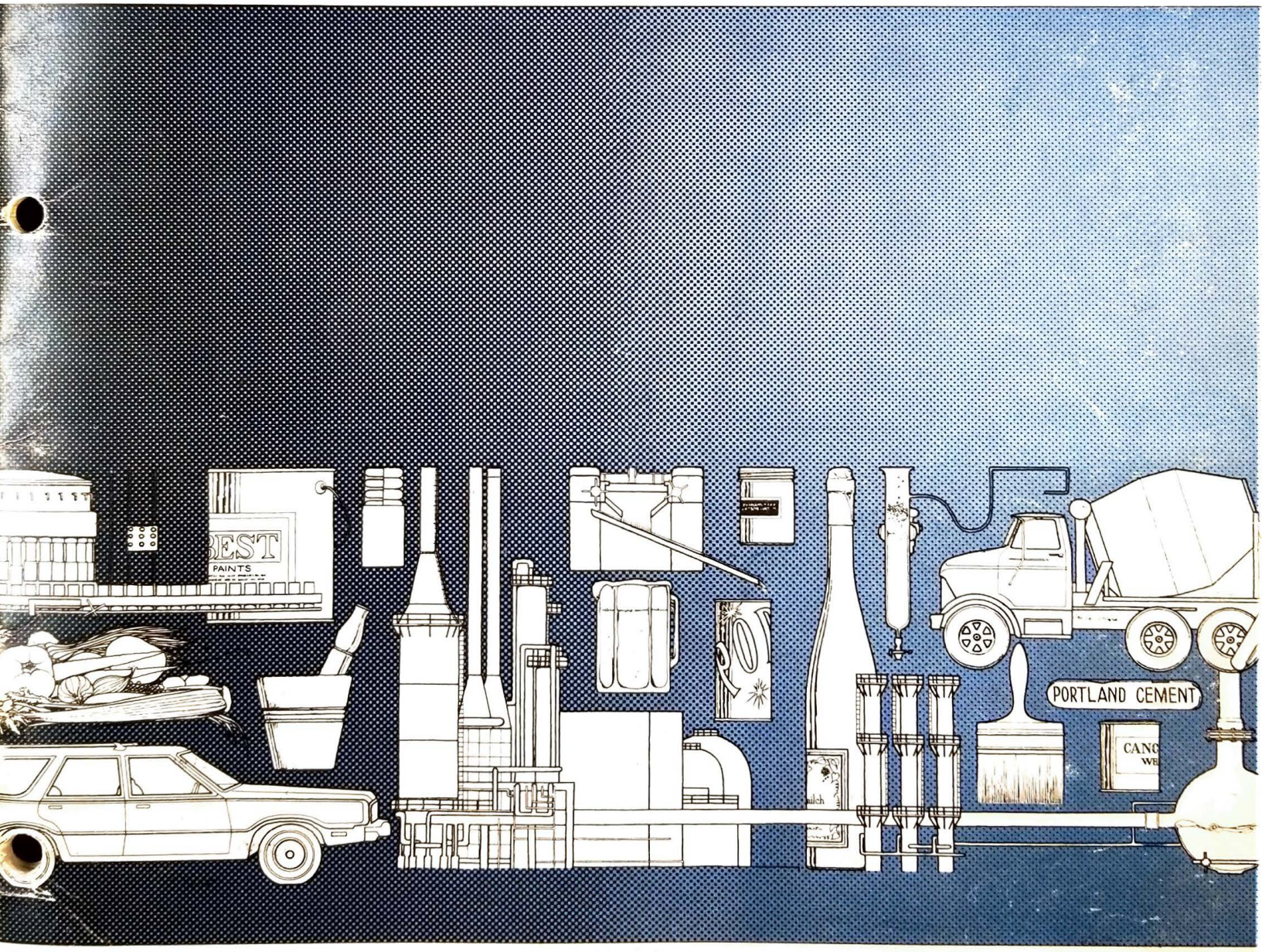
Engineering Filtration Data

GREAT LAKES FILTER
A MEMBER OF THE ACME GROUP



GLOSSARY OF FILTRATION TERMS

ABSOLUTE RATING — The size in microns of the largest hard, spherical particle that will pass through the filter element.

ABSORB — To soak in, as a sponge soaks in water.

ACTIVATED CARBON — Carbon activated by high temperature to form a material of high adsorptive capacity.

ACTUATION PRESSURE — The preselected PSID setting of a differential pressure indicator at which the signal button actuates.

ADSORB — Attracting and holding a gas, vapor, or liquid on the surface of a solid.

ADSORBENT — A solid material which adsorbs, such as clay, carbon, activated alumina.

AEROSOL — A dispersion of small particles in a gas.

AGGLOMERATE — A cluster of particles more or less fixed firmly to one another as by sintering or growing together.

AMBIENT — The term used to present a generalised description of an environment e.g. ambient temperature. The localised atmospheric environment.

AMORPHOUS — Non-crystalline, having no definable form.

ANION — Negatively charged ion, i.e. an atom or molecule which has gained one or more electrons in an electrolyte. It travels to the positive electrode—anode—on electrophoresis or electrolysis. Anions include all non-metallic ions, acid radicals and the hydroxyl ion (OH). (See "ION EXCHANGE")

ASBESTOS — A natural group of magnesium silicate materials found in fibrous form.

ATTRITION — Loss of material due to wear caused by rubbing or friction.

BACKWASH — To reverse fluid flow through the filtration media resulting in solids removal.

BAR — A unit of pressure One (1) Bar = 14.5 PSI.

BAFFLE — A plate protecting filter elements from the velocity of flow entering vessel.

BETA RATIO — The ratio of the number of particles of a specified micrometer in the influent fluid to the number of particles the same micrometer in the effluent fluid.

BLEED — The extraction from any circuit of a proportion of the through-put for sampling, quality control, recirculation or process control.

BLIND SPOTS — A place in the filter media where no filtration takes place.

BLINDING — Reducing or shutting off of flow due to closing pores in the filter media.

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

BRIDGING — Particles being removed arch over individual openings in the filter media or between the individual filter septa.

BUBBLE POINT — The differential gas pressure which when applied to a filter element submerged near the surface of a test fluid causes the first steady emission of gas bubbles from the filter element. A means of verifying the micron rating.

BUNA N — A Nitrile Rubber seal compound. This is a generic term covering many formulations.

BURST STRENGTH — The ability of a filter medium such as a filter paper to resist disruption by pressure applied in a direction normal to the surface.

BYPASS VALVE (RELIEF VALVE) — A valve mechanism that assures system fluid flow when a preselected differential pressure across the filter elements is exceeded.

CAKE — Solids deposited on the filter media.

CAPACITY (DIRT HOLDING CAPACITY) — The quantity of contaminant that a filter element is capable of retaining without exceeding a specified differential pressure at rated flow.

CASE SHUT-OFF VALVE — An optional design feature of filter assemblies which allows the case and element to be removed without draining the system.

CATION — A particle carrying a positive charge which in an electrolytic process moves toward the cathode. It may refer to a positive ion, molecule or a radical. (See "ION EXCHANGE")

CELLULOSE — A fibrous material of vegetable origin.

CELLULOSIC MEDIA — Compact structures of fibers, basically cellulose, impregnated with resin for strength, rigidity and fluid compatibility.

CENTER TUBE — A support device designed to support the filter medium in a filter element while permitting fluid flow and resisting element collapse.

CENTIPOISE — A unit of absolute viscosity. One centipoise equals .01 poise.

CENTISTOKE — A unit of kinematic viscosity. One centistoke equals .01 stoke.

CENTRIFUGE — A machine designed to subject material held in it or being passed through it to centrifuge force. Separation is thus achieved due to any difference in density i.e. accelerated sedimentation.

CLARITY — Clearness of a liquid measured by the amount of contaminants remaining.

CLAY — A natural occurring material usually being activated and used as an adsorbent.

CLEANABLE FILTER ELEMENT — A filter element which upon reaching predetermined differential pressure can be cleaned to an acceptable level of performance for re-use in its fluid system.

COALESCER — Means of causing the disperse phase of two liquids to combine into discrete droplets which, by reason of a difference in density compared with the continuous phase, will separate. Coalescer/separators are widely used for separating water from petroleum fuels.

COLLAPSE PRESSURE — The minimum differential pressure that a filter element is designed to withstand without permanent deformation.

CONTAMINANT — Undesirable solid, liquid or gaseous material present in the liquid or gaseous medium.

CONTAMINANT CAPACITY — The resultant weight of a contaminant (usually A-C fine test dust) which when added at specified intervals and at a specific flow rate produces a differential pressure across a filter element which can be converted or related to the useful life of a filter element.

CONVOLUTING — The accordion pleating of filter media to obtain a large effective filtration area in a minimum volume.

CYCLE — Filtration interval; length of time filter operates before cleaning.

DELTA (Δ) P — Pressure drop, differential pressure.

GLOSSARY OF FILTRATION TERMS (Continued)

DEGREE OF FILTRATION — A measure of the efficiency of filter element expressed in terms of percentage retention of standard contaminants under defined test conditions (Nominal Rating); and the size in microns of the largest hard spherical particle that will pass through the filter element (Absolute Rating).

DENIER — A unit of size of textile thread. The basis is that 450 metres have a standard weight of 0.05 gm. Of significance in describing filter fabrics.

DEPTH FILTRATION — Fluid flowing through a mass filter media following a tortuous path with many entrapments.

DEWATER — Removal of water from solids.

DIFFERENTIAL PRESSURE — The difference in pressure between two points in a fluid system usually in filtration systems expressed as ΔP between a housing inlet and outlet.

DISC PACK ELEMENT — Filter element constructed by packing alternate discs of filter medium and flow distributor plates into a compact cylindrical form.

DISPOSABLE FILTER ELEMENT — A filter element which is not cleanable and is therefore discarded and replaced at the end of its useful life. (Sometimes referred to as throwaway or non-cleanable element.)

EDGE TYPE FILTER — A filter which entraps particles on the edges of the medium.

EFFECTIVE FILTRATION AREA — That area of the fluid medium in a filter element which is exposed to flow.

EFFICIENCY — The ability of a filter element to remove/retain a specific artificial contaminant in a specified concentration under controlled test conditions. Efficiency is expressed in percent.

EFFLUENT — The discharged liquid from a filter, filtrate.

FILTER AID — Powders added to the liquid to be filtered in order to increase the porosity of the cake of solids formed on the filter septum thus maintaining the permeability and the flow of filtrate, lengthening the operating cycle.

FILTER ASSEMBLY — A filtering device consisting of a housing and filter element which directs flow from an inlet port, through a filter element and through an outlet port.

FILTER ELEMENT — A porous device which performs the actual filtration process.

FILTER MEDIA — The porous structures upon which, or in which, fluid system contaminants are trapped.

FILTRATE — The liquid which has passed through the filter, effluent.

FILTRATION — The process of separating a solid from a liquid or gas by a porous substance through which only the fluid passes.

FINES — Particles which are smaller than a specified size.

FLOW FATIGUE RESISTANCE — The ability of a filter medium to resist structural failure or deterioration from cyclic loading.

FLOW RATE — The rate at which a fluid is passed through a system.

FLUID — A gas or liquid.

FLUID COMPATIBILITY — The suitability of filtration media and seal materials for service with the fluid involved.

FULLER'S EARTH — Clay; a hydrous aluminum silicate.

GPH — Gallons per hour.

GPM — Gallons per minute.

HYDROPHILIC — Water wetting.

HYDROPHOBIC — Water rejecting.

IMPREGNATION — The infusion or saturation of a material with resin.

INFLUENT — The fluid entering a filter.

INLINE TYPE FILTER — A Filter Assembly whose inlet, outlet, and Filter Element have a common centerline.

ION — Any atom or molecule which has a resultant electric charge due to loss or gain of valence electrons.

ION EXCHANGE — The use of zeolites, artificial resins or immiscible liquids to capture anions or cations from solutions. Industrial applications include water softening, desalination and purification, solvent extraction, isotope separation and the extraction of metals from ores.

KINEMATIC VISCOSITY — The ratio of absolute viscosity (poise) to the specific gravity of a fluid. The unit of kinematic viscosity is the stoke.

L-TYPE FILTER — A filter assembly in which the inlet and outlet ports are positioned at 90° to each other.

LEAF — A support for the filter medium.

LIQUOR — Material to be filtered.

MEAN FILTRATION RATING — A measurement of the average pore size of the specific filter medium.

MEDIA MIGRATION — Separation and/or deterioration of components of the filter medium and subsequent release into the effluent.

MEDIUM — The porous material that performs the actual process of filtration.

MEMBRANE — A thin permeable film of inert polymeric material cast in such a way, from a mixture of solvents, so that the size, number and shape (tortuosity) of the pores is controlled.

MESH — Number of openings in a lineal inch of cloth.

MICROMETER OR MICRON — A unit of length. A micrometer is one millionth of a meter or 0.000039" (39 millionth's of an inch). Expressed in convenient terms 25 Micrometers approximately equal one thousandth of an inch (.001").

MULTI-PASS TEST — A test used to determine the Beta Ratio of a filter element.

NEGATIVE PRESSURE — Vacuum or suction.

NOMINAL FILTRATION RATING — An arbitrary micrometer value established by a filter manufacturer as an indication of filtration capability.

PARTICLE SIZE DISTRIBUTION — The distribution obtained from a particle count grouped by specific micron sizes.

PERMEABILITY — The relationship of flow per unit area to differential pressure across a filter medium.

PHOSPHATE ESTER BASE FLUIDS — Fire-resistant hydraulic fluids.

POISE (ABSOLUTE VISCOSITY) — Numerically equal to the force required to move a plane surface of one square centimeter over another plane surface at the rate of one centimeter per second when the surfaces are separated by a layer of fluid one centimeter in thickness (dyne sec/cm^2).

GLOSSARY OF FILTRATION TERMS (Continued)

PORE — A small channel or opening in a filter medium which allows the passage of fluid.

PORE SIZE DISTRIBUTION — The ratio of the number of holes of a given size to the total number of holes per unit area expressed as a percent and as a function of hole size.

POROSITY — The ratio of pore volume to total volume of a filter medium expressed as a percent.

PREFILT — Material to be filtered.

PSIA — Pounds per square inch absolute = PSIG (Gage) + atmospheric pressure (14.696).

PSID — Pounds per square inch differential, ΔP.

PSIG — Pounds per square inch gage = PSIA minus atmospheric pressure (14.696). That pressure registered on a conventional type gauge.

RATED FLOW — The optimum flow rate for which a filter is designed.

RECYCLE — The return of filtered liquid for another filtering.

REVERSE OSMOSIS — The reverse of natural osmosis achieved by external application of sufficient reverse pressure to cause solvent flow in its unnatural direction through a membrane, that is from the more concentrated to the dilute solution.

SCFM — Standard cubic feet per minute, i.e., units of gas flow rate. A standard cubic foot is measured volume of gas, 760 millimeters of mercury pressure (1 bar) and 0°C temperature.

SEMI DEPTH TYPE FILTRATION — The retention of contamination both on the surface and within the internal pore structure of the medium.

SEPTUM — Support for filter aids.

SINTERED FILTER MEDIA — Porous media formed by packing and fusing together a thin layer of metal or plastic particles or fibres.

SLURRY — Filter feed material in which the solids content is appreciable, such that the solids can easily be seen.

SPECIFIC GRAVITY — The ratio of the weight of a given volume of matter to the weight of an equal volume of water.

SSU = SAYBOLT SECONDS UNIVERSAL — A measure of viscosity. The time in seconds for 60 cubic centimeters (cc) of liquid to flow through a standard orifice at a specific temperature.

STRAINER — A coarse or relatively open filter element usually greater than 50 micron.

SURFACE TYPE FILTRATION — A filter medium which primarily retains contaminant on the influent face.

SYSTEM SILTING — The agglomeration and settling of ultrafine particles in a fluid system.

TEE TYPE FILTER — A filter assembly whose inlet and outlet ports are on a common center line at right angles to the axis of the filter element. Features element replacement without disturbing system connections.

TORR — The unit of pressure used in vacuum measurement; equal to 1/760 of a Standard atmosphere.

UNLOADING — The removal of a contaminant which was previously trapped or retained by the filter medium.

VISCOSITY — A measure of the internal friction or the resistance of a fluid to flow. The standard unit of measure is poise, stoke or SSU.

VOIDS — The openings in a medium or filter cake.

WIRE CLOTH — A metallic filter medium formed by weaving fine wires into a cloth with a controlled pore size.

Suggested additional sources of information:

CHEMICAL ENGINEERS' HANDBOOK, Perry & Chilton, McGraw-Hill

FILTRATION UPDATE 1983, Ivan Bartik, Technical Monograph

FILTER AIDS AND MATERIALS, Driscoll, Noyes

FLOW OF FLUIDS THROUGH VALVES, FITTINGS & PIPE, Technical Paper #410, Crane Co.

HACKH'S CHEMICAL DICTIONARY, Grant, McGraw-Hill

HANDBOOK OF CHEMISTRY AND PHYSICS, The Chemical Rubber Company

HANDBOOK OF FILTRATION, Eaton-Dikeman Company

HANDBOOK OF SEPARATION TECHNIQUES FOR CHEMICAL ENGINEERS, Schweitzer, McGraw-Hill

MEMBRANE FILTRATION, Brock, Science Tech

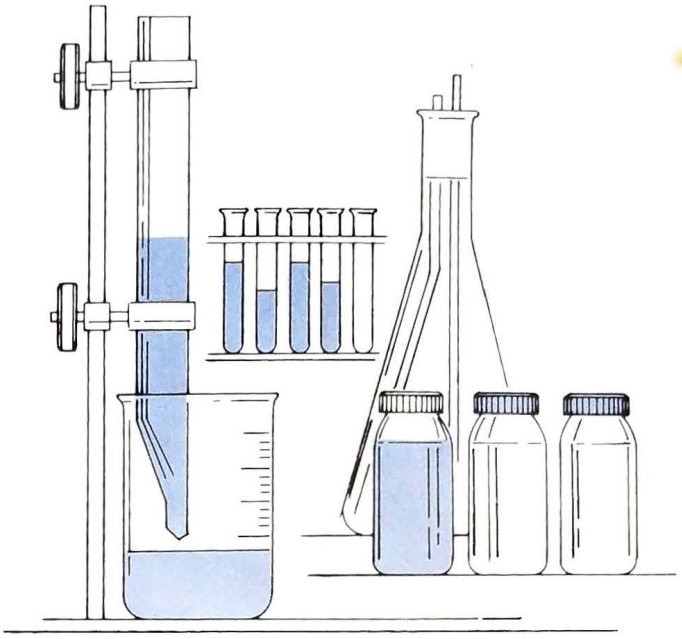
PUMP SELECTION, Rodger Walker, Ann Arbor Science

SOLID/LIQUID SEPARATION EQUIPMENT SCALE-UP, Uplands Press

SOLID/LIQUID SEPARATION TECHNOLOGY, Uplands Press

GREAT LAKES FILTER provides the best selection of filters available:

AIR MAZE—Filters, air/oil separators and breathers
FILTERITE—Vessels and tubes
BRUNSWICK Membrane Products
DYNALOY Metallic elements
ION EXCHANGE PRODUCTS
Cyclonic Separators
Filter Presses—Cloth, paper and pads
Dust Collector Bags
Liquid Pressure Vessels and Bags
Oil/Water Coalescer Separators
Oil Reclamation Systems
Custom Bags
Air Filters
Replacement Elements
Coolant Media
Sand Filters
Screens and Strainers
Flex-Sock® Connectors for Screeners



Laboratory and technical assistance readily available . . .

Our engineers make house calls.

FILTRATION APPLICATIONS FOR INDUSTRY

GREAT LAKES FILTER A MEMBER OF THE ACME GROUP

5151 Loraine
Detroit, Michigan 48208
Telephone (313) 894-1950, MI
Toll Free (800) 521-8565, U.S.