

INTERNATIONAL
**ENVIRO
GUARD**

MANUFACTURER OF
DISPOSABLE PROTECTIVE
CLOTHING

2023

INTERNATIONAL ENVIROGUARD

GUIDE TO CLEANROOM CONTAMINATION CONTROL

Learn about common sources of cleanroom contamination & how to best maintain your Sterility Assurance Level (SAL).



www.int-enviroguard.com

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ABOUT OUR COMPANY

For over 30 years, International Enviroguard has designed and manufactured an extensive assortment of disposable protective clothing and surface protection for a wide array of industries such as oil and gas, pharmaceuticals, construction, controlled environments, food processing, healthcare, agriculture, environmental remediation, and more.

INTERNATIONAL ENVIROGUARD PRODUCTS

- Body Filter 95+®
- Carpet Guard™
- ChemSplash® 1
- ChemSplash® 2
- Enviromat®
- GammaGuard CE®
- MicroGuard MP®
- MicroGuard CE®
- Polypropylene
- PyroGuard FR®
- PyroGuard CRFR™
- SMS
- Soft Scrubs™
- ValuGuard MP™
- ViroGuard®
- ViroGuard® 2



WE KNOW PROTECTION

International Enviroguard is the go-to supplier after a crisis. Our expertise in assessing protective needs and our nimble ability to deliver, has kept several essential teams safe after natural and man-made disasters. We are called in to support teams as they work on hurricane clean-up, infectious disease outbreaks and oil spills. Our ability to quickly identify and deliver the best protection for the job extends beyond these disasters to our entire operation.



WE DELIVER AFFORDABLE CONFIDENCE

International Enviroguard delivers engineered protection for the best total cost. We safeguard your people with a comfortable fit, performance and quality that can reduce waste and increase safety. We deliver more than products, we give you the power to reduce total costs, while enhancing protection and productivity.

WE CREATE A MORE COMFORTABLE WORKDAY

Comfort matters in the workplace. We design garments that shield you from pathogens, contaminants and grime while giving you the comfortable dexterity you need to do your job with confidence. Our innovative materials keep you cool, while our thoughtful design and sizing improve fit, wearability and ultimately, protection.

WE INNOVATE A BETTER EXPERIENCE

We are passionate about safeguarding what matters through innovation. Design thinking, flexible operations and an empowered culture drive our team to continually identify and solve new challenges. From optimal fitting garments and cooler fabrics, to advanced protection and user-driven product features, we engineer comfort and productivity in every inch.

LEARN ABOUT CONTROLLED ENVIRONMENTS

Industries concerned with high-level contamination face a worksite challenge of reducing or eliminating airborne particles, vapors, dust, and human-generated contaminants. Part of the process includes understanding the differences of a controlled environment vs a clean room and creating a strategy that ensures cleanliness levels are maintained.

What is a controlled environment?

A controlled environment, also referred to as a critical environment, is a space with carefully controlled environmental variables, such as air temperature, air pressure, and humidity, to meet operational requirements. At minimum, a controlled environment must meet three conditions: complete separation from other areas, fully controlled temperature, and air pressurization.

Companies that employ controlled environment strategies limit human traffic and require a degree of personal protective clothing in the area. Operations that implement controlled environment practices are not necessarily required to measure and regulate airborne particles in the environment. But specialized HVAC filters are usually monitored and replaced at a higher rate than other industries.

Concerns about controlling agents that are carried into the space by workers and visitors are routinely addressed. Controlled environments are not required to meet the high decontamination standards as a cleanroom.

Common Applications for Controlled Environments

- Engineering labs
- Laser labs
- Hospitals
- Cannabis and hemp grow rooms
- Clean manufacturing
- Food processing rooms
- Pharmacies
- Life science labs
- High energy physics labs

Controlled Environment Minimum Requirements



Complete separation from other areas



Fully controlled temperature



Air pressurization



LEARN ABOUT CLEANROOMS



What is a clean room environment?

A cleanroom is a type of controlled environment, but it has much more stringent requirements. In a clean room environment, personnel are tasked with identifying and controlling the number of particles per cubic meter to meet International Organization for Standardization (ISO) thresholds. In more simple terms, cleanrooms must meet standards that dictate the acceptable amount of particles in the air. This includes the use of environmental controls, decontamination, and filtration.

Cleanrooms require a specialized design and equipment, which is not required in a controlled environment. The goal of a cleanroom is to have a particle-free environment without dust, mold, or microorganisms. Specialized filtration and cleaning technology must be used to varying degrees depending on the application or industry.

Decision-makers typically need to identify the appropriate level of sanitation and control the space to meet or exceed clean room ISO guidelines.

Industries that leverage clean rooms include the following:

- Semiconductor Production and Microelectronics
- Pharmaceutical & Biotech Industry
- Medical Device Manufacturing and Packaging
- Life Sciences & Research
- Military Defense Contractors
- Aerospace

The important takeaway is that clean rooms are defined by successfully regulating the enclosed environment. Like other types of controlled environments, clean rooms also address temperature, humidity, airborne particles, and potential contaminants. Almost always, employee separations are imposed, and disposable protective clothing is worn.

UNDERSTANDING CLEANROOM CLASSIFICATIONS

A “cleanroom” refers to a space which meets ISO14644-1 or FED Std. 209E cleanroom classification standard. Currently, there are nine cleanroom classifications for particle contamination as outlined by the International Standards Organization, known collectively as ISO 14644-1 Standards. To meet requirements of a cleanroom, the air within an enclosed space must not exceed a particulate count as detailed by that room’s specific ISO classification.

These standards and regulations establish air changes per hour, the level of acceptable particles per cubic meter, and the acceptable size of those particles measured in micrometers (µm).

Standards are divided into classifications, also known as ISO 1 through ISO 9. Effectively, these delineate varying degrees of air cleanliness. Lower numbers denote a higher level of cleanliness, with class 1 as the most stringent and Class 9 as the least.

ISO-5 Cleanrooms (Class 100)

- Required to have 300-480 air changes per hour of HEPA filtered air and less than 29 particles/meter³ greater or equal to 5 microns.
- ISO-5 cleanroom classification also has requirements for >0.5 micron and >1 micron size particles. The equivalent FED standard is class 100 or 100 particles per cubic foot.
- Common applications include semiconductor manufacturing, pharmaceutical filling rooms, and laser & optics.

ISO-6 Cleanrooms (Class 1,000)

- Must have less than 35,200 particles >0.5 micron per cubic meter and 180 HEPA filtered air changes per hour. The equivalent FED standard is class 1000 or 1000 particles per cubic foot.
- Common applications include semiconductor manufacturing, pharmaceutical filling rooms, and laser & optics.

ISO-7 Cleanrooms (Class 10,000)

- Must have less than 352,000 particles >0.5 micron per cubic meter and 60 HEPA filtered air changes per hour. The equivalent FED standard is class 10,000 or 10,000 particles per cubic foot.
- Common applications include pharmacy USP797 compounding rooms, aerospace composite repair, PCB electronics manufacturing, precision industrial manufacturing, and medical device manufacturing.

ISO-8 Cleanrooms (Class 100,000)

- Must have less than 3,520,000 particles >0.5 micron per cubic meter and 20 HEPA filtered air changes per hour. The equivalent FED standard is class 100,000 or 100,000 particles per cubic foot.
- Common applications include mask manufacturing, pharmaceutical cream manufacturing, food processing/bottling, 3D printing, plastic extrusion for medical devices, e-liquid manufacturing, and nutraceutical packaging.

ISO-9 Cleanrooms (Room Air)

- Must have less than 35,200,000 particles >0.5 micron per cubic meter and 0-25 HEPA filtered air changes per hour.



UNDERSTANDING CLEANROOM CLASSIFICATIONS

ISO 14644-1 Cleanroom Standards | Cleanroom Classifications

Cleanliness Level	ISO Class Number	Maximum concentration limits (particles/m ³ of air) for particles equal to and larger than the sizes shown						Particles/ft ³ of air	FED STD 209E equivalent
		≥0.1 μm	≥0.2 μm	≥0.3 μm	≥0.5 μm	≥1 μm	≥5 μm		
Extremely Clean	ISO 1	10	2						
	ISO 2	100	24	10	4				
	ISO 3	1,000	237	102	35	8		1	Class 1
	ISO 4	10,000	2,370	1,020	352	83		10	Class 10
	ISO 5	100,000	23,700	10,200	3,520	832	29	100	Class 100
	ISO 6	1,000,000	237,000	102,000	35,200	8,320	293	1,000	Class 1,000
	ISO 7				352,000	83,200	2,930	10,000	Class 10,000
	ISO 8				3,520,000	832,000	29,300	100,000	Class 100,000
Clean	ISO 9				35,200,000	8,320,000	293,000		

Design Requirements for Cleanroom Classifications

Criteria	Class 10 ISO4	Class 100 ISO5	Class 1,000 ISO6	Class 10,000 ISO 7	Class 100,000 ISO 8
Air changes per HR/Min	500 to 600 / 8 to 10	300 to 480 / 5 to 8	180 / 3	60 / 1	20 / 0.33
Filter coverage %	90 - 100	60 - 70	20 - 30	7 - 15	4 - 5
CFM per square foot	85 - 90	36 - 65	18 - 32	9 - 16	4 - 8
Filter Efficiency	99.9997% UPLAs	99.997% HEPAs	99.997% HEPAs	99.997% HEPAs	99.97% HEPAs

UPLA Filter: Ultra Low Particulate Air filter. More dense than HEPA filters, making them 99.999% effective at removing particles 0.12-microns or larger.

HEPA filter: High Efficiency Particulate Air filter. 99.97% effective for removing particles of 0.3-micron diameter or larger.

CLEANROOM SOURCES OF CONTAMINATION

Primary Sources of Cleanroom Contamination: People, products, liquids, tools, equipment, and processes



The Human Body

The human body is one of the largest sources of clean room contamination. Depending on the clean room's ISO Class, different levels of protective clothing and additional procedures may be needed to meet ISO standards.

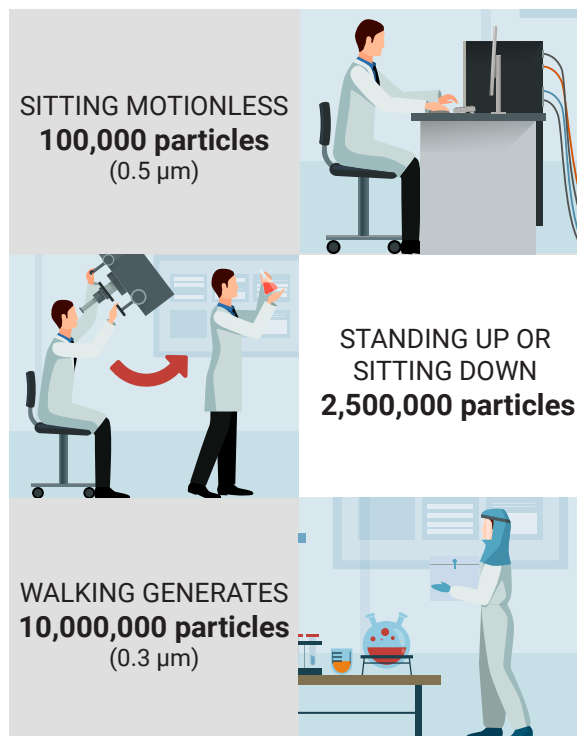
Here's how clean room personnel can unintentionally contaminate the environment:

- Not following proper gowning protocols like aseptic donning, gowning insufficiently, or going too long between changing garments may introduce particulates into the workspace.
- An improper fit of protective clothing or equipment may release particulates. If the clothing is too tight, it may rip from tension. If the garment is too large, it may snag on equipment or tools. Any ripping or tearing of fabric can release clothing fibers.
- The human body is continually shedding skin particles and hair.
- Beauty and cosmetic products like makeup, nail polish, hair spray, after-shave, and perfumes may release particulates

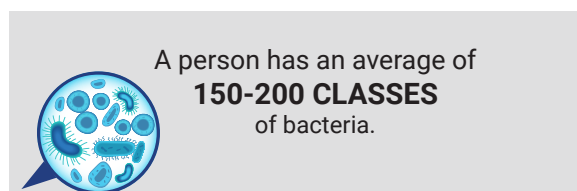
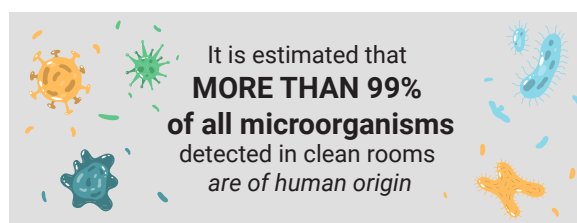
Control measures

- Train all clean room personnel on proper donning and doffing techniques for the ISO level.
- Consider aseptic donning techniques.
- Wear proper fitting protective clothing; not too large, not too tight
- Use low-linting protective clothing with a high tear and abrasion resistance to reduce particulate shed
- Use cuff sealing tape to prevent the spread of particulates from inside protective clothing
- Reduce movement as much as possible
- Train employees and cleaning teams on proper cleaning techniques and proper disposal.

Particulates generated from common activities (particles/ft³/min.)



Cleanliness Facts



CLEANROOM SOURCES OF CONTAMINATION



Labels and Tapes

Paper labels and tapes are one of the most common sources of contamination in the cleanroom, particularly if they are paper-based, have a paper core and/or contain adhesives that outgas or leave a sticky residue behind.

Control measures: Avoid tape manufactured on a cardboard core. Use tape rolls with a plastic core with a smooth surface. A burr-like core with sharp edges can puncture cleanroom gloves or bags, exposing your work area to further contamination. In terms of backings and liners, avoid tapes with paper backings or face stocks. Instead, use liners or backings made of synthetic materials to eliminate particle generation.

Adhesives: Adhesives can leave behind a sticky residue that outgasses and traps other contaminants in the workspace. To eliminate all of the label-generated, adhesive-based sources of contamination, use residue-free, cleanroom certified tapes, disposable liners, and packaging from a certified provider.



Liquids and Moisture

Water is commonly used in production processes and for cleaning purposes, however it is a large source of contamination. Water not only carries bacteria, but it may cause mold growth without proper humidity controls in place. Water purification is critical in cleanrooms. Tap water should not be used for cleaning or within processes as it is highly impure.

Chemical products: In a cleanroom, many cleaning solutions are purpose-specific (e.g., products that can only be used to clean the floor and not counters). This helps reduce the unintentional spread of contaminants to other areas of the clean room.

Control measures: Using highly purified chemicals to reduce contaminants. Ensure chemicals are delivered in non-corrosive containers; even the containers can cause contamination. Using solutions that minimize off-gassing reduces the release of unwanted gas into the air.

CLEANROOM

SOURCES OF CONTAMINATION



The Air

Room air contains 35,200,000 microns (0.5 microns or larger) of particulate matter per cubic meter, which is equivalent to ISO 9, the lowest cleanroom classification. The air carries a variety of particles, including skin flakes, hair, dander, clothing fibers, aerosols, as well as vapors and moisture. Contaminants in the air can cause electrostatic attraction, which may trigger chemical reactions that spread contamination through the air.

Control measures: Indoor air quality monitoring through the use of HEPA filters, air particle counters, humidity monitoring systems, and static electricity controls can help prevent air contamination.



The Facility

The clean room facility should be inspected regularly and cleaned appropriately. Occurrences such as a leak or peeling paint will cause contamination. This also applies to anything entering or leaving the facility such as a rolling cart, cleaning materials, incoming raw materials, and personnel. Other factors that can contaminate a facility include improper air flow, malfunctioning equipment, and humidity levels.

Control measures: Routinely inspect the facility design and components for sources of possible contamination. A formalized cleaning routine and process(es) help maintain ISO contamination standards by ensuring the workspace and equipment are properly cleaned. Indoor air quality monitoring via HEPA filters, air particle counters, humidity monitoring systems, and routine equipment cleaning help mitigate facility contamination sources.



Equipment and Processes

Equipment: Tools and machinery may generate gases, volatiles, and solid airborne particulates in all stages of operation. Any unclean equipment can lead to debris, flakes, chips, or a buildup of grease / grime from raw materials or processes. The equipment itself may generate vibrations or emissions that also create contaminants.

Cleaning process: Cleaning products and solutions are typically purpose-specific and should only be used for the specified cleaning area (i.e. floors only, counters only, etc.).

Control Measures: One of the best ways to keep contaminants at a minimum is to purchase cleanroom-grade solutions, disinfectants, and materials from an ISO-certified clean room supplier. Cleaning materials such as nonparticulating wipes and mops, and highly purified chemicals that reduce off-gassing are great ways to reduce contamination. Additionally, vacuums must have a classification rating equal to or better than the cleanroom ISO Class in which they are to be used.

CLEANROOM

SOURCES OF CONTAMINATION



Packaging

Most cleanroom packaging consists of polyethylene or nylon-based materials such as bags, sheeting / films, and containers. Many packaging materials are also anti-static, meaning they help prevent the buildup of static electricity.

Control Measures: Bagged items should be double-bagged and properly de-bagged so contamination from outside packaging is not brought into the cleanroom. Anti-static and low outgassing packaging materials are other great options for reducing contamination. Most paper-based products are avoided in cleanroom settings to prevent particle shed, this includes cardboard boxes, cardboard tape cores, and paper-based labels.

All packaging should be inspected before entering the cleanroom to ensure proper packaging and to look for any damage. Consider purchasing items from suppliers that use “clean-processed” packaging, or sterile packaging methods.



Raw Materials

Before any raw material or manufacturing product is brought into a cleanroom, it must be cleaned thoroughly. Contaminants can lurk on packaging or occur if materials are not handled properly when unpacking.

Control Measures:

Inspecting all items entering and leaving the facility, including proper decontamination procedures, helps reduce contamination. More stringent clean rooms often have on-site sterilization technology that can further reduce foreign debris. The two most common sterilization methods include Ethylene Oxide Gas Sterilization (ETO sterilization) and Gamma Irradiation Sterilization.



Static Charge

The presence of static electricity can cause product defects, equipment malfunction, affect sensitive processes, or generate sparks and flames. Static electricity can also cause chemical reactions with other chemicals, vapors, or particulates in the air.

Control Measures:

- Controlling humidity and ventilation
- Use of anti-static or “ionizing bars” to neutralize charged materials
- Use of anti-static guns that emit positive and negative charges to neutralize static on a surface.
- Use of anti-static agents, which are compounds used for treating materials or their surfaces to reduce or eliminate the buildup of static electricity. These agents are often available in the form of a liquid that is sprayed on surfaces to neutralize any static buildup.
- Donning anti-static work wear prevents static discharge. Look for garments that are certified to the anti-static regulation EN 1149-5.
- Use of anti-static packaging materials

LEARN ABOUT CLEAN ROOM CLOTHING



The Importance of Anti-Static Protective Clothing

Clean rooms and controlled environments involve many products and processes that are sensitive to static electricity. Static electricity can attract particulates and other contaminants to a product or area, causing damage. If dirt and debris infiltrates products or processes, it can lead to contamination, defects, recalls, health hazards, reduced productivity, and poor overall quality. This is where anti-static protective clothing plays a key role in clean rooms.

Protective clothing that is certified to EN 1149-5 is anti-static. **The EN 1149-5 standard** describes the requirements for electrostatic properties for safety apparel used in areas with a hazard of sudden electrostatic discharge or a risk of explosion.

This regulation covers the performance requirements of the garment, including both static decay and surface resistivity. This means certified garments are safe for use in ESD-sensitive environments and applications.

Clean-Processed Protective Clothing

In order for a product to be deemed clean-processed, it has to go through a clean-manufacturing process where employees are gowned in cleanroom attire, the manufacturing area is appropriately disinfected, and the addition of particulates to products is highly controlled. Clean-processed products are often referred to as "low linting."

Clean processing means that loose particles, threads, and other contaminants are removed before packaging, lessening the chance of contamination in a clean room or controlled environment.

More specifically, "no item of clean room clothing should be issued [to cleanroom workers] as received from the manufacturer. It must be laundered first to remove all loose threads and other contaminants possible to adhering to the surface."



LEARN ABOUT CLEAN ROOM CLOTHING



Sterile Protective Clothing

For work environments with the highest level of contamination control, sterile garments are needed. After sterile clothing is manufactured, it undergoes a sterilization process to remove contaminants. Sterilization minimizes the possibility of life forms and transmissible agents remaining on products or packaging. These life forms include microorganisms, bacteria, spores, fungus, and viruses.

There are multiple levels of sterilization. Different uses for sterilized products call for different levels of sterilization, often referred to as a Sterility Assurance Level, or SAL. The SAL addresses the possibility of bacteria, viruses, spores, or other microorganisms surviving the sterilization process of items such as medical devices, drugs/medications, protective clothing for cleanrooms, and more.

The highest SAL is 10^{-6} which is required for anything that enters the body other than through the digestive tract, and for sterile cleanrooms that involve pharmaceutical compounding, consumer drug manufacturing, or highly sensitive aerospace work.

Common Features of Controlled Environment Clothing

- **Bound Seams:** Bound seams are seams covered by an over-locking piece of fabric. This added fabric reinforces the seam, making it stronger and less likely to pull apart. If seams pull apart or tear, it can introduce contaminants from the garment and/or the worker into the clean room environment.
- **Tunnelized Elastic or "Channelized Elastic":** Raw edges on elastic often shed particles. To control this, it can be encapsulated in a "tunnel". This tunnel fully contains the elastic to seal off raw edges that can generate particulates.
- **Low-Linting:** Garments that are low linting minimize the amount of particles shed from the garment.
- **Abrasion Resistant:** Abrasion-resistant garments resist scratches that can release particles into the workspace.
- **Tear Resistant:** Garments that are tear-resistant have more durable fabric. Any rip or tear in the clothing can release particles from the clothing or contaminants from inside the clothing.

Tunnelized Elastic



INTERNATIONAL ENVIROGUARD CLEAN ROOM PROTECTIVE CLOTHING

Soft Scrubs™

Soft Scrubs™ are made of a durable, three layer SMS fabric. This breathable fabric offers “no-show through” coverage and provides an excellent barrier to particles. All scrub garments are anti-static to prevent electrostatic discharge.



PHYSICAL PROPERTY	TEST	RESULT
Weight	ASTM D3776	1.1 oz/y ²
Tensile Strength, Machine Direction	ASTM D5034	17 lbs
Tensile Strength, Cross Direction	ASTM D5034	25.9 lbs
Tear Strength, Machine Direction (Trapezoid)	ASTM D1117	6.1 lbs
Tear Strength, Cross Direction (Trapezoid)	ASTM D1117	9.3 lbs
Ball Burst Strength	ASTM D3787	21 lbs
Air Permeability	ASTM D737	66 cfm

PHYSICAL PROPERTY	TEST	RESULT
Electrostatic Properties	EN 1149-5:2008	Pass

Available Garments



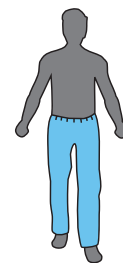
Denim Blue Short Sleeve Shirt, Round Hemmed Neck, Left Chest Pocket, Right Front Hip Pocket, Cloth Loop for Hanging

#2055B
Small - 4XL
30 per case



Denim Blue Long Sleeve Shirt, Round Hemmed Neck, Left Chest Pocket, Elastic Wrists, Cloth Loop for Hanging

#2054B
Small - 4XL
30 per case



Denim Blue Pants, Elastic Waist, Right Rear Hip Pocket, Open Ankles, Reinforced Crotch, Cloth Loop for Hanging

#2052B
Small - 4XL
30 per case

In a clean room and/or controlled environment, scrubs are often worn as an undergarment. This acts as an extra layer of contamination control if the outermost garment rips or tears

INTERNATIONAL ENVIROGUARD CLEAN ROOM PROTECTIVE CLOTHING

MicroGuard CE® | Clean-Processed Protective Clothing

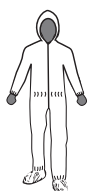
MicroGuard CE® clean-processed garments provide superior protection against particulates and non-hazardous liquids. Garments are designed to decrease particulate shed by combining low-linting fabric and tunnelized elastic. Clothing offers high mobility with less rip outs and comfort over long hours. All garments are individually packaged to prevent cross-contamination.

Available Garments



White Coverall with Tunnelized Wrists & Ankles

#CE8013CI
Sizes: Small - 4XL
25 per case



White Coverall with attached Hood & Boots and Tunnelized Wrists & Ankles

#CE8019CI
Sizes: Small - 4XL
25 per case



White Frock, No Pockets, Tunnelized Wrists

#CE8046CI
Sizes: Medium - 4XL
50 per case



White Full-Face Hood with Tunnelized Elastic Face. Covers Shoulders

#CE8063CI
Size: Universal
100 per case



White Sleeves, 21.5" Length, Tunnelized on Both Ends

#CE8065CI
Size: Universal
200 per case



Shoe Covers

Non-Skid Sole
CE8103CI
Size: Large
200 each per case

Non-Skid Sole
CE8105CI
Size: XL
200 each per case



Boot Covers

Non-Skid Sole
CE8104CI
Size: Large
200 each per case

Non-Skid Sole
CE8106CI
Size: XL
200 each per case

ISO CLASS	ISO CLASS LIMITS†	FS209 CLASS LIMITS††	MICROGUARD CE®
ISO 3	35	1	
ISO 4	352	10	
ISO 5	3,520	100	✓
ISO 6	35,200	1,000	✓
ISO 7	352,000	10,000	✓
ISO 8	3,520,000	100,000	✓
ISO 9	35,200,000	—	✓

† (particles / m³ of air) for particles equal to and larger than 0.5 microns

† † (particles / ft³ of air) for particles equal to and larger than 0.5 microns

INTERNATIONAL ENVIROGUARD CLEAN ROOM PROTECTIVE CLOTHING

MicroGuard CE® | Clean-Processed Protective Clothing

Physical Testing

TEST	METHOD	RESULT
Air Permeability (cfm)	ASTM D737	<0.55
Burst Strength (lbs)	ASTM D3787	20
Tensile Strength (lbs) Machine Direction	ASTM D5034	23.2
Tensile Strength (lbs) Cross Direction	ASTM D5034	18.1
Tensile Strength (lbs) Trapezoidal - Machine Direction	ASTM D1117	9.76
Tensile Strength (lbs) Trapezoidal - Cross Direction	ASTM D1117	4.97

Liquid & Chemical Testing

TEST	METHOD	RESULT
Bleach 5%	ASTM T903	Pass
Hydraulic Jack Oil	ASTM T903	Pass
Isocyanate Based Paint Hardener	ASTM T903	Pass
Motor Oil	ASTM T903	Pass
Sodium hydroxide	ASTM T903	Pass
Mineral Oil	ASTM T903	Pass
Blood	ASTM 1670-07	Pass

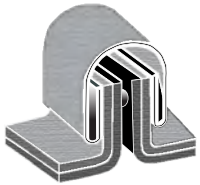
PHYSICAL PROPERTY	TEST	RESULT
Electrostatic Properties	EN 1149-5:2008	Pass



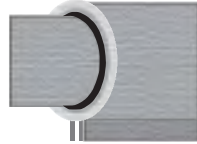
INTERNATIONAL ENVIROGUARD CLEANROOM PROTECTIVE CLOTHING

GammaGuard® CE Sterile Safety Clothing

Suitable for ISO Classes 5-9



BOUND SEAMS



**TUNNELIZED
ELASTIC**

ISO CLASS	ISO CLASS LIMITS†	FS209 CLASS LIMITS††	GAMMAGUARD® CE
ISO 3	35	1	
ISO 4	352	10	
ISO 5	3,520	100	✓
ISO 6	35,200	1,000	✓
ISO 7	352,000	10,000	✓
ISO 8	3,520,000	100,000	✓
ISO 9	35,200,000	—	✓

† (particles / m³ of air) for particles equal to and larger than 0.5 microns

†† (particles / ft³ of air) for particles equal to and larger than 0.5 microns



TUNNELIZED ELASTIC WRISTS

contain particulate shed



PARTICULATE & LIQUID BARRIER

for dual protection



INDIVIDUALLY PACKAGED

helps to prevent
cross-contamination



**MADE IN ISO-13485
CERTIFIED FACILITY**
for quality assurance



STERILE-DON™ PACKAGING
ensures loose particles are
removed & coveralls are partially
inside out for quick donning



CERTIFICATE OF STERILITY
included in each case



LOW-LINTING
to reduce particle shed



TEAR-RESISTANT
for enhanced durability



STERILIZED TO 10⁻⁶ SAL
for sterile work settings

GammaGuard® CE Physical Testing

TEST	METHOD	RESULT
Weight, oz/y ²	ASTM D3776	1.8
Ball Burst Strength (lbs)	ASTM D3787	21
Tensile Strength (lbs) Machine Direction	ASTM D5034	15
Tensile Strength (lbs) Cross Direction	ASTM D5034	24.5
Tensile Strength (lbs) Trapezoidal - Machine Direction	ASTM D1117	2.4
Tensile Strength (lbs) Trapezoidal - Cross Direction	ASTM D1117	5.6
Air Permeability (cfm)	ASTM D737	<0.55
Helmke Drum Particle Test	IEST-RP-CC003	Category 1



INTERNATIONAL ENVIROGUARD CONTAMINATION CONTROL PRODUCTS



Enviromat® | Clean Room Tacky Mats for Contamination Control

Enviromat® is a multi-layered and numbered adhesive pad that removes particulates from the soles of footwear and rolling carts prior to entry into a clean room or controlled environment. No traction board or frame is needed for installation.



Long-Lasting Protection

With 30-layers per pad, this long-lasting tacky mat protects flooring throughout lengthy or multiple projects.



Easy Peel-Off, Numbered Layers

Layers are easy to peel off when soiled and each layer is numbered (30= top sheet, to 1= last sheet) to show how many are left.



Stop Dirt, Dust, and Debris

A sticky adhesive traps debris caught in the soles of shoes to reduce added cleanup and damage to flooring or carpeting.



Water-Based High-Tack Adhesive

keeps the mat firmly in place.



Stays Securely in Place

Enviromat stays in place, even with continuous foot traffic.



Multiple Sizes & Colors

Enviromat comes in a variety of sizes and colors to fit your worksite needs.

INTERNATIONAL ENVIROGUARD CONTAMINATION CONTROL PRODUCTS

Colors and Sizing

STYLE	DESCRIPTION
EM1836R30B	Blue, 18"x36", 30 sheets/pad, 4 pads/carton, 10 cartons/case
EM1836R30C	Clear, 18"x36", 30 sheets/pad, 4 pads/carton, 10 cartons/case
EM2430R30B	Blue, 24" x 30", 30 sheets/pad, 4 pads/carton, 10 cartons/case
EM2430R30W	White, 24"x30", 30 sheets/pad, 4 pads/carton, 10 cartons/case
EM2436R30B	Blue, 24"x36", 30 sheets/pad, 8 pads/carton, 10 cartons/case
EM2436R30W	White, 24"x36", 30 sheets/pad, 4 pads/carton, 10 cartons/case
EM3636R30	Clear, 36"x36", 30 sheets/pad, 4 pads/carton, 10 cartons/case
EM3645R30B	Blue, 36"x45", 30 sheets/pad, 4 pads/carton, 10 cartons/case

Physical Properties

PROPERTY	RESULT
Ability of Dust Removal (Five steps with weight 100kg)	99.9%
Thickness per Sheet	45 microns
Sheet Quantity	30 sheets/mat
180° Peeling off Strength	330-350 g/25mm
Adhesive Type	Water-based Acrylic
Substrate	Polyethylene Film
Chemical Name	Polyethylene
Chemical Formula	Proprietary



CLEANROOM

GLOSSARY OF TERMS

Glossary of Clean Room and Controlled Environment Terms

Anti-Static: A material that is anti-static prevents the buildup of static electricity or reduces the effects of static electricity. Anti-static protective clothing and materials help reduce the likelihood of electrostatic discharge (ESD).

Anti-Static Regulation EN 1149-5: EN 1149-5: This standard outlines the requirements for electrostatic properties for safety apparel that is used in areas with a hazard of sudden electrostatic discharge or a risk of explosion. The regulation covers the performance requirements of the garment for both static decay and surface resistivity. Certified garments are considered safe for use in ESD-sensitive applications.

Clean-Processed: Clean processing of protective clothing means that loose particles, threads, and other contaminants are removed before packaging, lessening the chance of contamination in a clean room or controlled environment. All garments undergo a clean-manufacturing process where employees are gowned in cleanroom attire, the manufacturing area is appropriately disinfected, and the addition of particulates to products is highly controlled.

Electrostatic Discharge (ESD): The discharge or release of static energy that emits heat, light, and sound.

Ethylene Oxide Gas Sterilization (ETO sterilization): Commonly known as Gas Sterilization, EO (EO) sterilization is performed by exposing the material(s) to ethylene oxide gas. The cleaning process takes place in a vacuum-tight chamber. When all the air in the chamber is removed, a set amount of EO ensures proper cleansing is achieved. It is not ideal for materials that absorb gases.

Gamma Irradiation Sterilization: Gamma sterilization requires a radiation source and exposes a material to a controlled dose of gamma rays (radiation dose). The radiation source used is cobalt 60 and this material is often used for applications such as sterilization, decontamination, or to modify materials. This process is effective for sterilizing products with varying densities. It can penetrate products that are sealed in their final packaging to ensure the complete sterility of the packaging and raw materials.

Ionizing Bar: Ionizing bars rapidly neutralize static charges to prevent electrostatic attraction of particles (ESA) and electrostatic discharge (ESD).

ISO-Certified: Governed by the International Organization for Standardization, ISO Certification ensures a product complies with quality, safety, efficiency, and other standards that have been created to ensure optimal quality. Certification signifies that processes work efficiently and effectively, that all steps in the manufacturing process can be tracked. Overall, this certification ensures products can be traced and controlled throughout their development, thereby identifying any quality or compliance issues sooner. An ISO Certification is a designation that validates a manufactured product's quality and reliability.

Outgassing: Outgassing describes the release of a gas that was dissolved, trapped, frozen, or absorbed in a material.

Sterility Assurance Level (SAL): The SAL addresses the possibility of bacteria, viruses, spores, or other microorganisms surviving the sterilization process of items. The federal Food and Drug Administration (FDA) requires all devices that are labeled as sterile to have a sterility assurance level of 10⁻⁶.

Tunnelized Elastic: Elastic that has been encapsulated to prevent raw edges from shedding particulates. Also known as "channelized elastic". This method fully seals off elastic in its own "channel" to reduce the possibility of particulate shed. Any particulate shed is contained within the channel that surrounds the elastic.

INTERNATIONAL ENVIROGUARD DISCLAIMER

The information provided is based on technical data and research that International Enviroguard believes to be reliable. All information is subject to revision as further knowledge becomes available.

It is the user's responsibility to determine toxicity levels and the proper personal protective equipment needed. This information reflects the laboratory performance of fabrics under controlled conditions, not of complete "as-sold" garments.

This information is intended for use by individuals with the technical expertise to evaluate their specific end-use conditions, at his or her own discretion and risk. Anyone using or intending to use this information should first check that a garment is suitable for the intended use.

Customers of International Enviroguard are solely responsible for conducting their own Hazard Risk Assessment to identify safety hazards in their work environment. Customers of International Enviroguard are solely responsible for selecting appropriate garments and personal protective equipment for their employees based upon known or potential hazards.

Employers must ensure end-users properly use, care, and maintain their garments and personal protective equipment. An end-user should stop using a garment if the fabric becomes torn, punctured, or worn to avoid potential exposure to hazards.

As working conditions and other factors vary, International Enviroguard does not make or provide any warranties, expressed or implied, including but not limited to fitness for a particular use or purpose, and does not make any representation that these garments will protect end-users from injury.

INTERNATIONAL ENVIROGUARD DOES NOT ASSUME ANY LIABILITY IN CONNECTION WITH ANY USE OF THIS INFORMATION OR ITS PERSONAL PROTECTIVE PRODUCTS AND GARMENTS.