LAKOS Purging & Solids Handling

Guidelines for specifying an effective liquid-solids separation solution

*Separation is a solution only when the solids have been removed **from the liquid, from the separator** and **from the facility***

The range of products offered by LAKOS to purge and handle separated solids (see information below and at right) provides the user of a LAKOS Separator with the options to optimally solve a wide range of very specific liquid-solids problems. Anything less may only be converting a "dirty water problem" into a "dirty filter problem".

Specifying LAKOS purging and solids-handling products assures maximum durability, given that purging involves concentrated solids-in-liquid, which can quickly damage the typical valves and equipment intended only for clean fluid applications. LAKOS specifies quality in order to achieve maximum performance under these difficult conditions.

Only LAKOS offers a full complement of equipment for the customization needed to satisfy virtually any system requirements. The information in this brochure helps with the selection process. Unusual requirements can also be handled by the experience and innovation unique to LAKOS.

SOLIDS PURGE TRANSFER SYSTEMS

AutoPurge-Ball Valves – Requires only electricity to actuate the valve according to programmed purge frequency and duration.

AutoPurge-Pneumatic Pinch Valves – Preferred technique for durability and abrasive solids. Requires electricity for the programmable controller and compressed air to operate the valve.

AutoPurge-Fail Safe Pneumatic Ball Valves – Provides the added safety of closing the valve during a power failure. Compressed air and electricity are required.

Purge Diffusers – When purging into an open vessel, this device prevents excessive splashing. Easily attaches to any LAKOS AutoPurge valve.

Purge Liquid Concentrators – Typically reduces liquid loss during purging by as much as 50 times less, providing a very concentrated solids discharge. Fully automated.

PURGED SOLIDS HANDLING SYSTEMS

Purge Bag (PBV) Vessel – A closed system with a bag filter to capture and concentrate purged solids. Includes indicator package to identify when bag requires change-out.

Solids Capacity: 360 cubic inches (6 liters)

Drum Shroud Decant (SDS) System – Turns a standard 55-gallon drum into a solids concentrating device, capable of 80-90% solids by volume. Unique shroud connects to the drum in order to decant excess purged liquid back to system use.

Solids Capacity: 12,700 cubic inches or 7 cubic feet (200 liters)

Solids Collection Hopper (SCH) Systems – Features an easy tilt design for solids discharge and decant connections to return excess purged liquid back to system use. Concentrates solids 80-90%.

Solids Capacity: 1 cubic yard or 27 cubic feet or 46,656 cubic inches (765 liters)

Custom Solids Handling Systems – LAKOS has designed systems involving extra-large containers, screw augers, rail cars, oversize dump trucks and more. Consult factory for special requirements.

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General purging guidelines

- Avoid “uphill” purge piping to reduce the potential for solids clogging.
- Install a manual valve prior to any purge system. This will allow for isolating the purge system to accommodate any servicing needs.
- Long purge-line piping requires a long purge duration in order to thoroughly flush solids out of the line and avoid clogging of the purge line.
- Purging by means of a continuous bleed through a restricted or modulated valve requires periodic inspection and occasional full-open purging to minimize the potential for clogging the reduced purge opening.
- Recognize the size, shape and specific gravity of solids to be purged. Consider the potential for problems when dealing with solids that can interweave, compact, bridge, etc. Increased purging frequency and/or other techniques may need to be considered.
- Two-stage separators (in series, such as super separators) must be piped and purged individually. A common purge line can be used only *after the proper purge valves.*

Purge transfer as a solution

When the application allows that purging is the final handling of the separated solids, it may be important to know the volume of fluid which may be lost when purging. This information is subject to variations, based on separator size, flow rate and system pressure. Volumes noted here identify the total volume purged (both liquid and solids).

Purge Size	4 Second Duration*	10 Second Duration**
¾-inch	½-1½ gallons 2-6 liters	1-3 gallons 4-11 liters
1½-inch	2-6 gallons 8-23 liters	5-15 gallons 19-57 liters
2-inch	3-10 gallons 11-38 liters	7-24 gallons 26-91 liters
3-inch	11-23 gallons 42-87 liters	28-57 gallons 106-216 liters

* The 4-second purge is limited to pneumatic pinch valves or manual purging.

** Motorized ball valves require a minimum purge duration of 10 seconds.

Estimating solids load by application

Solids loads (typically expressed as “parts per million”; see percentage conversion formulas on pages 3 and 4) vary somewhat in all applications. LAKOS experience offers the following industry guidelines for estimating purposes:

- **Heat Transfer/Comfort Cooling Towers**
  Up to 5 ppm (average less than 1-2 ppm)
- **Process Cooling/Recirculation**
  Up to 100 ppm (average 1-20 ppm)
- **Heavy Industry** (steel mills, quench systems)
  10 to 1000 ppm (average 10-100 ppm)

Rate of solids accumulation

Once the approximate parts per million is determined (see above), the chart on page 3 (page 4 for metrics) uses system flow rate to help identify the actual solids volume to expect from the purge of a separator for a given application.

Desired servicing routine

Determine the desired frequency for servicing the LAKOS solids collection system. Once per week will require a larger solids collection capacity than once per day, for example. Note the solids collection capacity for the various LAKOS solids-handling systems on page 1.

Compatibility to user facility

Evaluate the solids collection system for its compatibility with the facility. It may not be appropriate, for example, to specify a hopper-style system in a facility accustomed to dealing with 55-gallon drums.

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Solids accumulation rates – U.S. measurements

see back cover for metrics

ppm = parts per million

FLOW RATE U.S. gpm	SOLIDS LOAD PER HOUR (cubic inches) — (see "Estimating solids load by application," page 2)							
	1 ppm	Weight*	**10 ppm**	Weight*	**100 ppm**	Weight*	**1000 ppm**	Weight*
25	.4	.4 oz.	3.5	4.9 oz.	35	3 lbs.	350	30 lbs.
50	.7	.8 oz.	7.0	9.8 oz.	70	6 lbs.	700	60 lbs.
100	1.4	1.9 oz.	14.0	19.6 oz.	140	12 lbs.	1,400	120 lbs.
250	3.5	4.9 oz.	35.0	3 lbs.	350	30 lbs.	3,500	300 lbs.
500	7.0	9.8 oz.	70.0	6 lbs.	700	60 lbs.	7,000	600 lbs.
1,000	14.0	19.6 oz.	140.0	12 lbs.	1,400	120 lbs.	14,000	1,200 lbs.
2,500	35.0	3 lbs.	350.0	30 lbs.	3,500	300 lbs.	35,000	3,000 lbs.
5,000	70.0	6 lbs.	700.0	60 lbs.	7,000	600 lbs.	70,000	6,000 lbs.

* Estimated weight, based on solids with a specific gravity of 2.6 (sand, scale, etc.)

Handy calculations

1 cubic inch = 1/2 ounce liquid (space equivalent)
= 1.4 - 4.8 oz. solids*

1 cubic foot = 1,728 cubic inches
= 7.5 gallons liquid (space equivalent)
= 150 - 250 lbs. solids*

1 cubic yard = 46,656 cubic inches (27 cubic feet)
= 202 gallons liquid (space equivalent)
= 4,050 - 14,175 lbs. solids*

**Based on solids ranging in specific gravity from 2.4 to 8.5*

To compute "ppm" …

$$\frac{\text{Volume of solids per hour (in cubic feet)}}{\text{Total cubic feet of water per hour}} \times 1{,}000{,}000$$

NOTE: Total cubic feet of water per hour is calculated by multiplying U.S. gpm x 8.02

Parts Per Million vs. Percentage by Volume

1 ppm = .0001 percent
10 ppm = .001 percent
100 ppm = .01 percent
1,000 ppm = .1 percent

Note: Some calculations have been rounded off for simplification.

Liquid-space conversions

1 cup (measured) = 14 cubic inches

1 pint = 29 cubic inches

1 quart = 58 cubic inches

1 gallon = 231 cubic inches

55 gallons = 12,705 cubic inches (7.3 cubic feet)

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Solids accumulation rates – metric measurements

see page 3 for U.S. measurements

ppm = parts per million

FLOW RATE m^3/hr	SOLIDS LOAD PER HOUR (liters) — (see "Estimating solids load by application," page 2)							
	1 ppm	Weight*	**10 ppm**	Weight*	**100 ppm**	Weight*	**1000 ppm**	Weight*
5	.005	13 gr.	.050	130 gr.	.5	1.3 kg.	5	13 kg.
10	.010	26 gr.	.100	260 gr.	1	2.6 kg.	10	26 kg.
25	.025	65 gr.	.250	650 gr.	2.5	6.5 kg.	25	65 kg.
50	.050	130 gr.	.500	1.3 kg.	5	13 kg.	50	130 kg.
100	.100	260 gr.	1.0	2.6 kg.	10	26 kg.	100	260 kg.
250	.250	650 gr.	2.5	6.5 kg.	25	65 kg.	250	650 kg.
500	.500	1.3 kg.	5.0	13 kg.	50	130 kg.	500	1300 kg.
1000	1.000	2.4 kg.	10.0	26 kg.	100	260 kg.	1000	2600 kg.

* Estimated weight, based on solids with a specific gravity of 2.6 (sand, scale, etc.)

Handy calculations

1 cm^3 = 0.001 liter
= 2.4 - 8.4 grams solids*

1 dm^3 = 1,000 cm^3
= 1 liter (space equivalent)
= 2.4 - 8.4 kg solids*

1 m^3 = 10^6 cm^3
= 1,000 liters (space equivalent)
= 2,400 - 8,400 kg solids*

**Based on solids ranging in specific gravity from 2.4 to 8.5*

To compute "ppm" …

$$\frac{\text{Volume of solids per hour (in cubic meters)}}{\text{Total cubic meters of water per hour}} \times 1{,}000{,}000$$

Parts Per Million vs. Percentage by Volume

1 ppm	=	.0001 percent
10 ppm	=	.001 percent
100 ppm	=	.01 percent
1,000 ppm	=	.1 percent

Note: Some calculations have been rounded off for simplification.

1 mg/liter = 1 ppm

Liquid-space conversions

1 cup (measured) = 14 cubic inches = 0.2 liters

1 pint = 29 cubic inches = 0.5 liters

1 quart = 58 cubic inches = 0.9 liters

1 gallon = 231 cubic inches = 3.8 liters

55 gallons = 12,705 cubic inches (7.3 cubic feet) = 208 liters (0.2 m^3)

Lakos Separators are manufactured and sold under one or more of the following U.S. Patents:
3,289,608; 3,512,651; 3,568,837; 3,701,425; 3,947,364; 3,963,073; 4,027,481; 4,120,795; 4,123,800; 4,140,638; 4,147,630; 4,148,735; 4,305,825; 4,555,333; 5,320,747; 5,338,341; 5,368,735; 5,425,876; 5,571,416; 5,578,203; 5,622,545; 5,653,874; 5,894,995; 6,090,276; 6,143,175; 6,167,960; 6,202,543; Des. 327,693; and corresponding foreign patents, including 600 12 329.4-08 (Germany) and EP 1 198 276 B1 (EU); other U.S. and foreign patents pending.

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