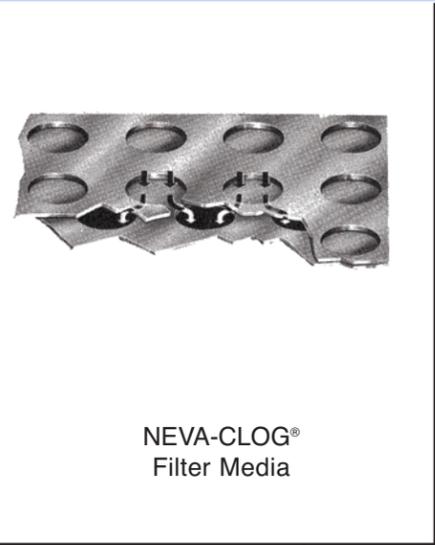
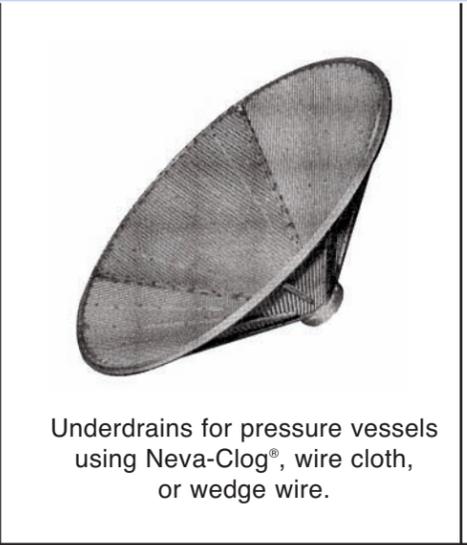


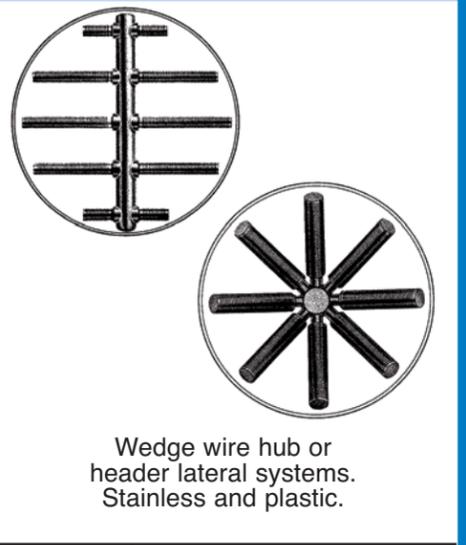
We have all of the capabilities to help you with your pressure leaf filtration needs and problems. We can provide new filters, rebuilding or repairs for your old filters, filter leaves and spare parts. We will help you engineer and design (or redesign) your pressure leaf filtration system. We can help you solve problems of clarity, bleed through, recycle time, plugged cloth and other difficulties.



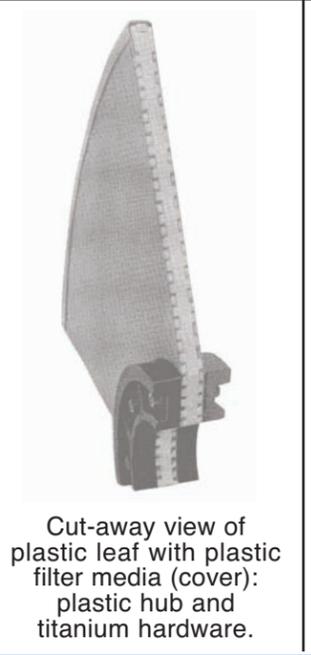
NEVA-CLOG®  
Filter Media



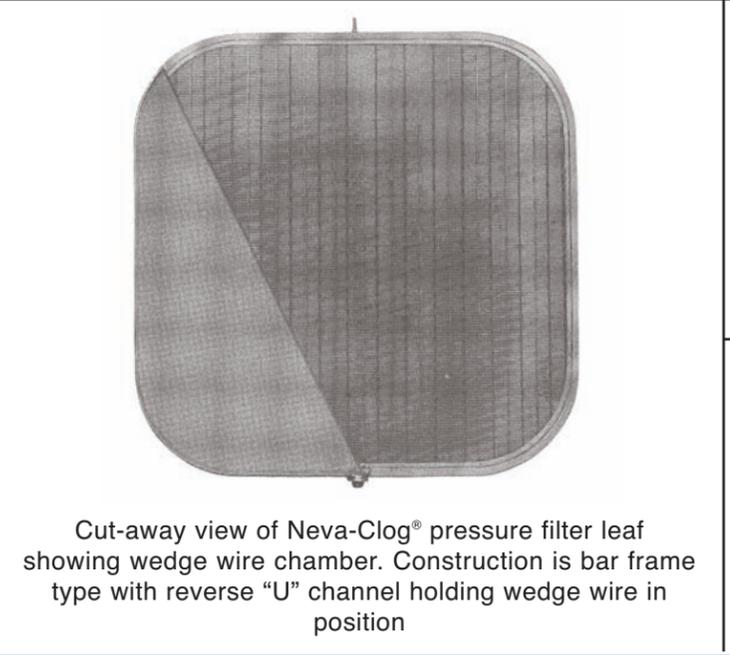
Underdrains for pressure vessels using Neva-Clog®, wire cloth, or wedge wire.



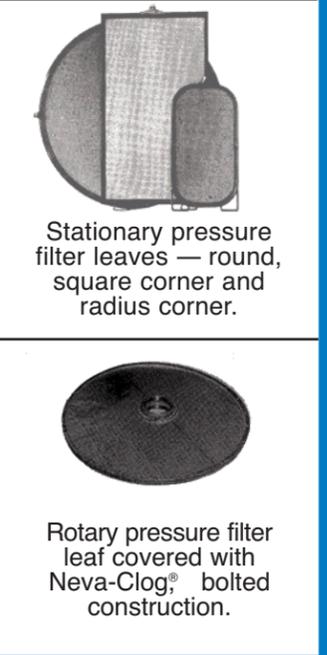
Wedge wire hub or header lateral systems. Stainless and plastic.



Cut-away view of plastic leaf with plastic filter media (cover): plastic hub and titanium hardware.



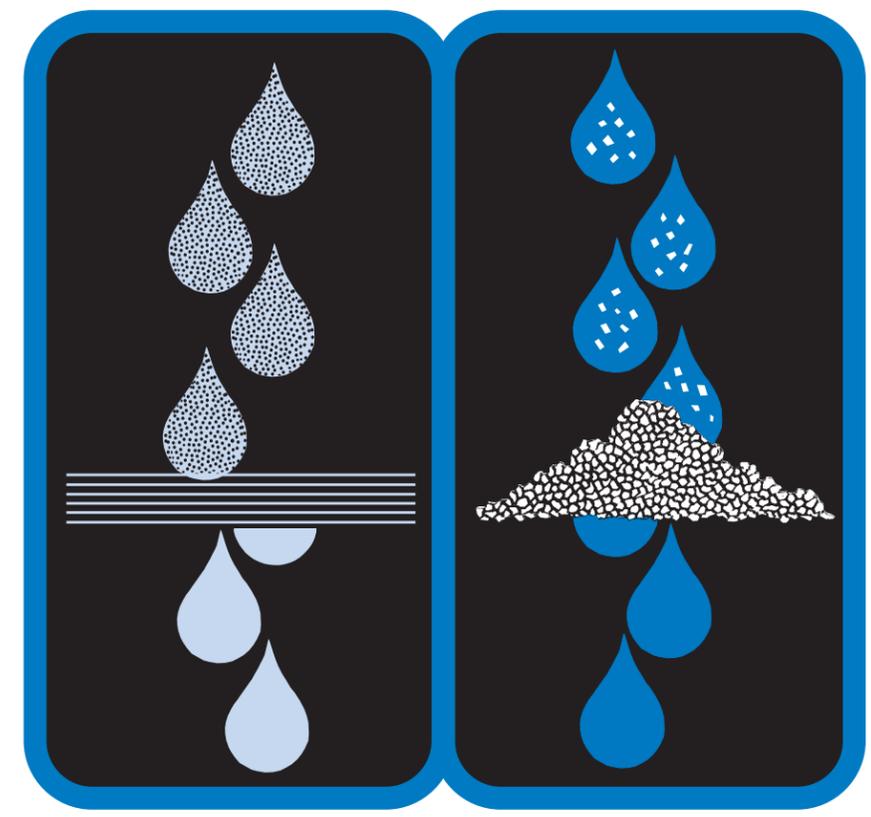
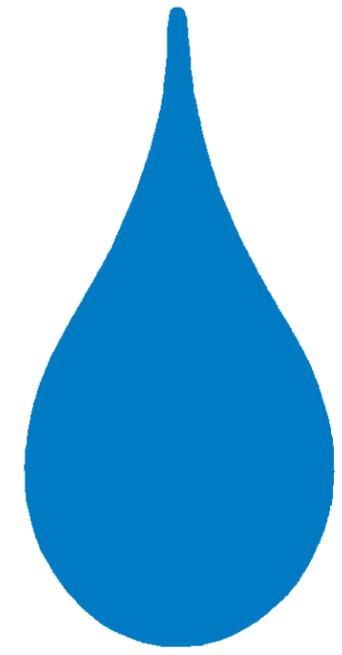
Cut-away view of Neva-Clog® pressure filter leaf showing wedge wire chamber. Construction is bar frame type with reverse "U" channel holding wedge wire in position



Stationary pressure filter leaves — round, square corner and radius corner.



Rotary pressure filter leaf covered with Neva-Clog®, bolted construction.



Liquid Clarification

Solids Recovery

Your "One Stop Source" for:  
**PRESSURE LEAF FILTRATION**

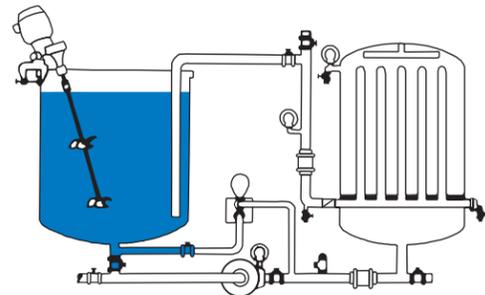
- North American-Hercules® Filters
- Nafco "C" Fibrous Precoat
- New Leaves for ALL Types of Filters
- Leaf Rebuilding and Repair
- Laboratory and Pilot Filters
- Metal and Plastic Filters Media
- Engineering, Problem Solving, Systems Design

## The Typical Filtration Process FUNDAMENTALS OF OPERATION

Pressure-leaf filters, in either vertical or horizontal arrangement, provide excellent removal of suspended solids from a liquid. The slurry is introduced to the tank under pressure and is forced through the filter elements. Suspended solids are retained on the filter media. The clarified liquid flows to the interior of the leaf and is discharged to process. Solids are removed from the filter leaves and the unit is ready for another cycle. Even multiple filtering stations are normally a one-man operation.

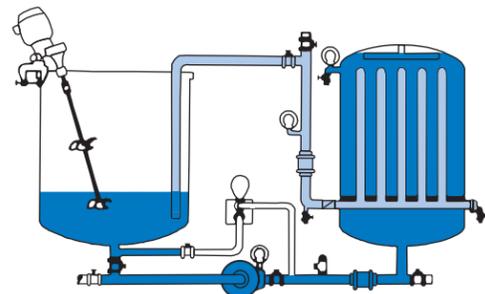
### Precoat preparation

A filteraid (3 to 15 lbs. per 100 sq. ft of filter area) is added to the precoat tank filled with clear liquid or filter process liquid. The slurry is agitated until thoroughly mixed (5-10 minutes).



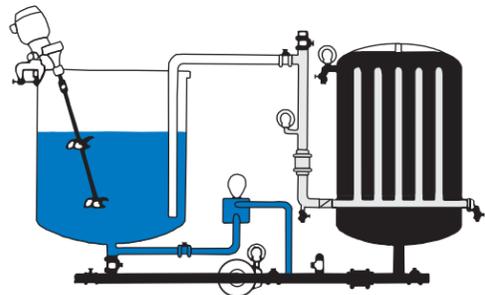
### Precoating

The slurry is now recirculated through the filter after venting all air. This will deposit a uniform layer of precoat (filter-aid) on each filter leaf. The preferred flow rate of liquid during precoating is 30 to 60 gal. per sq. ft. per hour for aqueous solutions.



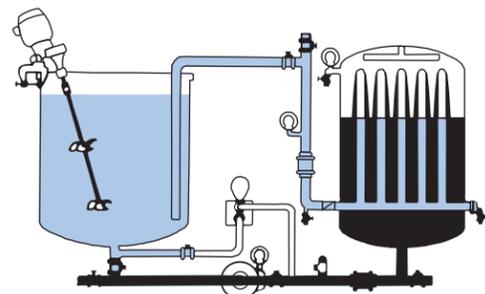
### Filtering

The unfiltered process liquid is pumped to the filter. The filtrate is directed to process or storage and filtration continued until a full cake (3/4" to 1 1/2") is formed or flow diminishes. If the solids are slimy in nature, it might be necessary to inject a filteraid slurry into the main feed line by means of a proportioning pump. This is a common practice called "body feeding."



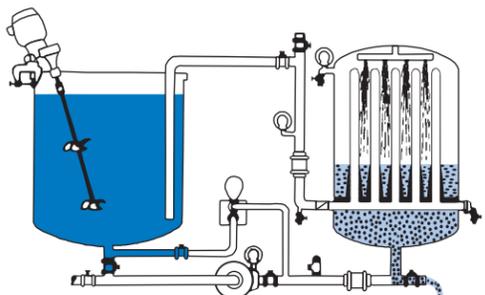
### Draining and/or Blowdown

When the filter is ready for cleaning, the unfiltered "heel" in the tank is simply allowed to drain from the tank with the cake or is blown back to the feed tank by air pressure. Releasing some air through the leaves also serves to keep the cake in place for "dry cake" discharge.



### Cleaning

Drain valves are opened and the cake is washed from the leaves by means of water jets. This flushing action can be accomplished by a built-in sluicing header, air or steam pressure, or manual hosing. Mechanical vibration is used for "dry cake" discharge.



## WHERE TO START — WHEN YOU NEED A NEW FILTER...

### How big a filter do you need?

Filters are available in many sizes and are rated in square feet of effective filtration area. Determining exactly how large a filter you need depends primarily on flow rate and cake loading. First, let's figure out...

#### 1. Liquid Throughput

Every sq. ft. of filter area will filter at a given rate, depending on the filter cake resistance and liquid viscosity. Since slurries vary so much, this calculation should be based on your own slurry. It can be determined from past experience, laboratory or pilot scale studies. Slurries with non-gelatinous solids may range up to 300 gph per sq. ft.; high viscosity slurries may average between 20 and 30 gph per sq. ft. After throughput has been determined, the required filter area is figured as follows:

$$\frac{\text{Required throughput (GPH)}}{\text{Avg. filtration rate (GPH/sq. ft.)}} = \text{Filter Area (sq. ft.)}$$

#### 2. Solids loading

Sizing is based on the solids buildup (including body-feed) and the desired cycle time. This formula is figured:

$$\frac{\text{Total solids per cycle (cu. ft.)}}{\text{Attainable cake thickness (ft.)}} = \text{Filter Area (sq. ft.)}$$

Cake thickness will also influence the spacing of leaves:

Leaf Spacing	Maximum Cake Thickness
2" *	3/4"
3"	1 1/8"
4"	1 1/2"

\*Not recommended for dry cake discharge filters.

The greater area figured from 1 and 2 (above) is the one to use.

### What material is used in constructing filter leaves and media?

Stainless steel, Monel<sup>1</sup>, nickel, Carpenter 20<sup>2</sup>, Hastelloy<sup>3</sup>, titanium, plastic, or whatever you require. Corrosion is a filter's "worst enemy" and its potential effect on the filter and components must be considered from the start. Filter cloths, if needed, are available in metal, cotton or synthetic fabrics in a multitude of weave patterns and porosities.

### Can a filter be automated?

Completely! We can make a filter virtually think for itself—automatically "read gauges that measure pressure, flow and cake thickness... operate valves that direct flow...stop and clean itself...precoat itself and start the filtering cycle all over again. And again. And again.

### What is meant by "reserve" capacity?

We generally recommend purchasing a filter with 10-15% reserve capacity—more filtration area than is actually necessary. Building a reserve capacity into your filter at the time of the original order costs relatively little extra, and it is instantly available should you ever need it.

The final decision will be based on the answers to the following question:

- 1) Can the cake be removed by sluicing or is dry cake discharge required?
- 2) Is automatic discharge required or can the cake be manually removed?
- 3) Is automatic discharge possible with your cake?
- 4) What kind of space is available for the filter?
- 5) Should the filter be totally enclosed throughout the cycle for safety reasons?
- 6) Will the filter cycle be automated?
- 7) Is "heel" (i.e. unfiltered liquid remaining in the filter at the end of each cycle) filtration important?
- 8) Is intermittent flow likely?

The answers to these questions will come from process requirements, past experience or testing and personal preference. Together, the answers will indicate one or more of the different types of filters shown herein.

<sup>1</sup>TM International Nickel Co.    <sup>2</sup>TM Carpenter Steel Co.  
<sup>3</sup>TM Cabot Corp.

The wide variety of filters manufactured by **LEEM/LSS Filtration** enables the customer to pick the features best suited for the application.

## INTRODUCTION

**LEEM/LSS Filtration** is a diversified manufacturer and engineering designer of products for filtration. We produce North American-Hercules® filters as well as automation packages, components and parts for them. We have engineers and manufacturer's representatives available to our customers and potential customers throughout the U.S. and Canada.

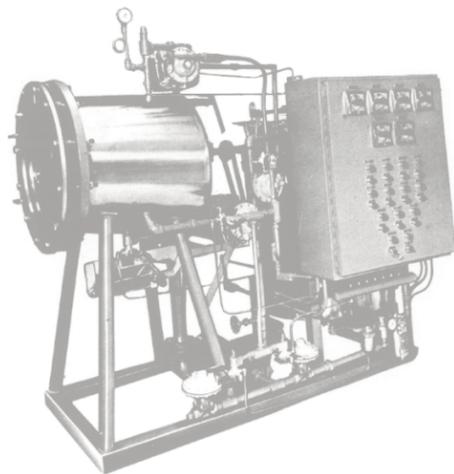
Our job is to serve you well with the most cost effective products and services for your operation. Toward that end we hope that you will find this brochure both interesting and informative.

In order to offer a complete service for pressure leaf filtration, in addition to the filters themselves, we provide the following products and services:

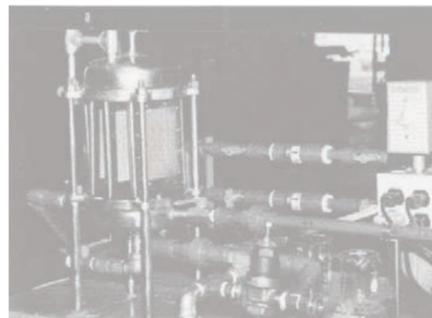
- **Leaves** for all types of pressure leaf filters (**metal and plastic**)
- NAFCO "C" fibrous **precoat** filter medium
- All kinds of **wire cloth** covers
- Leaf **rebuilding** and **repair** service
- Filter leaf **fabric covers**
- **Engineering** and **problem solving** service
- **Spare parts** for North American & Hercules® filters
- **Laboratory** filters (for Sale and Rental)
- PILOT FILTERS (Rental)

## PILOT AND TEST FILTERS

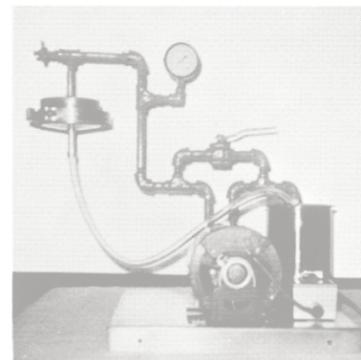
The first step in determining if pressure leaf filtration will satisfy your requirements might be to operate a Pilot or Test Filter in your lab or on a plant side stream. We have Pilot and Test Filters available in various sizes as shown below, for rent or sale.



**30 sq. ft., Pilot Unit**  
Automated



**2/3 sq. ft., Pilot Unit**  
Ideal for drinking water tests.  
Pyrex glass chamber



**0.1 sq. ft., Lab Unit**  
Table top size.

## OTHER PRODUCTS AND SERVICES

In order to be a "ONE STOP SOURCE" for Pressure Leaf Filtration, **LEEM/LSS Filtration** offers the following additional products and services:

### Filter Leaves—New

or **ALL MAKES** of pressure leaf filters, not just our own.

### Filter Leaves—Rebuilding and Repairing

For **ALL MAKES** of pressure leaf filters.

(NOTE: For more detailed information about **Filter Leaves**, ask for our special brochure on this subject, Filter leaves come in many designs and constructions.)

### Automation and Systems

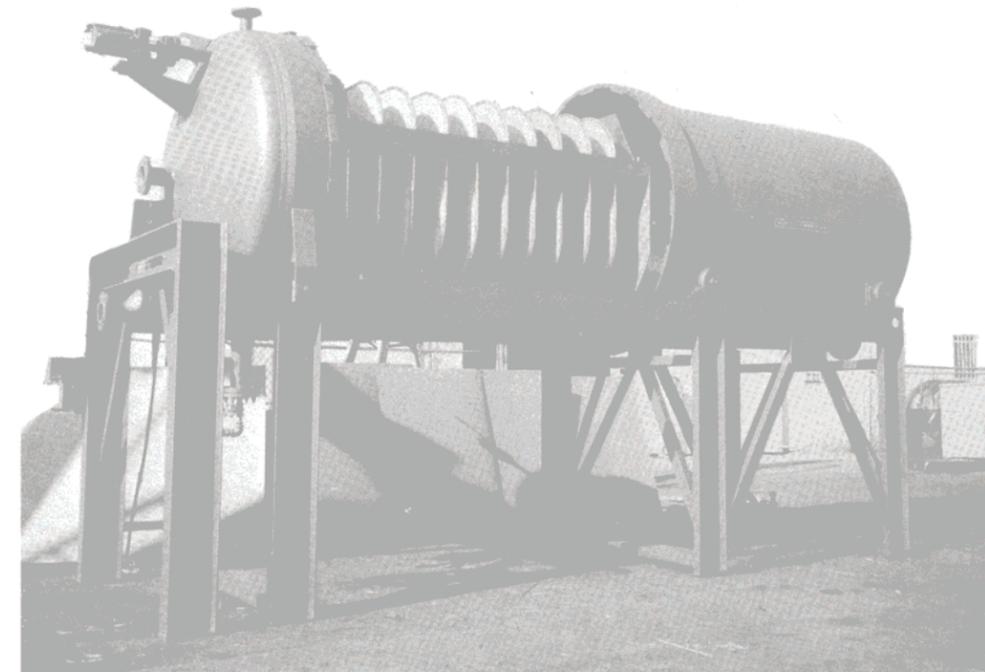
We can provide complete automation packages for single or multiple filter units and systems, ready for installation, including valves, pumps, motors, interconnecting piping, precoat and body feed tanks, instruments and mixers.

### Fibrous Precoat

Our NAFCO "C" is used by many pressure leaf filter operators to help produce a firm precoat (and thus quick clarity) in a minimum amount of time.

### Pilot Filter Tests

We will help you set up and run pilot filter tests. If desired, we will run the tests for you. This is particularly important in the evaluation of D.E. filtration for drinking water.

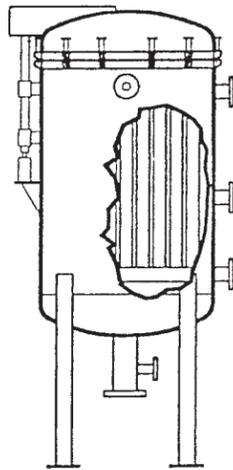


NAFCO 60-RS-520 WITH VIBRO-CLEANER.

To the left is a photo of a large retractable shell filter with the shell in the retracted position and the leaves exposed. The leaves discharge through a manifold at the bottom.

## TYPES OF PRESSURE LEAF FILTERS

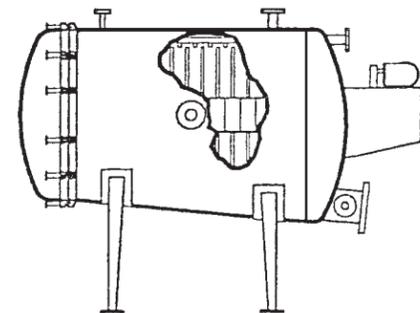
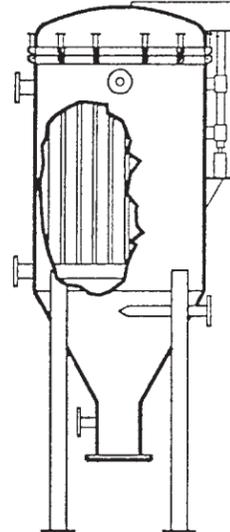
**LEEM/LSS Filtration** offers you the widest choice of pressure leaf filter configurations with leaf areas ranging from 30 to 2000 square feet. The following outline drawings show the variety available.



### NORTH-AMERICAN HERCULES®

Vertical tank — Vertical leaf

- to 500 square feet
- least floor space required
- bottom outlet filter leaves
- choice of cake discharge
  - wet cake slurry by sluicing
  - dry cake by vibration
- can be mounted between floors



### HERCULES® ROTOJET

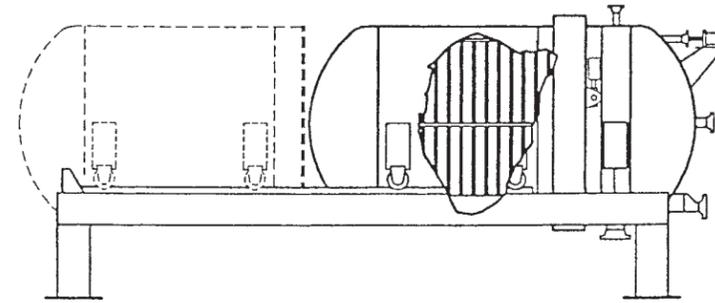
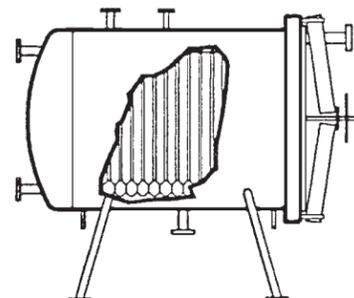
Horizontal tank, rotatable leaf

- to 1000 square feet
- most efficient wet cake discharge
- center outlet rotatable leaves
- all filter leaves interchangeable
- polypropylene leaves available

### HERCULES® RAPIDOR

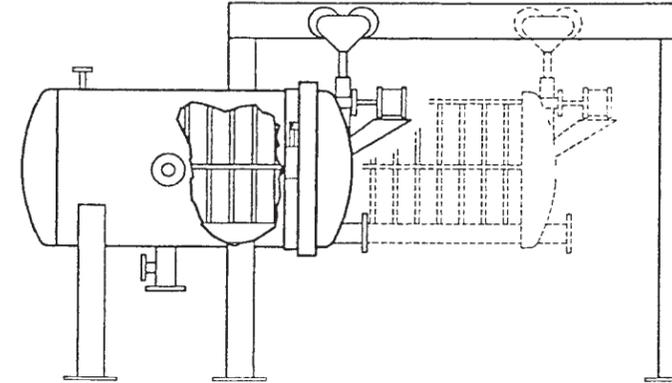
Horizontal tank, vertical leaf

- to 600 square feet
- bottom outlet filter leaves
- optional heel leaf
- manual dry cake discharge
- all filter leaves interchangeable
- quick opening door



### RETRACTABLE SHELL

- to 2000 square feet
- least head room required
- bottom outlet leaves
- interchangeable leaves
- no piping disconnects to open for cake discharge
- hydraulic quick opening door



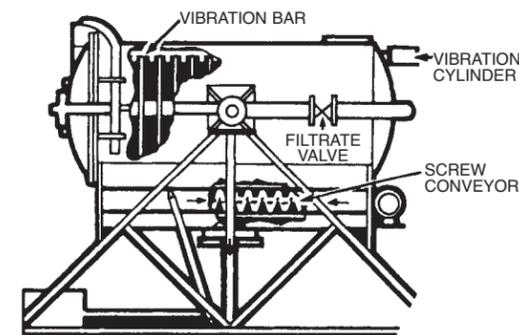
### RETRACTABLE BUNDLE

- to 2000 square feet
- bottom outlet leaves
- interchangeable leaves
- dry cake discharge over open space
- hydraulic quick opening door

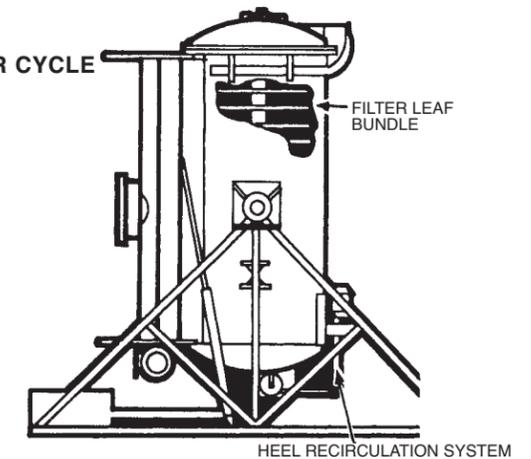
### MODEL "T" TILTING FILTERS

- Ideal for discharging toxic or obnoxious cake.
- Cake may be washed free of mother liquid or extracted after primary filtration.
- One-sided horizontal leaves. Flow may be intermittent or varying in pressure with no fear of losing the cake.
- No pipe connections to make or break during complete cycle.

#### • CLEANING CYCLE



#### • FILTER CYCLE



### FILTER SYSTEMS

- single or multiple filters
- manual or automatic systems
- filter-aid tanks, pumps and mixers

