RESPIREX

BLUE LAMINATE

Technical Guide

Manufacturer of Personal Protective and Respiratory Protective Equipment

CONTENTS

❖ Intended use of Blue Laminate

Blue Laminate is a high performance chemical barrier material manufactured by laminating spunbonded polythene to a barrier film which is coated by a polymer. 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 Blue Laminate

- 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

❖Product Range

SC1 - Splash Contamination suit conforming to EN14605:2005

Type 3 chemical splash/contamination suit of one piece construction with integral hood and face-seal, where the breathing apparatus is worn externally.

Neoprene rubber face grommet to seal around the wearer's breathing 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.

Permanently attached highly chemically resistant laminated gloves fitted (welded) to the suit. Integral socks in the same material as the suit with plain outer leg allowing the wearing of customer's own boots. (Boots not included)

SC4 - Splash Coverall suit conforming to EN14605:2005

Fully encapsulating Type 3 (liquid tight) suit covering both the wearer and the breathing apparatus, including the following features:

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 4mbar. 117cm (46") Fine tooth zip fitted to rear of suit, closing at bottom complete with single storm flap with double-sided tape. Permanently attached highly chemically resistant laminated gloves (welded).

Integral socks in blue laminate material with plain outer leg allowing the wearing of customer's own boots. (Boots not included)

Frontair 2 - Air Fed Suit conforming to EN1073-1:1998

The Respirex Frontair 2 One Piece Suit is an air-fed suit designed for use in atmospheres where particulate contamination may be a hazard, when manufactured in the Respirex Blue Laminate material it gives added chemical protection as set out in the permeation charts on pages 8 to 10 of this brochure.

The suit features an air system, fitted with a variable control valve that can be operated by the wearer and is completely contained within the garment providing breathing air to the head and ventilation to the arms and legs. This offers a minimum flow level of 265 litres per minute and a maximum flow level of 600 litres per minute with an external airline support point to reduce the trip hazard. The internal waist belt supports both the air-line and the air distribution system and at the same time holds the suit in the correct wearing position.

Featuring permanently attached highly chemically resistant laminated gloves, anti-slip feet with ankle ties the suit is entered using a rear mounted zip covered by a double zip flap fitted with self-adhesive tape.

Nominal protection factor greater than class 5.

Frontair 2 - Air Fed Hood conforming to EN14594:2005

The Respirex Frontair 2 Hood is an air-fed hood designed for use in atmospheres where particulate contamination may be a hazard.

This hood is designed for use with breathable air supplied from an external compressed air source providing positive pressure. It features an air dissipation system completely contained within the hood that provides breathing air to the user together with a separate, reusable waist belt working with a maximum flow level of 320 litres per minute.

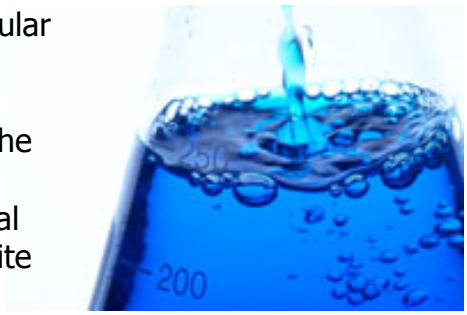
The 360° swivelling airline system mounted on an adjustable belt incorporates a hose restraint fitting and an audible low flow warning device. The lightweight soft elasticated neck seal is designed for comfort and to permit removal of a contaminated hood without touching the inner surfaces.

PPE manufactured from "Blue Laminate" 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.

❖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:



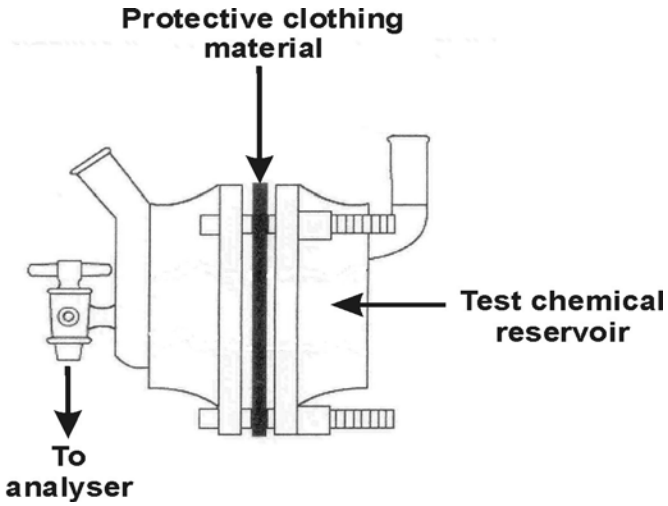
- Sorption of molecules of the chemical into the contacted (outside) surface of a material
- Diffusion of the sorbed molecules in the material
- Desorption of the molecules from the opposite (inside) surface of the material

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.

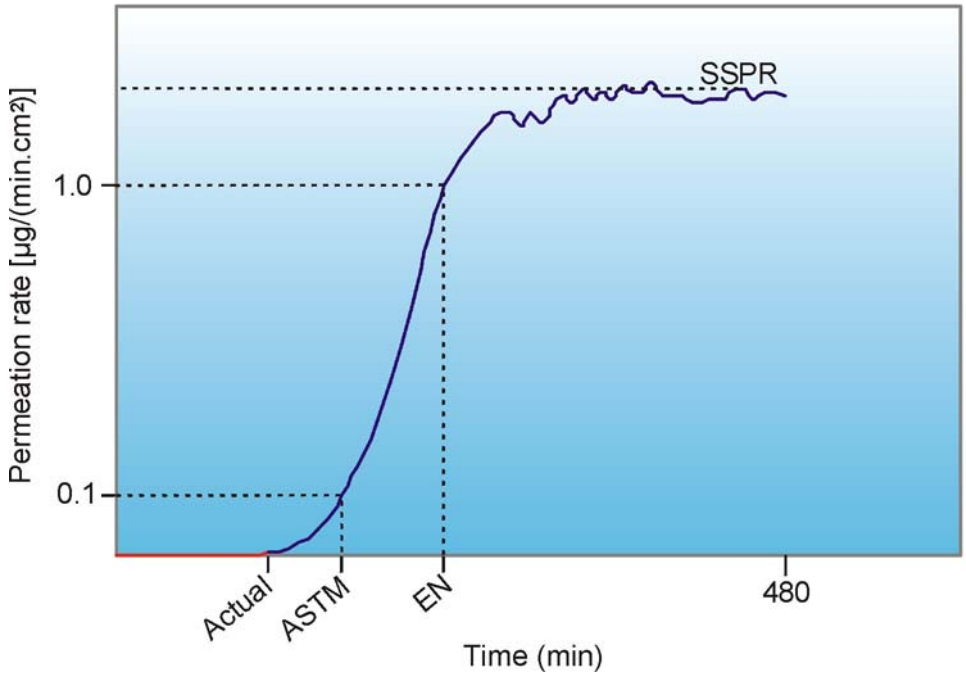
The Permeation test cell

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).



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.

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.

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.

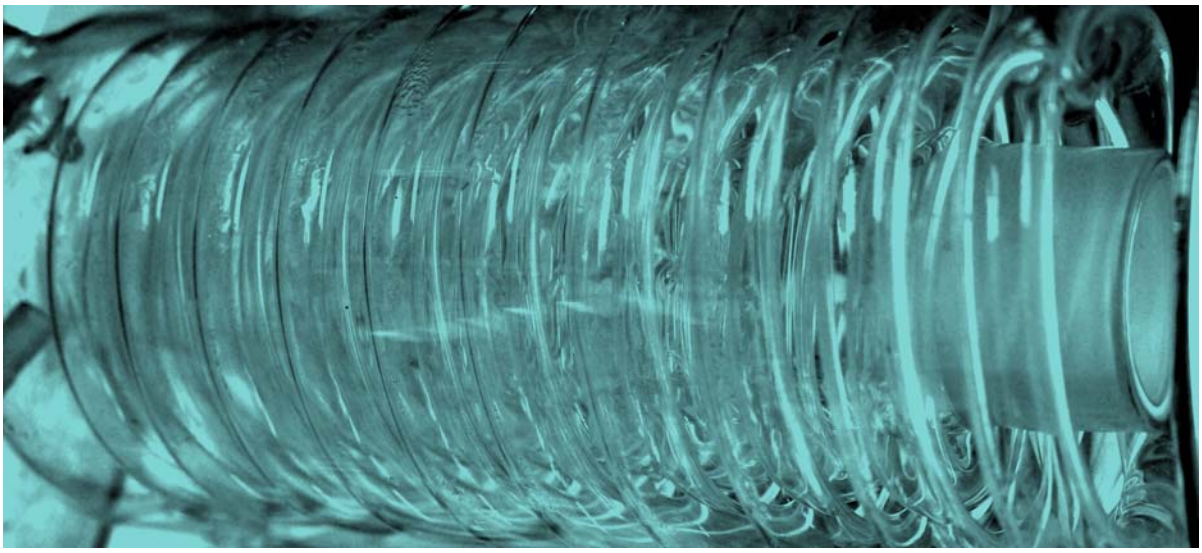
The "safe wear time" of a protective clothing garment depends on a number of factors such as:

- 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.

❖Chemical Permeation Data Tables

Chemical Name		CAS Number	Actual (min.)	ASTM (min.)	EN374-3 (min.)	EN Class	SSPR µg/(min.cm^2)	MDPR µg/(min.cm^2)	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	75-05-8	>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	79-06-1	>480	>480	>480	6	<0.10	0.10	No degradation
acrylic acid	L	79-10-7	>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	79-11-8	>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	75-09-2	>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	68-12-2	>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

Chemical Name		CAS Number	Actual (min.)	ASTM (min.)	EN374-3 (min.)	EN Class	SSPR µg/(min.cm^2)	MDPR µg/(min.cm^2)	Observation
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
formic acid (96%)	L	64-18-6	>480	>480	>480	6	<0.001	0.001	Discolouration
furaldehyde 2-	L	98-01-1	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	54-11-5	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

Chemical Name		CAS Number	Actual (min.)	ASTM (min.)	EN374-3 (min.)	EN Class	SSPR µg/(min.cm^2)	MDPR µg/(min.cm^2)	Observation
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	7446-09-5	>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
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	76-03-9	>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	79-01-6	12	14	21	1	12.1	0.05	No degradation
trifluoroacetic acid	L	76-05-1	>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)

❖Chemical Warfare Agent Protection

The blue laminate 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:

- Mustard agent (HD)
- Sarin (GB)
- Soman (GD)
- VX

Table 1 Material samples

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

Table 2 Seam samples

Agent	Breakthrough time (hours)	Temperature (°C)
HD	>48	37
GB	>48	37
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	0 kPa *	1
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

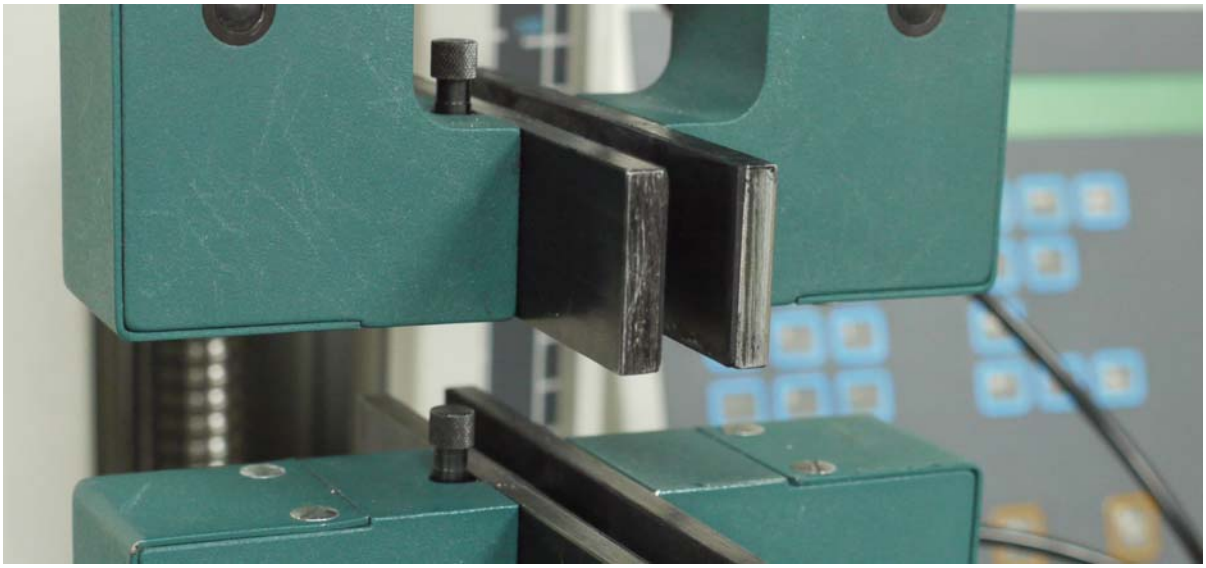
* only exposed to the hydrostatic pressure of the liquid in the test cell. Testing carried out by Centexbel laboratories.

❖Physical Properties

Tested In Accordance With:	Performance Requirement	Level Of Performance	EN14325:2004 Class
EN 530:1994 Meth 2	Abrasion Resistance	2000 cycles	6
EN ISO 7854:1997 Meth B	Flex Cracking Resistance (visual assessment)	1000 cycles – Pass 2500 cycles - Fail	1
EN 863:1995	Puncture Resistance	13.6 Newtons	2
EN ISO 9073-4:1997	Trapezoidal Tear Resistance	Length 76.3 Newtons Width 53.1 Newtons	3
EN ISO 13934-1:1999	Tensile strength	Length 159.1 Newtons Width 92.5 Newtons	2
EN 13274-4:2001 Meth 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 x 108 Ω Reverse <3.4 x 107 Ω	-

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

** Anti-static properties are not claimed for all PPE manufactured from "Blue Laminate". 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.



❖Storage Conditions

The Respirex range of PPE manufactured from "Blue Laminate" 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 sub-zero 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.

❖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.

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

The laboratory offers:

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

Contact details:

Respirex Testing Laboratory,
Unit F, Kingsfield Business Centre,
Philanthropic Road, Redhill,
Surrey, RH1 4DP,
Tel: +44 (0) 1737 857391
Fax: +44 (0) 1737 779441
E-mail: **laboratory@respirex.co.uk**
Web: **www.respirexinternational.co.uk**

Issue BR02/10
July 2010

Respirex International Limited
Unit F, Kingsfield Business Centre,
Philanthropic Road, Redhill,
Surrey RH1 4DP,
Tel: +44 (0) 1737 778600
Fax: +44 (0) 1737 779441
Email: info@respirex.co.uk
Web: www.respirexinternational.com