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Draft Indian Standard

RESPIRATORY PROTECTIVE DEVICES – FULL FACE MASKS – SPECIFICATION

(First Revision of IS 14166)

(ICS 13.340.30)

Occupational Safety and Health Sectional
Committee, CHD 8

Last Date for Comments : 20th May 2024

Occupational Safety and Health Sectional Committee, CHD 8

FOREWORD

(Formal clause shall be added later)

A full face mask is a facepiece which covers the eyes, nose, mouth and chin and provides adequate sealing on the face of the wearer of a respiratory protective device against the ambient atmosphere, when the skin is dry or moist, when the head is moved and when the wearer is speaking. Air enters the full face mask through the facepiece connector(s) and passes either directly through the nose and mouth area if there is an inner mask around mouth and nose or via the eye (visor) area of the full face mask. An inner mask may be used to separate the nose and mouth from the eye (visor) area(s) of the full face mask.

The exhaled air flows back either through the facepiece connector into the breathing apparatus (closed circuit breathing apparatus, pendulum breathing) or directly to the ambient atmosphere via the exhalation valve(s) (open circuit breathing apparatus), or by other appropriate means in other types of respiratory protective devices.

A given respiratory protective device is considered to be conforming to this standard when the individual components satisfy the requirements of this standard and practical performance tests have been carried out on complete apparatus. If for any reason a complete apparatus is not tested then simulation of the apparatus is permitted provided the respiratory characteristics and weight distribution are similar to those of the complete apparatus.

This standard covers full face masks for respiratory protective devices, except escape apparatus and diving apparatus. It specifies requirements for full face masks which are used as a part of respiratory protective devices.

The original standard was published in 1994 in line with EN 136 : 1989 'Respiratory protective devices; full-face masks; requirements, testing and marking' published by the European Committee for Standardization (CEN).

This first revision has been carried out to incorporate latest technological developments and international practices. Significant assistance has been derived from the revised EN 136 : 1998 for the revision of this standard.

In this first revision, the following major changes have been made:

- a) Escape application for full face mask is included;
- b) Classification (class 1, 2, and 3) introduced based on area of application;
- c) Tolerances for specified requirements defined and testing conditions specified;
- d) Materials requirement specific for class 2 and class 3;
- e) Test method for differential pressure testing of speech diaphragm added;
- f) New parameter introduced – Leak tightness;
- g) Flammability test method is different for different classes;
- h) Strength of head harness requirement different for classes;
- j) Facepiece connector and threading requirements different for classes;
- k) Vision test using apertometer done away with for field of vision;
- m) Tensile force requirement different for different classes;
- n) Breathing resistance requirement different for different classes and threading of mask;
- p) Requirement for resistance to thermal radiation introduced for class 3 masks;
- q) Identification marking given for different classes;
- r) Recommendation introduced for marking of parts and components of full face masks;
- s) Sample conditioning for humid atmospheric conditions, for example, $(70 \pm 3) ^\circ\text{C}$ and 95 percent to 100 percent, RH increased to 72 hours from 12 hours.

It is recommended that reference should be made to IS 9623 for guidance on the type of respiratory protection that should be provided for particular conditions. In addition, care should be taken in the choice of breathing apparatus itself, where such equipment is to be used in very high $(60 \pm 3) ^\circ\text{C}$ or very low $(-30 \pm 3) ^\circ\text{C}$ ambient temperatures and the instructions provided by the suppliers should be carefully noted.

Certain toxic substances which may occur in some atmospheres can be absorbed by the skin. Where these do occur, respiratory protection alone is not sufficient and the whole body should be protected.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance

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with IS 2 : 2022 'Rules for rounding off numerical values (*second revision*). The number of significant places retained in the rounded value should be the same as that of the specified value in this standard.

*Draft Indian Standard***RESPIRATORY PROTECTIVE DEVICES — FULL FACE MASKS
— SPECIFICATION***(First Revision)***1 SCOPE**

This standard prescribes requirements for full face masks for respiratory protective devices and their methods of sampling and test, except diving apparatus.

2 REFERENCES

The standards listed below contain provisions which through reference in this text constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreement based on this Indian Standard are encouraged to investigate the possibility of applying the most recent editions of the Indian Standards indicated below.

3 TERMINOLOGY

For the purpose of this standard the definitions given in IS 8347 and the following shall apply.

3.1 Full face mask — Facepiece which covers the eyes, nose, mouth and chin and provides adequate sealing on the face of the wearer of a respiratory protective device against the ambient atmosphere, when the skin is dry or moist, when the head is moved and when the wearer is speaking.

4 CLASSIFICATION

Three classes of full face masks are described, each providing same level of protection but having differences with respect to areas of application.

Class 1: Full face masks for light duty use

Class 2: Full face masks for general use

Class 3: Full face masks for special use

5 REQUIREMENTS**5.1 Nominal Values and Tolerances**

Values that are not stated as maximum or minimum shall have a tolerance of ± 5 percent. The ambient temperature for testing shall be (27 ± 2) °C, the temperature limits shall have accuracy of ± 1 percent, and the relative humidity shall be (65 ± 5) percent.

5.2 Materials

For class 2 and class 3 full face masks, exposed parts that is those which may be subjected to impact during use of the apparatus shall not be made of aluminium, magnesium, titanium or alloys containing such proportions of these metals as will, on impact, give rise to frictional sparks capable of igniting flammable gas mixtures.

Testing shall be done as per **6.2**.

5.3 Cleaning and Disinfecting

The materials used shall withstand the cleaning and disinfecting agents as recommended by the manufacturer.

Testing shall be done as per **6.3**.

5.4 Finish of Parts

The finish of any part of the full face mask that might come in contact with the wearer shall be free from sharp edges and burrs. Testing shall be done as per **6.2** and **6.5**.

5.5 Speech Diaphragm Assembly

5.5.1 Where the facepiece includes a speech diaphragm the latter shall be protected against mechanical damage as assessed by visual inspection in accordance with **6.2**.

5.5.2 The speech diaphragm shall withstand a differential pressure of 80 m bar (static pressure) with the positive pressure on the outside (ambient atmosphere). Testing shall be done as per **6.2** and **6.4.1**.

5.5.3 When a speech diaphragm assembly can be subjected to an external force it shall withstand axially a tensile force of 150 N applied for 10 seconds. The test shall be repeated 9 times at intervals of 10 seconds. Test shall be done as per **6.2** and **6.4.2**.

5.5.4 After a class 3 full face mask has been subjected to thermal radiation test in accordance with **6.15** and allowed to return to ambient atmosphere, the requirements of **5.5.1**, **5.5.2** and **5.5.3** shall be met. Testing shall be done as per **6.2** and **6.4**.

5.6 Replaceable Components

This requirement applies to class 3 full face masks only.

Unless integral with the full face mask the following components (when fitted) shall be replaceable:

Inner mask, head harness, lens/visor, connector(s), inhalation and exhalation valves, check valves, speech diaphragm, lens wiper.

Testing shall be done as per **6.2**.

5.7 Practical Performance

The full face mask shall meet all laboratory tests except flammability and inward leakage before practical performance testing.

The complete apparatus shall undergo practical performance tests under realistic conditions. These general tests serve the purpose of checking the equipment for imperfections that cannot be determined by the tests described elsewhere in this standard. In addition to the tests described in this standard, details of practical performance tests for breathing apparatus are given in the relevant Indian Standards.

Where practical performance tests show the apparatus has imperfections related to wearer's acceptance the test report shall provide full details of those parts of practical performance tests which revealed these

imperfections. This will enable other testing labs to duplicate the tests and assess the results thereof.

Testing shall be done as per **6.5**.

NOTE – Examples of Indian Standards for breathing apparatus are IS 10245 (Parts 1 to 4), and IS 15803

5.8 Resistance to Temperature

After conditioning in accordance with **6.1** and being allowed to return to room temperature the full face mask shall show no appreciable deformation. Any incorporated threaded connector shall be gauged and shall conform to either IS 14138 (Part 1) or IS 14138 (Part 2). Moreover, for class 3 full face masks, threads shall be gauged and shall conform to either IS 14138 (Part 1) or IS 14138 (Part 2), at the end of conditioning period as per **6.1 (b)**. After the resistance to temperature test the face piece shall be tested for leak tightness and shall meet the requirements of **5.9**.

Testing shall be done as per **6.2, 6.14, 6.6** and **6.7**.

5.9 Leak tightness

5.9.1 The leakage of the full face mask shall not exceed that indicated by a change in pressure of 1 mbar in 1 min, when tested with 10 mbar negative pressure.

Testing shall be done as per **6.6**.

5.9.2 Compatibility with Skin

Materials that may come into contact with the wearer's skin shall not be known to likely cause irritation or any adverse effect to health and the manufacturer of the facepiece shall give a declaration to this effect along with each consignment.

Testing shall be done as per **6.2** and **6.5**.

5.10 Flammability

5.10.1 Class 1 full face masks

Parts of the full face mask that might be exposed to flame during use shall not burn or continue to burn for more than 5 seconds after removal from flame.

Testing shall be done according to **6.2** and **6.13.1**.

5.10.2 Class 2 and 3 full face masks

Parts of the full face mask that might be exposed to flame during use shall not burn or continue to burn for more than 5 seconds after removal from flame.

Testing shall be done according to **6.2** and **6.13.2**.

5.10.3 The masks shall conform to the requirements of leak tightness (**5.9**), both before and after flammability tests as per **6.13.1** and **6.13.2**.

5.11 Resistance to Thermal Radiation

Class 3 full face masks shall be resistant to thermal radiation. Whether a full face mask is resistant to thermal

radiation may be tested in two ways:

- a) If the full face mask conforms to leak tightness (5.9) after a test period of 20 minutes although it may be deformed; or
- b) If the visibility becomes impaired after a test period of ≥ 4 minutes and the face piece still conforms to leak tightness (5.9) when tested after an additional one minute.

The conformity of the test full face mask to leak tightness (5.9) shall be checked before the test. Testing for resistance to thermal radiation shall be done as per 6.15.

5.12 Inward Leakage of Facepiece

A full face mask shall fit against the contours of the face so that when tested in accordance with 6.7 the inward leakage of the test contaminant shall not exceed an average value of 0.05 percent of the inhaled air for any of the ten test subjects in any of the test exercises.

5.13 Carbon dioxide Content of the Inhalation Air

When tested in accordance with 6.8 the carbon dioxide content of the inhaled air (dead space) shall not exceed an average of 1.0 percent (by volume).

5.14 Head Harness

5.14.1 The head harness shall be designed so that the full face mask can be donned and removed easily, when tested in accordance with 6.2 and 6.5.

5.14.2 The head harness shall be adjustable or self-adjusting and shall hold the full face mask firmly and comfortably in position, when tested in accordance with 6.2 and 6.5.

5.14.3 *Strength of harness*

5.14.3.1 For class 1 full face masks each strap of the head harness shall withstand a pull of 100 N applied for 10 seconds in the direction of pulling when the full face mask is donned. Buckles and attachment lugs (if present) shall withstand the same pull. Testing shall be done as per 6.2 and 6.9.1.

5.14.3.2 For class 2 and class 3 full face masks each strap of the head harness shall withstand a pull of 150 N applied for 10 seconds in the direction of pulling when the full face mask is donned. Buckles and attachment lugs (if present) shall withstand the same pull. Testing shall be done as per 6.2 and 6.9.1.

5.14.3.3 Each strap shall not have linear deformation of more than 5 percent after being subjected to pull of 50 N for 10 seconds. Testing shall be done as per 6.9.2.

5.15 Facepiece Connector

The connection between the facepiece and the apparatus may be achieved by a permanent or special type of connection or by a threaded connection. 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. Correct and reliable connection between facepiece and other parts of the equipment shall be ensured.

Testing shall be done as per 6.2, 6.5 and 6.7.

5.15.1 Class 1 full face mask shall not have threaded connection as per IS 14138 (Part 1) or IS 14138(Part 2) when tested as per **6.2**.

5.15.2 Class 2 and class 3 full face masks shall have only one threaded connection as per IS 14138 (Part 1) or IS 14138 (Part 2). If any other connector is used, it shall not be possible to connect it to threads conforming to IS 14138 (Part 1) or IS 14138 (Part 2). Testing shall be done as per **6.2**.

5.15.3 *Strength of connectors*

5.15.3.1 For class 1 full face mask, connection between facepiece and connector shall be able to withstand axially a tensile force of 250 N when tested as per **6.10**.

5.15.3.2 For class 2 and class 3 full face masks, connection between facepiece and connector shall be able to withstand axially a tensile force of 500 N when tested as per **6.10**.

5.15.3.3 Before and after the test for strength of connectors, the face mask shall meet requirements of leak tightness (**5.9**) when tested as per **6.6**.

5.16 **Eyepiece(s) and Visor(s)**

5.16.1 Eyepieces/visors and anti-mist discs designed to serve as visors shall be attached in a reliable and gastight manner to the facepiece when tested as per **6.2**.

5.16.2 Eyepieces/visors shall not distort vision as determined in practical performance tests, when tested in accordance with **6.5**.

5.16.3 The manufacturer shall provide means to reduce misting of the eyepiece(s) or visor(s) so that vision is not interfered with when the apparatus is tested in the practical performance tests in accordance with **6.5**.

Where antifogging compounds are used as intended or specified by the manufacturer, they shall be compatible with the eyes, skin and the components of the facepiece.

5.16.4 The impact resistance of the eyepiece(s) or visor(s) shall be tested in accordance with **6.11**. At the end of the test the facepiece shall not be damaged in any way that may make it ineffective or cause injury to the wearer. The effectiveness shall be determined by testing the face mask for leak tightness as per **6.6** before and after the impact test. The face mask shall meet requirement of leak tightness (**5.9**) both before and after the impact test.

5.17 **Inhalation and Exhalation Valves**

Valve assemblies shall be such that they can be readily maintained and, if intended by the manufacturer, correctly replaced. It shall not be possible to fit an exhalation valve assembly into the inhalation circuit or an inhalation valve assembly into the exhalation circuit.

Inhalation and exhalation valve assemblies, sub-assemblies and piece parts designed to be identical by the manufacturer are acceptable. However, inhalation and exhalation valve assemblies, sub-assemblies and piece parts designed to be different by the manufacturer are acceptable only if precise and comprehensible description is provided in the information supplied by the manufacturer. This information shall also contain illustrations (photographs, drawings etc.) on how to assemble the facepiece correctly. The parts shall be unambiguously described and marked. Means to check correct assembly shall be described.

Testing shall be done as per **6.2**.

5.17.1 *Inhalation Valves*

5.17.1.1 Inhalation valves shall function correctly in all orientations.

5.17.1.2 A full face mask with a centre thread connection as per IS 14138 (Part 2) shall not have an inhalation valve. If standard thread connection as per IS 14138 (Part 1) is used, an inhalation valve shall be incorporated in the full face mask.

5.17.1.3 If a full face mask has to be used with filters, it shall be provided with an inhalation valve, if there is no valve in the filter.

Testing shall be done as per **6.2** and **6.16**.

5.17.2 *Exhalation Valves*

5.17.2.1 Exhalation valve(s) shall function correctly in all orientations. A full face mask with centre thread connection as per IS 14138 (Part 2) shall not have an exhalation valve.

5.17.2.2 A full face mask with a standard thread connection as per IS 14138 (Part 1) and a full face mask belonging to class 1 shall have at least one exhalation valve or other appropriate means to allow the escape of exhaled air and/or excess air.

5.17.2.3 Exhalation valve(s), if fitted, shall be protected against or be resistant to dirt and mechanical damage. They may be shrouded or include any other device that may be necessary to comply to inward leakage requirement (**5.11**).

Exhalation valve(s) shall continue to operate correctly and meet requirements of breathing resistance (**5.18**) after (a) a continuous exhalation flow of 300 l/min, and (b) a negative pressure (static) in the mask of 80 mbar (30 s for each test).

Testing shall be done as per **6.2**, **6.12** and **6.16**.

5.17.3 *Tensile Force*

5.17.3.1 *Class 1 full face masks*

Before and after the test, the full face mask shall meet the requirement of leak tightness (**5.9**).

When the exhalation valve housing is attached to the face blank it shall withstand axially a tensile force of 50 N applied for 10 seconds. The test shall be repeated 9 times at intervals of 10 seconds.

Testing shall be done as per **6.2** and **6.16**.

5.17.3.2 *Class 2 and 3 full face masks*

Before and after the test the full face masks shall meet the requirement of leak tightness (**5.9**).

When the exhalation valve housing is attached to the face blank it shall withstand axially a tensile force of 150 N applied for 10 seconds. The test shall be repeated 9 times at intervals of 10 seconds.

Testing shall be done as per **6.2** and **6.16**.

5.18 Breathing Resistance

When tested in accordance with **6.12**, the breathing resistance of full face mask (except for positive pressure breathing apparatus) shall meet the requirements of **5.17.1** or **5.17.2**.

If the facepiece has a special connection for use only with positive pressure breathing apparatus, its breathing resistance is not assessed separately but as a part of the complete apparatus, which shall meet the requirements of the appropriate standard for breathing apparatus.

5.18.1 Facepieces with connection other than those in **5.17.2** shall meet the requirements given in Table 1.

Table 1 Breathing Resistance

(Clause 5.18.1)

Inhalation resistance, mbar			Exhalation resistance, mbar
30 l/min continuous flow	95 l/min continuous flow	160 l/min continuous flow or 50 l/min sinusoidal (25 cycles/min, 2.0 l/stroke)	160 l/min continuous flow or 50 l/min sinusoidal (25 cycles/min, 2.0 l/stroke)
≤ 0.5	≤ 1.5	≤ 2.5	≤ 3.0

5.18.2 Class 2 and Class 3 full face masks with centre threaded connection as per IS 14138 (Part 2) and without valve(s) shall meet the requirements given in Table 2.

Table 2 Breathing Resistance

(Clause 5.18.2)

Inhalation resistance, mbar	Exhalation resistance, mbar
160 l/min continuous flow or 50 l/min sinusoidal (25 cycles/min, 2.0 l/stroke)	160 l/min continuous flow or 50 l/min sinusoidal (25 cycles/min, 2.0 l/stroke)
≤ 0.6	≤ 0.6

6 Test Methods

6.1 Conditioning

Two full face masks shall be exposed to the following conditions successively:

- Dry atmosphere of $(70 \pm 3) ^\circ\text{C}$ for 72 hours;
- Atmosphere of $(70 \pm 3) ^\circ\text{C}$ at 95 percent to 100 percent relative humidity for 72 hours; and
- Temperature of $(-30 \pm 3) ^\circ\text{C}$ for 24 hours.

It shall be ensured that no thermal shock occurs during conditioning.

6.2 Visual Inspection

All samples are subject to visual inspection. The visual inspection shall be carried out prior to, or during laboratory or practical performance tests.

6.3 Cleaning and Disinfection

All samples that are to be used for inward leakage tests shall be cleaned and disinfected following the instructions of the manufacturer provided with the full face mask. Conformity to inward leakage (5.13) shall be tested as per 6.7 and practical performance shall be tested as per 6.5.

6.4 Speech Diaphragm

6.4.1 Three samples shall be tested as received. Only a sudden change in pressure shall be regarded as significant.

The speech Diaphragm shall withstand a differential pressure of 80 mbar(static pressure)with the positive pressure on the outside (ambient atmosphere).

- Test is applicable if mask used Speech Diaphragm.
- Please dismantle Speech Diaphragm as per manufacturer's instructions, check visually for any sign of Damage during disassembly.
- Use suitable fixture to fit Speech diaphragm (*see* Fig. 1).
- Close Valve 2 (*see* Fig. 1)., Open Valve 1(*see* Fig. 1)., Start pump.
- Adjust Valve 1 to measure 80mbar on differential pressure meter connected to positive port.
- Connect Speech Diaphragm Fixture in front of valve 2.
- Open valve 2, ensure that pressure meter reads 80 mbar for few (5-10) seconds. If pressure is less than 80 mbar, adjust using valve 1.
- Stop the pump.
- Check Speech diaphragm for damage.
- Assemble speech diaphragm in mask with manufacturers instruction, check for proper assembly and proper functioning of mask after assembly.

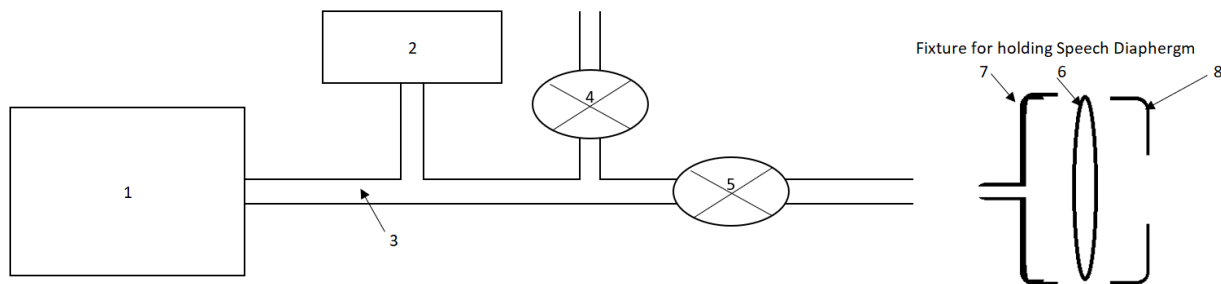


FIG. 1 SCHEMATIC DIAGRAM OF SPEECH DIAPHRAGM

1	Airflow pump	4	On Off Valve 1
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2	Differential Pressure meter	5	On Off Valve 2
3	Flexible tubing (approx. 6 mm)	6	Speech Diaphragm Outer side
7	Connector to hold speech diaphragm with stoper, o-ring and internal threads		
8	Stopper connector with male threads to hold Speech diaphragm leak tight		

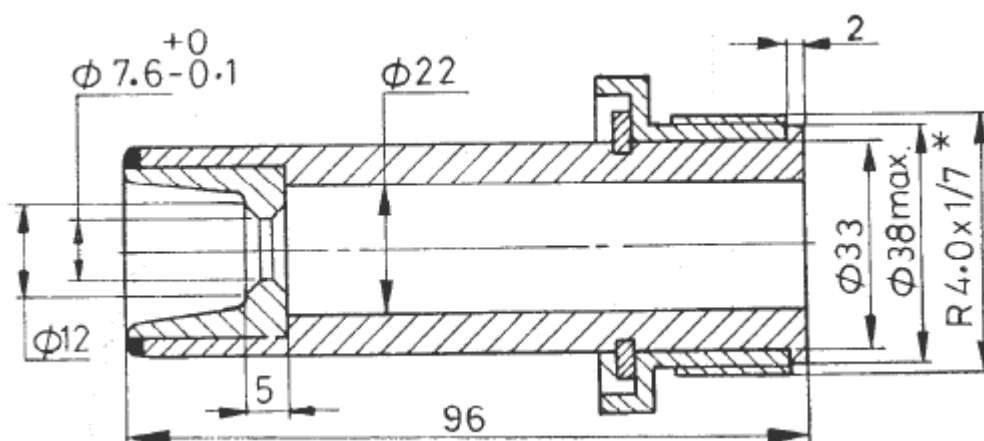
6.4.2 Three samples shall be tested as received.

6.5 Practical Performance Test

6.5.1 General

Two samples shall be tested, both after conditioning in accordance with **6.1**. All tests shall be carried out by two test subjects at ambient temperature. The test temperature and humidity shall be recorded.

During the test, a filter simulator (Fig. 2) shall be fitted to facepiece with standard thread connection as per IS 14138 (Part 1). For other facepieces, a filter or other equipment, normally used with the facepiece shall be fitted.



* See IS 14138 (Part 1)

FIG. 2 FILTER SIMULATOR FOR STANDARD THREAD CONNECTION

6.5.2 The practical performance test shall be carried out and evaluated as per the method prescribed in IS 17274 (Part 7).

6.6 Leak tightness

All sample shall be tested for leak tightness, and also as specified elsewhere in the standard.

The test shall be carried out using a dummy head and a pressure of -10 mbar created in the cavity of the facepiece. During the test the inhalation port shall be sealed and the exhalation valve disc shall be moistened. The pressure shall be measured by usual methods with a least count of 0.1 mbar.

6.7 Inward Leakage

6.7.1 General

6.7.1.1 Two samples shall be tested: one as received, and the other conditioned as per **6.1** but after returning to ambient temperature. Either sodium chloride or sulfur hexafluoride shall be used as the test agent.

Prior to the test it shall be ensured that the full face mask is in good working condition and that it can be used without hazard. For the test, persons shall be selected who are familiar with using such equipment. A panel of 10 clean shaven persons shall be selected covering the spectrum of facial characteristics of typical users (excluding significant abnormalities). In the test report, faces of the ten test persons shall be described by the four facial dimensions as shown in Fig. 3. If more than one size of full face mask is manufactured, test subjects shall select the most appropriate size in accordance with manufacturer's information.

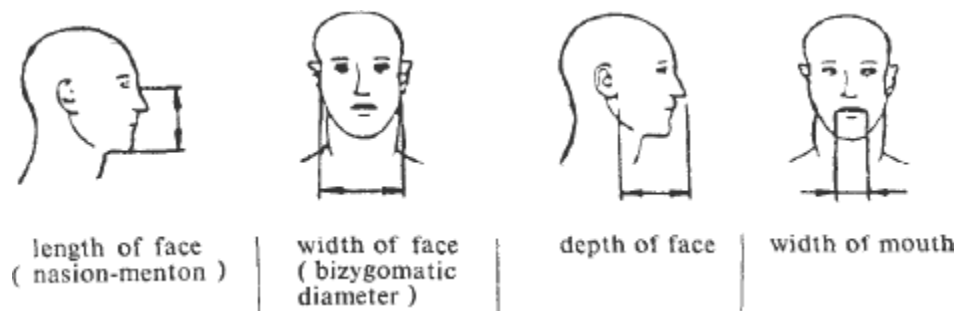


FIG. 3 FACIAL DIMENSIONS

6.7.2 The inward leakage test shall be carried out for the full face mask as per the method prescribed in IS 17274 (Part 1).

6.8 Carbon Dioxide Content of Inhalation Air

6.8.1 General

6.8.1.1 One sample as received shall be tested.

6.8.1.2 The full face mask shall be fitted to Sheffield dummy head securely without any deformation and shall be leaktight. If necessary, the full face mask can be sealed to dummy head with PVC tape or other suitable sealant.

6.8.1.3 Air shall be supplied to the full face mask from breathing machine adjusted to 25 strokes/min and 2.0 litres/stroke. The exhaled air shall have carbon dioxide content of 5 percent by volume.

6.8.2 The sample shall be subjected to any one of the three separate tests prescribed in IS 17274 (Part 9) to determine the carbon dioxide content of the inhalation air.

6.9 Tensile Strength of Head Harness

6.9.1 Three samples shall be tested as received. The force shall be applied to the free ends of the straps.

6.9.2 Three samples shall be tested as received. The permanent linear deformation shall be measured 4 hours after the pull test.

6.10 Tensile Strength of Connector

Three samples shall be tested as received. The full face mask shall be fitted on a dummy head in such a

manner that load can be applied axially to the connector. Additionally, restraining straps or bands shall be fitted over the faceblank around the connection so that load is applied as directly as possible to the fitting of the connector with the faceblank and the restraining force is not applied wholly to the head harness (*see* Fig. 4). Test time shall be 10 seconds.

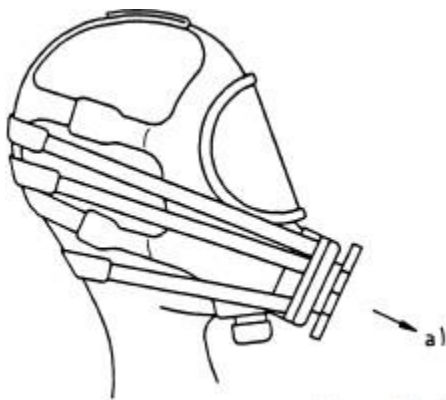


FIG. 4 ARRANGEMENT FOR TENSILE STRENGTH OF CONNECTOR TEST

6.11 Impact Resistance of Eyepiece/Visor

Five samples shall be tested as received.

Impact resistance shall be tested using a completely assembled full face mask mounted on a dummy head such that a steel ball having 22 mm diameter and weighing 43.8 g (approximately) falls normally from a height of 1.30 m on the centre of the eyepiece/visor.

6.12 Breathing Resistance

Three samples shall be tested as received. The breathing resistance shall be measured with the full face mask fitted securely in a leak tight manner but without deformation on a Sheffield dummy head. Test shall be carried out according to the static and dynamic method prescribed in IS 17274 (Part 2).

For the static method, inhalation resistance shall be determined at 30 lpm, 95 lpm, and 160 lpm, whereas exhalation resistance shall be determined at 160 lpm. For the dynamic method, breathing resistance shall be determined using breathing machine adjusted to 25 cycles/min and 2 litres/stroke.

6.13 Flammability

6.13.1 Class 1 full face mask

Three samples shall be tested, one as received and two conditioned in accordance with 6.1 but after returning to ambient temperature.

The full face masks shall be mounted on a metallic dummy head and flammability test shall be carried out according to the single burner dynamic procedure (6.2.4) of IS 17274 (Part 10).

6.13.2 Class 2 and 3 full face mask

Three samples shall be tested, one as received and two conditioned in accordance with 6.1 but after returning to ambient temperature.

The full face masks shall be mounted on a metallic dummy head and flammability test shall be carried out according to the six burner dynamic procedure (6.2.2) of IS 17274 (Part 10).

6.14 Resistance to Temperature

Two samples shall be tested as received. The threaded connection shall be gauged at room temperature. For class 3 full face masks, the gauge test shall be completed within 30 seconds of removal from conditioning as per 6.1.

6.15 Resistance to Thermal Radiation

Five samples shall be tested as received. The test for thermal radiation shall be carried out according to the method prescribed in 6.3.1 of IS 17274 (Part 10). The source of thermal radiation shall be adjusted so that the thermal energy flux is $8.0 \pm 0.0/-0.2 \text{ kW/m}^2$ at a distance of 175 mm. The breathing machine shall be adjusted to 20 cycles/min and 1.5 litres/stroke.

6.16 Inhalation and Exhalation Valve

Three samples shall be tested as received.

7 MARKING

7.1 The manufacturer shall be identified by name, trademark or other means of identification.

7.2 All units of the same model shall be provided with a type identifying mark. Class shall be identified by “CL” followed by the class number. For example, a class 2 mask shall be marked with CL 2.

7.3 Where the performance of components may be affected by ageing, means of identifying the date of manufacture shall be given. In case actual date cannot be provided, at least the year of manufacture shall be provided. For parts on which marking cannot be done, relevant information shall be supplied by the manufacturer. *See Annex B* for marking recommendations for parts and components.

7.4 Components or parts that are designed to be replaced by the user and sub-assemblies with considerable bearing on safety shall be readily identifiable. For parts on which marking cannot be done, relevant information shall be supplied by the manufacturer. *See Annex B* for marking recommendations for parts and components

7.5 All markings shall be clearly visible and durable.

7.6 The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act, 2016* and the Rules and Regulations framed thereunder, and the products may be marked with the standard mark.

8 SAMPLING AND CRITERIA FOR CONFORMITY

8.1 Lot

In a single consignment, all the full face masks assembled under uniform conditions of manufacture on the same day, shall constitute a lot.

8.2 Each lot shall be tested separately for ascertaining the conformity of the lot to the requirements of the specification. The number of face masks to be selected from the lot (*see* IS 4905 for random sampling) shall be according to the number of samples required for each test as mentioned in **6**.

8.3 The lot shall be considered to have satisfied the requirements of this standard if there is no failure in the samples. Otherwise, the lot shall be rejected.

9 INFORMATION SUPPLIED BY THE MANUFACTURER

9.1 The following information shall be supplied by manufacturers along with each full face mask in the official languages of the country:

- a) Declaration that materials of the full face mask that may come into contact with the wearer's skin does not cause irritation or any adverse effect to health;
- b) Applications and limitations;
- c) Facepiece classification;
- d) Checks prior to use;
- e) Donning and fitting process;
- f) Cleaning and disinfection process;
- g) Storage and maintenance instructions;
- h) Warnings for the following scenarios:
 - i) Chances of leakage in case of wearer having facial hair or spectacles;
 - ii) Use of equipment in explosive atmosphere;
 - iii) Air quality;
 - iv) Hazards of oxygen and oxygen enriched air;
 - v) Class 1 full face mask shall not be used with self-contained breathing apparatus.

9.2 Information provided shall be precise and comprehensible. If helpful, illustrations and part numbers should be added. Additional markings indicating limitations or extra requirements shall be explained.

ANNEX A

(Clause 2)

LIST OF REFERRED INDIAN STANDARDS

<i>IS No.</i>	<i>Title</i>
IS 8347 : 2008	Respiratory protective devices — Definitions, classification and nomenclature of components (<i>first revision</i>)
IS 10245 (Part 1) : 1996	Breathing apparatus: Part 1 closed circuit breathing apparatus

	(Compressed Oxygen Cylinder) - Specification (<i>first revision</i>)
IS 10245 (Part 2) : 2023	Respiratory Protective Devices-Specification Part 2 Self-Contained Open Circuit Breathing Apparatus (<i>second revision</i>)
IS 10245 (Part 3) : 1999	Breathing apparatus: Part 3 fresh air hose and compressed air line breathing apparatus - Specification (First Revision)
IS 10245 (Part 4) : 1982	Specification for breathing apparatus: Part 4 escape breathing apparatus (Short Duration Self - Contained Type)
IS 14138 (Part 1) : 1994	Respiratory protective devices: threads for facepieces, Part 1 Standard thread connection
IS 14138 (Part 2) : 1994	Respiratory protective devices: threads for facepieces, Part 2 Centre thread connection
IS 15803 : 2008	Respiratory protective devices - Self contained closed circuit breathing apparatus chemical oxygen (KO ₂) type, self generating, self rescuers - Specification
IS 17274 (Part 1) : 2023 ISO 16900-1 : 2019	Respiratory protective devices — Methods of test and test equipment Part 1 Determination of inward leakage (<i>first revision</i>)
IS 17274 (Part 2) : 2019/ 16900-2: 2017	Respiratory Protective Devices — Methods of Test and TestEquipment - Part 1 Determination of Inward Leakage
IS 17274 (Part 7) : 2023 ISO 16900-7 : 2020	Respiratory protective devices Methods of test and test equipment Part 7: Practical performance test methods (<i>first revision</i>)
IS 17274 (Part 9) : 2019/ 16900-9 : 2015	Respiratory Protective Devices - Methods of Test and Test Equipment - Part 9 Determination of Carbon Dioxide Content of theInhaled Gas
IS 17274 (Part 10) : 2019/ 16900-10 :2015	Respiratory Protective Devices - Methods of Test and Test Equipment - Part 10 Resistance to Ignition, Flame, Radiant Heat andHeat

ANNEX B

(Clauses 7.3 and 7.4)

MARKING RECOMMENDATIONS FOR PARTS AND COMPONENTS OF FULL FACE MASK TABLE A-1 RECOMMENDATION FOR MARKING

Components/Parts	Part-Marking	Date/Year of Manufacture
Inhalation valve disc	N	N
Exhalation valve disc	N	R
Connector (if fitted)	R	N

Faceblank	R	R
Head harness	R	R
Visor	R	N
Visor frame	R	N
Inner mask	R	R
Check valve unit	N	N
Speech diaphragm	R	R
R: Marking is necessary. N: Marking is not necessary.		