Membrane Systems for Waste Minimization

SANBORN Technologies

POLLUTION PREVENTION

Waste Minimization and Resource Recovery

MANUFACTURERS are continuously struggling to meet the increasing demand for competitively priced world class products while at the same time striving to meet increasingly strict governmental regulations requiring the reduction or elimination of industrial wastes — preferably through source reduction. Sanborn Technologies continues to develop and deploy state-of-the-art separation solutions to assist manufacturers to produce higher quality products and meet environmental mandates.

SANBORN TECHNOLOGIES MEMBRANE SYSTEMS

For wastewaters containing oily emulsions or very fine suspended solids, membrane techology has proven to be the most reliable treatment solution. Sanborn's membrane systems offer a straightforward approach to separating wastewaters which in the past required extensive physical / chemical treatment. Membranes are the preferred solution for protecting the environment because they provide a positive physical barrier between wastewater and discharge, use less energy, and eliminate airborne pollution caused by evaporators.

HOW MEMBRANE SEPARATIONS ARE ACCOMPLISHED

Membrane separations work by using a very tight membrane filter which separates smaller molecules, such as water, from larger molecules, such as an oil emulsion. Depending upon the characteristics of the waste stream and the desired objective, two classes of membranes — UF and NF — have evolved as Sanborn's standard for waste minimization because they are easy to use and reliable.

CLASSIFICATIONS OF SANBORN TECHNOLOGIES MEMBRANE SYSTEMS

ULTRAFILTRATION (UF)

Ultrafiltration membrane systems offer the widest range of flexibility in applications. These membranes separate particles down to 0.005 micron and, when designed into a tubular wide channel configuration, can handle heavy solids from operations like vibratory finishing. Ultrafiltration membrane systems are chemically resistant and the preferred method of waste minimization for breaking emulsions — reducing wastes by as much as 98% without the use of chemical additives. The ultrafiltration separation process is mechanical and operates without messy and expensive prefiltration. In most cases ultrafiltration can produce sewerable effluent, thus dramatically reducing waste disposal costs.

Primary Applications include:

- Aqueous Parts Washer Solutions
- Metalworking Coolants
- Vibratory, Burnishing, and Deburring Wastes
- Mop Water
- Food Processing Wastes
- Air Compressor Blowdown
- Printing Press Washwater

NANOFILTRATION (NF)

Nanofiltration uses a tighter membrane than ultrafiltration and offers a higher quality water output. Operating at pressures between 100-200 psi, NF is considered a cross between UF and RO. Available in narrow channel configurations, NF is used in low solids applications, or in conjunction with significant prefiltration. See the discussion of wide versus narrow channel configurations on page 2.

OTHER CROSS FLOW MEMBRANE TECHNOLOGIES

MICROFILTRATION (MF)

Microfiltration, a low pressure membrane system, separates particles down to 0.1 micron. This technology is used for separations such as suspended solids removal, metal hydroxide clarification, and as a biological wastewater clarifier. MF is sensitive to oil fouling and is difficult to use in the presence of free oil.

REVERSE OSMOSIS (RO)

Reverse osmosis is a high pressure process that is used to separate water from dissolved salts and metals. It is the tightest of the membrane systems and offers competitive performance to ion exchange and carbon absorption technologies. RO is sensitive to oils and solids, and is a poor choice for oily waste minimization.

FEATURES

- A high-tech polymeric membrane is insensitive to chemical and concentration changes in the waste feed stream.
- Half-inch tubular membranes allow processing of high-solids waste. (UF only)
- System operates in batch or continuous mode.
- Self-contained and skid-mounted units install easily.

BENEFITS

DIRECT COST SAVINGS

- Reduced waste volume saves on disposal costs.
- Simple operation saves on labor costs.
- Extremely low operating costs give continued savings.

ENVIRONMENTAL BENEFITS

- Positive membrane barrier ensures consistent effluent quality.
- Lower waste volumes reduce environmental liability.
- Low-pressure, non-chemical system is safe to operate.

VALUABLE TIME SAVINGS

- Unattended operation and limited maintenance saves man-hours.
- Less storage, monitoring, and hauling away of wastewater saves time.

TODAY'S TECHNOLOGY

APPLICATIONS FOR MEMBRANE SYSTEMS

Metalworking Coolants
Removal of the water in emulsions achieving waste minimization

Aqueous Parts Washer Solutions
Resource recovery of the washer solution for bath extension

Vibratory, Burnishing, and Deburring Wastes
Removal of the suspended solids in the rinse stream for resource recovery of the rinse water

Mop Water
Removal of the water from the oily wash water for waste minimization

Food Processing Wastes
Removal of suspended solids, FOG, and reduction of BOD and COD for waste minimization

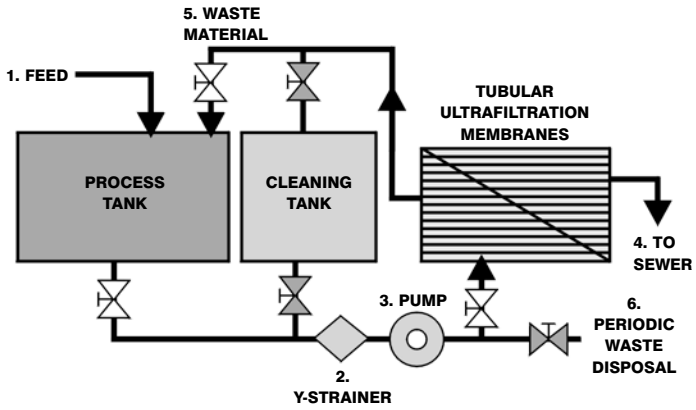
Air Compressor Blowdown
Removal of condensate water from compressor blowdown for disposal

Printing Press Washwaters
Removal of the rinse waters from the printing inks for waste minimization

HOW UF MEMBRANE SYSTEMS WORK

UF membrane systems work by pumping wastewater across a semi-permeable membrane and driving the cleaned water (permeate) out of the membrane. The process is continuous, and because of the cross-flow pattern and the large ½ inch internal diameter tubular filter, the membrane does not cake or plug. No materials are trapped within the membrane; instead they are concentrated, and on a periodic basis pumped from the process tank for disposal.

HOW MEMBRANE SYSTEMS WORK

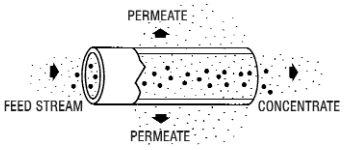


MEMBRANE CONFIGURATIONS — WIDE AND NARROW CHANNEL

Most membrane technology is available as both wide and narrow channel configurations. Each has their advantages:

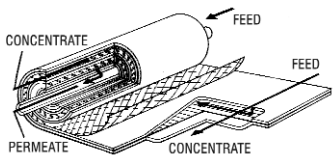
WIDE CHANNEL configuration means that the inside dimensions of the membrane module are typically at least ½ inch. This allows the modules to be used in high solids applications. For example, most manufacturing plants generate and process mop water that has a high solids content.

CUTAWAY OF TUBING SHOWS WIDE CHANNEL TUBULAR MEMBRANES



½" WIDE CHANNEL TUBULAR ELEMENT

NARROW CHANNEL membranes typically have dimensions inside the module of 1,250 microns. This tight packing of membrane allows smaller modules to be employed to achieve separations and reduces the capital equipment cost. Since the flow path is small, prefiltration is necessary. Narrow channel devices are best applied in waste streams that do not contain solids.



NARROW CHANNEL
SPIRAL WOUND ELEMENT

Accessories

Coalescer for Free-Oil Removal Improves Membrane Performance

The Sanborn Oil Separator (SOS) is designed for the efficient removal of free oils to less than 1% from wastewater. Two configurations are available with processing capabilities of 5 GPM (Gallons Per Minute) and 10 GPM. Shipped fully assembled, this compact separator is easily positioned, simple to install, and requires only plant air to operate. The Sanborn Oil Separator is extremely reliable and requires only an occasional prefilter clean-out for maintenance.

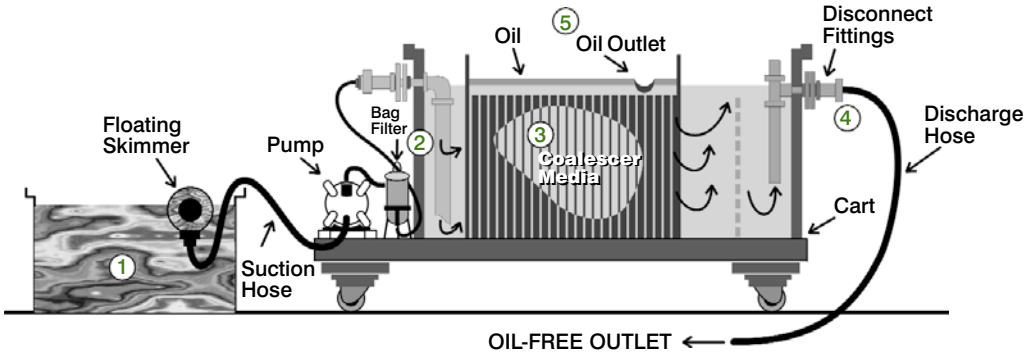
SOS-5

NF-1000 WITH INTEGRATED SOS AND TRANSFER PUMP

GENERAL SPECIFICATIONS

MODEL	5 GPM	10 GPM
Length (in.)	60	60
Width (in.)	30	30
Height (in.)	36	48
Dry Weight (lbs.)	180	220
Hold-Up Volume	40 gal.	80 gal
Air Required	1 SCFM	2 SCFM

OIL SEPARATOR OPERATION



SYSTEM OPERATION

1. Contaminated fluid is continuously fed into the unit.
2. The fluid is processed through a bag filter, then flows into the media chamber.
3. Free oils are coalesced and separated in the porous media bed.
4. Clarified fluid overflows the discharge baffle and is discharged.
5. Separated free oils and other impurities are collected at the top of the separator and are discharged automatically by means of an oil weir.

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