RESPIREX™

Living + Breathing Personal Protection

CHEMPROTEX™ 300

Chemprotex™ 300

Chemprotex™ 300 is a high performance chemical barrier material manufactured by laminating spunbonded polythene to a barrier film which is coated by a protective outer polymer coating. It is the combination of film and polymer which provides a particle-tight material with good resistance to penetration and permeation by many liquids and gases. It is designed to be used in the manufacture of single use Type 2, (non gas tight) and type 3 and 4 chemical and biological protective clothing for both the Emergency Services and industrial end-users.

Primary benefits of Chemprotex™ 300:

- Excellent material strength and high tear resistance
- Supple and light
- Large permeation data base for a wide range of chemicals
- Low noise (non rustle) material
- Advanced seam technology
- Anti-static properties

PPE manufactured from Chemprotex™ 300 is designed for single use only; Respirex cannot guarantee the integrity or performance characteristics of PPE that has seen repeated use. Guidance on the recommended use of specific items of PPE can be found in the relevant user instructions.

SC1 SPLASH CONTAMINATION SUIT

The SC1 in Chemprotex™ 300 is a single use Type 3 splash contamination suit designed for use with breathing apparatus worn outside the suit or with a face mask and filter.

The garment is CE certified to EN14605:2005 and is intended for use in areas that are not immediately dangerous to life or health.

- One-piece construction
- Integral hood with neoprene rubber face grommet to seal around the wearer's face mask
- 91cm (36") Nylon zip fitted across the shoulders in rear of suit, flapped internally and encased in a double external housing with self adhesive tape closure
- Chemically protective laminated glove welded to the suit material
- Supplied with Mapa M420 neoprene outer gloves
- Integral socks in the same Chemprotex™ 300 material as the suit with plain outer leg allowing the wearing of customer's own boots. (Boots not included)

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

IL: Class 1
EN 1073-2:2002
Radioactive Particulate Protective Clothing

EN 1149-5:2008
Antistatic Protective Clothing

EN 14126:2003
Protective Clothing Against Infective Agents

SC4 SPLASH CONTAMINATION SUIT

The SC4 in Chemprotex™ 300 is a single use fully encapsulating Type 3 (liquid tight) suit covering both the wearer and the breathing apparatus and is CE certified to EN14605:2005.

- Laminated anti-mist visor giving clear undistorted vision
- Single valve to side of hood to ensure that the pressure change within the suit does not exceed 400 pascals in one minute
- 117cm (46") Fine tooth zip fitted to rear of suit, closing at bottom complete with single storm flap with double-sided tape
- Chemically protective laminated glove welded to the suit material
- Supplied with Mapa M420 neoprene outer gloves
- Integral socks in Chemprotex™ 300 material with plain outer leg allowing the wearing of customer's own boots. (Boots not included)

Certification:

TYPE 3
EN14605:2005
Liquid-Tight Chemical Protective Clothing

RJS CHEMICAL RESPIRATOR SUIT

The RJS Chemical Respirator Suit is a one piece Type 3 chemical protective suit for use in hazardous industrial and emergency response environments.

- Lightweight suit design with backpack mounted powered respirator provides excellent wearer comfort
- Respirator and loose-fitting hood provide cooling air over the head and through the suit, making the wearer more comfortable and better able to focus on tasks
- The loose-fitting hood design provides high protection without the need for a tight-fitting face piece, which means:
  - Many wearers feel less constricted
  - Can be used by wearers with facial hair or glasses
  - Training needs are reduced
  - Face-fit testing is not required
- Compared to a gas-tight suit with SCBA, the suit and respirator is significantly lighter and more comfortable, with far greater operational duration.
- Greater freedom of movement an operational independence than when using air-fed suits with an airline
- The clear wide-view visor provides reassurance to casualties and victims by allowing easier, friendly 'whole-face' communication

Suit Features

- Manufactured from Chemprotex™ 300 a high performance, lightweight, chemical barrier material
- Chest zip with double storm flap and Velcro closure
- Chemically protective laminated glove welded to the suit material, with elasticated over-sleeve for use with gloves providing mechanical protection
- Integral sock foot with elasticated outer leg allowing the wearing of customer's own boots.
- Includes knee pad pockets, allowing protective pads to be fitted if required

3M™ Jupiter™ Powered Respirator

The Jupiter turbo unit provides respiratory protection against a wide range of contaminants. An ergonomically designed padded backpack ensures the unit's low weight is comfortably carried on the user's shoulders. As a result, the Jupiter powered air turbo unit is comfortable enough to wear for entire work shifts.

- Head-up display shows turbo status, hours used and warnings
- Audible and visual low airflow alarm
- Easy to adjust and maintain
- IP53 rating. Suitable for use in a decontamination shower.
- Choice of battery packs with up to 8 hours operational use
- Range of filters available offering protection from particulate, organic vapour, inorganic and acid gases, ammonia and CBRN hazards

Filter Options

- P R - Particulates
- A2P R - Organic Vapours and Particulates
- A2BEK1P R - Combination organic vapours, inorganic and acid gases & Ammonia and Particulates
- K1P R - Ammonia and Particulates
- ABE1P R - Combination organic vapours, inorganic and acid gases and Particulates
- ABEK2P R - Combination organic vapours, inorganic and acid gases & Ammonia and Particulates with additional protection against certain military agents

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

EN 14126:2003
Protective Clothing Against Infective Agents

EN 12941:1998+A2:2008 APF 40, NPF 500*
Respiratory Protective Devices

* Additional testing to EN 1073-1:1998 demonstrated that a Total Inward Leakage (Respiratory Zone of less than 0.002%) was achieved, relating to a Nominal respiratory Protection Factor of 50,000.

N.B. There are uses, environments and chemicals for which this garment is unsuitable. It is the responsibility of the user to review available data and verify that the garment is appropriate for the intended use and meets all specified government industry standards.

LIGHTWEIGHT COWL SUIT

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

- One-piece construction in blue Chemprotex™ 300
- Integral elasticated hood
- Nylon zip, fitted vertically from groin to neck with twin flaps and VELCRO® brand hook and loop fastener to seal
- Unique zip-flap arrangement ensures liquid tight performance without the need for taping the flap
- Minimal taping required to achieve stated performance - unlike the majority of other suits that require taping at the wrist, ankle zip and facemask, the lightweight combi needs only a single piece of tape at the neck, dramatically reducing donning and doffing times
- Elasticated legs
- Double cuff with elasticated outer and soft elasticated inner for user comfort and thumb loop to ensure sleeves don't ride up the arm in use

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

EN 1149-5:2008
Antistatic Protective Clothing

PHYSICAL PROPERTIES

Tested In Accordance With:	Performance Requirement	Level Of Performance	EN14325:2004 Class
EN 530:2010 Method 2	Abrasion Resistance	2,000 cycles	6
EN ISO 7854:1997 Method B	Flex Cracking Resistance (visual assessment)	1,000 cycles – Pass 2,500 cycles - Fail	1
EN 863:1995	Puncture Resistance	12 Newtons	2
EN ISO 9073-4:1997	Trapezoidal Tear Resistance	Length 116 Newtons Width 83 Newtons	4
EN ISO 13934-1:1999	Tensile strength	Length 180 Newtons Width 133 Newtons	3
EN 13274-4:2001 Method 3 (single burner test)	Resistance to ignition*	No part ignited or continued to burn on removal from the flame	Pass
EN 25978:1993	Resistance to blocking	Slight blocking	-
EN ISO 13935-2:1999	Seam Strength	166.8 Newtons	4
EN 1149-1:2006	Surface resistance**	Face $<3.6 \times 10^8$ Ω Reverse $<3.4 \times 10^7$ Ω	-

* Chemprotex™ 300 meets the resistance to ignition requirements of EN14325:2004 but is not flame resistant. PPE manufactured from Chemprotex™ 300 should not be worn in potentially flammable or explosive environments.

** Anti-static properties are not claimed for all PPE manufactured from Chemprotex™ 300. Please refer to the specific user instructions supplied with each product for detailed performance information. Regardless of the anti-static properties of any suit materials, it is the responsibility of the end-user to ensure that their working practices (e.g. grounding) achieve dissipation of any static charges which may build up on the suit during use.

CHEMICAL WARFARE AGENT PROTECTION

The Chemprotex™ 300 material has been tested for resistance to permeation by chemical warfare agents in accordance with FINABEL O.7.C methods at the respected TNO laboratories. Both the material and seams were found to offer an extremely high level of protection against the following agents:

Table 1: Material samples

Agent	Breakthrough time (hours)	Temperature (°C)
Mustard agent (HD)	>48	37
Sarin (GB)	>48	37
Soman (GD)	>48	37
VX	>48	37

Table 2: Seam samples

Agent	Breakthrough time (hours)	Temperature (°C)
Mustard agent (HD)	>48	37
Sarin (GB)	>48	37
Soman (GD)	>48	37
VX	>48	37

RESISTANCE TO PENETRATION BY INFECTIVE AGENTS

The material has passed the requirements of EN14126:2003 for protective clothing against infective agents. It is therefore suitable to provide protection against blood, blood-borne pathogens, body fluids, biologically contaminated aerosols and both wet and dry microbial penetration.

Tested According To	Requirement	Level of Performance	EN14126:2003 Class
ISO 22610:2006	Resistance to wet microbial penetration	> 75 min	6
ISO 16603:2004	Resistance to penetration by blood and body fluids using synthetic blood	Pass	N/A
ISO 16604:2004	Resistance to penetration by blood-borne pathogens using bacteriophage Phi-X174	20 kPa	6
ISO/DIS 22611:2003	Resistance to penetration by biologically contaminated aerosols	Log > 5	3
ISO 22612:2005	Resistance to dry microbial penetration	<1 Log cfu	3

CHEMICAL PERMEATION DATA TABLES

Chemical Name	State	CAS Number	Actual (min.)	ASTM (min.)	EN374-3 (min.)	EN Class	SSPR µg/(min.cm²)	MDPR µg/(min.cm²)	Observation
acetaldehyde	L	75-07-0	>480	>480	>480	6	<0.05	0.05	No degradation
acetic acid (30%)	L	64-19-7	>480	>480	>480	6	<0.001	0.001	No degradation
acetic acid (glacial)	L	64-19-7	>480	>480	>480	6	<0.001	0.001	No degradation
acetic anhydride	L	108-24-7	>480	>480	>480	6	<0.001	0.001	No degradation
acetone	L	67-64-1	>480	>480	>480	6	<0.02	0.02	No degradation
acetonitrile	L	64047	>480	>480	>480	6	<0.05	0.05	No degradation
acetophenone	L	98-86-2	>480	>480	>480	6	<0.05	0.05	No degradation
acrylamide (50%)	L	65532	>480	>480	>480	6	<0.10	0.10	No degradation
acrylic acid	L	65660	>480	>480	>480	6	<0.005	0.005	Discolouration
acrylonitrile	L	107-13-1	>480	>480	>480	6	<0.05	0.05	No degradation
allyl alcohol	L	107-18-6	>480	>480	>480	6	<0.05	0.05	No degradation
ammonia	G	7664-41-7	32	49	>480	6	0.17	0.005	No degradation
ammonium hydroxide (35% NH3 in water)	L	1336-21-6	>480	>480	>480	6	<0.001	0.001	No degradation
amyl acetate-n	L	628-63-7	>480	>480	>480	6	<0.02	0.02	No degradation
aniline	L	62-53-3	>480	>480	>480	6	<0.05	0.05	No degradation
aviation fuel	L	-	>480	>480	>480	6	<0.05	0.05	No degradation
benzene	L	71-43-2	28	35	58	2	3.0	0.05	No degradation
benzonitrile	L	100-47-0	>480	>480	>480	6	<0.05	0.05	No degradation
benzoyl chloride	L	98-88-4	>480	>480	>480	6	<0.05	0.05	No degradation
benzyl alcohol	L	100-51-6	>480	>480	>480	6	<0.05	0.05	No degradation
benzyl chloride	L	100-44-7	>480	>480	>480	6	<0.05	0.05	No degradation
bromine	L	7726-95-6	imm	7	8	0	high	0.001	Discolouration
butadiene 1,3	G	106-99-0	>480	>480	>480	6	<0.02	0.02	No degradation
butane	G	106-97-8	>480	>480	>480	6	<0.05	0.05	No degradation
butanol n-	L	71-36-3	>480	>480	>480	6	<0.05	0.05	No degradation
Butyl aldehyde	L	123-72-8	>480	>480	>480	6	<0.05	0.05	No degradation
Butyl ether n-	L	142-96-1	>480	>480	>480	6	<0.05	0.05	No degradation
carbon disulphide	L	75-15-0	>480	>480	>480	6	<0.05	0.05	No degradation
chlorine	G	7782-50-5	>480	>480	>480	6	<0.001	0.001	No degradation
chloroacetic acid (68%)	L	65692	>480	>480	>480	6	<0.001	0.001	No degradation
chlorobenzene	L	108-90-7	120	145	291	5	1.5 (max)	0.05	No degradation
chloroethanol 2-	L	107-07-3	>480	>480	>480	6	<0.02	0.02	No degradation
chloroform	L	67-66-3	3	6	9	0	22.5	0.01	No degradation
cresol m-	L	108-39-4	>480	>480	>480	6	<0.05	0.05	No degradation
cyclohexane	L	110-82-7	>480	>480	>480	6	<0.05	0.05	No degradation
cyclohexanone	L	108-94-1	7	13	>480	6	0.23	0.05	No degradation
dichlorodimethylsilane	L	75-78-5	>480	>480	>480	6	<0.001	0.001	Slight blistering
dichloromethane	L	64164	>480	>480	>480	6	<0.05	0.05	No degradation
diesel fuel	L	-	>480	>480	>480	6	<0.10	0.10	No degradation
diethylamine	L	109-89-7	7	8	11	1	2.1	0.05	Slight swelling
di(2-ethylhexyl)phthalate	L	117-81-7	nt	nt	>480	6	nm	1.0	No degradation
dimethylacetamide N,N	L	127-19-5	223	>480	>480	6	0.08	0.05	No degradation
dimethylformamide N,N	L	61699	>480	>480	>480	6	<0.01	0.01	No degradation
dimethyl sulphate	L	77-78-1	>480	>480	>480	6	<0.02	0.02	No degradation
dimethyl sulphide	L	75-18-3	7	12	29	1	2.6	0.05	No degradation
dimethyl sulphoxide	L	67-68-5	>480	>480	>480	6	<0.02	0.02	No degradation
dioxane 1,4-	L	123-91-1	26	>480	>480	6	0.05	0.01	No degradation
epichlorohydrin	L	106-89-8	>480	>480	>480	6	<0.05	0.05	No degradation
ethanol	L	64-17-5	>480	>480	>480	6	<0.02	0.02	No degradation
ethanolamine	L	141-43-5	>480	>480	>480	6	<0.001	0.001	No degradation
ethyl acetate	L	141-78-6	>480	>480	>480	6	<0.01	0.01	No degradation
ethyl cellosolve acetate	L	111-15-9	>480	>480	>480	6	<0.01	0.01	No degradation
ethylene diamine	L	107-15-3	>480	>480	>480	6	<0.001	0.001	No degradation
ethylene dibromide	L	106-93-4	>480	>480	>480	6	<0.05	0.05	No degradation
ethylene glycol	L	107-21-1	>480	>480	>480	6	<0.05	0.05	No degradation
ethylene oxide	G	75-21-8	>480	>480	>480	6	<0.05	0.05	No degradation
formaldehyde (37%)	L	50-00-0	>480	>480	>480	6	<0.001	0.001	No degradation

Chemical Name	State	CAS Number	Actual (min.)	ASTM (min.)	EN374-3 (min.)	EN Class	SSPR µg/(min.cm²)	MDPR µg/(min.cm²)	Observation
formic acid (96%)	L	64-18-6	>480	>480	>480	6	<0.001	0.001	Discolouration
furaldehyde 2-	L	72321	7	16	>480	6	0.50	0.02	No degradation
glutaraldehyde (5%)	L	111-30-8	>480	>480	>480	6	<0.10	0.10	No degradation
heptane	L	142-82-5	>480	>480	>480	6	<0.02	0.02	No degradation
hexane	L	110-54-3	>480	>480	>480	6	<0.05	0.05	No degradation
hydrazine monohydrate	L	7803-57-8	>480	>480	>480	6	<0.001	0.001	No degradation
hydrochloric acid (37%)	L	7647-01-0	>480	>480	>480	6	<0.001	0.001	No degradation
hydrofluoric acid (48%)	L	7664-39-3	>480	>480	>480	6	<0.02	0.02	No degradation
hydrofluoric acid (73%)	L	7664-39-3	30	267	>480	6	0.18	0.01	No degradation
hydrogen chloride	G	7647-01-0	>480	>480	>480	6	<0.001	0.001	No degradation
hydrogen fluoride (anhydrous gas)	G	7664-39-3	132	244	304	5	nm	0.01	Degraded and discoloured
hydrogen fluoride (anhydrous liquid)	L	7664-39-3	52	125	228	4	1.5	0.01	Degraded and discoloured
hydrogen peroxide (30%)	L	7722-84-1	>480	>480	>480	6	<0.001	0.001	No degradation
kerosene	L	8008-20-8	>480	>480	>480	6	<0.05	0.05	No degradation
mercuric chloride (sat. solution)	L	7487-94-7	>480	>480	>480	6	<0.001	0.001	No degradation
methacrylic acid	L	79-41-4	>480	>480	>480	6	<0.001	0.001	No degradation
methanol	L	67-56-1	46	57	>480	6	0.54	0.02	No degradation
methyl acrylate	L	96-33-3	118	231	>480	6	0.15	0.02	No degradation
methyl-t-Butyl-ether	L	1634-04-4	145	248	>480	6	0.16	0.05	No degradation
methyl chloride	G	74-87-3	>480	>480	>480	6	<0.05	0.05	No degradation
methyl ethyl ketone	L	78-93-3	>480	>480	>480	6	<0.05	0.05	No degradation
methyl mercaptan	G	74-93-1	>480	>480	>480	6	<0.001	0.001	No degradation
methyl methacrylate	L	80-62-6	58	97	>480	6	0.42	0.02	No degradation
methyl vinyl ketone	L	78-94-4	>480	>480	>480	6	<0.05	0.05	No degradation
Methyl -2-pyrrolidone n-	L	872-50-4	6	12	>480	6	0.74	0.05	No degradation
methylene bromide	L	74-95-3	28	39	>480	6	0.45	0.05	No degradation
nicotine	L	56558	nt	nt	>480	6	nm	0.10	No degradation
nitric acid (70%)	L	7697-37-2	>480	>480	>480	6	<0.001	0.001	No degradation
nitric acid (>90% fuming)	L	7697-37-2	>480	>480	>480	6	<0.01	0.01	Discolouration
nitrobenzene	L	98-95-3	>480	>480	>480	6	<0.05	0.05	No degradation
nitromethane (96%)	L	75-52-5	>480	>480	>480	6	<0.05	0.05	No degradation
oleum (15% free SO3)	L	8014-95-7	>480	>480	>480	6	<0.001	0.001	No degradation
perchloric acid	L	7601-90-3	>480	>480	>480	6	<0.001	0.001	No degradation
petrol, leaded	L	-	>480	>480	>480	6	<0.10	0.10	No degradation
petrol, unleaded	L	8006-61-9	>480	>480	>480	6	<0.05	0.05	No degradation
phenol (85%)	L	108-95-2	>480	>480	>480	6	<0.05	0.05	No degradation
phosphoric acid (85%)	L	7664-38-2	>480	>480	>480	6	<0.001	0.001	No degradation
phosphorus oxytrichloride	L	10025-87-3	373	437	440	5	5.7 (max)	0.001	No degradation
potassium chromate (sat. solution)	L	7789-00-6	>480	>480	>480	6	<0.05	0.05	No degradation
propan-2-ol	L	67-63-0	>480	>480	>480	6	<0.05	0.05	No degradation
propylene oxide 1,2-	L	75-56-9	75	91	>480	6	0.55 (max)	0.05	No degradation
pyridine	L	110-86-1	19	22	>480	6	0.50 (max)	0.05	No degradation
'Roundup' weedkiller	L	-	>480	>480	>480	6	<0.001	0.001	No degradation
sodium cyanide (45%)	L	143-33-9	>480	>480	>480	6	<0.001	0.001	No degradation
sodium hydroxide (40%)	L	1310-73-2	>480	>480	>480	6	<0.001	0.001	No degradation
sodium hypochlorite (12% chlorine)	L	7681-52-9	>480	>480	>480	6	<0.001	0.001	No degradation
styrene	L	100-42-5	157	208	>480	6	0.51 (max)	0.05	No degradation
sulphur dioxide	G	2025884	>480	>480	>480	6	<0.001	0.001	No degradation
sulphuric acid (50%)	L	7664-93-9	>480	>480	>480	6	<0.001	0.001	No degradation
sulphuric acid (95-98%)	L	7664-93-9	>480	>480	>480	6	<0.001	0.001	No degradation
tetrachloroethylene	L	127-18-4	>480	>480	>480	6	<0.05	0.05	No degradation
tetrahydrofuran	L	109-99-9	23	27	41	2	4.1	0.05	No degradation
toluene	L	108-88-3	39	79	173	4	2.0	0.04	No degradation

Chemical Name	State	CAS Number	Actual (min.)	ASTM (min.)	EN374-3 (min.)	EN Class	SSPR µg/(min.cm²)	MDPR µg/(min.cm²)	Observation
toluene 2,4-diisocyanate	L	584-84-9	>480	>480	>480	6	<0.10	0.10	No degradation
toluidine o-	L	95-53-4	>480	>480	>480	6	<0.05	0.05	No degradation
trichloroacetic acid (80%)	L	64353	>480	>480	>480	6	<0.001	0.001	No degradation
trichlorobenzene 1,2,4-	L	120-82-1	>480	>480	>480	6	<0.05	0.05	No degradation
trichloroethylene	L	65386	12	14	21	1	12.1	0.05	No degradation
trifluoroacetic acid	L	64406	>480	>480	>480	6	<0.001	0.001	No degradation
triethylamine	L	121-44-8	59	71	168	4	1.7	0.05	No degradation
vinyl acetate	L	108-05-4	>480	>480	>480	6	<0.05	0.05	No degradation
xylene (iso-mix)	L	1330-20-7	377	399	>480	6	0.35 (max)	0.05	No degradation

Key:

imm	immediate
nm	not measured
L	liquid
G	gas
<	less than
>	greater than
nt	not tested

–	not applicable
CAS number	Chemical Abstract Service Number. The number is unique for each chemical.
SSPR	Steady State Permeation Rate
MDPR	Minimum Detectable Permeation Rate
MAX	Maximum Permeation Rate (SSPR not reached)

STORAGE CONDITIONS

The Respirex range of PPE manufactured from Chemprotex™ 300 should be stored under the following conditions:

- Temperature range of -5°C to +30°C.
- In dry conditions above ground level; away from direct sunlight and in an environment free from harmful gases and vapours.
- Only remove PPE from its original packaging when intending to use.
- Care should be taken when storing PPE at extreme temperatures. At subzero temperatures the flexibility of the material may be reduced, resulting in a potential lowering of protection offered by the PPE.

DISPOSAL

Incineration is acceptable as no halogens are present or used in the manufacture. The calorific value is the same as oil; however uncontrolled combustion can lead to noxious fumes and un-burnt hydrocarbons. All components are thermoplastic and can be recycled as mixed polyolefin where facilities exist. The film has been designed not to biodegrade due to its intended application, so the film will not destabilise or cause toxic leach if used in landfill.

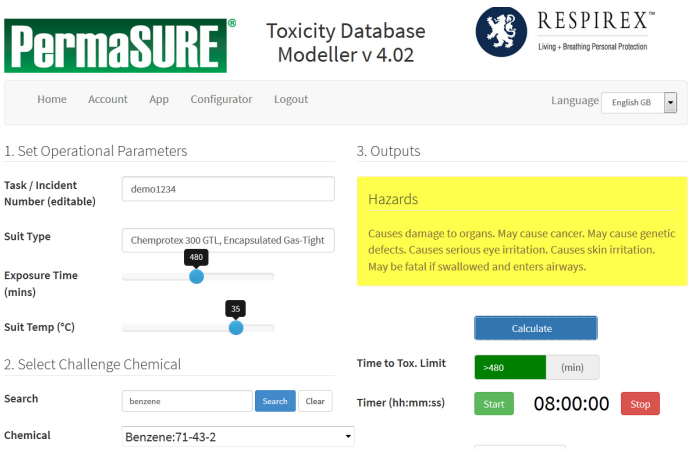
The product is comprised mainly from ethylene gas which is a by-product of oil production and refining which was once flared. No formal carbon footprint has been made on this product, however provided the product is not incinerated overall carbon dioxide release to the atmosphere during production and disposal will be low.

PERMASURE® TOXICITY MODELLER

PermaSURE® is a toxicity modelling web application for Respirex chemical protective suits made from Chemprotex™ 300 and 400 fabrics. Using the latest toxicity modelling techniques, the PermaSURE® app calculates your safe working time based on the chemical you are working with, the suit you are using and the suit temperature.

To use PermaSURE® simply select the suit type being used, set the exposure time, suit temperature and challenge chemical. Once the required information has been entered click calculate and PermaSURE will determine the time to reach the toxic limit and confirm if you are safe to work.

Full details are available at www.respirex-permasure.com.



CHEMICAL PERMEATION

What is Permeation? [a]

Permeation is the process by which a chemical moves through a protective clothing material on a molecular level.

Permeation involves:

- Sorption of molecules of the chemical into the contacted (outside) surface of a material
- Diffusion of the sorbed molecules in the material
- Desorption of the molecules from the opposite (inside) surface of the material

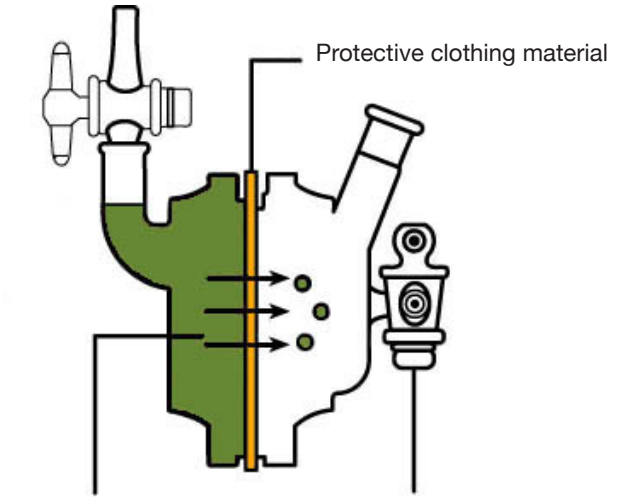
How is Permeation measured?

The resistance of a protective clothing material to permeation by hazardous liquid and gaseous chemicals is defined by the permeation rate of the chemical through the material and the breakthrough time.

Permeation test methods include ASTM F739, EN374-3 and ISO 6529; exposure of the material to the chemical is total and constant, and emulates total immersion conditions. There are no permeation test methods at this time for chemicals which are solids; generally it is considered that solids do not permeate.

The Permeation test cell

The protective clothing material specimen acts as a partition between one chamber of a permeation test cell, which contains the test chemical, and another chamber, which contains the collection medium a. The outer surface of the material is exposed to the test chemical. The inner surface of the material is monitored analytically to determine the amount of chemical (if any) permeating the material.

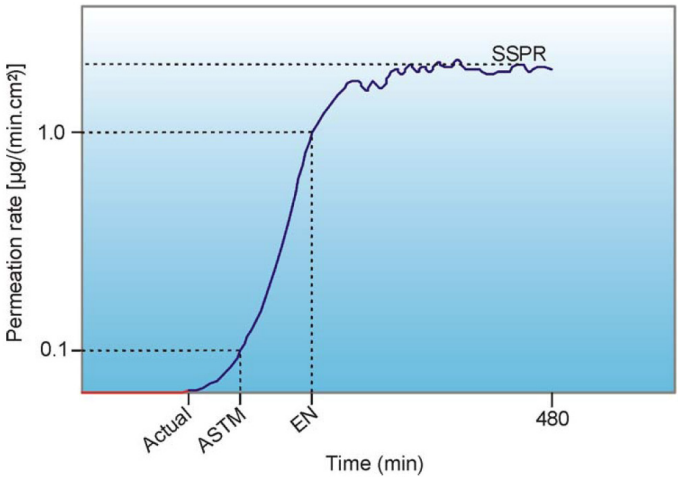


Permeation Rate

The mass of test chemical permeating the protective clothing material for a given exposed surface area per unit time b. This is typically expressed as µg/(min.cm^2).

Actual breakthrough time

The elapsed time measured from the start of the test to the time at which the test chemical is first detected a. The actual breakthrough time is therefore dependent upon the MDPR, which in turn is dependent on the chemical and analytical technique employed.



Steady State Permeation Rate (SSPR) [a]

The constant rate of permeation that occurs after breakthrough when the chemical contact is continuous and all forces affecting permeation have reached equilibrium. It is possible that steady state permeation may not be achieved during the period for which permeation testing is conducted.

Minimum Detectable Permeation Rate (MDPR) [c]

The lowest rate of permeation that is measurable with the complete permeation test system. The sensitivity of the test method in detecting low permeation rates is determined by the combination of the analytical technique and collection system selected, and the ratio of material specimen area to collection medium volume or flow rate.

Normalised breakthrough time (according to ASTM F739-07)

The elapsed time measured from the start of the test to the time at which the test chemical reaches a permeation rate of 0.1 µg/(min.cm^2).

Normalised breakthrough time (according to EN374-3:2003)

The elapsed time measured from the start of the test to the time at which the test chemical reaches a permeation rate of 1.0 µg/(min.cm^2).

Performance classification of normalised breakthrough times (EN374-3:2003) [d]

Normalised Breakthrough Time (EN374-3:2003) (minutes)	EN Class
>10	1
>30	2
>60	3
>120	4
>240	5
>480	6

Interpreting permeation test results

All permeation tests were conducted with pure chemicals under laboratory controlled conditions on materials only and are not intended to indicate the duration of “safe wear time” for a garment.

A normalised breakthrough time of >480 minutes indicates that the permeation rate did not reach the defined rate of 0.1 µg/(min.cm^2) (ASTM F739-07) or 1.0µg/(min.cm^2) (EN374-3:2003). Permeation however may still have occurred at lower rates; and depending on the chemical toxicity, it is possible that a chemical may be permeating the material and a level of toxicity reached within a protective clothing garment long before the reportable breakthrough of 480 minutes. Breakthrough time alone therefore is only a means of comparing different material performances and does not indicate safe protection for up to the number of minutes reported.

The “safe wear time” of a protective clothing garment depends on a number of factors such as:

- Temperature
- Type of exposure
- Toxicity of chemical

The determination of suitability of a garment for an application should be based on end user risk assessment.

Other chemicals and mixtures

The permeation characteristics of mixtures of chemicals can be different from those displayed by the individual chemical. Testing can be commissioned from the Respirex Testing Laboratory (an independent UKAS accredited laboratory) if there is a chemical or mixture that you use that does not appear within the permeation data tables.

References used in this section on chemical permeation:

a) BS EN ISO 6529:2001 Protective clothing – Protection against chemicals – Determination of resistance of protective clothing materials to permeation by liquids and gases.

b) BS EN 374-3:2003 Protective gloves against chemicals and micro-organisms – Part 3: Determination of resistance to permeation by chemicals.

c) ASTM F739-07 Standard Test Method for Permeation of Liquids and Gases through Protective Clothing Materials under Conditions of Continuous Contact.

d) BS EN 374-1:2003 Protective gloves against chemicals and micro-organisms – Part 1: Terminology and performance requirements.

THE RESPIREX TESTING LABORATORY

The Respirex Testing Laboratory is an independent test facility accredited by the United Kingdom Accreditation Service (UKAS). It offers a range of chemical permeation and physical testing services to European, International and American standards.

The laboratory offers:

- Confidentiality
- Independent Service
- Fast Turnaround
- Support with Development Projects

Chemical permeation standards include:
- BS EN 374-3
- BS EN ISO 6529
- ASTM F739-07

Physical testing standards include BS EN 14325 with reference to standards:
- BS EN ISO 7854 Flex cracking resistance
- BS EN ISO 13934-1 Tensile strength
- BS EN ISO 9073-4 Trapezoidal tear resistance
- BS EN 530 Abrasion resistance
- BS EN ISO 13935-2 Seam tensile strength
- BS EN 863 Puncture resistance

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