or gas testing. The two further filters shall be subjected to conditioning as described in 7.1.2, and then to mechanical strength testing prior to aerosol or gas testing.		P
7.1.3.2	Dust clogging		P
	“As received” filters shall be used for this test.		P
7.2	Visual inspection		P
	A visual inspection of the device is carried out and the results reported as appropriate. The visual inspection includes marking and information supplied by the manufacturer.		P
7.3	Inward leakage		P
7.3.1	General		P
7.3.2	Principle		P

EN 12942: 1998+A1:2002			
Clause	Requirement -test	Result--Remark	Verdict
	A test subject wearing the complete equipment on test, walks on a horizontal treadmill surrounded by an atmosphere containing a known concentration of the test substance. The device is adjusted to, and maintained at, the manufacturer's minimum design condition. The percentage inward leakage of the test substance into the breathing zone is measured.		P
7.3.3	Test subjects and number of tests		P
	Two complete devices are tested, each being tested on five test subjects. Both devices, if fitted with full face masks, shall be subjected to the impact test in 8.1.1 of EN 136:1998, prior to the inward leakage test. One complete device is tested to provide five inward leakage results; the other complete device is tested after being subjected to the storage temperatures as in 6.2 to provide five further inward leakage results. The test subjects selected shall be familiar with using such or similar equipment. Male and female test subjects shall be used.		P
7.3.4	Apparatus		P
	The apparatus is used for both test substances.		P
7.3.4.1	Enclosure		P
	An enclosure is positioned over a treadmill and is capable of being filled with the test atmosphere which preferably enters the top of the enclosure via a duct and flow distributor and is directed downwards over the head of the test subject. The concentration of the test substance inside the effective working volume is checked to ensure it is homogeneous. The enclosure is large enough to permit walking on the treadmill without interference.		P
	The air velocity through the enclosure measured close to the test subject's head, with the test subject standing centrally on the treadmill, shall be 0,12 m/s to 0,2 m/s.		P
	The design of the enclosure shall be such that the device worn by the test subject can be supplied if necessary with breathable air (free of the test substance). Such an air supply is attached to the filter or equipment normally used with the device.		P
7.3.4.2	Treadmill		P
	A level treadmill capable of working at 6 km/h.		P
7.3.4.3	Sampling probe and connections		P

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Clause	Requirement -test	Result--Remark	Verdict
	The probe consists of a length of tubing fitted with a plastics ball of approximately 20 mm diameter and having eight holes each of 1,5 mm diameter spaced equidistant around the circumference of the ball (see Figure 1). The facepiece can act as a support for the sampling probe after piercing at a suitable position. Connections to the sampling probe shall be sealed into the hole made in the facepiece.		P
	For tests on all types of device, the sample holes in the ball probe should lie in the position shown in Figure 1. A second sampling probe is provided, to measure the ambient concentration of test substance in the test chamber. The sampling probes are connected to the analysing instrument by means of thin tubing the length of which is kept as short as possible.		P
	A sampling rate of not greater than 3 l/min shall be used.		P
7.3.4.4	Detection systems		P
	The detection systems including sampling probes and connections shall have a response time of less than 20 s for a response of 10 % to 90 % of the full scale deflection of the indicator used.		P
7.3.4.5	Power supply		P
	The power supply shall enable the manufacturer's minimum design condition to be maintained throughout the duration of the test. The battery fitted to the device shall not be used.		P
7.3.5	Test procedure		P
	The test procedure is the same for both test substances.		P
7.3.5.1	Place all the sample tubes initially in close proximity to one another within the enclosure. The resistance of the sample tubes shall be adjusted, e.g. by means of a screw clip, so that identical readings for the test substance concentration are obtained from each sample tube.		P
7.3.5.2	Ask the test subjects to read the manufacturer's fitting instructions and if necessary show them how to fit the device correctly in accordance with the fitting instructions.		P
7.3.5.3	Inform the test subjects that if they wish to adjust the facepiece during the test they may do so. However, if this is done the relevant section of the test will be repeated having allowed the system to re-settle.		P

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Clause	Requirement -test	Result--Remark	Verdict
7.3.5.4	Adjust the device to the manufacturer's minimum design condition. Where pulse sampling is to be used the method specified in 7.3.7.3.1 shall be carried out. After fitting the facepiece ask each test subject "Does the facepiece fit". If the answer is "Yes", continue the test. If the answer is "No" take the test subject off the panel and report the fact.		P
7.3.5.5	Ensure that the test subjects have no indication of the results as the test proceeds.		P
7.3.5.6	Ensure the test atmosphere is OFF.		P
7.3.5.7	Place the test subject in the enclosure. Connect up the sampling probe. Have the test subject walk at 6 km/h for 2 min. Measure the test substance concentration inside the facepiece to establish the background level.		P
7.3.5.8	Wait for a stable reading to be obtained.		P
7.3.5.9	Turn the test atmosphere ON.		P
7.3.5.10	Instruct the test subject to continue to walk for a further 2 min or until the test atmosphere has stabilized.		P
7.3.5.11	Whilst still walking have the test subject perform the following exercises:		P
	a) walking without head movement or talking for 2 min;		P
	b) turning head from side to side (approximately 15 times), as if inspecting the walls of a tunnel for 2 min;		P
	c) moving head up and down (approximately 15 times), as if inspecting the roof and floor for 2 min;		P
	d) reciting the alphabet or an agreed text out loud as if communicating with a colleague for 2 min;		P
	e) walking without head movement or talking for 2 min.		P
	Repeat exercises a) to e) for three of the test subjects with the device switched off, immediately after the test subject has performed the test with the power on, and without removing the facepiece. Ensure that both devices are tested with the power off.		P
7.3.5.12	Record		P
	a) chamber concentration;		P
	b) the concentration in the breathing zone of the device over each exercise period.		P
7.3.5.13	Turn off the test atmosphere and when the test substance has cleared from the chamber remove the test subject.		P
7.3.5.14	Record the subjective assessment by each test subject of misting of the facepiece in "power-on" and, where applicable "power-off" conditions.		P

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Clause	Requirement -test	Result--Remark	Verdict
7.3.5.15	After use by each test subject the device shall be cleaned, disinfected and dried in accordance with the manufacturer's information for use before being used for its next inward leakage test.		P
7.3.6	Test using sulfur hexafluoride as test substance		P
7.3.6.1	Apparatus		P
	The general arrangement is shown in Figure 2a).		P
7.3.6.1.1	Test substance: sulfur hexafluoride		P
	It is recommended that a test atmosphere concentration between 0,1 % and 1 % by volume should be used. With appropriate instruments accurate determinations of leakage are possible within the range from 0,01 % to approximately 20 % depending on the test concentration.		P
7.3.6.1.2	Detection means		P
	The concentration of sulfur hexafluoride in the test atmosphere and inside the facepiece of the device is measured and recorded by suitable instruments, ensuring that the response time for the detection system complies with 7.3.4.5.		P
7.3.6.2	Atmospheric conditions for test		P
	The test is performed at ambient temperature and humidity.		P
7.3.6.3	Procedure		P
	The procedure specified in 7.3.5 shall be used.		P
7.3.6.4	Calculation of inward leakage		P
	The leakage (P) is calculated from measurements of concentration in the facepiece made over the last 100 s of each of the exercise periods, to avoid carry over results from one exercise to the other.		P
	The value of P, expressed as a percentage, is calculated from the following equation: $P(\%) = \frac{C_2}{C_1} \times 100$		P
7.3.7	Test using sodium chloride as test substance		P
7.3.7.1	Apparatus		P
	The general arrangement is shown in Figure 2b).		P
7.3.7.1.1	Aerosol generator		P

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Clause	Requirement -test	Result--Remark	Verdict
	The sodium chloride aerosol is generated from a 2 % solution of reagent grade sodium chloride in distilled water. A single large Collison atomizer is used, which requires an air flow rate of 100 l/min at a pressure of 7 bar. The atomizer and its housing are fitted into a duct through which a constant flow of air is maintained. It may be necessary to heat or dehumidify the air in order to obtain complete drying of the aerosol particles.		P
	The mean sodium chloride concentration within the enclosure shall be (8 ± 4) mg/m3 and the variation throughout the effective working volume shall not be more than 10 %. The particle size distribution shall be 0,02 um to 2 um equivalent aerodynamic diameter with a mass median diameter of 0,6 um.		P
7.3.7.1.2	Flame photometer		P
	A flame photometer is used to measure the concentration of sodium chloride inside the facepiece. Essential performance characteristics for a suitable instrument are as follows:		P
	a) it shall be specifically designed for the direct analysis of sodium chloride aerosol;		P
	b) it shall be capable of measuring concentrations of NaCl aerosol between 15 mg/m3 and 5 ng/m3;		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;		P
	e) the response to other elements has to be reduced. This applies particularly to carbon, the concentration of which will vary during the breathing cycle. This reduced response can 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
7.3.7.1.3	Sample tubes and pumps		P
	Sample tubes are of plastics tubing with a nominal inside diameter of 4 mm through which air is drawn by means of a pump. If no pump is incorporated into the photometer an adjustable flow pump is used to withdraw an air sample. Dependent on the type of photometer it can be necessary to dilute the sample with clean air. The pump shall be such that aerosol losses are minimized within the pump and changes in flow rate caused by changing pressure within the sampling zone are also minimized.		P

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Clause	Requirement -test	Result--Remark	Verdict
	Two separate sample tubes are needed, one to measure the concentration of test substance in the enclosure and one to measure the concentration in the wearer's breathing zone. A further tube is fitted to the apparatus under test in order to allow the pressure variation inside the facepiece to actuate a changeover valve.		P
7.3.7.1.4	Switching system		P
	A system is required which will switch the sample to the photometer only during the inhalation phase of the respiratory cycle. During the exhalation phase clean air is fed to the photometer. The essential elements of such a system are:		P
	a) an electrically operated valve with a response time of the order of 100 ms. 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 approximately 0,02 mbar and which can be connected to a probe inserted in the breathing zone under the facepiece. The sensor has an adjustable threshold and is capable of differential signalling when the threshold is crossed in either direction. The sensor shall work reliably when subjected to the accelerations produced by the head movements of the subjects;		P
	c) an interfacing system to actuate the valve in response to a signal from the pressure sensor;		P
	d) a timing device to record the proportion of the total respiratory cycle during which sampling takes place.		P
7.3.7.2	Atmospheric conditions for test		P
	The test shall be performed at ambient temperature and a relative humidity of not greater than 60 %, in the enclosure when the atomizer is operating.		P
7.3.7.3	Test procedure		P
7.3.7.3.1	General		P
	Where sodium chloride is used as the test substance a pulsed sampling measurement system shall be employed (see Table 6). This requires an additional step in the common procedure 7.3.5 as follows:		P
	The test subject, wearing the device with power on, shall stop breathing, so that the reading of the pressure inside the facepiece can be taken. The switching level for the changeover valve shall be adjusted approximately 0,02 mbar below this reading (depending on the circumstances) so that sampling can be performed during the inhalation phase.		p

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Clause	Requirement -test	Result--Remark	Verdict
	These adjustments shall be made after the test subject has fitted the device.		P
7.3.7.3.2	Total inward leakage (TIL)		P
	The test procedure as specified in 7.3.5 shall be used.		P
7.3.7.3.3	Inward leakage excluding filter penetration (IL)		P
	The test procedure as specified in 7.3.5 shall be used but with breathable air free of test substance being supplied to the device.		P
7.3.7.3.4	Inward leakage excluding filter penetration (IL) using a TIL-method with high efficiency surrogate particle filters		P
	The test procedure as specified in 7.3.5 shall be used but with the filters of the device replaced by high efficiency particle filters with penetration values against sodium chloride of less than 0,01 % when tested in accordance with prEN 143. These filters preferably shall be such as are provided to be used with the device.		P
	The penetration value(s) of the filter(s) used shall be recorded in the report.		P
7.3.7.4	Calculation of inward leakage		P
	The inward leakage P is calculated from measurements of C1 and C2. The measured mean concentration for each exercise (C2) is the mean of measurements of concentration in the facepiece made over the last 100 s of each of the exercise periods to avoid carry over of results from one exercise to the other.		P
	The value of P, expressed as a percentage, is calculated from the equation: $$P(\%) = \frac{C_2}{C_1} \times \left(\frac{t_{IN} + t_{EX}}{t_{IN}} \right) \times 100$$		P
7.4	Practical performance test		P
7.4.1	Principle		P
	Test subjects wearing the device carry out activities in simulation of practical use. The test subjects are then asked to assess subjectively the device for ease of use.		P
7.4.2	Test subjects		P
	Two test subjects are used the medical history of whom is known to be satisfactory. The necessity of a medical examination before, and supervision during, the tests is decided by the test officer.		P
7.4.3	Test conditions		P

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Clause	Requirement -test	Result--Remark	Verdict
	The test is carried out in an atmosphere of (20 ± 5) ° C and relative humidity of (60 ± 15) %. The noise level in the area shall be not greater than 75 dBA. The actual conditions shall be recorded.		P
7.4.4	Procedure		P
	Two devices shall be used in the test each fitted with fully charged battery(s) and clean filter(s).		P
	Each test subject is asked to use the device in accordance with the manufacturer's information supplied by the manufacturer and the following sequence of activities shall be carried out in a total time of 30 min.		P
	The order in which the activities are done is at the discretion of the test officer.		P
	a) walking on the level at a regular rate of 6 km/h for 10 min;		P
	b) walking on the level with headroom of (1,3 ± 0,2) m for 5 min;		P
	c) crawling on the level with headroom of (0,70 ± 0,05) m for 5 min;		P
	d) filling a small basket with suitable 12 mm chippings 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 chippings can be returned. The test subject stoops or kneels as desired and fills the basket with chippings. The test subject then lifts the basket and empties its contents back into the hopper.		P
	The procedure is repeated 20 times in 10 min.		P
	The test subject then removes the device and the procedure is repeated for the other test subject wearing the other device.		P
7.4.5	Test report		P
	After completing the procedure, each test subject is asked to comment on the following:		P
	a) head harness comfort;		P
	b) harness or belt comfort;		P
	c) ease of donning and doffing;		P
	d) security of fastenings and couplings;		P
	e) accessibility of any controls fitted;		P
	f) clarity and field of vision including misting;		P
	g) speech transmission (including hearing);		P

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Clause	Requirement -test	Result--Remark	Verdict
	h) the balance of the device in use;		P
	i) any inadvertent operation of the “on–off” switch or of any means of changing flow rate or classification;		P
	j) whether the flow rate and distribution of air cause any stress or discomfort;		P
	k) ease of operation of the checking facilities;		P
	l) freedom of head movement with respect to breathing hose, if fitted;		P
	m) any other aspect on which the wearer may wish to comment.		P
7.5	Carbon dioxide content of the inhalation air (dead space)		P
7.5.1	Principle		P
	The device is fitted to a Sheffield dummy head connected to a breathing machine, and operated at the manufacturer’s minimum design condition and with the power off. The inhaled air is analysed for carbon dioxide content.		P
7.5.2	Test equipment		P
	A typical test arrangement using a single cylinder breathing machine is shown in Figure 3.		P
7.5.2.1	Breathing machine, and associated equipment with solenoid valves controlled by the lung.		P
7.5.2.2	Auxiliary lung.		P
7.5.2.3	Sheffield head.		P
7.5.2.4	Carbon dioxide flowmeter, analysers and absorber		P
	The carbon dioxide absorber is necessary to prevent build up of carbon dioxide in the test equipment circuit.		P
7.5.3	Procedure		P
	Measure the carbon dioxide concentration in the sample by means of the analyser. Continue the test until a steady value is obtained. Record this value as the uncorrected level of carbon dioxide in the inhaled air.		P
	Measure the ambient carbon dioxide level 1 m in front of and level with the tip of the nose of the dummy head. Take the measurement once a stabilized level for carbon dioxide in the inhalation air has been attained. Alternatively, measure the ambient level at the inhalation sampling tube with carbon dioxide supply turned off. The reference level shall be below 0,1 %.		P
	Subtract the laboratory ambient carbon dioxide level from the measured value in the air and record this as the corrected carbon dioxide content of the inhaled air.		P

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Clause	Requirement -test	Result--Remark	Verdict
7.5.4	Report		P
	Report the carbon dioxide content of the inhaled air sample when a steady value has been obtained with the power to the device both “on” and “off”.		P
7.6	Breathing resistance		P
7.6.1	Inhalation resistance with power switched off		P
	The device fitted with clean filters shall be mounted on a Sheffield dummy head attached to a breathing machine adjusted to 20 cycles/min and 1,5 l/stroke or 95 l/min continuous flow. The peak inhalation resistance shall be measured near the mouth of the dummy head.		P
7.6.2	Inhalation resistance with power switched on		P
	The device shall be fitted on a Sheffield dummy head and operated at the manufacturer’s minimum design condition. The peak inhalation resistance shall be measured near the mouth of the dummy head attached to a breathing machine adjusted to 25 cycles/min and 2,0 l/stroke.		P
7.6.3	Exhalation resistance with power switched on		P
	The device shall be fitted on a Sheffield dummy head and operated according to the information supplied by the manufacturer, with fully charged batteries and clean filters. The exhalation resistance shall be measured near the mouth of the dummy head attached to a breathing machine adjusted to 25 cycles/min and 2,0 l/stroke. The peak exhalation resistance shall be measured at each of the orientations of the head defined as follows: looking ahead, vertically upwards, with the facepiece vertically downwards and then, with the normally vertical axis of the head horizontal, with the facepiece looking to the right and to the left.		P
7.6.4	Inhalation resistance after clogging		P
	The tests in 7.6.1 and 7.6.2 shall be repeated, but with the device in its current condition after the clogging test in 7.9.		P
7.7	Manufacturer’s minimum design duration		P
7.7.1	Principle		P
	The device is fitted to a Sheffield dummy head and connected to a breathing machine running at a specified setting. The device is switched on and the manufacturer’s minimum design condition (as specified by the manufacturer) is monitored at intervals to confirm the manufacturer’s design duration.		P

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Clause	Requirement -test	Result--Remark	Verdict
7.7.2	Apparatus		P
7.7.2.1	As appropriate, test equipment to measure the manufacturer's minimum design condition. The manufacturer has to provide details of the minimum design condition and details of how the condition should be checked prior to each use. It is not therefore possible to list in detail all test equipment that might be needed for this test.		P
7.7.2.2	A Sheffield dummy head, fitted with mouth tube and pressure port.		P
7.7.2.3	A breathing machine, capable of 20 cycles/min and 1,5 l/stroke sinusoidal breathing pattern.		P
7.7.2.4	Tubing for all connections.		P
7.7.3	Preparation of the device		P
	Fit a fully charged battery charged according to the manufacturer's information and clean filter(s) to the device.		P
7.7.4	Procedure		P
	Fit the facepiece to the dummy head so that it is leaktight. Check that the manufacturer's minimum design condition is exceeded at the start and for the manufacturer's stated duration. Report the pass or failure of the device with the values of the design condition measured and manufacturer's minimum design condition limit value.		P
7.8	Air supply flow rate		P
7.8.1	Principle		P
	The flow of filtered air from the device is measured at zero back pressure. The initial flow rate and the flow rate after continuous running for the manufacturer's stated design duration are measured.		P
7.8.2	Test equipment		P
7.8.2.1	A Sheffield dummy head, fitted with mouth tube and pressure port at the mouth.		P
7.8.2.2	A blower or suction device or other means of extracting at least 250 l/min of air at p5 mbar pressure.		P
7.8.2.3	Control means for blower or suction device, such as a variable power regulator for the motor or an adjustable bleed in the air supply pipework.		P
7.8.2.4	Suitable flowmeter(s), e.g. calibrated from 50 l/min to 500 l/min.		P
7.8.2.5	Micromanometer, capable of detecting a pressure difference of ±0,05 mbar and with a range of not less than 10 mbar.		P

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Clause	Requirement -test	Result--Remark	Verdict
	An inclined liquid manometer or an electronic micromanometer is recommended.		P
7.8.2.6	Tubing for connections.		P
7.8.3	Preparation of device		P
7.8.3.1	General		P
	Fit a fully charged battery and clean filter(s) to the device.		P
	In order to ensure a fully charged battery the following method is recommended. Operate the device normally until there is an audible decrease in air flow. Switch off the device and place the battery on charge according to the manufacturer's information.		P
7.8.3.2	Fitting to dummy head		P
	Fit the device in a leaktight manner to the dummy head and connect the micromanometer, flowmeter and suction device as outlined in Figure 4a) or Figure 4b) as appropriate.		P
7.8.4	Procedure: initial flow rate		P
7.8.4.1	Switch on the device and adjust the suction means until the micromanometer indicates zero back pressure.		P
	Record the flow from the facepiece.		P
7.8.4.2	Continue to ensure zero back pressure and repeat the flow measurement at intervals of 5 min until a total time of 30 min has elapsed.		P
7.8.4.3	Calculate the average of the seven flow measurements and report as the initial flow rate.		P
7.8.5	Procedure: design duration		P
	After measuring the initial flow rate as described in 7.8.4, disconnect the hose from the dummy head and close off the mouth tube so that all the filtered air now escapes via the exhalation valve.		P
	Allow the device to run for 1 h less than the manufacturer's claimed duration and then unseal the mouth tube and reconnect the rubber hose.		P
	Measure and record the flow rate as described in 7.8.4 at a total elapsed time (including the first 30 min for initial flow rate measurement) equal to the manufacturer's claimed duration.		P
	Report the flow rate at the manufacturer's claimed duration.		P
7.9	Clogging		P

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Clause	Requirement -test	Result--Remark	Verdict
	The test equipment and the test atmosphere shall be that described in prEN 143:1997 with the following modifications. The air inlet to the device shall be in the test atmosphere. The complete device fitted with a fully charged battery and clean filter(s) shall be tested on a Sheffield dummy head connected to a breathing machine running at 30 l/min (20 cycles /min and 1,5 l/stroke, sinusoidal breathing pattern). Operate the device in a dust concentration of (400 ± 100) mg/m3 until the product of dust concentration and the testing time is:		P
	a) Particle filter only		N
	b) Gas filter only		N
	c) Combined filters		P
	d) Special filters		N
7.10	Resistance to collapse of breathing hose		P
7.10.1	Apparatus		P
	Two circular plates (100 ± 1) mm in diameter and thickness at least 10 mm. One plate is fixed and the other is capable of moving at right angles to the plane of the plates. The moving plate is capable of being loaded to ensure a total force of 50 N can be applied between the plates (see Figure 5).		P
7.10.2	Procedure		P
	Set the device at the manufacturer's minimum design condition and place the breathing hose between the two plates centrally and carry out the relevant test to measure the peak inhalation resistance in accordance with 7.6.2. Apply the test force of 50 N (which includes the weight of the movable plate) to the hose and again carry out the relevant test to measure the peak inhalation resistance in accordance with 7.6.2. Where more than one breathing hose is fitted to the device, each hose shall be assessed for collapse with a test force of 50 N simultaneously.		P
	Report peak inhalation resistances and the difference between them.		P
7.11	Strength of hose and couplings		P
	The breathing hose and couplings are suspended and the appropriate force (see Table 2) is applied for 10 s to the free end. Where multiple hoses are fitted to the device, apply the appropriate load to each hose.		P
7.12	Interactive flow rate		P
7.12.1	General		P

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Clause	Requirement -test	Result--Remark	Verdict
	The measurement of the interactive flow rate is necessary when the particle filter efficiency or the protection capacity of gas filters used with power-assisted filtering devices can be tested separately at constant flow rates.		P
	The peak of the interactive air flow rate (Qp) is the air flow into the filter(s) when a complete device fitted on a Sheffield dummy head is subject to either a constant withdrawal of air at 95 l/min or at the peak air flow rate of a breathing machine set to 30 l/min (20 cycles/min, 1,5 l/stroke).		P
	The average of the interactive air flow rate (QA) is the average air flow into the filter(s) when a complete device fitted on a Sheffield dummy head is subjected to a breathing machine set to 30 l/min (20 cycles/min, 1,5 l/stroke).		P
	Values of Qp and QA can be calculated by using the air flow pressure characteristic of a filter: $Q = a \times (\Delta P)^b$		P
7.12.2	Apparatus		P
7.12.2.1	Breathing machine.		P
7.12.2.2	Pressure transducer and recorder.		P
7.12.2.3	Sheffield dummy head.		P
7.12.2.4	Air flowmeter(s), to measure 20 l/min to 180 l/min.		P
7.12.2.5	Air pump, capable of withdrawing at least 180 l/min.		P
7.12.2.6	Valves, tubing and connectors.		P
7.12.3	Method		P
7.12.3.1	To obtain values of a and b mount the device in a leaktight manner (by sealing) on the Sheffield dummy head.		P
	Connect the dummy head to the pump through a valve and air flowmeter [!see Figure 6, detail a)"]. Measure the pressure drop (ΔP) across the filter at a range of air flow rates between 0 l/min and 180 l/min.		P
	From the values of pressure drop (△P), and flow rate (Q) calculate the values of a and b in equation (2).		P
7.12.3.2	To measure average interactive flow rate mount the device in a leaktight manner (by sealing) on the Sheffield dummy head and connect the dummy head to the breathing machine set at 30 l/min (20 cycles/min, 1,5 l/stroke) [see Figure 6, detail b)].		P

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Clause	Requirement -test	Result--Remark	Verdict
	Switch on the breathing machine and the device.		P
	Record the variation of differential static pressure between the filter and atmospheric pressure.		P
7.12.3.3	Taking into account only the △P values with the sign corresponding to an air flow into the filter [for the device in Figure 6, detail b) this corresponds to △P ≤0] calculate the time average of ｜△P ｜b which is (｜△P ｜b).		P
	The average interactive flow rate QA is then given by: $Q_A = a \times (\overline{\mid \Delta P \mid^b})$		P
7.12.3.4	To measure the peak interactive flow rate with the device fitted to the Sheffield head as in 7.12.3.2, and the turbo unit switched on read the maximum instantaneous pressure drop (△Ppeak) when the breathing machine is at the maximum inhalation point of the breathing cycle.		P
	Calculate the peak of the interactive flow rate (Qp) from: $Q_A = a \times \mid \Delta P_{PEAK} \mid^b$		P
7.12.3.5	Alternatively replace the breathing machine by a pump removing air at a constant air flow rate of 95 l/min [see Figure 6, detail c)]. Measure the pressure drop as △Ppeak and calculate Qp from equation (4).		P
	It is recommended that a computer data acquisition and analysis system is used in the measurements of △P to calculate the value in real time.		P
7.13	Mechanical strength of filters		P
7.13.1	Test equipment		P
7.13.1.1	The apparatus as shown schematically in Figure 7, 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 on to a steel plate (P) under its own mass as the cam rotates. The mass of the steel case shall be over 10 kg, and the base of the equipment should weigh at least ten times as much as the case, or should be bolted to the floor.		P
7.13.2	Test procedure		P
	The filters shall be tested as received, removed from their packaging but still sealed.		P
	The test rig is operated at the rate of approximately 100 rotations per minute for approximately 20 min and a total of 2 000 rotations.		P

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Clause	Requirement -test	Result--Remark	Verdict
	The filters shall be placed on their sides in the steel case (K) so that they do not touch each other during the test, allowing 6 mm horizontal movement and free vertical movement. After the test any loose material that may have been released from the filter shall be removed prior to performance testing.		P
7.14	Filters		P
7.14.1	General		P
	When a single filter of a multiple filter device is tested separately the air flow specified for a test shall be proportioned equally. The air flow specified for particle filters is the peak of the interactive flow rate as defined in 7.12.3.4 and for gas filters the average interactive flow rate as defined in 7.12.3.2. If, however, the single filter is intended to be used alone, then the full air flow shall be used for testing. This is the test flow rate.		P
	For each test aerosol or test gas, two filters shall be tested after conditioning in accordance with 7.13 only and two in accordance with the conditions specified in 6.2, still in their packaging or seal, and then in accordance with 7.13.		P
7.14.2	Particle filter efficiency		P
	Filters suitable for use against solid and liquid aerosols shall be tested against sodium chloride and paraffin oil.		P
	Filters suitable only for use against solid aerosols and water-based aerosols shall be tested against sodium chloride only.		P
	Filters shall be tested using the test methods described in prEN 143:1997 after conditioning in accordance with 7.14.1 and tested at the appropriate flow rate as defined in 7.14.1. Where the paraffin oil test is used the aerosol concentration shall be (20 ± 10) mg/m3.		P
7.14.3	Protection capacity of gas filters, special filters, AX filters, SX filters and combined filters		P
7.14.3.1	General		P
	All performance tests shall be conducted so that the test gas or air will pass through the filter horizontally.		P
	If the gas filter is combined with a particle filter, the combined filter shall be submitted for the penetration test for the particle filter as described in 7.14.2 in addition to the relevant gas tests described in 7.14.3.2, 7.14.3.3, 7.14.3.4 and 7.14.3.5.		P

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Clause	Requirement -test	Result--Remark	Verdict
	Protection capacity (minimum breakthrough time) is measured at the appropriate flow rate defined in 7.14.1 and at (70 ± 2) % relative humidity at (20 ± 1) ° C under the conditions given in Table 7, Table 8 and Table 9 or 7.14.3.5.		P
7.14.3.2	Protection capacity of A, B, E and K filters		P
	Any convenient experimental method may be employed for obtaining the specified influent concentration, and for measuring the effluent concentration, provided they conform to the following limits:		P
	a) influent concentration: within ±10 % of specified value;		P
	b) effluent concentration: within ±20 % of specified value.		P
	The recorded breakthrough time shall be adjusted if necessary by simple proportion to conform with the specified influent concentration.		P
7.14.3.3	Protection capacity of special filters		P
	Special filters shall be tested under conditions given in Table 9.		P
7.14.3.4	Protection capacity of AX filters		P
	AX filters shall be tested under the conditions given in Table 10.		P
7.14.3.5	Protection capacity of SX filters		P
	Protection capacity (sorption and desorption) of SX filters shall be assessed using the following procedures:		P
	a) Sorption		P
	Use as test gas/gases those against which the filters are intended to give protection.		P
	The test gas concentration shall be 0,5 % by volume.		P
	The breakthrough concentration shall be 5 ml/m3 .		P
	b) Desorption		P
	Load the filters with the test gas for 10 min under the same conditions as for the sorption test.		P
	After dosing, the filters shall be sealed and stored at approximately 20 ° C for a period of (3 ± 1) days.		P
	After storage pass clean air, at the appropriate test flow rate as specified in 7.14.1, at (20 ± 1) ° C and (70 ± 2) % RH through the filter for a period of 2 h. The concentration of the test gas in the effluent air shall be monitored during the desorption test.		P
7.15	Resistance to flame		P

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Clause	Requirement -test	Result--Remark	Verdict
7.15.1	Principle		P
	The facepiece or other component of the device is mounted either on a dummy head (facepiece) or in a suitable manner on a rotating support arm and passed through a flame and the effects of the flame on the device observed.		P
7.15.2	Apparatus		P
7.15.2.1	A dummy head mounted on a support which enables it to be rotated to describe a horizontal circle (see Figure 8). A facility to enable attachment of any other parts of the device to the rotating support.		P
7.15.2.2	Gas supply rig consisting of a propane storage tank with flow control valve and pressure gauge, flashback arrester and a propane burner. The burner shall be adjustable in height.		P
	A “TEKLU” burner or that described in EN ISO 6941:1995 has been found suitable.1)		P
7.15.2.3	A mineral insulated thermocouple probe of 1,5 mm diameter.		P
7.15.3	Procedure		P
7.15.3.1	Facepiece		P
	Fit the device to the dummy head and ensure that a speed of rotation of (60 ± 6) mm/s can be obtained.		P
7.15.3.2	Other components		P
	Fit the component to the support arm at such a radius that a speed of rotation of (60 ± 6) mm/s can be obtained.		P
7.15.3.3	Rotate the head and device or component so that it is over the burner. Adjust the position of the burner such that the distance between the top of the burner and the lowest part of the device which is to pass through the flame is (20 ± 2) mm. Rotate the head away from the burner.		P
	Ignite the gas at the burner. Ensure that the burner air vent is fully closed and adjust the flow control valve to give a flame height of approximately (40 ± 4) mm above the burner top. These settings shall be adjusted to give a flame temperature of (800 ± 50) ° C at a point (20 ± 2) mm above the burner top.		P
	Pass the device or component once through the flame at the set speed of (60 ± 6) mm/s.		P
	Repeat the test to enable an assessment to be made of all materials on the exterior of the device. Any one component shall be passed through the flame once only.		P

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Clause	Requirement -test	Result--Remark	Verdict
7.15.4	Assessment and test report		P
	Examine the device or component after it has passed through the flame and report whether it continues to burn.		P
7.16	Noise level		N
7.16.1	Principle		N
	The device is worn by a test subject and the noise level in dBA measured at the test subject's ears.		N
7.16.2	Apparatus		N
7.16.2.1	Microphones, capable of being fitted at the test subject's ears.		N
7.16.2.2	Sound level meter, of type 1 or 2 as specified in EN 60651.		N
7.16.3	Procedure		N
7.16.3.1	Calibrate the sound level meter in accordance with the manufacturer's information.		N
7.16.3.2	Ensure that the device to be tested is equipped with a fully charged battery and one of the filter types designed to be used with the device.		N
7.16.3.3	Fix the microphones to the test subject at the centres of each of the external ears and level with the tragions.		N
7.16.3.4	Have the test subject don the device.		N
7.16.3.5	Switch on the power supply on the device and measure, in succession, the sound pressure level at each of the two ears with the sound level meter set to indicate "A" weighting frequency characteristics.		N
7.16.3.6	Check that the background noise level in the test room is not less than 10 dBA lower than that measured for the device and adjust the background level as necessary to meet this condition.		N
7.16.3.7	Report the higher of the results from the two ears as the noise generated by the device as experienced by the wearer.		N
7.16.3.8	Repeat the procedure for the complete set of filter types designed to be used with the device.		N
8	Markingp		P
8.1	General		P
	Sub-assemblies and piece parts with considerable bearing on safety shall be marked so that they can be identified.		P
8.2	Facepiece		P

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Clause	Requirement -test	Result--Remark	Verdict
	The facepiece shall be marked with the following information:		P
	a) the name, trademark or other means of identification of the manufacturer;		P
	b) the size, if more than one is available;		P
	c) type-identifying mark;		P
	d) year of manufacture.		P
8.3	Turbo unit and battery casing (if separate from the blower)		P
	Each shall be marked with the following information:		P
	a) the name, trademark or other means of identification of the manufacturer;		P
	b) type identifying mark;		
	c) if appropriate, an indication that the device is intrinsically safe for use in explosive atmospheres and reference to EN 50020:1994;		P
	d) the year of manufacture;		P
	e) the number of this European Standard;		P
	f) the sentence “See information supplied by the manufacturer” in the official language(s) of the country of destination, or appropriate pictogram.		P
8.4	Filters		P
8.4.1	General		P
8.4.1.1	All filters except unencapsulated filters shall be marked with:		P
	a) the appropriate filter type and colour code		P
	b) the number of this European Standard;		P
	c) the year and month of expiry of shelf life or equivalent;		P
	d) the manufacturer’s name, trade mark or other means of identification;		P
	e) the sentence “See information supplied by the manufacturer” in the official language(s) of the country of destination or the appropriate pictogram;		P
	f) type identifying mark.		P
8.4.1.2	Unencapsulated filters shall be marked with:		P
	a) the appropriate filter type;		P
	b) type identifying mark;		P

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Clause	Requirement -test	Result--Remark	Verdict
	c) all other information specified in 8.4.1.1 shall be included in or on the smallest packages		P
8.4.2	Particle filters		P
	All particle filters shall be marked as follows:		P
	Filters which do not pass the paraffin oil test shall be clearly marked with either “For use against solid and water based aerosols only” or “S”. If only the “S” appears on the filters then the words “For use against solid and water based aerosols only” shall be included in or on the smallest packages. All other particle filters shall be marked with the letters “SL”.		P
8.4.3	Gas and combined filters		P
	a) All AX filters shall be marked “For single use only”.		P
	b) All SX filters shall be marked with the name(s) of the chemicals against which the filter has been tested.		P
	c) All NOP filters shall be marked “For single use only”.		P
	d) All HgP filters shall be marked with the sentence “Maximum use time 50 h”.		P
8.4.4	Combined filters		P
	Combined filters shall be marked as specified in 8.4.1, 8.4.2 and 8.4.3 as appropriate.		P
8.5	Filter or filter package if not already on the filter		P
	The filter or the filter package shall be marked with the following information, unless it is already on the filter:		P
	a) the appropriate filter type and colour code as given in 8.4.1, 8.4.2, 8.4.3 or 8.4.4;		P
	b) the number of this European Standard;		P
	c) the year and month of expiry of shelf life or equivalent;		P
	d) the manufacturer’s name, trademark or other means of identification;		P
	e) the sentence “See information supplied by the manufacturer” in the official language(s) of the country of destination, or the appropriate pictogram;		P
	f) type identifying mark;		P
	g) the manufacturer’s recommended conditions of storage (at least the temperature and humidity).		P
	The information specified in c), f) and g) shall be visible without opening the package		P
8.6	All packages		P

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Clause	Requirement -test	Result--Remark	Verdict
	All packages shall be marked with the following or it shall be visible without opening the packages:		P
	a) the manufacturer's recommended conditions of storage (at least the temperature and humidity);		P
	b) the sentence "See information supplied by the manufacturer" in the official language(s) of the country of destination, or the appropriate pictogram;		P
	c) an indication of the contents.		P
9	Information supplied by the manufacturer		P
9.1	Complete device		P
9.1.1	Information in the official language(s) of the country of destination shall accompany every device on delivery, enabling trained and qualified persons to use it.		P
	It is suggested that detailed maintenance and storage recommendations should be made available separately from the information supplied by the manufacturer.		P
	9.1.2 The information shall comprise the range of application, instructions concerning correct fitting, care, maintenance, battery charging and storage. This shall include the range of operating and storage temperatures and humidities. Attention shall be drawn to possible incorrect use and, where appropriate, the possibility of looped hoses and/or cables becoming caught up.		P
9.1.3	The information shall describe precisely and comprehensibly which permissible combinations of components are to be used for a specific type and class of device.		P
	The information shall in addition give detailed advice on the use and replacement of filters.		P
9.1.4	A warning shall be given that the power-off state is considered to be an abnormal situation.		P
9.1.5	Attention should be drawn to the fact that if the device is permissible for use in an explosive atmosphere it is marked as such.		P
9.1.6	The information shall state the manufacturer's claimed duration and the minimum design condition, and include details of how the condition shall be checked prior to each use.		P
9.1.7	The information shall describe a method for confirming the correct functioning of the checking device specified in 6.7.		P

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Clause	Requirement -test	Result--Remark	Verdict
9.1.7	The information shall describe a method for confirming the correct functioning of the checking device specified in 6.7.		P
9.1.8	A warning that the device is unsuitable for use in oxygen deficient atmospheres.		P
9.1.9	A warning that the user shall not confuse the markings on a filter relating to any European Standard other than EN 12942 with the classification of this device when used with this filter.		P
9.2	Filters		P
	The information given in 9.1.3 and information on application, fitting, care, range of storage conditions (at least temperature and humidity) and possible incorrect use shall be included in the smallest commercially available package.		P

EUT Photos

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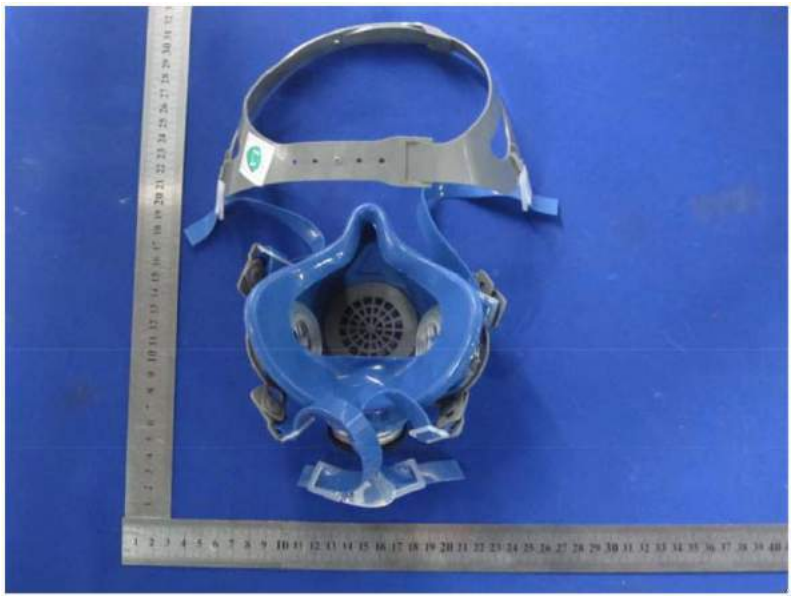

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