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

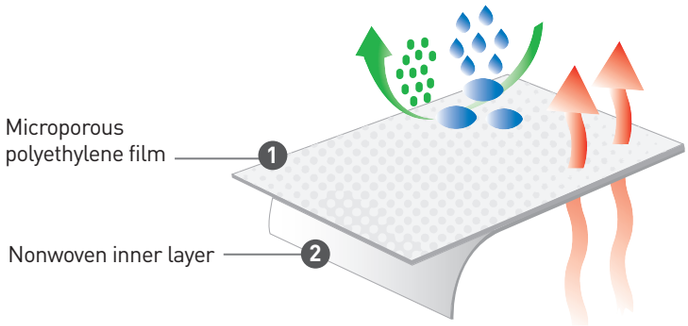
Anti-static - Tested according to EN 1149-5

*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.

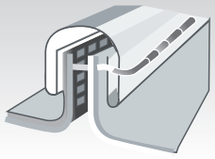


Protection Levels & Additional Properties

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 x 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·K/W)	16.3·10^{-3}	-
EN 31092/ISO 11092 Water Vapour Resistance (Ret in m^2·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

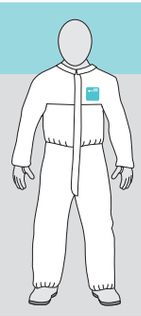
MICROGARD® 2000 products have been extensively tested according to European and International requirements, including ASTM, for both physical and barrier performance. More details can be found on our website **www.microgard.com**

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

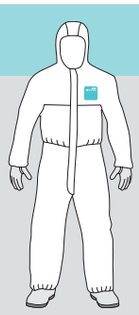


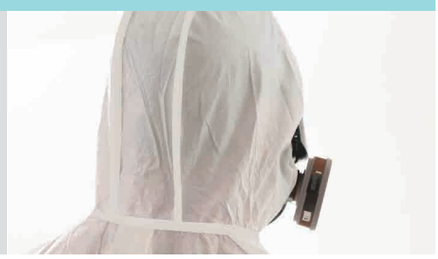
MICROGARD® 2000 STANDARD Coverall Models (continued)

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

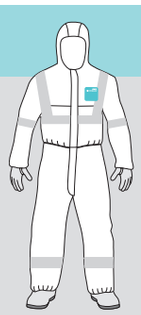




Model 113

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

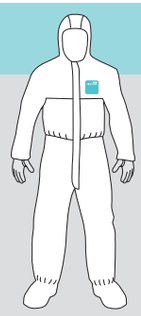
Sizes: S-3XL
Colour: White



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

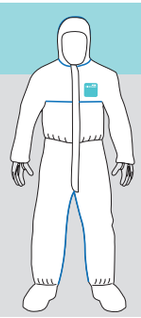
Sizes: S-3XL
Colour: White



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

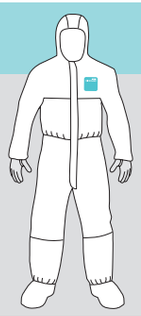
Sizes: S-3XL
Colour: White



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

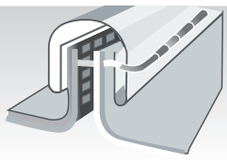
Bound seams ensure spray tight protection to the front of the garment and excellent overall particle protection.

* 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.

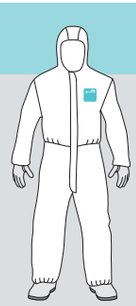
MICROGARD® 2000 COMFORT Coverall

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

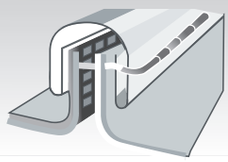
Protection Levels & Additional Properties

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

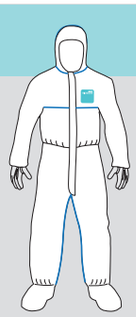
Bound Seams

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.

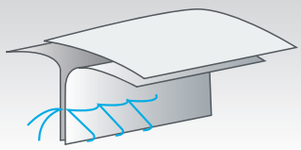
*EMSL test method

MICROGARD® 2000 Ts PLUS Coveralls

Protection Levels & Additional Properties

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

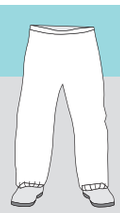
MICROGARD® 2000 Accessories

Model 209

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

Sizes: S-3XL
Colour: White

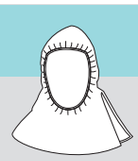
Model 301



Trousers
- Elastication to waist and ankles
- Bound seams

Sizes: S-3XL
Colour: White

Model 503



Hood
- Balaclava Style
- Elasticated face opening
- Bound seams

Size: One Size
Colour: White

Model 213

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

Size: One Size
Colour: White

Model 400

Overshoes
- Elasticated opening
- Bound seams

Size: One Size (fits 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

▲ Cape Hood

Model 214

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

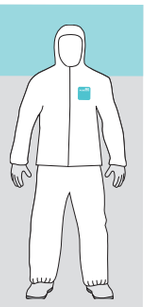
Sizes: S-3XL
Colour: White

Model 401

Overshoes
- Elasticated opening
- Bound seams

Size: One Size (fits size 46-48)
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 406

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

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**

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

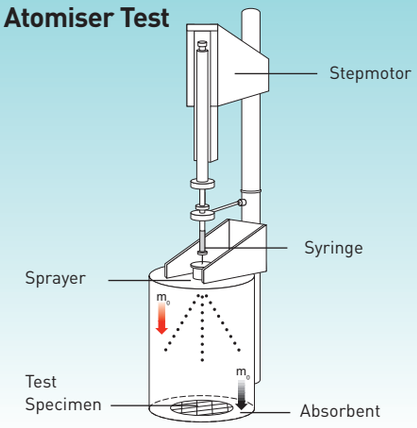
For more information on protecting your work force from pesticides visit **www.microgard.com**

▲ 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