

FAQ

Frequently Asked Questions

Glossary of Terms

Aerosol – A suspension of very small particles approximately 100 microns or smaller in size in a gas, for example: fog, smoke, and fine sprays.

Aerosol Generators – Mechanical means of producing a system of dispersed phase and dispersing medium. Used to generate aerosols such as DOP for HEPA filter leak testing.

Aerosol Photometers – Light-scattering mass concentration indicating instruments have a threshold sensitivity of at least 10-3 microgram per liter for 0.3 micron diameter DOP concentrations over a range of 105 times the threshold sensitivity. Photometers may include hand-held remote meter probes which can scan for airborne contaminants in HEPA filters, in penetrations around frames, seals, and plenums, and in hoods and workstations. (IES)

Air Change Rate – The number of times the total air volume of a defined space is replaced in a given unit of time. This is computed by dividing the total volume of the subject space (in cubic feet) into the total volume of air exhausted from the space per unit of time. (NEBB)

Air Cleaners – Filtration systems that may be free standing or installed in a ceiling or wall; remove contaminants such as bacteria, viruses and dust from the air. Air cleaners may incorporate HEPA filters.

Air Dyers – Units that provide dry, pressurized air for drying wafers, instruments and other parts.

Air Showers – Chambers located between the cleanroom and an outside environment that remove particulate contamination from cleanroom garments as personnel pass through. The chambers may include HEPA filters, interlocking doors, a re-circulating air system, and air nozzles in various patterns through which filtered air is blown onto the personnel in the shower. The air is moved over the worker, removing particulate contamination from the worker's garments.

Air Velocity Meters/ Monitors – Meters measure and indicate the force and speed of airflow. Meters may use a variety of probes for measuring near HEPA filters and in right angles. Monitors check and regulate air velocity.

Airborne Particulate Cleanliness Classes – The statistically allowable number of particles per cubic foot of air according to Federal Standard 209E.

Alarms – Visual and audible alarms are used to warn of unacceptable conditions at monitored sites. Alarms may use buzzers, bells and/or warning lights.

Ambient – The normal environment conditions such as temperature, relative humidity or room pressure of a particular area under consideration.

Anemometer – A device that measures air speed.

Antistatic – Reducing static electric charges by retaining enough moisture to provide electrical conduction. Has a surface resistivity of 10⁹ to 10¹² ohms per square.

Antistatic Cleaners – Liquid cleaners that enhance surface resistivity of cleanroom tabletops, workstation, and other surfaces.

Architectural Design/Construction Services – Contract services provide for the design and construction of cleanrooms. Included are architecture, engineering, construction management, planning and turnkey construction of cleanroom facilities.

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As-Built Cleanroom – A cleanroom facility that is complete and ready for operation with all services connected and functional, but without production equipment personnel within the facility.

At-Rest Cleanroom – A cleanroom facility that is complete and has the production equipment installed and operating, but without personnel within the facility.

ATR – Attenuated total reflectance.

Bags – Containers for storing parts, products, etc. Antistatic static shielding and breather bags are common types of bags used in cleanrooms. Antistatic and static shielding bags are used to encase static sensitive devices of most sizes. Breather bags are used for parts sterilization and can be autoclave, EtO, dry heat or radiation sterilized. The bags typically are cleaned in cleanroom conditions.

Barometers – Instruments used to measure atmospheric pressure.

Barrier Pressure Packs – Seamless aluminum cans house a sprayed-in plastic pouch of PVC or polyolefin. The pouch adheres to the upper part of the can to form a leak-proof seal. The product is dispensed by depressing the can valve. The can allows separation of the product from the propellant.

Benches – Furniture which accommodates seating for several people. Used in gowning areas to divide dirty and clean areas.

Biological Safety Cabinets – Bench-top or freestanding cabinets with laminar airflow used for handling materials that present a health hazard. Cabinets typically include a work surface; HEPA filters for supply and exhaust air, and a protective view-screen.

Blower/Exhausters – Devices used to move and/or control air in HVAC systems, HEPA/ULPA filters modules or to circulate air or exhaust air from workstations.

Blower/Filter Modules – Self-contained units house a HEPA or ULPA filter and a blower to distribute the air. The units, which are mounted into a cleanroom ceiling, wall or bench, provide filtered airflow at various blower speeds.

Boots – Protective coverings for the foot that extend part way up the leg. Boots may be made of antistatic materials, and can be disposable or laundered for reuse.

Bottles – Containers used primarily for liquids, made of plastics, Teflon or other cleanroom compatible material. Bottles can be used to store chemicals and other liquids.

Boxes Antistatic/ Conductive – Containers used for transport and storage of parts and materials which are subject to static damage. The cases/boxes are made of conductive materials and are available in a variety of sizes. Antistatic trays, inserts and pans may be available with the cases.

Breath Control Shields – Typically made of acrylic or plastic materials, shields isolate equipment or the work from particulate contamination expelled by workers.

Brushes – Cleanroom and static control brushes are made of double-cleaned, non-static-generating natural hairs or stainless steel. They are used for cleanroom cleaning applications.

Caps, Bouffant – Full or puffed-out head coverings held in place with an elastic opening. The caps are made of cleanroom compatible fabrics, most commonly, spun-bonded polypropylene.

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Carts – Wheeled vehicles used to transport chemicals, supplies and other materials within or between cleanrooms. Chemical carts may be enclosed, and include drain trays to contain spills within the cart.

Cathode Luminescence – Luminescence produced when high-velocity electrons bombard a metal in vacuum, thus vaporizing small amounts of the metal in an excited state, which amounts emit radiation characteristic of the metal.

Ceiling Grid Systems – Frameworks of parallel and perpendicular bars used to house filters and light fixtures in cleanroom ceilings. The grids may include a gel or other type of sealant for providing an airtight seal around the filters.

Certification – The process of validating the performance of environmental systems in order to show compliance to specifications.

Chairs – Cleanroom chairs are made with cleanroom compatible materials such as stainless steel or aluminum. They may include filtered back and seat cushions to eliminate contamination expelled when a worker sits down. They may be made of conductive materials to provide static protection.

Chemical Adsorbers – Dry processed carbon composite adsorbers for chemical adsorption systems.

Chemical Filter Systems – Solution purification systems that pump, filter, agitate and carbon-treat chemical processing solutions.

Clean Zone – A defined space in which the concentration of airborne particles is controlled to specified limits. (Federal Standard 209E)

Cleaners – Emulsify grease, oil and other soils on surfaces.

Cleaners, Parts – Various types of equipment for cleaning miscellaneous parts and quartzware. They equipment uses water and/or chemical baths to clean parts. Chemical fumes are drawn out and exhausted from the unit.

Cleaning/Janitorial Services – Specialized maintenance and cleaning of cleanrooms, including vacuuming and other cleaning services.

Cleaning Tools/Supplies – Cleaning tools include rollers, brooms and cleaning guns. Roller/applicators may have sponge or adhesive rollers to clean work surfaces, floors or walls.

Cleanroom – A room in which the concentration of airborne particles is controlled to specified limits. (Federal Standard 209E)

Cleanroom Candy – For relieving dehydration due to low humidity in cleanrooms. The candy is packaged in antistatic cleanroom bags, with each piece individually wrapped.

Cleanroom Clocks – Wall-mounted clocks have plastic cases, and are packaged for Class 100 environments.

Cleanroom Phones – Flush-mounted or wall-mounted units that function as standard telephones. Connections can be made within the building or to outside lines.

Cleanroom, Mobile/Portable – Typically consist of a frame with curtains and ceilings filter modules. May be moved without disassembling. The rooms may include lighting, pre-filters and casters for portability.

Cleanroom, Modular – Pre-fabricated rooms that are delivered equipped with all components and are ready for assembly. They may be expandable, re-locatable and typically are available in variety of sizes.

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Coatings – A coat or layer over a surface. High purity coatings using fluoropolymers, Teflons, epoxy and plasma deposition can be applied to walls, racks, electric motors, containers and furniture. Static control coatings are typically applied and are used for non-porous surfaces such as Teflon and plastic.

Communications Systems – Systems available include intercom units and speak-throughs. They systems allow communication between personnel whom are within and outside the cleanroom. Computer communication systems provide access to cleanroom computers remotely from outside the cleanroom.

Compressors – Machines used to increase the pressure of a vapor or gas. Oil-free compressors are used for applications requiring ultra-pure air.

Condensation Nuclei – Small particles normally within the size range of 0.01 micron to 0.1 micron radius upon which water vapor condenses in the atmosphere. (IES)

Conductive – Having that property of conductivity or transmitting electricity. Has a surface resistivity of less than 105 ohms per square.

Containment Boxes – Provide isolation for valves, flow meters and other instruments. Boxes may be made of PVDF or polypropylene.

Containment Rooms – Rooms provide a cleanroom environment while containing or isolating the process being performed inside the room. Outside air may be taken into the rooms, where it is filtered through HEPA filters.

Contamination – The process or act by which materials or surfaces are soiled with bacteria or other contaminating substances.

Controlled Area – An air-conditioned workspace or room in which the particle concentration is lower than normal air conditioned spaces. A controlled area is not to be classified as a cleanroom, but some special filtration is required. (NEBB)

Controller – An instrument that measures the value of a variable quantity or condition and corrects deviations from preset values.

Coveralls – One-piece, loose fitting outer garments with sleeves and legs which are worn over regular clothing to protect products from contamination.

Curtains – Made of vinyl, conductive vinyl, heavy-duty vinyl or other materials with antistatic grids. Used for directing airflow, separating processes and for static reduction of wet process hoods and other equipment.

Data Management Systems – Computerized systems integrate analog, digital and serial inputs from on-line devices such as particle counters. The systems provide reports and graphic data trends.

DCP – Direct current plasma.

Decontamination Factor – The ratio of the concentration of a contaminant in the uncleaned (untreated) air to its concentration in the clean (treated) air. (IES)

Dehumidifiers – Reduce the amount of water vapor in the ambient atmosphere.

Deionized (DI) Water – Water from which charged or ionizable organic and inorganic salts are removed.

Desiccators – Closed containers, usually made of glass or plastic, with an airtight seal, used for drying materials.

Diffusers – Spread out or diffuse gases and liquids.

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Disinfectant Cleaners – Chemical agents that destroy microorganisms.

Dispensers – Used to hold cleanroom gloves and finger cots, or other products, and are made of stainless steel, plexiglass, enamel or plastics.

Doors – The exit from or entrance to a cleanroom. Cleanroom doors often are equipped with windows and are interlocking; one door remains closed while the other door is open.

DOP – Dioctyl phthalate; a viscous liquid used to test cleanroom air filters.

DOP Aerosol – A dispersion of dioctyl phthalate droplets in air.

Dryers, Hand/Glove – Used to dry hands/gloves, the units use HEPA filtered heated air.

Duct Cleaning System – Use HEPA filters, vacuum and disinfectant to clean HVAC ducts. Portable units can be transported and include a variety of tools.

Ducts – Passages for the flow of air through a ventilation system.

Ducts, Exhaust – Exhaust gas and fumes from work benches and cleanroom areas. Fire-resistant ducts are used to exhaust non-flammable, toxic and corrosive vapors. Ducts may be made of resins and other non-smoke-generating materials.

Dust Removers – Compressed gas in a can with extension tube. Used for cleaning equipment, parts, etc.

Environmental Control Systems – Computerized systems provide control and monitoring of temperature, humidity, ventilation, lighting, pressure, airflow, electricity, motion, fire/life safety access control and other environmental conditions.

ESD (Electrostatic Discharge) – A transfer of electrostatic charge between object at different electrostatic potentials caused by direct contact or induced by electrostatic field.

ESD Protective Material – Material capable of limiting the generation of static electricity; rapidly dissipating electrostatic charges over its surface or volume; or providing shielding from ESD spark discharge or electrostatic fields. ESD protective materials are classified according to their surface resistivity as conductive, static dissipative, antistatic or insulative.

Fabric Membranes – Waterproof, breathable materials that prevent liquid from soaking into fabrics, while allowing moisture to escape. The membranes can be laminated to various fabrics.

Face Masks – Coverings for part of the face (specifically the nose and mouth) that prevent contamination from exhaled matter. Masks are made of a variety of cleanroom fabrics.

Face Velocity – The velocity obtained by dividing the air quantity by the component face area. (NEBB)

Facility Monitoring Systems – Integrated hardware and software systems that allow data to be acquired from multiple outputs. The systems capture data from environmental monitoring points.

Fast Tracking – A building method in which construction begins before plans and designs are complete.

Federal Standard 209E – The document that establishes standard classes of air cleanliness for airborne particulate levels in cleanrooms and clean zones. It prescribes methods for class verification and monitoring of air cleanliness. It also addresses certain other factors, but only as they affect control of airborne particulate contamination.

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Fibers – Particles with lengths of 100 microns or more and aspect ratios of at least 1:10; fibers are woven into fabric.

Filter Cartridge – Used to filter liquids. The cartridges are the part of the filter unit made of a particular media or material. Common filter media include carbon, cellulose, ceramic, cloth, glass fiber, nylon, paper, polypropylene, polysulfone, polycarbonate, porous metal, PTFE, stainless steel and wire cloth. The media is assembled in a number of configurations, including cell assembly, cross flow, hollow fiber, pleated, spun bonded, string wound and tubular.

Filter Housing – Outside assemblies that house filter cartridges. Housings are available in a variety of materials including carbon, steel, polypropylene, PTFE and stainless steel.

Filter Media – The portion of a filter cartridge or system that provides the separation of liquids and solids. Filter media includes paper, cellulose, glass fiber, membranes, nylon, PTFE and 316 L stainless steel.

Filter Modules – Units that house a HEPA or a ULPA filter. The units are mounted into cleanroom ceilings, walls or benches and provide filtered airflow.

Filter Testing Systems – Systems for testing liquid and air filters include robotic scanning that automatically tests HEPA filters and reports the data. Liquid filters can be tested via computerized system that perform pressure hold and bubble point integrity tests.

Filters, Gas – Remove solid and liquid aerosol contamination as well as water and oxygen from high purity gases such as helium, nitrogen, hydrogen and other gases.

Finger Cots – Coverings or sheaths for the finger to be worn where complete hand covering is not required and tactile sensitivity is desired. They are available in a variety of materials for cleanliness and ESD properties.

Fire Detection/Suppression Systems – Used for detecting/suppressing fires and detecting particles from thermal degradation or combustion in cleanroom wet benches, workstations, fume hoods and other equipment as well as in cleanrooms. Detectors may use technology and air sampling methods, which are not affected by airflow, humidity, vibration and other conditions within the cleanroom. Suppression systems include those designed for wet benches that use carbon dioxide as the extinguishing agent.

Fittings – Connect sections of liquid and gas tubing to each other or to valves, filters, regulators or gauges in piping systems. Fittings should be made of the same material as the tubing to which they are attached. They commonly are made of stainless steel, plastic or PTFE.

Floor Coatings/Waxes – Cleanroom floor coatings and waxes may provide antistatic properties to reduce static build-up. The coatings are sealants, which protect the floor from chemicals, solvents and bacterial growth. Waxes also may provide static dissipation, and are applied like standard liquid floor waxes.

Flooring – Various types of flooring are used in cleanrooms, depending upon cleanliness levels. Contamination control flooring may have a tacky finish, to trap dust and other debris from wheels and shoes. Access flooring consists of solid or perforated panels or raised pedestals. Air can flow through perforated panels to maintain laminar flow and can be exhausted in a sub-floor area. Vinyl flooring features sealed seams to prevent accumulation of contamination. Static dissipative flooring prevent static buildup and electrostatic discharge.

Flow-meters – Instruments used to measure pressure, flow rate and discharge rate of a liquid or gas.

Flux Removers – Chlorinated solvents with alcohols formulated to remove soldering flux, that may be sprayed from aerosol cans. The cans usually feature extension tubes to concentrate the spray in small areas.

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FTIR – Fourier transform infrared spectroscopy.

Fume Hood Velocity Controls/Monitors – Electronic monitors used to measure fume hood face velocity, volume flow or differential pressure. The monitors warn of unsatisfactory airflow rates.

Fume Hoods – Units that filter fumes from chemicals, solvents, acids and other hazardous materials. Hood includes HEPA filters and/or carbon filters to filter fumes from the work surface and return purified air to the room. A glass, plexiglass or acrylic front panel may be included.

Garment Fabrics – Material used to make garments is made from fibers or threads by weaving, knitting or other means.

Garment Processing Equipment – Garment washing, drying or dry cleaning equipment incorporating filtration systems.

Garment Processing Services – Services for the cleaning, rental, processing and sterilization of cleanroom garments. Laundering and processing are done in cleanrooms using filtered water. Typically includes testing of garment cleanliness, rental of cleanroom garments, and EtO and gamma irradiation sterilization.

Garment Racks – Freestanding racks made of cleanroom compatible materials such as stainless steel and polypropylene.

Garment Storage Bags – Made of cleanroom compatible fabric and used to transport garments (usually a coverall, boots and gloves) from one clean environment to another, or to store garments. Bags may be static dissipative and/or chemical resistant.

Garments – Items of clothing worn to protect a cleanroom atmosphere from contaminants released by workers. Garments include coveralls, frocks, lab coats and smocks.

Gas Detectors/Monitors – Instruments that identify and measure gases in an environment.

Gas System Design/Process Piping Installation – High purity systems, toxic gas systems, gas distribution and management systems, and chemical and liquid distribution systems are designed and installed. Mechanical and piping contracting services, as well as, quality control and testing may be provided.

Gases – Pure gases include argon, hydrogen, nitrogen, helium and others.

Glove Inflator – Allows easy donning of gloves. The gloves are inflated using air, allowing the user to put and take off the gloves easily.

Glove Liner – Half-finger glove liners are worn under latex or vinyl gloves to absorb moisture away from the skin during extended periods of glove wear. Glove liners are typically made from polyester or nylon.

Glove Sealers – Seal cleanroom gloves around the wrists of cleanroom garment sleeves.

Glove boxes – An enclosure, with or without gloves, that services the nuclear, biomedical, semiconductor, chemical and other industries where confinement to or from the atmosphere is required using low differential pressure. (American Glove Box Society) Typically, is a small enclosure where handwork is done in an environment isolated from the worker. The worker inserts his hands only through built in gloves.

Gloves – Hand coverings having separate sections for each finger and the thumb. Gloves often extend part way up the arm. Gloves are available in latex, vinyl, neoprene, nitrile, nylon, polyester, polyurethane, PTFE and other materials. They are available in antistatic and conductive, chemical resistant, sterile, powdered and powder-less styles in a variety of lengths and sizes, and may be ambidextrous or hand-specific.

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Ground – A metallic connection with the earth to establish zero potential or voltage with respect to ground or earth.

Hand Cleaning System – An automated unit that dispenses a cleansing solution onto hands when placed into the machine. The unit also may dry the hands with HEPA filtered air.

Hand Tools – Instruments used to handle critical products or perform certain tasks.

Helium Detectors – Use helium as the tracer gas to test for leaks in vacuum systems.

HEPA Filters – High Efficiency Particulate Air Filters are replaceable extended-media-dry-tape filters in a rigid frame having a minimum particle-collective efficiency of 99.97% for 0.3 micron thermally generated dioctyl phthalate (DOP) (or specified alternative aerosol) particles, and a maximum clean filter pressure drop of 2.54 cm (1") water gauge when tested at rated airflow capacity. (IES)

Hoods – Head and face coverings that also cover the neck and may extend to cover the shoulders. Eyes-only hoods allow only the eyes to be uncovered; other hoods are open-faced or cover part of the face. Helmet shield systems have HEPA filtered air packs.

Humidifiers – Units that add moisture to the air, for comfort and ESD control. ESD builds more in drier air.

HVAC System Design – Service includes the design of air conditioning, plumbing, process piping and temperature/humidity systems. Systems may include HEPA filters, pre-filters and noise control devices.

Insulative – Material that is a poor conductor of electricity. Has a surface resistivity of greater than 10¹² ohms per square.

Instrument Battery Packs – Rechargeable battery pack used to extend the battery life of monitors and other instruments.

Ionization – The process by which a neutral atom or molecule, such as air, acquires a positive or negative charge.

Ionization Equipment – Ionization equipment releases positive and negative ions to neutralize static. Ions are released from emitter points on bars or grids or other apparatus into the air. Power modules are available to operate a number of ionization grids or bars simultaneously.

Isokinetic Sampling – A technique for collecting airborne particulate matter in which the sampling device is designed so that the air stream entering has the same velocity and direction as the ambient atmosphere being sampled.

Kohm – A unit electrical resistance equal to 1000 ohms.

Laminar Flow – Airflow in which essentially the entire body of air within a confined area moves with uniform velocity along parallel flow lines. Usually this is from the ceiling fan filter units straight down to the floor.

Leak Detection Systems – Instruments and materials designed to detect leaks in closed systems.

Leak, HEPA Filter – A gap or void in filter media or gaskets, which permits unfiltered air to penetrate into the cleanroom or clean workstation. (IES)

Light Curtain – Used to protect personnel from robots used in manufacturing processes. The system may include infrared light guards that cast beams around the robots. If the beams are interrupted, the robot stops.

Lighting – Room lighting is supplied by ceiling mounted modules, often incorporated into ceiling HEPA filter modules. Work area lighting may be supplied by illuminators – concentrated light sources that are placed next to the work area – which can be adjusted to focus light on the desired area. Fixtures are sealed to prevent contamination, or aerodynamically designed so they do not interrupt the laminar flow.

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Manometers – Instruments for measuring; a U-tube partially filled with liquid, actually water, mercury or a light oil, so constructed that the amount of displacement of the liquid indicated the pressure being exerted on the instrument. (NEBB)

Material Handling Equipment – Mechanical or automated equipment that moves materials or products.

Mats, Contamination Control – Used to trap contamination from cartwheels and shoes prior to entering the cleanroom or air shower. Mats are available with tacky finish disposable sheets, which are peeled off and discarded when soiled. Adhesive strips hold the mats to the floor. Mat frames are available to hold some types of mats in place.

Mats, Other – Mats made of cleanroom compatible material in various configurations for different applications and may be designed to combat worker fatigue and static.

Meters – Instruments used to measure and record quantity or rate of flow.

Meters, Temperature/Airflow/Humidity – Meter measure air temperature, relative humidity and/or air velocity. Instruments may use interchangeable probes to measure each condition.

Microbial Air Samplers – Used to collect and monitor airborne or surface microorganisms. The instruments typically use a method by which organisms are drawn into an impeller drum, where they are impacted onto an agar strip by centrifugal force.

Microbial Tracking – Analysis, comparison and tracking of microbial strains.

Micron (micrometer) – An instrument through which minute objects are enlarged by a lens or lens system. Types include optical, electron and x-ray.

Mini-Environment – These enclosures are commonly mounted to a ceiling and provide an isolated environment. They consist of a HEPA filter/blower hung on the ceiling over an area with curtains, plastic or glass panels surrounding the filtered area. They may also be free standing or on wheels for portability.

Mixed Airflow Cleanroom – A cleanroom with a combination of laminar or unidirectional airflow and turbulent airflow within the same enclosure.

Mohm – A unit of mechanical mobility, equal to the reciprocal of one mechanical ohm.

Monitors – Devices used to check and/or regulate.

Mops – Available with sponge head, string heads, tubular knit polyester (no edges) or adhesive disposable poly foam laminate sheets. Mops are used to remove contaminants from walls, ceiling, floors, windows and other surfaces.

Mop Wringers – Used with cleanroom sponge mops to eliminate manual wringing in critical areas.

Noise Control Materials – Acoustical foam and curtains block noise and are installed on floors and walls. Noise-dampening tiles and pads also are available.

Non-unidirectional Airflow – (known as turbulent flow) Airflow which does not meet the definition of unidirectional airflow by having either multiple pass circulating characteristics or a nonparallel flow direction. Turbulent flow cleanrooms exhibit non-uniform or random airflow patterns throughout the enclosure. (Federal Standard 209E)

Ohm – The unit of electrical resistance in which a potential difference of one volt produces a current of one ampere.

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Operational Cleanroom – A cleanroom facility in normal operation with all services functioning and with production equipment personnel present and performing their normal work functions in the facility. (Federal Standard 209E)

Ovens – Heated enclosures for baking, heating or drying. Cleanroom ovens have HEPA filters.

Packaging – Packaging films and materials are used for cleanroom packaging of parts, garments and other materials. Packaging materials include PVC, polyethylene and Teflon. Sterilizable packaging materials are available which allow the flow of steam and ethylene oxide gas.

Particle – A solid or liquid object, generally between 0.001 micron and 1000 microns in size. (Federal Standard 209E)

Particle Concentration – The number of individual particles per unit volume of air.

Particle Counters – Instruments used for counting particles larger than a given threshold in air, gases and liquids (LPC). Methods of counting include optical (OPC) and laser. Airborne particle counters count airborne particles larger than a given threshold size.

Particle Size – The apparent maximum linear dimension of the particle in the plane of observation as observed with an optical microscope or the equivalent diameter of a particle detected by automatic instrumentation. The equivalent diameter is the diameter of a reference sphere having known properties and producing the same response in the sensing instrument as the particle being measured. (Federal Standard 209E)

Particle Size Standards – Used to check the accuracy of equipment and instruments that measure and count sub-micron particles. The standards are traceable standard uniform polystyrene spheres.

Particulate – A substance that consists of particles (minute quantities of solid or liquid matter).

Pass-Throughs or Pass-Thrus – Openings in walls with tow doors through which materials and objects are passed. Pass-through doors interlock so that one door always is closed while the other is open.

Penetration – The exit concentration of a given gas from an air-cleaning device, expressed as percentage of inlet concentration. (IES)

Piping, Fluids/Gases – Provides ultra-pure flow paths for gases and liquids to and from the cleanroom. The piping commonly is made of stainless steel or a variety of very clean durable and inert plastics.

PIXE – Proton-induced x-ray emission.

Plastic Sheet Materials – Transparent, clear or colored PVC, acrylic or other plastic sheets used for static dust control in cleanroom windows, curtains and partitions.

Plenum Chamber – Replaceable filters installed before a final filter to remove gross contaminants and protect the final filter from environmental conditions. The pre-filters have a lower efficiency than the one they protect.

Polymers/Plastics – Provide chemical and corrosion resistance, and maintain properties over a range of temperatures. They can be used in the manufacture of cleanroom components and equipment.

Pre-filters – Replaceable filters installed before a final filter to remove gross contaminants and protect the final filter from environmental conditions. The pre-filters have a lower efficiency than the one they protect.

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Pressure, Static – The pressure of a fluid at rest, or in motion, exacted perpendicularly to the direction of the flow. (IES)

Pressure, Total - Pressure representing the sum of static pressure and velocity pressure at the point of measurement.

Pressure, Velocity – Pressure caused by and related to the velocity of the flow of fluid; a measure of the kinetic energy of the fluid. (IES)

Pressure Gauges – Measure and indicate positive, negative or differential pressure.

Pressure Regulators – An open-close device used on the vent of a closed gas pressure system to maintain pressure in a specified range.

Processing Equipment, Pharmaceutical – Specialized equipment used to produce and process pharmaceuticals. Equipment used for filling, stoppering, tableting, mixing/agitating and other processes are available.

Processing Equipment, Semiconductor – Equipment used in various steps of producing semiconductor devices.

Product Decontamination – Contact sterilization, including cobalt-60 gamma radiation processing and ethylene oxide (EtO) sterilization.

Psychrometric Chart – A graphical representation of the thermodynamic properties of moist air. (NEBB) It shows relative and absolute humidity.

Pumps – Used to maintain a vacuum or to distribute fluids and gases. Diaphragm pumps are metering pumps that use a diaphragm to isolate the operating parts from the pumped liquids, maintaining fluid purity.

Recommended Practices (IES) – Recommended Practices are issued either in the form of guidelines or a handbook and describe preferred technical methodologies and procedures. Recommended Practices are the only authorized vehicle by which technical guidance or philosophy may be published or presented in the name of the Institute of Environmental Sciences. (IES)

Recorders – Paper and paperless recorders provide graphic plots of measured signals. Data from temperature, humidity, pressure and other environmental sensors may be recorded for future use.

Relative Humidity (RH) – The ratio of water vapor in the air as compared to the maximum amount of water vapor that the air can hold. (NEBB) This changes with temperature. Warmer air can hold more water vapor.

Resistance (Filter) – The pressure drop across a filter at a stated flow and under given conditions; generally expressed in millimeters water gauge or in SI units as N/m to the second power or Pascals. (IES)

Resistivity – A measure of the intrinsic ability of a material to conduct electrical current flow. Both conductors and non-conductors have resistivity.

Robots/Robotic Equipment – Robots are re-programmable, multifunctional manipulators designed to move materials, parts tools or specialized devices through variable programmed motions for the performance of a variety of tasks.

Room Construction Services – Services provided include installation, construction and renovation of cleanrooms (both modular and conventional) and related equipment and systems.

Safety Products – Cleanroom safety include first aid stations and kits, eye wash stations, decontamination showers, emergency personal protective equipment and other products that protect the health and safety of cleanroom workers.

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Sealants – Used to seal HEPA filters into ceiling grid systems. Plastic, silicone and gel sealants are commonly used.

Semiconductor – Solid materials, such as silicone, that have a resistivity between that of a conductor and that of a resistor materials with properties of both a conductor and insulator.

Shelving – Posts, brackets and shelves made of a variety of cleanroom compatible materials. Solid shelves, perforated shelves, cantilevered shelves, and slanted shelves may be provided. Shelving may be freestanding or mounted onto a workstation or bench.

Shoes, Conductive – Shoes with soles of conductive materials to prevent static discharge from water.

Shoe Cleaners – Mechanical devices outside cleanrooms or air showers to clean the bottom, sides and top of shoes with a brush system before entering the clean area.

Shoe Covers – Outer fabric covering that cover the shoe to prevent contamination from footwear. They are available in a variety of materials and styles: spun bond polypropylene, non-skid, ESD, etc.

Signs – Cleanroom signs are used to warn of chemical hazards and proper procedures, and to identify special areas.

Skin Care Products – Hand creams and skin protectors are designed for daily use by cleanroom workers who wear rubber or vinyl gloves that may irritate the skin. The products moisturize the hands to reduce chapping and irritation. It is extremely important for any skin care products to be free of silicone.

Smoke Sticks/ Powders – Provide a method of testing fume hood safety or HEPA filter leaks. Powders are non-toxic and non-flammable. They are suspended to determine draft and leak locations.

Sponges/Spill Control Products – Sponge blocks, wipers, sheets and rolls are available for soaking up liquid spills or cleaning. Many types may be reused, and are chemical-resistant and cleanroom packaged.

Standard Deviation – The positive square root of the expected value of the square of the difference between a random variable and its mean.

Static Control Plastics – Transparent static dissipative plastic sheets are used in partitions, windows, glove boxes, and workstations. Acrylic and polycarbonate plastics are used, and come in a variety of colors.

Static Dissipative – Able to break up, scatter or disperse stationary electrical charge resulting from friction. Has surface resistivity of 10^5 to 10^9 to the ninth power ohms per square.

Static Meters/Sensors – Instruments and devices for measuring moisture, electrostatic fields and other parameters. Instruments for measuring conductive devices are available.

Stationery – Stationery and documentation materials include paper, forms, notebooks, clipboards, bulletin boards, recorder materials, envelopes, folders, labels, and tape. Stationery products are made of cleanroom compatible, non-shedding material, and accept ink from cleanroom pen and thermal printers. Some products may be used in copy machines. Specialized cleanroom printing services are available.

Steam Generators – Generates clean steam for cleanroom humidification, sterilizing and steam heating applications. Uses distilled, deionized, reverse osmosis or demineralized water.

Step Stools/Ladders – Step stools have two or three steps of a specific width; ladders may have up to five steps. Steps may be open or solid.

Frequently Asked Questions

Sterile – Free from living microorganisms.

Sterilization Monitor – This computer-based system provides reports on the status and quality of ethylene oxide (EtO) sterilization process conditions.

Storage Cabinets – Used to store cleanroom garments, accessories, products or supplies. Cabinets may include HEPA filters to wash contents with clean air. Shelves are used to store accessories and supplies.

Swabs – Small pieces of cotton, foam, or other material on the end of wooden or plastic handles used to clean small objects or in small spaces.

Tables – Freestanding, four-legged furniture that has solid or perforated tops. Vibration isolation tables provide low vertical and horizontal frequencies for vibration control.

Testing/Certification Services – Independent, contract services for the testing and certification of HEPA filters, laminar flow equipment, safety cabinets and HVAC systems. Certification and testing of HEPA filters includes leak testing, scanning, electrical testing, particle count surveys, sound level measurement, vibration measurement, temperature and humidity measurement, airflow balancing, gas system testing, light level measurement and room pressurization. Product qualification testing and environmental analysis/testing also are available.

Thermometers – Devices used to measure temperature, and operate by means of a thermocouple (a pair of dissimilar conductors joined in a series to form a closed circuit which produces a thermoelectric current when heated). The device measures temperature in degrees Celsius or Fahrenheit.

Training Materials – Videos, seminars, testing courses, tapes, manuals, primers and complete programs for various cleanroom training applications, including maintenance, preparation of a cleanroom and certification and testing.

Tubing – Stainless steel and plastic tubing used for liquid or gas handling operations.

Turnkey – A method of construction design, installation, etc. Where the contractor, installer, etc. assumes total responsibility from design through project completion.

ULPA Filters – Ultra Low Penetration Air Filters are extended media dry filters in a rigid frame that have a minimum particle-collection efficiency of 99.999% for particles greater than or equal to 0.12 micron in size.

Unidirectional Airflow – (Known as laminar flow) Air flowing in single pass in a single direction through a cleanroom or clean zone with generally parallel streamlines.

USP Microbial Classification – United States Pharmacopoeia microbial classification.

Vacuum Cleaners – Used to clean surfaces through the use of suction. Cleanroom vacuum cleaners use HEPA filters to collect particles and filter the air exhausted from the machine.

Valves – Devices that permit a flow in one direction only, or regulate the flow by opening or blocking passage; for use with liquids and gases in pipes and tubes.

VC – Voltage contrast.

Velocity – A vector quantity which denotes, at once, the time rate and direction of a linear motion. (NEBB)

Viable Particle – A particle capable of living and growing.

Frequently Asked Questions

Wall Systems – Upright structures consisting of interlocking individual panels, which enclose areas. They provide an airtight environmental as well as sound and thermal insulation. Wall systems may include doors, windows, power and piping service panels and pass-throughs.

Waste Receptacles – Containers used for disposing of contaminated waste.

Water Analyzers – Organic analyzers measure organic compounds, resistivity and temperature in high purity water.

Water Heaters – Used to heat deionized water for manufacturing applications. Most heaters use a heat exchanger that prevents contamination of the deionized process water.

Water Purification Equipment – Used for welding and soldering applications, including assembly of high purity piping systems.

Welding Equipment – Used for welding and soldering applications, including assembly of high purity piping systems.

Wet Process Equipment – Benches and workstations are used for manufacturing processing applications, and may feature laminar airflow and exhaust system to remove acid fumes. They may include rinsers, hot plates, temperature baths, fire suppression systems and sinks and tanks for specific purposes.

Wipers – Material used to wipe surfaces and absorb liquids. They may be made of foam, sponge, polyester, or a variety of other materials.

Workstation Accessories – Components and accessories for use with workstations and benches include utility services such as electrical, compressed air and vacuum; workstation extensions; support arms; and other accessories.

Workstations/Benches – Controlled environments around processes or work area in which the air is cleaned of particulates by use of a HEPA/ULPA filter. Tabletop or bench top units can be placed directly on work surfaces, and are portable.

Wrist Strap Monitor – Detect faulty wrist straps and grounding cords. The cord is plugged into the monitor, which provides audible/visual alarms to warn the user of improper grounding.

Wrist/Heel Straps – Bands worn on the wrist or over footwear which attach to grounding cords to prevent static electricity from building up and being discharged from the body.

For more information, contact:

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