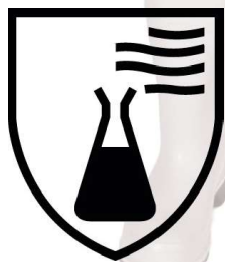




RESPIREX™



## Instructions for use of GTB gas-tight suit (Type 1a)



**EN 943-1:2015+A1:2019**  
**TYPE 1a**

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## General information

The Respirex GTB & GTVB are designated as a re-usable Type 1a “gas-tight” chemical protective suit. The European standard EN 943-1:2015+A1:2019 designates Type 1a as a suit where the breathing apparatus is worn inside the suit.

Respirex GTB & GTVB gas-tight suits have been tested and issued type-approval by BSI The Netherlands (notified body ID no. 2797). The suits are UKCA and CE marked to indicate compliance with European Regulation 2016/425 on personal protective equipment (PPE) and Regulation 2016/425 on personal protective equipment as brought into UK law and amended. The materials of construction have also been tested and certified in accordance with the provisions of EN 943-1:2015+A1:2019. Further information on the performance of each specific material can be found on the data sheet supplied with the suit.

UKCA and CE Declarations of Conformity can be found at [www.respirex.com/doc](http://www.respirex.com/doc)

## General features of Respirex GTB & GTVB gas-tight suits

A large rigid visor bonded to the suit. An outer removable visor for added protection to the bonded visor can be fitted as an optional extra.

Exhalation valves fitted to the rear of the suit which automatically release any excess pressure that builds up inside the garment. This ensures that the pressure within the suit does not exceed 400 Pa as stipulated by clause 5.11 of EN943-1:2015 +A1:2019.

A 122cm gas-tight zip which enables easy donning or doffing. Double outer flaps with a hook & loop closure are fitted to cover the teeth of the zip.

The sleeves of the gas-tight suit are designed in a bat-wing style that allows wearers to easily withdraw their arms from the sleeve whilst the suit is being worn. This feature enables the wearer to operate a communications system or to read a breathing apparatus gauge.

A dual glove system consisting of a laminated inner glove having good chemical resistance (Kemblok™) bonded to an outer Neoprene glove affording protection against mechanical abuse (as well as having some degree of chemical resistance). Gloves are fitted to the suit by means of either the Respirex locking cone and grommet system or ‘Sure-Loc’ front loading cuff system (see pages 3-5).

Highly chemically resistant heavy-duty safety boots with steel toe cap and mid soles conforming to EN 20345:2011. These can either be permanently affixed or detachable (see pages 6-7). Alternatively the garment can have integral sock booties made from the same material as the suit for use with the wearer’s own boots. Suits with this feature can also have outer legs that fold down over the exterior of the boots to help prevent liquid ingress.

Optional 360° swiveling pass-thru complete with a non-return valve, couplings compatible with the wearer’s breathing apparatus and a dead end cap. Where necessary this feature permits air to be passed to the second man attachment on the wearer’s breathing apparatus during decontamination. Connected to the pass-thru on the inside of the suit is a length of hose with a coupling that attaches to the second man attachment.

Optional anchor point to which a personal line can be attached, there is also a facility to attach a distress signal unit (DSU).

The waist of the suit is supported by means of an internal belt.

## Additional GTVB features

In addition to the above the additional features of a GTVB are:-

Located on the left breast of the suit is a switch that controls the amount of cooling air supplied to each extremity of the suit. The internal ventilation system is passed down the arms and legs through supported tubing. Four settings are available by depressing and turning the switch to the required flow rate, either 3, 30 or 100 litres/min. Alternatively cooling air can be turned off completely by turning the switch to the ‘O’ position.

Note: With this facility the customer must inform Respirex of the make of open-circuit self-contained breathing apparatus (SCBA) that is to be used with the suit and the air pressure that is delivered to 3/30/100 litre switchover block. This is to enable the switchover assembly to be set to the user’s specific requirements and to ensure correct flow rates.

If the customer changes the SCBA used with the suit Respirex should be notified since the switchover block may no longer operate at the correct flow rates.

## Limitations & warnings

Worn in conjunction with suitable gloves and safety boots the Respirix GTB & GTVB meet the performance requirements of TYPE 1a “gas-tight” chemical protective suits for emergency teams.

These suits are for use with self contained breathing apparatus (SCBA) only and must only be used by persons who have been fully trained and are familiar with suit equipment.

The suits are manufactured from materials that do not breathe. The wearer’s body temperature will rise and therefore care should be taken not to lose too much body fluid. The wearer should leave the work area and disrobe the suit before becoming distressed.

Ensure you are using a suit made from a material that will give you protection against the chemical hazard.

If inorganic chemicals penetrate the fabric of the suit they will cause degradation (damage) which will be obvious on inspection.

Usable temperature range: -20°C to 120°C. Note: This usable temperature range is based on the evaluation of the physical properties of the material only. Be aware that resistance to permeation by chemicals varies heavily with temperature.

Care should be taken if the suit has been in contact with organic chemicals as these can permeate into the fabric of the suit. These chemicals will diffuse naturally from the fabrics but the time taken depends on the chemicals and the condition under which the suit is stored.

If the visor has been subjected to acid splash or spray during use it should be rinsed off with copious quantities of water. Failure to remove certain acids can lead to degradation of the visor materials and lead to a reduced vision.

Always use compatible PPE, e.g. gloves and safety boots advised by Respirix. For any enquiries please contact the Respirix customer services department on

Tel : +44 (0)1737 778600, Fax : +44(0)1737 779441 or Email : [info@respirex.co.uk](mailto:info@respirex.co.uk).

## Pre-checking the gas-tight suit

After each use, gas-tight suits should undergo a visual inspection and leak-tightness test (internal pressure test) according to EN 464:1994. If the suit has remained unused it should undergo a visual inspection after a period of not greater than six months and be subject to an annual leak-tightness test (see page 17).

1. Check that the gloves are correctly fitted (see pages 3 - 5).
2. The suit is free from contamination both inside and out.
3. The identification number is clearly legible in the suit.
4. The zip operates correctly and the pull tag is in good condition.
5. The suit materials are free from splits and punctures; pay particular attention to the seam areas.
6. Vision through the visor is not obstructed scratches or scuff marks. A removable outer visor can be fitted which prevents damage to the main visor (see page 12).
7. Respirix recommend that the exhalation valves are part of the visual pre-check. If the valve diaphragm is distorted or damaged in any way it must be replaced (see page 10).

## Fitting gloves - Locking cone & grommet system

1. Firstly turn the sleeve of the garment inside out.
2. Carefully push the tapered cone into the glove so that the glove stretches over the cone (see Figs 1 & 2).



Fig. 1



Fig. 2

3. Push the glove and cone into the cuff body with the little finger of the glove in-line with the seam of the sleeve (see Fig 3).
4. Make sure that the glove and cone are pushed into the cuff body with equal pressure all around its circumference (see Fig 4).
5. Locate the locking ring over the gauntlet of the glove and screw into the cuff body (see Fig 5). If necessary, the gauntlet of



Fig. 3



Fig. 4

the glove can be cut down if it is too long and interferes with the locking ring.

6. Turn the sleeve the correct way out by pulling on the glove (see Fig 6).



Fig. 5



Fig. 6

Check that there are no creases in the glove around the cuff seal. If there are any creases or the glove is pinched in any way it should be removed and re-fitted. If the cuff and glove have been assembled as described there should now be a gas tight wrist seal.

## Fitting gloves - Front loading 'Sure-Loc' cuff system

Note: The front loading 'Sure-Loc' cuff system is used with a pre-assembled glove and ring supplied by Respirex.

### Removing gloves


1. Rotate the red locking pins counter-clockwise to the UNLOCK position [  ].using the red keylock tool provided (see Figs. 7 & 8).



Fig. 7



Fig. 8

2. Rotate the front collar counter-clockwise (see Fig.9).



Fig. 9



Fig. 10

3. Slide the front collar off the cuff body and over the glove to allow access to the glove assembly (see Fig.10).
4. Grip the cuff body (or sleeve) and pull on the glove to extract the glove assembly from the cuff body (see Fig.11).
5. The glove assembly is now removed from the cuff body (see Fig.12).



Fig. 11



Fig. 12

## Replacing gloves

1. Orientate the glove assembly before inserting it into the cuff body (see Fig.13). Ensure that the glove assembly has:
  - a) the right hand glove for the right hand sleeve, and the left hand glove for the left hand sleeve
  - b) correctly orientated glove, i.e. thumbs uppermost or slightly inclined to suit user requirements.

Note: Once the glove assembly is in position it cannot be rotated.

2. Push the glove assembly into the cuff body (see Fig.14), use your thumbs to ensure its full insertion (see Fig.15).



Fig. 13




Fig. 14

3. Slide the front collar over the glove and onto the cuff body (see Fig.10).



Fig. 15

4. Rotate the front collar clockwise (see Fig.9) to secure it. The red locking pin MUST be aligned with the mark on the cuff body to ensure the locking function.
5. Rotate the red locking pins to the LOCK position [  ] using the red keylock tool (see Fig.8).
6. Before use, perform a check by trying to unlock the front collar (i.e. rotating it counter-clockwise). This quick test will determine whether or not the cuff is safe for use.

## Assembly of boots into optional detachable boot system

1. Fit the rubber 'O' ring (D00693) into the groove on the boot sealing collar. Locate the 'O' ring at the bottom of the groove, Figs. 16 & 17.



Fig. 16



Fig. 17

2. If there is an 'O' ring already fitted, check that it is not damaged. If in doubt fit a new 'O' ring (D00693) to the boot sealing collar.
3. With the leg of the suit turned inside out, locate the boot through the leg sealing collar so that the 'O' ring can be seen in the groove. Ensure that the boot is facing in the correct direction, Fig.18.



Fig. 18



Fig. 19

4. Locate the retaining collar (B01603) around the top groove of the leg sealing collar and snap into position, Fig.19.
5. When snapped into position the retaining collar should appear as shown in Fig.20.
6. Pull the boot sealing collar up so that the retaining collar is trapped in position as shown in Fig.21.
7. Turn the PVC protective strip up over the stainless steel band as shown in Fig.22.



Fig. 20



Fig. 21

8. Pull the leg of the garment through. The final assembly of the boot into the detachable boot system should appear as shown in Fig.23.





Fig. 22



Fig. 23

Parts required:

- Rubber 'O' ring - Part number D00693
- Retaining collar - Part number B01603

## Removing boots from optional detachable boot system

1. Turn the leg of the suit inside out. Fold down the PVC protective strip then pull the leg sealing collar down so that a gap appears under the retaining collar as shown in Fig. 24.
2. Using a pair of external circlip pliers remove the retaining collar as shown in Fig. 25.
3. Push the boot sealing collar through the leg sealing collar and remove the boot from the suit leg, Fig. 26.



Fig. 24



Fig. 25



Fig. 26

## Recommended donning procedure for the GTB gas-tight suit

Donning the Respirex GTB suit is a very simple matter although it will be necessary for a dresser to assist the wearer in the donning procedure.

1. Unzip the suit by pulling approximately 61cms (24") at a time keeping the zip straight with one hand as you pull the slider with the other. Repeat this exercise for the whole length of the zip. Fold down the suit to expose the top of the boots (if fitted) or integral socks.
2. The wearer should step into the boots and with the aid of the dresser lift the suit to the waist making sure the crotch is positioned comfortably. The suit waist belt should be fastened firmly ensuring that it is not twisted (see Figs.27 & 28).
3. With the assistance of the dresser the wearer should now don the breathing apparatus (SCBA) in the usual way but without starting up. Leave the face mask hanging on its strap around the wearer's neck.
4. The dresser should now connect the internal hose from the suit swivel to the second man attachment on the BA.
5. Next the dresser should lift the pod at the rear of the suit up and over the BA cylinder (see Figs. 29 & 30).
6. The wearer should now carry out all necessary pre-checks.
7. Next the BA cylinder should be switched on in accordance with the manufacturer's instructions and the face mask put on by the wearer. The dresser can assist the wearer to adjust the head straps of the face mask until comfortable. If required a fireman's safety helmet can now also be put on by the wearer (see Fig. 31).
8. The wearer should now cross his arms over his chest whilst the dresser lifts the suit up and over the wearer's shoulders and head and fastens the zip carefully following the procedure outlined in stage 1 (see Fig. 32). The wearer can now slide his arms down the sleeves and into the gloves (see Fig. 33).
9. Finally the dresser should seal the outer zip flaps using the velcro strips provided



Fig. 27



Fig. 28



Fig. 29



Fig. 30



Fig. 31



Fig. 32



Fig. 33

## Removing the wearer from the GTB gas-tight suit

Firstly the suit must be decontaminated sufficiently to safely remove the wearer from the garment (see **Cleaning & Warnings**). It will be necessary for the dresser to aid the wearer to remove the suit (it is **ESSENTIAL** that the dresser wears suitable protective clothing).

10. The wearer's arms should be removed from the sleeves and folded across his chest.
11. The dresser should unzip the suit carefully (following the procedure outlined in the dressing instructions).
12. Fold the suit over the wearer's head and off the BA down to the waist. The outer surface of the suit should be kept away from the wearer at all times.
13. Disconnect the internal hose from the second man attachment on the BA.
14. Shut down the BA cylinder according to the manufacturer's instructions and remove the wearer's face mask. With the assistance of the dresser the BA can now be removed in the usual way.
15. Unfasten the suit waist belt.
16. Fold the suit down to the top of the boots or integral socks so that the wearer can step out of the suit.

## Instructions for use of optional fall arrest facility

This arrest facility must only be used in conjunction with a back 'D' ring fixing fall arrest harness approved to EN 361 and a retractable type fall arrester approved to EN 360. The retractable type fall arrester should always be positioned above head height using an anchorage approved to EN 795. Adhere to the manufacturer's instructions for appropriate fall clearances and the avoidance of swing fall hazards. Always follow the manufacturer's instructions for methods of use, inspection and care of harnesses and fall arresters.

Use of any other form of arrest device other than those mentioned above is not covered by the EU type approval of this suit.

1. Don the fall arrest harness according to manufacturer's instructions ensuring that the back 'D' ring fixing point is between the wearer's shoulder blades, see Fig 34.
2. Don the self-contained breathing apparatus and GTB suit as outlined on page 8 as far as stage 7.
3. Pull the harness trunk on the GTB suit inside out and down towards the 'D' ring fixing point of the fall arrest harness. Connect the 'D' ring on the fall arrest harness to the internal harness link of the suit using the EN 362 approved connector supplied by Respirex, see Fig 35.
4. Complete the donning procedure for the GTB suit as described on page 8.
5. Attach the exterior harness link on the GTB suit to a retractable type fall arrester device approved to EN 360.

**NOTE :** When a GTB suit is being worn in conjunction with a fall arrest harness the trunk at the rear of the hood must concertina flat towards the wearer's neck. This ensures that in the event of a fall the movement of the harness is taken up by the trunk thus preventing damage occurring to the suit, see Fig 36.



Fig. 34



Fig. 35



Fig. 36

## Replacing the exhalation valve diaphragm

1. Using a torque driver with a 'TX10' Torx bit, loosen and remove the screw from the centre of the exhalation valve, then remove the cap.
2. Carefully slide the diaphragm up the central spigot and remove from the exhalation valve body.
3. Check that there is no dust, debris or contamination of any kind in the exhalation valve body.
4. Carefully slide a new diaphragm down the central spigot until it rests evenly on the valve body. Ensure the diaphragm is correctly orientated with the ridged side uppermost (see Fig 38).
5. Replace the exhalation valve cap and ensure the two location channels engage with the locating keys on either side of the valve body. **Note:** When correctly located, the valve cap will not rotate independently on the valve body.
6. Replace the centre screw, turn by hand two times to engage the thread with the valve body, then fully tighten using a torque driver set to  $23 \pm 2$  cNm.

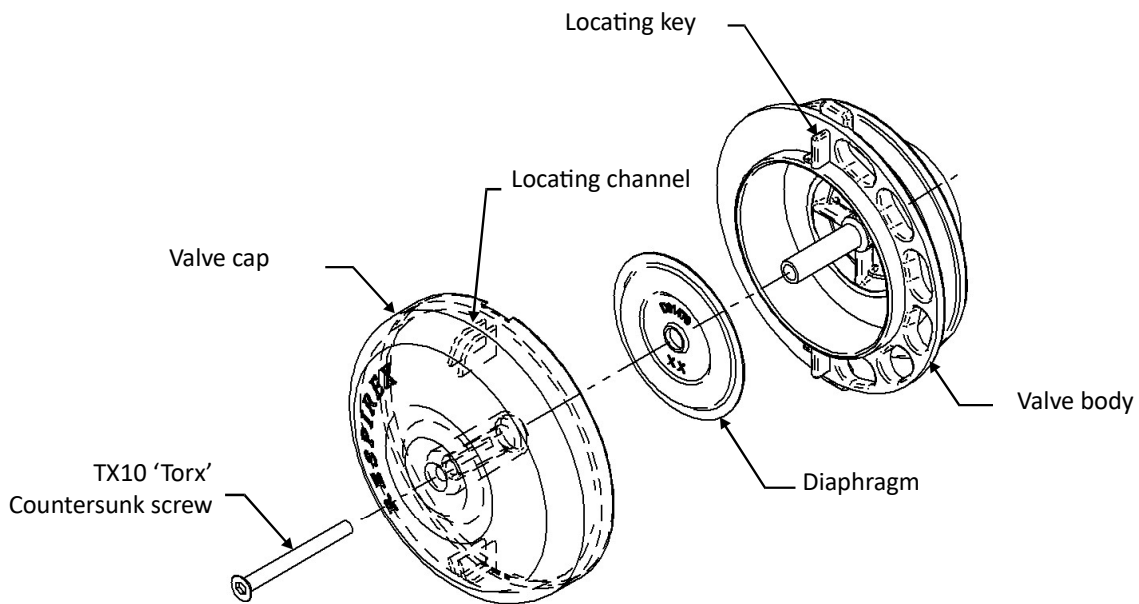


Fig. 37

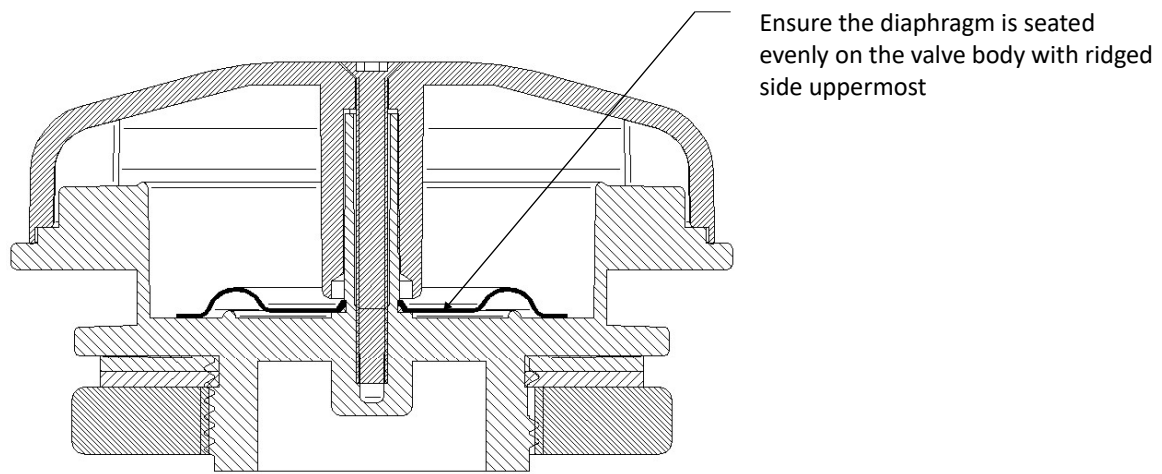


Fig. 38

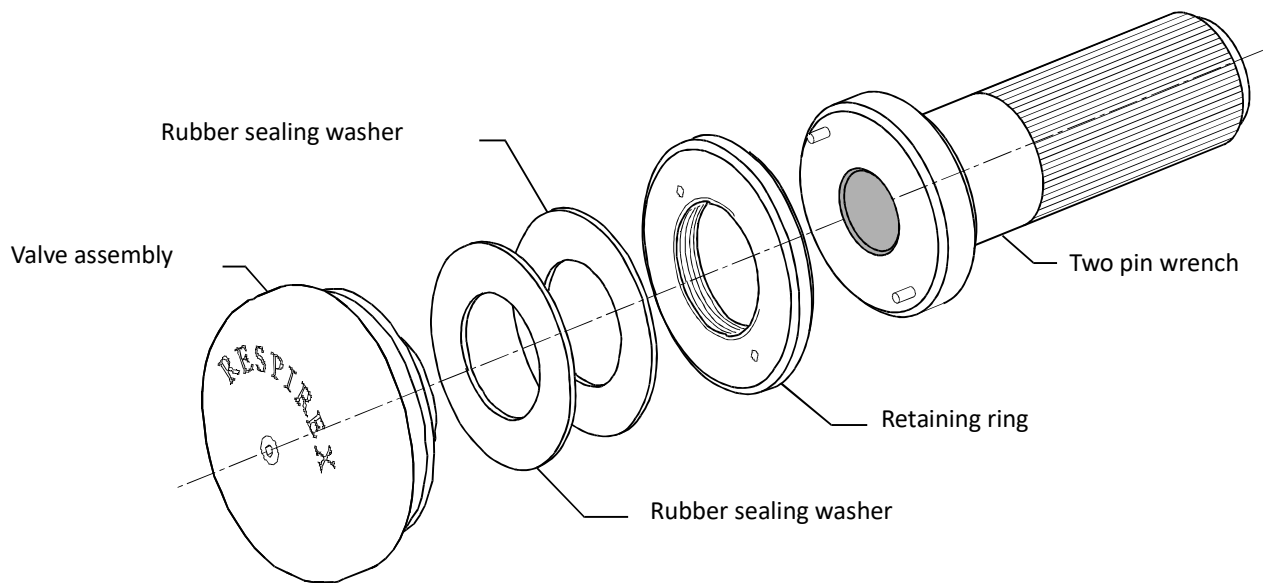


Fig. 39

## Removing a complete exhalation valve assembly

1. Lay the suit on a clean flat surface and open the zip to its fullest extent.
2. Using a two pin wrench (Tool No. G01486) locate the pins into the two holes in the exhalation valve retaining ring and unscrew.
3. Remove the rubber sealing washer.
4. Then from the outside of the suit carefully remove the exhalation valve assembly.

## Replacing a complete exhalation valve assembly

1. The new exhalation valve will have all the parts screwed together, so remove the retaining ring and one of the rubber sealing washers.
2. Check that the remaining rubber sealing washer is laying flat against the valve body.
3. Locate the thread on the exhalation valve assembly through the hole in the back of the suit.
4. Locate the second rubber sealing washer around the thread on the valve body so that it is laying flat against the material of the suit.
5. Hand tighten the retaining ring onto the exhalation valve.
6. Check that the exhalation valve is orientated correctly (the Respirex lettering should be at the top of the valve and the three slots under the cover must be at the bottom).
7. Tighten the retaining ring using the two pin wrench (Tool No. G01486).

## Replacing the removable visor (Part no. G00017)

1. Carefully peel the removable visor from the Velcro discs.
2. If necessary clean the rigid visor before fitting a new removable visor.
3. Remove the protective film from the new removable visor.
4. Locate the centre discs at the top and bottom of the removable visor on to the centre discs on the hard visor.
5. Wrap the removable visor around each side of the rigid visor, lining up all the fixing discs and pressing together (see Fig 40).



Fig. 40

## Cleaning

Preliminary washing by means of a high pressure shower will remove most of the contaminate from the outer surface of the suit sufficient to allow the wearer to undress from the suit.

Should you not have access to a high pressure shower, the suit can be washed by using copious quantities of water sprayed over the suit for a minimum period of 5 minutes using a suitable detergent and neutralizer. If the garment has been used in acid the recommended neutralizer is a solution of bicarbonate of soda and water (6% bicarbonate of soda w/v). Water will neutralize alkali contamination.

In both the circumstances described above the suit can now be removed for further cleaning.

The internal surfaces should be sprayed with Synodor to kill all bacteria within the garment whilst the outer surface should be cleaned using Citrikleen. Mix one part Citrikleen to 19 parts water, i.e. 5% solution. Never use Citrikleen in neat form as this will cause damage to the garment materials. Never use a washing machine, spin or tumble drier.

Garments used by more than one person must be cleaned, inspected and sanitized after each use. If not cleaned contamination may cause illness or disease.

### Warnings

HAND WASH ONLY 

DO NOT SPIN

DO NOT DRY CLEAN 

DO NOT BLEACH 

DO NOT IRON 

DO NOT TUMBLE DRY 

DO NOT USE AGGRESSIVE CLEANING POWDERS

DO NOT SCRUB THE SURFACE OF THE FABRIC

## Cleaning accessories

The outer surface of the suit can be cleaned with Citrikleen, Part No. F00938.

The inner surface of the suit can be cleaned with Respirex Synodor Odor San, Part No.F00936, this will neutralize any bacteria build-up within the suit.

The visor can be cleaned with Respirex 'Fog-Off', Part No. F00934. The zip must be regularly lubricated with 'Max-Wax', Part No. F00149.

All these accessories are available from Respirex. Please contact our Customer Services Department on Tel : +44(0) 1737 778600.

## Servicing & maintenance

GTB Gas Tight suits that are manufactured from polymer rubber materials, e.g. Viton/Butyl/Viton, can be repaired using a Respirex repair kit\*. Garments manufactured from thermoplastic materials, e.g. PVC, require specialist equipment and will need to be returned to the manufacturer for repairs. *\*Respirex does not guarantee any repairs carried out by the end-user.*

It is recommended that used garments are periodically returned to our care and maintenance department for overhaul, repairs, and where necessary report on the condition of your equipment. When your garments should be returned for inspection will depend upon the extent of usage.

There is no pre-determined life expectancy for your garments; this will depend upon usage, maintenance and washing. However, the level of protection offered by your garment will be seriously diminished by the existence of the following:

- |                                      |                                 |
|--------------------------------------|---------------------------------|
| 1. Lifting seam tapes                | 4. Holes/Tears                  |
| 2. Degradation/Thinning of materials | 5. Excessive dirt               |
| 3. Broken closures                   | 6. Stretched or worn cuff seals |

For further enquiries on servicing & maintenance contact Respirex customer services on Tel: +44 (0) 1737 778600

## Storage

When not in use it is recommended that the suit is kept sealed in the red storage container supplied. If the suit is out of operation and kept in the storage container it is recommended that at a maximum period of 3 months it is removed and a complete visual inspection carried out. The suit should be laid out flat or hung and then refolded. A leaktightness test (internal pressure test) to EN 464:1994 should be performed after each use (see Pages 16 and 17). A suitable test rig can be supplied by Respirex.

In order to maintain the level of protection offered, care should be taken to minimize the risk of damage occurring to the suits during transportation between work areas. It is recommended that all suits are transported in a suitably sized rigid container resistant to penetration by sharp objects, abrasive surfaces, chemicals, oils, solvents etc.

The suit must always be stored in a dry, decontaminated, clean condition with the zip fully waxed and fully open.



## Method of folding suit for storage container

1. Turn suit over face downwards (see Fig 41).
2. Place plastic bag over head & visor of suit (see Fig 42).
3. Tuck sleeves & back pack into plastic bag (see Fig 43).



Fig. 41



Fig. 42



Fig. 43

4. Fold the legs in half (see Fig 44).
5. Fold top half of suit backwards so visor is on top (see Fig 45).
6. Pack in the container with the visor on top (see Fig 46).
7. Seal the lid of the container with plastic cable ties (Part No. C00642).



Fig. 44



Fig. 45



Fig. 46



The suit can be supplied with an optional three-point hanging system with loops on the head and shoulders. This allows the suit to be hung on the Respirex three-point hanging frame without distortions to the visor (see Fig 47).



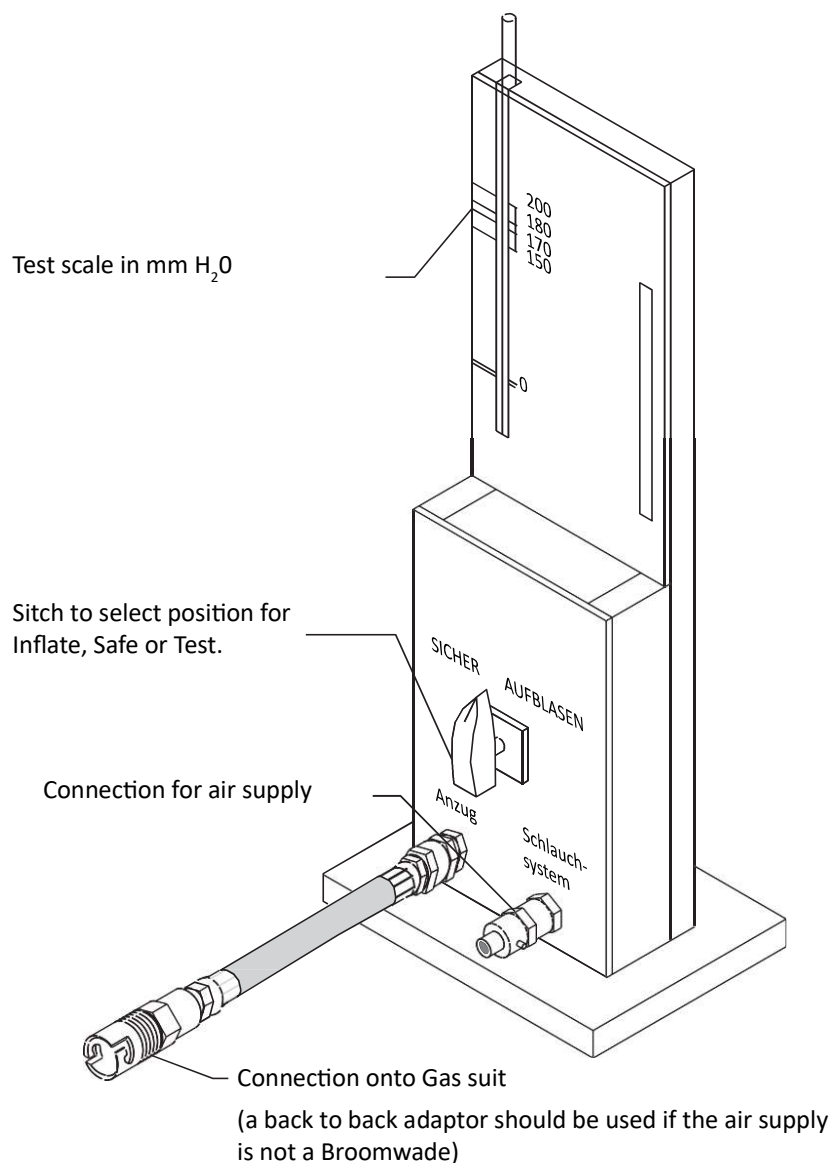
Fig. 47

## How to fill a test rig

To do this insert the male instant air plug attached to the length of cord into the socket on the length of hose connected to the 'SUIT' socket on the test rig. Turn the switch to 'TEST'. Place the black tube from the small filling bottle into the 60ml bottle filled with manometer liquid. Squeeze the small bottle and draw up manometer liquid. Once the small bottle is full remove the tube from the 60ml bottle and place into the top of the test rig with the end of the black tube level with the narrow Red band. Squeeze the bottle to empty the liquid into the test rig, repeat the operation until liquid is level with Red filling band. Should an air bubble form agitate the liquid until it clears.

This may be done by leaving the valve set at 'TEST' and gently blowing and releasing to make the liquid move up and down in the tube.

If the test rig is overfilled place the tube from the small filling bottle into the test rig and suck up any excess liquid. If for any reason the fluid needs 'topping up' repeat instructions as above.



## Conducting a pressure test

1. Lay the suit out as flat as possible, away from any source of heat and/or currents of air. Seal the exhalation valves with the rubber bungs provided. Visually inspect the suit and remove any creases and folds as far as is practicable. Leave the suit at ambient temperature ( $20 \pm 5$ ) °C for minimum of 1 hour.
2. Connect the black hose from the port marked 'SUIT' on the test rig to the airline coupling on the suit. Make certain that the rig selector valve is turned to 'SAFE'. Connect a suitable compressed air source providing air at approx 15 PSI (1.03 bar) to the port marked 'AIRLINE' on the test rig.
3. Turn the rig selector valve to 'INFLATE'. Inflate the suit carefully to a pressure of  $(1750 \pm 50)$  Pa. Ensure that any creased areas are unfolded and that the suit takes up its full shape (see Fig 48).



Fig. 48

4. Check the inflation level by turning the valve through 'SAFE' to 'TEST'. When the pressure begins to approach the marks inflate a little at a time until the bottom of the red area is reached.
5. As the material stretches the pressure will drop. For 10 minutes keep adding sufficient air to keep the liquid in the Yellow area  $(1750 \pm 50)$  Pa. After 10 minutes adjust the fluid level to the top of the Green area  $(1650 \pm 50)$  Pa. Allow a further 6 minutes to elapse and record the drop in pascals. The pressure drop must not be more than 300 Pa to comply with EN 943-1:2015.

### NOTE

Gas tight suits that have a non-return valve fitted to the swivelling pass through must be inflated and tested through one of the exhalation valves by carrying out the following procedure.

1. Using a 2mm hexagon key loosen the screw from the centre of the exhalation valve and remove the cap.
2. Carefully stretch the diaphragm over the centre spigot to remove from the exhalation valve body.
3. Push the inflation & test plug into the exhalation valve body until sealed (see Fig 49).

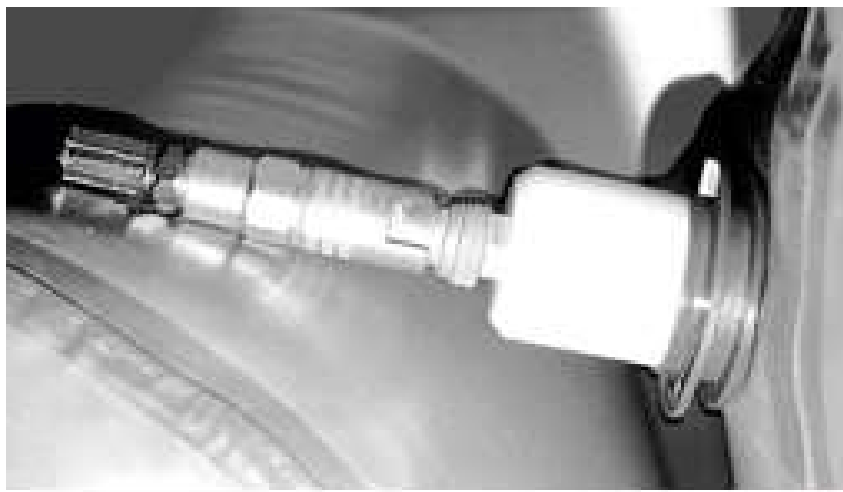


Fig. 49

4. Connect the inflation hose from the test rig onto the coupling fitted to the plug.
5. Now carry out test procedures as previously described.
6. After completing the test remove the inflation hose from the inflation & test plug.
7. Remove the inflation & test plug from the exhalation valve and any other plugs that may have been fitted.
8. Carefully stretch the diaphragm over the centre spigot making sure that it is correctly orientated and that the hole in the diaphragm is located under the shoulder of the spigot.
9. Replace the exhalation valve cap making sure that the location channel on the cap is located over the location key on the exhalation valve body (the RESPIREX lettering should be at the top).
10. Replace the centre screw and hand tighten using a 2mm hexagon key

**Note:** If you are performing leak-tightness tests using the electrically operated Respirex automatic test unit please refer to the instructions supplied with the unit.

If you currently use a manual test rig but are interested in purchasing an automatic test unit please contact our customer services department.

## Chemical permeation testing at Respirex

At its headquarters at the Kingsfield Business Centre, Redhill, Respirex operate a chemical testing laboratory equipped with the latest technology. All the testing is carried out by fully qualified chemists who are able to test Respirex's own materials against any chemical that the customer requests. In this way the customer can be advised and recommended the most suitable material to use against any challenging chemical encountered in the workplace.

Permeation is the process by which a chemical moves through protective clothing material on a molecular level. Permeation testing is carried out according to the European standards EN 16523-1:2015+A1:2018 and ISO 6529 and the American standard ASTM 739. Clothing material is exposed to the challenging chemical in a permeation cell so that breakthrough times and permeation rates can be measured. Breakthrough time is the time taken for the chemical to permeate through the material after continuous contact with the outer surface of a chemical safety suit. Permeation rates, measured in  $\mu\text{g (min.cm}^2\text{)}$ , are an indication of the amount of chemical reaching the person inside the suit after breakthrough occurs.

For advice on chemical permeation or decontamination contact the Respirex on,

Tel : +44 (0)1737 778600,

Fax : +44 (0) 1737 779441 or

Email : [info@respirex.co.uk](mailto:info@respirex.co.uk),

where our qualified staff will be happy to help you. Outside of normal working hours (9.00am-5.00pm) please leave details of your enquiry on the answerphone service so that the laboratory staff can deal with your query with the minimum of delay.

# Physical Properties of Suit Fabric and Seams

Material tested in accordance with Table 1 of EN 943-1:2015+A1:2019 - Minimum performance requirements of chemical protective clothing materials for enhanced robustness suits.

Property	Test Method	A00037 (EN 14325:2018)		A00038 (EN 14325:2018)		Minimum performance class required for EN 943-1: 2015+A1:2019
		Class	Property	Class	Property	
Abrasion resistance	EN ISO 12947-2 (inc. pressure drop)	6	> 2 000 cycles	6	> 2 000 cycles	3
Flex cracking resistance	EN ISO 7854 Method B (inc. pressure drop)	4	> 8 000 cycles	4	> 8 000 cycles	1
Trapezoidal tear resistance	EN ISO 9073-4	4	> 60 N	4	> 60 N	3
Puncture resistance	EN 863	3	> 50 N	3	> 50 N	2
Tensile Strength	EN ISO 13934-1	6	> 1 000 N	6	> 1 000 N	3
Resistance to ignition	EN 13274-4:2001 Meth 3 modified	Pass	None of the specimens ignited	Pass	None of the specimens ignited	Pass
Seam strength	EN ISO 13935-2	6	> 500 N	6	> 500 N	5

Property	Test Method	A00017 (EN 14325:2018)		A00092 (EN 14325:2018)		Minimum performance class required for EN 943-1: 2015+A1:2019
		Class	Property	Class	Property	
Abrasion resistance	EN ISO 12947-2 (inc. pressure drop)	6	> 2 000 cycles	6	> 2 000 cycles	3
Flex cracking resistance	EN ISO 7854 Method B (inc. pressure drop)	5	> 20 000 cycles	4	> 8 000 cycles	1
Trapezoidal tear resistance	EN ISO 9073-4	3	> 40 N	4	> 60 N	3
Puncture resistance	EN 863	2	> 10 N	2	> 10 N	2
Tensile Strength	EN ISO 13934-1	6	> 1 000 N	6	> 1 000 N	3
Resistance to ignition	EN 13274-4:2001 Meth 3 modified	Pass	None of the specimens ignited	Pass	None of the specimens ignited	Pass
Seam strength	EN ISO 13935-2	5	> 300 N	5	> 300 N	5

## Permeation Performance

The table below indicates the resistance to permeation by chemicals of clothing material, suit seams, Respirix glove liners and suit visor as required by EN 943-1:2015+A1:2019.

All tests carried out under laboratory conditions by independent accredited laboratories in accordance with ISO 6529 unless otherwise stated.

Table A shows average breakthrough times for Sodium Hydroxide on Respirix's PVC ranges:

Table A

Chemical	Suit Fabric and Seams		KEMBLOK™	Visor
	A00037	A00038	Glove	
Sodium Hydroxide 40%	> 480 mins	> 480 mins	> 480 mins	> 480 mins

Table B shows average breakthrough times for Sulphuric Acid on Respirix's neoprene and butyl ranges:

Table B

Chemical	Suit Fabric and Seams		KEMBLOK™	Visor
	A00017	A00092	Glove	
Sulphuric Acid 95-98%	> 480 mins	> 480 mins	> 480 mins	> 480 mins

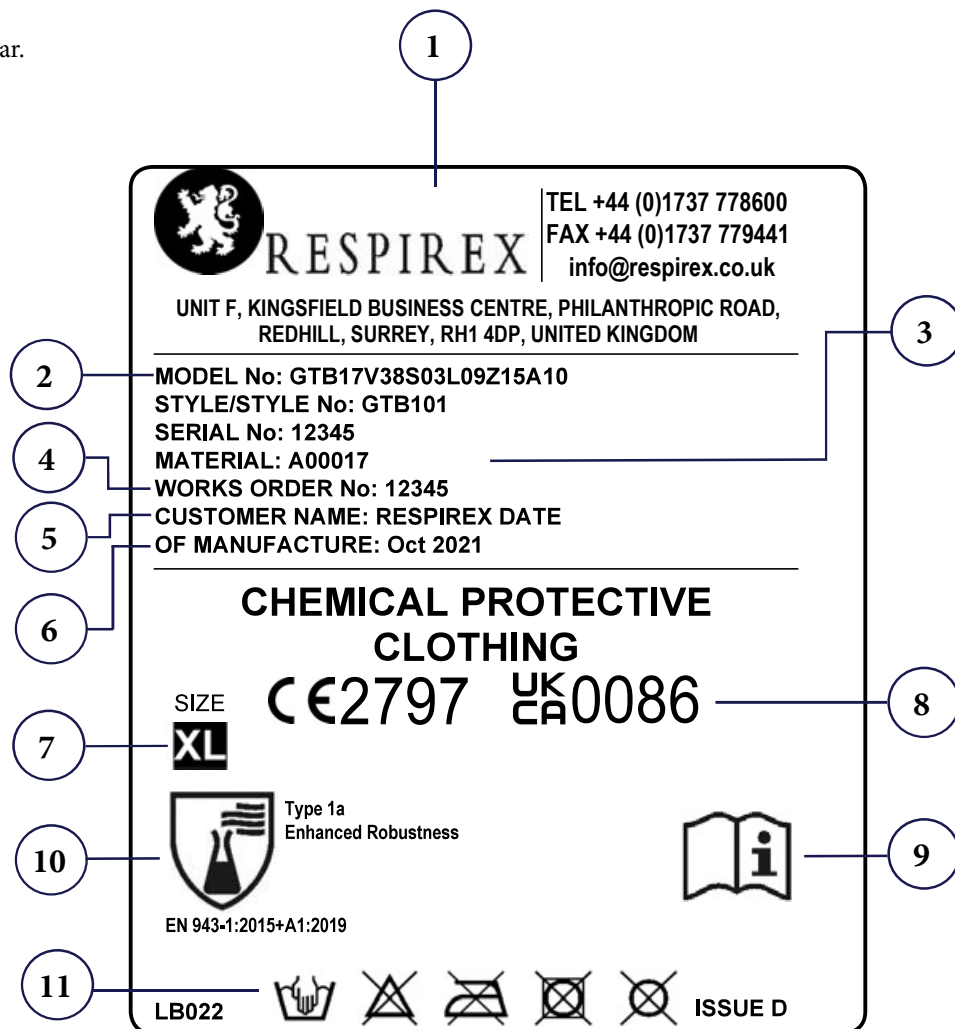
### Classification of permeation resistance

Class	Breakthrough time (minutes)
6	> 480
5	> 240
4	> 120
3	> 60
2	> 30
1	>10

## Product labelling

1. Manufacturer of garment and address:  
Respirex International Ltd.
2. Manufacturer's Model number
3. Material of Manufacture.
4. Manufacturer's Order No.
5. Customer Name.
6. Date of manufacture: Day/Month/Year.
7. Garment Size

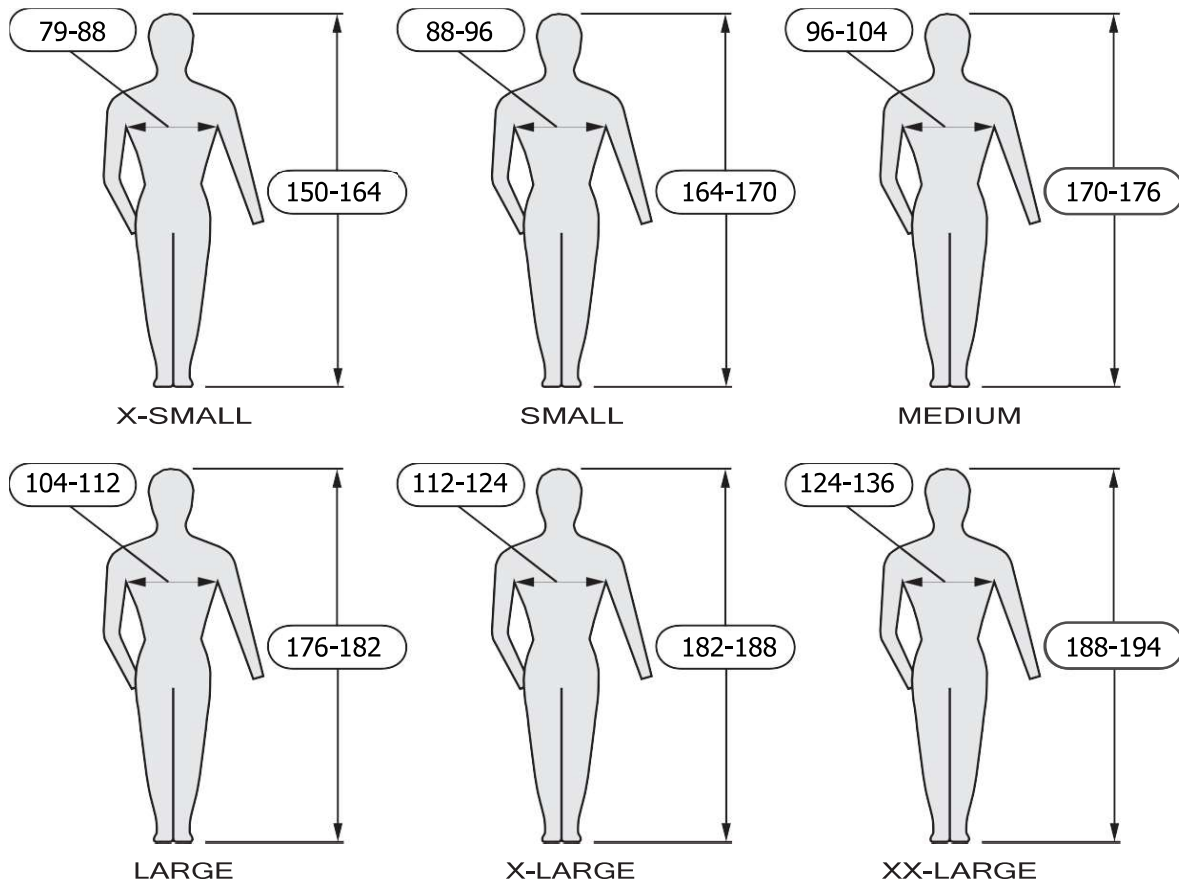
Size	Chest (cms)
S	88-96
M	96-104
L	104-112
XL	112-124
XXL	124-136



8. CE Mark and notified body code, UKCA Mark and approval body code.
9. "Open Book Pictogram"; wearer must refer to the "Instructions for use" for further information.
10. Protection against liquid chemicals
11. Protection against electrostatic hazard
12. Protection against biological hazard
13. Five care pictograms indicating that clothing is not suitable for cleaning and reuse.
  - Pictogram 1 Hand wash
  - Pictogram 2 Do not bleach
  - Pictogram 3 Do not iron
  - Pictogram 4 Do not machine dry
  - Pictogram 5 Do not dry clean

## Sizing

The following pictograms designate the range of height & chest sizes suitable for specific sizes of GTB gas-tight suit, check your body measurements and select the correct size of suit. Body measurements in cm (inch).



Size	Height	Chest
XS	150 -164 (4'11"-5'4½")	79 -88(31"-35")
S	164 -170 (5'4½"-5'7")	88 -96(35"-38")
M	170 -176 (5'7"-5'9")	96 -104(38"-41")
L	176 -182 (5'9"-5'11½")	104 -112(41"-44")
XL	182 -188 (5'11½"-6'2")	112 -124(44"-49")
XXL	188 -194 (6'2"-6'4½")	124 -136(49"-53½")









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