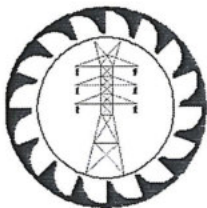


CEB
SPECIFICATION

**SPECIFICATIONS FOR PERSONAL PROTECTIVE
EQUIPMENT**

Respiratory Protection

- **Filtering Half Masks to Protect Against
Particles**
- **Half Masks**
- **Full Face Masks**
- **Particle Filers**
- **Gas/Combined Filters**



**CEYLON ELECTRICITY BOARD
SRI LANKA**



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1. Scope

This specification specifies the requirements of Ceylon Electricity Board for filtering half masks, half masks and full face masks as part of respiratory protective devices except escape apparatus and diving apparatus.

2. Service Conditions

(i)	Annual average ambient temperature	30 °C
(ii)	Maximum ambient temperature	40 °C
(iii)	Maximum relative humidity	90%
(iv)	Environmental conditions	Humid tropical climate

3. Applicable Standards

BS EN 149	Respiratory Protective devices-Filtering Half Masks to Protect against Particles- Requirement , Testing, Marking
BS EN 143	Respiratory Protective devices- Particle Filters -Requirement , Testing, Marking
EN 140	Respiratory Protective devices – Half Masks and Quarter Masks – Requirements, Testing, Marking
EN 14387	Respiratory Protective devices- Gas Filters and Combined Filters – Requirements, Testing, Marking
EN 136	Respiratory Protective devices-Full Face Masks – Requirements, Testing, Marking
42 CFR Part 84 Respiratory Protective Devices	NIOSH (USA) certification requirements for respiratory protective devices

4. Filtering half Masks to Protect against Particles

4.1 Basic Features and Technical Requirements

A particle filtering half mask covers the nose, mouth and the chin and may have inhalation and/or exhalation valve(s). The half mask consists entirely or substantially of filter material or comprises a face piece in which the main filter(s) form an inseparable part of the device.

It is intended to provide adequate sealing on the face of the wearer against the ambient atmosphere, when the skin is dry or moist and when the head is moved.

Air enters the particle filtering half mask and passes directly to the nose and mouth area of the facepiece or, via an inhalation valve(s) if fitted. The exhaled air flows through the filter material and/or an exhalation valve (if fitted) directly to the ambient atmosphere.

These devices are designed to protect against both solid and liquid aerosols.



Materials used shall be suitable to withstand handling and wear over the period for which the particle filtering half mask is designed to be used. Any material from the filter media released by the air flow through the filter shall not constitute a hazard or nuisance for the wearer.

If the particle filtering half mask is designed to be re-usable, the materials used shall withstand the cleaning and disinfecting agents and procedures to be specified by the manufacturer

Parts of the device likely to come into contact with the wearer shall have no sharp edges or burrs. Materials that may come into contact with the wearer's skin shall not be known to be likely to cause irritation or any other adverse effect to health

All demountable parts (if fitted) shall be readily connected and secured, where possible by hand.

4.2 Classification

4.2.1 Particle Filtering Half Masks Conforming to BS EN Standards

Particle filtering half masks are classified according to their filtering efficiency and their maximum total inward leakage. There are three classes of devices:

FFP1, FFP2 and FFP3

The protection provided by an FFP2 or FFP3 device includes that provided by the device of lower class or classes.

In addition, particle filtering half masks are classified as single use only or as re-usable (more than one shift).

4.2.2 Particle Filtering Half Masks Conforming to NIOSH Requirements

According to the NIOSH requirements, Particle filters are classified as follows

N95, N99, N100, R95, R99, R100, P95, P99, P100

Number stands for particulate filtering efficiency

N: not resistant for Oil,

R: moderately resistant for oil and

P: strongly resistant for oil.

4.3 Filter Efficiency

4.3.1 Filter Efficiency of Masks Conforming to BS EN Standard

The efficiency of the filter of the particle filtering half mask shall meet the requirements of below table.



Table 1 – Minimum Filter Efficiency

Classification	Filter efficiency of test aerosol	
	Sodium chloride test 95 l/min	Paraffin oil test 95 l/min
	% Max.	% Max.
FFP1	80	80
FFP2	94	94
FFP3	99	99

4.3.2 Filter Efficiency of Masks Conforming to NIOSH Requirements

The requirements for minimum filter efficiency are given in below table.

Table 2 - Minimum Filter Efficiency

Filter class	Filter efficiency	Remarks
N95	95%	Not Resistant to oil
N99	99%	
N100	99.97%	
R95	95%	Moderately resistant oil
R99	99%	
R100	99.97%	
P95	95%	Strongly resistant to oil
P99	99%	
P100	99.97%	

4.4 Carbon dioxide content of the inhalation air

The carbon dioxide content of the inhalation air (dead space) shall not exceed an average of 1.0% (by volume).

4.5 Breathing resistance

The breathing resistances apply to valved and valveless particle filtering half masks and shall meet the requirements of below table.

Table 3 - Breathing resistance

Classification	Maximum permitted resistance (mbar)		
	inhalation		exhalation
	30 l/min	95 l/min	160 l/min
FFP1	0,6	2,1	3,0
FFP2	0,7	2,4	3,0
FFP3	1,0	3,0	3,0



4.6 Head harness

The head harness shall be designed so that the particle filtering half mask can be donned and removed easily.

The head harness shall be adjustable or self-adjusting and shall be sufficiently robust to hold the particle filtering half mask firmly in position and be capable of maintaining total inward leakage requirements for the device.

4.7 Marking

The marking shall be clearly visible and durable.

4.7.1 Marking on the Filters Conforming to BS EN Standard

- i. The manufacturer shall be identified by name, trade mark or other means of identification.
- ii. The number and the year of publication of the standard conforming to.
- iii. Appropriate class (FFP1, FFP2, FFP3) followed by a single space and then:
"NR" if the filter is limited to single shift. e.g. EN 143:2000 FFP3 NR
"R" if the filter is re-usable. e.g. EN 143:2000 FFP3 R
- iv. If appropriate, the letter D (dolomite clogging test) in accordance with clogging performance.
E.g. EN 143:2000 FFP3 R D

4.7.2 Marking on the Filter Packaging Conforming to BS EN Standard

- i. Above details under "marking on the filter"
- ii. Year of end of shelf life.
- iii. Manufacturer recommended storage conditions (at least temperature and humidity).

4.7.3 Marking on the Filters Conforming to NIOSH Requirements

- i. The manufacturer shall be identified by name, trade mark or other means of identification.
- ii. Standard conforming to.
- iii. Appropriate class (N, R, P) followed by filtering efficiency level.
e.g. N95, P100

4.8 TESTING

The filter shall be subjected to the following tests according to the standard BS EN 149:2001 or NIOSH requirements. A summary sheet of tests carried out or test reports shall be submitted as specified in 4.9.

4.8.1 Tests for Masks Conforming to BS EN Standard

- i. Visual Inspection
- ii. Practical Performance



- iii. Leakage
- iv. Carbon Dioxide Content of the Inhalation Air
- v. Breathing Resistance
- vi. Filter penetration
- vii. Clogging test (Mandatory for reusable half masks, optional for non-reusable half masks)

4.8.2 Tests for Masks Conforming to NIOSH Requirements

- i. Airflow Resistance Test
- ii. Filter Efficiency Level
- iii. Exhalation Valve Leakage Test

4.9 Test Certificates

A *summary sheet* of the tests carried out shall be submitted where the summary sheet clearly shows the equipment concerned, the manufacturer's identity, the tests carried out, test results and the standard's requirements against the test results to determine passing or failing of the test.

The summary sheet shall be from the accredited independent testing laboratory where the testing was carried out and this testing laboratory shall be acceptable to the purchaser. Proof of accreditation of the testing laboratory by a national/international authority shall be forwarded if requested by the purchaser.

Submission of individual test reports is not necessary if duly authenticated summary sheet is submitted as described above.

5. Half Masks

5.1 Basic Features and Technical Requirements

A Half Mask is a face piece which covers the nose, mouth and chin. Half masks are intended to provide adequate sealing on the face of the wearer of a respiratory protective device against the ambient atmosphere, when the skin is dry or moist and when the head is moved.

The use of aluminium, magnesium and titanium or alloys containing such proportions of these metals as will, on impact, give rise to frictional sparks capable of igniting flammable gas mixtures for exposed parts, i.e. Those which may be subjected to impact during use of the apparatus shall be restricted to a minimum.

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.

Unless integral with the half mask, the following components (if fitted) shall be replaceable: Head harness, connector(s), inhalation and exhalation valves.



Materials that can come into contact with the wearer's skin shall not be known to be likely to cause irritation or any other adverse effect to health.

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

5.2 Head harness

The head harness shall be designed so that the face piece can be donned and removed easily.

The head harness shall be adjustable or self-adjusting and shall hold the face piece firmly and comfortably in position.

Each strap of the head harness, buckles and other adjusting means shall withstand a pull of 50 N applied for 10 s in the direction of pulling when the face piece is donned. No breaks or sliding of the straps shall occur. The requirement applies to the buckles and attachment lugs as well as to the straps.

5.3 Connector

The connection between the face piece and the apparatus may be achieved by a permanent or special (e.g. insert) type of connection or by a thread connection.

The connection between the face blank and the connector shall be sufficiently robust to withstand axially a tensile force of 50 N.

5.4 Inhalation valves and exhalation valves

Valve assemblies shall be such that they can be readily maintained and correctly replaced. It shall not be possible to interchange exhalation valve assembly and inhalation valve assembly.

An appropriate method of checking correct assembly shall be described, e.g. visual inspection; check by the wearer; test by maintenance personnel etc.

5.4.1 Inhalation Valve

The face piece should preferably be provided with one or more inhalation valve(s). Face piece shall be provided with an integral inhalation valve, if there is no valve in the filter.

Inhalation valves shall function correctly in all orientations.

5.4.2 Exhalation valve

Exhalation valves shall function correctly in all orientations

The face piece shall have at least one exhalation valve or appropriate means to allow the escape of exhaled air and, where applicable, any excess air delivered from a supplied air source.



5.5 Carbon dioxide content of inhalation air

The carbon dioxide content of the inhalation air (dead space) shall not exceed an average of 1,0% (by volume).

5.6 TESTS

Half masks shall be subjected to the following tests according to the standard BS EN 140:1998 or NIOSH Requirements. A summary sheet of tests carried out *or* test reports shall be submitted as specified in 5.7.

- i. Visual Inspection
- ii. Practical Performance
- iii. Head Harness
- iv. Connector
- v. Exhalation Valve
- vi. Leakage
- vii. Carbon Dioxide Content of the Inhalation Air
- viii. Breathing Resistance

5.7 Test Certificates

A *summary sheet* of the tests carried out shall be submitted where the summary sheet clearly shows the equipment concerned, the manufacturer's identity, the tests carried out, test results and the standard's requirements against the test results to determine passing or failing of the test.

The summary sheet shall be from the accredited independent testing laboratory where the testing was carried out and this testing laboratory shall be acceptable to the purchaser. Proof of accreditation of the testing laboratory by a national/international authority shall be forwarded if requested by the purchaser.

Submission of individual test reports is not necessary if duly authenticated summary sheet is submitted as described above.

5.8 Marking

The marking shall be clearly visible and durable.

5.8.1 Marking of Masks Conforming to BS EN Standard

5.8.1.1 Marking on the Facepiece

- i. The manufacturer shall be identified by name, trade mark or other means of identification.
- ii. All units of the same model shall be provided with a type-identifying marking.
- iii. Size (if more than one size is available).
- iv. The number and the year of the standards complied.



- v. Where the reliable performance of components may be affected by ageing, means of identifying the date (at least the year) of manufacture shall be given.
- vi. For parts which cannot reasonably be marked e.g. straps of head harness, the relevant information shall be included in the information supplied by the manufacturer.
- vii. Parts which are designed to be replaced by the authorized user and sub-assemblies with considerable bearing on safety shall be readily identifiable.

5.8.1.2 Marking on the Packaging

- i. The manufacturer shall be identified by name, trade mark or other means of identification.
- ii. All units of the same model shall be provided with a type-identifying marking.
- iii. Size (if more than one size is available).
- iv. The number and the year of the standards complied.
- v. The end of shelf life may be indicated.

5.8.2 Marking of Masks Conforming to NIOSH Requirements

- i. Manufactures identification.
- ii. Type-identifying marking.

6. Full Face Masks

6.1 Basic Features and Technical Requirements

A full face mask is a face piece 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, and even when the head is moved or when the wearer is speaking.

Air enters to the full face mask through the connectors and passes either directly to the nose and mouth area or via the eye area of the full face mask. The exhaled air flows back either through the connector in the breathing apparatus (Closed circuit breathing apparatus, Pendulum breathing) or directly to the ambient atmosphere via exhalation valve(s) or by other appropriate means in other types of respiratory protective devices.

An inner mask may be used to separate the nose and mouth from the eye (visor) area of the full face mask.

The finish of any part of the full face mask likely to be in contact with the wearer shall be free from sharp edges and burrs

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

6.2 Classification

Masks are classified into three classes, each providing the same level of respiratory protection but having some differences which reflect intended areas of application.



- Class 1: Full face mask for light duty use
- Class 2: Full face mask for general purpose use
- Class 3: Full face mask for special purpose use

For class 2 and class 3 full face masks exposed parts i.e. 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.

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.

6.3 Resistance to thermal radiation

Class 3 full face masks shall be resistant to thermal radiation

6.4 Flammability

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

6.5 Head Harness

The head harness shall be designed so that the full face mask can be donned and removed easily. The head harness shall be adjustable or self-adjusting and shall hold the full face mask firmly and comfortably in position.

For class 1 full face masks each strap of the harness shall withstand a pull of 100 N applied for 10 s when tested as per the standard BSEN 136:1998 or similar test method.

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 s as per the standard BSEN 136:1998 or similar test method.

Buckles and attachment lugs (if present) shall withstand the same pull

There shall be no permanent liner deformation of each strap of more than 5% after having been tested at a pull of 50 N for 10 s.

For class 3 full face masks once fitted, the head harness shall be easily adjustable by the wearer or self-adjusting.



6.6 Connection

The connection between the full face mask and the apparatus may be achieved by a permanent or special type of connection or by a threaded connection.

If more than one connector is fitted the design of the face piece or of the remainder of the equipment shall be such that the use of different types or combinations of respiratory protection devices does not present a risk.

All demountable connections shall be readily connected and secured, where possibly by hand. Any means of sealing shall be retained in position when connection is disconnected during normal maintenance.

For class 1 full face masks the connection between the face blank and the connector shall be sufficiently robust to withstand axially a tensile force of 250 N.

For class 2 and class 3 full face masks the connection between the face blank and the connector shall be sufficiently robust to withstand axially a tensile force of 500 N.

6.7 Speech diaphragm

Where the face piece includes a speech diaphragm the latter shall be protected against mechanical damage as assessed by visual inspection.

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

6.8 Eyepieces/Visor

Eyepieces/Visor and anti-mist discs designed to serve as visors shall be attached in a reliable and gastight manner to the face blank.

The manufacturer shall provide means to reduce misting of the eyepieces or visors so that vision is not interfered with when the apparatus is used.

Where anti-fogging compounds are used as intended or specified by the manufacturer, they shall not be known to be likely to cause irritation or any other adverse effect to health.

6.9 Inhalation valves and exhalation valves

Valves 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 valves shall function correctly in all orientations.

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

Exhalation valves (if fitted) shall be protected against or be resistant to dirt and mechanical damage



6.10 Leak tightness

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

6.11 Carbon dioxide content of the inhalation air

The carbon dioxide content of the inhalation air (dead space) shall not exceed an average of 1% (by Volume).

6.12 Marking

The marking shall be clearly visible and durable.

6.12.1 Marking of Masks Conforming to BS EN Standard

- i. Manufactures identification.
- ii. All units of the same model shall be provided with a type-identifying marking.
- iii. The number and the year of the standard complied.
- iv. The respective class number following the letters "CL" immediately following the number of the standard e.g. EN 136:1996 CL 3 shall be marked.
- v. Where the reliable performance of components may be affected by ageing, means of identifying the date (at least the year) of manufacture shall be given.

For parts which cannot reasonably be marked e.g. straps of head harness, the relevant information shall be included in the information supplied by the manufacturer.

- vi. Components or parts which are designed to be replaced by the authorized user and sub-assemblies with considerable bearing on safety shall be readily identifiable.

For parts which cannot reasonably be marked e.g. straps of head harness, the relevant information shall be included in the information supplied by the manufacturer.

6.12.2 Marking of Masks Conforming to NIOSH Requirements

- iii. Manufactures identification.
- iv. Type-identifying marking.

6.13 TESTS

Full face masks shall be subjected to the following tests according to the standard BS EN 136:1998 or NIOSH requirements. A summary sheet of tests carried out or test reports shall be submitted as specified in 6.14.

- i. Visual Inspection
- ii. Flammability



- iii. Resistance to thermal radiation (only applicable for Class 3 full face masks)
- iv. Head harness
- v. Connector
- vi. Eye piece/ visor
- vii. Inhalation valve and Exhalation valve
- viii. Leak tightness
- ix. Carbon dioxide content of the inhalation air
- x. Breathing resistance
- xi. Inward leakage
- xii. Field of vision
- xiii. Practical performance

6.14 Test Certificates

A *summary sheet* of the tests carried out shall be submitted where the summary sheet clearly shows the equipment concerned, the manufacturer's identity, the tests carried out, test results and the standard's requirements against the test results to determine passing or failing of the test.

The summary sheet shall be from the accredited independent testing laboratory where the testing was carried out and this testing laboratory shall be acceptable to the purchaser. Proof of accreditation of the testing laboratory by a national/international authority shall be forwarded if requested by the purchaser.

Submission of individual test reports is not necessary if duly authenticated summary sheet is submitted as described above.

7. Particle Filters

7.1 Basic Features and Technical Requirements

A Particle filter is a device to be used with a face piece which passes air to the face piece after removing the airborne particles.

The filter shall be made of suitable material to withstand normal usage and exposures to those temperatures, humidity and corrosive environments that are likely to be encountered internally it shall withstand corrosion by the filtering media.

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

Any material of the filter media or any gaseous products that may be released by the air flow through the filter shall not be known to constitute a hazard or nuisance for the wearer.

Materials that can come into contact with the wearer's skin shall not be known to be likely to cause irritation or any other adverse effect to health.



7.2 Classification

7.2.1 Particle filters conforming to BSEN 143:2000

There are three classes of particle filters classified according to their filtering efficiency;

P1, P2 and P3 in ascending order of the filtering efficiency.

In addition, filters may be classified as one time use only, or re-usable.

The protection provided by a P2 or P3 filter includes the protection provided by the filter of lower class or classes. Ex: P3 filter includes the protection provided by P1 and P2

7.2.2 Particle filters conforming to NIOSH Requirements

According to the NIOSH requirements, Particle filters are classified as follows

N95, N99, N100, R95, R99, R100, P95, P99, P100

Number stands for particulate filtering efficiency

N: not resistant for Oil,

R: moderately resistant for oil and

P: strongly resistant for oil.

7.3 Connection

The connection between filter (s) and face piece or other device (s) with which it is intended to be used shall be robust and leak tight. The filter shall be readily replaceable without use of special tools and shall be designed or marked to prevent incorrect assembly.

7.4 Mass

The maximum mass of filter designated to be used directly connected a half mask is 300 g.

The maximum mass of fitter designated to be used directly connected to a full face mask is 500g.

7.5 Filter Efficiency

Filter efficiency according to the BS EN 143

The requirements for minimum filter efficiency are given in below table.

Table 4 - Minimum Filtering Efficiency

Filter class	Filtering efficiency %	Remarks
P1	80	Filters both oil and non-oil based particulates
P2	94	
P3	99.95	



7.5.1 Filter efficiency according to the NIOSH Requirements

The requirements for minimum filter efficiency are given in below table.

Table 5 - Minimum Filtering Efficiency

Filter class	Filter efficiency	Remarks
N95	95%	Not Resistant to oil
N99	99%	
N100	99.97%	
R95	95%	Moderately resistant oil
R99	99%	
R100	99.97%	
P95	95%	Strongly resistant to oil
P99	99%	
P100	99.97%	

7.6 Marking

7.6.1 Markings for filters conforming to BS EN 143

The marking shall be clearly visible and durable.

7.6.1.1 Filter and Filter Package

- The manufacturer shall be identified by name, trade mark or other means of identification.
- Appropriate filter type and class (P1,P2,P3) and white colour code
- The number and the year of standard conforming to.
- "NR" if the filter is limited to single shift. Ex: EN 143:2000 P3 NR
- "R" if the filter is re-usable Ex: EN 143:2000 P3 R
- A mark showing if the filter is for a multiple filter device.
- Year of end of shelf life.

7.6.2 Markings for filters conforming to NIOSH Standards

- The manufacturer shall be identified by name, trade mark or other means of identification.
- Appropriate filter designation (Ex: N95, P100)
- NIOSH name in block letters or NIOSH logo
- TC Number (NIOSH Testing and Certification number)
- Filter model number



7.7 TESTING

The filter shall be subjected to the following tests according to the standard BS EN 143:2000 or NIOSH requirements. A summary sheet of tests carried out *or* test reports shall be submitted as specified in 7.8.

- i. Visual Inspection
- ii. Mechanical Strength
- iii. Test Flow conditions
- iv. Breathing Resistance
- v. Filter penetration
- vi. Clogging test

7.8 Test Certificates

A *summary sheet* of the tests carried out shall be submitted where the summary sheet clearly shows the equipment concerned, the manufacturer's identity, the tests carried out, test results and the standard's requirements against the test results to determine passing or failing of the test.

The summary sheet shall be from the accredited independent testing laboratory where the testing was carried out and this testing laboratory shall be acceptable to the purchaser. Proof of accreditation of the testing laboratory by a national/international authority shall be forwarded if requested by the purchaser.

Submission of individual test reports is not necessary if duly authenticated summary sheet is submitted as described above.

8. Gas Filters

8.1 Basic Features and Technical Requirements

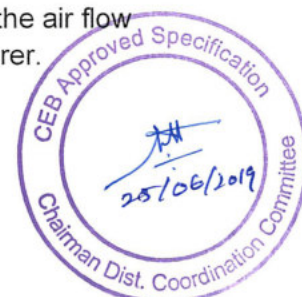
A Gas filter is a device to be used with a face piece which passes air to the face piece after removing the harmful gases and vapours.

A Combined Filter is a device to be used with a face piece which passes air to the face piece after removing the harmful gases, vapours and particles.

The filter shall be sufficiently robust to withstand the rough usage it is likely to receive in service. No part of the filter likely to be in contact with the wearer shall have sharp edges or burrs. The filter shall be designed to ensure its full function in any orientation.

The filter shall be made of suitable material to withstand normal usage and exposures to those temperatures, humidity and corrosive environments that are likely to be encountered. Internally it shall withstand corrosion by the filtering media.

Any material of the filter media or any gaseous products that may be released by the air flow through the filter shall not be known to constitute a hazard or nuisance for the wearer.



Where respirators are designed to use more than one filter (i.e. multiple filter device), through which the flow is proportioned, all requirements given in this Standard are to be met by the complete set of filters (e.g. the total mass of a filter set designated to be used directly connected to a full face mask shall not exceed 500 g).

8.2 Classification

8.2.1 Types of Filters

Gas filters are produced in one of the following types: Types A, B, E, K, AX and SX.

Type A

For use against certain organic gases and vapours with a boiling point $> 65^{\circ}\text{C}$ as specified by the manufacturer

Type B

For use against certain inorganic gases and vapours as specified by the manufacturer

Type E

For use against sulphur dioxide and other acidic gases and vapours as specified by the manufacturer

Type K

For use against ammonia and organic ammonia derivatives as specified by the manufacturer

Type AX

For use against certain organic gases and vapours with a boiling point $\leq 65^{\circ}\text{C}$ as specified by the manufacturer. For single use only.

Type SX

For use against specific named gases and vapours as specified by the manufacturer

Special filters are:

Type NOP3

For use against nitrogen oxides, e.g. NO , NO_2 , NO_x

Type HgP3

For use against mercury

Special filters shall always incorporate a P3 filter according to EN 143 and may be combined with each other and/or types specified above except for type SX.

Multi type gas filters are Filters which are a combination of two or more of the above types excluding type SX and which meet the requirements of each type separately.



Combined filters are gas or multi-type gas filters incorporating a particle filter according to EN143.

8.2.2 Classes of Filters (Only applicable for filters conforming to BS EN)

Gas filters of types A, B, E and K are classified in terms of capacity as follows:

- Class 1 low capacity filters;
- Class 2 medium capacity filters;
- Class 3 high capacity filters.

The protection provided by a class 2 or 3 filter includes that provided by the corresponding filter of lower class or classes.

The classification of combined filter includes of particle filter according to EN 143. Type AX and type SX gas filters and special filters are not classified.

8.3 Connection

The connection between filter(s) and face piece or other device(s) with which it is intended to be used shall be robust and leak tight.

The filter shall be readily replaceable without use of special tools and shall be designed or marked to prevent incorrect assembly. The particle filter of combined filters shall be on the influent side of the gas filter.

8.4 Mass

The maximum mass of filter(s) designated to be used directly connected to a half mask in 300 g.

The maximum mass of filter(s) designated to be used directly connected to a full face mask is 500g.

8.5 Breathing resistance

The resistance imposed by filter(s) to the flow of air shall be as low as possible and in no case exceed the values specified in the relevant standard.

For multi type gas filters with mixed classes and/or types, the value corresponding to the highest shall not be exceeded. Highest value for breathing resistance is 9.8 mbar. Therefore, maximum resistance of the multi type gas filter should not exceed 9.8 mbar.

8.6 Combined Filters

The particle filter shall be on the influent side of the filter.

Combined filters shall meet the requirements for the minimum efficiency as specified in EN 143 and NIOSH requirements (Table 4 and 5) for each class of particle filter.



8.7 Marking

8.7.1 General

The marking shall be as clearly visible and as durable as possible.

Sub-assemblies and components with considerable bearing on safety shall be marked so that they can be identified.

If sub-assemblies with considerable bearing on safety are too small to be marked, the information shall be given in the information supplied by the manufacturer.

8.7.2 Marking on Filters Conforming to BS EN Standard

8.7.2.1 Filters

All filters shall be marked at least with:

- i. The appropriate filter type, class and colour code, in accordance with below Table.

Table 6 - Marking

Filter (Cartridge) Type	Class	Colour code
A	1,2 or 3	Brown
B	1,2 or 3	Grey
E	1,2 or 3	Yellow
K	1,2 or 3	Green
AX		Brown
SX		Violet
P	1,2 or 3	White
Or combinations of them		
NOP3		Blue-white
HgP3		Red-white

The type and class are followed by a single space and then:

“NR” if the particle filter part of the combined filter is limited to single shift use only.

Or

“R” if the particle filter part of the combined filter is re-usable.

EXAMPLES:

A2P3 R	brown-white
A2B1	brown-grey
AB2	brown-grey
AXP3 NR	brown-white
SXP3 R	violet-white
AB1P1 NR	brown-grey-white
ABEK2P3 R	brown-grey-yellow-white



If the marking is not directly on the filter body, it shall be on a label of the appropriate colour code affixed to the filter body. In this case, the colour of the body shall be considered to be the colour code.

Silver or light metal colour shall not be regarded as white or grey.

- ii. A mark showing if the filter is for a multiple filter device;
- iii. The number of the Standard
- iv. The year and month of end of shelf life.
The end of shelf life may be informed by a pictogram where the code "yyyy/mm" indicates the year and month;
- v. The manufacture, supplier or importer shall be identified by name, trademark, or other means of identification;
- vi. The sentence "See information supplied by the manufacture" in English language, or the appropriate pictogram
- vii. Manufacturers model designation;
- viii. For AX filter, the sentence "For single use only" in English language or an appropriate pictogram;
- ix. For SX filter, name(s) of chemicals and the respective maximum concentrations against which the filter provides protection.
- x. All NOP3 filters shall additionally be marked "For single use only" in English language or an appropriate pictogram;
- xi. All HgP3 filters shall additionally be marked with the sentence "Maximum use time 50 hours" in English language or an appropriate pictogram;
- xii. Combined filters meeting the clogging requirements may be additionally marked by the letter "D". This letter shall follow the classification marking preceded by a single space.

8.7.2.2 Filter packaging

The filter package shall be marked at least with the following information:

- i. Year and month of the end of shelf life. The end of shelf life may be informed by a pictogram where the code 'yyyy/mm' indicated the year and month.
- ii. Manufacturer's model designation;
- iii. Manufacturer's recommended conditions of storage (at least the temperature and humidity) or equivalent pictogram.

8.7.3 Marking on Filters Conforming to NIOSH Requirements

- i. The appropriate filter type and colour code, in accordance with below Table.
- ii. The manufacture, supplier or importer shall be identified by name, trademark, or other means of identification;
- iii. The sentence "See information supplied by the manufacture" in English language, or the appropriate pictogram
- iv. Manufacturers model designation;



Table 7 – Filter Types

Filter (Cartridge) Type	Gases	Colour code
OV	Organic Vapours	Black
AM/MA	Ammonia and Methylamine	Grey
AG	Acid Gas	White
OV/AG	Acid Gases & Organic Vapours	Yellow
MG	Multi Gas or Vapours	Olive
HG	Mercury Vapour	Orange
P100	Particle filter (Combined Filter)	Magenta

8.8 TESTS

Gas and Combined filters shall be subjected to the following tests according to the standard BS EN 143:2000 or NIOSH requirements. A summary sheet of tests carried out or test reports shall be submitted as specified in 8.9.

- i. Visual Inspection
- ii. Mechanical Strength
- iii. Test Flow conditions
- iv. Breathing Resistance
- v. Gas Capacity
- vi. Filter penetration
- vii. Clogging test (optional)

8.9 Test Certificates

A *summary sheet* of the tests carried out shall be submitted where the summary sheet clearly shows the equipment concerned, the manufacturer's identity, the tests carried out, test results and the standard's requirements against the test results to determine passing or failing of the test.

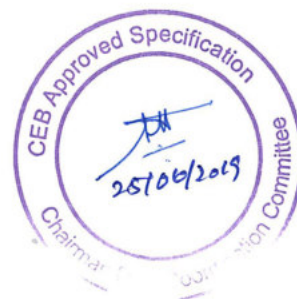
The summary sheet shall be from the accredited independent testing laboratory where the testing was carried out and this testing laboratory shall be acceptable to the purchaser. Proof of accreditation of the testing laboratory by a national/international authority shall be forwarded if requested by the purchaser.

Submission of individual test reports is not necessary if duly authenticated summary sheet is submitted as described above.

9. QUALITY ASSURANCE

The manufacturer shall possess valid ISO 9001:2008 or latest Quality Assurance certifications for the plant where the manufacture of equipment is done.

Bidders shall furnish a copy of the ISO certificate certified as true copy of the original by the manufacturer, along with the offer.



10. ADDITIONAL REQUIREMENTS

Packaging and Delivery

Each product shall be packaged in an individual container or package of sufficient strength to properly protect the product from mechanical damage or visual contamination before use.

Where appropriate filter shall be factory sealed to protect the filtering media from environmental influences and in such a way that the breaking of the factory sealing can be identified.

The type of packaging suitable for transport shall be defined by the manufacturer.

At the request of the customer or according to government specifications any additional or amended instructions shall be included in the package.

11. INFORMATION TO BE SUPPLIED WITH THE OFFER

The bid shall be accompanied with the following;

- a) English version of catalogues describing the equipment and indicating the type/model number.
- b) Technical literature in English describing the constructional and operational features, relevant drawings etc. of the equipment.
- c) Information on the following:
Instructions for use, information on storage, fitting and adjustment, handling, disposal, periodic inspection, periodic testing and useful service life
- d) Packing details.
- e) Completed schedule of particulars as per Annex A.
- f) Test reports or summary sheet conforming to relevant clauses

12. SAMPLE STUDY

One sample of the offered equipment including accessories if any, shall accompany the bid to facilitate analysis and evaluation. Any additional sample may be requested by the purchaser if such deemed necessary.

13. ANNEX

Annex A - Schedule of Guaranteed Technical Particulars



SCHEDULE OF GUARANTEED TECHNICAL PARTICULARS

(CEB Requirements shall be filled by the procurement entity and information of the offer shall be filled by the manufacturer/supplier)

Respiratory Protection			
Specific Requirements			
Sr No	Item	Requirement	Offered
1	Required respirator type	<input type="checkbox"/> Filtering Half-Mask against Particles - Reusable <input type="checkbox"/> Filtering Half-Mask against Particles - Disposable <input type="checkbox"/> Half-Mask <input type="checkbox"/> Fullface-Mask	
2	Protection required against	<input type="checkbox"/> Particles (Dust, Mist, Fume) <input type="checkbox"/> Gas/Vapour <input type="checkbox"/> Particles + Gas/Vapour (Combined)	
3	Required Particle Filter	<input type="checkbox"/> N95 / P2 or above <input type="checkbox"/> P95 / P2 or above <input type="checkbox"/> P100 / P3 <input type="checkbox"/> Other (specify) - _____ <input type="checkbox"/> N/A	
4	Required Gas/Vapour Filter Type	<input type="checkbox"/> Specify - _____ <input type="checkbox"/> N/A	
5	Number of Cartridges	Double Cartridges (N/A for Filtering Half-Mask against Particles)	
6	Size	<input type="checkbox"/> Medium <input type="checkbox"/> Specify - _____	



General Requirements			
Sr No	Item	Requirement	Offered
7	Brand	specify	
8	Model	specify	
9	Country of Manufacture	specify	
10	Applicable Standard	BS EN or NIOSH approved	
11	Any special designs, if available	specify	
12	Ability to carry out a fit testing by the supplier	Yes	
13	Ability to replace the pre-particle filter in combined filters (gas + particle filters)	Yes	
14	Year and Month/Quarter of Manufacture	Manufactured within two years before the bid closing date.	
15	Marking on the equipment	Yes	
16	Test Reports/ Summary Sheet submitted	Required	
17	Quality Assurance for Manufacturer	Please refer clause 9	
18	Samples	Please refer clause 12	
19	Warranty	specify	
20	Packing details submitted	Please refer clause 11	
21	Product catalogues, technical literature submitted	Please refer clause 11	
22	Information on the following should be submitted Instructions for use, information on storage, shelf life, fitting and adjustment, handling, cleaning, disposal, periodic inspection, periodic testing	Please refer clause 11	

I/We certify that the above data are true and correct

.....
Signature of the Bidder/Manufacture and Seal

.....
Date

