



RESPIREX™



**PPE FOR CBRN  
INCIDENTS**



## PPE FOR CBRN INCIDENTS

CBRN (or Chemical, Biological, Radiological and Nuclear) incidents require appropriate PPE to protect responders. Due to the scope of a CBRN response, a variety of EN and ISO standards cover the individual PPE elements and risks. There are also some guidelines on complete PPE ensembles for use in CBRN incidents which are discussed later, but these cross reference the individual PPE standards below.



**Chemical Hazards** - EN 943-1 and -2 Specify performance requirements for Gas-tight Suits, while EN 14605 deals with liquid and spray tight suits, EN 374 covers gloves, EN 136 and EN 137 cover respiratory protection and EN 13832 covers chemical protective footwear.

Chemical hazards can also include Chemical Warfare Agents (CWA) - these pose a particular risk due to their high toxicity and persistence.

Standards such as EN 943 do not include requirements for testing against warfare agents, so it is vital that all items of personal protective equipment designed for CBRN use should also be tested separately against these agents to ensure suitability.



**Biological Hazards** - EN 14126 Specifies the performance requirements of protective clothing against infective agents

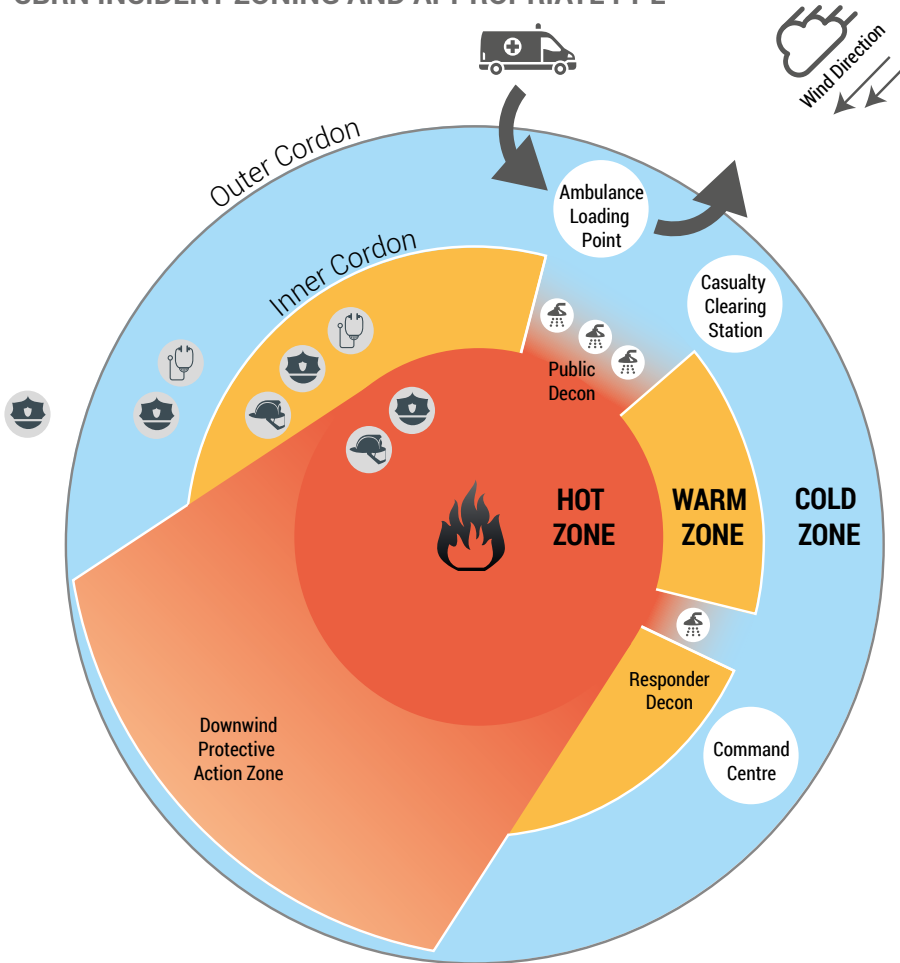


**Radiological Hazards** - EN 1073 parts 1 & 2 deal with protective clothing against radiological contamination.



**Nuclear Hazards** - No PPE will provide significant protection against ionising radiation, the only effective protection is distance or high-density shielding (e.g. concrete or lead).

# CBRN INCIDENT ZONING AND APPROPRIATE PPE



CBRN incident sites are typically divided into three distinct areas:

## HOT ZONE

This is the area where the initial release occurs or disperses to. It will be the area which may pose an immediate threat to the health and safety of all those located within it and is the area of greatest risk.

## WARM ZONE

An area uncontaminated by the initial release of a substance, located upwind of the hot zone, which becomes contaminated by the movement of people or vehicles.

The warm zone will be extended to include the area of decontamination activity. These areas cannot be guaranteed as free from contamination.

## COLD ZONE

The uncontaminated area located upwind of the hot zone between the inner cordon and the outer cordon where it has been assessed that there is no immediate threat to life. This is the clean treatment area.

## PPE RECOMMENDATIONS

In the **hot zone** the PPE requirement for initial response where the hazard is unknown or where high levels of vapour or gasses are present would typically be an Type 1A (ET) gas-tight suit used with self contained breathing apparatus (SCBA) for respiratory protective equipment (RPE). If boots are not integral to the suit, these need to be F3A Fire fighter safety wellingtons.

These suits encapsulate the wearer and the RPE and are designed to provide maximum protection to responders in environments that are Immediately Dangerous to Life and Health (IDLH). This level of protection is broadly equivalent to Category A in BS 8467 (Personal protective ensembles for use against CBRN agents), and Level A in the US Hazardous Waste Operations and Emergency Response standard (HAZWOPR), which provides guidelines on PPE in Appendix B.



EN 943-2 Gas-Tight Suits

Once the hazard or hazards in the hot zone have been identified and levels of vapours established the level of PPE required to operate safely in hot zone can be re-assessed. If vapour levels are not at IDLH levels a move to liquid-tight suits with a high protection factor (and low inward leakage) may be appropriate. This could include lighter weight encapsulating suits or suits with attached gloves, sock feet and a liquid-tight facemask seal worn with external SCBA (providing greater freedom of movement). This equates to Category B1 of BS 8467 or Level B of HAZWOPR.

Where SCBA is worn outside of an encapsulating suit it is important that the respiratory protective equipment has been tested for use against chemical agents. In the USA NIOSH have a test procedure (RCT-CBRN-STP-0200, 0201) and in the UK BS 8468-1 covers testing of SCBA against chemical warfare agents.



Type 3 Liquid Tight Suit with SCBA

In the **warm zone** powered respirator suits or liquid-tight suits with a full facemask respirator and CBRN filter may be used with chemical gloves and boots. This ensemble allows responders to operate for longer, but also provides greater freedom of movement and dexterity. Depending on the nature of the hazard (e.g. radiological hazards), following a suitable risk assessment this level of PPE may also be able to be used in the hot zone, If oxygen levels permit and CBRN filtration is effective against the hazard. This equates to Category B2 of BS 8467 or Level C of HAZWOPR.



Powered Respirator Protective Suit

The **cold zone** should be uncontaminated, with extremely low potential for skin or respiratory contact with the hazard. PPE is normally kept to standard medical PPE for healthcare workers and Type 6 suits with half mask respirators, chemical gloves and safety boots.

Typically the fire brigade are likely to be the first responders to enter the hot zone as the gas-tight suits and SCBA used for HAZMAT incidents will also have been selected based on their suitability for CBRN response.

Specialist response teams from other services may also be deployed with similar equipment (e.g. the UK Hazardous Areas Response Team). The nature of the ensemble limits the time a responder can work in the hot zone; typically SCBA provides 20 mins working time (which needs to include the time taken to enter and exit the hot zone and decontaminate the wearer). The physical burden and associated heat stress from wearing SCBA in a gas-tight suit also needs to be considered when assessing safe working time in the hot zone.

Responders in liquid tight suits with a full facemask CBRN respirator and filter will be able to work longer and have greater freedom of movement and dexterity, but as these suits are sealed, heat stress for the wearer will need to be considered when setting working times.

Gas or liquid tight powered air respirator CBRN suits (like the Respirix PRPS or RJS) are ideally suited to medical responders as the lower physical stress associated with wearing this type of suit allows for increased working times and the lack of a facemask aids communication with casualties and other responders. These suits are also ideal for crowd and casualty management in the warm zone.

## REFERENCES:

### European Performance Standards

**BS EN 943-1:2015+A1:2019**

Performance requirements for Type 1 (gas-tight) chemical protective suits

**BS EN 943-2:2019**

Performance requirements for Type 1 (gas-tight) chemical protective suits for emergency teams (ET)

**BS EN 14605:2005+A1:2009**

Protective clothing against liquid chemicals. Performance requirements for clothing with liquid-tight (Type 3) or spray-tight (Type 4) connections.

**EN 13832-3:2008**

Footwear protecting against chemicals

**EN ISO 20345:2011**

General purpose safety footwear

**EN 15090:2012 F3A I<sub>3</sub>**

Fire-fighter boot standard - Heat & Flame resistance

**BS EN 374-1:2016+A1:2018**

Protective gloves for dangerous chemicals and micro-organisms

**BS EN 136:1998**

Respiratory protective devices - full face masks

**BS EN 137:2006**

Respiratory protective devices - self-contained open-circuit compressed air breathing apparatus with full face mask

**BS8467:2006**

Personal protective ensembles for use against CBRN agents

**BS 8468 Parts 1 & 2:2006**

Respiratory protective devices for use against chemical, biological, radiological and nuclear (CBRN) agents. Part 1 - SCBA, Part 2 Full facemask respirators

### American Performance Standards

**NFPA 1991:2016**

Vapour protective ensembles for Hazmat emergencies

**NFPA 1992:2018**

Liquid Splash-Protective Ensembles for Hazardous Materials Emergencies

**NFPA 1994:2018**

Protective Ensembles for First Responders to Hazardous Materials Emergencies and CBRN Terrorism Incidents

**NFPA 1981:2019**

Open-Circuit Self-Contained Breathing Apparatus (SCBA) for Emergency Services

**NFPA 1986:2017**

Respiratory Protection Equipment for Tactical & Technical operations

**OSHA 29 CFR 1910.120**

US Hazardous Waste Operations and Emergency Response standard (HAZWOPR)

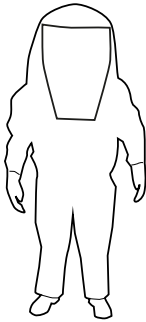
**OSHA 29 CFR 1910.132**

Personal Protective Equipment

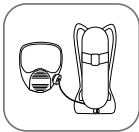
**OSHA 29 CFR 1910.134**

Respiratory Protective Equipment

## HOT ZONE



Encapsulating EN 943-2 ET  
Type 1a Gas-Tight Suit

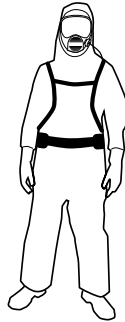


Self Contained  
Breathing  
Apparatus  
(SCBA)

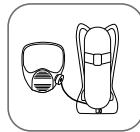


Fire Fighter  
Safety  
Wellingtons\*

## HOT / WARM ZONE



Liquid-Tight Type 3 Suit



Self Contained  
Breathing  
Apparatus  
(SCBA)



Chemical  
Protective  
Gloves to  
EN 374\*



Chemical  
Protective  
Safety  
Wellingtons

## WARM ZONE



Liquid-Tight Type 3 Suit



CBRN Full  
Facemask  
Respirator &  
Filter



Chemical  
Protective  
Gloves to  
EN 374\*



Chemical  
Protective  
Safety  
Wellingtons

\* if not already fitted to the suit

For use where the hazard is unknown, where high levels of vapour or gasses are present and in areas that are immediately dangerous to life and health (IDLH).

- **GTL**  
Chemprotex™ 400  
Encapsulating Gas-Tight Suit
- **Tychem® TK**  
Encapsulating Gas-Tight Suit
- **Hazmax FPA Boots**

Worn where there is likelihood of contact with contaminated surfaces and residual vapours. Can be worn once an assessment has been carried out to ensure the level of protection is adequate.

- **GLS 300A**  
Type 3 gas-tight  
encapsulating suit
- **GLS 300B**  
Type 3 gas-tight suit for  
external BA
- **SC1**  
Type 3 Liquid-tight suit for  
external BA
- **Hazmax™ Boots**

Worn where there is likelihood of contact with contaminated surfaces and residual vapours. Can be worn once an assessment has been carried out to ensure the level of protection is adequate.

- **SC1**  
Type 3 Liquid-tight suit
- **SC1 Ultra**  
Type 3 Liquid-tight suit
- **Hazmax™ Boots**

## WARM ZONE



Gas-Tight Type 1c  
Powered Respirator Suit



CBRN  
Powered  
Respirator &  
Filters



Chemical  
Protective  
Gloves to  
EN 374\*

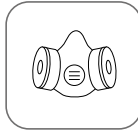


Chemical  
Protective  
Safety  
Wellingtons\*

## COLD ZONE



Limited Spray Tight  
Type 6 Suit



Half mask  
Respirator &  
Filter



Chemical  
Protective  
Gloves to  
EN 374

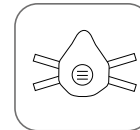


Chemical  
Protective  
Safety  
Wellingtons

## CASUALTIES



Pre & Post Decontamination  
Kits, Body Bags



Disposable  
respirator



Chemical  
Protective  
Gloves to  
EN 374

- **PRPS**  
*Gas-tight CBRN powered respirator suit*
- **Hazmax™ Boots**

Very low risk of physical surface contamination. Typically used at a large distance from any agent release and/or some considerable time after release - Typically be used for cordon control.

- **Splashmaster Coveralls in Chemprotex 300**  
Type 3 (& 6) *liquid-tight suit*
- **Hazmax™ Boots**

Equipment for contaminated casualties to allow them to disrobe and bag-up their possessions prior to decontamination and to provide modesty clothing after decontamination. CBRN Body bags safely contain contaminated fatalities.

- **Pre-Decontamination Modesty Kit**
- **Post Decontamination Modesty Kit**
- **Gas-Tight CBRN Body Bags**



# GAS-TIGHT SUITS FOR EMERGENCY TEAMS

## BACKGROUND:

---

Gas-tight suits for emergency teams protect responders and chemical workers from dangerous and toxic chemicals in liquid or gaseous form. They are used in areas that are considered immediately dangerous to life and health (IDLH).

Our **Type 1a-ET** suits are designed for Self-Contained Breathing Apparatus (SCBA) worn inside the suit, which provides the greatest protection to the emergency responder and simplifies decontamination after an incident.

All gas-tight suits are leak-tightness tested during manufacture.

## APPLICATIONS:

---

- Fire brigades
- Civil defence & CBRN
- Chemical industry
- Petrochemical
- Shipping
- Private Hazmat teams
- Bomb disposal



# GTL LIGHTWEIGHT SUIT

A lightweight, fully encapsulating, **Type 1a - ET** gas-tight suit, designed to protect the emergency responder against toxic, corrosive gases, liquids and solid chemicals.

- Ten year shelf life (seven years maintenance free)
- Compatible with the Permasure® Toxicity Modeller for calculation of safe working time with a given chemical based on real world conditions
- Fully encapsulating design to allow breathing apparatus to be worn inside the suit
- Manufactured in yellow Chemprotex™ 400 a light weight high performance chemical barrier, multi-layer non-woven fabric
- Heavy-duty 122cm (48") long gas-tight zip, fitted to the right hand side of the suit; a flap with a hook and loop fastener fitted to cover the teeth of the zip
- Adjustable internal support belt and bat-wing sleeves for optimum wearer comfort
- Flexible, multi-laminated, anti-mist visor giving clear undistorted vision
- Chemically protective, laminated glove welded to the suit material with an elasticated over-sleeve to prevent splash entering the supplied Neoprene outer gloves
- Integral socks with outer splash guards
- Pressure test & inspection required at year seven
- ESD version (GTL ESD) available with antistatic butyl outer gloves and covered exhalation valves for use in Ex atmospheres



## Testing & Certification:



**TYPE 1a-ET**, EN 943-2:2019(ET)

Protective clothing against liquid and gaseous chemicals, aerosols and solid particles - Requirements for suits for Emergency Teams



EN 1073-2:2002, Class 3 (NPF >9090)

Protective clothing against radioactive contamination



FINABEL 0.7.C

Chemical Warfare Agents



EN 14126:2003

Protective Clothing Against Infective Agents



## ATEX Zones (GTL ESD Version only)



Tested in accordance with EN IEC 60079-32-2:2015 and CEN/CLC/TR 16832:2015 for use in the following ATEX environments:

Dust Ex atmospheres:

**ZONES 20, 21 & 22**

Gas Ex atmospheres:

**ZONES 1 & 2**

## GTR LIMITED LIFE SUIT



HOT ZONE

Fully encapsulating **Type 1a - ET** regular robustness gas-tight suit manufactured in DuPont™ Tychem® TK, a high performance, seven layer, non-woven, chemical barrier fabric.

- Fully encapsulating design to allow breathing apparatus to be worn inside the suit
- Heavy duty 122cm (48") long gas-tight zip, fitted to the right hand side of the suit - flap with a hook and loop fastener fitted to cover the teeth of the zip
- Adjustable internal support belt and bat-wing sleeves for optimal wearer comfort
- Flexible, multi-laminated, anti-mist visor giving clear undistorted vision
- Detachable gloves fitted using gas-tight locking cuff
- Bonded inner & outer gloves provide chemical and mechanical protection
- Supplied with detachable Hazmax™ FPA safety boots for speed of donning and increased user comfort, sock feet with outer splash guard legs available as an option
- Ten year shelf-life
- Maintenance free for the first five years unless used
- Pressure test annually from year five or after each use

### Options:

- Air-line pass-through for supplementary air
- Equipment attachment points

### Testing & Certification:



#### **TYPE 1a-ET**, EN 943-2:2019(ET)

Protective clothing against liquid and gaseous chemicals, aerosols and solid particles - Requirements for suits for Emergency Teams



#### EN 1073-2:2002, Class 3 (NPF >9090)

Protective clothing against radioactive contamination



#### FINABEL 0.7.C

Chemical Warfare Agents



#### EN 14126:2003

Protective Clothing Against Infective Agents

# GLS GAS-TIGHT SUITS



## BACKGROUND:

The GLS range of suits were developed at the request of several leading European chemical manufacturers and represent a new concept in lightweight industrial gas-tight suits. They are **single-use Type 1** garments that are comfortable, light and flexible.

Type 1a GLS suits are designed for Self-Contained Breathing Apparatus (SCBA) worn inside the suit, which provides the greatest protection to the emergency responder and simplifies decontamination after an incident. Type 1b GLS suits are for SCBA worn externally and can be useful when working in confined spaces, as the SCBA cylinder can be slipped off the shoulders and passed forward.

They are also suitable for use in a number of different EX zones (see the individual suits for details).

## APPLICATIONS:

- Industrial fire brigades
- Chemical industry
- Petrochemical
- Pharmaceutical

# GLS 300 A



The GLS 300A suit in Chemprotex™ 300 is a single use **Type 1a** fully encapsulating gas-tight chemical protection suit covering both the wearer and the breathing apparatus. The suit combines the benefits of a lightweight high-performance chemical barrier fabric with a gas-tight construction. It incorporates attached antistatic chemical gloves, sock feet and a lightweight gas-tight zip.

- Large laminated anti-mist visor gives clear undistorted vision
- Twin exhalation valves to side of hood to ensure that the suit maintains a comfortable working pressure
- Lightweight gas-tight zip fitted to rear of suit, closing at the top and covered with a double storm flap with hook and loop fastener
- Chemically protective anti-static glove attached to the suit
- Integral socks in Chemprotex™ 300 material with splash-guard outer legs allowing the wearing of customer's own boots. (Boots not included)
- Must be worn with ESD footwear to ensure a conductive path to ground [when used in potentially explosive atmospheres]

## Testing & Certification:



**TYPE 1a**, EN943-1:2015+A1:2019  
Gas-Tight Chemical Protective Suits



**TYPE 3**, EN14605:2005+A1 2009  
Liquid-Tight Chemical Protective Clothing



**TYPE 4**, EN14605:2005+A1 2009  
Spray-Tight Chemical Protective Clothing



**TYPE 5**, EN13982-1:2004+A1:2010  
Particulate Protective Clothing



**TYPE 6**, EN13034:2005+A1 2009  
Limited Spray-Tight Chemical Protective Clothing



**HOT / WARM ZONE**

## ATEX Tested for use in explosive environments:



Dust Ex atmospheres: ZONES 20, 21 & 22  
Gas Ex atmospheres: ZONES 1 & 2

Tested in accordance with EN IEC 60079-32-2: (2015)  
and CEN/CLC/TR 16832:2015

# GLS 300 B

The GLS 300B suit in Chemprotex™ 300 is a single use **Type 1b** gas-tight chemical protection suit designed for use with breathing apparatus worn outside the suit, a facemask and filter or airline respirator. The suit combines the benefits of a lightweight high-performance chemical barrier fabric with a gas-tight construction. It incorporates permanently attached antistatic chemical gloves, sock feet and a lightweight gas-tight zip.

- Integral hood with flexible facemask seal with a protective outer chemical barrier fabric. For a gas and liquid-tight seal the protective outer fabric should be taped to the facemask
- Lightweight gas-tight zip fitted across the shoulders in rear of suit, with double external cover flaps with a hook and loop fastener
- Chemically protective anti-static glove attached to the suit
- Integral socks in Chemprotex™ 300 material with splash-guard outer legs allowing the wearing of customer's own boots. (Boots not included)
- Must be worn with ESD footwear to ensure a conductive path to ground [when used in potentially explosive atmospheres]



## Testing & Certification:



**TYPE 1b**, EN943-1:2015+A1:2019  
Gas-Tight Chemical Protective Suits



**TYPE 3**, EN14605:2005+A1 2009  
Liquid-Tight Chemical Protective Clothing



**TYPE 4**, EN14605:2005+A1 2009  
Spray-Tight Chemical Protective Clothing



**TYPE 5**, EN13982-1:2004+A1:2010  
Particulate Protective Clothing



**TYPE 6**, EN13034:2005+A1 2009  
Limited Spray-Tight Chemical Protective Clothing

## ATEX Tested for use in explosive environments:



Dust Ex atmospheres: ZONES 20, 21 & 22  
Gas Ex atmospheres: ZONES 0, 1 & 2  
Tested in accordance with EN IEC 60079-32-2: (2015)  
and CEN/CLC/TR 16832:2015



 **HOT / WARM ZONE**

# LIQUID-TIGHT SUITS



## BACKGROUND:

Limited life Type 3 liquid tight chemical splash suits provide an economical solution for dealing with a wide range of chemical and CBRN hazards. Particularly suitable for applications where suits are needed infrequently, where the type of hazard is unknown, or where decontamination facilities are limited - they are widely used by fire brigades, police, civil defence, transport and shipping companies.

## APPLICATIONS:

### SPLASH SUITS

- Fire brigades
- Civil defence & CBRN
- Chemical industry
- Shipping
- Spill clean-up

# SC1 SPLASH SUIT

Lightweight, Type 3 liquid-tight chemical splash contamination suit, designed for use with breathing apparatus worn outside the suit, or with a face mask and filter.

- Compatible with the Permasure® Toxicity Modeller for calculation of safe working time with a given chemical based on real world conditions (see page 27)
- One-piece construction in Chemprotex™ 300
- Integral hood, with Neoprene rubber face grommet, to seal around the wearer's face mask
- 91cm (36") Nylon zip, fitted across the shoulders in the rear of the suit, with double external zip-flaps sealed with double-sided tape
- Kemblok™ chemically protective laminated glove, welded to the suit material
- Supplied with separate neoprene outer gloves for mechanical protection
- Integral socks, with plain outer leg, allowing the wearing of customer's own boots (boots not included)
- Chemprotex™ 300 material conforms to EN1149-1:2006 for antistatic protective clothing



## Testing & Certification:



**TYPE 3**, EN14605:2005+A1 2009  
Liquid-Tight Chemical Protective Clothing



**TYPE 4**, EN14605:2005+A1 2009  
Spray-Tight Chemical Protective Clothing



**TYPE 5**, EN13982-1:2004+A1:2010  
Particulate Protective Clothing



**TYPE 6**, EN13034:2005+A1 2009  
Limited Spray-Tight Chemical Protective Clothing



FINABEL 0.7.C  
Chemical Warfare Agents



EN 14126:2003  
Protective Clothing Against Infective Agents



EN 1073-2:2002  
Protective clothing against radioactive contamination



Flexible neoprene face grommet



**HOT / WARM ZONE**

## SC1 ULTRA SUIT

Lightweight, Type 3 liquid-tight chemical splash contamination suit, designed for use with breathing apparatus worn outside the suit, or with a face mask and filter.



- Compatible with the Permasure® Toxicity Modeller for calculation of safe working time with a given chemical based on real world conditions
- One-piece construction in Chemprotex™ 300
- Integral hood, with Neoprene rubber face grommet, to seal around the wearer's face mask
- 91 cm (36") Nylon zip, fitted across the shoulders in the rear of the suit, with double external zip-flaps sealed with a hook and loop fastener for quicker donning & doffing
- Chemically protective butyl glove, permanently attached to the suit material
- Integral socks, with plain outer leg, allowing the wearing of customer's own boots (boots not included)
- Chemprotex™ 300 material conforms to EN1149-1:2006 for antistatic protective clothing
- Earthing strip on feet for use with ESD/Conductive boots to provide a conductive path from the gloves to earth for static sensitive applications

### Testing & Certification:



**TYPE 3**, EN14605:2005+A1 2009  
Liquid-Tight Chemical Protective Clothing



**TYPE 4**, EN14605:2005+A1 2009  
Spray-Tight Chemical Protective Clothing



**TYPE 5**, EN13982-1:2004+A1:2010  
Particulate Protective Clothing



**TYPE 6**, EN13034:2005+A1 2009  
Limited Spray-Tight Chemical Protective Clothing



FINABEL 0.7.C  
Chemical Warfare Agents



EN 14126:2003  
Protective Clothing Against Infective Agents



EN 1073-2:2002  
Protective clothing against radioactive contamination



Resealable Zip Flap



**HOT / WARM ZONE**



# SPLASHMASTER™ COVERALL

Lightweight, Type 3 liquid-tight, limited-life coverall, designed for use with a with a face mask and filter or appropriate face and head protection.

- Compatible with the Permasure® Toxicity Modeller for calculation of safe working time with a given chemical based on real world conditions
- One-piece construction in blue Chemprotex™ 300
- Integral elasticated hood
- Adjustable throat flap for improved seal around the base of the facemask
- Nylon zip, fitted vertically from groin to neck with twin flaps and hook and loop fastener to seal
- Unique zip-flap arrangement ensures liquid tight performance without the need for taping the flap
- Elasticated legs
- Elasticated wrists with thumb loop



## Testing & Certification:



**TYPE 3**, EN14605:2005+A1 2009  
Liquid-Tight Chemical Protective Clothing



**TYPE 4**, EN14605:2005+A1 2009  
Spray-Tight Chemical Protective Clothing



**TYPE 5**, EN13982-1:2004+A1:2010  
Particulate Protective Clothing



**TYPE 6**, EN13034:2005+A1 2009  
Limited Spray-Tight Chemical Protective Clothing



EN 14126:2003  
Protective Clothing Against Infective Agents



EN1149-5:2018  
Antistatic protective clothing



WARM/COLD ZONE

# POWERED AIR SUITS



## BACKGROUND:

---

Powered air systems provide continuous filtered air to the user increasing wearer comfort and allowing the user to work for longer due to the reduced physical burden.

The loose-fitting hood design of powered respirator suits (and hoods) provides high protection without the need for a tight-fitting face piece, which means:

- Many wearers feel less constricted
- They can be used by wearers with facial hair
- Training needs are reduced
- Face-fit testing is not required
- The unobstructed view of the wearers face provides reassurance to casualties and aids communication

## APPLICATIONS:

---

### PRPS

- Civil defence & CBRN
- Healthcare
- Fire brigades
- Police

# PRPS SUIT

The Powered Respirator Protective Suit (PRPS) is a one-piece gas-tight chemical protective suit for use by emergency response personnel after a CBRN incident. The suit was developed in conjunction with the UK National Health Service and is now widely used in the UK and overseas.

- Manufactured from DuPont™ Tychem® TK, a high performance, multi-layer chemical barrier material
- Respiratory system comprising a battery powered CleanAir® Chemical 2F powered respirator fitted with a visual display unit mounted inside the suit at the base of the visor, and audible alarm
- Visual display warns the wearer after 1 hour operational use, and again after 15 minutes for decontamination
- Two CleanAIR® CBRN (A3B2E2K2P3) filters provide protection against chemical and biological warfare agents
- Heavy duty gas-tight zip fitted across the chest enclosed by double external storm flaps with hook and loop fastener
- Dual glove system comprising protective outer gloves bonded to inner Kembrok™ laminate gloves
- Gas-tight locking cuff mechanism
- Highly chemically resistant Hazmax™ FPA safety boots permanently attached to suit
- Improved operational duration over gas-tight SCBA suits
- Pressure test every three years or after each use



## Options:

- Reusable PVC training suit - PRPS(T)
- Choice of lightweight dexterity gloves for medical tasks or heavy-duty gloves for increased physical protection

## Testing & Certification:



**TYPE 1c**, EN 943-2:2002

Protective clothing against liquid and gaseous chemicals, aerosols and solid particles



FINABEL 0.7.C

Chemical Warfare Agents



EN 14126:2003

Protective Clothing Against Infective Agents



EN 12941:1998+A2:2008

Respiratory protective devices

*\*The Powered Respirator Protective Suit (PRPS) has been assessed by a notified body as satisfying Annex II of the PPE regulation (EU) 2016/425 using technical standards EN 943-2 'Protective clothing against liquid and gaseous chemicals, including liquid aerosols and solid particles Part 2: Performance requirements for "gas-tight" (Type 1) chemical protective suits for emergency teams (ET)' and EN 12941 'Respiratory protective devices - Powered filtering devices incorporating a helmet or a hood - Requirements, testing, marking'.*



**WARM ZONE**

DuPont™ and Tychem® are trademarks or registered trademarks of E.I. du Pont de Nemours & Company.

## CLEANAIR® CHEMICAL 2F PAPR

---



The CleanAIR® Chemical 2F Plus is a battery-powered air purifying respirator (PAPR), available with a range of particulate and combination particulate and chemical filters. The PAPR's intelligent flow control maintains a consistent 160l/min airflow regardless of filter clogging or battery charge.

The PAPR is available with a choice of single-use or rechargeable batteries and includes a remote display unit that is mounted behind the visor of the PRPS hood. The display on the PAPR body shows the airflow, battery and filter status with an audible warning for low airflow and low battery charge.

The CleanAIR® Chemical 2F PAPER is compatible with a range of CleanAIR® particulate and combination filters and incorporates a shut-off valve on each filter port, allowing filters to be changed without having to doff the suit.

---

### Accessories:

#### Single-Use (Primary) Battery

- A single-use Lithium battery capable of powering the CleanAIR® Chemical 2F PAPER for up to four hours
- This item is cannot be recharged and has a maximum shelf-life of 10 years



#### Rechargeable Battery & Charger

- A Lithium-Ion rechargeable battery capable of powering the CleanAIR® Chemical 2F PAPER for more than four hours on a full charge
- EU or UK Charger



#### CleanAIR® Filters

A range of filters are available including CBRN, Combination, Chemical and Particulate. All filters incorporate a RD40x1/7" thread with an ABS housing.

PRPS Suits are supplied with CBRN (A3B2E2K2P3) filters, while training suits are supplied with combination A2B2E2K2P3 filters





# PROTECTIVE FOOTWEAR

## BACKGROUND:

---

Workmaster™ boots from Respirex are manufactured at our state of the art production facility in the UK and incorporate a number of significant innovations.

Our boots are available with a high-grip vulcanised rubber soles which significantly improves the slip resistance and the durability of the sole compared to conventional materials. It is also fuel and oil resistant and resistant to hot contact.

We have a range of specialist materials from the highly chemically resistant Hazmax™ compound to Cryolite which is lightweight and biodegradable. We were also the first manufacturer to release a boot that is certified for live working up to 26,500 Volts.

Our full range of boots (including food and construction industry footwear) can be found at [www.workmasterboots.com](http://www.workmasterboots.com)

## APPLICATIONS:

---

### HAZMAX™ BOOTS

- Petrochemical
- Chemical Industry
- Pharmaceutical
- Civil defence & CBRN
- Military
- Fire brigades
- Police

### CBRN OVERBOOTS

- Military
- Civil defence & CBRN
- Police

# HAZMAX™ FPA BOOT

---

A chemically protective anti-static boot with an integral steel toe cap and vulcanised rubber sole for superior slip resistance. Hazmax™ FPA boots provide increased heat resistance and conform to the EN 15090:2012 HI<sub>3</sub>F3A Fire fighter boot standard.

- Resistant to flame and radiant heat (20kW/m<sup>2</sup>)
  - Heat insulation of the sole (250°C for 40 minutes)
  - Green Hazmax chemically resistant compound shaft certified to EN 13832-3
  - Black vulcanised rubber sole for maximum grip - 30% better than a conventional safety boot sole
  - ESD Version available for ATEX environments
- 



## Testing & Certification:



EN20345:2011 S5 SRC HI HRO CI FO  
Safety Footwear



EN13832-3:2018 A K O P Q R T  
Footwear protecting against prolonged contact with chemicals.



EN 15090:2012, Class 2 - Type F3A (HI3, CI, SRC)  
Footwear for Firefighters



# HAZMAX ESD BOOT

---

A chemically protective Electro-Static Discharge (ESD) Hazmax™ S5 safety boot that is suitable for applications such as pharmaceutical electro-protective areas.

- ESD properties meet the requirements of EN 61340-5-1:2016 (0.1MΩ to 100MΩ) and EN 61340-5-1:2007 (0.1MΩ to 35MΩ)
- 

## Testing & Certification:

As Hazmax CBRN.



# HAZMAX OVERBOOTS

---

Chemically protective anti-static overboots in a choice of two styles; Maxi Overboots for use over safety boots, Compact Overboots for use over safety shoes/trainers.

- Green Hazmax chemically resistant compound shaft certified to EN 13832-3 (see [workmasterboots.com](http://workmasterboots.com) for chemical permeation data)
- Machine washable at 40°C



## HAZMAX CBRN BOOT

A chemically protective S5 safety boot with an integral steel mid-sole and toe cap and a vulcanised rubber sole for superior slip resistance. Manufactured from an enhanced version of our Hazmax compound for greater protection from warfare agents, the boot also provides protection against a broad range of hazardous chemicals.

- Manufactured from black chemically resistant Hazmax™ CBRN compound and certified to EN 13832-3:2018 (Footwear protecting against chemicals)
- Black vulcanised rubber sole for maximum grip - 30% better than a conventional safety boot sole
- Fuel and Oil resistant
- Also available with a composite (metal-free) toecap and mid-sole



### Testing & Certification:



EN20345:2012 S5 SRC HI HRO CI FO  
Safety Footwear



EN13832-3:2018 A K O P Q R T  
Footwear protecting against prolonged contact  
with chemicals.

## CBRN OVERBOOT

A chemically protective anti-static overboot with an ambidextrous quick-don design. Tested against a broad range of hazardous chemicals and chemical warfare agents, the boot design allows it to be fastened single-handedly in less than five seconds.

- Single ambidextrous design allows the boot to be worn on either the right or left foot to speed donning & doffing
- Manufactured from combat black or olive green chemically resistant Hazmax™ CBRN compound and certified to EN 13832-3:2018 (Footwear protecting against chemicals)
- Quick & easy to decontaminate
- Designed to fit and completely cover standard military issue combat boots
- Available in olive green or combat black



### Testing & Certification:



EN20347:2012 OB A FO SRA  
Occupational Footwear



EN13832-3:2018 A K O P Q R T  
Footwear protecting against prolonged contact  
with chemicals.

# KEMBLOK™ GLOVES



## BACKGROUND:

---

Kemblok gloves use multiple layers of chemical barrier materials to provide excellent protection against a broad range of chemicals. They are ideal as glove liners to provide enhanced chemical protection for heavier gloves providing mechanical protection, or as a chemical protective glove in applications where only a chemical barrier is required (e.g. laboratories or spill clean up).

## APPLICATIONS:

---

- Transferring chemicals and loading process equipment
- Filling, blending & charging of raw materials
- Opening & draining pumps, valves or lines
- Handling application and cleaning tools
- Chemical Testing
- Degreasing
- Emergency response
- Spills & leakages



# KEMBLOK GLOVES

---

Manufactured using a seven-layer chemical barrier laminate material, Kemblok™ gloves provide excellent protection against a wide range of chemicals, viruses and micro-organisms.

- Protection against chemicals and micro-organisms to EN ISO 374-1:2016
- Can be worn as a liner under heavier gloves providing mechanical protection
- Lightweight & comfortable
- Compatible with the PermaSURE® toxicity modelling smart-phone app which calculates safe working times for over 4,000 chemicals
- Ergonomic ambidextrous design
- Working temperature -40°C to 70°C
- Silicone and latex free
- REACH compliant
- Available in three sizes (Small, Medium & Large)



---

## Testing & Certification:



EN ISO 374-1:2016 - Type A

Protective gloves against chemicals & micro-organisms.  
Permeation Level 6 with reagents A, D, E, G, H & L



EN ISO 374-5:2016

Protective gloves against chemicals & micro-organisms. With EN ISO 374-2:2014 AQL  
Performance Level 3 including Viral Penetration



EN 420:2003+A1:2009

Clause 5.2, Finger Dexterity Level 5

# ACCESSORIES



## BODY BAG

---

A gas-tight body bag, designed to contain chemically contaminated mortalities and body parts after a Chemical, Biological, Radiological or Nuclear (CBRN) incident.

- Manufactured with a high performance CBRN barrier fabric
- Reinforced base and sturdy carrying straps
- CBRN filter (ClaeanAIR® NBC Filter) allows gasses produced by the body as part of the decomposition process to pass out of the bag safely
- Shut off cap for CBRN filter port
- Absorbent pads in the bottom of the bag capable of holding more than five litres of fluid
- Disposal by means of either cremation or burial
- Waterproof A4 pouch for identification paperwork
- Clear viewing window to allow relatives to view the deceased



## MODESTY PACK, PRE-DECON

---

Allows contaminated casualties to change from their own garments in as dignified a manner as possible prior to decontamination in a drench shower.

## MODESTY PACK, POST-DECON

---

For use after casualties have set aside their own garments and have been decontaminated in a drench shower.



# CHEMICAL PERMEATION DATA

CHEMICAL	CAS NO.	EN 374 & EN 13832 LETTER CODE	LAMINATE VITON®	VITON®/BUTYL/VITON®	DIUPONT® TYCHEM® TK	CHEMPROTEX™ 400	CHEMPROTEX™ 300	KEMBLOK™	HAZMAX™
Acetic acid (Glacial)	64-19-7	N	6	6	6	6	6	6	6
<b>Acetone</b>	67-64-1	B	6	6	6	6	6	6	4
<b>Acetonitrile</b>	75-05-08	C	6	6	6	6	6	6	5
Ammonia 33%	1336-21-6	O	6		6	6	6	6	6
<b>Ammonia Gas</b>	7664-41-7		6	6	6	6	6	6	6
<b>Carbon Disulphide</b>	75-15-0	E	6	6	6	6	6	6	3
<b>Chlorine Gas</b>	7782-50-5		6	6	6	6	6	6	4
<b>Dichloromethane</b>	75-09-02	D	5	3	6	6	6	6	3
<b>Diethylamine</b>	109-89-7	G	6	3	6	6	1	6	4
<b>Ethyl Acetate</b>	141-78-6	I	6	5	6	6	6	6	5
Formaldehyde 37%	79-11-8	T	6	6	6	6	6	6	6
<b>Heptane</b>	142-82-5	J	6	6		6	6	6	6
Hydrofluoric Acid 48%	7664-39-3	S		6	6	6	6	6	6
<b>Hydrogen Chloride Gas</b>	7647-01-0		6	6	6	6	6	6	6
<b>Methanol</b>	67-56-1	A	6	6	6	6	6	6	6
Nitric Acid 50%	7697-37-2	M	6	6	6	6	6	6	6
<b>Sodium Hydroxide 40%</b>	1310-73-2	K	6	6	6	6	6	6	6
Sodium Hypochlorite 16%	7681-52-9	R				6	6	6	6
Sulphuric Acid 50%	7664-93-9	L				6	6	6	6
<b>Sulphuric Acid 96%</b>	7664-93-9		6	6	6	6	6	6	6
<b>Tetrahydrofuran</b>	109-99-9	H	6	2	6	6	2	6	4
<b>Toluene</b>	108-88-3	F	6	6	6	6	4	6	5

Normalised breakthrough results for each material are given with the EN Class number (EN 16523), see key below for breakthrough times. Full details and further permeation results are at [respirex.com](http://respirex.com)

<b>Class 6</b> >480 mins	<b>Class 5</b> >240mins	<b>Class 4</b> >120mins	<b>Class 3</b> >10mins	<b>Class 2</b> >30 mins	<b>Class 1</b> >10 mins	<b>Class 0</b> Not tested
--------------------------	-------------------------	-------------------------	------------------------	-------------------------	-------------------------	---------------------------

Chemicals in **bold** are the 15 standard test chemicals defined in EN943-2:2002

## PermaSURE® Toxicity Modeller

PermaSURE® is a toxicity modelling app for Respirex™ Kemblok™ gloves and chemical protective suits made from Chemprotex™ fabrics. Using the latest modelling techniques, the PermaSURE® app calculates your safe working time based on the chemical you are working with, the PPE you are using and the working temperature.

The advantages of PermaSURE® are:

- Models low-level, but potentially-significant, permeation before breakthrough.
- Takes account of the toxicity of the substance when calculating a safe working time

Full details are available at [respirex.com](http://respirex.com)





RESPIREX™

---

Living + Breathing Personal Protection

**FIND OUT MORE**

For more details on our range of personal protective clothing call us on  
+44 (0)1737 778 600 or visit our website:

**[www.respirex.com](http://www.respirex.com)**