Product Catalogue
Chemical Protective Clothing

MICROGARD®
High Performance Protection in Comfort

About Microgard Limited

Microgard Limited is a leading manufacturer of chemical protective clothing, introducing new technology and designs to the market to improve wearer protection and comfort for over 35 years

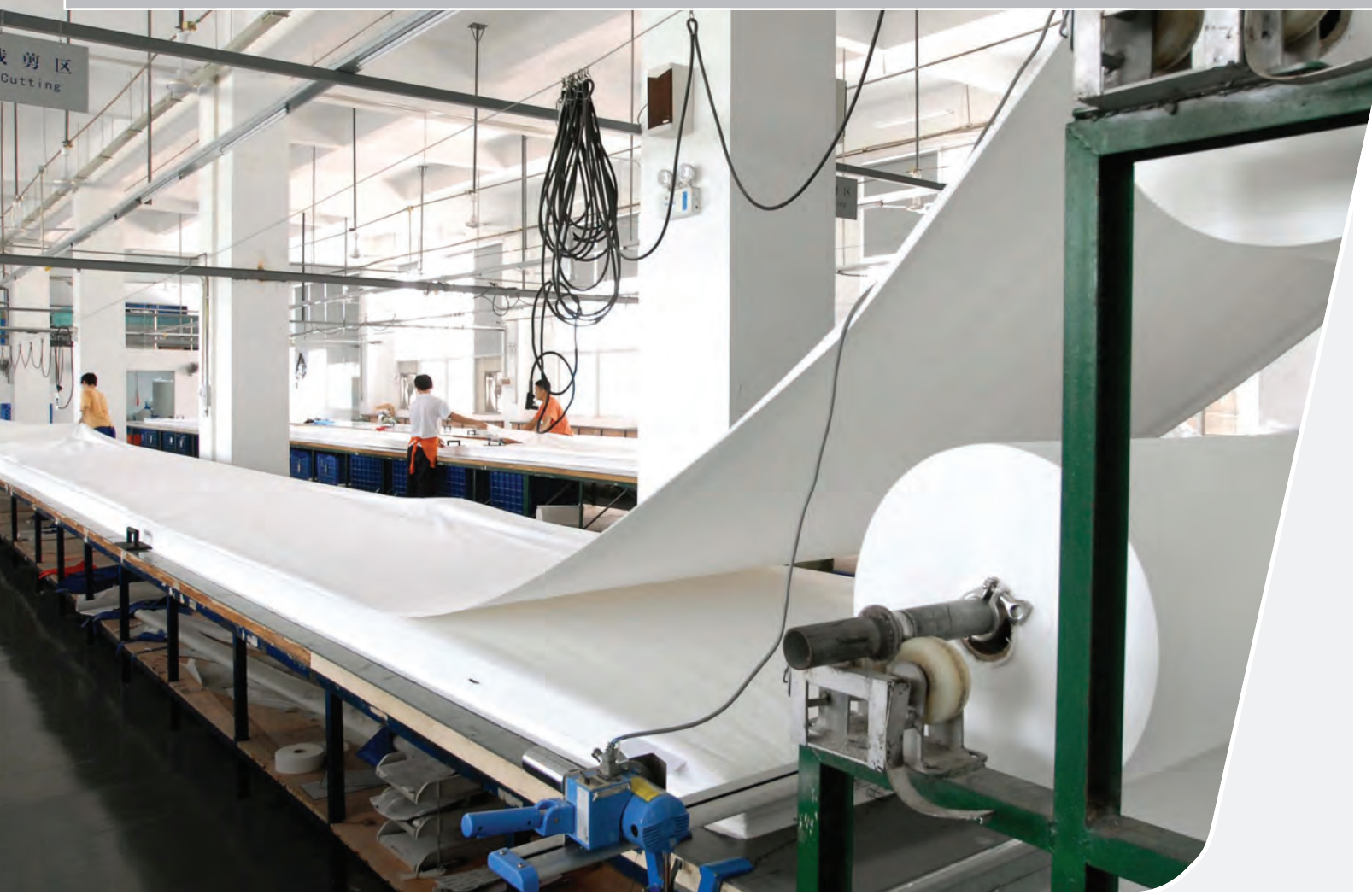
Microgard Limited was one of the world's first manufacturers of limited life chemical protective clothing. Established in 1975, the company has built its reputation on introducing new technology and designs to the market to improve wearer protection and comfort. Today, millions of MICROGARD® and MICROCHEM® products are worn around the globe, protecting people throughout industry and the public sector.

Protecting people while they work in dirty or hazardous environments has always been the focus of Microgard Limited. Whether you are working with liquid or solid chemicals, asbestos, paint, oil, grease, viruses and blood borne pathogens, or one of the countless other workplace contaminants in evidence today, trust Microgard Limited to help keep you protected.

Contents

MICROGARD®
High Performance Protection in Comfort

Experts in Manufacturing & Design



MICROGARD® and MICROCHEM® products are manufactured in accordance with the International Quality Standard ISO 9001 at our wholly owned state-of-the-art manufacturing plant in Xiamen (China).

All MICROGARD® and MICROCHEM® products are designed to meet or exceed the requirements of the European PPE Directive 89/686/EEC for chemical protective clothing.

The combination of our ISO 9001 accredited manufacturing environment and the expertise of our UK based design, product development and technical departments means that users can be assured that all MICROGARD® and MICROCHEM® products achieve the standards they were designed to meet.

The management systems of Microgard Limited & Microgard Xiamen Limited are assessed and certified by SGS (notified body CE0120) as meeting the requirements of PPE Directive 89/686/EEC (Article 11B) to manufacture personal protective equipment.

Microgard Ltd
ISO 9001 Certificate
Article 11B Certificate

Microgard Xiamen
ISO 9001 Certificate
Article 11B Certificate

Ethical Trading

MICROGARD®
High Performance Protection in Comfort

Microgard Limited, a modern company committed to the principles of an ethical manufacturing policy

It is our policy to protect the general welfare and occupational health and safety of any employee involved in the manufacturing process of the MICROGARD® and MICROCHEM® range of protective garments and allied products.

We are committed to the principles of the Ethical Trading Initiative Base Code. These recommendations conform to the standards of the International Labour Organisation, which states that in particular, no child labour will ever be used in any process and all of our employees enjoy safe, hygienic and comfortable working conditions. Employees will be paid an above average wage, enjoy regular employment and their working hours should not be excessive.

All products are manufactured in Microgard Xiamen, China; a wholly owned subsidiary of UK based Microgard Limited. Opened in 2008 on the modern AEPZ Export Development Zone, our facility was designed and built to the highest standards and allows every employee to enjoy clean, safe and climate controlled working conditions, excellent canteen and sanitary facilities together with free, first class dormitory accommodation.

For a copy of the Microgard Ethical policy please visit **www.microgard.com** or email **sales@microgard.com**

Charity Support

We are very proud to contribute to the Vipingo village fund. The charity is situated 40 km north of Mombasa in Kenya and has evolved from its very small beginnings in to a UK registered charity concentrating on education and conservation.

The Future Hope Montessori School is in the village of Vipingo on the East Coast of Africa and currently there are 70 children who attend, ranging in age from 3 to 7 years old. These children would never have gone to school without attending this Kindergarten. State primary schools do exist, but unless a child has been to Kindergarten they will not be offered a place at primary school. The school therefore guarantees the children a place in primary school, which in turn guarantees a place in secondary school. The children are fed two meals a day which makes a huge difference to their health, as many live in pitiful circumstances just above starvation level. The new fully fledged Montessori Nursery School consists of three classrooms for reception with a separate block for the kitchen, dining room and staff room.

"We are very proud to know that our contribution helps to give these children education and hope for a better future."

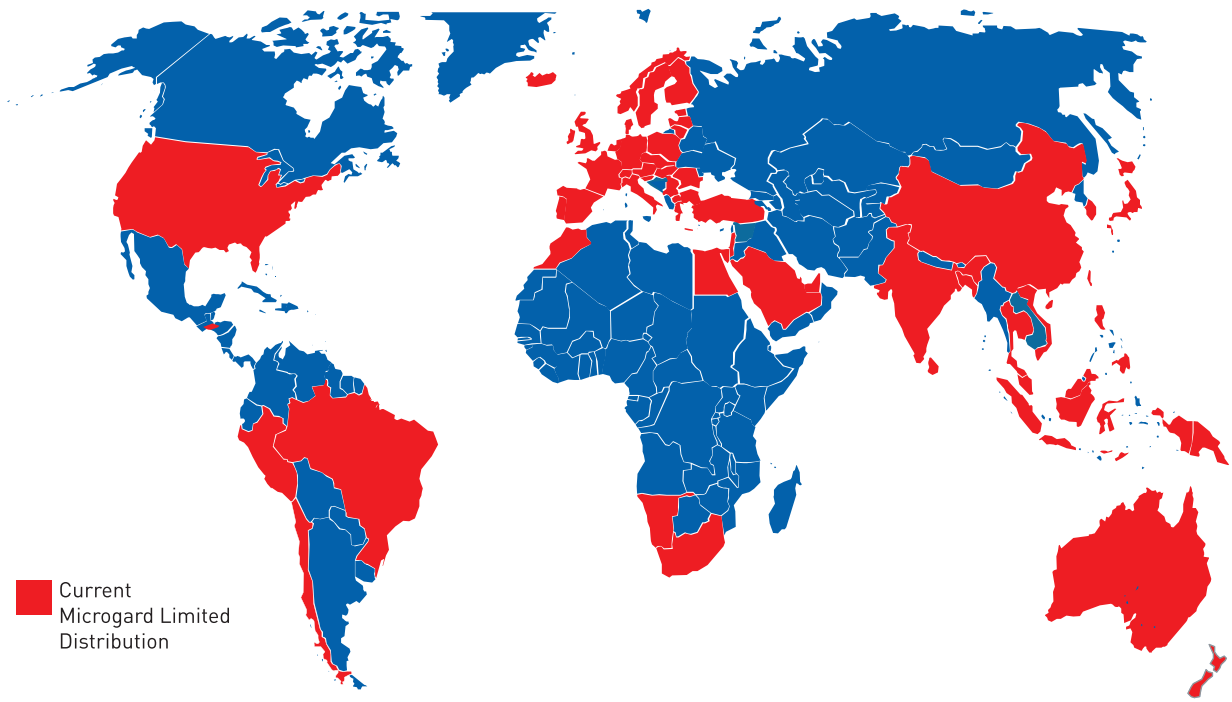
Graham Stonehouse, Managing Director, Microgard Limited

FUTURE HOPE MONTESSORI SCHOOL PROJECT

For further details on the Vipingo Village Fund visit: **www.vipingovillagefund.org**

Global Distribution

Microgard Limited is developing a global distribution network



MICROGARD® and MICROCHEM® products are now protecting people in most major industrial regions, with a global distribution network covering over 50 countries throughout Europe, the Middle East, Asia, North and South America, Australasia and Africa.

Microgard Limited supplies a select range of specialist distributors. These distributors serve different markets ranging from the agricultural industry to the pharmaceutical sector. Our drive and determination to lead through advances in innovation, and in understanding local conditions, lies behind our fast growing global distribution network supplying companies and organisations in Europe, the Middle East, Asia, North America and South America, Australasia and Africa.

To support both our distribution network and end users we have a team of regional Business Development Managers providing technical sales support, customer trials and end user training.

MICROGARD® and MICROCHEM® products have been extensively tested to achieve ASTM, ANSI, European Norms (EN), Japanese Industrial Standards (JIS) and the Korean Occupational Safety and Health Association (KOSHA) guidelines on chemical protective clothing – and we work extensively with our distributors to ensure conformance with all relevant local test methods and standards.

Local language websites have been developed and tailored to regional market requirements.

Websites

www.microgard.com

www.microgard.fr

www.microgard.de

www.microgard.es

www.microchemusa.com

THE SUNDAY TIMES INTERNATIONAL TRACK 100 2011 HSBC

THE QUEEN'S AWARDS FOR ENTERPRISE: INTERNATIONAL TRADE 2011

Product Range Overview

MICROGARD®
High Performance Protection in Comfort

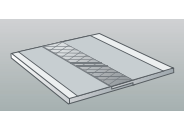
Microgard Limited offer a full range of garments and accessories to help keep you protected against hazards, be it gases, liquids or dusts, from aprons through to fully encapsulated suits.

The type of chemical protective clothing worn at work is critical to help keep users safe. The different fabrics available cover a broad spectrum of applications ranging from asbestos removal through to handling hazardous chemicals such as ammonia and hydrofluoric acid. Our technical support team and Business Development Managers can advise you on the most suitable garments to meet your specific needs.

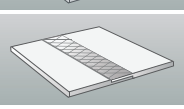
MICROGARD® 1500	Utilising the latest in microfibre technology, MICROGARD® 1500 is highly breathable and has been proven to filter 100% of particles down to 3 microns in size, making it ideal for protecting workers against asbestos and other relatively large hazardous particulates.
MICROGARD® 1500 PLUS	Utilising the latest in microfibre technology, MICROGARD® 1500 PLUS is highly breathable and anti-static. It has been proven to filter 99.9% of particles down to 3 microns in size, making it ideal for protecting workers against low hazard pharmaceutical powders and other relatively large hazardous particulates.
MICROGARD® 2000	MICROGARD® 2000 provides both protection and comfort with the latest microporous film laminate technology, providing exceptional liquid and particulate protection. Ideal for a wide range of industrial applications where protection from low hazard liquid spray and fine particulates is required.
MICROGARD® 2500	A unique material offering exceptional mechanical strength, liquid and particulate protection. MICROGARD® 2500 achieves the highest classifications for protection from biological agents, in accordance with EN 14126: 2003 and ASTM F 1671.
MICROCHEM® 3000	MICROCHEM® 3000 is one of the lightest and most comfortable chemical protective fabrics on the market today. This durable 3 layer fabric provides an extremely effective barrier against both inorganic chemicals and biological hazards.
MICROCHEM® 4000	MICROCHEM® 4000 is an exceptional chemical barrier against many concentrated organic, inorganic chemicals and biological agents. Tested against over 160 chemicals, including chemical warfare agents, this multi layer fabric is renowned for being lightweight yet durable and comfortable.
MICROCHEM® 5000	MICROCHEM® 5000 is the latest addition to Microgard's market leading product range and reaches new levels in chemical protection. This highly visible innovative multi layer fabric is strong, durable and suitable for workers in extremely hazardous areas, including HAZMAT response teams.
MICROGARD® FR	MICROGARD® FR is a flame retardant material designed to be worn over woven thermal protective garments such as NOMEX® or PYROVATEX®, offering protection from particulates and light liquid splash without compromising worker protection in the event of a flash fire.
MICROCHEM® CFR	MICROCHEM® CFR is a flame retardant material designed to be worn over woven thermal protective garments such as NOMEX® or PYROVATEX®, offering protection from particulates and pressurised liquid spray without compromising worker protection in the event of a flash fire.

MICROGARD® / MICROCHEM® Seam Technology

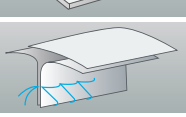
Microgard Limited use 5 different seam types for its range of protective clothing depending on the fabric and the final application for which it will be used.



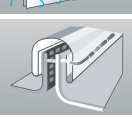
Ultrasonically Welded & Taped Seams
A feature throughout the MICROCHEM® 4000 & 5000 range, this seam technology is our highest barrier to liquid and particulates.



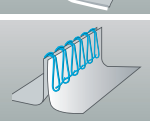
Ultrasonically Welded Seams
Provides a strong liquid and particle barrier.



Stitched & Taped Seams
Internal stitching which is overtaped to offer increased strength and an effective barrier to liquids and particulates.



Bound Seams
An overlay of material similar to the base fabric is lock-stitched in place. This technology provides superior strength, liquid and particle barrier when compared to a traditional stitched seam.



Stitched Seams
Microgard Limited utilise 3-thread overlocking technology, which offers an excellent balance of a strong seam with good particle barrier. Internal stitching reduces the risk of any potential linting from the thread.

Guide to European Norms and Selection Guide

To assist you with the selection of chemical protective clothing the EU has developed six "types" of chemical protective clothing.

Certification to a particular type offers an indication of your suits protection against a particular hazard (gas, liquid or dust). As a manufacturer it is our responsibility to ensure that MICROGARD® and MICROCHEM® products meet the requirements of these type standards, where applicable.

Please be aware that conformance to these types standards does not mean that your suit is 100% impervious to your hazard. Under this testing, suits are only required to meet the minimum performance requirements specified. In the case of the Type 5 particulate test, suits are allowed individual leakages of up to 30%, providing the average for the suits tested is less than 15%.

Microgard Limited manufacture products according to ISO 9001, thus ensuring as far as is reasonably possible they consistently achieve the desired protection level. For more information visit **www.microgard.com**

Current European "Types" of Chemical Protective Clothing

EN "Types"	Definition	Symbol*
EN 943-1 & 2 **"Type 1"**	**Gas Tight Chemical Protective Clothing** Protective clothing against liquid and gaseous chemicals, aerosols and solid particulates	TYPE 1
EN 943-1 **"Type 2"**	**Non Gas Tight Chemical Protective Clothing** Suits which retain positive pressure to prevent ingress of dusts, liquids and vapours	TYPE 2
EN 14605 **"Type 3"**	**Liquid Tight Suits** Suits which can protect against strong and directional jets of liquid chemical	TYPE 3
EN 14605 **"Type 4"**	**Spray Tight Suits** Suits which offer protection against saturation of liquid chemicals	TYPE 4
EN ISO 13982-1 **"Type 5"**	**Dry Particulate Protection** Suits which provide protection to the full body against airborne solid particulates	TYPE 5
EN 13034 **"Type 6"**	**Reduced Spray Suits** Suits which offer limited protection against a light spray of liquid chemicals	TYPE 6

Disclaimer
MICROGARD®/MICROCHEM® garments are available for most applications. However please note that a detailed assessment of the nature of the hazard and the working environment should be undertaken prior to the selection of appropriate PPE. Microgard Ltd provides the information in this product catalogue to assist you with selecting the correct product, but responsibility for the correct choice of PPE remains with the user.

Additional Standards achieved by the MICROGARD® product range

Standard	Definition	Symbol*
EN 1073-2**	Protective clothing against radioactive particulate contamination	EN 1073-2
EN 14126	Protective clothing against infective agents ("Type" prefixed with "-B" [i.e. Type 3-B] indicates approval to this European Norm)	EN 14126
EN 1149-1 EN 1149-5	Protective Clothing with electrostatic properties***	EN 1149
DIN 32781	Protective Clothing. Protective suits against pesticides	DIN 32781
EN ISO 14116	Protective Clothing Limited flame spread materials, material assemblies and clothing	EN ISO 14116 INDEX 1/0/0
EN 12941	Respiratory protective devices. Powered filtering devices incorporating a helmet or a hood	EN 12941

* Type approvals do not necessarily apply to accessories. Always refer to the garment label and instructions for use document which will indicate the protection level offered.

** Gives no protection against radioactive radiation

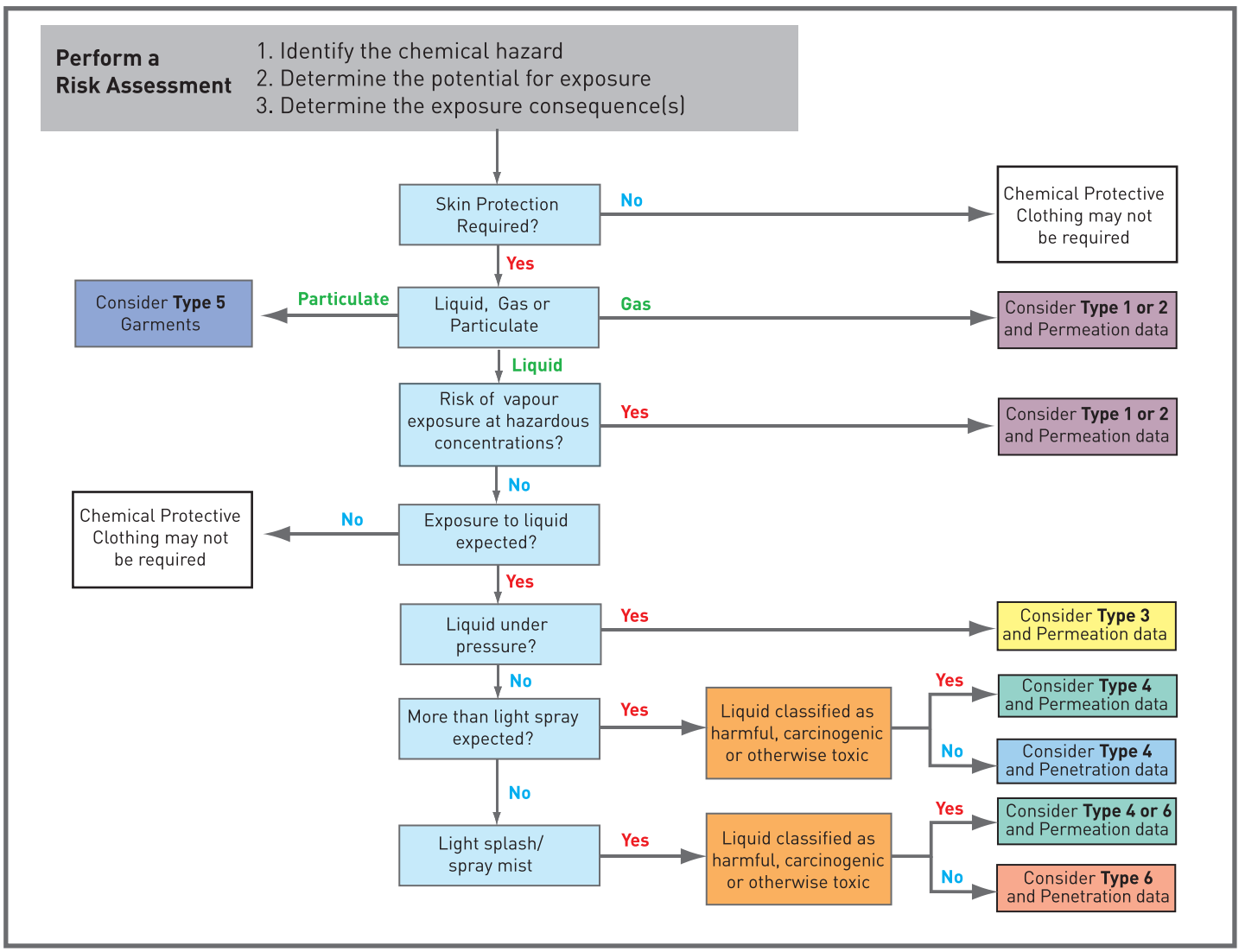
*** Always ensure the garment and wearer are properly grounded

Selecting the Correct Chemical Protective Clothing

MICROGARD®
High Performance Protection in Comfort

Microgard Limited has devised this simple flowchart as a basic tool to assist users and specifiers in selecting the correct "type" of chemical protective clothing.

It is important that protective clothing's suitability for a particular use is determined by a trained expert in occupational health & safety. Many chemicals can cause serious and permanent injury to an unprotected or improperly protected user. Therefore special emphasis has to be placed on the careful selection of chemical protective clothing when the potential for exposure to such chemicals has been identified.



Factors to Consider

Advice on the suitability of chemical protective clothing for a task is very often based on reported permeation breakthrough times. The standard test methods used for measuring breakthrough time (i.e. EN 374-3, ISO 6529, ASTM F 739) are often regarded as representing the "worst case scenario", since the chemical is held in direct contact with the barrier material. Intermittent contact or splashes of chemical, in real-life, may in fact lengthen the breakthrough time. Also, laboratory generated chemical permeation data may not always reflect conditions in the workplace. Temperature, pressure, flexing etc. could all potentially have an impact on the breakthrough time. When choosing chemical protective clothing consideration has to be given to permeation and penetration, and the physical performance attributes of the product (abrasion, tear, tensile, strength etc.) Other physical properties to consider are the strength of seams and closures (i.e. zips) the flexibility, weight and comfort factors (i.e. thermal insulation, breathability etc.) The best chemically resistant material will be ineffective if torn, cut, punctured or otherwise damaged.

The Microgard Technical Team can assist in the selection of chemical protective clothing. Visit **www.microgard.com** for more details or e-mail **technical@microgard.com**

Important note: This guide is simplified and as such chemical protective clothing's suitability for a particular use should only be determined by a trained expert in occupational health & safety. It is the responsibility of the user to assess the types of hazards and the risks associated with exposure and to verify the information provided for the product to make a final decision on the appropriate personal protective equipment needed for their specific circumstance.

Protective Clothing according to EN 14126:2003 - Protection from Infective Agents

Protective Clothing against infective agents has two main functions...

- to prevent infective agents from reaching the (possibly injured) skin
- to prevent the spreading of infective agents to other people and other situations, e.g. eating or drinking, when the person has taken his protective clothing off

In many work situations i.e. microbiological laboratories; the infective agents can be contained and the risk of exposure limited to the occurrence of an accident.

However, in other types of work i.e. sewage & waste water treatment, caring for infected animals, emergency clean-up; the organisms cannot be contained, exposing the worker continuously to the risk of infection by biological agents. In these situations the biological agents the worker is exposed to may not be known.

Applications where workers can be exposed to biological agents

- Waste water treatment works, sewage systems work
- Agriculture
- Food Industry
- Healthcare, hospitals, emergency services
- Clinical, veterinary laboratories
- Refuse disposal plants
- Activities where there is contact with animals and/or products of animal origin

Micro-organisms are a very heterogeneous group in that they come in all shapes and sizes, and their living conditions, survival abilities etc. vary widely. A distinction is made between four risk groups according to the risk of infection for humans. Details of these risk groups, along with their containment measures are found in European Directive 2000/54/EEC (on the protection of workers from the risk related exposure to biological agents at work).

EN14126:2003

Due to the heterogeneity of micro-organisms, it is not possible to define performance criteria of protective clothing on the basis of risk groups, nor on the type of micro-organism. Also it may not be possible to define exactly the organisms the worker is exposed to. Hence the test methods in EN14126:2003 focus on the medium containing the micro-organism, such as liquid, aerosol or a solid dust particle.

In accordance with the requirements of EN14126:2003 protective clothing should be certified as Category III and subjected to 5 test methods specified in the standard. The corresponding protective clothing "Type" is then prefixed with the letter "B" (e.g. Type 3-B) and the biohazard symbol is displayed.

For a copy of the Microgard Guide to EN14126:2003 please visit www.microgard.com

Microgard suggested garments for protection against infective agents

Microgard Product	Protection against biologically contaminated dust	Protection against biologically contaminated liquids	Tasks*	Risk Groups ✓ Risk Groups 1, 2 ✓ Risk Groups 1, 2, 3, 4
MICROGARD® 2000 STANDARD	✓	-	A/B	1. Biological agent unlikely to cause sickness in humans 2. Biological agent that could cause sickness in humans and represent a danger to employees; substance dispersal amongst the population is unlikely; effective preventitive measures or treatment is normally possible
MICROGARD® 2000 Ts PLUS	✓	✓	A/B	
MICROGARD® 2500 PLUS	✓	✓	B	
MICROCHEM® 3000	✓	✓	B/C	3. Biological agent, that can cause severe illness in humans and represent a serious risk for employees; a risk of dispersal amongst the population may occur; but effective preventive measures or treatment are normally possible 4. Biological agent, that causes severe illness in humans and represents a serious risk for employees; the risk of dispersal amongst the population is high under some circumstances; effective preventive measures or treatment are not normally possible.
MICROCHEM® 4000	✓	✓	B/C	
MICROCHEM® 5000	✓	✓	B/C	

*Tasks - A. Routine inspection = no contact with contaminated material or objects B. Handling and disposal of possibly contaminated material, objects or animals C. Performed tasks require application of cleaning and disinfecting chemicals

Use of MICROGARD® and MICROCHEM® Chemical Protective Clothing in Ex-Zones

MICROGARD®
High Performance Protection in Comfort

Ex-Zones
The purpose of 'Zoning' is to provide the basis for correct selection of a protection concept. Areas are classified depending on the properties of the flammable vapours, liquids, mists, gases or combustible fibres/dusts that may be present in the environment and the likelihood that a combustible concentration of that gas or dust is present.

Where ignition sources cannot be eliminated and a flammable gas or dust area may be present, it is important to assess the extent and duration of the risk to select the correct equipment. This is normally referred to as 'Zoning' (Ex-Zones).

Gas Explosion Groups
Group I: Concerned with underground mining where coal dust and methane are present.

Group II: Concerned with surface industries gases & dust. They are sub-grouped according to volatility - IIA being the least volatile and IIC the most volatile.

Having conducted tests at the Swiss Safety Institute, Basel, the table below shows in which situation MICROGARD® and MICROCHEM® protective clothing may be safely worn*. Ex-Zone definitions as specified by CENELEC/IEC†.

		MICROGARD® 2000	MICROCHEM® 3000	MICROCHEM® 4000	MICROCHEM® 5000
Zone 0	An area in which a potentially explosive atmosphere, consisting of air and flammable substances – in the form of gas, vapour or mist – is continuously present or present for a long period.	✓	✓	✓	✓
Zone 1	An area in which a potentially explosive atmosphere, consisting of a mixture of air and flammable substances – in the form of gas, vapour or mist – is likely to occur in normal operation	✓	✓	✓	✓
Zone 2	An area in which a potentially explosive atmosphere, consisting of a mixture of air and flammable substances – in the form of gas, vapour or mist – is not likely to occur in normal operation	✓	✓	✓	✓
Zone 20	An area in which a potentially explosive atmosphere, in the form of a cloud of combustible dust in the air, is continuously present or present for long period.	✓	✓	✓	✓
Zone 21	An area in which a potentially explosive atmosphere, in the form of a cloud of combustible dust in the air, is likely to occur in normal operation	✓	✓	✓	✓
Zone 22	An area in which a potentially explosive atmosphere, in the form of a cloud of combustible dust in the air, is not likely to occur in normal operation	✓	✓	✓	✓

MICROGARD® and MICROCHEM® protective clothing meet the requirements of EN1149-1. For more information please visit **www.microgard.com**

*Ex-Zone testing conducted by the Swiss Safety Institute at 23°c and 30% relative humidity. The anti-static properties of MICROGARD® and MICROCHEM® protective clothing depends on the take up of moisture from the air. The anti-static treatment is therefore only effective when the relative humidity is above 25%. Please note that only the clothing material is dissipative. In order to prevent the creation of a spark, the garment and the wearer should be properly grounded. According to requirements in relevant standards (i.e. BGR 132), clothes and protective suits must not be changed in Ex-Zones if the minimum ignition energy is <3mJ. MICROGARD® and MICROCHEM® protective clothing should not be donned or removed in Ex-Zones.

† Sources: European (Cenelec) Standards **www.cenelec.org**, International (IEC) Standards **www.iec.ch**

MICROGARD® 1500

Applications

- Asbestos related work
- Handling powders
- General maintenance
- Construction

MICROGARD® 1500 coveralls have been designed for workers involved in the stripping, clear up or handling of asbestos, general maintenance, construction and contract cleaning.

Features & Benefits

Protection - Proven to filter 100% of particles >3 microns*

Comfort - Air and water vapour permeable ("breathable") to help reduce the risk of heat stress

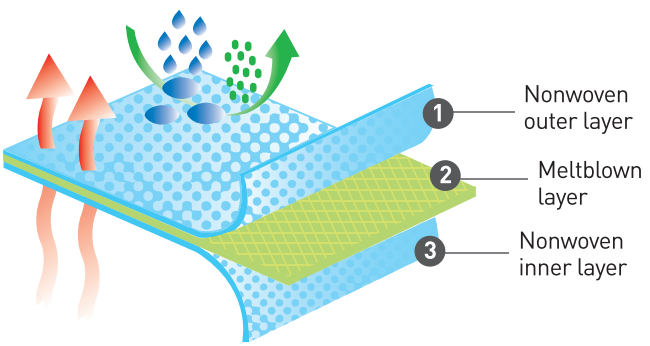
Silicone Free - Critical in spray painting applications

Optimised body fit - Improves wearer comfort and safety.

*JSTIIF particle penetration test

MICROGARD® 1500

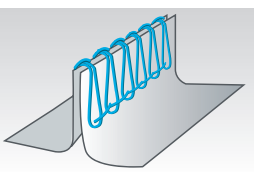
Asbestos fibres, such as Chrysotile, are typically 3-5 microns in size. The SMS fabric used in the construction of MICROGARD® 1500 coveralls has been proven to filter 100% of particles larger than 3.0 microns*



Protection Levels & Additional Properties

Stitched Seams

Combining strength with particle barrier

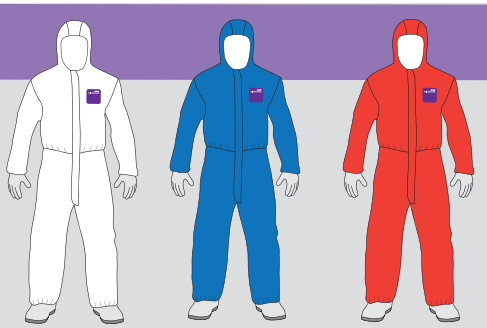


Model 138

Suit Features

- 3 piece hood
- Elasticated hood, wrists, waist and ankles
- 2-way front zipper with re-sealable storm flap

Sizes: S-3XL
Colours: White, Navy, Red



MICROGARD® 1500 Technical Data

Test Method	White	Navy	Red	EN Class
EN 530 Abrasion	›10	›10	›10	1 of 6
EN ISO 7854 Flex Cracking	›15,000	›15,000	›15,000	4 of 6
EN ISO 9073-4 Tear Resistance (MD)	22.6N	›20N	›20N	2 of 6
EN ISO 9073-4 Tear Resistance (CD)	28.8N	›20N	›20N	
EN ISO 13934-1 Tensile Strength (MD)	96.3N	103N	100N	1 of 6
EN ISO 13934-1 Tensile Strength (CD)	58.7N	59.9N	55.4N	
EN 863 Puncture Resistance	9.87N	›5N	›5N	1 of 6
EN 13274-4 Resistance to ignition	Pass	Pass	Pass	-
ISO 13935-2 Seam Strength	109.9N	137N	113.6N	3 of 6

Fabric Repellence & Penetration Resistance to Liquid Chemicals				
Repellence of Liquids	**Result (%)**	**Result (%)**	**Result (%)**	**EN Class**
- 30% Sulphuric Acid	99.1	97.8	97.6	3 of 3
- 10% Sodium Hydroxide	97.5	99.2	97.5	3 of 3
Resistance to penetration by liquids	**Result (%)**	**Result (%)**	**Result (%)**	**EN Class**
– 30% Sulphuric Acid	0	0	0	3 of 3
– 10% Sodium Hydroxide	0	0	0	3 of 3

MICROGARD® 1500 Range Overview

MICROGARD® 1500

Used for the stripping, clear up or handling of asbestos, general maintenance, construction and contract cleaning.

▲ MICROGARD® 1500

MICROGARD® 1500 (White)	
Fabric Filtration Efficiency*	
Particle Size	**%**
0.3-0.5 µm	98.7%
0.5-1.0 µm	99.2%
1.0-3.0 µm	99.7%
3.0-5.0 µm	100%
›5.0 µm	100%

* JSTIIF Test Method

MICROGARD® 1500 PLUS

Applications

- Asbestos related work
- Handling powders
- General maintenance
- Construction
- Pharmaceutical industries
- Wood and metal processing
- Touch-up paint spraying
- Fibreglass / resin applications / ceramic fibres

MICROGARD® 1500 PLUS is a highly breathable anti-static SMS fabric which utilises the latest developments in micro-fibre technology to ensure good filtration efficiency.

Features & Benefits

Protection - Proven to filter 99.9% of particles >3 microns*

Comfort - Air and water vapour permeable ('breathable') to help reduce the risk of heat stress

Silicone Free - Critical in spray painting applications

Anti-static - Tested according to EN 1149-5

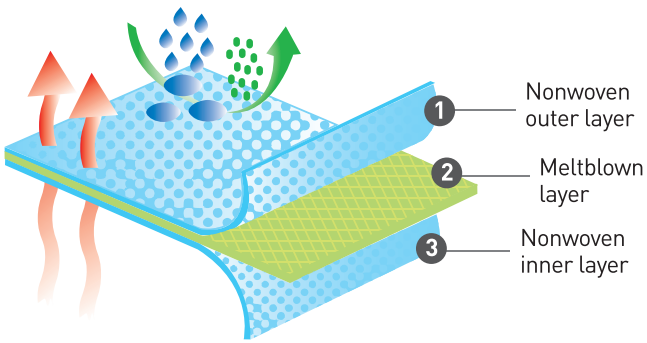
Optimized Body Fit - Improves wearer comfort and safety

*JSTIIF particle penetration test

MICROGARD® 1500 PLUS

The SMS fabric used in the MICROGARD® 1500 PLUS coverall is highly breathable, making it ideal for operatives working in warmer environments.

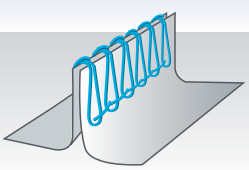
SMS fabrics are a particularly good barrier against particulates such as, asbestos, brick dust and cement dust and will provide protection from light aerosol mists; as found in some paint spray environments.



Protection Levels & Additional Properties

Stitched Seams

Combining strength with particle barrier

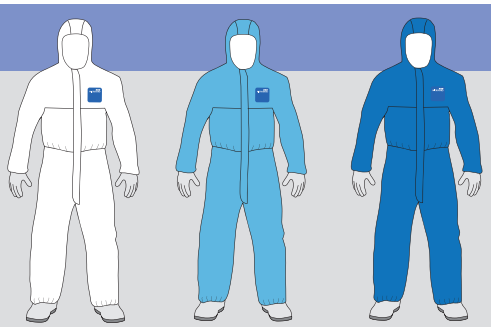


Model 111

Suit Features

- 3 piece hood
- Elasticated hood, wrists, waist and ankles
- 2-way front zipper with re-sealable storm flap
- Anti-static treatment

Sizes: S-3XL
Colours: White, Light Blue, Navy



MICROGARD® 1500 PLUS Technical Data

Test Method	White	EN Class	Light Blue	EN Class	Navy	EN Class
EN 530 Abrasion	>100	2 of 6	>10	1 of 6	>10	1 of 6
EN ISO 7854 Flex Cracking	100,000	6 of 6	15,000	4 of 6	40,000	5 of 6
EN ISO 9073-4 Tear Resistance (MD)	31.1N	2 of 6	32.2N	2 of 6	45.4N	2 of 6
EN ISO 9073-4 Tear Resistance (CD)	23.8N		47.6N		32.2N	
EN ISO 13934-1 Tensile Strength (MD)	77.9N	1 of 6	116N	2 of 6	98.1N	2 of 6
EN ISO 13934-1 Tensile Strength (CD)	49.2N		63.8N		69.6N	
EN ISO 13938-1 Burst Resistance	55.4kPa	1 of 6	75.5kPa	1 of 6	99.8kPa	2 of 6
EN 863 Puncture Resistance	9.6N	1 of 6	7.0N	1 of 6	7.85N	1 of 6
EN 13274-4 Resistance to ignition	Pass	-	Pass	-	Pass	-
EN 25978 Resistance to blocking	No blocking	-	No blocking	-	No blocking	-
EN 1149-5 Anti-Static	$<5.0 \times 10^{10}$	-	$<5.0 \times 10^{10}$	-	$<5.0 \times 10^{10}$	-
ISO 13935-2 Seam Strength	117.7N	3 of 6	123.8N	3 of 6	84.8N	3 of 6

Fabric Repellence & Penetration Resistance to Liquid Chemicals						
Repellence of Liquids	**Result (%)**	**EN Class**	**Result (%)**	**EN Class**	**Result (%)**	**EN Class**
- 30% Sulphuric Acid	97.1	3 of 3	96.7	3 of 3	97.3	3 of 3
- 10% Sodium Hydroxide	95.2	3 of 3	99.3	3 of 3	95.8	3 of 3
Resistance to penetration by liquids	**Result (%)**	**EN Class**	**Result (%)**	**EN Class**	**Result (%)**	**EN Class**
– 30% Sulphuric Acid	0.1	3 of 3	0	3 of 3	0	3 of 3
– 10% Sodium Hydroxide	0	3 of 3	0	3 of 3	0	3 of 3

MICROGARD® 1500 PLUS Range Overview

MICROGARD® 1500 PLUS

Anti static suit, used for the stripping, clear up or handling of asbestos, general maintenance, construction and contract cleaning.

▲ MICROGARD® 1500 PLUS

MICROGARD® 1500 PLUS (White)	
Fabric Filtration Efficiency*	
Particle Size	**%**
0.3-0.5 µm	97.8%
0.5-1.0 µm	98.7%
1.0-3.0 µm	99.4%
3.0-5.0 µm	99.9%
>5.0 µm	99.9%

* JSTIIF Test Method

MICROGARD® 2000

Applications

- Pharmaceutical industries
- Agriculture
- Cleanrooms
- Paint spraying
- Crime scene investigation
- Veterinary services

MICROGARD® 2000 provides both protection and comfort with exceptional liquid and particulate protection. Ideal for a wide range of industrial applications.

Features & Benefits

Protection - Excellent liquid penetration resistance and barrier to fine particulates (>0.01 microns*)

Comfort - Moisture vapour permeable ('breathable') to help reduce the risk of heat stress

Silicone free - Critical in paint spraying applications

Low linting - Reduces the risk of fibre contamination in some critical areas

Optimised body fit - Improves wearer comfort and safety

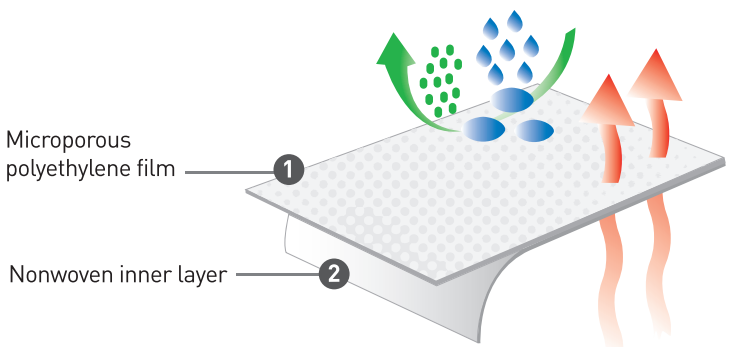
Anti-static - Tested according to EN 1149-5

*EMSL test method

MICROGARD® 2000

MICROGARD® 2000 is designed to allow water vapour (perspiration) to escape from the suit yet will withstand saturation of liquid chemicals and filter 100% of particulates down to 0.01 microns in size*.

The use of a high quality two-way stretch microporous film provides an effective liquid and particle barrier combined with a high water vapour transmission rate from inside to outside.

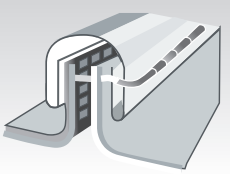


Protection Levels & Additional Properties

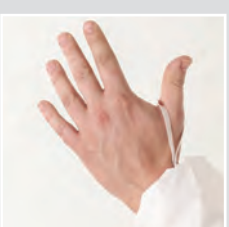
TYPE 5-B | TYPE 6-B | EN 14126 | DIN 32781 | EN 1073-2 | EN 1149-5

Bound Seams

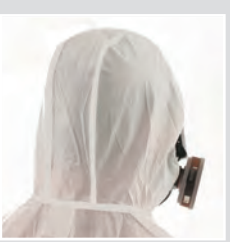
Superior strength, liquid and particle barrier



Innovative Design Features



Finger loops to prevent sleeve movement when working above your head



Hoods designed for optimum fit with respirators, particularly full face masks

Specialist Approvals

MICROGARD® 2000 has passed a range of specialist testing methods including:

Biological Agents
EN14126 : 2003
See page 9

Suitable for Ex-Zones
See page 10

Technical Support

Technical datasheets & product flyers available to download at:

www.microgard.com or by emailing **technical@microgard.com**

MICROGARD® 2000 Range Overview

MICROGARD® 2000 STANDARD

Low hazard liquid chemical repellence, particle protection, protection from pesticides and barrier to biological agents. Spray tight and ultra low linting for critical environments.

▲ MICROGARD® 2000 STANDARD

MICROGARD® 2000 COMFORT

Low hazard liquid chemical repellence and particle protection. Provides Type 5 & 6 protection for workers in warm environments

▲ MICROGARD® 2000 COMFORT - See page 19

MICROGARD® 2000 SOCO

Designed to prevent crime scene contamination, as well as officer protection, in partnership with Greater Manchester Police.

▲ MICROGARD® 2000 SOCO - See page 20

MICROGARD® 2000 Ts PLUS

Type 4 protection, MICROGARD® 2000 performance. Stitched & taped seams offer a higher level of protection from liquid chemical penetration.

▲ MICROGARD® 2000 Ts PLUS - See page 21

MICROGARD® 2000

MICROGARD® 2000 Technical Data

MICROGARD® 2000 is extensively tested in accordance with statutory requirements, including physical performance attributes and barrier to hazardous substances. The following tables outline the results obtained in independent laboratories according to European test methods.

Test Method	Result	EN Class (EN14325)
EN 530 Abrasion	100 cycles	2 of 6
EN ISO 7854 Flex Cracking	40,000 cycles	5 of 6
EN ISO 9073-4 Tear Resistance (Machine Direction)	40.7N	1 of 6
EN ISO 9073-4 Tear Resistance (Cross Direction)	18.6N	
EN ISO 13934-1 Tensile Strength (Machine Direction)	108.1N	1 of 6
EN ISO 13934-1 Tensile Strength (Cross Direction)	48.3N	
EN 863 Puncture Resistance	8.2N	1 of 6
EN ISO 13938-1 Burst Resistance	184.1kPa	3 of 6
EN 13274-4 Resistance to ignition	Pass	-
EN 1149-5 Electrostatic Properties (Surface resistivity)	$<5.0 \times 10^{10}$	-
ISO 13935-2 Seam Strength	111N	3 of 6
BS EN 20811 Hydrostatic Head (water pressure test)	>200cm	-
EN 31092/ISO 11092 Thermal Resistance (Rct in $m^2 \cdot K/W$)	$16.3 \cdot 10^{-3}$	-
EN 31092/ISO 11092 Water Vapour Resistance (Ret in $m^2 \cdot Pa/W$)	<15	3 of 3 (DIN 32781)

The following table sets out MICROGARD® 2000 performance for resistance to chemical penetration in accordance with EN ISO 6530. For further information on penetration testing see page 55.

Fabric Repellence & Penetration - Resistance to Liquid Chemicals	White	EN Class	Green	EN Class
Repellence of Liquids - 30% Sulphuric Acid	96.7	3 of 3	97.5	3 of 3
Repellence of Liquids - 10% Sodium Hydroxide	96.7	3 of 3	97.8	3 of 3
Repellence of Liquids - n-heptane (undiluted)	95.5	3 of 3	95.7	3 of 3
Repellence of Liquids - Isopropanol	93.8	2 of 3	93.9	2 of 3
Resistance to penetration by liquids- 30% Sulphuric Acid	0.0	3 of 3	0.0	3 of 3
Resistance to penetration by liquids 10% Sodium Hydroxide	0.0	3 of 3	0.0	3 of 3
Resistance to penetration by liquids – n-heptane (undiluted)	0.0	3 of 3	0.0	3 of 3
Resistance to penetration by liquids – Isopropanol	0.0	3 of 3	0.0	3 of 3

MICROGARD® 2000 when tested in accordance with EN 14126: 2003 demonstrates an excellent barrier to infective agents. The specific test results are detailed in the table below and for further information on this European Norm see page 7.

EN14126 Barrier to Infective Agents	Result	EN Class
ISO 16603 Resistance to penetration by blood/fluids under pressure	Pass to 20kPa	Class 6 of 6
ISO 16604 Resistance to penetration by blood borne pathogens	Pass to 20kPa	Class 6 of 6
EN ISO 22610 Resistance to wet bacterial penetration (mechanical contact)	No penetration (up to 75 mins)	Class 6 of 6
ISO/DIS 22611 Resistance to biologically contaminated aerosols	No penetration	Class 3 of 3
ISO 22612 Resistance to dry microbial penetration	No penetration	Class 3 of 3

MICROGARD® 2000 products have been extensively tested according to European and International requirements, including ASTM, for both physical and barrier performance. More details can be found on our website **www.microgard.com**

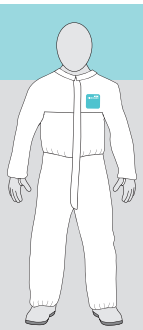
MICROGARD® 2000 STANDARD Coverall Models

Model **103**

Suit Features

- Collar
- 2-way front zipper with re-sealable storm flap
- Finger loops
- Elasticated waist, wrists & ankles

Sizes: S-3XL
Colours: White

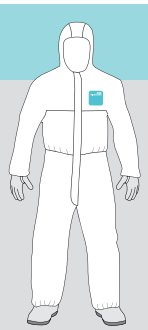


MICROGARD® 2000 STANDARD Coverall Models (continued)

Model **111**

Suit Features
- 3-piece hood
- 2-way front zipper with re-sealable storm flap
- Finger loops
- Elasticated hood, waist, wrists & ankles

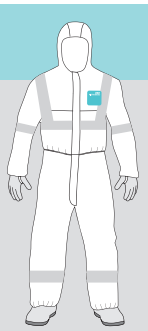
Sizes: S-3XL
Colours: White and Green



Model **113**

Suit Features
- 3-piece hood
- 2-way front zipper with re-sealable storm flap
- Finger loops
- Elasticated hood, waist, wrists & ankles
- Reflective Hi-Vis tape

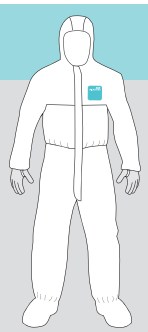
Sizes: S-3XL
Colour: White



Model **122**

Suit Features
- 3-piece hood
- 2-way front zipper with re-sealable storm flap.
- Finger loops
- Elasticated hood, waist & wrists & ankles
- Boot end with anti slip soles

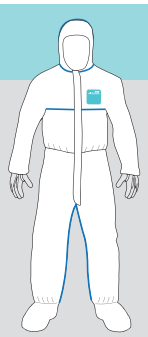
Sizes: S-3XL
Colour: White



Model **128**

Suit Features
- 2-piece hood & chinstrap
- 2-way front zipper with re-sealable storm flap
- Dual finger loops
- Elasticated hood, waist, wrists & ankles
- Supplied with 2 loose pockets
- Blue bound seams

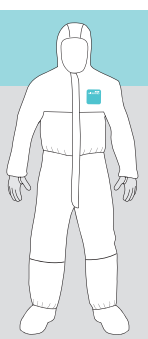
Sizes: S-3XL
Colour: White



Model **156**

Suit Features
- 3-piece hood
- 2-way front zipper with re-sealable storm flap
- Finger loops
- Elasticated hood, waist, wrists, ankles & overflaps
- Intergrated socks with boot overflaps

Sizes: S-3XL
Colour: White



MICROGARD® 2000 COMFORT

MICROGARD® 2000 COMFORT has been specifically designed for those working in warmer climates or warm working environments to help reduce the risk of heat stress.

The critical areas to the front of the garment (including the hood, arms and legs) are MICROGARD® 2000 offering a high level of liquid and particle protection with a low level of water vapour resistance. Water vapour resistance according to EN 31092 of Ret <15*

The back panel is MICROGARD® 1500 PLUS fabric which is air and water vapour permeable. This panel allows airflow around the suit, increasing wearer comfort. Air permeability result according to EN ISO 9237 of 160 l/m^2.s

Bound seams ensure spray tight protection to the front of the garment and excellent overall particle protection.

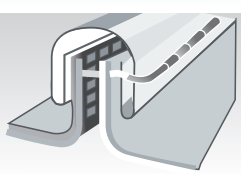
* Ret is a measurement of a materials resistance to moisture vapour transfer. The lower the value the less resistance there is and therefore the more breathable the fabric.

MICROGARD® 2000 COMFORT Coverall

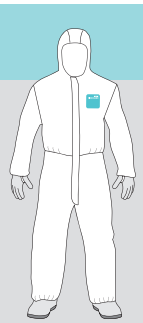
Protection Levels & Additional Properties

Bound Seams

Superior strength, liquid and particle barrier



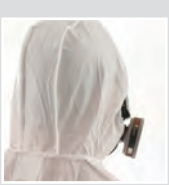
Model 129



Features & Benefits:

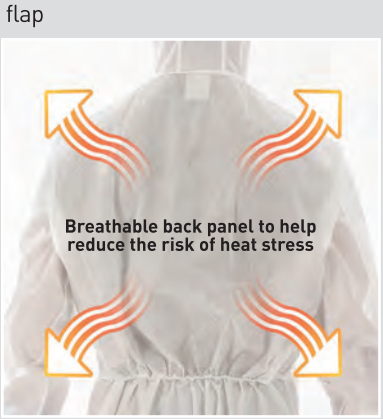
- **Protection** - Hood, arms, legs and front torso in 2000 fabric
- **Comfort** - Air and water vapour permeable ("breathable") to help reduce the risk of heat stress
- **Silicone Free** - Critical in spray painting applications
- **Anti-static** - Tested according to EN 1149-5
- 3 piece hood
- Elasticated hood, wrists, waist and ankles
- 2-way front zipper with re-sealable storm flap
- Breathable SMS back panel

Sizes: S-3XL
Colour: White



3 Piece Hood

Finger Loops



Breathable SMS back panel

Applications

- Pharmaceutical industry
- Cleanrooms
- Paint spraying
- Veterinary services
- Pest control

MICROGARD® 2000 SOCO

Developed specifically for police forensic Scene of Crime Officers (SOCOs), the MICROGARD® 2000 SOCO suit will provide you with the essential balance of comfort and performance.

Working closely with Greater Manchester Police (UK) SOCOs the coverall and overboots* were designed to fit both male and female officers and is available in a range of sizes.

This ensures that you can get on with the job without worrying about the performance or comfort of your protective clothing.

*sold separately, see page 30

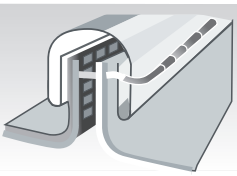
MICROGARD® 2000 SOCO Coverall

Protection Levels & Additional Properties

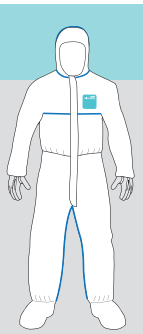
Bound Seams

Superior strength, liquid and particle barrier

Also available with stitched and taped seams for Type 4 spray-tight applications



Model 128



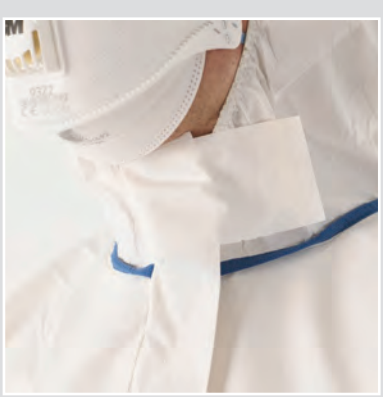
Features & Benefits:

- **Ultra low linting** - Reduces the risk of crime scene contamination
- **Self adhesive pockets** - Can be positioned anywhere on the garment to secure equipment
- **Finger loops** - To prevent sleeve movement when working above your head
- **Protection** - From biological agents in the highest performance class according to EN14126
- **Anti-static** - Tested according to EN 1149-5
- Elasticated hood, wrists, waist and ankles
- 2-way front zipper with re-sealable storm flap
- 2 piece hood
- Chin strap
- Dual finger loops
- Supplied with 2 pockets

Sizes: S-3XL
Colour: White

Pocket

Seam



Chinstrap

Applications

- Forensics
- Scene of Crime Officers (SOCOs)
- Crime Scene Investigation (CSI)

MICROGARD® 2000 Ts PLUS

MICROGARD® 2000 Ts PLUS is now the product of choice for many pharmaceutical workers around the world.

MICROGARD® 2000 is designed to allow water vapour (perspiration) to escape from the suit yet will withstand saturation of liquid chemicals and filter 100% of particulates down to 0.01 microns in size*.

With stitched and taped seams, MICROGARD® 2000 Ts PLUS provides an exceptional overall barrier to low hazard liquid spray and fine particulates.

*EMSL test method

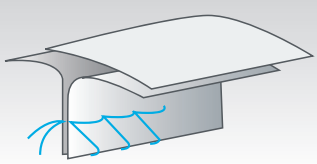
MICROGARD® 2000 Ts PLUS Coveralls

Protection Levels & Additional Properties

TYPE 4-B | TYPE 5-B | TYPE 6-B | EN 14126 | EN 1073-2 | DIN 32781 | EN 1149-5

Stitched & Taped Seams

Internal stitching which is overtaped to offer increased strength and an effective barrier to liquids and particulates.



Features and benefits

- **Protection** - Proven barrier to low concentration liquid chemicals, diluted pesticides, liquid & particulate biological hazards
- **Comfort** - Moisture vapour permeable ('breathable') to help reduce the risk of heat stress
- **Silicone Free** – Critical in spray painting applications
- **Low Linting** – Reduced risk of contamination in critical areas
- **Anti-static** – Tested according to EN 1149-5
- **Optimized Body Fit** – Improves wearer comfort and safety
- **Tunnelled elasticated wrists, hood and ankles** – helps to minimise the risk of linting and cross contamination
- **Thumb loops** – help to prevent sleeve movement when working above your head
- **Chinstrap** – helps to reduce the risk of cross contamination

Sizes: S-3XL
Colours: White , Yellow (111 only), Green (111 only)

Available in the following models: 103, 111, 122, 128, 139, 156

Please see pages 17-18 for more details of the model features

Thumb loop

Single zip with resealable flap

Chinstrap

Applications

- Agriculture
- Paint spraying
- Pharmaceutical industries
- Fibreglass product manufacturing
- Boat and ship building
- Mining

MICROGARD® 2000 Accessories

MICROGARD® 2000 Accessories

Model 209

Lab Coat
- Front zip fastening
- Left breast pocket
- Lower right pocket
- Bound seams

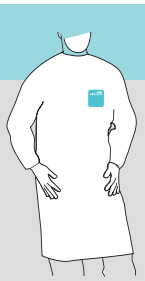
Sizes: S-3XL
Colour: White

Model 213

Apron
- Tie fastening to waist
- 100 cm long tie fastening

Size: One Size
Colour: White

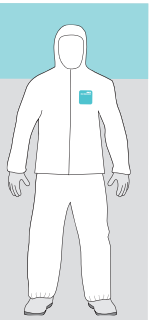
Model 214



Hospital Gown
- Rear Velcro fastening
- Elasticated wrists
- Bound seams

Sizes: S-3XL
Colour: White

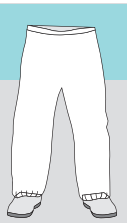
Model 219



Jacket & Trouser Set
- Zip fastening jacket
- Elasticated hood and hem on jacket
- Elasticated waist and ankles on trousers
- Bound seams

Sizes: S-3XL
Colour: White

Model 301



Trousers
- Elastication to waist and ankles
- Bound seams

Sizes: S-3XL
Colour: White

Model 400

Overshoes
- Elasticated opening
- Bound seams

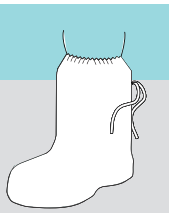
Size: One Size (fits size 42-46)
Colour: White

Model 401

Overshoes
- Elasticated opening
- Bound seams

Size: One Size (fits size 46-48)
Colour: White

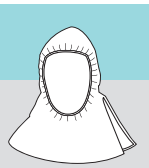
Model 406



Overboots
- Tie fastening
- Elastic to top of boot
- Bound seams

Size: One Size (fits size 42-46)
Colour: White

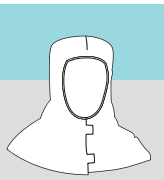
Model 503



Hood
- Balaclava Style
- Elasticated face opening
- Bound seams

Size: One Size
Colour: White

Model 507



Cape Hood
- Balaclava style cape hood covering part of shoulders
- Velcro fastening to front
- Bound seams

Size: One Size
Colour: White

▲ Cape Hood

Model 600

Oversleeves
- Elasticated at both ends
- Bound seams

Size: One Size
Colour: White

For more information on our range of accessories, or if you can't see the accessory you are looking for, please contact Microgard Limited customer services Tel: **+44 (0) 1482 625444**, email **sales@microgard.com** or visit **www.microgard.com**

MICROGARD® 2000 - Protection from Pesticides

Almost on a daily basis, farm workers are exposed to various chemical and biological hazards. Depending on the level and duration of exposure (and specific effects for these hazards) they may be required to wear Personal Protective Equipment. The PPE required may include respirators, gloves and chemical protective clothing.

DIN 32781 defines the performance criteria for chemical protective clothing to be worn during the handling and application (spraying etc.) of diluted mixtures of pesticides. During spray testing of MICROGARD® 2000 against the 5 pesticides listed in this standard no penetration was detected.

Typical applications where agriculture workers are exposed to chemicals

- Mixing and loading the undiluted concentrate
- Spraying the highly diluted mixture
- Exposure at work place to a fine aerosol caused by drift
- Exposure by intensive contact with treated foliage

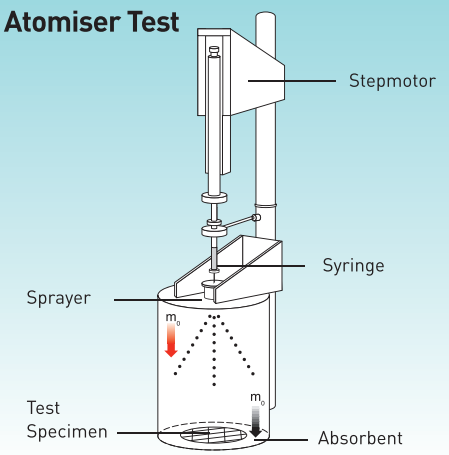
For more information on protecting your work force from pesticides visit **www.microgard.com**

▲ MICROGARD® 2000 STANDARD - See page 18

▲ MICROGARD® 2000 SOCO - See page 20

▲ MICROGARD® 2000 Ts PLUS - See page 21

Atomiser Test



EN14786:2006 Protective Clothing.

Determination of resistance to penetration by sprayed liquid chemicals,emulsions and dispersions. Atomiser test EN14786 specifies a test method to determine the resistance of textile materials against penetration by atomized liquid chemicals, emulsions and dispersions.

These materials are intended to be used in both limited-use and reusable protective clothing. The penetration is expressed in percent, as a ratio of the amounts of chemical applied and retained by the textile.

Key elements of DIN 32781	MICROGARD® 2000 STANDARD & Ts PLUS Performance
The material shall not cause irritation of skin or other hazards to health	Full compliance with EN340: 2003 (Protective Clothing; General Requirements)
Tear Strength min 10N	MD 40.7N, CD 18.6N (Average 29.7N)
Tensile Strength min 30N in both directions	MD 48.3N, CD 108.1N
Penetration Index less than or equal to 5% for one of the chemicals specified - Atomiser test according to EN 14786: 2006	0% Penetration detected with all 5 chemicals tested
Ergonomic Aspects – Water Vapour resistance according to EN31092	Tested by EMPA and Ret recorded as ‹15
Resistance of penetration of liquids. Testing according to EN13034: 2005	Certified to EN13034:2005 (Type 6)
Seam Strength min of 30N	>75N

DIN 32781 Test Chemicals - EN14786 Atomiser Test
MICROGARD® 2000 Performance

Brand name & ZA-Nr.	Manufacturer	Test Result (% Penetration)
U46-D-Fluid 0941-00	BASF	None Detected
Pirimor Granulat 2470-00	Syngenta	None Detected
Amistar 5090-00	Syngenta	None Detected
Betanal Expert 4991-00	Bayer CropScience	None Detected
Folicur 4028-00	Bayer CropScience	None Detected

MICROGARD® 2000 - Contamination Control

Cleanrooms are highly specialised working areas used to protect products and processes, as well as personnel from being contaminated. A cleanroom is defined according to ISO 14644 -1 (1999) as, "a room in which the number concentration of airborne particles is controlled, and which is constructed and used in a manner to minimize the introduction, generation and retention of particles inside the room and in which other relevant parameters, e.g. temperature, humidity and pressure are controlled if necessary."

The air cleanliness in a cleanroom is controlled by passing incoming ventilation air through highly efficient filters and by also dressing the operators in specialised cleanroom garments. Cleanrooms are used in many different industries, for instance, in microelectronics, pharmaceutical industry and the food and beverage industry. Cleanroom technology is also used when performing certain orthopaedic surgical operations.

ISO 14644-1 Class	Maximum Number of Particles in Air (particles in each cubic metre equal to or greater than the specified size)					
	Particle size					
	>0.1µm	>0.2µm	>0.3µm	>0.5µm	>1µm	>5µm
ISO Class 1	10	2				
ISO Class 2	100	24	10	4		
ISO Class 3	1000	237	102	35	8	
ISO Class 4	10,000	2,370	1,020	352	83	
ISO Class 5	100,000	23,700	10,200	3,520	832	29
ISO Class 6	1,000,000	237,000	102,000	35,200	8,320	293
ISO Class 7				352,000	83,200	2930
ISO Class 8				3,520,000	832,000	29,300
ISO Class 9				35,200,000	8,320,000	293,000
MICROGARD® 2000 Fabric Total Linting (Mean of both sides)				**5,297**	**3,865**	**292**

MICROGARD® 2000 coveralls have been subjected to various tests* relevant to cleanroom clothing performance; including ISO 9073-10 (control of linting of textiles), EN13982-2 for inward leakage of particulates and a series of fabric filtration tests. With the information from these results and other relevant data it is possible for us to offer guidance on the suitability of MICROGARD® 2000 by cleanroom class. However, suitability is also dependant on the cleanroom conditions and model features.
For advice please contact the Microgard technical team on +44 (0) 1482 625444 or email technical@microgard.com.

MICROGARD® 2000 suitability by cleanroom class									
ISO 14644-1 Class 1	1	2	3	4	5	6	7	8	9
MICROGARD® 2000	x	x	x	x	x	✓	✓	✓	✓
US Federal Standard 209E			1	10	100	1,000	10,000	100,000	
MICROGARD® 2000			x	x	x	✓	✓	✓	

Key functions of cleanroom clothing	MICROGARD® 2000 Performance
Protection of product and environment from contamination by personnel	• Bound seams (MICROGARD® 2000 STANDARD) and high particle barrier fabric reduce particle migration • Ultra low linting – tested according to ISO 9073-10
Protection of personnel from solid or liquid hazardous substances and biological agents	• Approved Category III chemical protective clothing; - Type 5 Particle protection - Type 6 Reduced spray tight • EN14126: 2003 barrier to infective agents
Static dissipative	• Meets the requirements of EN1149-1 • Safe for use in Ex-Zones. See page 10 for details

*All tests conducted with standard unwashed and non-sterilised MICROGARD® 2000 STANDARD coveralls

MICROGARD® 2500

Applications

- Viral contaminated areas (including Avian Influenza)
- Biological protection
- Emergency medical response
- Medical research
- Chemical and pharmaceutical industries
- Low pressure industrial cleaning
- Industrial paint spraying
- Nuclear industry

MICROGARD® 2500 is a unique material offering exceptional mechanical strength, liquid and particulate protection.

Features & Benefits

Protection - Achieves the highest classifications for protection from biological agents, in accordance with EN 14126:2003 and ASTM F 1671 for penetration of blood, body fluids and blood borne pathogens

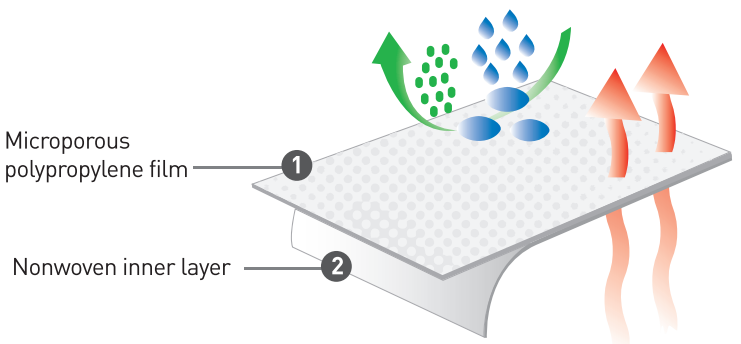
Comfort - Moisture vapour permeable ('breathable') to help reduce the risk of heat stress

Anti-static - Tested according to EN 1149-1

Low linting - Reduced risk of contamination in critical areas

MICROGARD® 2500

MICROGARD® 2500 is a durable microporous polypropylene laminate which provides an excellent barrier to chemical spray and infective agents. This specialist fabric is also breathable to help ensure user comfort. The fabric's physical strength and flexibility ensures protection and comfort even in the harshest environments.



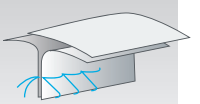
Protection Levels & Additional Properties

TYPE 4-B | TYPE 5-B | TYPE 6-B | EN 1073-2 | EN 1149-1 | EN 14126

MICROGARD® 2500 PLUS in addition is approved to Type 3-B certification.

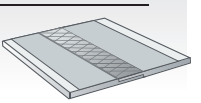
Stitched & Taped Seams (STANDARD)

Increased strength and an effective liquid & particle barrier



Ultrasonically Welded & Taped Seams (PLUS)

This seam technology is our highest barrier to liquid and particulates



Innovative Design Features

Finger loops to prevent sleeve movement when working above your head

Hoods designed for optimum fit with respirators, particularly full face masks

Specialist Approvals

MICROGARD® 2500 has passed a range of specialist testing methods including:

Biological Agents
EN14126 : 2003
See page 9

Technical Support

Technical datasheets & product flyers available to download at:

www.microgard.com or by emailing **technical@microgard.com**

MICROGARD® 2500 Range Overview

MICROGARD® 2500 PLUS

Low concentrated liquid chemical repellence, particle protection and barrier to biological agents.

▲ MICROGARD® 2500 PLUS

MICROGARD® 2500 PLUS PAPR

Encapsulated suit for use in conjunction with Sundström SR500 / SR500EX PAPR fan unit & filters.

▲ MICROGARD® 2500 PLUS PAPR - See page 29

MICROGARD® 2500

MICROGARD® 2500 Technical Data

MICROGARD® 2500 is extensively tested in accordance with statutory requirements, including physical performance attributes and barrier to hazardous substances. The following tables outline the results obtained in independent laboratories according to European test methods.

Test Method	Result	EN Class (EN 14325)
EN 530 Abrasion	100 cycles	2 of 6
EN ISO 7854 Flex Cracking	40,000 cycles	5 of 6
EN ISO 9073-4 Tear Resistance (Machine Direction)	43.1N	2 of 6
EN ISO 9073-4 Tear Resistance (Cross Direction)	35.7N	
EN ISO 13934-1 Tensile Strength (Machine Direction)	122.8N	3 of 6
EN ISO 13934-1 Tensile Strength (Cross Direction)	113.5N	
EN 863 Puncture Resistance	15.23N	2 of 6
EN ISO 13938-1 Burst Resistance	110.7kPa	2 of 6
EN 13274-4 Resistance to ignition	Pass	-
EN 1149-1 Electrostatic Properties (Surface Resistance)	$<2.5 \times 10^9$	-
ISO 13935-2 Seam Strength	185.5N	4 of 6

MICROGARD® 2500 has been tested against numerous chemicals. For further information on permeation testing and a more extensive list of chemicals see page 55 onwards.

EN ISO 6529 Chemical Permeation Test Results			
Chemical Name	**CAS Number**	**BT at 1.0µg/cm²/min**	**EN Class (EN 14325)**
Sodium Hydroxide (aq.50 wt%)	13-10-73-2	>480	6 of 6
Sulphuric Acid (95-96 wt%)	7664-93-9	>480	6 of 6

The following table sets out MICROGARD® 2500 performance for resistance to chemical penetration in accordance with EN ISO 6530. For further information on penetration testing see page 55.

Fabric Repellence & Penetration - Resistance to Liquid Chemicals	Result (%)	EN Class
Repellence of Liquids - 30% Sulphuric Acid	99.9	3 of 3
Repellence of Liquids - 10% Sodium Hydroxide	96.3	3 of 3
Repellence of Liquids - n-heptane (undiluted)	87.2	1 of 3
Repellence of Liquids - Isopropanol	91.7	2 of 3
Resistance to penetration by liquids – 30% Sulphuric Acid	0.0	3 of 3
Resistance to penetration by liquids – 10% Sodium Hydroxide	0.0	3 of 3
Resistance to penetration by liquids – n-heptane (undiluted)	0.0	3 of 3
Resistance to penetration by liquids – Isopropanol	0.0	3 of 3

MICROGARD® 2500 when tested in accordance with EN 14126: 2003 demonstrates an excellent barrier to infective agents. The specific test results are detailed in the table below and for further information on this European Norm see page 7.

EN14126 Fabric Barrier to Infective Agents	Result	EN Class
ISO 16603 Resistance to penetration by blood/fluids under pressure	Pass to 20kPa	Class 6 of 6
ISO 16604 Resistance to penetration by blood borne pathogens	Pass to 20kPa	Class 6 of 6
EN ISO 22610 Resistance to wet bacterial penetration (mechanical contact)	No penetration (up to 75 mins)	Class 6 of 6
ISO/DIS 22611 Resistance to biologically contaminated aerosols	No penetration	Class 3 of 3
ISO 22612 Resistance to dry microbial penetration	No penetration	Class 3 of 3

MICROGARD® 2500 products have been extensively tested according to European and International requirements, including ASTM, for both physical and barrier performance. More details can be found on our website **www.microgard.com**

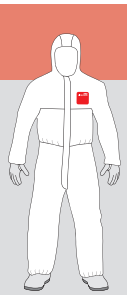
MICROGARD® 2500 Coverall Models

Model **111**

Suit Features

- 3 piece hood
- Elasticated hood, wrist, waist and ankles
- 2-way front zip with resealable storm flap
- Finger loops

Sizes: S-3XL **Colour:** White

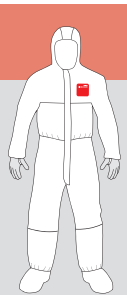


Model **122**

Suit Features

- 3 piece hood
- Elasticated hood, wrists and waist
- 2-way front zipper with re-sealable storm flap
- Finger loops
- Integrated socks with boot overflap

Sizes: S-3XL **Colour:** White



MICROGARD® 2500 PLUS AIRline

Air-supplied suits for protection from hazardous particulate contamination.

MICROGARD® 2500 PLUS AIRline is a range of one-piece suits designed for use in combination with belt mounted, continuous flow airline regulators such as the Sundström SR507* (sold separately). With breathable air supplied from an external compressed air source, the positive pressure generated within the suit provides the wearer with protection from hazardous particulates.

MICROGARD® 2500 PLUS AIRline

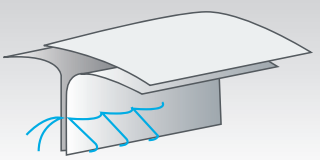
Protection Levels & Additional Properties

EN 1073-1 EN 1149-5

CE marked to EN 1073-1: 1998 with a nominal protection factor of 50,000 (Class 5 of 5)

Stitched & Taped Seams

Increased strength and an effective liquid & particle barrier



Model 750

Features & Benefits

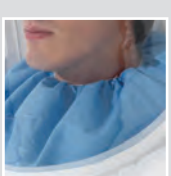
- **Double elasticated cuffs** - Enables a liquid tight connection with chemical protective gloves (additional taping or Glove Link is required)
- **Air permeable SMS collar** - Maintains sufficient air in the breathing zone whilst allowing excess air to flow into the body of the suit
- **Four exhalation valves** - Exhalation valves fitted to the rear of the suit allows CO_2 to escape and equalises pressure within the suit, allowing a full range of movement without risk of excessive pressure causing harm to the suit or the wearer
- **Attached socks with elasticated boot over-flap** - Socks are designed to be worn inside chemical protective boots with the leg over-flap worn outside to reduce the potential for chemical ingress
- **Panoramic visor design** - Ensures a good field of vision for the wearer
- **Emergency rip cord** – Permits rapid doffing of the suit in cases of emergency or undue distress to the wearer

Model 752

- **Attached sock boots with anti-slip PVC sole** - designed to allow soft or protective safety shoes to be worn inside and offer limited resistance to slip.

Sizes: S-3XL
Colour: White

Attached sock boot with anti-slip PVC sole


Panoramic visor with air permeable collar


Airline pass-thru

Applications

- Protection from radioactive particulate contamination*
- Particulate protection (including APIs – Active Pharmaceutical Ingredients)

* Gives no protection against radioactive radiation

Sundström

For use in combination with airline regulators such as the SR507* (Sold separately)

* Sundström SR507 airline regulator unit and SR540 breathing hose used as part of the EC-Type Examination process. For advice on the suitability of other airline regulator systems please contact the Microgard technical team on +44 (0) 1482 625444 or email technical@microgard.com

MICROGARD® 2500 PLUS PAPR

Providing complete protection from liquid and particulate hazards!

MICROGARD® 2500 PLUS PAPR (powered air purifying respirator) is a fully encapsulated liquid tight chemical suit. Model 700 is designed for use in combination with Sundström SR500 / SR500EX PAPR fan unit & filters and Model 701 for use with Scott Proflow SC / EX fan units and filters (sold separately).

MICROGARD® 2500 PLUS PAPR Coverall

Protection Levels & Additional Properties

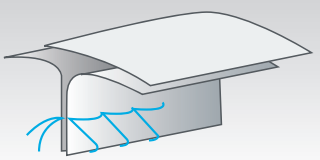
TYPE 3-B | TYPE 4-B | TYPE 5-B | EN 1073-2 | EN 1149-1 | EN 14126 | EN 12941

Respiratory Protective Device, approved to EN 12941 TH3 with an Assigned Protection Factor (APF) of 40*

*UK APF according to Annex C of EN529:2005. The APF means the factor by which the hazard is reduced, i.e. how many times cleaner the air is inside the hood than outside

Stitched & Taped Seams

Increased strength and an effective liquid & particle barrier



Applications

- Particulate protection (including API - Active Pharmaceutical Ingredients)
- Resistance to penetration of low hazard chemicals
- Biological agents (Risk groups 1 & 2)
- Protection from radioactive particulate contamination**

**Gives no protection against radioactive radiation

Specialist Approval

Biological Agents
EN14126 : 2003
See page 9

Model 700 (Sundström) and Model 701 (Scott Proflow)

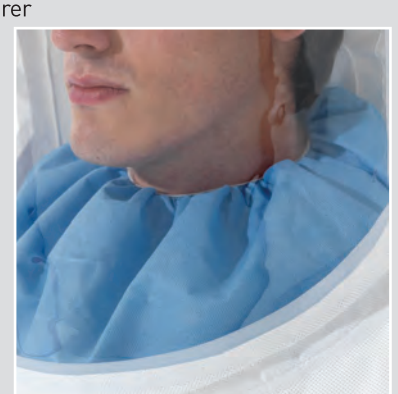
Features & Benefits

- **Double elasticated cuffs** - Enables a liquid tight connection with chemical protective gloves (additional taping or Glove Link is required)
- **Air permeable SMS collar** - Maintains sufficient air in the breathing zone whilst allowing excess air to flow into the body of the suit
- **Four exhalation valves** - Exhalation valves fitted to the rear of the suit allows CO_2 to escape and equalises pressure within the suit, allowing a full range of movement without risk of excessive pressure causing harm to the suit or the wearer
- **Attached socks with elasticated boot over-flap** - Socks are designed to be worn inside chemical protective boots with the leg over-flap worn outside to reduce the potential for chemical ingress
- **Panoramic visor design** - Ensures a good field of vision for the wearer
- **Emergency rip cord** – Permits rapid doffing of the suit in cases of emergency or undue distress to the wearer

Sizes: S-3XL
Colour: White

Attached sock with boot overflap

Glove Link (sold separately) attached nitrile gloves



Panoramic visor and air permeable collar

Also available in the PAPR range...

MICROCHEM® 3000 PAPR | MICROCHEM® 4000 PAPR

***Please note**: Scott and Sundström fan units, breathing hoses and filters sold separately. For advice please contact your distributor.

MICROGARD® 2500 Accessories

MICROGARD® 2500 Accessories

Model 203

Lab Coat
- Collar
- Stud front fastening
- Left breast pocket
- Lower right pocket
- Bound seams

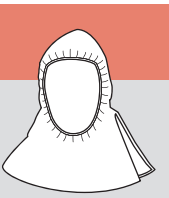
Sizes: S-3XL
Colour: White

Model 406

Overboots
- Elastic to top of boot
- Tie fastening
- Bound seams

Size: One Size (fits size 42-46)
Colour: White

Model 503



Cape Hood
- Balaclava Style
- Elasticated face opening
- Bound seams

Size: One Size
Colour: White

Model 213

Apron
- Tie fastening to waist
- 100cm long tie fastening

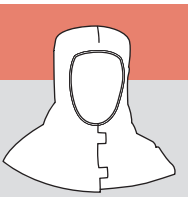
Size: One Size
Colour: White

Model 407

Overboots
- Elasticated opening
- PVC anti-slip sole
- Adjustable Shoe Tie
- Bound seams

Size: 42-46
Colour: White

Model 507



Cape Hood
- Balaclava Style cape hood covering part of shoulders
- Velcro fastening to front
- Bound seams

Size: One Size
Colour: White

Model 400

Overshoes
- Elasticated opening
- Bound seams

Size: One Size (fits size 42-46)
Colour: White

Model 409

SOCO Overboots
- Elastic to top of boot
- Tie fastening
- Blue binding to seams
- Reinforced Surestep non-slip soles
- Adjustable shoe tie

Size: One Size (fits size 42-46)
Colour: White

Model 600

Oversleeves
- Elasticated at both ends
- Bound seams

Size: One Size
Colour: White

For more information on our range of accessories, or if you can't see the accessory you are looking for, please contact Microgard Limited customer services Tel: **+44 (0) 1482 625444**, email **sales@microgard.com** or visit **www.microgard.com**

MICROCHEM® 3000

Applications

- Chemicals
- Oil and petrochemicals
- Pharmaceutical
- Food industry (caustic clean downs)
- Sewage purification installations
- Industrial and tank cleaning
- Mining

MICROCHEM® 3000 is one of the lightest and most comfortable chemical protective materials on the market today. This durable 3 layer fabric provides an extremely effective barrier against both inorganic chemicals and biological hazards.

Features & Benefits

Protection - Multi-layer barrier fabric effective against numerous chemicals

Highly visible - Bright yellow for improved worker safety

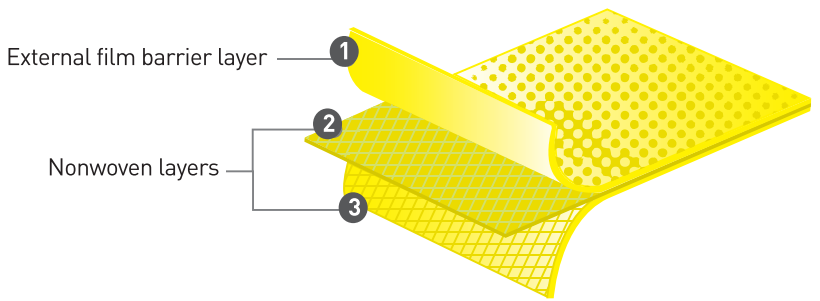
Comfort - Lightweight yet durable

Anti-static - Tested according to EN 1149-1

Designed to protect - Typical coverall features include dual zip systems and double cuffs

MICROCHEM® 3000

One of the lightest and most comfortable chemical protective garments on the market today this durable 3 layer fabric provides an extremely effective barrier against both inorganic chemicals and biological hazards.

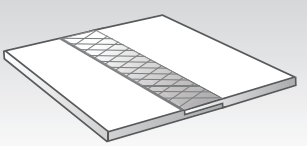


Protection Levels & Additional Properties

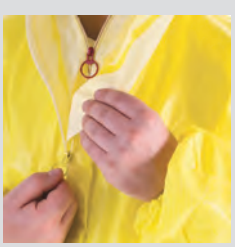
Ultrasonically Welded Seams

Provides a strong liquid and particle barrier

(MICROCHEM® 3000 PAPR features welded and taped seams)



Innovative Design Features



Double zip system helps ensure a liquid tight seal without the need for additional taping

Double cuff design to enable a spray-tight connection with chemical protective gauntlets (additional taping or Glove Link is required)

Specialist Approvals

MICROCHEM® 3000 has passed a range of specialist testing methods including:

Biological Agents
EN14126 : 2003
See page 9

Suitable for Ex-Zones
See page 10

Technical Support

Contact the Microgard technical team to discuss facilitating independent permeation testing of your specific chemical or chemical mixture

Email: **technical@microgard.com**

Technical datasheets & product flyers available to download at: **www.microgard.com**

MICROCHEM® 3000 Range Overview

MICROCHEM® 3000

Protection against concentrated inorganic chemicals & biological agents.

▲ MICROCHEM® 3000

MICROCHEM® 3000 PAPR

Encapsulated suit for use in conjunction with Sundström SR500 / SR500EX PAPR fan unit & filters.

▲ MICROCHEM® 3000 PAPR - See page 35

MICROCHEM® 3000

MICROCHEM® 3000 Technical Data

MICROCHEM® 3000 is extensively tested in accordance with statutory requirements, including physical performance attributes and barrier to hazardous substances. The following tables outline the results obtained in independent laboratories according to European test methods.

Test Method	Result	EN Class (EN14325)
EN 530 Abrasion	500 cycles	3 of 6
EN ISO 7854 Flex Cracking	100,000 cycles	6 of 6
EN ISO 9073-4 Tear Resistance (Machine Direction)	44N	2 of 6
EN ISO 9073-4 Tear Resistance (Cross Direction)	29N	
EN ISO 13934-1 Tensile Strength (Machine Direction)	109N	2 of 6
EN ISO 13934-1 Tensile Strength (Cross Direction)	62N	
EN 863 Puncture Resistance	10N	2 of 6
EN ISO 13938-1 Burst Resistance	90kPa	2 of 6
EN 13274-4 Resistance to ignition	Pass	-
EN 1149-1 Electrostatic Properties (Surface Resistivity)	‹5.0 x 10^{10}	-
ISO 13935-2 Seam Strength	›125N	4 of 6

MICROCHEM® 3000 has been tested against over 100 chemicals. For further information on permeation testing and a more extensive list of chemicals see page 55 onwards.

EN ISO 6529 Chemical Permeation Test Results			
Chemical Name	**CAS Number**	**BT at 1.0µg/cm²/min**	**EN Class (EN 14325)**
Acetic Acid Glacial	64-19-7	›540	6 of 6
Ethylene Glycol	107-21-1	›480	6 of 6
Formic Acid 90%	64-18-6	›480	6 of 6
Hydrazine monohydrate 98% (containing Hydrazine, 64-65 wt %)	7803-57-8	›540	6 of 6
Hydrochloric Acid 37%	7647-01-0	›540	6 of 6
Hydrogen Peroxide 35%	7722-84-1	›480	6 of 6
Isopropyl Alcohol	67-63-0	›480	6 of 6
Mercury	7439-97-6	›480	6 of 6
Methanol	67-56-1	›480	6 of 6
Perchloric Acid 30%	7601-90-3	›540	6 of 6
Sodium Hydroxide (40%)	1310-73-2	›540	6 of 6
Sodum Hypochlorite	7681-52-9	›480	6 of 6
Sulphuric Acid (96%)	7664-93-9	›540	6 of 6

MICROCHEM® 3000 when tested in accordance with EN 14126: 2003 demonstrates an excellent barrier to infective agents. The specific test results are detailed in the table below and for further information on this European Norm see page 7.

EN14126 Barrier to Infective Agents	Result	EN Class
ISO 16603 Resistance to penetration by blood/fluids under pressure	Pass to 20kPa	Class 6 of 6
ISO 16604 Resistance to penetration by blood borne pathogens	Pass to 20kPa	Class 6 of 6
EN ISO 22610 Resistance to wet bacterial penetration (mechanical contact)	No penetration (up to 75 mins)	Class 6 of 6
ISO/DIS 22611 Resistance to biologically contaminated aerosols	No penetration	Class 3 of 3
ISO 22612 Resistance to dry microbial penetration	No penetration	Class 3 of 3

MICROCHEM® 3000 products have been extensively tested according to European and International requirements, including ASTM, for both physical and barrier performance. More details can be found on our website **www.microgard.com**

MICROCHEM® 3000 Coverall Models

Model **103**

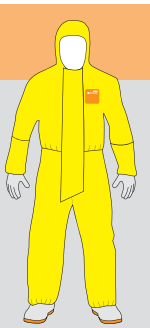
Suit Features
- Collar
- Double zip closure
- Double cuffs
- Elasticated waist, double cuffs and ankles

Sizes: S-3XL
Colour: Yellow

Model **111**

Suit Features
- 2 piece hood
- Double zip closure
- Double cuffs
- Elasticated hood, waist, double cuffs and ankles

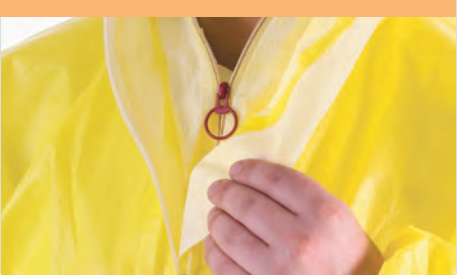
Sizes: S-3XL
Colour: Yellow



Model **121**

Suit Features
- 2 piece hood
- Double zip closure
- Elasticated hood, waist, ankles and sleeve over cuffs
- Attached Ansell Barrier Gloves

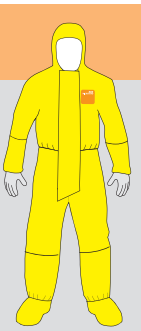
Sizes: S-3XL
Colour: Yellow



Model **122**

Suit Features
- 2 piece hood
- Double zip closure
- Elasticated hood, double cuffs and waist
- Integrated socks with boot overflap

Sizes: S-3XL
Colour: Yellow



MICROCHEM® 3000 PAPR

Providing complete protection from liquid and particulate hazards!

MICROCHEM® 3000 PAPR (powered air purifying respirator) is a fully encapsulated liquid tight chemical suit. Model 700 is designed for use in combination with Sundström SR500 / SR500EX PAPR fan unit & filters and Model 701 for use with Scott Proflow SC / EX fan units and filters (sold separately).

MICROCHEM® 3000 PAPR Coverall

Protection Levels & Additional Properties

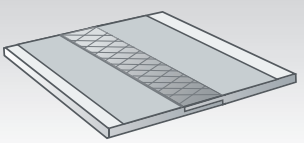
TYPE 3-B | TYPE 4-B | TYPE 5-B | EN 1073-2 | EN 1149-1 | EN 14126 | EN 12941

Respiratory Protective Device, approved to EN 12941 TH3 with an Assigned Protection Factor (APF) of 40*

*UK APF according to Annex C of EN529:2005. The APF means the factor by which the hazard is reduced, i.e. how many times cleaner the air is inside the hood than outside

Ultrasonically Welded & Taped Seams

This seam technology is our highest barrier to liquid and particulates.



Applications

- Exposure to liquid inorganic chemicals, acids & bases
- Protection from radioactive particulate contamination**

**Gives no protection against radioactive radiation

Sundström

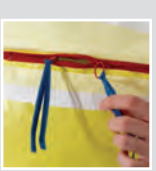
SCOTT SAFETY

Model 700 (Sundström) and Model 701 (Scott Proflow)

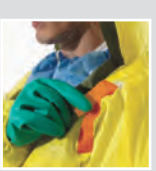
Features & Benefits

- **Double elasticated cuffs** - Enables a liquid tight connection with chemical protective gloves (additional taping or Glove Link is required)
- **Air permeable SMS collar** - Maintains sufficient air in the breathing zone whilst allowing excess air to flow into the body of the suit
- **Four exhalation valves** - Exhalation valves fitted to the rear of the suit allows CO_2 to escape and equalises pressure within the suit, allowing a full range of movement without risk of excessive pressure causing harm to the suit or the wearer
- **Attached socks with elasticated boot over-flap** - Socks are designed to be worn inside chemical protective boots with the leg over-flap worn outside to reduce the potential for chemical ingress
- **Panoramic visor design** - Ensures a good field of vision for the wearer
- **Emergency rip cord** – Permits rapid doffing of the suit in cases of emergency or undue distress to the wearer

Sizes: S-3XL
Colour: Yellow



Front entry zip



Escape rip cord

Externally mounted (Sundström) filters

Specialist Approvals

Biological Agents
EN14126 : 2003
See page 9

Suitable for Ex-Zones
See page 10

Also available in the PAPR range...

MICROGARD® 2500 PLUS PAPR | MICROCHEM® 4000 PAPR

***Please note**: Scott and Sundström fan units, breathing hoses and filters sold separately. For advice please contact your distributor.

MICROCHEM® 3000 Accessories

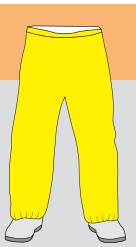
MICROCHEM® 3000 Accessories

Model **201**

Jacket
- 2 piece hood
- Double zip closure
- Elasticated wrists and hem
- Welded seams

Sizes: S-3XL
Colour: Yellow

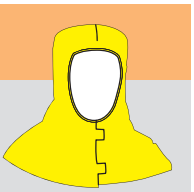
Model **301**



Trousers
- Elastication to waist and ankles
- No pockets
- Welded seams

Sizes: S-2XL
Colour: Yellow

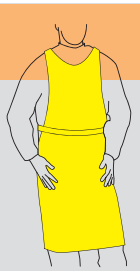
Model **507**



Cape Hood
- Balaclava style cape hood covering part of shoulders
- Velcro fastening to front
- Welded seams

Size: One Size
Colour: Yellow

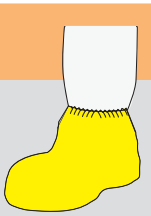
Model **213**



Apron
- Tie fastening to waist
- 100cm long tie fastening

Size: One Size
Colour: Yellow

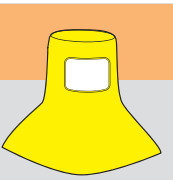
Model **400**



Overshoes
- Elasticated opening
- Welded seams

Size: One size (fits size 42-46)
Colour: Yellow

Model **508**



Cape Hood with visor
- Balaclava style cape hood covering part of shoulders
- Welded seams
- Visor to face opening

Size: One Size
Colour: Yellow

Model **214**

Hospital Gown
- Rear velcro fastening
- Elasticated wrists
- Welded seams

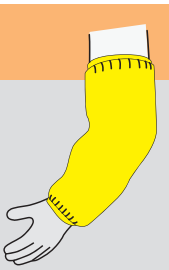
Sizes: S-3XL
Colour: Yellow

Model **406**

Overboots
- Elastic to top of boot
- Tie fastening
- Welded seams

Size: One Size (fits size 42-46)
Colour: Yellow

Model **600**



Oversleeves
- Elasticated at both ends
- Welded seams

Size: One Size
Colour: Yellow

For more information on our range of accessories, or if you can't see the accessory you are looking for, please contact Microgard Limited customer services Tel: **+44 (0) 1482 625444**, email **sales@microgard.com** or visit **www.microgard.com**

MICROCHEM® 4000

Applications

- Chemical handling / transportation
- Oil-based mud protection
- Hazardous waste remediation
- Sewage purification Installations
- Industrial / tank cleaning
- HAZMAT Emergency Response (i.e. Level B)
- Pharmaceutical
- Mining
- Agriculture

MICROCHEM® 4000 is designed to provide an exceptional barrier against organic and inorganic chemicals and biological agents.

Features & Benefits

Protection - Permeation tested against over 160 chemicals, including chemical warfare agents

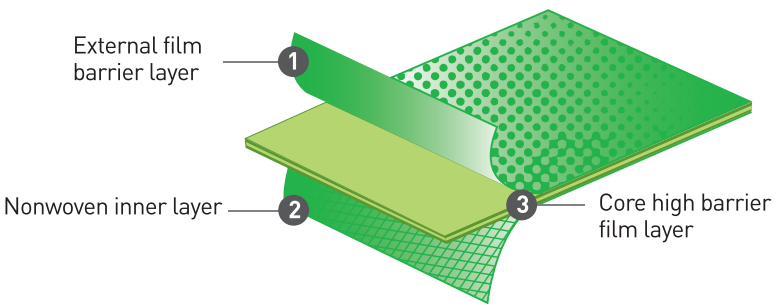
Comfort - Textile like inner improves wearer acceptance

Anti-static - Tested according to EN 1149-1

Designed to protect - Typical coverall features include dual zip systems and double sleeves

MICROCHEM® 4000

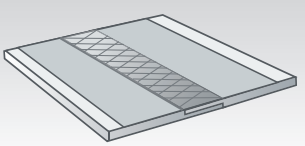
A unique multi-layer barrier fabric renowned for its lightweight, yet robust textile feel and exceptional barrier to organic & inorganic chemicals.



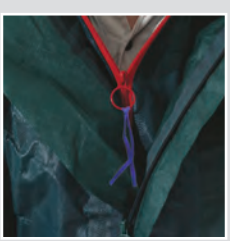
Protection Levels & Additional Properties

Ultrasonically Welded & Taped Seams

A feature throughout the MICROCHEM® 4000 range, this seam technology is our highest barrier to liquids and particulates.



Innovative Design Features



Double zip system helps ensure a liquid tight seal without the need for additional taping

Double cuff design to enable a spray-tight connection with chemical protective gauntlets (additional taping or Glove Link is required)

Specialist Approvals

MICROCHEM® 4000 has passed a range of specialist testing methods including:

Biological Agents
EN14126 : 2003
See page 9

Suitable for Ex-Zones
See page 10

Technical Support

Contact the Microgard technical team to discuss facilitating independent permeation testing of your specific chemical or chemical mixture

Email: **technical@microgard.com**

Technical datasheets & product flyers available to download at: **www.microgard.com**

MICROCHEM® 4000 Range Overview

MICROCHEM® 4000

Protection against concentrated organic and inorganic chemicals.

▲ MICROCHEM® 4000

MICROCHEM® 4000 Model 151

Developed for the emergency services. Rubber face seal for use with full face respirators.

▲ MICROCHEM® 4000 151 - See page 42

MICROCHEM® 4000 APOLLO

Encapsulated Type B suit developed in conjunction with the UK Fire & Rescue Services.

▲ MICROCHEM® 4000 APOLLO - See page 41

MICROCHEM® 4000 PAPR

Encapsulated suit for use in conjunction with Sundström SR500 / SR500EX PAPR fan unit & filters.

▲ MICROCHEM® 4000 PAPR - See page 43

MICROCHEM® 4000

MICROCHEM® 4000 Technical Data

MICROCHEM® 4000 is extensively tested in accordance with statutory requirements, including physical performance attributes and barrier to hazardous substances. The following tables outline the results obtained in independent laboratories according to European test methods.

Test Method	Result	EN Class (EN 14325)
EN 530 Abrasion	2,000 cycles	6 of 6
EN ISO 7854 Flex Cracking	40,000 cycles	5 of 6
EN ISO 9073-4 Tear Resistance (Machine Direction)	88N	3 of 6
EN ISO 9073-4 Tear Resistance (Cross Direction)	44N	
EN ISO 13934-1 Tensile Strength (Machine Direction)	172N	2 of 6
EN ISO 13934-1 Tensile Strength (Cross Direction)	84N	
EN 863 Puncture Resistance	16N	2 of 6
EN ISO 13938-1 Burst Resistance	116kPa	2 of 6
EN 13274-4 Resistance to ignition	Pass	-
EN 13274-4 Resistance to flame	Pass	1 of 3
EN 1149-1 Electrostatic Properties (Surface Resistance)	$<2.5 \times 10^9$	-
ISO 13935-2 Seam Strength	185.2N	4 of 6

MICROCHEM® 4000 has been tested against over 160 chemicals. For further information on permeation testing and a more extensive list of chemicals see page 55 onwards.

EN ISO 6529 Chemical Permeation Test Results			
Chemical Name	**CAS Number**	**BT at 1.0µg/cm²/min**	**EN Class (EN 14325)**
Acetone	67-64-1	>540	6 of 6
Acetonitrile	75-05-8	>540	6 of 6
Chlorine Gas (>99.8 wt%)	7782-50-5	>540	6 of 6
Chromium Trioxide (50 wt%)	1333-82-0	>480	6 of 6
Ethyl Acetate	141-78-6	>540	6 of 6
Heptane-n (99.8%)	142-82-5	>540	6 of 6
Hydrofluoric Acid (71-75 wt%)	7664-39-3	>540	6 of 6
Hydrogen Chloride Gas (>99.0 wt%)	7647-01-0	>540	6 of 6
Hydrogen Peroxide (35%)	7722-84-1	>480	6 of 6
Methanol	67-56-1	>540	6 of 6
Methyl Ethyl Ketone	78-93-3	>540	6 of 6
Nitric Acid conc (70%)	7697-37-2	>540	6 of 6
Sodium Hydroxide (40 wt%)	1310-73-2	>540	6 of 6
Sulphuric Acid (96%)	7664-93-9	>540	6 of 6
Toluene	108-88-3	>540	6 of 6

TNO Protocols – Resistance to permeation of Chemical Warfare Agents			
Chemical	**Detection Limit**	**Temperature (°C)**	**Breakthrough Time (hh:mm)**
Mustard (HD)	0.1µg/cm² (pinpoint BT) or 4µg/cm² (continuous and homogenous BT)	37	>24:00
Lewisite (L)	Approx. 0.5 µg/cm²	37	>05:00 <06:00
Sarin (GB)	Approx. 0.05 µg/cm²	37	>24:00
VX	Approx. 0.05 µg/cm²	37	>24:00

MICROCHEM® 4000 when tested in accordance with EN 14126: 2003 demonstrates an excellent barrier to infective agents. The specific test results are detailed in the table below and for further information on this European Norm see page 7.

EN14126 Barrier to Infective Agents	Result	EN Class
ISO 16603 Resistance to penetration by blood/fluids under pressure	Pass to 20kPa	Class 6 of 6
ISO 16604 Resistance to penetration by blood borne pathogens	Pass to 20kPa	Class 6 of 6
EN ISO 22610 Resistance to wet bacterial penetration (mechanical contact)	No penetration (up to 75 mins)	Class 6 of 6
ISO/DIS 22611 Resistance to biologically contaminated aerosols	No penetration	Class 3 of 3
ISO 22612 Resistance to dry microbial penetration	No penetration	Class 3 of 3

MICROCHEM® 4000 products have been extensively tested according to European and International requirements, including ASTM, for both physical and barrier performance. More details can be found on our website **www.microgard.com**

MICROCHEM® 4000 Coverall Models

Model **103**

Suit Features
- Collar
- Double zip closure
- Double cuffs with knitted inner cuff
- Elasticated outer cuffs, waist and ankles

Sizes: S-3XL
Colour: Green

Model **111**

Suit Features
- 2 piece hood
- Double zip closure
- Double cuffs with knitted inner cuff
- Elasticated hood, outer cuffs, waist and ankles

Sizes: S-3XL
Colour: Green

Model **121**

Suit Features
- 2 piece hood
- Double zip closure
- Elasticated hood, waist and ankles
- Attached Ansell Barrier Gloves

Sizes: S-3XL
Colour: Green

Model **122**

Suit Features
- 2 piece hood
- Double zip closure
- Double cuffs with knitted inner cuff
- Elasticated hood, outer cuffs, waist and boot overflaps
- Integrated socks with boot overflap

Sizes: S-3XL
Colour: Green

Model **125**

Suit Features
- 2 piece hood
- Double zip closure
- Elasticated hood, waist and boot overflaps
- Integrated socks with boot overflap
- Attached Ansell Barrier Gloves

Sizes: S-3XL
Colour: Green

MICROCHEM® 4000 APOLLO

MICROCHEM® 4000 APOLLO

Trusted by fire and rescue crews around the world

Developed with the UK Fire & Rescue services MICROCHEM® 4000 APOLLO is a fully encapsulated liquid tight chemical suit designed for use in conjunction with self contained breathing apparatus (SCBA)

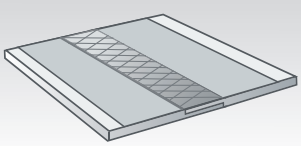
MICROCHEM® 4000 APOLLO

Protection Levels & Additional Properties

TYPE 3-B | TYPE 4-B | EN 14126

Ultrasonically Welded & Taped Seams

A feature throughout the MICROCHEM® 4000 range, this seam technology is our highest barrier to liquid and particulates.



Applications

- Chemicals
- Oil and petrochemicals
- Pharmaceutical
- Agriculture
- Sewage purification installations
- Industrial and tank cleaning
- Emergency Services (HAZMAT, CBRN)

...may also be suitable for use in Level B applications

(according to US Environmental Protection Agency (EPA) & NFPA guidelines).

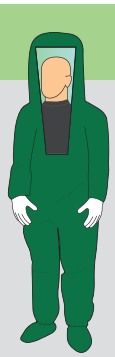
Contact the Microgard tech team for full details or email technical@microgard.com

Specialist Approvals

Biological Agents
EN14126 : 2003
See page 9

Suitable for Ex-Zones
See page 10

Model 126



Suit Features

- Rear entry double zip system
- Rear mounted BA (breathing apparatus) pouch – universal fit with most BA
- Attached socks with boot overflap
- Attached Ansell Barrier® Gloves
- Exhalation valves
- Clear face visor
- Ultrasonically welded and taped seams
- Bat-wing design enables air gauge checking within the suit
- Chest strap for DSU (Distress Signal Unit)
- Adjustable internal support braces

Sizes: M-2XL
Colour: Green

SCBA rear pouch

Rear mounted BA pouch

Decontamination process example

MICROCHEM® 4000 Model 151

MICROCHEM® 4000

Developed for first responders and the emergency services

Rear entry suit, with neoprene rubber face seal for a close fit to full face respirators. Ideal for use in hazardous areas where protection against concentrated chemicals and biological agents is required.

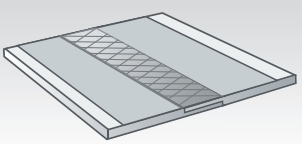
MICROCHEM® 4000 Model 151

Protection Levels & Additional Properties

TYPE 3-B | TYPE 4-B | TYPE 5-B | EN 1073-2 | EN 1149-1 | EN 14126

Ultrasonically Welded & Taped Seams

A feature throughout the MICROCHEM® 4000 range, this seam technology is our highest barrier to liquid and particulates.



Model 151 - G00 & G02

Suit Features

- Neoprene rubber face seal
- Rear horizontal zip entry
- Attached socks with boot overflap
- Ultrasonically welded and taped seams

151-G02

- Includes attached Ansell Barrier Gloves, with over sleeves and finger loops

Sizes: S-3XL
Colour: Green

Model 151 also available in...

MICROCHEM® 5000

Socks with boot overflap

Rear entry double zip system

Neoprene rubber face seal

Applications

- Chemicals
- Oil and petrochemicals
- Pharmaceutical
- Agriculture
- Sewage purification installations
- Industrial and tank cleaning
- Emergency Services (HAZMAT, CBRN)

Specialist Approvals

Biological Agents
EN14126 : 2003
See page 9

Suitable for Ex-Zones
See page 10

MICROCHEM® 4000 PAPR

Applications

- Exposure to liquid organic & inorganic chemicals inc chemical warfare agents
- Biological agents (Risk Groups 3 & 4)
- Active pharmaceutical ingredients
- Protection from radioactive particulate contamination**

**Gives no protection against radioactive radiation

Specialist Approvals

Biological Agents
EN14126 : 2003
See page 9

Suitable for Ex-Zones
See page 10

Providing complete protection from liquid and particulate hazards!

MICROCHEM® 4000 PAPR (powered air purifying respirator) is a fully encapsulated liquid tight chemical suit. Model 700 is designed for use in combination with Sundström SR500 / SR500EX PAPR fan unit & filters and Model 701 for use with Scott Proflow SC / EX fan units and filters (sold separately).

MICROCHEM® 4000 PAPR Coverall

Protection Levels & Additional Properties

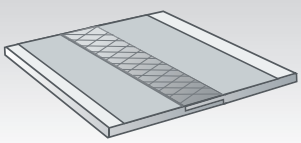
TYPE 3-B | TYPE 4-B | TYPE 5-B | EN 1073-2 | EN 1149-1 | EN 14126 | EN 12941

Respiratory Protective Device, approved to EN 12941 TH3 with an Assigned Protection Factor (APF) of 40*

*UK APF according to Annex C of EN529:2005. The APF means the factor by which the hazard is reduced, i.e. how many times cleaner the air is inside the hood than outside

Ultrasonically Welded & Taped Seams

This seam technology is our highest barrier to liquid and particulates.



Model **700 (Sundström)** and Model **701 (Scott Proflow)**

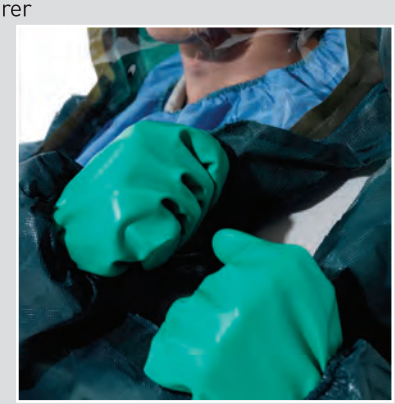
Features & Benefits

- **Double elasticated cuffs** - Enables a liquid tight connection with chemical protective gloves (additional taping or Glove Link is required)
- **Air permeable SMS collar** - Maintains sufficient air in the breathing zone whilst allowing excess air to flow into the body of the suit
- **Four exhalation valves** - Exhalation valves fitted to the rear of the suit allows CO_2 to escape and equalises pressure within the suit, allowing a full range of movement without risk of excessive pressure causing harm to the suit or the wearer
- **Attached socks with elasticated boot over-flap** - Socks are designed to be worn inside chemical protective boots with the leg over-flap worn outside to reduce the potential for chemical ingress
- **Panoramic visor design** - Ensures a good field of vision for the wearer
- **Emergency rip cord** – Permits rapid doffing of the suit in cases of emergency or undue distress to the wearer

Sizes: S-3XL
Colour: Green

Externally mounted (Sundström) filters

Boot overflap



Emergency rip cord

Also available in the PAPR range...

MICROGARD® 2500 PLUS PAPR | MICROCHEM® 3000 PAPR

***Please note**: Scott and Sundström fan units, breathing hoses and filters sold separately. For advice please contact your distributor.

MICROCHEM® 4000 Accessories

MICROCHEM® 4000

MICROCHEM® 4000 Accessories

Model 212

Apron
- Tie fastening to waist
- 100cm long tie fastening

Size: One Size
Colour: Green

Model 301

Trousers
- Elastication to waist and ankles
- No pockets
- Welded and taped seams

Sizes: S-2XL
Colour: Green

Model 510

Cape Hood with visor
- Underarm fastening with velcro straps
- Welded seams

Size: One Size
Colour: Green

Model 215

Hospital Gown
- Velcro fastening to neck
- Tie fastening at the waist
- Double cuff with knitted inner cuff
- Welded and taped seams

Sizes: S-3XL
Colour: Green

Model 406

Overboots
- Elastic to top of boot
- Tie fastening
- Welded seams

Size: One Size (fits size 42-46)
Colour: Green

Model 600

Oversleeves
- Elasticated at both ends
- Welded seams

Size: One Size
Colour: Green

Model 230

Jacket
- 2 piece hood
- Double zip closure
- Elasticated wrists and hem
- Welded and taped seams

Sizes: S-3XL
Colour: Green

Model 507

Cape Hood
- Balaclava style cape hood covering part of shoulders
- Velcro fastening to front
- Welded seams

Size: One Size
Colour: Green

For more information on our range of accessories, or if you can't see the accessory you are looking for, please contact Microgard Limited customer services Tel: **+44 (0) 1482 625444**, email **sales@microgard.com** or visit **www.microgard.com**

MICROCHEM® 5000

Applications

- Chemicals
- Oil and petrochemicals
- Pharmaceuticals
- Mining
- Agriculture
- First response
- Fire service
- Industrial and tank cleaning
- Sewage purification installations

MICROCHEM® 5000 reaches new levels in chemical protection and has been engineered to protect. The highly visible multi layer fabric is strong, durable and suitable for workers in extremely hazardous areas, including HAZMAT response teams.

Features & Benefits

Performance - Barrier to numerous organic and inorganic chemicals and biological hazards

Comfort – Multi layer material which is lightweight, yet strong and durable

Highly visible - Highly visible bright orange colour for improved worker safety

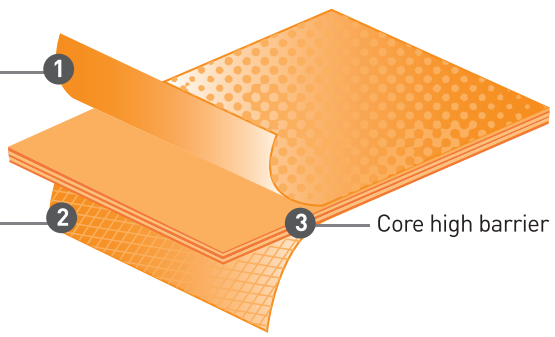
Protection - >480 minutes breakthrough time against 14 of 15 chemicals listed in EN ISO 6529

Anti-static - Tested according to EN 1149-1

Designed to protect - Innovative design features include liquid-tight dual zip designs without the need for additional taping

MICROCHEM® 5000

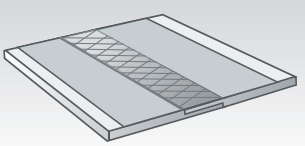
This highly visible innovative material is strong, durable and suitable for workers in extremely hazardous areas, including HAZMAT response teams.



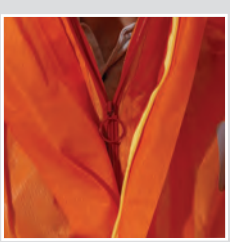
Protection Levels & Additional Properties

Ultrasonically Welded & Taped Seams

A feature throughout the MICROCHEM® 5000 range, this seam technology is our highest barrier to liquids and particulates.



Innovative Design Features



Double zip system helps ensure a liquid tight seal without the need for additional taping

Double cuff design to enable a spray-tight connection with chemical protective gauntlets (additional taping or Glove Link is required)

Specialist Approvals

MICROCHEM® 5000 has passed a range of specialist testing methods including:

Biological Agents
EN14126 : 2003
See page 9

Suitable for Ex-Zones
See page 10

Technical Support

Contact the Microgard technical team to discuss facilitating independent permeation testing of your specific chemical or chemical mixture

Email: **technical@microgard.com**

Technical datasheets & product flyers available to download at: **www.microgard.com**

MICROCHEM® 5000 Range Overview

MICROCHEM® 5000

Protection against organic and inorganic chemicals and biological hazards

▲ MICROCHEM® 5000

MICROCHEM® 5000 model 151

Developed for the emergency services. Rubber face seal for use with full face respirators

▲ MICROCHEM® 5000 151 - See page 49

MICROCHEM® 5000

MICROCHEM® 5000 Technical Data

MICROCHEM® 5000 is extensively tested in accordance with statutory requirements, including physical performance attributes and barrier to hazardous substances. The following tables outline the results obtained in independent laboratories according to European test methods.

Test Method	Result	EN Class (EN 14325)
EN 530 Abrasion	2000 Cycles	6 of 6
EN ISO 7854 Flex Cracking	5000 Cycles	3 of 6
EN ISO 9073-4 Tear Resistance (Machine Direction)	67.7N	4 of 6
EN ISO 9073-4 Tear Resistance (Cross Direction)	60.2N	
EN ISO 13934-1 Tensile Strength (Machine Direction)	165.0N	3 of 6
EN ISO 13934-1 Tensile Strength (Cross Direction)	136.3N	
EN 863 Puncture Resistance	14.3N	2 of 6
EN ISO 13938-1 Burst Resistance	143.1kPa	2 of 6
EN 13274-4 Resistance to ignition	Pass	-
EN 13274-4 Resistance to Flame	Pass	2 of 3
EN25978 Resistance to blocking	Slight Blocking	-
EN 1149-1: 2006 Electrostatic Properties (Surface Resistance)	$<2.5 \times 10^{9}$	-
EN 1149-1: 2006 Electrostatic Properties (Surface Resistivity)	$<5.0 \times 10^{10}$	-
ISO: 13935-2 Seam Strength	241.8N	4 of 6

MICROCHEM® 5000 has been tested against numerous chemicals. For further information on permeation testing and a more extensive list of chemicals see page 55 onwards.

EN ISO 6529 Chemical Permeation Test Results			
Chemical Name	**CAS Number**	**BT at 1.0µg/cm²/min**	**EN Class (EN 14325)**
Acetone	67-64-1	>480	6 of 6
Acetonitrile	75-05-8	>480	6 of 6
Ammonia Gas, 1 atmos.	7664-41-7	>480	6 of 6
Carbon Disulphide	75-15-0	>480	6 of 6
Chlorine (>99.8wt%) Gas, 1 atmos.	7782-50-5	>480	6 of 6
Diethylamine	109-89-7	>480	6 of 6
Ethyl Acetate	141-78-6	>480	6 of 6
Hexane-n (99.8 wt%)	110-54-3	>480	6 of 6
Hydrogen Chloride (> 99.0 wt%) Gas, 1 atmos	7647-01-0	>480	6 of 6
Methanol (> 99.5 wt%)	67-56-1	>480	6 of 6
Sodium Hydroxide (aq, 50wt%)	1310-73-2	>480	6 of 6
Sulphuric Acid (96 wt%)	7664-93-9	>480	6 of 6
Tetrahydrofuran	109-99-9	>480	6 of 6
Toluene (99.99 wt%)	108-88-3	>480	6 of 6

TNO Protocols – Resistance to permeation of Chemical Warfare Agents			
Chemical	**Detection Limit**	**Temperature (°C)**	**Breakthrough Time (hh:mm)**
Mustard (HD)	Approx. 0.5 µg/cm²	37	>17:40
Lewisite (L)	Approx. 0.5 µg/cm²	37	>06:30 <09:30
Sarin (GB)	Approx. 0.05 µg/cm²	37	>24:00
VX	Approx. 0.05 µg/cm²	37	>24:00

MICROCHEM® 5000 when tested in accordance with EN 14126: 2003 demonstrates an excellent barrier to infective agents. The specific test results are detailed in the table below and for further information on this European Norm see page 7.

EN14126 Barrier to Infective Agents	Result	EN Class
ISO 16603 Resistance to penetration by blood/fluids under pressure	Pass to 20kPa	Class 6 of 6
ISO 16604 Resistance to penetration by blood borne pathogens	Pass to 20kPa	Class 6 of 6
EN ISO 22610 Resistance to wet bacterial penetration (mechanical contact)	No penetration (up to 75 mins)	Class 6 of 6
ISO/DIS 22611 Resistance to biologically contaminated aerosols	No penetration	Class 3 of 3
ISO 22612 Resistance to dry microbial penetration	No penetration	Class 3 of 3

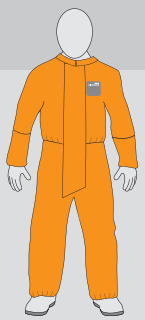
MICROCHEM® 5000 products have been extensively tested according to European and International requirements, including ASTM, for both physical and barrier performance. More details can be found on our website **www.microgard.com**

MICROCHEM® 5000 Coverall Models

Model **103**

Suit Features
- Collar
- Double zip closure
- Double cuffs with knitted inner cuff
- Elasticated outer cuffs, waist and ankles

Sizes: S-3XL
Colour: Orange



Model **111**

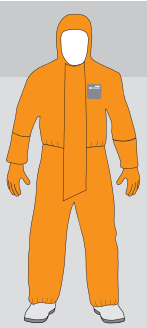
Suit Features
- 2 piece hood
- Double zip closure
- Double cuffs with knitted inner cuff
- Elasticated hood, outer cuffs, waist and ankles

Sizes: S-3XL
Colour: Orange

Model **121 - G02**

Suit Features
- 2 piece hood
- Double zip closure
- Elasticated hood, waist and ankles
- Attached Ansell Barrier Gloves

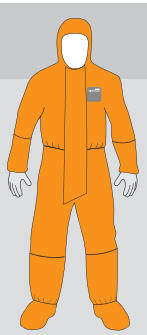
Sizes: S-3XL
Colour: Orange



Model **122**

Suit Features
- 2 piece hood
- Double zip closure
- Double cuffs with knitted inner cuff
- Elasticated hood, outer cuffs, waist and boot overflaps
- Integrated socks with boot overflap

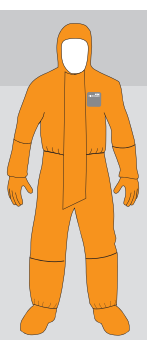
Sizes: S-3XL
Colour: Orange



Model **125 - G02**

Suit Features
- 2 piece hood
- Double zip closure
- Elasticated hood, waist and boot overflaps
- Integrated socks with boot overflaps
- Attached Ansell Barrier Gloves

Sizes: S-3XL
Colour: Orange



MICROCHEM® 5000 Model 151

MICROCHEM® 5000

Developed for first responders and the emergency services

Rear entry suit, with neoprene rubber face seal for a close fit to full face respirators. Ideal for use in hazardous areas where protection against concentrated chemicals and biological agents is required.

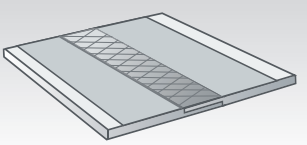
MICROCHEM® 5000 Model 151

Protection Levels & Additional Properties

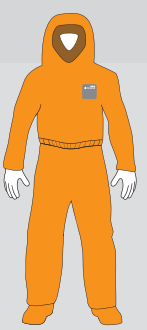
TYPE 3-B | TYPE 4-B | TYPE 5-B | EN 1073-2 | EN 1149-1 | EN 14126

Ultrasonically Welded & Taped Seams

A feature throughout the MICROCHEM® 5000 range, this seam technology is our highest barrier to liquids and particulates.



Model 151 - G00 & G02



Suit Features

- Neoprene rubber face seal
- Rear horizontal zip entry
- Attached socks with boot overflap
- Ultrasonically welded and taped seams

151-G02

- Includes attached Ansell Barrier Gloves, with over sleeves and finger loops

Sizes: S-3XL
Colour: Orange

Model 151 also available in...

MICROCHEM® 4000

Socks with boot overflap

Neoprene rubber face seal

Rear entry double zip system

Applications

- Chemicals
- Oil and petrochemicals
- Pharmaceutical
- Agriculture
- Sewage purification installations
- Industrial and tank cleaning
- Emergency Services (HAZMAT, CBRN)

Specialist Approvals

Biological Agents
EN14126 : 2003
See page 9

Suitable for Ex-Zones
See page 10

MICROGARD®
High Performance Protection in Comfort

MICROGARD® Outlast® PCM Vest

Outlast® is the original temperature-regulating technology. Outlast® technology balances your temperature through the use of patented Thermocules™ that absorb and store excess heat, releasing it when you need it most.

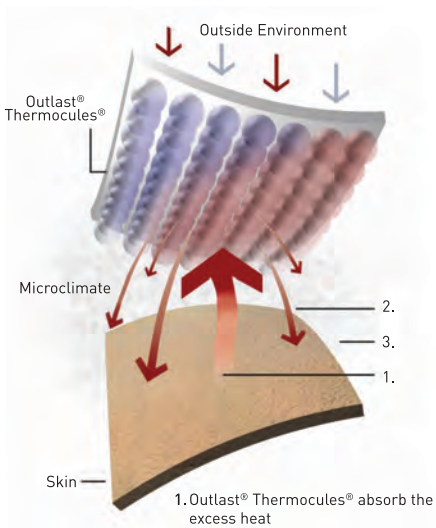
The main benefits of products with Outlast® technology

- Balances temperature
- Adapts to your thermal needs
- Reduces overheating
- Less perspiration
- Less chill
- Not too hot, not too cold

Outlast® Thermocules™ continually absorb, store and release excess body heat to balance temperature and humidity build-up.

Registered trademark of the Space Foundation, an initiative of the aerospace industry and NASA. Patented Outlast® Phase Change Technology is recognized by NASA as Certified Space Technology.

How Outlast® Adaptive Comfort® Works



1. Outlast® Thermocules® absorb the excess heat
2. Stored heat is released to the body as needed
3. The result is a constant microclimate

MICROGARD® SURE STEP™ Overshoes

The MICROGARD® SURE STEP™ Overshoes feature a revolutionary monofilament coating that offers excellent anti-slip properties (confirmed by independent laboratory tests).

This unique coating also makes MICROGARD® SURE STEP™ stronger and more durable than traditional CPE overshoes, resulting in a safer yet more economical product.

Features include

- Liquid resistant material
- Lint free
- Generous sizing to accommodate shoe size 42-48
- Anti-static to EN1149-1
- Available in white or blue

For more information on our range of accessories, or if you can't see the accessory you are looking for, please contact Microgard Limited customer services
Tel: +44 (0) 1482 625444, email **sales@microgard.com** or visit **www.microgard.com**

MICROGARD® GLOVE LINK

Provides a splash proof seal without the need for additional taping. GLOVE LINK is compatible with most MICROGARD® and MICROCHEM® coveralls where a splash proof connection with chemical protective gauntlets is required.

NOTE: Chemical protective gauntlets must have a minimum cuff size of 325mm (13") and a smooth surface.If in any doubt on the compatibility with your chemical gauntlets,email the Microgard technical team: **technical@microgard.com**

Each MICROGARD® GLOVE LINK set contains:
• 2 x Grooved cuff adapters • 4 x Rubber o-rings
(One adapter and two rings are required for each glove connection)

MICROGARD® FR

Applications

- Oil and petrochemicals
- Petroleum distribution and processing
- Utilities

MICROGARD® FR is a flame retardant material designed to be worn over woven thermal protective garments such as NOMEX® or PYROVATEX®, offering protection from particulates and light liquid splash without compromising worker protection in the event of a flash fire*.

Features & Benefits

Protection - Flame retardant treated Sontara/wood pulp/polyester fabric with good barrier to particulates and low level liquid spray

Comfort - Air and water vapour permeable ('breathable') to help reduce the risk of heat stress

Optimized Body Fit - Improves wearer comfort and safety

*Must be worn over thermal protective garments, such as NOMEX® or PYROVATEX®, and never be worn next to the skin.

MICROGARD® FR

MICROGARD® FR will not compromise wearer protection in the event of a flash fire.

MICROGARD® FR offers wearers protection from liquid chemicals to EN Type 6 and particulates to EN Type 5, and peace of mind to workers in potentially explosive/flammable environments. To decrease the risk of burn injury wear over thermal protective workwear*

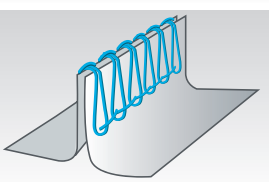
In addition to it's excellent FR properties, the fabric used in the manufacture of MICROGARD® FR is designed to allow water vapour (perspiration) to escape from the suit (water vapour resistance, Ret** = < 5), helping to reduce the risk of heat stress.

Wear over a thermal protective garment (EN ISO 14116 Index 2 or above) in areas with a risk of flash fire and where protection from low level liquid spray and particulates is required.

Protection Levels & Additional Properties

Stitched Seams

Combining strength with particle barrier



Model 111

Suit Features

- 2 piece hood
- Elasticated hood, wrists, waist and ankles
- External overlocked seams

Sizes: M-3XL
Colour: Denim Blue

*MICROGARD® FR should never be worn in isolation for flame retardant protection. Always wear over the top of garments which achieve EN ISO 14116 Index 2 or above. ** Ret is a measurement of a materials resistance to moisture vapour transfer. The lower the value the less resistance there is and therefore the more "breathable" the fabric.

MICROGARD® FR Technical Data

MICROGARD® FR is extensively tested in accordance with statutory requirements, including physical performance attributes.

Test Method	Result	EN Class
EN 530 Abrasion (visual assessment)	500 cycles	3 of 6
EN ISO 7854 Flex Cracking (visual assessment)	100,000 cycles	6 of 6
EN ISO 9073-4 Tear Resistance (MD)	42.1N	2 of 6
EN ISO 9073-4 Tear Resistance (CD)	26.3N	
EN ISO 13934-1 Tensile Strength (MD)	164.7N	2 of 6
EN ISO 13934-1 Tensile Strength (CD)	90.7N	
EN 863 Puncture Resistance	17N	2 of 6
EN ISO 13938-1 Burst Resistance	120kPa	2 of 6
EN 13274-4 Resistance to ignition	Pass	-
EN 25978 Resistance to Blocking	Slight Blocking	-
EN 1149-5 Electrostatic Properties (surface resistivity)	$<5.0 \times 10^{10}$	-
ISO 13935-2 Seam Strength	148.9N	4 of 6
EN ISO 14116 Limited Flame Spread	Index 1/0/0	-

MICROGARD® FR

Simulated flash fire test data

prEN ISO 13506
Draft standard for protective clothing against heat and flame – test method for complete garments – prediction of burn injury using an instrumented mannequin (ISO/DIS 13506: 2004)

Body Burn Prediction
Flame Exposure Time: 4 seconds
(data acquisition time 60 seconds)*
Mean heat flux: 84kW/m² (+/-5%)

Clothing System A

- 2nd & 3rd degree burns = 14%
- 1st degree burns = 0.9%
- Pain = 29.8%

Outer layer – MICROGARD® FR coverall, size XL
Mid layer – Inherently FR 265g/m² thermal protective coverall, size Medium/Regular (chest 102-107cm)
Base layer – Inherently FR thermal protective long sleeve vest, size Large

Clothing System B

- Pain = 12.3%

Outer layer – MICROGARD® FR coverall, size XL
Mid layer – Roots FRA-02 350g/m² Pyrovatex FR treated cotton coverall, size UK44 regular
Base layer – 100% cotton long sleeve T-shirt size L, Denim jeans size 36" waist Regular

*MICROGARD® FR should never be worn in isolation for flame retardant protection. Always wear over the top of garments which achieve EN ISO 14116 Index 2 or above.

Note: The burn injury results are expressed by calculating the percentage burn injury based on the total area of mannequin covered by the garments under test being 100%. For these tests the head, hands and feet were therefore not included in the calculations.

Technical Support

To test MICROGARD® FR with your flame retardant workwear, contact our technical team on

+44 (0) 1482 625444

or email

technical@microgard.com

MICROCHEM® CFR

Applications

- Oil and petrochemicals
- Petroleum distribution and processing
- Utilities

MICROCHEM® CFR is a flame retardant material designed to be worn over woven thermal protective garments such as NOMEX® or PYROVATEX®, offering protection from particulates and pressurised liquid spray without compromising worker protection in the event of a flash fire*.

Features & Benefits

Protection - Flame retardant treated fabric with PVC barrier film offering wearers protection from liquid chemicals to EN Type 3 & 4

Versatile - In most applications where there is the need for protection from chemical spray without compromising wearer protection in the event of a flash fire

Optimized Body Fit - Improves wearer comfort and safety

Highly visible - Highly visible bright red colour to improve worker safety

*Must be worn over thermal protective garments, such as NOMEX® or PYROVATEX®, and never be worn next to the skin.

MICROCHEM® CFR

In high risk areas MICROCHEM® CFR is proven to protect

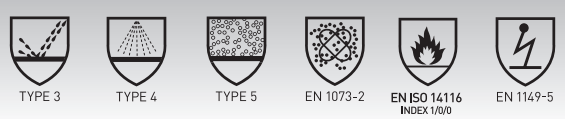
MICROCHEM® CFR offers wearers protection from liquid chemicals to EN Types 3 & 4 and peace of mind to workers in potentially explosive/flammable environments, by decreasing the risk of burn injury when worn over thermal protective workwear*

Wear over a thermal protective garment (EN ISO 14116 Index 2 or above) to provide chemical spray protection according to Types 3 and 4.

MICROCHEM® CFR Chemical Barrier Performance

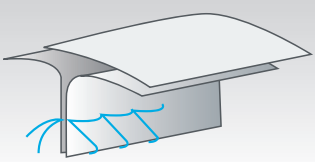
Chemical Name	ASTM F903 Penetration (mins)	ASTM F739 Permeation (mins)
Acetone	›60	12
Carbon Disulfide	›60	7
Dichloromethane	›60	4
Ethyl Acetate	›60	16
Hexane	›60	›480
Sulphuric Acid	›60	10
Tetrachloroethylene	›60	›480
Toluene	›60	6

Protection Levels & Additional Properties



Stitched & Taped Seams

Increased strength and an effective liquid & particle barrier



Model 111

Suit Features

- 2 piece hood
- Elasticated hood, wrists and ankles
- Double zip closure

Sizes: S-3XL
Colour: Red

*MICROCHEM® CFR should never be worn in isolation for flame retardant protection. Always wear over the top of garments which achieve EN ISO 14116 Index 2 or above.

MICROCHEM® CFR Technical Data

MICROCHEM® CFR is extensively tested in accordance with statutory requirements, including physical performance attributes.

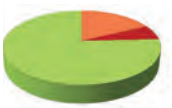
Test Method	Result	EN Class
EN 530 Abrasion (visual assessment)	>2,000 cycles	6 of 6
EN ISO 7854 Flex Cracking (visual assessment)	>15,000 <40,000	4 of 6
EN ISO 9073-4 Tear Resistance (MD)	30.2N	2 of 6
EN ISO 9073-4 Tear Resistance (CD)	45.6N	
EN ISO 13934-1 Tensile Strength (MD)	124N	2 of 6
EN ISO 13934-1 Tensile Strength (CD)	74N	
EN 863 Puncture Resistance	14N	2 of 6
EN 25978 Resistance to Blocking	No Blocking	-
EN 1149-5 Electrostatic Properties (surface resistivity)	Pass	-
EN ISO 14116 Limited Flame Spread	Index 1/0/0	-

MICROCHEM® CFR

Simulated flash fire test data

ASTM F 1930
Standard test method for evaluation of flame resistant clothing for protection against flash fire simulations using an instrumented manikin.

Body Burn Prediction
Flame Exposure Time: 3.5 seconds (data acquisition time 30 seconds)*
Mean heat flux: 2 cal/cm².sec



Clothing System A

- 3rd degree burns = 6.56%
- 2nd degree burns = 17.76%

% Total burn = 24.32%

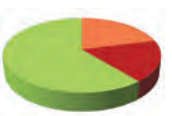
Outer layer - MICROCHEM® CFR coverall
Mid layer – Inherently FR 6.0oz/yd² thermal protective coverall
Base layer – no underwear

Clothing System B

- 3rd degree burns = 30%
- 2nd degree burns = 23%

% Total burn = 53%

Outer layer – Single use 1.9oz/yd² microporous film laminate coverall
Mid layer – Inherently FR 6.0oz/yd² thermal protective coverall
Base layer – no underwear



Clothing System C

- 3rd degree burns = 18%
- 2nd degree burns = 21%

% Total burn = 39%

Outer layer – Single use 1.0oz/yd² spunbond polypropylene coverall
Mid layer – Inherently FR 6.0oz/yd² thermal protective coverall
Base layer – no underwear

Note: The burn injury results are expressed by calculating the percentage burn injury based on the total area of mannequin covered by the garments under test being 100%. For these tests the head, hands and feet were therefore not included in the calculations.

Technical Support

To test MICROCHEM® CFR with your flame retardant workwear, contact our technical team on

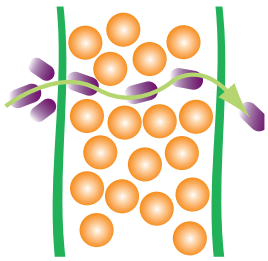
+44 (0) 1482 625444

or email

technical@microgard.com

Guidance on Chemical Permeation and Penetration

What is permeation?



Permeation is the process by which a hazardous chemical moves through a material on a molecular level. Molecules of chemical absorb into the outer surface of the material. They then diffuse across the material and are released or desorbed from the inner surface.

Measuring permeation

The resistance of a protective clothing fabric to permeation by a potentially hazardous chemical is determined by measuring the breakthrough time and the permeation rate of the chemical through the fabric.

Permeation Test Methods

There are various permeation test methods in use today. Which one to use depends on a number of factors including the country of use for the protective clothing, and the type of chemical (i.e. gas or liquid).

Permeation rate (PR)

This is the rate at which the hazardous chemical permeates through the test fabric and is expressed as a mass of hazardous chemical flowing through a fabric area per unit of time i.e. 1.0μg/cm^2/min or 1.0 millionth of a gram per square centimetre per minute.

Breakthrough Detection time (BDT)

The average time elapsed between initial contact of the chemical with the outside surface of the fabric and the detection of the chemical at the inside surface by the analytical device.

A breakthrough detection time of >480 mins and a permeation rate of "nd" (not detected) does not mean breakthrough has not occurred. It means that permeation was not detected after an observation time of eight hours. Permeation may have occurred, but at a rate less than the minimum detectable permeation rate or MDPR. MDPR can vary depending on the chemical or the analytical device/test method.

Breakthrough time (BT)

This is the average time between initial contact of the chemical with the outside surface of the fabric and the time at which the chemical is detected at the inside surface of the fabric at the permeation rate specified by the appropriate standard.

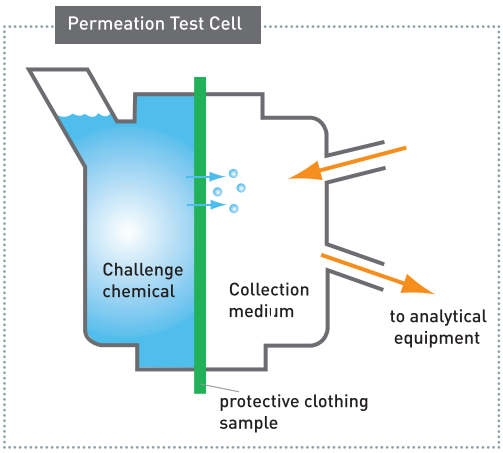
The key test methods and the normalised permeation rates required are listed below;

1) EN374-3 specifies a normalised permeation rate of 1.0μg/cm^2/min, with the lowest BT to be recorded.
2) ISO 6529: 2001 specifies BT to be reported at the normalised permeation rate of 1.0μg/cm^2/min or 0.1μg/cm^2/min, with the mean BT to be recorded.
3) ASTM F739 specifies results to be recorded as breakthrough time (BT) at 0.1μg/cm^2/min.

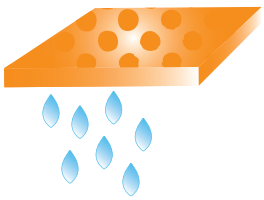
In Europe (as specified in EN 14325:2004) either EN374-3 or EN ISO 6529: 2001 can be used for permeation testing, and the normalised breakthrough time is recorded at the permeation rate of 1.0μg/cm^2/min.

The resistance of MICROCHEM® to permeation by a hazardous chemical is determined by measuring the breakthrough time and permeation rate of the chemical through the fabric. Permeation tests are performed by independent, accredited laboratories in accordance with EN ISO 6529, EN374-3 or ASTM F739.

For further information on MICROCHEM® resistance to permeation see pages 57-62 or visit **www.microgard.com**



What is penetration?



Penetration is a process by which a chemical flows through holes (i.e. pores) or essential openings in a material on a non-molecular level.

Penetration Test Methods

There are various penetration test methods in use today. Which one to use depends on a number of factors, including the country of use for the protective clothing and the task for which the chemical protective clothing will be used. Recognised penetration test methods include:

EN ISO 6530 "Gutter Test"

Test method for the measurement of indices of penetration, absorption and repellence for protective clothing materials against liquid chemicals, mainly chemicals of low volatility. Specified in EN 13034 for "Type 6" chemical protective clothing, this test involves 10ml of liquid chemical being applied in 10s (+/-1s) onto the surface of a protective clothing material, which is laid in an inclined gutter at an angle of 45°. Results are taken 1 minute after initial exposure, simulating a light splash of liquid chemicals, and expressed in percentages (%)

Example of MICROGARD® Fabrics Resistance to Penetration in accordance with EN ISO 6530			
Chemical	CAS Number	MICROGARD® 1500 PLUS	
		Repellence (%)	Penetration (%)
Sulphuric Acid (30wt%)	7664-93-9	97.1	0.1
Sodium Hydroxide (10wt%)	1310-72-2	95.2	0

*Test results for white fabric only. For test results on other colours and chemicals tested visit **www.microgard.com** or contact the MICROGARD Technical Team, e-mail **technical@microgard.com**

ISO 13994 "Penetration under Pressure Test"

ISO 13994 describes a series of test methods that enable the determination of the resistance of materials used in protective clothing to visible penetration under the conditions of continuous liquid contact and pressure. Protective clothing "pass/fail" determinations are based on visual detection of liquid penetration. As specified in ISO 16602 for "Type 4" spray tight chemical protective clothing, ISO 13994 test procedure D involves the continuous exposure of a material to a liquid chemical with pressure maintained at 0kPa for 5 minutes. This is followed by increasing the pressure in increments of 3.5kPa every 15s until failure is observed or a maximum of 35kPa is reached.

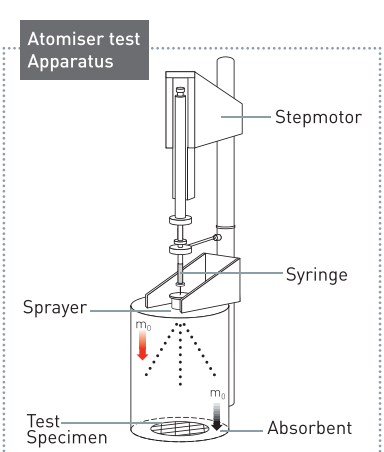
Example of MICROGARD® 2000 Resistance to Penetration Under Pressure ISO 13994, Procedure D		
Chemical	CAS Number	Result (kPa)
Sulphuric Acid (96wt%)	7664-93-9	>14
Sodium Hydroxide (30wt%)	1310-72-2	>14
Methanol	67-56-1	10.5
Toluene	108-88-3	7

ASTM F903 is the US equivalent of ISO 13994 procedure C1. Specified in NFPA 1992 (Liquid tight protective clothing for emergency responders), this involves the continuous exposure of a material to a liquid chemical with pressure maintained at 0 psi for 5 min followed by 2 psi [13.8 kPa] for 1 min followed by 0 psi for 54 min. For details of MICROGARD® performance in accordance with this method please contact the Microgard Technical Team, e-mail **technical@microgard.com**

EN 14786 "Atomiser Test"

Test method to determine the resistance of protective clothing materials against penetration by atomised liquid chemicals, emulsions and dispersions. Specified in DIN 32781 and ISO/FDIS 27065 for protective clothing worn by operators applying liquid pesticides, this test involves a specimen being contaminated by a small quantity of liquid chemical, emulsion or dispersion.
After 30 minute exposure the specimen is analysed using a suitable technique (e.g.high pressure liquid chromatography (HPLC)) to measure the quantity of liquid which penetrated. The penetration of a protective clothing material is defined as the ratio of the mass of chemical penetrated to the mass of chemical applied.

MICROGARD® 2000 performance when tested according to EN 14786 is available on page 23 and online at **www.microgard.com**



MICROGARD® and MICROCHEM® Chemical Permeation Data

Versatile chemical protection starts with MICROCHEM®

Working with chemicals, you and your colleagues face hazards every day. Everything from an accidental spill or splash exposure to industrial chemicals, warfare agents and radioactive processes.

The resistance of MICROCHEM® to permeation by a hazardous chemical is determined by measuring the breakthrough time and permeation rate of the chemical through the fabric. Permeation tests are carried out by independent, accredited laboratories in accordance with EN ISO 6529, EN369, EN374-3 and ASTM F739.

For more information on test methods or to discuss permeation testing of your specific chemical, or chemical mixture, please visit www.microgard.com, contact the technical team on +44 (0) 1482 625444 or email technical@microgard.com

EN Class/ CP Class	Normalised breakthrough times	Time to cumulative permeation of 150µg/cm²
0	Immediate (no class)	Immediate (no class)
1	>10	≥10
2	>30	≥30
3	>60	≥60
4	>120	≥120
5	>240	≥240
6	>480	≥480

NOW AVAILABLE **CHEMICAL PERMEATION DATA**

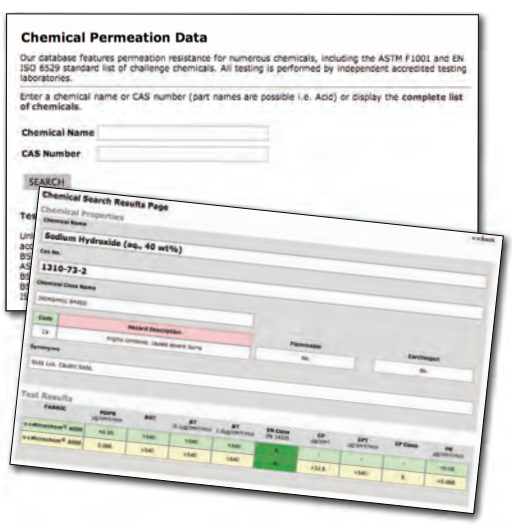
SEARCH BY...
>Chemical Name >CAS No.

The Microgard chemical database is now available online and features permeation resistance for a wide range of chemicals, including the ASTM F1001 and EN ISO 6529 recommended list of challenge chemicals. All testing is performed by independent, accredited testing laboratories.

Key features of the chemical database include

- Instant access to over 200 chemicals with permeation data for MICROCHEM® 3000, 4000 & 5000.
- Easy to use navigation
- Allows you to compare MICROCHEM® fabric performance

For up to the minute chemical permeation data visit: www.microgard.com



ACRONYMS KEY

—	Not Reported
MDPR	Minimum detectable permeation rate
BDT	Breakthrough detection time (first appearance after the MDPR)
BT 0.1	Normalised breakthrough detection time at 0.1µg/cm²/min
BT 1.0	Normalised breakthrough detection time at 1.0µg/cm²/min
EN Class	Based on the mean BT (or lowest if the mean is not available) at 1.0µg/cm2/min according to ISO 6529
CP	Cumulative Permeation for the test duration. If no permeation detected, then often reported as <(MDPR x 480)
CPT	Time to cumulative permeation of 150µg/cm²
CP Class	Based on the time to cumulative permeation of 150µg/cm², in accordance with ISO 16602
PR	Steady state permeation rate. If not reached then maximum permeation rate for the duration of the test is reported. If no permeation is detected then reported as <MDPR

Safety Note: All chemical tests and breakthrough times given relate to laboratory tests on fabrics only. Seams and closures may have lower breakthrough times, particularly when worn or damaged. It is the user's responsibility to select an appropriate garment, gloves, boots and other equipment for the particular use. The user shall be responsible for determining how long the garment can be worn for the particular use and whether it can be suitably cleaned for re-use. Microgard Limited does not give any warranties or make any representations about its garments other than those contained in the official literature supplied by Microgard Limited with each garment.

MICROGARD® 2500 Permeation Data

Chemical Name	CAS Number	MDPR µg/cm²/min	BDT	BT 0.1 µg/cm²/min	BT 1.0 µg/cm²/min	EN Class EN 14325	CP µg/cm²	CPT µg/cm²/min	CP Class	PR µg/cm²/min
Acetone	67-64-1	-	Imm	Imm	Imm	0	-	-	-	High
Acetonitrile	75-05-8	-	Imm	Imm	Imm	0	-	-	-	High
Carbon Disulphide	75-15-0	-	-	5	45	2	181.4	>360	5	-
Dichloromethane (99.99 wt%)	75-09-2	-	Imm	Imm	Imm	0	-	-	-	High
Diethylamine (99.9 wt%)	109-89-7	-	Imm	Imm	Imm	0	-	-	-	High
Dimethylformamide-N,N (99.95 wt%)	68-12-2	-	Imm	Imm	Imm	0	-	-	-	High
Ethyl Acetate (99.98 wt%)	141-78-6	-	Imm	Imm	Imm	0	-	-	-	High
Hexane, n-	110-54-3	-	Imm	Imm	Imm	0	-	-	-	High
Hydrochloric Acid (36-37 wt%)	7647-01-0	≤0.05	Imm	Imm	Imm	0	-	-	-	-
Methanol (> 99.5 wt%)	67-56-1	-	Imm	Imm	Imm	0	-	-	-	High
Nitrobenzene (99.99 wt%)	98-95-3	-	Imm	Imm	Imm	0	5639	<30	1	-
Sodium Hydroxide (aq., 50wt%)	1310-73-2	-	>480	>480	>480	6	-	-	-	<0.1
Sodium Hypochlorite Solution (aq., 5 wt% available chlorine)	7681-52-9	0.041	>480	>480	>480	6	<19.7	>480	6	<0.041
Sulphuric Acid (95-96 wt%)	7664-93-9	-	>480	>480	>480	6	6.1	>480	6	-
Tetrachloroethylene (99.9 wt%)	127-18-4	-	Imm	Imm	Imm	0	-	-	-	High
Tetrahydrofuran	109-99-9	-	Imm	Imm	Imm	0	-	-	-	High
Toluene (99.99 wt%)	108-88-3	-	Imm	Imm	Imm	0	-	-	-	High

MICROCHEM® 3000 Permeation Data

Chemical Name	CAS Number	MDPR µg/cm²/min	BDT	BT 0.1 µg/cm²/min	BT 1.0 µg/cm²/min	EN Class EN 14325	CP µg/cm²	CPT µg/cm²/min	CP Class	PR µg/cm²/min
Acetic Acid, Glacial (99.88wt%)	64-19-7	≤0.05	-	-	>540	6	-	-	-	<1.0
Acetic Anhydride	108-24-7	≤0.05	-	-	>540	6	-	-	-	<1.0
Acetone	67-64-1	≤0.08	4	4	30	1	-	-	-	-
Acetonitrile	75-05-8	≤0.08	Imm	Imm	7	0	-	-	-	-
Acrylamide	79-06-1	-	-	-	>480	6	-	-	-	<1.0
Acrylic Acid	79-10-7	-	-	-	>480	6	-	-	-	<1.0
Ammonia Gas (>99.98 wt%) 1 atmos.	7664-41-7	≤0.05	Imm	1	3	0	-	-	-	-
Ammonium Hydrogen Fluoride	1341-49-7	-	-	-	>480	6	-	-	-	<1.0
Aniline	62-53-3	-	-	-	>480	6	-	-	-	<1.0
Benlate®	17804-35-2	-	-	-	>480	6	-	-	-	<1.0
Benzene	71-43-2	-	-	-	2	0	-	-	-	-
Benzene Sulphonyl Chloride (99%)	98-09-9	-	-	-	>480	6	-	-	-	<1.0
Benzyl Chloride (99wt%)	100-44-7	-	-	-	16	1	-	-	-	-
Bromine	7726-95-6	-	-	-	2	0	-	-	-	-
Butanol N-	71-36-3	-	-	-	>480	6	-	-	-	<1.0
Butyl Acrylate N-	141-32-2	-	-	-	16	1	-	-	-	-
Butyl methyl ether T-	1634-04-4	<0.1	-	-	1	0	-	-	-	-
Carbon Disulphide	75-15-0	-	-	Imm	Imm	0	-	-	-	-
Chlorine (>99.8wt%) Gas, 1 atmos.	7782-50-5	≤0.05	9	9	10	1	-	-	-	-
Chlorine, liquid (saturated 99.9+%)	7782-50-5	-	-	-	2	0	-	-	-	-
Chloroacetic Acid (79wt%)	79-11-8	0.076	>480	>480	>480	6	<37	>480	6	<0.076
Chloroacetyl Chloride	79-04-9	-	-	-	36	2	-	-	-	-
Chloroethanol 2- (99%)	107-07-3	-	-	-	>480	6	-	-	-	<1.0
Chloroform	67-66-3	-	-	-	Imm	0	-	-	-	-
Chromium trioxide (50 wt%)	1333-82-0	0.09	>480	>480	>480	6	<43.2	>480	6	<0.09
Cresols, mixed	1319-77-3	<1.0	-	-	>480	6	-	-	-	<1.0
Dichloroethane 1,2	107-06-2	-	-	-	4	0	-	-	-	-
Dichloroethylene trans 1,2	156-60-5	-	-	-	2	0	-	-	-	-
Dichloromethane (99.99 wt%)	75-09-2	≤0.08	Imm	Imm	Imm	0	-	-	-	-
Diesel	68334-30-5	-	-	-	15	1	-	-	-	-
Diethyl Ether	60-29-7	-	-	-	Imm	0	-	-	-	-
Diethylamine (99.9 wt%)	109-89-7	≤0.08	Imm	Imm	Imm	0	-	-	-	-
Difluoroaniline 2,4	367-25-9	-	-	-	>480	6	-	-	-	<1.0
(Dimethyl Amino) Pyridine 2- (99+%)	5683-33-0	-	-	-	57	2	-	-	-	-
Dimethyl Sulphate	77-78-1	-	-	-	>480	6	-	-	-	<1.0
Dimethylamine (40 wt%)	124-40-3	-	-	-	>480	6	-	-	-	<1.0
Dimethylformamide N, N (>99.8 wt%)	68-12-2	-	-	-	>480	6	-	-	-	<1.0
Epichlorohydrin (99%)	106-89-8	-	-	-	>480	6	-	-	-	<1.0
Ethanolamine (99.8 wt%)	141-43-5	0.07	>480	>480	>480	6	<33.6	>480	6	<0.07
Ethyl Acetate (99.98 wt%)	141-78-6	≤0.08	Imm	Imm	Imm	0	-	-	-	-
Ethylene Glycol	107-21-1	-	-	-	>480	6	-	-	-	<1.0
Ethylhexanoic Acid 2,	149-57-5	-	-	-	>480	6	-	-	-	<1.0

Important: Breakthrough time alone is not sufficient to determine how long a garment may be worn once the garment has been contaminated. Safe wear time may be longer or shorter depending on numerous other factors, including the toxicity, exposure conditions and permeation behaviour of the substance.

MICROCHEM® Chemical Permeation Data

MICROCHEM® 3000 Permeation Data

Chemical Name	CAS Number	MDPR µg/cm²/min	BDT	BT 0,1 µg/cm²/min	BT 1,0 µg/cm²/min	EN Class EN 14325	CP µg/cm²	CPT µg/cm²/min	CP Class	PR µg/cm²/min
Farm Fluid S	N/A	<1.0	-	-	>360	5	-	-	-	<1.0
Formaldehyde 37%	50-00-0	-	-	-	>480	6	-	-	-	<1.0
Formic Acid 90%	64-18-6	-	-	-	>480	6	-	-	-	<1.0
Furfural	98-01-1	-	-	-	>540	6	-	-	-	<1.0
Heptane, n- (99.8 wt%)	142-82-5	≤0.08	Imm	Imm	Imm	0	-	-	-	-
Hexamethylene Diamine 1,6-	124-09-4	-			>480	6				<1.0
Hexane, n-	110-54-3	0.09	Imm	Imm	Imm	0	-	-	-	-
Hydrazine monohydrate 98% (containing Hydrazine, 64-65 wt%)	7803-57-8	<1.0	>540	-	>540	6	-	-	-	<1.0
Hydrobromic Acid	10035-10-6	-	-	-	>480	6	-	-	-	<1.0
Hydrochloric Acid (36-37 wt%)	7647-01-0	0.05	14	193	>540	6	-	>540	6	<1.0
Hydrofluoric Acid (62-64% in urea)	7664-39-3	-	-	-	41	2	-	-	-	-
Hydrogen Chloride (> 99.0 wt%) Gas, 1 atmos	7647-01-0	≤0.05	Imm	Imm	8	0	-	-	-	-
Hydrogen Peroxide 35%	7722-84-1	-	-	-	>480	6	-	-	-	<1.0
Iodine	7553-56-2	-	-	-	>540	6	-	-	-	<1.0
Isopropyl Alcohol	67-63-0	-	-	-	>480	6	-	-	-	<1.0
Mercury	7439-97-6	0.05	>480	>480	>480	6	<24.0	>480	6	<0.05
Methanol (> 99.5 wt%)	67-56-1	0.05	imm	<1	>480	6	-	364	5	0.59
Methoxyacetic Acid 2-	625-45-6	-	-	-	>540	6	-	-	-	<1.0
Methyl Iodide	74-88-4	-	-	-	>480	6	-	-	-	<1.0
Methyl-2- Pyrrolidone,N-	872-50-4	-	-	-	>480	6	-	-	-	<1.0
Nitric Acid Conc (70%)	7697-37-2	-	-	-	>480	6	-	-	-	<1.0
Nitrobenzene (99.99 wt%)	98-95-3	-	-	-	>480	6	-	-	-	<1.0
Octave	75747-77-2	-	-	-	>480	6	-	-	-	<1.0
Paraffin	92062-35-6	-	-	-	25	1	-	-	-	-
Perchloric Acid (30 wt%)	7601-90-3	≤0.05	>540	>540	>540	6	-	-	-	≤0.05
Petrol (unleaded)	8006-61-9	-	-	-	2	0	-	-	-	-
Phenol ("liquified" approx. 90wt% with water)	108-95-2	0.021	>480	>480	>480	6	<10.0	>480	6	<0.021
Phenol Liquid at 45°C	108-95-2	-	-	-	>480	6	-	-	-	<1.0
Phenol/Benzyl Alcohol 25/5	108-95-2 (in 100-51-6)	-	-	-	>480	6	-	-	-	<1.0
Phosphoric Acid 85+%	7664-38-2	-	-	-	>480	6	-	-	-	<1.0
Phosphoric Pentachloride	10026-13-8	-	-	-	>480	6	-	-	-	<1.0
Phosphorus Oxychloride	10025-87-3	-	-	-	9	0	-	-	-	-
Phthalic Anhydride (135°C)	85-44-9	-	-	-	>480	6	-	-	-	<1.0
Pivalic Acid	75-98-9	-	-	-	>480	6	-	-	-	<1.0
Polyethylene Glycol 200	25322-68-3	-	-	-	>480	6	-	-	-	<1.0
Propionaldehyde	123-38-6	-	-	-	70	3	-	-	-	-
Reglone	85-00-7	-	-	-	>480	6	-	-	-	<1.0
Ripcord	52315-07-8	-	-	-	>480	6	-	-	-	<1.0
Round-up	38641-94-0	-	-	-	>480	6	-	-	-	<1.0
Sodium Bisulphate (40%)	7681-38-1	-		-	>480	6	-	-	-	<1.0
Sodium Chloride	7647-14-5	-	-	-	>480	6	-	-	-	<1.0
Sodium Cyanide (satd soln)	143-33-9	-	-	-	>480	6	-	-	-	<1.0
Sodium Fluoride (satd)	7681-49-4	-	-	-	>480	6	-	-	-	<1.0
Sodium Hydroxide (aq., 40 wt%)	1310-73-2	0.068	>540	>540	>540	6	<32.6	>540	6	<0.068
Sodium Hydroxide (aq., 50wt%)	1310-73-2	0.068	>540	>540	>540	6	<33	>540	6	<0.068
Sodium Hydroxide (aq., 50wt%) at 80°C	1310-73-2	0.031	>480	>480	>480	6	<26.0	>480	6	<0.031
Sodium Hypochlorite Solution (aq., 14.5 wt% available chlorine)	7681-52-9	0.041	>480	>480	>480	6	<19.7	>480	6	<0.041
Sodium Hypochlorite Solution (aq., 5 wt% available chlorine)	7681-52-9	0.041	>480	>480	>480	6	<19.7	>480	6	<0.041
Sodium Methylate 30%	124-41-4	-	-	-	>480	6	-	-	-	<1.0
Sodium Silicofluoride (sat'd)	16893-85-9	-	-	-	>480	6	-	-	-	<1.0
Styrene	100-42-5	-	-	-	2	0	-	-	-	-
Sulphuric Acid (95-96 wt%)	7664-93-9	0.051	>540	>540	>540	6	<24.5	>540	6	<0.051
Sulphuric Acid (aq., 50wt%) at 80°C	7664-93-9	0.021	>480	>480	>480	6	<10.0	>480	6	<0.021
Sulphuric Acid 98+%	7664-93-9	<0.1	-	-	>480	6	-	-	-	<1.0
SUVA HCFC-123 (1,1 Dichloro-2,2,2 Trifluoroethane)	306-83-2	-	-	-	251	5	-	-	-	-
Tetrahydrofuran	109-99-9	≤0.08	Imm	Imm	Imm	0	-	-	-	-
Thionyl Chloride	7719-09-07	-	-	-	Imm	0	-	-	-	-
Thiourea Dioxide (sat'd)	1758-73-2	-	-	-	>480	6	-	-	-	<1.0
Toluene (99.99 wt%)	108-88-3	≤0.08	Imm	Imm	Imm	0	-	-	-	-
Toluene 2,4 Diisocyanate	584-84-9	-	-	-	>480	6	-	-	-	<1.0
Toluidine o	95-53-4	-	-	-	>480	6	-	-	-	<1.0
Trichloroacetic Acid 98%	76-03-9	-	-	-	>480	6	-	-	-	<1.0
Trichloroethylene	79-01-6	-	-	-	2	0	-	-	-	
Triethylamine	121-44-8	-	-	-	Imm	0	-	-	-	
Trifluoroacetic Acid (99.0wt%)	76-05-1	-	-	-	>540	6	-	-	-	<1.0
Vinyl Acrylate	2177-18-6	-	-	-	3	0	-	-	-	-
Xylene m	1330-20-7	-	-	-	2	0	-	-	-	
Zinc Bromide (sat'd soln)	7699-45-8	-	-	-	>480	6	-	-	-	<1.0

MICROCHEM® 4000 Permeation Data

Chemical Name	CAS Number	MDPR µg/cm²/min	BDT	BT 0.1 µg/cm²/min	BT 1.0 µg/cm²/min	EN Class EN 14325	CP µg/cm²	CPT µg/cm²/min	CP Class	PR µg/cm²/min
Acetic Acid, Glacial (99.88wt%)	64-19-7	≤0.05	-	-	>540	6	-	-	-	<1.0
Acetic Anhydride	108-24-7	≤0.05	-	-	>540	6	-	-	-	<1.0
Acetone	67-64-1	≤0.08	43	127	>540	6	-	-	-	<1.0
Acetonitrile	75-05-8	≤0.08	>540	>540	>540	6	-	-	-	<0.08
Acrylamide	79-06-1	-	-	-	>480	6	-	-	-	<1.0
Acrylic Acid	79-10-7	-	-	-	>480	6	-	-	-	<1.0
Acrylonitrile	107-13-1	-	-	-	>480	6	-	-	-	<1.0
Ammonia Gas (>99.98 wt%) 1 atmos.	7664-41-7	≤0.05	5	18	60	2	-	-	-	-
Ammonia Liquid (99%), Liquified at -34°C	7664-41-7	0.01	Imm	>480	>480	6	-	>480	6	0.02
Ammonium Hydrogen Fluoride	1341-49-7	-	-	-	>480	6	-	-	-	<1.0
Ammonium Hydroxide (28%)	1336-21-6	-	-	-	>480	6	-	-	-	<1.0
Amyl acetate	628-63-7	-	-	-	>480	6	-	-	-	<1.0
Aniline	62-53-3	-	-	-	>480	6	-	-	-	<1.0
Benlate®	17804-35-2	-	-	-	>480	6	-	-	-	<1.0
Benzene	71-43-2	<0.05	21	157	>540	6	-	-	-	<0.25
Benzyl Chloride (99wt%)	100-44-7	-	-	-	>480	6	-	-	-	<1.0
Bis(3-aminopropyl)amine	56-18-8	<1.0	-	-	>480	6	-	-	-	<1.0
Bromine	7726-95-6	-	-	-	10	0	-	-	-	-
Butadiene 1,3- (>99.0 wt%)	106-99-0	0.011	>540	>540	>540	6	<5.4	>540	6	<0.011
Butanol N-	71-36-3	-	-	-	>480	6	-	-	-	<1.0
Butyl Acrylate N-	141-32-2	-	-	-	>480	6	-	-	-	<1.0
Butyl methyl ether T-	1634-04-4	<0.1	-	-	>480	6	-	-	-	<1.0
Carbon Disulphide	75-15-0	-	Imm	Imm	2	0	-	-	-	-
Chlorine (>99.8wt%) Gas, 1 atmos.	7782-50-5	0.020	196	402	>540	6	24	>540	6	0.11
Chlorine, liquid (saturated 99.9+%)	7782-50-5	-	-	-	>480	6	-	-	-	<1.0
Chloro-5-(chloromethyl)pyridine 2-	70258-18-3	0.5	-	-	>540	6	-	-	-	<1.0
Chloroacetic Acid (79wt%)	79-11-8	-	-	-	>480	6	-	-	-	<1.0
Chloroacetic Acid Ethyl Ester (99wt%)	105-39-5	-	-	-	>480	6	-	-	-	<1.0
Chloroacetyl Chloride	79-04-9	-	-	-	>480	6	-	-	-	<1.0
Chloroacrylonitrile 2-	920-37-6	<0.1	-	-	>480	6	-	-	-	<1.0
Chloroaniline 4- (75°C)	106-47-8	-	-	-	>480	6	-	-	-	<1.0
Chlorobenzene	108-90-7	-	-	-	>480	6	-	-	-	<1.0
Chloroform	67-66-3	-	-	-	11	1	-	-	-	-
Chloromethane (99.9 wt%)	74-87-3	0.023	>540	>540	>540	6	<11	>540	6	<0.023
Chlorosulphonic Acid	7790-94-5	-	-	-	69	3	-	-	-	-
Chlorotoluene o	95-49-8	-	-	-	>480	6	-	-	-	<1.0
Chlorotoluene p	106-43-4	-	-	-	>480	6	-	-	-	<1.0
Chromium trioxide (50 wt%)	1333-82-0	0.09	>480	>480	>480	6	<43.2	>480	6	<0.09
Cresol-m in Water Solution (20g/l)	108-39-4	<0.1	-	-	>480	6	-	-	-	<1.0
Cresol-o in Water Solution (20g/l)	95-48-7	<0.1	-	-	>480	6	-	-	-	<1.0
Cresol-p in Water Solution (20g/l)	106-44-5	<0.1	-	-	>480	6	-	-	-	<1.0
Cumene (99.9wt%)	98-82-8	0.016	>540	>540	>540	6	<7.7	>540	6	<0.016
Cyclohexylamine (>99.5% wt%)	108-91-8	0.05	49	55	82	3	-	-	-	-
Di (aminopropyl) Amine (Diamine)	56-18-8	<1.0	-	-	>480	6	-	-	-	<1.0
Di-tert-butyl peroxide (98 wt%)	110-05-4	<0.05	>540	>540	>540	6	-	-	-	<0.05
Dichloro-4-(trifluoromethyl)benzene 1,2	328-84-7	-	-	-	>480	6	-	-	-	<1.0
Dichloroacetone 1,1	513-88-2	-	-	-	>480	6	-	-	-	<1.0
Dichloroacetone 1,3	534-07-6	-	-	-	>480	6	-	-	-	<1.0
Dichlorodiethylether 2,2-	111-44-4	-	-	-	>540	6	-	-	-	<1.0
Dichloroethane 1,2	107-06-2	-	-	-	>480	6	-	-	-	<1.0
Dichloromethane (99.99 wt%)	75-09-2	-	-	-	9	0	-	93	3	2.94
Dichloromethysilane (>99 wt%)	75-54-7	-	-	-	20	1	-	-	-	-
Diesel	68334-30-5	-	-	-	>480	6	-	-	-	<1.0
Diethanolamine (99wt%)	111-42-2	-	-	-	>480	6	-	-	-	<1.0
Diethyl Ether	60-29-7	-	-	-	2	0	-	-	-	-
Diethylamine (99.9 wt%)	109-89-7	0.019	Imm	Imm	Imm	0	-	8	0	90.1
Diethylenetriamine	111-40-0	-	-	-	>480	6	-	-	-	<1.0
Difluoroaniline 2,4	367-25-9	-	-	-	>480	6	-	-	-	<1.0
Dimethyl Dicarbonate	4525-33-1	<1.0	-	-	>540	6	-	-	-	<1.0
Dimethyl Sulphate	77-78-1	-	-	-	>480	6	-	-	-	<1.0
Dimethyl Sulphoxide (99+%)	67-68-5	-	-	-	>480	6	-	-	-	<1.0
Dimethylacetamide-N,N (liquid)	127-19-5	-	-	-	>480	6	-	-	-	<1.0
Dimethylamine (40 wt%)	124-40-3	-	-	-	>480	6	-	-	-	<1.0
Dimethylformamide N, N (>99.8 wt%)	68-12-2	<0.05	>540	>540	>540	6	-	-	-	<0.05
Dimethylformamide-N,N (99.95 wt%)	68-12-2	0.0094	>540	>540	>540	6	<4.5	>540	6	<0.0094
Dipropylene Glycol Methyl Ether	34590-94-8	-	-	-	>480	6	-	-	-	<1.0
Epichlorohydrin (99%)	106-89-8	-	-	-	>480	6	-	-	-	<1.0
Ethanol	64-17-5	<0.1	>540	>540	>540	6	-	-	-	<0.1

Important: Breakthrough time alone is not sufficient to determine how long a garment may be worn once the garment has been contaminated. Safe wear time may be longer or shorter depending on numerous other factors, including the toxicity, exposure conditions and permeation behaviour of the substance.

MICROCHEM® Chemical Permeation Data

MICROCHEM® 4000 Permeation Data

Chemical Name	CAS Number	MDPR µg/cm²/min	BDT	BT 0,1 µg/cm²/min	BT 1,0 µg/cm²/min	EN Class EN 14325	CP µg/cm²	CPT µg/cm²/min	CP Class	PR µg/cm²/min
Ethanolamine (98wt%)	141-43-5	-	-	-	>480	6	-	-	-	<1.0
Ethion	563-12-2	<1.0	-	-	>540	6	-	-	-	<1.0
Ethyl Acetate (99.98 wt%)	141-78-6	≤0.08	28	40	>540	6	-	-	-	<1.0
Ethyl Benzene	100-41-4	-	-	-	>480	6	-	-	-	<1.0
Ethyl Parathion	56-38-2	<1.0	-	-	>480	6	-	-	-	<1.0
Ethylene Diamine	107-15-3	-	-	-	>480	6	-	-	-	<1.0
Ethylene Dibromide	106-93-4	-	-	-	>480	6	-	-	-	<1.0
Ethylene Glycol	107-21-1	-	-	-	>480	6	-	-	-	<1.0
Ethylene Oxide (gas at ca. 1 Atmos)	75-21-8	<0.1	>540	>540	>540	6	-	-	-	<0.1
Ethylhexanoic Acid 2,	149-57-5	-	-	-	>480	6	-	-	-	<1.0
Fluorobenzene	462-06-6	-	-	-	105	3	-	-	-	-
Formaldehyde 37%	50-00-0	-	-	-	>480	6	-	-	-	<1.0
Formic Acid 90%	64-18-6	-	-	-	>480	6	-	-	-	<1.0
Furfural	98-01-1	-	-	-	>480	6	-	-	-	<1.0
Fyfanon	121-75-5	<1.0	-	-	>480	6	-	-	-	<1.0
Gas Oil (SHELL "Heizoel HVS 300 CST")	68476-33-5	-	-	-	>540	6	-	-	-	<1.0
Heptane, n- (99.8 wt%)	142-82-5	≤0.08	49	73	>540	6	-	-	-	0.12
Hexachloro-1, 3-butadiene	87-68-3	0.09	>540	>540	>540	6	-	-	-	<0.09
Hexamethyl Disilazane	999-97-3	-	-	-	>480	6	-	-	-	<1.0
Hexane, n-	110-54-3	0.09	>540	>540	>540	6	-	-	-	<0.09
Hydrazine monohydrate 98% (containing Hydrazine, 64-65 wt%)	7803-57-8	<1.0	>540	-	>540	6	-	-	-	<1.0
Hydrobromic Acid	10035-10-6	<0.1	>540	>540	>540	6	-	-	-	<0.1
Hydrochloric Acid (36-37 wt%)	7647-01-0	0.01	-	-	>480	6	-	-	-	<1.0
Hydrofluoric Acid (71-75 wt%)	7664-39-3	<0.05	8	175	>540	6	-	-	-	0.89
Hydrofluoric Acid 37%	7664-39-3	<0.1	-	-	>480	6	-	-	-	<1.0
Hydrofluorosilicic acid	16961-83-4	0.04	>480	>480	>480	6	<19.2	>480	6	<0.04
Hydrogen Chloride (> 99.0 wt%) Gas, 1 atmos	7647-01-0	≤0.05	8	125	>540	6	-	-	-	<1.0
Hydrogen Fluoride (99%), Liquified at 17°C	7664-39-3	0.01	90	110	120	4	-	375	5	1.82
Hydrogen Fluoride (anhydrous) Gas	7664-39-3	0.001	-	-	42	2	-	-	-	-
Hydrogen Peroxide 35%	7722-84-1	-	-	-	>480	6	-	-	-	<1.0
Hydrogen Sulphide (>99wt%)	7783-06-4	0.04	>540	>540	>540	6	-	-	-	<0.04
Isopropyl Alcohol	67-63-0	-	-	-	>480	6	-	-	-	<1.0
Maleic Anhydride	108-31-6	-	-	-	>480	6	-	-	-	<1.0
Mercury	7439-97-6	0.05	>480	>480	>480	6	<24.0	>480	6	<0.05
Methanesulphonyl Chloride (99.8 wt%)	124-63-0	0.04	>480	>480	>480	6	<19.2	>480	6	<0.04
Methanol (> 99.5 wt%)	67-56-1	≤0.08	21	>540	>540	6	-	-	-	<0.1
Methyl Chloride	74-87-3	-	-	-	>480	6	-	-	-	<1.0
Methyl Chloroformate	79-22-1	<0.5	-	-	>540	6	-	-	-	<1.0
Methyl Ethyl Ketone	78-93-3	<0.1	9	53	>540	6	-	-	-	<1.0
Methyl methacrylate (>99.0 wt%)	80-62-6	<0.05	>540	>540	>540	6	-	-	-	<0.05
Methyl Parathion	298-00-0	<1.0	-	-	>480	6	-	-	-	<1.0
Methyl-2- Pyrrolidone,N-	872-50-4	0.05	-	-	>480	6	-	-	-	<1.0
Nicotine (>99.0 wt%)	54-11-5	0.6	>480	-	>480	6	<288	>250	5	<0.6
Nitric Acid (≥ 99.5 %)	7697-37-2	<0.06	>540	>540	>540	6	-	-	-	<0.06
Nitric Acid Conc (70%)	7697-37-2	<0.05	>540	>540	>540	6	-	-	-	<0.05
Nitrobenzene (99.99 wt%)	98-95-3	0.024	>540	>540	>540	6	<11	>540	6	<0.024
Nitrochlorobenzene-P 88°C	100-00-5	<0.5	-	-	<480	6	-	-	-	<1.0
Paraffin	92062-35-6	-	-	-	>480	6	-	-	-	-
Perchloroethylene	127-18-4	-	-	-	>480	6	-	-	-	<1.0
Petrol (unleaded)	8006-61-9	-	-	-	>480	6	-	-	-	<1.0
Phenol ("liquified" approx. 90wt% with water)	108-95-2	<0.1	>540	>540	>540	6	-	-	-	<0.1
Phenol Liquid at 45°C	108-95-2	-	-	-	>480	6	-	-	-	-
Phenol/Benzyl Alcohol 25/5	108-95-2 (in 100-51-6)	-	-	-	>480	6	-	-	-	<1.0
Phosgene Gas	75-44-5	0.05	-	-	387	5	-	-	-	-
Phosphoric Acid 85+%	7664-38-2	-	-	-	>480	6	-	-	-	<1.0
Phosphoric Pentachloride	10026-13-8	-	-	-	>480	6	-	-	-	<1.0
Phosphorus Trichloride (99wt%)	7719-12-2	-	-	-	>540	6	-	-	-	<1.0
Pivalic Acid	75-98-9	-	-	-	>480	6	-	-	-	<1.0
Polyethylene Glycol 200	25322-68-3	-	-	-	>480	6	-	-	-	<1.0
Propionaldehyde	123-38-6	-	-	-	>480	6	-	-	-	<1.0
Propionic Acid	79-09-4	-	-	-	>480	6	-	-	-	<1.0
Propionitrile	107-12-0	-	-	-	>480	6	-	-	-	<1.0
Propylene Oxide 99%	75-56-9	<0.05	3	3	17	1	-	-	-	-
Quinoline (98 wt%)	91-22-5	0.08	>480	>480	>480	6	<38.4	>480	6	<0.08
Reglone	85-00-7	-	-	-	>480	6	-	-	-	<1.0
Ripcord	52315-07-8	-	-	-	>480	6	-	-	-	<1.0
Round-up	38641-94-0	-	-	-	>480	6	-	-	-	<1.0
Sodium Chloride	7647-14-5	-	-	-	>480	6	-	-	-	<1.0
Sodium Cyanide (satd soln)	143-33-9	-	-	-	>480	6	-	-	-	<1.0
Sodium Fluoride (satd)	7681-49-4	-	-	-	>480	6	-	-	-	<1.0
Sodium Hydroxide (aq., 40 wt%)	1310-73-2	≤0.05	>540	>540	>540	6	-	-	-	<0.05
Sodium Hydroxide (aq., 50wt%)	1310-73-2	0.068	>540	>540	>540	6	<33	>540	6	<0.068
Sodium Hydroxide (aq., 50wt%) at 80°C	1310-73-2	0.031	>480	>480	>480	6	<26.0	>480	6	<0.031

MICROCHEM® 4000 Permeation Data

Chemical Name	CAS Number	MDPR µg/cm²/min	BDT	BT 0.1 µg/cm²/min	BT 1.0 µg/cm²/min	EN Class EN 14325	CP µg/cm²	CPT µg/cm²/min	CP Class	PR µg/cm²/min
Sodium Hypochlorite Solution (aq., 14.5 wt% available chlorine)	7681-52-9	0.041	>480	>480	>480	6	<19.7	>480	6	<0.041
Sodium Hypochlorite Solution (aq., 5 wt% available chlorine)	7681-52-9	0.041	>480	>480	>480	6	<19.7	>480	6	<0.041
Sodium Silicofluoride (sat'd)	16893-85-9	-	-	-	>480	6	-	-	-	<1.0
Styrene	100-42-5	-	-	-	>480	6	-	-	-	<1.0
Sulphur Dioxide Gas	7446-09-5	0.001	-	-	>480	6	-	-	-	<1.0
Sulphuric Acid (50 wt%)	7664-93-9	<0.05	>540	>540	>540	6	-	-	-	<0.05
Sulphuric Acid (95-96 wt%)	7664-93-9	≤0.05	>540	>540	>540	6	-	-	-	<0.05
Sulphuric Acid (aq., 50wt%) at 80°C	7664-93-9	0.021	>480	>480	>480	6	<10.0	>480	6	<0.021
Sulphuric Acid 98+%	7664-93-9	<0.1	-	-	>480	6	-	-	-	<0.1
SUVA HCFC-123 (1,1 Dichloro-2,2,2 Trifluoroethane)	306-83-2	-	-	-	380	5	-	-	-	-
Tetrachloroethylene (99.9 wt%)	127-18-4	0.030	30	218	>540	6	42	>540	6	0.17
Tetrahydrofuran	109-99-9	≤0.08	Imm	Imm	5	0	-	-	-	-
Tetramethyl Ammonium Hydroxide (Sat'd)	75-59-2	-	-	-	>480	6	-	-	-	<1.0
Thionyl Chloride	7719-09-07	-	-	-	2	0	-	-	-	-
Thiourea Dioxide (sat'd)	1758-73-2	-	-	-	>480	6	-	-	-	<1.0
Toluene (99.97wt%)	108-88-3	0.042	3	69	>540	6	65	>540	6	0.17
Toluene (99.99 wt%)	108-88-3	≤0.08	<6	<6	>540	6	-	-	-	0.67
Toluene 2,4 Diisocyanate	584-84-9	-	-	-	>480	6	-	-	-	<1.0
Toluidine o	95-53-4	-	-	-	>480	6	-	-	-	<1.0
Triacetonediamine	36768-62-4	-	-	-	>540	6	-	-	-	<1.0
Trichloroacetic Acid 98%	76-03-9	<1.0	-	-	>480	6	-	-	-	<1.0
Trichloroethylene	79-01-6	-	-	-	7	0	-	-	-	-
Triethylamine	121-44-8	-	-	-	5	0	-	-	-	-
Vinyl Acetate (99.97wt%)	108-05-4	0.022	>540	>540	>540	6	<11	>540	6	<0.022
Vinyl Acrylate	2177-18-6	-	-	-	>480	6	-	-	-	<1.0
Vinyl Benzyl Chloride	57458-41-0	-	-	-	>480	6	-	-	-	<1.0
Xylene m	1330-20-7	-	-	-	>480	6	-	-	-	<1.0
Xylylenediamine-m	1477-55-0	-	-	-	>540	6	-	-	-	<1.0

MICROCHEM® 5000 Permeation Data

Chemical Name	CAS Number	MDPR µg/cm²/min	BDT	BT 0.1 µg/cm²/min	BT 1.0 µg/cm²/min	EN Class EN 14325	CP µg/cm²	CPT µg/cm²/min	CP Class	PR µg/cm²/min
Acetone	67-64-1	0.02	>480	>480	>480	6	-	>480	6	<0.02
Acetonitrile	75-05-8	0.01	>480	>480	>480	6	<4.8	>480	6	<0.01
Ammonia Gas (>99.98 wt%) 1 atmos.	7664-41-7	0.03	38	41	>480	6	62.7	>480	6	0.03
Ammonia Liquid (99%), Liquified at -34°C	7664-41-7	0.01	>480	>480	>480	6	-	>480	6	<0.01
Bromine	7726-95-6	0.05	10	11	12	1	-	-	-	High
Butadiene 1,3- (>99.0 wt%)	106-99-0	0.02	>480	>480	>480	6	<9.6	>480	6	<0.02
Carbon Disulphide	75-15-0	0.1	-	277	>480	6	15	>480	6	0.1
Chlorine (>99.8wt%) Gas, 1 atmos.	7782-50-5	0.001	>480	>480	>480	6	<0.48	>480	6	<0.001
Chloroform	67-66-3	0.07	45	53	101	3	-	184	4	2.26
Chloromethane (99.9 wt%)	74-87-3	0.05	>480	>480	>480	6	<24	>480	6	<0.05
Cyclohexylamine (>99.5% wt%)	108-91-8	0.099	>480	>480	>480	6	<47.5	>480	6	<0.099
Dichloromethane (99.99 wt%)	75-09-2	0.04	19	23	59	2	-	114	3	6.99
Diethyl Ether	60-29-7	0.1	>480	>480	>480	6	<4.8	>480	6	<0.1
Diethylamine (99.9 wt%)	109-89-7	0.01	>480	>480	>480	6	<4.8	>480	6	<0.01
Dimethylformamide N, N (>99.8 wt%)	68-12-2	0.01	>480	>480	>480	6	<4.8	>480	6	<0.01
Ethyl Acetate (99.98 wt%)	141-78-6	0.1	-	>480	>480	6	<2.5	>480	6	<0.1
Ethylene Oxide (gas at ca. 1 Atmos)	75-21-8	0.04	41	55	195	4	-	273	5	1.04
Heptane, n- (99.8 wt%)	142-82-5	0.01	>480	>480	>480	6	<4.8	>480	6	<0.01
Hexane, n-	110-54-3	0.01	>480	>480	>480	6	<4.8	>480	6	<0.01
Hydrofluoric Acid (71-75 wt%)	7664-39-3	0.03	>480	>480	>480	6	<14.4	>480	6	<0.03
Hydrogen Chloride (> 99.0 wt%) Gas, 1 atmos	7647-01-0	0.03	-	>480	>480	6	<3.5	>480	6	<0.03
Hydrogen Fluoride (99%), Liquified at 17°C	7664-39-3	0.01	>480	>480	>480	6	-	>480	6	0.05
Hydrogen Sulphide (> 99 wt%)	7783-06-4	0.05	>480	>480	>480	6	ND *	>480	6	<0.05
Methanol (> 99.5 wt%)	67-56-1	0.03	>480	>480	>480	6	<14.4	>480	6	<0.03
Nitrobenzene (99.99 wt%)	98-95-3	0.1	-	>480	>480	6	<2.5	>480	6	<0.1
Propylamine, n-	107-10-8	0.02	145	163	>480	6	114	390	5	0.86
Propylene Oxide 99%	75-56-9	0.08	90	90	114	3	-	171	4	4.38
Sodium Hydroxide (aq., 50wt%)	1310-73-2	0.05	-	>480	>480	6	<6	>480	6	<0.05
Sodium Hydroxide 30%	1310-73-2	0.05	-	>480	>480	6	<6	>480	6	<0.05
Sulphuric Acid (95-96 wt%)	7664-93-9	0.02	>480	>480	>480	6	<9.6	>480	6	<0.02
Tetrachloroethylene (99.9 wt%)	127-18-4	0.05	>480	>480	>480	6	<24	>480	6	<0.05
Tetrahydrofuran	109-99-9	0.01	>480	>480	>480	6	<4.8	>480	6	<0.01
Thionyl Chloride	7719-09-07	0.02	15	15	17	1	-	27	1	High
Toluene (99.99 wt%)	108-88-3	0.01	>480	>480	>480	6	<4.8	>480	6	<0.01

Important: Breakthrough time alone is not sufficient to determine how long a garment may be worn once the garment has been contaminated. Safe wear time may be longer or shorter depending on numerous other factors, including the toxicity, exposure conditions and permeation behaviour of the substance.

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MICROGARD® and MICROCHEM® garments are designed and manufactured under an ISO 9001 quality control approved system.

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