



Microgard® Guide to European Norms and Selection Guide

Microgard® Guide to Protective Clothing “Types”			
EN Type	Type Description	EN Symbol	Microgard Product*
Type 1 EN943-1 EN943-2	Gas Tight Protective Clothing. Protective clothing against liquid and gaseous chemicals, aerosols and solid particulates	 TYPE 1	-
Type 2 EN943-1	Non Gas Tight Protective Clothing. Suits which retain positive pressure to prevent ingress of dusts, liquids and vapours	 TYPE 2	4000 Saturn
Type 3 EN14605	Liquid Tight Suits Suits which can protect against strong and directional jets of liquid chemical	 TYPE 3	2500 Plus 3000 4000 4000 Apollo
Type 4 EN14605	Spray Tight Suits Suits which offer protection against saturation of liquid chemicals.	 TYPE 4	2000 Plus 2500 Plus 3000 4000 4000 Apollo CFR
Type 5 EN ISO 13982-1 (&2)	Dry Particle Suits Suits which provide protection to the full body against airborne solid particulates	 TYPE 5	1500 Standard 2000 Comfort 2000 Plus 2500 Plus 3000 4000 FR
Type 6 EN13034	Reduced Spray Suits Suits which offer limited protection against a light spray of liquid chemicals	 TYPE 6	1500 Standard 2000 Comfort 2000 Plus 2500 Plus FR

Additional European Norms (EN) achieved by the Microgard® product range			
EN	Description	EN Symbol	Microgard Product*
EN1073-2**	Protective clothing against radioactive particulate contamination	 EN 1073-2	2000 Comfort 2000 Plus 2500 Plus 3000 4000
EN14126	Protective clothing against infective agents “Type” prefixed with letter “B” (i.e. Type 3B) indicates approval to this European Norm	 EN 14126	2000 Plus 2500 Plus 3000 4000
EN1149-1	Protective clothing with electrostatic properties***	 EN 1149-1	1500 Standard 2000 Comfort 2000 Plus 2500 Plus 3000 4000 Range FR CFR
EN533	Protective Clothing. Limited flame spread materials and assemblies	 EN533	FR CFR

* Type approvals do not apply to accessories and partial body protection items. Always refer to the garment label, which will indicate the protection level offered.

** Gives no protection against radioactive radiation

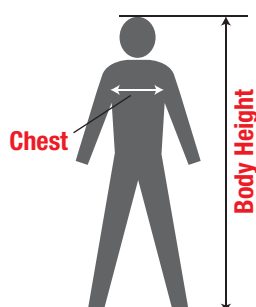
*** Always ensure the garment and wearer are properly grounded

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.

Garment sizes

Choose appropriate size according to the following body measurement. This is important in maximizing comfort and garment life.



Body Measurements (CM)

Size	Chest	Body Height
S	84-92 (33-36")	164-170 (5'4"-5'6")
M	92-100 (36-39")	170-176 (5'6"-5'8")
L	100-108 (39-42")	176-182 (5'8"-6'0")
XL	108-116 (42-45")	182-188 (6'0"-6'2")
XXL	116-124 (45-48")	188-194 (6'2"-6'4")
XXXL	124-132 (48-51")	194-200 (6'4"-6'6")



Microgard® 1500 features a high quality 3-layer anti-static SMS fabric

Protection Levels



TYPE 5



TYPE 6

Additional Properties



EN 1149-1

Microgard® 1500 coveralls now feature an improved hood design for universal fit with most full face respirators.

- The SMS fabric used in Microgard® 1500 is tested EN1149-1, for use in areas where static control is necessary
- 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; similar to what you would find in some paint spray environments
- SMS is not suitable for heavy liquid splashes or spray as you would find in industrial paint spray applications, wash-down processes and other wet environments
- The SMS fabric used in Microgard® 1500 is also highly breathable, making it ideal for working in warmer environments

Applications

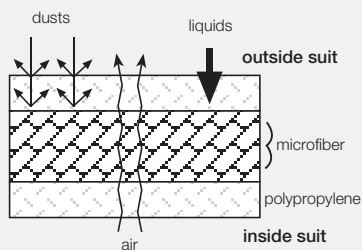
- General Maintenance
- Pharmaceuticals manufacturing
- Insulation laying
- Wood & metal processing
- Touch-up paint spraying
- Sign manufacturing
- Asbestos stripping
- Fiberglass/resin applications/ceramic fibers

Microgard® 1500 Hooded Coveralls meet the following European Norms

- **Type 5** EN ISO 13982-1(&2) Dry particle suit
- **Type 6** EN 13034 Reduced spray suit
- **EN1149-1** Anti-static

Fabric construction

Microgard®1500 uses the latest developments in micro-fiber, multi-layer spunbond technology



The interface between these layers creates a high particle filtration efficiency and high breathability

MICROGARD® 1500 - Suit Features

- Breathable SMS fabric
- Improved hood design for optimum fit with full face respirators
- Elasticated hood, wrist, waist & ankles
- Optimized body fit for improved wearer comfort
- 3-thread overlocked seams
- 2-way zip for added convenience
- Re-sealable tape for added protection

Colour



White

Standard sizes S to XXXL

For details of fabric physical performance see page 11

Perform in comfort...

Microgard® 2000 Comfort offers high level breathability without compromise

Protection Levels



Additional Properties



Microgard® 2000 Comfort has been specifically designed for those working in warmer climates or warm working environments to help reduce heat stress.

- Combines a NEW lightweight Microporous fabric with a high wicking and breathable back panel for moisture management and breathability that is unsurpassed!
- Microporous PE laminate fabric and bound seams ensure a high level of liquid protection. The SMS back panel aids airflow around the wearer without compromising the protection level

Microgard® 2000 Comfort will help keep you safe and comfortable in environments where low hazard liquids and/or particulates are present.

Applications

- Automotive paint spray
- Fiberglass product manufacturing

Microgard® 2000 Comfort coveralls meet the following European Norms

- **Type 5** EN ISO 13982-1(&2) Dry particle suit
- **Type 6** EN 13034 Reduced spray suit
- **EN1073-2** Barrier to radioactive particulates – Class 1
- **EN1149-1** Anti-static



MICROGARD® 2000 COMFORT - Suit Features

- Breathable PE laminate fabric with SMS back panel
- Improved hood design for optimum fit with full face respirators
- Optimized body fit for improved wearer comfort
- Elasticated hood, wrist, waist & ankles
- Bound seams
- 2-way zip for added convenience
- Re-sealable tape for added protection

Colour



Standard sizes S to XXXL

For details of fabric physical performance see page 11



Comfort, performance and protection with the NEW Microgard® 2000 Plus coverall

Protection Levels



It is widely accepted that to provide a balance between comfort and performance, limited life protective clothing should have three key features;

- Good breathability
- Low thermal resistance
- Good mechanical strength

Microgard® 2000 Plus features all three, offering protection without compromising comfort, and is now the product of choice for workers around the World, in industries ranging from Heavy Industrial Paint Spraying to Pharmaceuticals manufacturing.

- The 2 layer microporous fabric used in the manufacturing of Microgard® 2000 Plus is designed to be highly breathable (Ret* = <15) yet will withstand saturation of liquid chemicals and filter more than 99% of particulates down to 1.0 micron in size**

Additional Properties



Applications

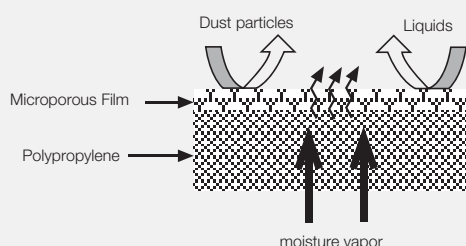
- Pharmaceutical product manufacturing
- Low level liquid chemical spray
- Ship building & automobile manufacturing
- Agriculture
- Veterinary services
- Local authority applications including park maintenance
- Pest control
- Automotive paint spray
- Fiberglass product manufacturing

Microgard® 2000 Plus coveralls meet the following European Norms

- **Type 4** EN 14605 Spray tight suit
- **Type 5** EN ISO 13982-1(&2) Dry particle suit
- **Type 6** EN 13034 Reduced spray suit
- **EN14126** Barrier to infective agents
- **EN1073-2** Barrier to radioactive particulates – Class 1
- **ISO/9073** Lint free fabric (outside)
- **EN1149-1** Anti-static

Fabric construction

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



MICROGARD® 2000 PLUS - Suit Features

- Breathable PE laminate fabric
- Improved hood design for optimum fit with full face respirators
- Optimized body fit for improved wearer comfort
- Finger loops to help prevent sleeve movement when working above your head
- Bound seams ensure spray tight protection
- 2-way zip for added convenience
- Re-sealable tape for added protection

Colour



Standard sizes S to XXXL

For details of fabric physical performance see page 11



Welded seam construction and unique microporous fabric for liquid tight protection

Protection Levels



Additional Properties



Featuring one of the highest quality breathable microporous films available on the market, Microgard® 2500 Plus coveralls are designed to protect you from heavy liquid spray and particulates. The fabric's physical strength and flexibility ensures you are protected and comfortable in even the harshest environments.

Applications

- Viral contaminated areas (inc. Avian Influenza)
- Part of your Business Continuity PPE Kit
- CDC (Centres for Disease Control) applications
- Decontamination processes
- Low hazard chemical spray
- Emergency services first response
- Veterinary services
- Industrial Paint Spraying
- Shipbuilding

Microgard® 2500 Plus coveralls meet the following European Norms

- **Type 3** EN 14605 Liquid tight suit
- **Type 4** EN 14605 Spray tight suit
- **Type 5** EN ISO 13982-1(&2) Dry particle suit
- **Type 6** EN 13034 Reduced spray suit
- **EN14126** Barrier to infective agents
- **EN1073-2** Barrier to radioactive particulates – Class 1
- **EN1149-1** Anti-static

EN14126: 2003 Barrier to Infective Agents – Fabric Performance

- Determination of the resistance of protective clothing materials to penetration by blood and body fluids
Pass to 20kPa (Class 6 of 6)
- Resistance of protective clothing materials to penetration by blood-borne pathogens
Pass to 20kPa (Class 6 of 6)
- Determination of resistance to wet bacterial barrier penetration
No penetration (up to 75 minutes) (Class 6 of 6)
- Resistance to penetration by biologically contaminated aerosols
No penetration (Class 3 of 3)
- Resistance to dry microbial penetration
No penetration (Class 3 of 3)

MICROGARD® 2500 PLUS - Suit Features

- Microporous PP laminate fabric
- Improved hood design for optimum fit with full face respirators
- Optimized body fit for improved wearer comfort
- Elasticated hood, wrist, waist & ankles
- Ultrasonically welded seams
- Re-sealable tape for added protection

Colour



Standard sizes S to XXXL

For details of fabric physical performance see page 11



Microchem® 3000 is one of the lightest and most comfortable chemical protective garments on the market today

Protection Levels



Additional Properties



Featuring a soft and flexible 3 layer fabric, strong ultrasonically welded seams, and an effective chemical barrier against most inorganic chemicals.

Applications

- Chemical handling or transportation
- Oil based mud protection (i.e. oil drilling rigs)
- Pesticide and insecticide spraying
- Land reclamation and clean up
- Food industry clean downs (Caustic clean down operations)

Microchem® 3000 Plus coveralls meet the following European Norms

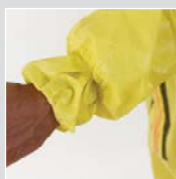
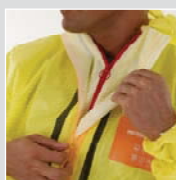
- **Type 3** EN 14605 Liquid tight suit
- **Type 4** EN 14605 Spray tight suit
- **Type 5** EN ISO 13982-1(&2) Dry particle suit
- **EN14126** Barrier to infective agents
- **EN1073-2** Barrier to radioactive particulates – Class 1
- **EN1149-1** Anti-static

Chemical permeation testing conducted on Microchem® 3000 fabric against over 100 chemicals according to EN374-3, EN369 or EN ISO 6529.

All chemical tests and breakthrough times quoted relate to laboratory tests on fabrics only. Seams and closures may have lower breakthrough times – particularly when worn or damaged. The final determination of suitability is the user's responsibility.

Example of chemical permeation test results for Microchem® 3000 fabric

Chemical Name	CAS Number	Test method & permeation rate	Normalised Breakthrough Time (NBT)
Sulphuric Acid (98%)	7664-93-9	EN ISO 6529 1.0µm/cm²/min	>540 mins
Dimethylformamide (DMF)	68-12-2	EN ISO 6529 1.0µm/cm²/min	>540 mins
Hydrochloric Acid (37%)	7647-01-0	EN ISO 6529 1.0µm/cm²/min	>540 mins
Methanol	67-56-1	EN ISO 6529 1.0µm/cm²/min	>540 mins



MICROCHEM® 3000 - Suit Features

- Double zip system helps ensure a liquid tight seal
- Double cuff design to enable a liquid tight connection with chemical protective gauntlets*
- Hood designed for optimum fit with full face respirators
- Ultrasonically welded seams

* taping of wrists required

Colour



Standard sizes S to XXXL

See page 12-13 for additional chemical permeation data



Microchem® 4000, when you can't compromise on protection

Protection Levels



Additional Properties



The unique Microchem® 4000 5-layer fabric is renowned for its lightweight and comfortable textile feel and an exceptional barrier to organic & inorganic chemicals.

Applications

- Chemical manufacturing, handling or transportation
- Industrial hazardous waste handling
- Land reclamation and clean up
- Emergency services first response chemical spill

Microchem® 4000 coveralls meet the following European Norms

- **Type 3** EN 14605 Liquid tight suit
- **Type 4** EN 14605 Spray tight suit
- **Type 5** EN ISO 13982-1(&2) Dry particle suit
- **EN14126** Barrier to infective agents
- **EN1073-2** Barrier to radioactive particulates – Class 1
- **EN1149-1** Anti-static

Chemical permeation testing conducted on Microchem® 4000 fabric against over 100 chemicals according to EN374-3, EN369 or EN ISO 6529.

All chemical tests and breakthrough times quoted relate to laboratory tests on fabrics only. Seams and closures may have lower breakthrough times – particularly when worn or damaged. The final determination of suitability is the user's responsibility.

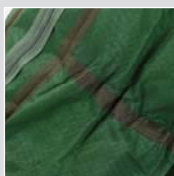
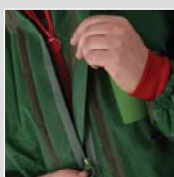
Microchem® 4000 fabric against chemical warfare agents*

Chemical	Breakthrough Time (hrs : mins)
Lewisite (L)	>06:00 <24:00
Mustard Agent (HD)	>24:00
Sarin (GB)	>24:00
VX	>24:00

* Tests performed according to TNO test protocol.



Style122 with fixed boot ends



MICROCHEM® 4000 - Suit Features

- Double zip system helps ensure a liquid tight seal every time
- Double cuff design to enable a liquid tight connection with chemical protective gauntlets*
- Internal sleeve cuff features knitted wrist for wearer comfort
- Hood designed for optimum fit with full face respirators
- Ultrasonically welded and taped seams

* taping of wrists required

Colour



Standard sizes S to XXXL

See page 14-15 for additional chemical permeation data

3M Protective Clothing

MICROCHEM® 4000 APOLLO

Protection
in comfort



Protection Levels



Additional Properties



Trusted by fire and rescue crews around the world

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

Microgard® 4000 Apollo coveralls meet the following European Norms

- **Type 3** EN14605 Liquid tight suit
- **Type 4** EN14605 Spray tight suit
- **EN14126** Barrier to infective agents
- **EN1149-1** Anti-static

Applications

- Chemical manufacturing, handling or transportation
- Industrial hazardous waste handling
- Land reclamation and clean up
- Emergency services first response chemical spill (inc. Fire Service Appliances)

May also be suitable for use in Type B applications (according to US Environmental Protection Agency (EPA) & NFPA guidelines).



MICROGARD® 4000 Apollo - Suit Features

- Rear entry double zip system
- Rear mounted BA pouch (universal fit with most BA)
- Fixed boot ends with boot overlap
- Attached Ansell Barrier® Gloves
- Mylar 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

Colour



Green

Standard sizes M to XXL

3M Protective Clothing

MICROCHEM® 4000 SATURN



Protection Levels



Additional Properties



Comfort and protection, with Microchem® 4000 chemical barrier

Encapsulated suit designed for use in conjunction with airline breathing apparatus, either full face or half mask face piece with breathing hose, belt mounted flow control or pressure reducer valve.

Microgard® 4000 Saturn coveralls meet the following European Norms

- **Type 2** EN943-1 positive pressure (non-gas tight) suit
- **EN14126** Barrier to infective agents
- **EN1149-1** Anti-static

May also be suitable for use in Type B applications (according to US Environmental Protection Agency (EPA) & NFPA guidelines).

Applications

- Chemical manufacturing, handling
- Industrial hazardous waste handling



MICROGARD® 4000 Saturn - Suit Features

- Fixed boot ends with boot overlap
- Attached Ansell Barrier® Gloves
- Rear zip entry
- Air hose tail attachment
- Exhalation Valves
- Mylar Visor
- Ultrasonically welded and taped seams
- Compatible with most airline breathing apparatus

Colour



Green

Standard sizes L to XXL

3M Protective Clothing

MICROGARD® FR



Protection Levels



Additional Properties



* Microgard® FR should never be worn in isolation for flame retardant protection. Always wear over the top of garments which achieve EN533 Index 2 or above. Mannequin testing conducted using DuPont™ NOMEX® workwear which achieves at least EN533 Index 3 and EN531 for workers exposed to heat & flames.

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. Microgard® FR also offers peace of mind to workers in potential explosive/flammable environments, by decreasing the risk of burn injury when worn over their thermal protective workwear*.

Applications

- Oil & Gas, Petrochemical applications
- Utilities Contractors
- All applications where there is the need for particulate or limited chemical splash protection without compromising on wearer protection in the event of a flash fire

Microgard® FR coveralls meet the following European Norms

- **Type 5** Dry particle suit
- **Type 6** Reduced spray suit
- **EN533** Limited flame spread materials & assemblies – **Pass to Index 1**
- **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)
- **EN1149-1** Anti-static

Microgard® FR EN368 Resistance to chemical penetration and repellency

Chemical Name	Repellency	Penetration
Sulphuric Acid (30%)	95.2%	1.15%

3M Protective Clothing

MICROGARD® CFR



Protection Levels



Additional Properties



* Microgard® CFR should never be worn in isolation for flame retardant protection. Always wear over the top of garments which achieve EN533 Index 2 or above. Mannequin testing conducted using DuPont™ NOMEX® workwear which achieves at least EN533 Index 3 and EN531 for workers exposed to heat & flames.

In high risk areas Microgard® CFR is proven to protect

Microgard® CFR offers wearers protection from liquid chemicals to EN Type 4 and particulates to EN Type 5. Microgard® CFR also offers piece of mind to workers in potential explosive/flammable environments, by decreasing the risk of burn injury when worn over their thermal protective workwear*.

Applications

- Oil & Gas, Petrochemical applications
- Utilities Contractors
- All applications where there is the need for particulate or limited chemical splash protection without compromising on wearer protection in the event of a flash fire

Microgard® CFR coveralls meet the following European Norms

- **Type 4** Spray tight suit
- **EN533** Limited flame spread materials & assemblies – **Pass to Index 1**
- **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)
- **EN1149-1** Anti-static

Microgard® CFR chemical testing

Chemical Name	EN374-3 (mins)	ASTM F903 (Penetration) (mins)	ASTM F739 (Permeation) (mins)
Acetone	Not tested	>60	12
Carbon Disulfide	Not tested	>60	7
Dichloromethane	Not tested	>60	4
Dimethylformamide	<1	>60	>480
Ethyl Acetate	Not tested	>60	16
n-Hexane	Not tested	>60	>480
Hydrochloric Acid (conc.)	>480	Not tested	Not tested
Sulphuric Acid (95%)	16	>60	10
Tetrachlorethylene	Not tested	>60	>480
Toluene	Not tested	>60	6

3M Protective Clothing

MICROGARD® Fabric Performance

EN14325 FABRIC PHYSICAL TESTS

Microgard1500*	M2000 Comfort***	M2000**** Plus	Microgard 2500 Plus	Microchem 3000	Microchem 4000	Microgard FR	Microgard CFR
SMS	Microporous PE Laminate	Microporous PE Laminate	Microporous PP Laminate	Spunbond PP with barrier film	5 Layer laminate	50%FR Treated Sontara, 5% woodpulp, 45% polyester with addition of Fluorochemical	50% FR Treated Sontara, 5%woodpulp, 45% polyester with PVC Barrier film
EN 530 Abrasion	10	100	100	500	2000		
EN ISO 7854 Flex Cracking	15,000	40,000	40,000	100,000	100,000	>100,000	>5,000
EN ISO 9073-4 Tear Resistance (MD)	22.6N	15N	40.7	44N	142.4N	29.6N	21.4N
EN ISO 9073-4 Tear Resistance (CD)	28.8N	30N	18.6N	29N	105.4N	36.6N	25N
EN ISO 13934-1 Tensile Strength (MD)	>100N	77N	108.1N	109N	172N		
EN ISO 13934-1 Tensile Strength (CD)	>55N	44N	48.3N	62N	84N		
EN 863 Puncture Resistance	9.87N	7.2N	8.2N	10N	16N	13.18N	14.64N
EN ISO 13938-1 Burst Resistance		>100kPa	184.1kPa	90kPa	379kPa	160kPa	252kPa
EN 13274-4 Resistance to ignition	Pass	Pass	Pass	Pass	Pass	Pass	Pass
EN 1149-1 Anti-static	Pass**	Pass	Pass	Pass	Pass	Pass	Pass
BS EN 20811 Hydrostatic Head (water pressure test)	>100cm	232cm	>250cm	356cm	>692cm	>100cm	>100cm
EN533 Limited Flame Retardancy						Index 1/0	Index 1/0

ISO 6530 Repellency to Liquids – 30% Sulphuric Acid	99.1%	96.0%	99.30%	98.00%	93.4%	95.2%	
ISO 6530 Repellency to Liquids – 10% Sodium Hydroxide	97.5%	95.6%	96.30%	97.70%	93.0%		
ISO 6530 Repellency to Liquids – n-heptane (undiluted)	0.0%	98.3%	87.20%	92.20%	91.0%		
ISO 6530 Repellency to Liquids – Isopropanol	23.1%	91.9%	91.70%	79.10%	90.7%		
ISO 6530 Resistance to penetration by liquids – 30% Sulphuric Acid	0.0%	0.0%	0%	0%	0%	1.15%	
ISO 6530 Resistance to penetration by liquids – 10% Sodium Hydroxide	0.0%	0.0%	0%	0%	0%		
ISO 6530 Resistance to penetration by liquids – n-heptane (undiluted)	26.6%	0.0%	0%	0%	0%		
ISO 6530 Resistance to penetration by liquids – Isopropanol	19.5%	0.0%	0%	0%	0%		

ALOXITE PARTICLE PENETRATION TEST (FABRIC) FILTRATION EFFICIENCY %

Particle Size 1.0 – 1.5µm	98.3%	>99%					
Particle Size 1.5 – 2.0µm	98.6%	>99%					
Particle Size 2.0 – 2.5µm	99.2%	>99%					
Particle Size 2.5 – 3.0µm	99.5%	>99%					
Particle Size 3.0 – 3.5µm	99.7%	>99%					
Particle Size >3.5µm	99.8%	100%					

EN ISO 6529/EN374-3 PERMEATION TEST – NBT 1.0µm/cm²****

Acetone							
Acetonitrile			Immediate	21	>480mins		
Ammonia (anhydrous), 99.99%			Immediate	5	>480mins		
Carbon Disulfide			Immediate	2	2mins		
Chlorine Gas, 99.5%			Immediate	Immediate	Immediate		
Dichloromethane			Immediate	Immediate	>480mins		
Diethylamine			Immediate	Immediate	12mins		
Ethyl Acetate			Immediate	Immediate	4mins		
n-Hexane			Immediate	2	>480mins		
Hydrochloric Acid 36%			Immediate	>480	>480mins		>480mins
Hydrogen Chloride, 99.0%			Immediate	>480	>480mins		
Methanol			Immediate	>480	>480mins		
Sodium Hydroxide, 30%		>480mins	>480	>480	>480mins		
Sulfuric Acid 96%			>480	>480	>480mins		16mins
Tetrahydrofuran			Immediate	Immediate	19mins		
Toluene			Immediate	3	>480mins		

EN14126 BARRIER TO INFECTIVE AGENTS

ISO 16603 Resistance to penetration by blood/fluids under pressure		Class 6 of 6	Class 6 of 6	Class 6 of 6	Class 6 of 6		
ISO 16604 Resistance to penetration by blood borne pathogens		Class 6 of 6	Class 6 of 6	Class 6 of 6	Class 6 of 6		
EN ISO 22610 Resistance to wet bacterial penetration (mechanical contact)		Class 6 of 6	Class 6 of 6	Class 6 of 6	Class 6 of 6		
ISO/DIS 22611 Resistance to biologically contaminated aerosols		Class 3 of 3	Class 3 of 3	Class 3 of 3	Class 3 of 3		
ISO 22612 Resistance to dry microbial penetration		Class 3 of 3	Class 3 of 3	Class 3 of 3	Class 3 of 3		

***Results shown relate to 50gsm SMS. Contact Microgard Ltd for performance of 60gsm SMS fabric used in M1500 Standard product.

****Pass applies to WH15 & BL15 Microgard 1500 Standard. Contact Microgard Ltd for details.

*****Fabric results for Microporous fabric which covers at least 85% of the product. Refer to M1500 results for back panel fabric performance

*****Fabric results for white. For Green results please visit www.microgard.com

*****Permeation results recorded at 0.1µm/cm² for M2500 Plus fabric

*****Chemical breakthrough times quoted relate to laboratory tests on fabrics only. Seams and closures may have lower breakthrough times – particularly when worn or damaged. The final determination of suitability is the user's responsibility.

Microgard®/Microchem® Chemical Permeation Chart

Versatile Chemical Protection Starts with Microchem®

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

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

The resistance of Microchem fabric 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 to EN ISO 6529, EN369, EN374-3.

Microgard® 2000				
Chemical	CAS No.	Synonyms	Normalised Breakthrough Time (NBT)	Classification according to EN14325: 2004
Sodium Hydroxide 10%	1310-73-2	Soda Lye, Caustic Soda,	>480	6
Sodium Hydroxide 30%	1310-73-2	Soda Lye, Caustic Soda	>480	6
Microgard® 2500 Plus				
Carbon Disulfide	75-15-0		5	0
Sodium Hydroxide 50%	1310-73-2	Soda Lye, Caustic Soda,	>480	6
Sulphuric Acid 98+%	7664-93-9	Oil of Vitriol, Oleum (98%), Nordhausen Acid (98%), BOV	>480	6
Microchem® 3000				
2-(Dimethyl Amino) Pyridine 99+%	n/a		57	2
2, Ethylhexanoic Acid	149-57-5		>480	6
2-2 (Amino Ethoxy Ethanol)	n/a		>480	6
2-Chloroethanol 99%	107-07-3		>480	6
Acetic Acid Glacial	64-19-7	Pyroligneous Acid (crude)	>480	6
Acetic Anhydride	108-24-7		>480	6
Acetone	67-64-1	2-Propanone, Pyroacetic Ether, Dimethyl Ketone,	21	0
Acetonitrile	75-05-8	Ethanenitrile, Methyl Cyanide, Cyanomethane,	5	0
Acrylamide	79-06-1		>480	6
Acrylic Acid	79-10-7		>480	6
Ammonia (liquid - 33°C)	1336-21-6		2	0
Ammonia Gas	7664-41-7		2	0
Ammonium Hydrogen Fluoride	1341-49-7		>480	6
Aniline	62-53-3	Aminobenzene, Aniline Oil, Phenylamine, Kyanol,	>480	6
Aqueous bacteria, staphylococcus aureus	n/a		>480	6
Benlate	n/a		>480	6
Benzene	71-43-2	Cyclohexatriene, Benzol,	2	0
Benzene Sulphonyl Chloride (99%)	98-09-9		>480	6
Benzyl Chloride (99w%)	100-44-7		16	1
Butanol n	71-36-3	Propyl Carbinol, Butyl Alcohol,	>480	6
Butyl Acrylate n	141-32-2		15	1
Carbon Disulfide	75-15-0		5	0
Chlorine Water (sat'd 99.9+%)	7782-50-5		2	0
Chloroacetyl Chloride	79-04-9		36	2
Chloroform	67-66-3		Imm	0
Cresol m	100-84-5		>480	6
Dichloroethane 1,2	107-06-2		4	0
Dichloroethylene trans 1,2	n/a		2	0
Dichloromethane	75-09-2	Methylene Bichloride, Methylene Chloride,	Imm	0
Diesel	68334-30-5		15	1
Di-Ethyl Ether	60-29-7		Imm	0
Diethylamine	109-89-7		Imm	0
Diffluoroaniline 2,4	367-25-9		>480	6
Dimethyl Sulphate	77-78-1		>480	6
Dimethylamine 40%	124-40-3		>480	6
Dimethylformamide	68-12-2	DMF, DMFA,	>480	6
Epichlorohydrin (99%)	106-89-8		>480	6
Epoxy Hardener WH-6 (960223)	n/a		>480	6
Ethyl Acetate	141-78-6	Acetic Acid Ethyl Ester, Vinegar Naphtha, Acetic Ester,	2	0
Ethylene Chlorohydrin 99%	107-07-3		>480	6
Ethylene Glycol	107-21-1	2-Ethanediol, Glycol,	>480	6
Formaldehyde 37%	50-00-0	Formol, Formalin,	>480	6
Formic Acid 90%	64-18-6		>480	6
Furfural	98-01-1	Pyroligneous Aldehyde, Artificial Oil of Ants,	>480	6
Hexamethylene Diamine	124-09-4		>480	6
Hexane n	110-54-3		Imm	0
Hydrazine monohydrate 98%	n/a		>540	6
Hydrobromic Acid	10035-10-6		>480	6
Hydrochloric Acid 36%	7647-01-0	Muriatic Acid, Hydrogen Chloride,	>480	6

EN Class	Normalised Breakthrough Time in minutes
0	Immediate (no class)
1	≥ 10
2	≥ 30
3	≥ 60
4	≥ 120
5	≥ 240
6	≥ 480 (or >540)

For more information or guidance on specific chemicals, and details of test methods used for permeation testing, contact 3M Technical Service at 03-7806 2888.

All chemical tests and breakthrough times quoted relate to laboratory tests on fabrics only. Seams and closures may have lower breakthrough times – particularly when worn or damaged. The final determination of suitability is always the user's responsibility.

3M Protective Clothing

Protection
in comfort

Microgard®/Microchem® Chemical Permeation Chart

Microchem® 3000				
Chemical	CAS No.	Synonyms	Normalised Breakthrough Time (NBT)	Classification according to EN14325: 2004
Hydrofluoric Acid 40%	7664-39-3	Fluohydric Acid	>480	6
Hydrogen Peroxide 35%	7722-84-1	Albone, Peroxide, Hydrogen Dioxide, Hydroperoxide,	>480	6
Isopropyl Alcohol	67-63-0	2-Propanol, IPA, Isopropanol, Petrohol, Dimethyl Carbinol	>480	6
Mercury	7439-97-6		>480	6
Methanol	67-56-1	Methyl Alcohol, Wood Alcohol, Wood Naphtha, Wood Spirit	>480	6
Methyl Iodide	74-88-4		>480	6
N. Methyl Pyrrolidone	872-50-4		>480	6
Nitric Acid Conc (70%)	7697-37-2	Aquafortis,	>480	6
Nitrobenzene	98-95-3	Oil of Mirbane, Nitrobenzol,	>480	6
Octave	n/a		>480	6
Paraffin	8002-74-2		25	1
Petrol (unleaded)	8006-61-9	Gasoline, Benzin,	2	0
Phenol liquid @ 45°C	108-95-2		>480	6
Phenol/Benzyl Alcohol 25/5	n/a		>480	6
Phosphoric Acid o 85+%	7664-38-2	Orthophosphoric Acid	>480	6
Phosphoric Pentachloride	10026-13-8		>480	6
Phosphorous Oxychloride	10025-87-3		9	0
Phthalic Anhydride (135°C)	85-44-9		>480	6
Pivalic Acid	3377-92-2		>480	6
Polyethylene Glycol 200	n/a		>480	6
Pro-set 125M Resin (960217)	n/a		>480	6
Pro-set 226pf Hardener (960228)	n/a		>480	6
Propionitrile	107-12-0		70	3
Reglone	85-00-7		>480	6
Ripcord	52315-07-8		>480	6
Round-Up	38641-94-0		>480	6
Sodium Bisulphate 40%	7681-38-1		>480	6
Sodium Cyanide (satd soln)	143-33-9		>480	6
Sodium Fluoride (satd)	7681-49-4		>480	6
Sodium Hydroxide 50%	1310-73-2	Soda Lye, Caustic Soda,	>480	6
Sodium Hypochlorite	7681-52-9	Bleach	>480	6
Sodium Methlyate 30%	124-41-4		>480	6
Sodium Monochloride	n/a		>480	6
Sodium Silicofluoride (sat'd)	16893-85-9		>480	6
Styrene	100-42-5	Cinnamol, Styrol, Vinylbenzene, Ethylbenzene, Styrolene,	2	0
Sulphuric Acid 98+%	7664-93-9	Oil of Vitriol, Oleum (98%), Nordhausen Acid (98%), BOV	>480	6
SUVA HCFC-123 (1,1 Dichloro-2, 2,2 Trifluoroethane)	n/a		251	5
TEGO 51	n/a		>480	6
Tetrahydrofuran (THF)	109-99-9		Imm	0
Thionyl Chloride	7/9/19		Imm	0
Thiourea Dioxide (sat'd)	1758-73-2		>480	6
Titanium Chloride	10049-06-6		2	0
Toluene	108-88-3	Toluol, Methacide, Phenylmethane, Methyl Benzene,	3	0
Toluene 2,4 Diisocyanate	584-84-9	TDI, Nacconate 100	>480	6
Toluidine o	95-53-4		>480	6
Transformer Oil	n/a		60	3
Trichloroacetic Acid 98%	76-03-9		>480	6
Trichloroethylene	79-01-6	Algylen, Westrosol, Trimar, Trilene, Triline, Trielene,	2	0
Triethylamine	121-44-8		Imm	0
Xylene m	1330-20-7	Xylol, Diethyl Benzene,	2	0
Zinc Bromide (sat'd soln)	7699-45-8		>480	6



Microchem® 4000 Chemical Permeation Chart

Microchem® 4000				
Chemical	CAS No.	Synonyms	Normalised Breakthrough Time (NBT)	Classification according to EN14325: 2004
2-(2 Amino Ethoxy Ethanol)	n/a		>480	6
2, Ethylhexanoic Acid	149-57-5		>480	6
2,4 Difluoroaniline	367-25-9		>480	6
2-2 (Amino Ethoxy Ethanol)	n/a		>480	6
2-Aminoethanol (98wt%)	96-80-0		>480	6
2-Chloro-Acyl-Nitrile	n/a		>480	6
3,4-Dichlorobenzotrifluoride (Liquid)	526-84-7		>480	6
3-N, N-Diethylenetriamine	111-40-0		>480	6
4-Chloroaniline 75°C	106-47-8		>480	6
Acetic Acid Glacial	64-19-7	Pyroligneous Acid (crude)	>480	6
Acetic Anhydride	108-24-7		>480	6
Acetone	67-64-1	2-Propanone, Pyroacetic Ether, Dimethyl Ketone,	>480	6
Acetonitrile	75-05-8	Ethanenitrile, Methyl Cyanide, Cyanomethane,	>480	6
Acrylamide	79-06-1		>480	6
Acrylic Acid	79-10-7		>480	6
Acrylonitrile	75-05-8		>480	6
Ammonia (liquid - 33°C)	1336-21-6		2	0
Ammonia Gas	7664-41-7		2	0
Ammonium Hydrogen Fluoride	1341-49-7		>480	6
Ammonium Hydroxide 20% v/v	1336-21-6		145	4
Amylacetate	628-63-7	Isoamyl Acetate, Banana Oil, Amylacetate Ester,	>480	6
Aniline	62-53-3	Aminobenzene, Aniline Oil, Phenylamine, Kyanol,	>480	6
Aqueous bacteria, staphylococcus aureus	n/a		>480	6
Arsenic Dust	7440-38-2		>480	6
Benlate	n/a		>480	6
Benzene	71-43-2	Cyclohexatriene, Benzol,	>480	6
Benzyl Chloride (99w%)	100-44-7		>480	6
Bromine (Pure, Liquid)	7726-95-6		2	0
Bromine Soln. (Sat'd)	n/a		10	1
Butanol n	71-36-3	Propyl Carbinol, Butyl Alcohol,	>480	6
Butyl Acrylate n	141-32-2		>480	6
Chlorine (gas)	7782-50-5		>480	6
Chlorine Water (sat'd 99.9+%)	7782-50-5		>480	6
Chloroacetic Acid (99wt%) (Solid-vap perm.)	79-11-8		>480	6
Chloroacetic Acid Ethyl Ester (99wt%)	n/a		>480	6
Chloroacetyl Chloride	79-04-9		>480	6
Chlorobenzene	108-90-7		>480	6
Chloroform	67-66-3		11	1
Chlorosulphonic Acid	7790-94-5		69	3
Chlorotoluene o	n/a		>480	6
Chlorotoluene p	106-43-4		>480	6
Cresol-m in Water Solution (20g/l)	108-39-4		>480	6
Cresol-o in Water Solution (20g/l)	95-48-7		>480	6
Cresol-p in Water Solution (20g/l)	106-44-5		>480	6
Cyclohexylamine (>99.5% wt%)	n/a		83	3
Di (aminopropyl) Amine	n/a		>480	6
Dichloroacetone 1,1	n/a		>480	6
Dichloroacetone 1,3	n/a		>480	6
Dichloroethane 1,2	107-06-2		>480	6
Dichloromethane	75-09-2	Methylene Bichloride, Methylene Chloride,	12	1
Diesel	68334-30-5		>480	6
Diethanolamine (99wt%)	111-42-2		>480	6
Di-Ethyl Ether	60-29-7		2	0
Diethylamine	109-89-7		4	0
Diethylenetriamine	111-40-0		>480	6
Dimethyl Sulphate	77-78-1		>480	6
Dimethyl Sulphoxide (99+%)	67-68-5	DMSO	>480	6
Dimethylamine 40%	124-40-3		>480	6
Dimethylformamide	68-12-2	DMF, DMFA,	>540	6
Dipropylene Glycol Methyl Ether	34590-94-8		>480	6
Di-tert-butyl peroxide (98 wt%)	n/a		>540	6
Epichlorohydrin (99%)	106-89-8		>480	6
Epoxy Hardener WH-6 (960223)	n/a		>480	6
Ethanol	64-17-5	Absolute Alcohol, methylated spirits, ethyl alcohol	>480	6
Ethanolamine (98wt%)	141-43-5		>480	6
Ethyl Acetate	141-78-6	Acetic Acid Ethyl Ester, Vinegar Naphtha, Acetic Ester,	>480	6
Ethyl Benzene	100-41-4		>480	6
Ethyl Chloroacetate (99wt%)	105-39-5		>480	6
Ethylene Diamine	n/a		>480	6
Ethylene Dibromide	106-93-4		>480	6
Ethylene Glycol	107-21-1	2-Ethanediol, Glycol,	>480	6
Ethylene Oxide (gas at ca.1 Atmos)	75-21-8		>480	6

EN Class	Normalised Breakthrough Time in minutes
0	Immediate (no class)
1	≥ 10
2	≥ 30
3	≥ 60
4	≥ 120
5	≥ 240
6	≥ 480 (or >540)

For more information or guidance on specific chemicals, and details of test methods used for permeation testing, contact 3M Technical Service at **03-7806 2888**.

All chemical tests and breakthrough times quoted relate to laboratory tests on fabrics only. Seams and closures may have lower breakthrough times – particularly when worn or damaged. The final determination of suitability is always the user's responsibility.

Microchem® 4000 Chemical Permeation Chart

Microchem® 4000				
Chemical	CAS No.	Synonyms	Normalised Breakthrough Time (NBT)	Classification according to EN14325: 2004
Fluorobenzene	462-06-6		105	3
Formaldehyde 37%	50-00-0	Formol, Formalin,	>480	6
Formic Acid 90%	64-18-6		>480	6
Furfural	98-01-1	Pyroigneous Aldehyde, Artificial Oil of Ants,	>480	6
Hexamethylene Disilazane (1,1,1,3,3,3)	n/a		>480	6
Hexane n	110-54-3		>480	6
Hydrazine monohydrate 98%	n/a		>540	6
Hydrobromic Acid	10035-10-6		>480	6
Hydrochloric Acid 36%	7647-01-0	Muriatic Acid, Hydrogen Chloride,	>480	6
Hydrofluoric Acid 40%	7664-39-3	Fluohydric Acid	>480	6
Hydrofluoric Acid 60%	7663-39-3		>480	6
Hydrogen Peroxide 35%	7722-84-1	Albone, Peroxide, Hydrogen Dioxide, Hydroperoxide,	>480	6
Hydrogen sulphide	04/06/7783		>480	6
Isopropyl Alcohol	67-63-0	2-Propanol, IPA, Isopropanol, Petrohol, Dimethyl Carbinol	>480	6
Maleic Anhydride	108-31-6		>480	6
Mercury	7439-97-6		>480	6
Methanol	67-56-1	Methyl Alcohol, Wood Alcohol, Wood Naphtha, Wood Spirit	>480	6
Methyl Chloride	74-87-3		>480	6
Methyl Ethyl Ketone	78-93-3	MEK, Ethyl Methyl Ketone	>540	6
Methyl methacrylate (>99.0 wt%)	n/a		>540	6
Methyl Parathion	298-00-0	dimethyl-4-nitrophenyl, phosphorothionate	>480	6
N,N-Dimethylacetateamide (liquid)	526-84-7		>480	6
N. Methyl Pyrrolidone	872-50-4		>480	6
Nitric Acid Conc (70%)	7697-37-2	Aquafortis,	>480	6
Nitrobenzene	98-95-3	Oil of Mirbane, Nitrobenzol,	>480	6
Paraffin	8002-74-2		>480	6
Perchloroethylene	127-18-4	Ankilostin, Tetropil, Tetrachloroethylene, Tetracap, Didkene	>480	6
Petrol (unleaded)	8006-61-9	Gasoline, Benzin,	>480	6
Phenol liquid (90%)	108-95-2	Phenylic Acid, Phenic Acid, Phenyl Hydroxide, Oxybenzene	>540	6
Phenol liquid @ 45°C	108-95-2		>480	6
Phenol/Benzyl Alcohol 25/5	n/a		>480	6
Phosphoric Acid o 85+%	7664-38-2	Orthophosphoric Acid	>480	6
Phosphoric Pentachloride	10026-13-8		>480	6
Pivalic Acid	3377-92-2		>480	6
P-Nitrochlorobenzene 88°C	100-00-5		>480	6
Polyethylene Glycol 200	n/a		>480	6
Pro-set 125M Resin (960217)	n/a		>480	6
Pro-set 226pf Hardener (960228)	n/a		>480	6
Propionaldehyde	123-38-6		>480	6
Propionic Acid	79-09-4		>480	6
Propionitrile	107-12-0		>480	6
Propylene Oxide 99%	75-56-9		30	2
Reglone	85-00-7		>480	6
Ripcord	52315-07-8		>480	6
Round-Up	38641-94-0		>480	6
Sodium Cyanide (satd soln)	143-33-9		>480	6
Sodium Fluoride (satd)	7681-49-4		>480	6
Sodium Hydroxide 50%	1310-73-2	Soda Lye, Caustic Soda,	>480	6
Sodium Hypochlorite	7681-52-9	Bleach	>480	6
Sodium Monochloride	n/a		>480	6
Sodium Silicofluoride (sat'd)	16893-85-9		>480	6
Styrene	100-42-5	Cinnamol, Styrol, Vinylbenzene, Ethylbenzene, Styrolene,	>480	6
Sulphuric Acid 95+%	7664-93-9		>480	6
Sulphuric Acid 98+%	7664-93-9	Oil of Vitriol, Oleum (98%), Nordhausen Acid (98%), BOV	>480	6
SUVA HCFC-123 (1,1,1 Dichloro-2,2,2 Trifluoroethane)	n/a		380	5
TEGO 51	n/a		>480	6
Tetrabutyl Methyl Ether	1634-04-4		73	3
Tetrachloroethylene	79-01-6		>480	6
Tetrahydrofuran (THF)	109-99-9		19	2
Tetramethyl Ammonium Hydroxide (Sat'd)	75-59-2		>480	6
Thionyl Chloride	07/09/7719		2	0
Thiourea Dioxide (sat'd)	1758-73-2		>480	6
Toluene	108-88-3	Toluol, Methacide, Phenylmethane, Methyl Benzene,	>480	6
Toluene 2,4 Diisocyanate	584-84-9	TDI, Nacconate 100	>480	6
Toluidine o	95-53-4		>480	6
Transformer Oil	n/a		>480	6
Trichloroacetic Acid 98%	76-03-9		>480	6
Trichloroethylene	79-01-6	Algylen, Westrosol, Trimar, Trilene, Triline, Trielene,	7	0
Triethylamine	121-44-8		5	0
Vinyl Acrylate	n/a		>480	6
Vinyl Benzyl Chloride	n/a		>480	6
Xylene m	1330-20-7	Xylol, Diethyl Benzene,	>480	6



Occupational Health & Environmental Safety Division

3M Malaysia Sdn. Bhd. (7251 V)

Bangunan 3M,
No. 6, Persiaran Tropicana
47410 Petaling Jaya
Selangor, Malaysia
Tel: 03-7806 2888
Fax: 03-7806 2895/6
www.3M.com/occsafety