ISO Class 5 (Class 100) Cleanrooms
CLEANROOM CLEANING / PRODUCT GUIDE

A guide designed to outline the process of cleaning and maintaining ISO Class 5 (Class 100) Cleanrooms

- **Cleanroom Facts**

- **Cleanroom Classifications**

- **ISO Class 5 Cleaning Tips**

- **ISO Class 5 Garment Tips**

- **Proper Wipe Usage**

- **Recommended Supplies**

By Blue Thunder Technologies

www.BlueThunderTechnologies.com

Cleanroom Cleaning

WHAT ARE CLEANROOMS?

- A cleanroom or *clean room* is a controlled environment, typically used in manufacturing processes and scientific research facilities
- A cleanroom is designed to control contamination by monitoring airborne and surface particles, liquid levels, and static electricity.
- Use of filtration systems such as a high-efficiency particulate air (HEPA) and/or ultra-low penetration air (ULPA) filters aids in the removal of airborne particles.
- Two Standards are commonly used to classify cleanrooms. The Federal standard 209E is used domestically and the standard TC 209, established by the International Standards Organization, is recognized worldwide.

CONTAMINATION AND SOURCES

- Contamination can be caused by a number of environmental factors such as people, activities (such as movement), outside contaminants, HVAC systems and more.
- Contamination or particles can be found in the form of fibers, hair, skin flakes, bacteria, cosmetics and more
- A person in a sitting position produces about 100 thousand particles. A person walking 5 miles per hour produces 10 million!
- Ambient air outside in a typical urban environment contains 35,000,000 particles per cubic meter.

CONTAMINATION CONTROL

- Can be achieved by using the proper HEPA filtration system, furniture, procedures, garments, cleaning tools, wipes and more.

CLEANROOM ETIQUETTE

- Wear only cleanroom approved apparel. Depending on the cleanroom class and size, this may vary. Typically, garments such as gloves, lab coats, shoe covers, and eye protection are required.
- It is recommended to clean shoes with a sticky mat unless your cleanroom requires shoe covers.
- No food or water.
- Cosmetics and fragrances are discouraged and sometimes prohibited.
- If you must sneeze, do so in a corner covering your mouth with your arm.
- Do not block exits or fire extinguishers.

Cleanroom Cleaning

Minimum Apparel Recommendations					
	ISO 8 (Class 100,00)	ISO 7 Class (10,000)	ISO 6 (Class 1,000)	ISO 5 (Class 100)	ISO 4 (Class 10)
Beard Cover	✓	✓	✓	✓	✓
Face Mask				✓	✓
Boots			✓	✓	✓
Coverall			✓	✓	✓
Gloves				✓	✓
Hair Cover	✓	✓	✓	✓	✓
Hood				✓	✓
Frock	✓	✓			

Cleanroom Classification Chart

Class	FED STD 209E Equivalent	Maximum concentration limits (particles/m³ of air) for particles equal to and larger than the sizes listed below					
		0.1 micron	0.2 micron	0.3 micron	0.5 micron	1 micron	5 micron
ISO 1		10	2				
ISO 2		100	24	10	4		
ISO 3	1	1,000	237	102	35	8	
ISO 4	10	10,000	2,370	1,020	352	83	
ISO 5	100	100,000	23,700	10,200	3,520	832	29
ISO 6	1,000	1,000,000	237,000	102,000	35,200	8,320	293
ISO 7	10,000				352,000	83,200	2,930
ISO 8	100,000				3,520,000	832,000	29,300
ISO 9					35,200,000	8,320,000	293,000

Industries that use cleanrooms:

Aviation & Aerospace
Biotech
Education
Government
Health Care
Industrial /
Electronics Manufacturing
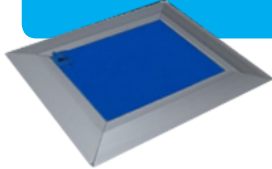Medical Device Manufacturing
Laboratory
Pharmaceutical
and More!

Cleanroom Cleaning

ISO Class 5 (Class 100) Cleanrooms

Minimum Apparel Recommendations	
	ISO 5 Class (100)
Beard Cover	✓
Face Mask	✓
Boots	✓
Coverall	✓
Gloves	✓
Hair Cover	✓
Hood	✓
Frock	

MAINTENANCE

It is very important to prevent contamination and maintain cleanliness by using sticky cleanroom mats before entering the cleanroom area. Replacement HEPA filters should also be changed regularly or as needed.

WHAT TO WEAR

Gloves: Cleanroom grade nitrile or latex gloves are recommended unless heavy duty cleaning or very harsh chemicals are being used.

Garments: SMS full body coveralls are often used in this critical environment. Another option, and possibly the best choice for a Class 100/ISO 5 cleanroom are Tyvek coveralls with an attached hood and boots. These coveralls are lightweight, resistant to water and chemicals, and provide excellent strength.

Bouffants: Bouffants are recommended in a Class 100/ISO 5 cleanroom. Tyvek Bouffants are a non-linting "clean" bouffant option.

Shoe Covers: Shoe covers are recommended in a Class 100/ISO 5 cleanroom. Polypropylene shoe covers are a cost effective option, offer excellent durability, and are cleanroom compatible.

Face masks and **eye protection** are typically necessary to maintain cleanliness in a class 100/ISO 5 cleanroom.

ISO Class 5 Cleaning Basics

CEILINGS

Cleaning should begin from the top down. Tacky rollers with extended handles can make this task much easier. In some cases it may be necessary to wet mop the ceiling. In this case, a self-wringing sponge mop with an extendable handle can be used. Another option is a flat mop with an extendable handle. Sometimes it is more effective to use a cleanroom wiping material cut to the size that will wrap around the head of an extendable mop handle. Occasionally, vacuum systems equipped with HEPA filters are used.

Di Water, a blend of Di Water and Isopropyl alcohol blends, cleanroom compatible cleaners, and disinfectants are examples of cleanroom compatible cleaning solvents.

WALLS

Walls can all be cleaned using the above mentioned methods. However, hand wiping is often more effective. It is important to select the proper wipe for use in this particular critical environment. Polyester knit wipers are recommended for use in a class 100/ISO 5 cleanroom. These wipes are extremely low in particle generation and have been laundered in a class 100 cleanroom using ultra-filtered water of 0.45 micron purity and HEPA-filtered air during moisture removal.

Cleaning solvents can be Di Water, a blend of Di Water and Isopropyl alcohol blends, cleanroom compatible cleaners, and disinfectants are examples of cleanroom compatible cleaning solvents.

Cleanroom Cleaning

ISO Class 5 Cleaning Basics Cont.

SURFACES

Only wipers that produce extremely low particulates should be used for wiping surfaces in a class 100/ISO 5 cleanroom. Lint free nonwoven wipers are commonly used for wiping surfaces in these cleanrooms. "Cleaner" wiping options would be the Ultimate 60 or Ultimate 70 Polyester Sealed Edge Wipers, which are both rated for this particular critical environment. If a super heavy, more absorbent wipe is needed, then the Ultimate 9 2-Ply Polyester Sealed Edge Wiper is a viable option. This wipe is comprised of two plies of continuous filament knitted polyester and is specifically rated for a class 10/ISO 4 cleanroom but also can be used in a class 100/ISO 5 cleanroom. Both layers are heat-bonded together and the edges are laser cut and sealed, making this wipe one of the "cleanest" available on the market.

The use of pre-saturated wipes with a blend of 70% Isopropyl alcohol and 30% Di Ionized water is very effective when "wet cleaning" is necessary. These wipes are packed in user friendly containers and have no loose fibers that are common with wet wipes in round pop-up containers.

If static charge is a concern, ESD wipes are available such as VISION 5 ESD Wipers, or Vision 1 Pink ESD Wipers.

Ultimate 5 ESD Wipers employ carbon fibers within the knit fabric. The fabric undergoes a multitude of special processes that include cleaning, scouring, cutting, and a special proprietary cleaning process.

FLOORS

The same rules apply for cleaning floors as they do for the ceilings except that an edgeless string mop can be added to your choice of mops. For these mopping systems, an autoclavable bucket and wringer is highly recommended.

* *It is important to note that all cleanrooms are not created equal when it comes to proper cleaning procedures. It is always recommended to consult your cleanroom procedural manual before attempting any of the following tasks. This guide was intended to demonstrate cleanroom products and the applications for which they are typically used.*