



 **S A F E T Y**
protection equipment

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About Mestel Safety

Mestel Safety is a company of the OCEAN REEF Group with 63 years of experience molding rubber goods and working in several different markets. The following are some of the products produced:

- Fashionable watch rubber, silicone, plastic, multi-compound components
- Diving equipment
- Military protection equipment
- Respiratory PPE
- Molding of silicone, liquid silicone, rubber, plastic and thermoplastic goods
- Engineering and manufacturing of molds for rubber/silicone and plastic
- Electronics
- Under Water Communication Systems
- Engineering
- Project Management
- Medical Products
- OEM

OCEAN REEF Group has 2 manufacturing plants of 6,000 and 40,000 sq/feet in San Diego, CA - USA and Genoa - Italy. Mestel Safety Italy is an ISO 9001-2008 certified company and also a NATO classified supplier.

The Production facility includes injection and compression presses, electronic components assembling, finished goods assembling and a testing dept.

The R&D includes a sophisticated rubber/silicone compounds testing laboratory, an advanced computerized self contained breathing checking apparatus, a 32,000 liter pool with computerized ultrasonic underwater communication control system and video/audio closed circuit for demonstration and training, and two Pro E working stations for product engineering and mold design.

Mestel Diving Equipment is distributed under the Registered Trademark, OCEAN REEF.

The Military and Respiratory PPE is known under the Mestel Safety brand or simply, SAFETY Protection Equipment.

In the late 1980's, Mestel decided to broaden its fields of production to not only include medical, diving, and military products but safety products as well. This change was due to a growing need for safety throughout the world. Mestel ambitiously decided to create a gas mask, based on new innovative concepts,

that was very different in design than all the gas masks produced up to that point.

The new full face gas mask was named the SGE 1000. The SGE 1000 did not use the cumbersome system of twin goggles with a rubber mask. Rather, the "SGE" mask used a transparent polycarbonate rigid full face visor shield with a comfortable rubber skirt (patented springing seal design) which covered the face and supported the other components of the gas mask.

After a few years, the Protection Division received international acclaim for the success of the SGE 1000. After the September 11, 2001 terrorist attack at the World Trade Center in New York, Mestel realized the need to change its market strategy and it was compelled to assist in the need by providing safety solutions to prevent casualties and properly assist people in possible future situations that may be similar to the 9/11 disaster. Mestel decided to create a new "Homeland Security Program Range of Products" and, soon after, a new working group started to operate.

This new branch would focus its efforts on developing and producing safety products,

specifically breathing protection devices, which would be beneficial in Homeland Security situations. Currently, Mestel Safety offers a wide variety of safety products that are useful for a broad range of people (professionals and general public). This brochure outlines the credentials of Mestel Safety, the engineering/design and production capabilities of the products Mestel Safety offers, and their evolution and flexibility to be modified in accordance with customer needs.

The first Mestel gas mask, the SGE 1000, started a world wide generation of “advanced” breathing protection devices. Currently the SGE 1000 is out of production; however, most of the protection products that Mestel Safety currently produces are evolutions from the SGE 1000.



Protection Products

SGE 150 Gas Mask



SGE 150 Gas Mask
(medium/large - code: 33970)
(small/medium - code: 33980)

An escape mask with many features of the SGE 400 and SGE 400/3 gas masks.

The SGE 150 Gas Mask has multi-purpose applications. The following are the characteristics of the mask:

- Silicone face seal
- Single front filter port
- Polycarbonate face shield
- Light weight
- Compact large field of vision
- Easy Maintenance

SGE 400 Gas Mask



SGE 400 Gas Mask
(medium/large - code: 33990)
(small/medium - code: 33981)

The SGE 400 mask has been designed to meet military and civil defense requirements.

The following are the characteristics of the mask:

- Single front filter connection
- Ballistic and chemical aggressive treated face shield
- Silicone face seal (excellent for long period use; tested for 6 days without removing)

SGE 400/3 Gas Mask - SGE 400/3 BB Gas Mask



SGE 400/3 Gas Mask
(medium/large - code: 33994)
(small/medium - code: 33982)

Identical to the SGE 400 but with 3 NATO 40mm DIN 3283 filter ports. Side location of filter allows a more comfortable aiming of a gun.

SGE 400/3 BB Gas Mask
(medium/large - code: 33992)
(small/medium - code: 33983)

Identical to the SGE 400/3 but with a butyl rubber face seal to respond to the CBRN requirements.

Comparative Table of Mak

	SGE 150	SGE 400	SGE 400/3	SGE 400/3 BB
Filter ports	1 (front)	1 (front)	3 (side & front)	3 (side & front)
Face silicone seal	Silicone	Silicone	Silicone	Butyl rubber
Face shield coating	No	Yes	Yes	Yes
Additional bottom port	No	Available	Available	Available
Drinking device option	No	Yes	Yes	Yes
Microphone connection	No	No	Available with side port substitution	Available with side port substitution
Lenses support	Available as access.	Available as access.	Available as access.	Available as access.
Integrated hood	Available	Available SGE 400/C	Available	Available
Speaking diaphragm	Available on request	Available on request	Available on request	Available on request
Mustard gas resistance	No	Face Shield Only	Face Shield Only	Yes



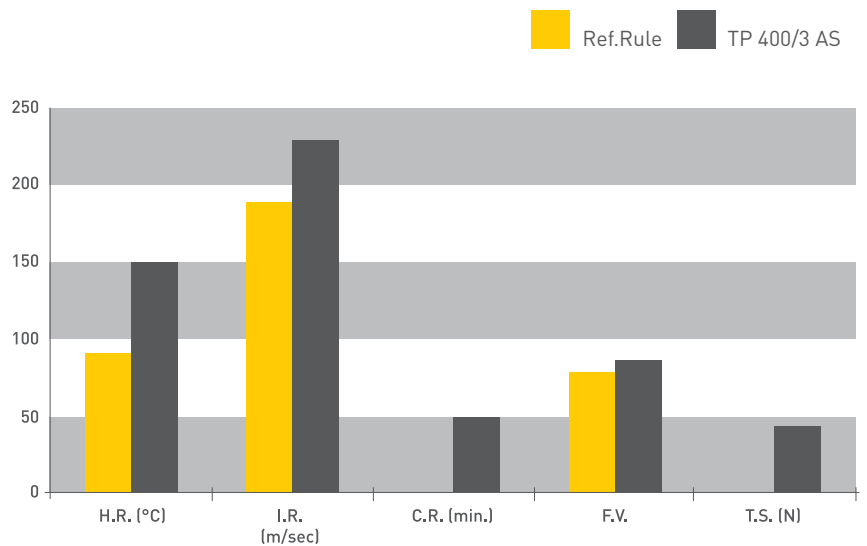
TP 400/3 AS
(mask with helmet - code: 34000)

The TP 400/3 AS (NATO ID 7272) is a PPE designed in collaboration with Italian Carabinieri to respond to 4 different needs of Police Departments engaged in antiriot operations.

Allowing police-personnel face protection against hits, inflammable liquids, even burning liquid or viscous chemical agents.

The gas mask is connectable to the antiriot helmet by 4 connection points, that are not flexible, which are positioned at 90 degrees to each other to guarantee the highest torsion rigidity even during contact situation (fighting).

Allows breathing protection in accordance with EN 136:1998 CL 3. Allows the use of standardized 40 mm NATO filters, applicable individually in the front or on both sides as a twin filter. The one-side single application is particularly comfortable when aiming guns, even for left-handed police-personnel.



I.R.	Impact Resistance: The TP 400/3 AS has been tested in conformity of STANAG 4096 ("broken ball"). The TP 400/3 has a score of V50, equal to 229 m/sec. The EN 166 is requiring a protection up to 190 m/sec. TP 400/3 AS exceeds the norm of 20%.
C.R.	Chemical Resistance: The permeability time of the visor and the face seal against a compound of mustard gas and clorobenzene at 20/80. The result is exceeding the 50 minutes of resistance. (NO PENETRATION).
F.V.	Field of Vision: The reference rule EN 136 requires a binocular view angle of 80%. The TP 400/3 reaches the 87% .
T.S.	Disconnection Strength : to remove the TP 400/3 AS from the policemen's face w/out the release of the buckles it is necessary to apply a strength of 470 Newton.

Multipurpose Filters A2B2E2K2P3



Intended use: Respiratory protection against gases vapors and particles in conjunction with a specified face piece. Scope of protection as indicated by product documentation, technical standards and installed application rules.

Connection to face piece: Standard thread connection (Rd 40mm x1/7")

Filter housing: aluminum, coated inside
 Sorbents: activated and impregnated carbon
 Particle filter: micro glass fibers, cellulose-fibers
 Plugs: polyethylene
 Shelf life: 5 years
 Outer diameter 108.5 mm
 Height (incl thread and plugs): 75 mm
 Weight: approx 370 gr

Filter type and category

Type	Code Color	Main Applications	Class	Max. permissible concentration
A	Brown	Organic gases and vapours with boiling point greater than 65 degrees °C	1 2 3	1000 ppm (0,1 % by vol.) 5000 ppm (0,5 % by vol.) 10000 ppm (1,0 % by vol.)
B	Grey	Inorganic gases and vapours, e.g. chlorine, hydrogen sulphide, hydrogen cyanide, but not carbon monoxide	1 2 3	1000 ppm (0,1 % by vol.) 5000 ppm (0,5 % by vol.) 10000 ppm (1,0 % by vol.)
E	Yellow	Sulphur dioxide, hydrogen chloride and other acid gases	1 2 3	1000 ppm (0,1 % by vol.) 5000 ppm (0,5 % by vol.) 10000 ppm (1,0 % by vol.)
K	Green	Ammonia and organic ammonia derivatives	1 2 3	1000 ppm (0,1 % by vol.) 5000 ppm (0,5 % by vol.) 10000 ppm (1,0 % by vol.)
Hg-P3 ²	Red-White	Mercury	-	-

Gas Mask Accessories

PVC Hood



PVC Hood
(mask accessory - code: 6715 - hood only)

Integral PVC Hood Option

Add a PVC hood to your SGE mask. The over-hood shroud covers the head, shoulders & upper chest; unlike other over-hoods, there are no gaps between the face-piece & hood. This is because the over-hood is permanently connected between the polycarbonate visor & facial gasket, which eliminates the possibility of user error & contaminates passing through the seal around the mask. This design leaves the head harness outside the hood for easy adjustment of the straps.

Optical Lens Support



Optical Lens Support
(mask accessory - code: 33299)

The lens frame for the SGE masks are made in a way to rapidly fit corrective lenses without the need to use any tool.

The lenses are mounted on the frame C 21 which snaps into the inside of the mask. The system avoids the use of glue, ensures a large field of vision, avoids fogging of the lens, and allows the use of standard lenses.

Materials Used

support lenses: polyamide 12

Internal Drinking Device (installed in the mask)



Drinking Device (installed in the mask)
(code: OR030000)

The internal drinking device for SGE 400–400/3 and 400/3BB masks is an optional accessory that could be easily assembled in place of the bottom cap of the mask.

The drinking device may be rotated, moving the internal tube to intercept the mouth and avoiding any uncomfortable condition when not necessary.

The external drinking device is supplied with a safety valve. To drink it is necessary to squeeze the valve, otherwise the tube is closed.

Water Canteen (w/pouch 1LT)



(code: OR03001)

External Drinking System for canteen



(code: OR03002)

External Drinking System



(code: 31999)

Speech diaphragm



The speech diaphragm seats in the same slot as the exhalation membrane.

Technical Mask Information

Integrate Holders for accessories

Quick Release head harness

One Piece full visor solvent and scratch proof



Filter Attachment EN STANDARD, EN148-1 RD 40-1/7"

Filter Attachment EN STANDARD, EN148-1 RD 40-1/7"

Recessed Viewing Area close to eyes

1. Integral face-piece

General features

This stiff, transparent structure is the actual supporting body of the SGE 400 protective masks. Its task is to replace the rubber bodies previously employed by traditional designs to bear the weight to which the mask is subjected. This unit supports the head harness, valves, filters, regulators, etc.

The main part of the face-piece, which consists of a large round surface in front of the eyes, is set back in the structure, thus keeping the overall dimensions to a minimum, reducing the risk of scratching and allowing the use of optical instruments so often used in today's armed forces. The material used is a specially coated polycarbonate (SGE 400; SGE 400/3; SGE 400/3 BB only), which transmits at least 90% of available light while absorbing U.V. rays.

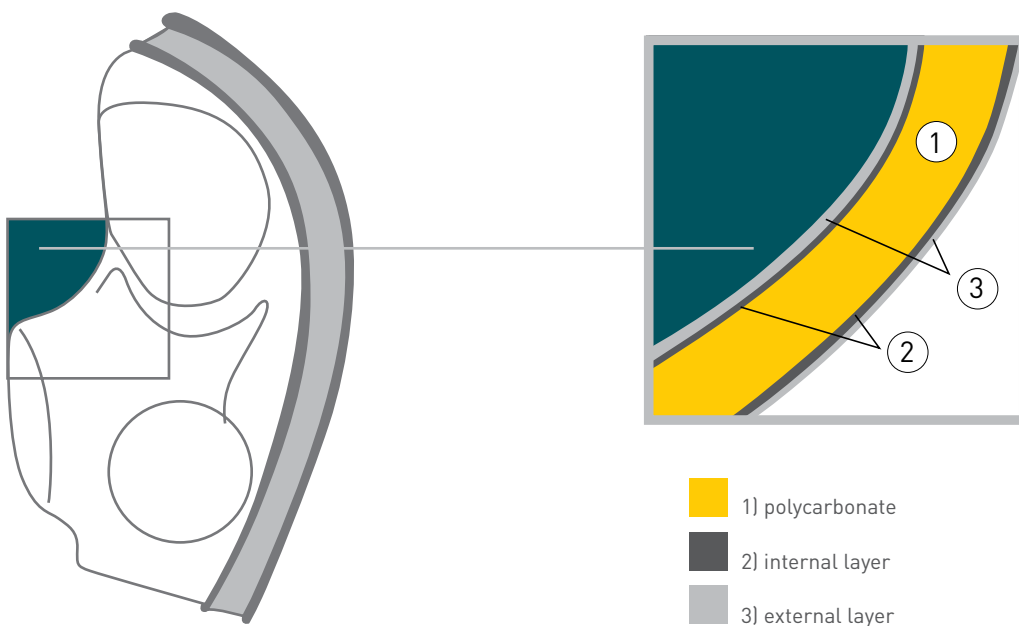
The advantages of this innovation are:

- a substantially reduced mask weight
- a better field of vision (practically the whole mask is transparent)
- the weight is held by a rigid structure, unlike the traditional rubber body which is flexible
- protection of the face is guaranteed by the impact and cut resistant structure
- for the above reasons and the consequent lack of discomfort due to limitation of field of vision, the mask fits comfortably which increases the amount of time a person can wear it
- the wearer can be easily identified due to the total transparency of the face-piece, helping to normalize conditions and maintain discipline

Mechanical features

In the SGE masks, the entire body of the masks is made of a strong, rigid material (polycarbonate) and is therefore able to allow full protection for the face and eyes against extremely violent impacts.

Laboratory tests have been carried out proving that the polycarbonate body is left unharmed by a 6.35 caliber bullet hitting it at a speed of more than 150 m/seconds. This means that the whole face is given the same protection afforded by the protective helmet.



Resistance to chemical agents

Treatment of the outer surfaces (SGE 400; SGE 400/3; SGE 400/3 BB only) makes the polycarbonate resistant to aggressive substances. Samples of the treated material have been subjected to mustard gas penetration tests. After over 50 hours, mustard gas failed to penetrate through the tested specimens.

The treated face-piece may also be decontaminated an unlimited number of times without deterioration, using all the normal decontamination methods including immersion in boiling water.

Material used

Face-piece: Transparent polycarbonate - Treatment (SGE 400; SGE 400/3; SGE 400/3 BB only): Polysiloxane resin

2. Face-seal

Due to the use of an integral load-bearing face-piece, it was possible to make the rubber face-seal much lighter, as its only function is to act as a seal. Traditional masks consist basically of a load-bearing rubber structure fitted with two sealed eye-pieces, and since the rubber body has to bear the weight of all the accessories attached to the mask it has to be made rigid and thick (heavy and uncomfortable) and will therefore not adhere comfortably to the wearer's face.

Our face-seal, on the other hand, is made of very soft rubber with a supple bellows type structure which allows perfect sealing and a very high degree of comfort even after very prolonged use. The bellows type structure also allows it to adjust easily to all face shapes, so that it is no longer necessary to stock large numbers of different sizes of masks, many of which will go unused.

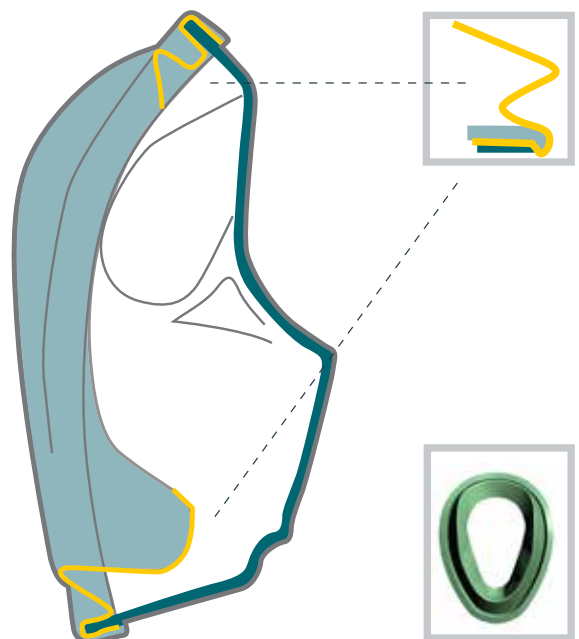
The face-seal has a seat into which the edge of the load-bearing face-piece is inserted, and the coupling of these two parts is ensured by the fixing rim. As a whole, the straps, face-seal and stiff body of the mask together provide far more comfort than traditional masks.

In the case of traditional flexible rubber bodies, the tensile stress exerted by the ends of the straps are discharged only on the points where these join the body. In order to obtain uniform sealing all around the edge of the mask, it is therefore necessary to pull the straps very tight.

Naturally, this situation is one of the greatest causes of discomfort when using traditional masks. SGE's stiff body means that the effort applied by the straps is distributed evenly and perfectly all around the edges of the mask so that it is not necessary to tighten the straps excessively and uncomfortably.

Material used

Platinum-catalyzed grade silicone rubber



3D seal

3. Filter fittings



The SGE masks have a threaded fitting for application of standard filters (DIN 3183, UNI EN 148-1). The fitting is contained in a single unit which also comprises the exhalation valve. The shape of the internal ring nut allows perfect ventilation of the whole face-piece, preventing misting even at low temperatures.

Mechanical characteristics

The material used is black polyarilamide, created for aeronautical and aerospace requirements. In addition to very high impact resistance, it is not affected by aging or atmospheric factors. Its abrasion resistance is such that after testing with over 3000 assembly/disassembly operations, the filter had sustained no wear.

Material used

Technopolymer parts: Polyarilamide reinforced with mineral charges Membrane: Polyisoprene mixture

4. Exhalation valve



As already seen, the exhalation valve is fitted onto the same unit containing the filter fitting.

Externally the valve has a structure which, although it covers the whole membrane, still allows easy discharging of the exhaled air.

The purpose of this covering structure is to keep a sufficient volume of uncontaminated air in continuous contact with the membrane.

6. Membranes



The exhalation membrane has been made to require minimum effort even at very high flow rates. The excellent memory of the membranes has been achieved by a combination of good design and high grade material. A considerable increase in resistance to chemical agents, has been achieved, using blends containing butyl rubbers instead of the traditional natural rubber used by other manufacturers.

7. Oral-nasal unit



The design of this component is critical to the effectiveness and comfort of the mask. Because it comes in direct contact with particularly sensitive areas of the face, the correct choice of shape and material was vital. The oral-nasal area of our mask is made of soft medical grade silicone rubber, designed specifically for use in contact with the human body for indefinite periods of time without causing irritation or allergic reactions of any kind. The shape is designed to provide optimum comfort and efficiency; the U shaped peripheral lip performs the following important functions:

- it adheres softly and evenly to the face, following its contours perfectly
- it has a sufficiently rigid structure to ensure effective sealing during inhalation
- it is sufficiently soft to open and swell under the slight pressure caused by exhalation, isolating the nose and mouth area perfectly from the rest of the mask

Breathing valve system

Two very light inhalation valves are attached laterally to the oral-nasal unit, the lower part of which is connected to the auxiliary drainage valve. The front part of the oral-nasal unit is attached into the exhalation/speech/feeding valve unit. This union is obtained by using the rubber's elasticity, guaranteeing perfect sealing.

Material used

Membrane: Polysoprene. Oral-nasal unit: Platinum-catalyzed medical grade silicone rubber

8. Fixing rim and strap



The fixing rim has the role of connecting the straps to the frame of the mask and at the same time fixing and locking the face-seal and the incorporated hood, if used. Once the rim is tightened in place by means of the special screw, it fits into a special seat in the frame of the mask.

In this way, the pull exerted on the fixing points of the head harness is transferred and distributed evenly around the whole circumference of the mask, allowing perfect adjustment of its tightness for maximum comfort and optimum sealing on the face of the wearer.

It should be pointed out that this is not possible with the traditional mask, as the pull exerted by the strap itself is secured, thus requiring the wearer to over-tighten the mask, drastically reducing the level of comfort.

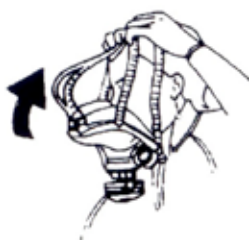
Material used

Rim: Polyamide 11 - Head-strap: NBR rubber

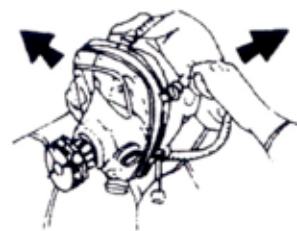
- (1) Loosen all the straps
(1) Allungare tutti i cinghiaggi



- (2) Wear the mask
(2) Indossare la maschera



- (3) Adjust the side straps
(3) Regolare i cinghiaggi laterali



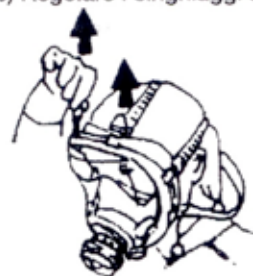
- (4) Correct position of the spider
(4) Posizione corretta del cinturino



- (5) Adjust the lower straps
(5) Regolare i cinghiaggi inferiori



- (6) Adjust the top straps
(6) Regolare i cinghiaggi superiori



9. Cleaning and decontamination

The mask design makes decontamination and cleaning easier. In fact, even when rubber is made of mixtures capable of providing a chemical shield, its structure does absorb and is penetrated by the contaminants. The SGE masks are made of two main parts: face shield and face seal. So the majority of the mask is made of plastic materials which are not permeable to aggressive agents, and are not penetrated by them even after very long exposure times. It is advisable to clean the mask each time after use. This is easily accomplished by washing with soap and water. Hot water can also be used. The mask can be disinfected using non aggressive disinfectants or by immersing it briefly in boiling water. At least once a year the inhalation and exhalation membranes must be checked, as well as the sealing gasket of the fitting on the mask.

Mestel Safety Credentials

Mestel Safety understands the importance of testing and certifying products. Therefore, over the years, Mestel Safety has undergone many certification processes and testing. The following are some of the certifications and countries that the Mestel Safety Gas Masks have been certified in:
(more information is available upon request)

1. **Certification ISO 9001-2008**
2. **University of Genoa Certification**
3. **Spain** (Centro Nacional de Medios de Protec- tion, Certificate of Approval No. 3082)
4. **Denmark**(Societa Generale Elastomeri S. p. A., Ar- bejdstilsynet)
5. **Australia**(Work Cover Authority, Certificate of Ap- proval No. 1778)
6. **England**(Health and Safety Executive, Certificate of Approval, CA/156/89)
7. **Complies with BS EN 136 UK, Germany, Denmark, HSE, DIN, EN 136:98**
8. **NATO classified supplier**

Product Testing

Mask Performances and Specifications

PENETRATION TIME OF WARFARE CHEMICALS

Mustard Gas Resistance

Mustard gas penetration on the SGE masks, and in particular on the butyl rubber face-seal of the SGE 150 and SGE 400/3 BB masks and the visor coating on the SGE 400 – SGE 400/3 - SGE 400/3 BB masks, had the following results:

Test made by:

Gruppe fuer Ruestungsdienste Laboratory – AC R&D Management
Polymers and protective raw materials

Customer FA 36 individual protection Subject : masks SGE 1000

Materials quality : different

Supplier : S.G.E.

Sample # : sample

Charge : IS-89-200

Packing slip 4.4.1989

Prescription testing rules : material identifications Test made by : Liechti , Hans Hulrich

Receipt note : 04.20.1989 # internal receipt : 89-256

Distributor IS, P+SW

Mustard gas resistance L000282

Sample shape: round ,diam. 44 mm

Test conditions: 30 C, mustard gas, chlorobenzene = 20:80

VISOR

(#1), 2.30 mm thickness-go through as gas = > 50 h

(#1), 2.30 mm thickness-go through as gas = > 50 h

Face seal

(#3), 2.68 mm thickness-go through as gas = > 50 h

(#3), 2.68 mm thickness-go through as gas = > 50 h

(#3), 2.68 mm thickness-go through as gas = > 50 h

The SGE masks are fully resistant to all used means of decontamination, including boiling water.

CARBON DIOXIDE CONTENT

Inhaled air: 0,44%

FIELD AND QUALITY OF VISION

The full transparent body allows a much wider field of vision. The quality of vision is not impaired in cold environment. The SGE masks are supplied with an easily removable corrective lens system using standard lenses.

FIELD OF VISION

(Eye area only)

Total (red + pink + yellow): 87% - Stereo field (pink): 80%

FOGGING UP OF VISOR

(Tested up to -30° C.)

- Starting cold: no fogging up
- Starting warm: no fogging up

LIGHT TRANSMITTANCE 92%

Field of vision

- Total 87%
- Overlapping 80%

COMMUNICATION

Microphone, earphones and hearing protection devices can be easily fitted to the mask. Due to the position and type of speech membrane, loud speaker use is easy and efficient.

PROTECTION AGAINST CONVENTIONAL WEAPONS

The visor protects not only the eyes, but the whole face against fragments, stones, splinters caused by explosions. It can stand with no damage (break or perforation) to the impact of a steel sphere 6.35 mm caliber bullet hitting the mask at any point at the speed of more than 150 m/sec.

Blast effects do not impair the protection performances as all the membranes are able to stand significant pressure. The speech diaphragm in particular is the open type and does not use the old rigid metal membrane.

HEAT RESISTANCE

The masks in all their parts are flame resistant and heat-radiation resistant. The mask does not melt or catch fire when tested accordingly with the EN 136 specification and the German Fire-Brigade radiation test. (800 C. temp. of flame for 5 sec. 200 C. temp. for 6 minutes).

DRINKING ACCESSORIES

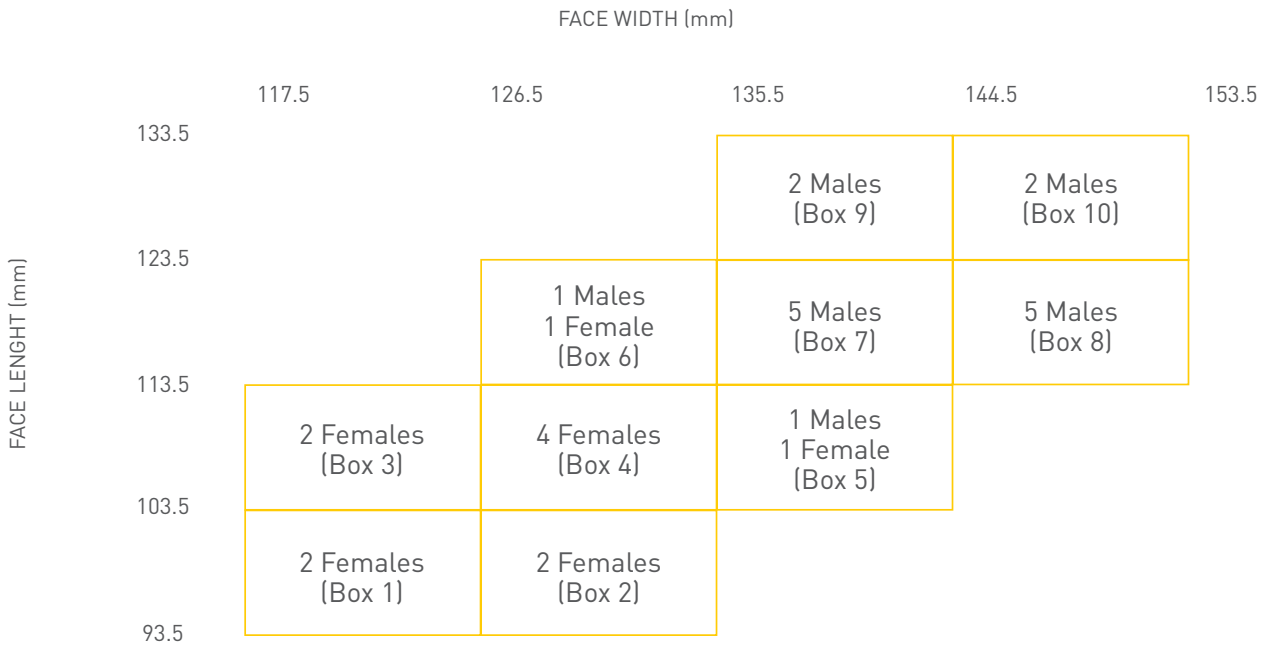
The SGE 400, 400/3, & 400/3 BB may be supplied with a drinking system (see mask accessories).

WEARING AND USE

The SGE masks have been developed to provide 5 days of continuous wearing. Thanks to the new concept of rigid body, it has been possible to adopt an exceptionally comfortable face-Seal.

LEAKAGE TEST/SIZES

The Protection factor allowed by the SGE masks have been proved by several certification laboratories worldwide. The most recent survey has been made by SBCCOM at Aberdeen Proving Ground (MD) on November 22nd 2003 in according with the new CBRN norms: the Procedure is the N° RCT- CBRN – STP-001. In accordance with the Los Alamos Scientific Laboratory ,25 member (male and female) Panel for testing of full face masks. LARGE of SGE 400/3 BB's have been submitted to a complete test of leakage.



25 participants performed 11 standard exercises, 1 minute long each, using a routine devised to stress the face seal of the respiratory face-piece. During the test, each test subject is asked to perform normal breathing; deep breathing; turning head side to side; moving head up and down; reciting the rainbow passage; sighting the rifle; reaching for the floor and ceiling; getting on hands and knees; grimacing exercises; and climbing the stairs at regular pace.

The max. PF is 100000 The minimum, acceptable PF is 500 on 95% of samples.

The following table shows:

- The date of the test
- The time of the test
- The mask number
- The subject number
- The head size in accordance with the Los Alamos table - The trial n°
- The average fit
- The results for each of the 11 tests

SBCOM Table

date	time	mask	subject	head size	concept	trial	avefit	exrcs1	exrcs2	exrcs3	exrcs4	exrcs5	exrcs6	exrcs7	exrcs8	exrcs9	exrcs10	exrcs11
11/19/2003	14:37:05	a1	1	9	1	1	74994.5	100000.0	100000.0	100000.0	100000.0	21423.7	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0
11/19/2003	4:55:59	a1	1	9	1	2	82395.0	100000.0	100000.0	100000.0	100000.0	90044.2	67118.3	36365.7	100000.0	100000.0	100000.0	100000.0
11/22/2003	10:41:25	a4	11	4-	1	1	6064.9	15732.7	9608.4	19698.6	5009.1	12634.5	14974.8	12198.5	13343.0	3394.6	1967.9	3447.6
11/22/2003	11:06:35	a4	11	4-	1	2	852.6	5001.7	3256.8	6422.1	4424.7	3815.7	14875.0	1690.9	6951.6	3669.1	101.8	1166.5
11/22/2003	11:30:36	a4	11	4	1	3	97133.8	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	75495.3	100000.0	100000.0	100000.0	100000.0
11/22/2003	10:41:26	a11	12	5	1	1	2623.7	752.1	5547.0	1290.5	3589.0	10528.1	2246.2	3208.9	6493.7	5114.6	4809.1	4546.7
11/22/2003	11:06:36	a11	12	5	1	2	2453.3	2928.2	2591.3	1278.2	4809.0	7649.6	1290.4	1921.2	2082.0	3807.6	2926.2	3917.9
11/22/2003	10:41:28	a3	13	6*	1	1	666.3	771.6	707.2	770.0	731.2	581.3	639.2	557.5	603.3	705.9	579.1	797.9
11/22/2003	11:06:37	a3	13	6	1	2	9041.7	9181.7	9554.3	11556.6	13430.6	8501.4	8841.7	6934.4	7683.2	12089.7	6959.0	9048.4
11/22/2003	11:30:45	a1	14	5-	1	1	5847.2	3530.4	3343.3	3570.8	3923.4	3779.8	4882.7	15838.8	20152.0	15838.1	17567.6	16186.9
11/22/2003	1:55:55	a1	14	5-	1	2	1413.3	1079.1	1321.7	1152.8	1192.2	1183.2	1230.0	2206.8	1918.7	1790.6	1702.6	1624.5
11/22/2003	11:30:38	a8	14	5	1	3	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0
11/22/2003	11:52:59	a1	14	5	1	4	96781.1	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	73214.5	100000.0	100000.0	100000.0
11/22/2003	11:30:46	a8	15	6	1	1	4535.7	4689.7	4281.3	4433.8	14829.8	20086.3	8618.4	5333.1	3521.2	3555.8	2609.5	2606.5
11/22/2003	11:55:57	a8	15	6	1	2	5537.0	100000.0	100000.0	100000.0	100000.0	100000.0	5025.2	2005.6	3091.0	3558.9	3050.8	3259.9
11/22/2003	11:30:48	a7	16	7	1	1	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0
11/22/2003	11:55:58	a7	16	7	1	2	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0
11/22/2003	11:30:49	a10	17	7	1	1	17.8	16.7	20.3	19.6	17.3	27.0	16.0	15.7	16.1	17.2	16.6	17.8
11/22/2003	11:55:59	a10	17	7	1	2	256.5	198.9	293.0	255.0	216.7	518.5	281.0	245.9	217.6	215.4	299.8	264.1
11/22/2003	11:53:00	a10	17	7	1	3	18735.2	22538.5	20032.4	21600.1	29351.0	17451.7	27068.6	16293.0	14514.2	17908.5	14496.8	15838.2
11/22/2003	10:32:04	a9	18	8	1	1	48494.1	63549.7	76810.1	97063.8	58334.4	33335.6	100000.0	37936.8	30934.4	50726.3	34449.8	43091.6
11/22/2003	10:55:43	a9	18	8	1	2	36982.2	100000.0	73604.3	18816.2	34315.2	40455.5	62416.7	31129.9	29793.2	39894.1	27399.6	42417.0
11/22/2003	10:32:05	a6	19	8	1	1	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0
11/22/2003	10:55:44	a6	19	8	1	2	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0
11/19/2003	15:42:28	a2	2	5	1	1	72692.1	100000.0	100000.0	100000.0	100000.0	100000.0	20506.0	79637.0	100000.0	100000.0	100000.0	100000.0
11/19/2003	16:05:07	a2	2	5	1	2	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0
11/22/2003	10:32:07	a12	20	9	1	1	26747.3	29455.0	26905.7	25412.4	26178.1	26077.4	28804.0	25018.4	24618.5	27056.0	27765.5	27811.1
11/22/2003	10:55:45	a12	20	9	1	2	22294.0	30860.4	20115.8	25513.5	23952.6	24391.5	24517.3	21506.8	19056.1	22374.4	20128.0	18112.3
11/22/2003	10:32:08	a2	21	10	1	1	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0
11/22/2003	10:55:46	a2	21	10	1	2	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0
11/19/2003	16:38:43	a3	3	3	1	1	530.1	560.1	477.7	463.9	624.9	654.1	517.9	491.6	479.4	530.2	501.3	603.8
11/19/2003	16:58:02	a3	3	3	1	2	756.6	801.2	707.6	650.4	850.3	871.5	646.8	660.2	723.1	864.0	795.9	863.1
11/19/2003	16:38:44	a4	4	7	1	1	64753.1	100000.0	22799.5	100000.0	64191.0	32854.9	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0
11/19/2003	16:58:04	a4	4	7	1	2	83286.5	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	64506.9	37633.7	100000.0	100000.0	100000.0

date	time	mask	subject	head size	concept	trial	avefit	exrcs1	exrcs2	exrcs3	exrcs4	exrcs5	exrcs6	exrcs7	exrcs8	exrcs9	exrcs10	exrcs11
11/19/2003	16:58:05	a5	5	5	1	1	29308.4	52430.5	56220.5	30006.3	31597.0	53437.2	35237.1	15599.5	17179.1	43718.2	17337.4	42509.6
11/19/2003	17:59:27	a8	5	4	1	1	99794.7	100000.0	100000.0	100000.0	100000.0	97787.1	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0
11/19/2003	17:37:49	a5	5	5	1	2	35009.2	64920.6	87471.0	30300.9	24671.1	29258.3	31711.9	21270.9	22219.6	62955.5	52581.2	47171.5
11/19/2003	17:37:50	a6	6	10	1	1	73917.8	100000.0	100000.0	100000.0	100000.0	100000.0	62299.7	51326.2	100000.0	100000.0	100000.0	30048.8
11/19/2003	17:59:28	a6	6	10	1	2	93925.4	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	58431.2	100000.0	100000.0	100000.0	100000.0
11/19/2003	17:37:52	a7	7	4	1	1	13895.4	100000.0	100000.0	13895.4	68005.7	88143.0	2296.8	27019.3	100000.0	31111.2	5467.7	100000.0
11/19/2003	17:59:29	a7	7	4	1	2	180.5	640.1	256.5	788.6	480.5	195.9	146.3	298.5	1810.3	508.5	45.4	81.2
11/19/2003	18:21:11	a7	7	4	1	3	88972.1	100000.0	100000.0	100000.0	100000.0	42311.5	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0
11/19/2003	18:21:09	a8	8	4	1	2	34334.9	29633.3	22904.3	33483.9	45008.6	9310.3	29871.8	100000.0	100000.0	100000.0	100000.0	100000.0
11/19/2003	18:21:10	a9	9	2	1	1	17.1	92.6	98.9	62.7	11.2	50.5	57.3	5.9	7.5	18.5	10.8	33.6
11/19/2003	18:40:23	a9	9	2	1	2	184.4	53.1	78.6	139.1	132.3	190.1	213.6	1044.3	3615.3	929.8	2117.7	1619.9
11/22/2003	11:30:39	a7	16	7	2	1	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0
11/22/2003	11:53:01	a7	16	7	2	2	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0
11/22/2003	12:19:59	a9	18	8	2	1	32213.7	100000.0	100000.0	23446.4	39253.3	30771.8	29552.2	17605.7	20634.2	39099.9	34769.9	36485.2
11/22/2003	12:42:21	a9	18	8	2	2	36160.1	45673.2	63029.1	19671.2	34881.6	39372.8	100000.0	28757.1	33862.5	47773.2	27518.6	33373.5
11/22/2003	12:20:00	a6	19	9	2	1	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0
11/22/2003	12:42:22	a6	19	8	2	2	48786.0	7969.7	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0
11/22/2003	12:20:01	a12	20	9	2	1	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0
11/22/2003	12:42:23	a12	20	9	2	2	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0
11/22/2003	12:20:02	a2	21	10	2	1	98975.5	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	89778.1
11/22/2003	12:42:24	a2	21	10	2	2	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0

*after the first two trials on Subject 17 using material was removed from a side port plug Mask A10, a large piece of material was removed from a side port plug

**after the first trial on Subject 13, the sampling line was replaced; the higher trial MAY have been the result of a bad sampling line (it can be argued that the failed data point was also due to fit failure, and redonning of the mask caused the passing second data point)

***after the first two trials on Subject 11 using Mask A4, loose canister was tightened, and a visibly damaged sample line was replaced

****after the first two trials on Subject 14 using Mask A1, an unseated gasket was detected in the side port; Subject 14 was then tested once in Mask A8 and then in a repaired Mask A1

- Mask fit failure
- Data not used due to failed RDECOM Equipment
- Manufacturer QC problem caused mask failure

*Additional leakage tests are available on pages 25-29

INTRODUCTION

Samples of SGE model 400 full face mask were submitted for testing to EN 136.

PROCEDURE

The tests were performed as specified in EN 136.

RESULT

- 4.1 Material**
Exposed metallic parts comprise the machine screw and nut used to clamp the visor bezel. Stainless steel.
- 4.2 Cleaning and disinfecting**
1% Tego mhg 103g solution used satisfactorily on all samples tested.
- 4.3 Speech diaphragm assembly**
- 4.4 Replaceable components**
The following component parts of the face-piece were replaceable: inner mask, head harness, visor, connector (*), inhalation valve, exhalation valve (*), check valves. Those parts marked (*) required the use of the special tool supplied.
- 4.5 Practical performance test**
2 samples, as received, were subjected to the practical performance test. There were no adverse comments on:
- 4.11.1 Donning/doffing
 - 4.11.2 Adjustability/comfort/security
 - 4.13.2 Distortion of vision
 - 4.13.4 Reduction of misting - no misting
- Speech transmission
- Ambient temperature, 27° C, relative humidity, 57%.
- 4.6 Resistance to temperature**
Samples numbered 5 and 5 were subjected to 72 hours @ 70°C, 72 hours @ 70° C and 100% RH and 24 hours @ -30°C.
- No visible deformation was evident on either sample following return to laboratory ambient conditions.
- 4.7 Inward leakage**
All the tested samples did not overcome the limit of 0,05%. See annex 1 for detail.
- 4.8 Compatibility to skin**
No adverse reaction during wearer tests.
Material used: Platinum catalyzed silicone — FDA N° 1172600.

RESULT

4.9 **Flammability**
Prior to flammability tests all samples have been leak tested. All the samples have held a vacuum of 12.5 mbars for 60 seconds before and after the flame test.

4.10 **Carbon dioxide content of the inhaled air**
1 sample, as received, was tested. The value was found to be 0,44%. This satisfies the maximum permitted value of 1%.

4.11 **Head harness**

4.11.1 **Harness donning and doffing**
Assessed as satisfactory during practical performance tests.

4.11.2 **Harness adjustment and security**
Assessed as satisfactory during practical performance tests.

4.11.3 **Harness strap tensile test**
All 6 straps on each of 3 as received samples were tested. All passed.

4.11.4 **Harness strap deformation**
All 6 straps of each of 3 as received sample harnesses were tested.

The extensions were:

Mask	1	2	3	4	5	6
1	46	46	54	56	48	44%
2	48	48	54	54	48	46%
3	48	46	52	52	50	44%

All satisfy the 100% maximum extension permitted.

The permanent linear deformations were as follows:

Mask	1	2	3	4	5	6
1	1	2	2	2	2	1%
2	2	2	2	2	2	1%
3	1	1	2	2	2	1%

All satisfy the 5% maximum permitted.

4.12 **Face piece connector**
The face piece is fitted with 1 nominally standard female threaded connector.

RESULT

- 4.12.1 **Standard thread connection**
When tested with the "GO" gauge specified in EN 148 Part 1, the gauge would not engage in any of the 5 samples assessed.
- 4.12.2 **Centre thread connection** Not applicable
- 4.12.3 **Connector tensile test**
3 as received samples were subjected to the tensile test. All passed.
- 4.12.4 **Demountable connections/sealing**
Connection to face-piece is by standard female thread, screwed in by hand. Rubber sealing gasket retained in base of connector.
- 4.12.5 **Connection to other parts of equipment** See 4.12.4 above.
- 4.13 **Eyepiece and visor**
- 4.13.1 **Visor attachment**
Visor attached to face seal by surrounding plastic bezel, secured by machine screw and nut. Visually satisfactory.
- 4.13.2 **Distortion of vision**
Practical performance test wearers reported no problem.
- 4.13.3 **Field of vision**
Total field of vision 87% Overlapped field of vision 80%
- 4.13.4 **Reduction of misting**
Practical performance test wearers reported no misting.
- 4.13.5 **Visor impact resistance**
5 samples, as received, were subjected to the impact test. No damage to any visor resulted. The negative pressure of 10 mbar was maintained by each sample before and after the test with no leakage.
- 4.14.1 **Inhalation valve**
- 4.14.1.1 **Number**
The face mask was provided with one inhalation valve located at the bottom of the standard thread connector.
- 4.14.1.2 **Function in all orientations**
The correct functioning of the inhalation valve was checked by fitting the mask to a Sheffield dummy head connected to a breathing machine operated at 21/stroke and 25 stroke/min. The pressure at the mouth was recorded with the head upright, facing down, facing upwards and facing sideways.
The tests were performed before and after testing to 4.14.2.4.5 sample masks, 3 as received and 2 temperature pre-conditioned, were tested.
The chart records of the inhalation resistance were uniform, and the maximum values were within specification for all orientations.
Max before = 1.57 mbar, max after = 1.65 mbar.

RESULT

4.14 Exhalation valve

4.14.2.1 Function in all orientation

The correct functioning of the exhalation valve was checked at the same time and by the same method as for the inhalation valve (4.14.1.2 above).

The chart records of the exhalation resistance were uniform, and the maximum values were within specification for all orientations.

Max before = 2.10 mbar, max after 2.18 mbar.

4.14.1.2 Number

The face mask was provided with one exhalation valve located within the face-piece connector.

4.14.1.4 Flow and vacuum

The exhalation valves of all 5 samples tested operated correctly after a continuous flow of 300 l/min., and a vacuum of 80 mbar = see 4.14.2.1.

4.14.3 Exhalation valve housing tensile is test

Not applicable, as valve housing incorporated within face-piece connector.

4.15 Breathing resistance

3 as received sample masks were tested.

Sample			1	2	3	Max
Inhalation	@30	l/min	0.18	0.16	0.30	0.50 mbar
	@95	l/min	0.85	0.61	0.87	1.50 mbar
	@160	l/min	1.70	1.62	1.72	2.50 mbar
Exhalation	@160	l/min	1.51	1.54	1.52	3.00 mbar

All values satisfy the maximum permitted.

GERMAN FIRE BRIGADE APPROVAL

HEAT RADIATION TEST

The samples have been tested to a temperature of 200° C provided by a heat radiant panel for 4 minutes. Subsequent leak test did not show any leakage.

% NaCl TOTAL INWARD LEAKAGE

SUBJECT	MASK	(a) WALK ONLY	(b) HEAD SIDE SIDE	(c) HEAD UP DOWN	(d) TALK	(e) WALK ONLY	MEAN
SJ	1	0.037	0.044	0.037	0.049	0.044	0.012
IM	2	0.024	0.045	0.020	0.030	0.023	0.028
NW	3	0.025	0.030	0.031	0.026	0.032	0.028
DB	4	0.003	0.008	0.013	0.016	0.019	0.012
GF	5	0.016	0.022	0.028	0.026	0.023	0.023
TO	1	0.008	0.018	0.024	0.031	0.023	0.021
NS	2	0.009	0.011	0.010	0.011	0.015	0.012
GC	3	0.011	0.027	0.048	0.027	0.025	0.027
SL	4	0.035	0.032	0.049	0.031	0.040	0.047
GW	5	0.025	0.035	0.011	0.024	0.034	0.032
MEAN		0.019	0.027	0.030	0.027	0.028	0.026

SUBJECT	FACE LENGTH mm	FACE WIDTH mm	FACE DEPTH mm	MOUTH WIDTH mm
SJ	120	120	120	50
IM	110	110	125	50
NW	120	130	130	50
DB	120	120	120	50
GF	115	120	115	45
TO	125	125	135	50
NS	126	125	125	50
GC	120	115	135	50
SL	115	120	130	55
GW	110	125	125	55

INTRODUCTION

The SGE full-face mask **conforms** to European standard EN-136. Only screw filters are used, conforming to European standard EN-148 part 1.

APPROVAL

The full face masks are Personal Protection Devices that fall under category 3 in terms of European 89/686/CEE (Leg. Dec. 4.12.92. N°475). The masks respect conformity regarding the harmonised EN136: 1998 standard and satisfy requirements laid down for class 3 apparel.

EN 136: 1998 indicates the European reference standard and CL 3 indicates the class the device belongs to in terms of the reference standard. The conformity mark indicates that the essential health and safety requirements indicated in Attachment 2 to the European Decree 89/686/CEE (Leg. Dec. 4.12.92 N° 475) are fulfilled.

APPLICATIONS

The mask can be used in conditions requiring protection for both eyes and respiratory system. It is particularly recommended for industrial and agricultural sectors where the air is contaminated by toxic and/or hazardous substances.

The SGE 150 full-face mask cannot be connected to SGE 2400 or SGE 2500 filtering fans (with acoustic alarm) as it is not designed for this purpose. For applications with filtering fans, the SGE 400 should be used, which is an integral part of the device and therefore conforms to European standard EN-147.

DESCRIPTION

The full-face mask is fitted by means of a headpiece with 6 straps. These can be adjusted to ensure a perfect fit over the face. **The internal nose and mouthpiece allow the air inhaled to pass through the visor without causing condensation or misting. It also reduces unused space inside the mask to prevent the build-up of carbon dioxide from the air exhaled.**

Filter testing - A2B2E2K2 P3 code: M40012S

Intended use: Respiratory protection against gases vapors and particles in conjunction with a specified face piece. Scope of protection as indicated by product documentation, technical standards and installed application rules.

Relevant standard: EN141 , EN 143

Certification: EC type approval test certificate, granted by accredited and notified test institute FORCE Institute-FORCE-Dantest CERT – Park Alle 345 DK-2605 Brøndby

Connection to face piece: Standard thread connection RA (Rd 40mmx1/7")

Filter housing: aluminum, coated inside
Sorbents: activated and impregnated carbon
Particle filter: micro glass fibers, cellulose-fibers
Plugs: polyethylene
Shelf life: 5 years
Outer diameter 108.5 mm
Height (incl thread and plugs): 75 mm
Weight: approx 370 gr

Gas filtration capacity

Test conditions (EN141) 30 L/min ,70% rel humidity, 20°C - Concentration 5060 ±100ml/m³, 20±1°C

Filter	Gas	Breakthrough at 10±2ml/m ³
18	C6H12	57 min
20		51 min
29		54 min
average		54 min

Requirement A2-P3 ≥ 35

Gas filtration capacity

Test conditions (EN141) 30 L/min ,70% rel humidity, 20°C - Concentration 5000±250ml/m³, 20±1°C

Filter	Gas	Breakthrough at 10±2ml/m ³
10	CL2	43 min
17		51 min
23		50 min
average		48 min

Requirement B2-P3 ≥ 20

Gas filtration capacity

Test conditions (EN141) 30 L/min ,70% rel humidity, 20°C - Concentration 5060±250ml/m³, 20±10°C

Filter	Gas	Breakthrough at 10±2ml/m ³
5	H ₂ S	138 min
19		136 min
21		142 min
average		138 min

Requirement B2-P3 ≥ 35

Gas filtration capacity

Test conditions (EN141) 30 L/min ,70% rel humidity, 20°C - Concentration 5000±250ml/m³, 20±10°C

Filter	Gas	Breakthrough at 10±2ml/m ³
8	HCN	42 min
12		42 min
16		44 min
average		43 min

Requirement B2-P3 ≥ 25

Gas filtration capacity

Test conditions (EN141) 30 L/min ,70% rel humidity, 20°C - Concentration 5060±250ml/m³, 20±10°C

Filter	Gas	Breakthrough at 10±2ml/m ³
32	SO ₂	27 min
1		28 min
24		28 min
average		28 min

Requirement E2-P3 ≥ 20

Gas filtration capacity

Test conditions (EN141) 30 L/min ,70% rel humidity, 20°C - Concentration 5000±2500ml/m3, 20±10°C

Filter	Gas	Breakthrough at 10±2ml/m3
3	NH3	55 min
4		54 min
13		59 min
average		56 min

Requirement B2-P3 ≥ 35

Breathing resistance (mbar)

Sample	30 L/m	95 L/m
1	1.76	6.45
2	1.61	5.80
3	1.68	6.41
4	1.63	5.82
5	1.63	5.85
average	1.66	6.06

Breathing resistance at, constant flow 2,6mbar (max as per EN 141), constant flow 9,8 mbar (max as per EN 141)

Test of filter on a mask SGE 150 and in accordance with EN 136

At a ventilation rate of 25 cycles/min and tidal volume of 2 Liters
Inhale cracking point 8.9 mbar - Exhale cracking point 1.9 mbar

CBRN Requirements

In 2003, a new certification (CBRN) was introduced for safety products in the United States. To find out more information about the new CBRN requirements and testing, visit the internet site, www.ready.gov or call the toll-free number 1-800-BE-READY.

The website will give information on what to know in deciding whether to buy escape hoods, gas masks, or other respirators for preparedness at home and work, as well as specific details of the CBRN requirements and testing. The purpose of the CBRN testing is to ensure that CBRN SCBA have (1) good face-fitting characteristics that can accommodate a wide variety of facial sizes and shapes, and (2) instructions for face-piece size selection and donning that are easily understood, easily followed, and effective. Furthermore, each CBRN SCBA respirator is evaluated on a panel of 25-40 test subjects having facial sizes and shapes that approximate the distribution of sizes and shapes of the general population. The website will also give information on the tests performed and how the test results are analyzed.



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