

Filtration & Separation Glossary of Terminology

A

ABRASION, FLEX: Fabric wear in a creased area caused by excessive bending, usually associated with cage contact used in baghouse filtration.

ABRASION RESISTANCE: Ability of a fiber or fabric to withstand surface wear.

ABSOLUTE: A degree of filtration that guarantees 100% removal of suspended solids over a specified size found in the filtrate.

ABSOLUTE PRESSURE: The pressure above an absolute vacuum. One atmosphere (14.7 psi) greater than gauge pressure. Symbolized as psia when the pressure is in psi units.

ABSORPTION: The taking in, incorporation or reception of gases, liquids, light or heat. Penetration of one substance into the inner structure of another, using filling the void of the matrix. The process of movement of a drug from the site of application into extracellular compartment of the body.

ACTIVATED CARBON: Charcoal activated by heating to 1472-1652°F a material of high adsorptive gases, vapors, organics, etc. Has a large internal surface area. Removes dissolved color, odor and taste from liquids or gases. Commonly used in the pharmaceutical industry to remove organic contaminants.

ACTIVATED SLUDGE: Biologically active floc from aeration and settling sewage and/or organic matter.

ADSORPTION: The adhesion of a substance to the surface of a solid or liquid. Adsorption is often used to extract pollutants by causing them to be attached to such adsorbents as activated carbon or silica gel.

AEROBIC BACTERIA: Organisms requiring oxygen to live.

AEROSOL: A dispersion of small liquid or solid particles suspended in air, gas or vapor.

AIR FLOW: Measure of the amount of air that flows through a filter, a variable of the degree of contamination, differential pressure, total porosity and filter area. Commonly expressed in either cubic feet/minute/square foot or liters/minute/square centimeter at a given pressure.

AIR STANDARD: Dry air at 70 degrees F and 29.92" mercury pressure.

AIR-TO-CLOTH (A/C) RATIO: The ratio of gas volume (acfm) to effective cloth area (sq. ft.). In SI units $A/C = m^3/m^2$.

AMBIENT: Refers to common environmental conditions in which experiment is conducted.

AFFLUENT: Fluid entering the filter or filter system. Commonly described as influent, it is the opposite of effluent.

AGGLOMERATION, PARTICLE Multiple particles joining or clustering together by surface tension to form large particles, usually held by moisture, static charge or particle architecture.

ALKALINITY: The capacity of water to neutralize acids, a property imparted by the water's content of carbonates, bicarbonates, hydroxides and occasionally borates, silicates and phosphates. It is expressed in milligrams per liter of equivalent calcium carbonate.

ANAEROBIC: Organism capable of growing without the presence of oxygen.

ANGSTROM: A unit of length 10^{-10} meter used to express wave lengths. Used in measurements of RO filtration in the ionic range.

ANTISTATIC: A condition inherent in or applied to a material usually fabric or plastic, which results in a significant reduction in or the absence of electrical charges. (an electrical resistivity of $\sim 10^{10}$ ohm/square or higher).

AQUEOUS: Similar to or resembling water. Referring to solution made in water.

ARIZONA ROAD DUST: Standardized test dusts for both liquid and air classified from natural Arizona dust generally referred to an A.C. Fine and A.C. Course Dust. Both dust materials also carry an ISO designation and have a standardized size distribution of particles.

ASHRAE: American Society of Heating, Refrigerating, and Air Conditioning Engineers.

ASYMMETRIC MEMBRANE: A membrane in which the pore size and structure are not the same from one side of the membrane to the other. These membranes are usually considered directional because of difference in flow characteristics depending on which side of the membrane faces the feed stream.

ASME: American Society of Mechanical Engineers. Published code, which governs the design of pressure housings.

ASSAY: Analytical procedure to determine purity or concentration of a specific substance in a mixture.

AUGMENTATION: In fabric air filtration, the imposition of an electrical field to the collecting surface and/or subjecting the incoming particulate matter to a charging process.

AUTOCLAVE: A chamber for sterilizing with saturated steam filters or equipment by using constant high temperature and pressure.

B

BACKPRESSURE: A backward surge of pressure from downstream to upstream of the filter. Can be the result of closing a valve or air entrapped in a liquid system.

BACKWASH: Reversal of a fluid flow through the filtration media to remove solids from the filter. To clean or regenerate a filter.

BACTERIA: Free living simple celled, microscopic organisms having a cell wall, lacking a defined nucleus, shape and round, rod-like, spiral or filamentous.

BACTERIAL CHALLENGE: Testing the bacterial retention of a filter.

BAGHOUSE: An air filtration structure utilizing fabric filter bags for the purpose of removing solid particulate from the gas stream.

BAG LIFE: Time a bag filter performs effectively.

BAR: Unit of pressure. 1 bar = 14.5 psi.

BARREN LIQUOR: Liquor for cake washing, which contains little to no valuable liquor; as barren cyanide solution in gold cake slimes washing.

BASKET: Element of a basket strainer. Normally uses a screen as a medium for removal of coarse bulk solids.

BELT FILTER PRESS: Akin to a rotary drum and belt filter is an automatic pressure filter, where sludge is compressed on an endless rotating belt, dewatering and providing for very dry cake for discharge.

BETA RATIO: Measurement of filter retention efficiency. Ratio of particles exposed to a filter, as a feed stream to the particles down stream (filtrate).

BIAXIALLY STRETCHED MEMBRANE: A microporous membrane from either polypropylene or PTFE that has been stretched in both the MD and CD direction in a manner to form pores of a controlled size and possessing a narrow pore size distribution.

BIOBURDEN: The load or level of microorganisms in a substance to be filtered.

BIOHAZARD: Biological refuse, possibly pathogenic in nature.

BIOSAFETY: Biological safety or non-toxicity of a substance to a living organism. For filters used in health care applications.

BIPOLAR: Have two (opposing) poles, (+) and (-) as applied to ionic charges or particles.

BROWNIAN MOTION: The continuous zigzag motion of suspended minuscule particles. The motion is caused by impact of the molecules in the fluid upon the particles.

BLINDING: Blockage by dust, fume or liquid not being discharged by the cleaning mechanism, results in a reduced gas or liquid flow of increased pressure drop across the filter media.

BLOWDOWN: The use of pressure to remove liquids and/or solids from a vessel.

BREAKTHROUGH: Used to describe the passing of solids through the cake build up of a filter medium. Also called breakpoint.

BRIDGING: Material or particulate blockage across an opening, often of a pore or filter medium.

BUBBLE POINT PRESSURE: A test to determine the maximum pore size openings of a filter. The differential gas pressure in which a wetting liquid (e.g. water) is pushed out of the largest pores and a steady stream of gas bubbles are emitted from a wetted filter under specific test conditions. A filter integrity test with specified, validated pressure values for specific pore-size and type filters.

BURST PRESSURE: The pressure causing rupture. The inside-out differential pressure that causes outward pressure on the structural of a filter medium, filter or housing.

C

CAKE (FILTER): Solids deposited on the filter media. In many cases the cake may serve as its own filter medium.

CAKE RELEASE: Ability of a medium to allow clean separation of the cake from the medium.

CALENDERING: A manufacturing process where woven and/or nonwoven fabrics are pressed between heavy rollers compressing the fibers. The process reduces the filter medium void volume, pore size rating, flow-rate and dirt-hold capacity of the medium.

CANDLE FILTER: A reusable filter consisting of a tube made from ceramics or metal. Flow is from the outside-in with particulate accumulating on the outside of the candle. The candle can be cleaned by various means, including back-pulsing, heat, chemicals etc.

CAPACITY: Volume of product which a housing will accommodate expressed in gallons or similar units. Also, amount which will filter at a given efficiency and flow rate, expressed in gallons per minute or similar units.

CAPSULES: Disposable devices which have an integrated filter and housing, including inlet and outlet.

CARTRIDGE: Filter devise and medium used in a housing to perform the function of coalescing, filtration or separating. Also referred to as an element.

CATHODE: Negative pole or electrode of an electrolytic system.

CAUSTIC: A class or name given to a class or group of chemicals, usually soda or sodium hydroxide.

CD: Refers to the “cross-machine” manufacturing direction of filtration roll stock.

CELLULOSE: (1) fibers used to manufacturer wetlaid paper (2) used as a filter aid in highly refined alpha cellulose form or as the slightly more unbleached form.

CENTER CORE or TUBE: Material formed into a cylinder shape for structural purposes to permit a cartridge to retain its original physical form.

CENTER PIPE or ROD: Component of a housing which is used as a mount for cartridges, typically through the center core.

CENTRIFUGATION: Separating two substances of differing densities by high speed spinning to create centrifugal force. Generally used to separate suspended particles from liquid.

CHROMATOGRAPHY: Separation of substances in a mixture based on their affinity for certain solvents and solid surfaces.

CLARIFICATION: Clearing a liquid by filtration, by the addition of agents to precipitate solids, or by other means.

CLARIFIER: An apparatus for the removal of settleable solids from a fluid by gravity.

CHARGE POLARITY: A particle, fiber or other material carrying an electrostatic charge.

CLARIFIER: A processing unit using flocculation processes to separate solids from liquid often in a non-turbulent zone where heavy solids settle out of solution. Often used for wastewater.

CLARITY: Amount of contaminate left in a filtered liquid.

CLASS 100 ENVIRONMENT: A room environment maintained by air conditioning and filtration so that fewer than 100 particles of size 1 μm or larger are found in a cubic foot of air.

CLASSIFICATION: Condition in which larger particle settle out below the finer ones. Also referred to as stratification. May also be referred to as the action to sort out particles by various groups or to other established criteria.

CLEANABILITY: The ability of a filter element to withstand repeated cleanings, while maintaining adequate dirt capacity.

CLEAN PRESSURE DROP: Differential pressure (drop) across measured in pounds per square inch at rated flow on new elements with clean product.

COAGULATION: In water and wastewater treatment, the destabilization and initial aggregation of colloidal and finely divided suspended matter by the addition of a floc-forming chemical or by biological processes.

COALESCER: Mechanical device which unites discrete droplets of one phase prior to being separated from a second phase. Can only be accomplished when both phases are immiscible.

COALESCING: Action of uniting small droplets of one liquid preparatory to its being separated from another liquid.

COATING: Immersion of filter media in a solution to provide the fibers with a coating that will lubricate and thereby reduce self-abrasion.

COLD STERILIZATION: Removal of all bacteria by filtration through a sterilizing grade 0.2µm absolute filter.

COLLAPSE PRESSURE: The outside-in differential pressure that causes the structure of a filter medium failure of a filter element.

COLLECTION EFFICIENCY: Percentage of contaminate collected.

COLLOID: Very small, insoluble non-diffusible solid or liquid gelatinous particles that remain suspension in a surrounding liquid. Solids usually on the order of 0.2 µm or less.

COMPATIBILITY: Relation to the non-reactivity of filter materials with a substance to be filtered.

COMPRESSIBILITY: Degree of physical change in filter cake particles when subjected to normal pressures.

COMPRESSION BAND: Stainless steel band sewn into the end of a bag to provide a surface to clamp against in the baghouse.

CONCENTRATOR: Removes some of the water from a sample to concentrate substances dissolved or suspended in it; usually used to concentrate solutions of biological macromolecules, (proteins & nucleic acids).

CONTAMINATE: Unwanted foreign matter in a fluid which is accumulated from various sources such as systems dirt, residue from moving parts, atmospheric solids.

CONTINUOUS PHASE: Basic product flowing through a filter or filter separator, which continues on through the system after being subjected to solids and/or other liquid separation.

CORE: Commonly refers to a perforated tube, which serves as the center of a filter cartridge (element).

CORE YARN: Used in filtration with fiberglass or synthetic yarn. Spun or texturized yarns are twisted around a filament (core) yarn, adding yarn strength and stability.

CRITICAL OPERATING PRESSURE: Pressure above which filtration or separation equipment may produce reduced efficiency or fails to function properly.

CROSSFLOW (TANGENTIAL FLOW) FILTRATION: A filtration system in which the feed stream flows across the filter media and exits as a retentate stream. The retentate stream is recycled to merge into the feed stream, while a portion of it passes through the filter media, resulting in concentration of the feed stream.

CYCLONE: A conical-shaped vessel for separating mixed sized particulates from the gas stream. The vessel has a tangential entry at the largest diameter allowing the larger particles to drop out and be removed from the bottom of the cone while smaller particulate exits overhead with the majority of the gas stream.

D

DE: Diatomaceous earth. A filter aid from diatomite's.

DALTON: Measure of molecular mass.

DI WATER: De-ionized water; water processed through an ion exchange process by passing through a mixed resin bed to remove positive and negative ions. The purity of water is measured by its electric resistance.

DEAD END FILTRATION: Feed stream flows in one direction only, perpendicular to and through the filter medium to emerge as product or filtrate.

DEHYDRATION: Removal of water or hydrocarbon in vapor from an air or gas; also water from another immiscible liquid. Differs from entrainment removal in that the dew point of a gas stream will be lowered by vapor removal. A form of purification.

DENIER: The weight in grams of 9,000 meters of a fiber.

DENSITY: Mass/unit volume, usually expressed in g/cc, lb./cu. ft or lb./gal.

DEPTH FILTRATION: A process that entraps contaminants both within the matrix and on the surface of the filter media.

DESALINATION: Production of fresh (potable) water from sea water, salt or brackish water by one of several processes, e.g. distillation, flash distillation, electro dialysis or reverse osmosis if salt content is not too huge.

DEWATERING: A physical process that removes sufficient water from sludge so that its physical form is changed from essentially that of a fluid to that of a slurry or damp solid.

DESICCANT: Drying agent or medium used in dehydration of air or gas or liquids. Examples: silica gel, activated alumina, molecular sieve etc.

DIALYSIS: The diffusion of solute molecules through a semi-permeable membrane.

DIATOMACEOUS EARTH FILTRATION (D.E.): A filtration method that uses a medium consisting of microscopic shells of single celled plants known as diatoms.

DIATOMITE: Skeletal remains of tiny aquatic plants that lived in the ocean and inland seas millions of years ago.

DIFFERENTIAL PRESSURE - Delta (Δ) P: The change in pressure or the pressure drop across a component or device located within the air stream; the difference between static pressure measured at the inlet and outlet of a component device.

DIFFUSION: In liquid cake washing, removing the original liquor around the individual particles by mixing with the wash liquor. In air, the particle at a size within one or two orders of magnitude of the gas-flow molecules, moves in Brownian motion and collides with a fiber or other filter media material during its random path of travel.

DIFFUSION TEST: A test to determine the integrity of a filter. The test is based upon the transition from diffusional flow to bulk flow of a gas, through a wetted filter.

DIFFUSIONAL INTERCEPTION: In gas filtration, at low gas flow velocities, tiny particles are subject to Brownian motion, enabling them to move out of the gas streamlines and become intercepted by the filter.

DIFFUSIONAL FLOW TEST: To determine the integrity of a filter. The test is based on the measurement of the diffusional flow of a gas through a wetted filter. Either the gas or the downstream liquid, displaced by the gas, may be measured. The transition from diffusional flow to bulk flow (bubble point) can be determined.

DIGESTED SLUDGE: Sludge or thickened mixture of water with sewage solids in which the organic matter has been decomposed by anaerobic bacteria.

DIRECT INTERCEPTION: Gas filtration: particles larger than the pores are removed by direct contact with the filter surface. Some particles smaller than pores can be removed as well depending on the proportion to their size hitting the surface.

DIRT (HOLDING) CAPACITY: Amount of dirt or debris retained by a filter in grams per unit area of the filter medium.

DISCONTINUOUS PHASE: Separated phase or product from the continuous phase. Example: water maybe the discontinuous phase when separated from hydrocarbon, air or gas.

DISPERSION: Operation which results in solid or liquid particles entering into suspension in a fluid. Also applies to a two phase system in which one phase, known as the disperse phase, is distributed throughout the other, known as the continuous phase.

DISPOSABLE FILTERS: Those filters not cleaned or reused. Referred to as one-time or single-use filters.

DISOLVED SOLIDS: Any solid material that will dissolve in a liquid that such as sugar in water.

DISTILLATION: Process of vaporizing a liquid and collecting the vapor, which is then usually condensed into a liquid.

DMF: Drug Master File. A written document that explains the formulation of an active ingredient, referenced in an Investigational New Drug (IND), New Drug Application (NDA), or Amendment to New Drug Application (ANDA) from a company.

DOP: Dioctyl phthalate, a plasticizer that can be aerosolized to particles of extremely uniform size. Retention of DOP aerosol is used as standard procedure for pore size rating of air filters. Typically, 99.97% DOP retention indicates HEPA efficiency.

DOWNSTREAM SIDE OF FILTER: The filtrate or product stream side of the filter. Fluid and/or solids that have passed through the filter.

DRY HEAT STERILIZATION: Sterilization at or above 356°F using a convection or forced air oven without moisture; may concurrently de-pyrogenate if adequate time and elevated temperature are employed.

DRY SCRUBBER: A chemical reaction chamber that neutralizes acids in a gas stream. Two system types: the spray dryer system injects a slurry, whereas dry sorbent injection systems use a dry powder.

DUPLEX FILTER: Assembly of two filters with a valve for selection of either or both filters.

DUROMETER (SHORE): Measure of hardness. Must be defined as being either A or D scale.

DUST COLLECTION: A term usually associated with an assembly of large pleated elements that collect air-borne particles where large volumes of air flow is found e.g. granaries, cement factories, abrasive production and other manufacturing facilities.

DYNE: The amount of force that cause a mass of one gram to alter its speed by one centimeter per second for each second during which the force acts.

E

E. coli: Escherichia coli is the most prevalent bacteria in the gastrointestinal tract of humans and animals. It occurs in solids and water as a result of fecal contamination.

END CAP: The end of many types of filter cartridges.

ETO STERILIZATION: Chemical sterilization using ethylene oxide at an elevated temperature of 1500 ° F and high relative humidity to facilitate permeation of the ethylene oxide into the material being sterilized.

EFFECTIVE FILTRATION AREA: The portion of filter that fluid flows through during the filtration process.

EFFICIENCY: Degree to which a filter device will perform in removing solids and/or liquids.

EFFLUENT: The fluid which has passed through a filter (filtrate or product stream); outflow from other treatment such as wastewater treatment plants.

ELECTRETS: A dielectric body in which a state of electric polarization is established. An imposed electric field on heated polyolefin following the drawing stage to form a charged fiber or yarn with electrostatic like properties. These properties may decay or by contamination by solvents and materials.

ELECTROCHEMICAL: A process by which electricity is used to effect chemical reaction. The inter-conversion of chemical and electrical energy.

ELECTRODIALYSIS: Dialysis (small molecules separated from larger molecules in the same solution/mixture) accelerated by an electromotive force applied to electrodes adjacent to the separating membranes.

ELECTROLYTE: Substances which will conduct an electrical current, either in molten state or in a solution e.g. NaCl in water.

ELECTROPHORESIS: The separation of charged molecules (such as proteins) based on their mobility in an electrical field.

ELECTROSTATICS: Electrical charges on particles and/or fibers in a filter medium create attractive and/or repulsive forces between particles and the fiber/medium. As a direct result, for many types of particles, strong attractive forces produce the intimacy needed to agglomerate even the fines.

ELECTROSTATIC PRECIPITATOR: A type of particulate filtration control that attracts charged particles to oppositely charged surfaces to collect airborne particulates. The particles are charged by ionizing the air with an electric field. The charged particles are then collected by a strong electric field generated between oppositely-charged electrodes.

ELEMENT: Typically a filter, such as a cartridge, pleated or non-pleated.

END CAPS: Components adhered to a filter element with adhesive or other means to contain the filter medium in a form designed for the element.

END POINT: Final objective or, in petroleum distillation, temperature at which the distillation ceases.

ENDOTOXIN: A toxic substance produced by bacteria, but which is released into the surrounding medium only upon the death or disintegration of the bacteria.

ENTRAINED WATER: Discrete water droplets carried by a continuous liquid or gas phase when water is immiscible with the liquid.

EPA: Environment Protection Agency regulates environmental monitoring. Establishes and enforces guidelines.

EXTRACTABLES: Chemicals leached from a filter during a filtration process; usually tested for by soaking in water under controlled conditions; may be removed by pre-flushing with suitable liquid.

F

FERMENTATION: Enzymatically controlled breakdown of an energy rich compound as a sugar to produce ethyl alcohol, carbon dioxide, and energy, by the action of yeasts which carry the necessary enzymes. Bacterial fermentations also occur.

FEED: Materials to be filtered. Also referred to as concentrate, influent, intake, liquor, mud, prefilter, pulp, slime or sludge.

FIBER: Any particle with length greater than or equal to 0.5 micron and at least five times greater than its diameter, leaving substantially parallel sides.

FIBER METAL FELT: A nonwoven media consisting of extremely fine metal fibers (2-20 micron in diameter) which are compressed and sintered. Used to filter molten polymers in the manufacture of fibers and films and hydraulic fluids for use in aerospace filters.

FIBER MIGRATION: Downstream migration of fibers from a filter medium.

FILL: Yarns that run in the filling or cross-machine direction of a woven fabric.

FILTER: (Noun) A specialized piece of equipment for carrying out filtration, consisting of the filter medium and suitable holder for constraining and supporting the filter in the fluid path.

FILTER: (Verb) Passing a fluid containing particles through a filter medium wherein particles are removed the fluid.

FILTER AID: Small size particle substance of low specific gravity which remains in suspension when mixed with a liquid to be filtered. Increases filtration efficiency of a feed when deposited on a septum by forming a porous cake.

FILTER CAKE: The accumulation of particulate or solids on a surface. Can also mean a pre-coat for filtering.

FILTER EFFICIENCY: A measurement of how well a filter retains particles. The percentage retention of particles of a specific size by a filter.

FILTER LIFE: Measure of a filter's useful service life based on the amount of standard contaminate required to cause differential pressure to increase to an unacceptable level, typically 2-4 times its initial differential pressure or 50-80% drop in initial flow or the downstream measure of unacceptable particulate.

FILTER MEDIA MIGRATION: Problem caused by a filter medium constructed of a non-continuous or fibrous matrix. Portions of the filter change structure causing fibers to migrate downstream.

FILTER MEDIUM: Permeable material that removes particles from fluid being filtered.

FILTER PAPER: A permeable web of randomly oriented fibers, generally cellulose or glass fiber formed from water draining from a suspension fed in a paper making process. Also, a presentation at a filtration conference.

FILTER PAPER: A permeable web of randomly oriented fibers, generally cellulose or glass fiber formed from water draining from a suspension fed in a paper making process. Also, a presentation at a filtration conference.

FILTER PRESS: Mechanical process where wet solids are compressed between two or multiple surfaces in the same equipment forcing water out of the solids, simultaneously compacting and drying the cake.

FILTRATE: The end product of the filtration process. The liquid exiting the filtrate outlet.

FILTRATION: Removal of particles from a fluid by passing the fluid through a permeable material.

FILTRATION RATE: The volume of liquid that passes through a given area of filter in a specific time.

FINES: Portion of a powder like material composed of particles smaller than the size specified.

FLOW DECAY: Decrease in flow rate caused by filter plugging or clogging.

FLOCCULATION: Growing together of minute size particles to form larger ones, called floc's.

FLOW DECAY TEST: Determines flow rate and throughput of a filter type or combination of filters on a specific liquid, usually by using small area filters, to determine the sizing of a filter system.

FLOW FATIGUE RESISTANCE: The ability of a filter element to resist structural failure of the filter medium due to flexing caused by cyclic differential pressure.

FLOW RATE: The speed at which a liquid flows and is measured in gallons or liters per minute. Flow rate of a liquid can be affected by the liquids' viscosity, differential pressure, temperature and type of filter used. Measuring air diffusion.

FLOW RESISTANCE: Resistance offered by a filter medium to fluid flow.

FLUE GAS DESULFERIZATION: The operation of removing sulfur oxides from exhaust gas streams of a boiler or industrial process. Usually a wet scrubber operation.

FLUID: Includes liquids, air or gas as a general term.

FLUX: Measure of the amount of fluid that flows through a filter, a variable of time, the degree of contamination, differential pressure, total porosity, viscosity and filter area.

FLY ASH: The air borne combustion residue from burning coal or other fuels.

FORWARD FLOW TEST: An integrity test measuring air diffusion at a low pressure (approximately 5 psi). Similar to a pressure hold test.

FRAZIER PERMEOMETER: Porosity testing device. The normal measurement is air flow in CFM passed through one square foot of fabric at 0.5 inch differential water pressure.

FULLERS EARTH: Medium used in some elements, usually a blend of attapulgus and montmorillonite clay. A finely divided hydrous aluminum silicate. Often a filter aid.

G

GAUGE PRESSURE: Pressure measured by a pressure gauge. Pressure above ambient pressure when the pressure is used in psi units.

GELATINOUS: Used to describe suspended solids that are slimy and deformable, causing rapid filter plugging.

GMP's: Good Manufacturing Practices. Food and Drug Administration regulations governing the manufacture of drugs. Sometimes referred to as CGMP's.

GRADIENT DENSITY: A stratified cross-section. Used to describe a filter medium where larger pores are at the upstream side of the medium with finer pores downstream. The configuration increases dirt-holding capacity and improved filter life. The medium may be inverted when a surface filter effect is desired resulting in lower differential pressure across the medium than if the medium has a single density throughout..

GRAVITY FILTER: Filter in which the driving force for filtration is provided solely by the head of liquor above the filter medium.

GRAVITY SEPARATION: Separation of immiscible phases resulting from a difference in specific gravity by coalescing.

GURLEY TEST: Measure of time required to expel 100 cc's of air through a filter medium placed within an apparatus that can be fitted with a selection of office sizes and weights. Historically used for paper products and more recently for microporous membranes. (ASTM: D-726).

H

HVAC FILTERS: Air filters used in heating and air conditioning locales.

HEAVY METAL: Metallic elements having a high density ($> 5\text{g/cm}^3$), toxic for the most part.

HEPA: An air filter or medium, which captures 99.97% when challenged with DOP 0.3 micron particles under certain laboratory controlled conditions.

HIMA: Health Industry Manufacturer's Association defines and sets standards governing the validation of filters for sterilizing liquids. . . a trade association, whose membership includes pharmaceutical manufacturers and filter manufacturers.

HOLDING CAPACITY: *See Dirt Holding Capacity above.*

HOUSING: A metal or plastic tank or tube with an inlet and outlet containing a filter (s), allowing for the flow of a fluid and contaminate through the filter, while containing the process.

HYDROPHILIC: Water accepting or wetting.

HYDROPHOBIC: A membrane or other material which repels and cannot be wetted by aqueous and other high surface tension fluids. When pre-wetted with low surface tension fluid, such as alcohol, the filter will then wet with water.

HYDROMETER: An instrument used to measure the density of a liquid.

I

IMMISCIBLE: Incapable of being mixed; insoluble.

INERTIAL IMPACTION: Gas filtration: Retention mechanism. Inertial Collection. As the gas stream lines bend in the vicinity of the filter, the carried particles continue in a straight line due to their inertia and impact the filter. Effective primarily for particles about $0.3\mu\text{m}$ and larger, at high gas velocities and low filter porosity.

IMPERMEABLE: Material that does not permit fluids to pass through.

IMPINGEMENT: Process of removing liquid or solid contaminate from a stream of compressed air or gas by causing the flow to impinge on a baffle plate at high velocity.

INFLUENT: Fluid entering the filter.

IN-LINE FILTER: A filter assembly in which the inlet, outlet & filter element are in line.

INERT: Chemical inactivity; unable to move; totally un-reactive.

INERTIAL IMPACTION: The particle, due to its inertia and usually in stream-line flow, deviates out off the air/gas stream striking a fiber or other material of a filter medium.

INLET PRESSURE: Pressure entering the inlet side of the filter. Also called upstream pressure or line pressure.

INORGANIC MATTER: Chemical substances of mineral origin, not containing carbon to carbon bonding. Generally structured through ionic bonding.

IN-SITU Sterilization or integrity testing of a filter in the system rather than as an ancillary operation such as in autoclave or bubble point stand.

INTEGRITY TEST: Used to predict the functional performance of a filter. The valid use of this test requires that it be correlated to standardized bacterial or particle retention test. Examples: Bubble Point Test, Diffusion Test, Forward Flow Test, Pressure Hold Test.

INTERFACIAL TENSION: Measure of miscibility or solubility of the continuous and discontinuous phases. Increases as miscibility or solubility decreases.

INTERSTICES: Spaces or openings in a filtration medium. Also referred to as pores or voids.

INTERSTITIAL: Pertaining to the openings in a filtration medium.

IN-VITRO: In isolation from living organisms in an experimental artificial environment e.g. cells in tissue culture; experiments carried out in test tubes.

IN-VIVO: Within the living organism.

ION(S): An atom or group of atoms that carries a positive or negative electrical charge as a result of having lost or gained one or more of the electrons.

ION EXCHANGE COLUMNS: Vessels filled with ion exchange resin (anion, cation, or mixed) for producing conditioned or DI Water. Also, type of column used for Ion Exchange Chromatography.

ISOTROPIC (SYMMETRIC) MEMBRANE: Membrane in which the pore openings are the same diameter throughout the thickness and on both sides of the membrane. Non-directional, their flow characteristics are independent of which side faces the feed stream.

K

K or k, the symbol for kilo (1,000).

Kilogram (kg = 1,000g). Kilometer (km = 1,000m). In computers, 1K = 1024 bits of information. 64K memory = 65,536 bits.

KNIFE EDGE SEAL: Narrow, pointed ridge on the sealing surface of an end cap, center seal or cartridges adaptor which provides a seal by biting into the cartridge gasket.

L

L-TYPE FILTER: Cartridge filter in which the inlet and outlet port axis are at right angles and the filter elements axis is parallel to either port axis.

LAMINAR FLOW: Term synonymous with streamline flow and viscous flow. A flow regime which the flow characteristics are governed mainly by the viscosity of the fluid.

LEAF: Any flat filter element that has or supports the filter septum.

LEAF FILTER: A filter housing and device consisting of a plurality of leaves, often placed in a vertical position.

LINE PRESSURE: Inlet pressure, upstream pressure. The pressure in the supply line.

LIQUOR: Material to be filtered. Also referred to as concentrate, feed influent, intake mud, prefilter, slime or sludge.

LIVE STEAM STERILIZATION: Sterilization by flowing saturated steam through a vented vessel or system, usually at 257°F and 20 psi (Can be performed up to 284°F and 35 psi.).

LOADED: A filter element that has collected a sufficient quantity of insoluble contaminants such that it can no longer pass rated flow without excessive differential pressure.

LOCK UP: Device that will lock either a column, elements or the body of a housing in place.

LOG REDUCTION VALUE: The logarithm to the base of 10 of the ratio of organisms in the feed to the organisms in the filtrate. Example: $\log_{10} [10^9/10^{1.7}] = 7.3$. Also used as a ratio of in/out bioburden in other sterilization methods such as autoclaving.

LOW INTERFACIAL TENSION: Where the interfacial tension of one liquid over the other liquid would be less than 25 dynes/cm at 70 degrees F.

LOX CLEANING: Process of cleaning for liquid oxygen service.

LVM: Low volatile material.

M

MANOMETER: A U-shaped tube filled with a specific liquid. The difference in height between the liquid in each leg of the tube gives directly the difference in pressure on each leg of the tube. Used to monitor differential pressure.

MARTIN'S DIAMETER: Statistical diameter used in particle size analysis; the mean length of the line, parallel to the microscope traverse, dividing each particle into two equal diameters.

MASS DISTRIBUTION: Relative frequency distribution of mass within a particle size distribution. Sometimes presented as cumulative percentage undersize.

MASS TRANSFER RATE: Measurement of the movement of matter as a function of atoms etc.

MD: Refers to the “machine-direction” when manufacturing filtration roll stock.

MEAN EFFICIENCY RATING: The measurement of the average efficiency of a filter medium using the Multi-Pass Test where the average filtration (BETA) ratio equals 2.0.

MEAN FLOW PORE MEASUREMENT: It is calculated as the diameter of the pore of a membrane partially voided of liquid such that air flow of the partially wetted membrane is equal to 1/2 the dry air flow. (Theoretical diameter of the mean pore).

MEDIA: Material through which fluid passes in the process of filtration and retains particles. Also, nutrients containing solutions in which cells or microorganisms are grown.

MEDIA MIGRATION: Migration of materials making up the filter medium may cause contamination of the filtrate.

MEDIUM: Principle component of a filter element. Material of controlled or uncontrolled pore size or mass through which a fluid stream is passed to remove foreign particles held in suspension or to repel droplets in the case of coalesced water.

MELTBLOWN: A nonwoven manufacturing process for filtration media, where a molten polymer is extruded out of an orifice with high-velocity air to create fine fibers. The fibers can create roll stock or be spray-spun onto porous tubes to create a finished filter.

MEMBRANE: Media through which a liquid is passed; usually associated with an extremely fine or tight type of filtration. Highly engineered thin polymeric film containing a narrow distribution of pores. Used as the separation mechanism in R/O, Electrodialysis (ED), Ultrafiltration (UF), Nanofiltration (NF) & Microfiltration (MF).

MEMBRANE FILTER: Continuous matrix with fine pores of defined size or a film allowing for the diffusion of a fluid through its structure; sometimes referred to as a dense film in the case where no pores are present.

MERV (Minimum Efficiency Reporting Values) Rating: A system for rating air filters according to their average particle size efficiency on a scale from 1-16 with 16 being the highest capture efficiency for average particles in the 0.3 to 1.0 micron range. The rating is derived from a test method developed by the American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE).

MESH: A term referring to a woven filtration medium, typically wire cloth or monofilament woven fabric.

MESH COUNT: Number of openings or fractions of openings in a lineal inch of wire cloth or monofilament woven fabric.

MICRON (μm): The common unit of measurement in the filtration industry is the micron or micrometer. One micron equals forty millionths of an inch (0.00004) or expressed differently 25.4 microns equals 0.001 inch.

MICRON RATING: The smallest size of particles a filter can remove.

MICROFILTRATION (MF): Used for clarification, sterilization, to detect or analyze bacteria and other organisms and particulate matter. Separation of particles ranging from 0.1 μm to 10 μm .

MICROMETER (m): Micron, 1/1,000,000 of a meter. 60 μm is approximately the diameter of a human hair.

MICROPOROUS MEMBRANE: Thin polymeric films (e.g. 0.001 to 0.005” thick) often with millions or pores per square inch, aligned as a torturous path, allowing for the passage of a fluid to remove solids. Often used for sterilizing filtration and other fine filtration purposes. Considered a surface filter medium.

MIGRATION: Contaminant released downstream of a filter.

MIL: One thousandth of an inch.

MINIMUM BUBBLE POINT PRESSURE: It is a diffusional flow pressure just before the onset of bulk flow. Minimum critical bubble point pressure: a filter specification derived from diffusional flow, bubble point curves for many filters.

MISCIBLE: Capable of being dissolved. Opposite of immiscible.

MIXED CELLULOSE ESTERS: Synthetic materials derived from naturally occurring cellulose. Materials used in the manufacture of membrane filters. Mixed cellulose esters membranes are used in a wide variety of applications, such as bacteria concentration in water analysis and air sampling.

MOLARITY: The term used to indicate the concentration of dissolved substance in a given solution. The measurement is in moles of dissolved substance per liter of solution.

MOLECULAR WEIGHT: Sum of the atomic weights of all atoms in a molecule. Also, Mole or Mol weight.

MOLECULAR SIEVE: Zeolite, natural or synthetic or similar materials where atoms are arranged in a crystal lattice in such a way that there are a large number of small cavities interconnected by smaller openings or pores of precise uniform size. Used as a drying agent or for absorptive applications.

MONOFILAMENT: Single, large continuous filament of a synthetic yarn. Similar to fishing line in cross-section.

MONOFILAMENT WOVEN FABRIC: Woven fabric from monofilament yarns used as a screen or surface filter. Often used in sifting, belting, medical filters etc. Most common yarns are from polyester, polypropylene and nylon.

MUD: Material to be filtered.

MULLENS BURST TEST: A formal measurement where test specimen (filtration medium) sees a force, which cause it to burst.

MULTIFILAMENT: A number of unbroken continuous fiber stands that run parallel to form a yarn. Typically used to manufacture a woven or knit fabric.

MULTI-PASS: A test system designed to be representative of a typical hydraulic or lubricating circuit. Fresh contaminant is introduced in slurry form into a test reservoir, mixed with the fluid in the reservoir and pumped through the test filter; contaminant not captured by the filter is returned to the reservoir for another pass (or more) through the filter.

N

NEEDLEFELT: A nonwoven fabric where staple fibers are entangled together through a manufacturing process using barbed needles, providing for a heavy weight filter fabric, which can filter air-borne particles for use in baghouses and suspended particles in liquids from lighter weight needlefelt fabrics for use liquid bag filtration.

NFR: Non-fiber releasing. A filter or medium, which will not release fibers into the filtrate.

NIOSH: Develops basic methodology for analytical test procedures. National Institute of Occupational Safety and Health.

NOMINAL: An arbitrary term used to describe the degree of filtration and generally not comparable or interchangeable between products or manufacturers. A user should always ask for a copy the test procedure used and results from the manufacturer's lab notebook to understand each rating.

NOMINAL FILTRATION RATING: An arbitrary micrometer value indicated by the filter manufacturer. The same ratings from two manufacturers are often different and rarely can be compared.

NONPOLAR: Compound or element that's electron capacity is satisfied. A neutral condition that will remain un-reactive. Not polar. *See Polar.*

NONWOVEN: A filter fabric that is formed of natural or synthetic fibers that are randomly oriented in filtration media. Typically, held together with a binder or fibers are entangled.

NYLON: When used as a membrane it is hydrophilic. A thermoplastic, polymeric material that has high mechanical strength & compatibility with different chemicals.

O

OPEN AREA: Pore area of a filter medium, often expressed as a percentage of the total area.

OSMOSIS: Diffusion of a liquid through a semi-permeable membrane from a dilute solution into a more concentrated solution, thus tending to equalize the concentration of each side of the membrane.

OUTLET PRESSURE: Downstream pressure. Pressure exiting the outlet side of the filter.

P

PACKED BED: Discrete particles such as sand, gravel, anthracite, fabricated rings or saddles, assembled in a confined space as a filtration medium for liquids and gases.

PAPER: Filter medium used on filter elements. A general term applied to resin bonded cellulose.

PARALLEL FILTRATION: Branching a filtration setup. Two assemblies of the same pore size are in parallel, to increase flow rate or simplify filter changes.

PARTICLE: Unit of material structure; a mass having observable length, width, thickness, size and shape.

PARTICLE COUNT: Practice of counting particles of solid matter in groups based on relative size contained in a certain area.

PARTICLE SIZE DISTRIBUTION: The size range and quantity of particles which are measurable in a dry or liquid sample. Used to determine the appropriate filter media for a specific process.

PARTICULATE: Any solid or liquid material in the atmosphere.

PARTICULATE UNLOADING: The process whereby a filter, particularly, a depth filter, can become blocked with particulate matter and subsequently release part of this matter downstream.

PERISTALTIC PUMP: A pump functioning by alternate pinching and release of tubing which drives the fluid forward in a pulsing action. The pump is noninvasive. Only the inner wall of the tubing contacts the fluid.

PERLITE: Material similar to volcanic glass with a concentrated shell structure. Used as a filter aid.

PERMEABILITY: A measure of fabric porosity or openness, expressed in cubic feet of air per minute per square foot of fabric at a 0.5" water column pressure differential in air or by specified conditions for liquid.

PERMEABLE: Material that has openings through which a liquid or gas will pass in filtering.

PERMEATE: The fluid which passes through a membrane, a term usually used with ultrafiltration or R/O.

pH: Measure of a substance's acidity or alkalinity from 1-14 with 7 being neutral. Measure of hydrogen ion concentration.

PHASE: May be continuous, as the basic product flowing through a housing or discontinuous as the material to be removed from the basic product. Both are distinct and separate.

PHENOLIC RESIN: Synthetic thermosetting resins obtained by the concentration of phenol and substituted phenols with aldehydes. Used as a binder in cellulose and glass fibers for form filter media.

PLASTISOL: Suspension of a thermosetting plastic which can be molded into a desired shape. Used as a combination end cap and gasket on an element.

PLEAT SUPPORT/SPACERS: Used to prevent the collapse of pleats in a pleated paper or membrane cartridge when under the action of differential pressure.

PLEATER: Automated equipment that folds a filter medium roll stock vertically for subsequent incorporation into a filter element. Provides for greater media surface area in a limited space. There are many types of pleaters, including pusher bar, rotary etc.

PLUGGING: Filtered out particles filling the openings (pores) in a medium to the extent of shutting down the flow of a fluid. Also referred to as blinding or blocking.

POINT-OF-USE FILTERS: Filters located immediately prior to where a clean effluent is required in a process.

POLAR: Compound or element capable of receiving or giving electrons. *See Non-Polar.*

POLYELECTROLYTE: Synthetic, water-soluble, linear polymers characterized by the presence of ionizing groups distributed along a molecular length. Used to promote flocculation.

POLYPROPYLENE: A thermoplastic polymeric material, resistant to a broad range of chemicals. When used as a membrane, polypropylene is hydrophobic.

POLYSULFONE: Has excellent flow rates, high mechanical strength, resistant to a broad range of temperatures, can be sterilized and is hydrophilic. Commonly used membrane material, but is not resistant to many organic solvents.

PORE: Opening in a medium. Also referred to as interstices. Size and shape of the openings are controlled by the manufacturer of the filter medium.

PORE SIZE: Diameter of pore in a filter medium.

PORE SIZE-ABSOLUTE RATING: The rated pore size of a filter. Particles equal or larger than the rated pore size are retained with 100% efficiency.

PORE SIZE-NOMINAL RATING: The pore size at which a particle of defined size will be retained with efficiency below 100% (typically 90-98%). Rating methods vary widely between manufacturers.

PORE SIZE DISTRIBUTION: Exclusive to permeable medium: describes the number of pores in various groups of sizes in a way similar to that discussed under particle size distribution.

POROSITY: The percent of open areas per unit volume of a medium whether it be a filter cake or roll stock, such as a paper, membrane, woven textile or nonwoven fabric.

POROUS METAL: Finely ground chards of sintered metal, which serve as a filter medium. Often used in high-pressure and/or temperature applications.

POROUS PLASTIC: Filter media made from finely ground plastic powder. When filled into a mold and heated, the points of powder contact to fuse, while allowing the spaces between the particles to remain open for fluid flow.

POTABLE: Drinkable (water).

PPM: Parts per million. A unit of concentration.

PRECOAT: A deposit of material (usually inert), such as a filter aid on a septum prior to beginning filtration.

PREFILT: Material to be filtered. Also referred to as concentrate, feed, influent, intake, liquor, mud, pulp slime or sludge.

PREFILTER: Filter for removing gross size contaminate before the product stream enters a finer rated filter.

PRESSURE, ABSOLUTE: Gauge pressure plus 14.7 psi.

PRESSURE, PROOF: A test pressure above normal operating pressure to assure that the part will withstand the norm without damage or leakage.

PRESSURE DIFFERENTIAL: Difference in pressure between two points.

PRESSURE DROP (ΔP): Difference in pressure between two points.

PRESSURE DROP, CLEAN: Differential pressure (drop) across a housing measured in psi at rated flow on new elements with clean product.

PRETREATMENT: Changing the properties of a liquid-solid mixture by physical or chemical means to improve its filterability.

PRIMARY SLUDGE: That portion of the raw wastewater solids contained in the raw plant influent, which is directly captured and removed in the primary sedimentation process.

PRODUCT: Continuous phase, either liquid or gas, which is being process through filtration or separation equipment.

PROTEIN BINDING: Adsorption of a protein to a surface such as a cellulose nitrate or nylon membrane due to various types of interactions between protein molecules and the surface.

PSEUDOMONAS DIMINUTA: Bacteria used in sterility testing. One of the smallest bacteria, 0.3 μ m in diameter, used to challenge a sterilizing grade filter during validation testing.

PSI: Pounds per square inch.

PSIA: Pounds per square inch absolute.

PSID: Pounds per square inch differential.

PSIG: Pounds per square inch Gauge.

PULSING BACKFLOW: Intermittent, on-off blowing with or without cake discharge.

PTFE: Highly durable and resistant to range of temperatures and chemicals. PTFE is hydrophobic. Polytetrafluoroethylene is better known as Teflon.

PULSE-JET BAGHOUSE: A baghouse using short intermittent bursts of compressed air to clean dust/particulate from filter bags that are supported by cages.

PYROGEN: Any substance that produces a fever. Pyrogens are lipopolysaccharides which are a by-product of the metabolism of certain bacteria.

Q

QUISCENT: State of rest of a body. In entrainment separation, the body would be a liquid. Also used to describe a sump containing evacuated liquids or solids.

R

RATED FLOW: Normal operating flow rate at which a product is passed through a housing; flow rate which a housing and medium are designed to accommodate.

RAW SLUDGE: Untreated sewage sludge.

REAGENT: Solution or substance used in analytical testing purposes or procedures.

RECOVERY: Ability of a filter to recover bacteria (or other defined particles) from a solution.

REENTRAINMENT: Process of rendering particles airborne again after they have been once deposited from an air stream.

RED MUD: Filter cake in sodium aluminate filtration.

RETENTION: Ability of a filter to retain particles suspended in a gas or liquid. A percentage of particles originally present.

REGENERATED CELLULOSE: Those rayon's in which the cellulose raw material is changed physically, but not chemically. Viscose, cuprammonium and nitrocellulose rayon's are of this type.

REPACK: Cylindrical element used in a single-stage filter separator for removal of one liquid and coarse solids from another liquid. May be used as a single element, a combination of wafers, or a cluster type. Medium may be excelsior, glass fiber or steel wool; or a combination of glass fibers and metal mesh.

RESIDUE: Solids deposited upon the filter medium during filtration in sufficient thickness to be removed in sizeable pieces. Sometimes referred to as a cake or discharge solids.

RESIDUAL DIRT CAPACITY: The dirt capacity remaining in a service loaded filter element after use, but before cleaning, measured under the same conditions as the dirt capacity of a new filter element.

RETENTION: Ability of a filter medium to retain particles of a given size.

REUSABLE FILTERS: Filters that are washed or cleaned of contaminate, either in-situ or off-line, for additional uses.

REVERSE OSMOSIS (RO): A water treatment method whereby water is forced through a semi-permeable membrane which filters out impurities, such as salt (NaCl) from seawater.

REYNOLDS NUMBER: Any of several dimensionless quantities, of form LV_p/N in theory of fluid motion.

ROTARY DRUM: Continuous liquid filter equipment consisting of a large rotating drum covered with a filter cloth and cake, which collects incoming particulate from a contaminated bath or flow. A washing and/or discharge device (scraper) ultimately cleans the contaminate from the cake as the drum rotates.

S

SAND FILTER: Filter composed of layers of sand, graded in particle size, so that the courser particles face the unfiltered flow.

SAYBOLT SECONDS UNIVERSAL: Units of viscosity as measured by observing the time in seconds required for 60 ml. of a fluid to drain through a tubular orifice 0.483 inches long by 0.0695 inches in diameter at stated conditions of temperature and pressure.

SCAVENGER: A filter or element in the bottom of a filter that recovers the liquid heel that remains in a filter tank at the end of a cycle.

SCREEN: Often a flat filter from wire cloth mesh or monofilament fabric filter used to classify particles of a certain size to "to screen out particles". Can also cover an element for protection; also used as a basic material for a separator element of basket in a basket strainer.

SCREW BASE: Element base which is threaded to mount by screwing the cartridge onto the cartridge adaptor.

SCRIM: An open weave textile or nonwoven fabric used as a strengthening member incorporated within the matrix of a filtration medium to provide increased tensile or tear properties.

SCRUBBER: Any device in which a contaminant, solid or gaseous, is removed from a gas stream by impacting it with liquid droplets.

SEDIMENTATION: Action of settling of suspended solids.

SEEDING: The application of a relatively coarse dust, dry dust to an air filter bag before filtration startup to provide an initial filter cake for immediate high efficiency and to protect the bag from blinding.

SELF-CLEANING: Filtering device designed to clean itself by the use of a blowdown or backwash action.

SEPARATION: Action of separating solids or liquids from themselves (e.g. by size, viscosity, density, charge etc.) or liquids or gases from fluids.

SEPTUM: Any permeable material that physically supports the filter media, usually for filter aids.

SERIAL FILTRATION: Filtration through two or more filters of decreasing pore size, one after the other, to increase throughput, filtration efficiency, or to protect the final filter.

SERVICE LIFE: Length of time an element operates before reaching an unacceptable benchmark e.g. maximum allowable pressure drop.

SHAKER BAGHOUSE: A baghouse using flexible bags applying a cleaning action accomplished by shaking the bags from the top.

SHELL: Outer wall of a housing. Also referred to as the body of a housing.

SIEVE: A screen filter with straight-through capillary pores and identical dimension.

SHIFTING: A separation process which separates solid particles by size, through rapid movement of a screen medium, such as a vibrating action. Used in flour, wheat, abrasive, sugar and aggregate sizing.

SILICIAGEL: regenerated adsorbent, consisting of amorphous silica. Used as a drying agent or dehumidifying agent for gases, liquids or oils.

SILTING INDEX: Measurement of the tendency of a fluid to cause silting in close tolerance devices as a result of fine particles and gelatinous materials being suspended in the fluid; measured by a silting index apparatus.

SINGLE-PASS: This test system is designed to be representative of a typical filter circuit. Fresh contaminates are introduced in a slurry form into the test reservoir, mixed with the fluid and pumped through the test filter. The test is run in such a manner to produce one pass of all fluid and contaminate.

SINTERING: A process of heating materials (e.g. metal or ceramic) to elevated temperature causing mating surfaces to fuse as one.

SIZE DISTRIBUTION: Proportion of particles of each size (by mass, number or volume) in a powder or suspension.

SLIMES: Slurry of fine particles; materials to be filtered. Also referred to as concentrate, feed influent, intake, liquor, mud, prefill, pulp or sludge.

SLUDGE: A thickened slurry. Municipal sewage is often dewatered to produce a concentrate for disposal. Also, residues and deposits occasionally formed by oils, after extended use.

SLURRY: Thin, watery suspension; a material to be filtered or dewatered.

SOLIDS: Mass or matter contained in a stream, considered an undesirable discontinuous phase and should be removed.

SOLUTE: Liquid which has passed through a filter. Also referred to as discharge liquor, effluent, filtrate, mother liquor or strong liquor.

SOLUTION: Single phase combination of liquid and non-liquid substances of two or more liquids.

SOP: A written document that explains how to complete a specific production-oriented task. Standard Operating Procedure.

SPARGING: Steam, compressed air, or gas is forced into a liquid through perforations or nozzles in a pipe as part of fermentation.

SPECIFIC GRAVITY: Ratio of weight of a volume of a substance to the weight of an equal volume of another substance typically compared to water with a specific gravity (Sp.G.) of 1.0.

SPECTROPHOTOMETER: Laboratory instrument which measures the wave length and intensity of a light emitted by most chemical agents. When a sample is atomized and burned, the presence of most elements may be determined by their spectra (wave length) emission down to the parts per million range.

SPIN-ON-FILTER: Cartridge filter in which the filter body and the filter element have been constructed and an integral disposable item. Filter change is rapid by spinning off the used unit from a fixed filter head and rapidly adding on the replacement unit.

SPUNBOND: A nonwoven fabric formed by producing, laying and self-bonding a web of filament material in one continuous set of processing steps. Usually made of polyester or polyolefin's.

SS: Abbreviation for stainless steel.

SPUN YARN: A continuous yarn for weaving of textiles consisting of staple fibers.

STACKED DISC FILTER: A filter housing and device consisting of a plurality of leaves place in a horizontal position. Used widely in food and beverage filtration.

STAPLE FIBER: A short length of natural or synthetic fiber typically from 1-4 inches in length, used to manufacture yarns for weaving and various types of nonwoven fabrics, such as needlefelt, airlaid and hydroentangled for use in filtration media.

STERILIZING FILTER: A non-fiber releasing filter which produces an effluent in which no microorganisms are present. Typically microporous membranes at or below 0.2 micron pore size rating have this capability.

STOKE'S DIAMETER: Diameter of a sphere having the same density and the same free falling speed as a particle when moving in a homogeneous fluid of the same density and viscosity, under conditions of laminar flow.

STOKE'S LAW: A physical law, which approximates the viscosity of a particle falling under the action of gravity through a fluid. Friction drag controls the rate of fall at a constant velocity known as the terminal or free-setting velocity.

STRATIFICATION: Condition in which the larger particles settle out below the finer ones. Also referred to as classification.

STREAM: Term sometimes used and synonymous with the words product, liquid, air, gas, fluid etc. in speaking of any matter processed by filtration or separation equipment.

STRING WOUND: An inexpensive filter consisting of textile roving (yarn) wrapped around a center core to form a filter medium and filter cartridge (element).

STRONG LIQUOR: Liquid which has passed though the filter. Also referred to as discharge liquid, effluent, filtrate, mother liquor or solute.

SUBSTRATE: Substance or basic material as a filter media or to which a deposit is added.

SULPA (Super ULPA): An air filter or medium, which captures 99.9999% when challenged with DOP 0.3 micron particles under certain laboratory control conditions.

SUMP: Collecting area of a housing located downstream typically from a coalescer element, in which coalesced droplets of the dispersed phase are deposited; also called water leg. May also be used to collect solids in applications where gross solids are present in a stream; also called mud sump.

SUPERNATANT: Liquid above settled solids.

SURFACE ENERGY: Molecular reaction; the breaking away of ion particles from a mass.

SURFACE FILTER: Filter medium that retains particles wholly on the surface and not in the depth of the cross-section of a filter medium e.g. plain weave wire cloth and monofilament woven fabrics or membrane.

SURFACE FILTRATION: A process that traps contaminants larger than the pore size on the top surface of the filter, usually a membrane, wire cloth or monofilament fabric. Contaminants smaller than the specified pore size may pass through the medium or may be captured within the medium by some other mechanism, such as surface affinity, triboelectric potential or other means, which prevents particle penetration.

SURFACE TENSION: Tendency of the surface of a liquid to contract to the smallest area possible under existing circumstances.

SURFACTANT: A soluble compound that reduces the surface tension of a liquid, or reduces interfacial tension between two liquids or between a liquid and a solid.

SURGE: Peak system pressure measured as a function of restricting or blocking fluid flow.

SUSPENDED SOLIDS: Solids that do not dissolve in liquid; those that remain suspended and can be removed by filtration.

SUSPENSION: Any liquid containing un-dissolved solids.

SWING BOLT: Type of housing head closure which reduces service time. Opposite of thru-blot flange where studs are used, such as with ASA type flanges.

T

TANGENTIAL (CROSSFLOW) FILTRATION: *See Crossflow (Tangential) Filtration.*

TARE: A deduction of weight, allowing for the weight of a container or medium; the initial weight of a filter.

TENSILE STRENGTH: Resistance to breaking. The amount of force required to break a membrane by stretching.

TENSIOMETER: Device used to read the surface tension of a liquid or to reading the interfacial tension between two immiscible liquids.

TERMINAL PRESSURE: Pressure drop across the unit at the time system is shut down or when the maximum allowable pressure drop is reached.

TERMINAL VELOCITY: Steady velocity achieved by a falling particle when gravitational forces are balanced by viscous forces.

THREE-STAGE FILTER SEPARATORS: Liquid prefilter coalescer separators containing three kinds or types of replaceable elements.

THROUGHPUT: The amount of solution which will pass through a filter prior to plugging.

TIPPING PAN FILTER: Process industry equipment which collects particulate from a liquid stream on a screen over a vacuum forming a dewatered cake and discharging the accumulation by tipping the collection screens.

TORTUOUS PATH: Crooked, twisting or winding path which tends to trap or stop solid particles, commonly referenced in relationship to the flow pattern and makeup of a filter medium.

TRAMP OIL: Free oil contained in emulsion type machine tool coolants. May be from machine leakage and from breakdown of the emulsifying agents in the cutting oil.

TRIBOELECTRIC SERIES (POTENTIAL/CHARGE): An inherent natural or induced positive or negative polarity charge that many materials possess. Fibers or a filtration medium with a triboelectric potential will capture charged and potentially neutral particles, assuming both positive and negative properties on the surface of the material. Triboelectric properties only work in air filtration assuming relative humidity below 90 %.

TRIBOELECTRICITY: The charge of electricity that is generated by friction such as rubbing.

THROUGHPUT: The amount of solution which will pass through a filter before clogging.

TOTAL DISSOLVED SOLIDS: Is the portion of the total solids in the sample that passes through the filter and is indicated by the increase in weight in the vessel after the filtrate has been dried at 356°F.

TOTAL SOLIDS / SUSPENDED SOLIDS: The material residue left in the vessel after evaporation of a sample and its drying in an oven at 217-221°F. The increase in weight over that of the empty vessel represents the total solids. Used in analyzing drinking water.

TORTUOUSITY: An continuous path that can be traced from a point on the upstream side of a filter to a point on the downstream side through a twisting pore pathway, traveled by the liquid or gas during filtration.

TRUE DENSITY: Mass of a particle divided by its volume, pores etc. being excluded from the volume calculation.

TURBIDIMETER: An instrument for measurement of turbidity, in which a standard suspension usually is used for reference.

TURBIDITY: Any insoluble particle that imparts opacity to a liquid. A reference point to the total amount of solids contained in a liquid.

TRUBULANT FLOW: Flow regime in which the flow characteristics are governed mainly by the inertia of the fluid. Turbulent flow in ducts is associated with high Reynolds Number (Re). It also gives rise to high drag.

U

U.S.P.: United States Pharmacopeia/National Formulary: The “Bible” of pharmaceutical manufacturer and test protocol for filtration media using Edition/Title XXI as a basis for evaluation.

ULPA: An air filter or medium, which captures 99.999% when challenged with DOP 0.3 micron particles under certain laboratory controlled conditions.

ULTRAFILTRATION (UF): A separation method operating at 50-200 psi in crossflow filtration mode. Efficiency is approximately 90%. Used to separate large molecules according to their molecular weight.

UNIFORMITY COEFFICIENT: Separation factor applied to the sizing of the sand used in water filtration plants.

UNIFORMITY OF FEED: Uniformity of the mixture of the solids in the feed liquid.

UNLOADING: The release of contaminate downstream that was initially captured by the filter medium.

UPSTREAM SIDE: The feed side of the filter. Fluid that has not yet entered the filter.

USEFUL LIFE: Determined when contamination causes a filter or system to have an adverse (lower) flow rate, low efficiency or high differential pressure, providing for an inefficient operation.

V

VACUUM: Depression of pressure below atmospheric pressure.

VALIDATION: Demonstration that a process or product does what it is supposed to do by challenging the system and providing complete documentation.

VAN DER WALS FORCES: The relatively weak attractive forces that are operative between neutral atoms and molecules that arise because of the electric polarization induced in each of the particles by the presence of other particles.

VELOCITY: Time rate of motion in a given direction.

VELOCITY HEAD: Velocity pressure or kinetic pressure.

VENT FILTERS: Filters that allow the passage of air while restricting the flow of fluid; typically containing low micron rated microporous membrane media. Common in medical devices and pharmaceutical tanks.

VESSEL: A container, usually used as alternatively to the word housing e.g. filter vessel.

VIBRATORY SIFTER: Process equipment that separates solids by size on a metal screen through a vibrating action. Larger particles remain on the screen as fines fall through, sometimes to one or more higher mesh count screens for further separation of particle size.

VISCOSITY: Degree of fluidity. Resistance to flow as a function of force, or gradual yielding of force. For a given filter and differential pressure, flow rate will decrease as viscosity increases.

VISCOSITY INDEX: Numerical value assigned to a fluid which indicates to what degree the fluid changes in viscosity with change in temperature.

VOID VOLUME: The amount of open or empty area across the full spectrum of a material or substance. A term often used to describe the amount of porosity in a filter medium.

VOLUMETRIC FLOW RATE: Fluid flow expressed as a volume flowing per unit of time (cc.³/sec., ft³/min., etc.)

W

WARP: The yarns that run lengthwise or in the machine direction in woven goods.

WASTE: Material removed, rejected or otherwise lost in various manufacturing processes.

WASTEWATER: Effluent water carried downstream from a filtration or separation process.

WATER BREAKTHROUGH TEST (WBT): An integrity test for hydrophobic filters or filter medium in which the resistance to water flow is overcome by a specific pressure such that water will flow through a specific pore size of the filter or filter medium. Also called Water Intrusion Test.

WATER FLOW/FLUX: Measure of the amount of water that flows through a filter, a variable of time, the degree of contamination, differential pressure, total porosity and filter area.

WATERHEAD: The height of water in a column. Provides a defined amount of pressure on a surface.

WATER INTRUSION TEST: *See Water Breakthrough Test above.*

WATER LEG: Area of housing for collection of water.

WEIGHT OF SOLIDS: Measure of solid particulate matter contained in a fluid sample.

WEIR: (1) A diversion dam (2) A device that has a crest and some side containment of known geometric shape, such as a V, trapezoid or rectangle and is used to measure flow of a liquid.

WET CAST MEMBRANE: A process to manufacture microporous membranes, typically from thermoplastic materials, solvents and non-solvents in the formation of a microporous membrane. 75 to 80% of all microporous membranes manufactured use this process.

WET STRENGTH: Strength of a medium when saturated with water.

WETTING AGENT: A surfactant added to a filter medium to insure complete intrusion (wetting) by a high surface tension fluid such as water.

WIRE CLOTH: Woven fabric from metal wire used as a screen, surface filter or media support. Often used in sifting, belting, hydraulic filtration etc. Most common wire used is stainless steel.

WOUND TUBES: Also referred to as string wound filters.

Y

YOKE: End cap used to hold a cartridge in place.

Z

ZETA POTENTIAL: The potential across the diffuse layer of ions surrounding a charged colloidal particle.

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