SCOTT LABORATORIES

Lenticular Housing Operating Instructions

Table of Contents

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Introduction

The Scott lenticular filter housing is designed to be mounted upright; please make sure there is adequate overhead clearance for dome removal. A hoist or forklift is recommended for safe handling of the dome with 3 or 4 high housings. Any manual lifting of the dome should be done only with proper lifting techniques and by personnel approved for maximum lifting rates exceeding the dome weight.

- **Maximum operating temperature: 284˚F (140˚C)**
- **Maximum operating pressure: 159 psi (10 bar)** ***(Liquid pressure only)***
- **All parts in contact with product are in 316L stainless steel**
- **Standard gasket material is silicone**

Lenticular Housing Models

Model	Inlet/Outlet	Gauge Port	Drain	Vent	Empty Weight (lbs)	Approx. Dome Weight (lbs)
12" 1-High	1 ½" TC	1 ½" TC	1" TC	¼" ball valve	115	51
12" 2-High	1 ½" TC	1 ½" TC	1" TC	¼" ball valve	128	64
12" 3-High	1 ½" TC	1 ½" TC	1" TC	¼" ball valve	140	76
12" 4-High	1 ½" TC	1 ½" TC	1" TC	¼" ball valve	155	91
16" 1-High	1 ½" TC	1 ½" TC	1" TC	¼" ball valve	168	68
16" 2-High	1 ½" TC	1 ½" TC	1" TC	¼" ball valve	182	81
16" 3-High	1 ½" TC	1 ½" TC	1" TC	¼" ball valve	198	95
16" 4-High	1 ½" TC	1 ½" TC	1" TC	¼" ball valve	210	110

Please note: split dome housings are stocked in limited sizes; some models are special order only.

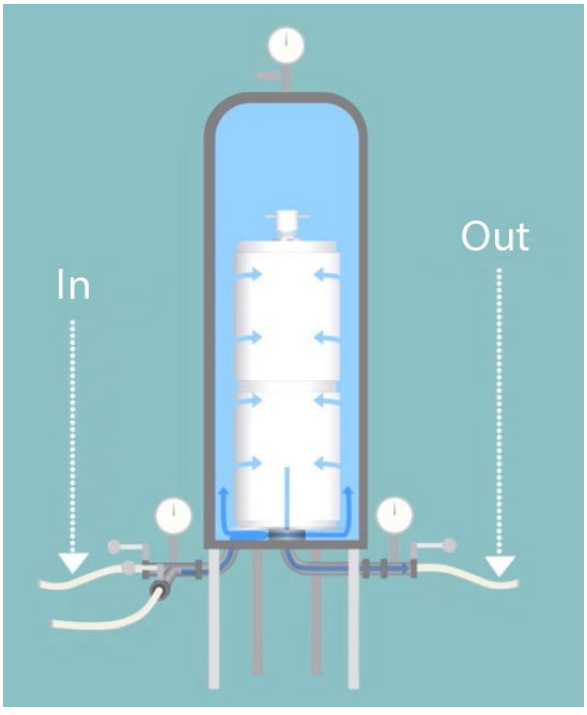
Filter Area & Volume

Model	Filter Area Supradisc II (m^2)	Housing Volume (dead volume without modules) (gal)	Volume Supradisc II (gal)	Dead Volume with Supradisc II installed (gal)	Equivalent to x 40cmx40cm sheets	Equivalent to x 60cmx60cm sheets	Total Dead Volume	% Higher Dead Volume than Supradisc II
12" 1-High	1.8	10	5	5	13	5.5	8	54%
12" 2-High	3.6	16	10	6	26	11	12	124%
12" 3-High	5.4	22	15	7	39	16	17	167%
12" 4-High	7.2	28	21	7	51	22	22	210%
16" 1-High	5	17	9	8	36	15	16	97%
16" 2-High	10	29	18	11	71	30	30	171%
16" 3-High	15	43	27	16	107	45.5	44	189%
16" 4-High	20	56	36	20	142	61	57	199%

Filter Housing Installation

1. Housing inlet and outlet elbows are positioned on the bottom of the base unit with tri-clamp connections. The inlet connection is offset of center (short elbow). Outlet connection is in the center (long elbow).
2. Connect one sanitary pressure gauge, using gasket and tri-clamp, to the top of the dome (this will record the inlet pressure). Alternatively, you can place the inlet gauge at the bottom inlet side by using a “T” fitting. You can also run pressure gauges in both inlet positions to make sure they register the same pressure.
3. Connect the second sanitary pressure gauge and stainless steel “T” fitting to the outlet side of the filter using gaskets and clamps (this will record the outlet pressure).
4. Connect butterfly valves to inlet and outlet with gasket and tri-clamp.
5. The vent valve on top of dome should be open half way prior to operation.
6. The drain valve on the bottom of the housing should be closed.

WARNING: Absolute caution should be taken with pressurized vessels. Gas or liquid pressure above the pressure vessel’s rating should never be used. Regulators should always be used on gas supply if using gas.

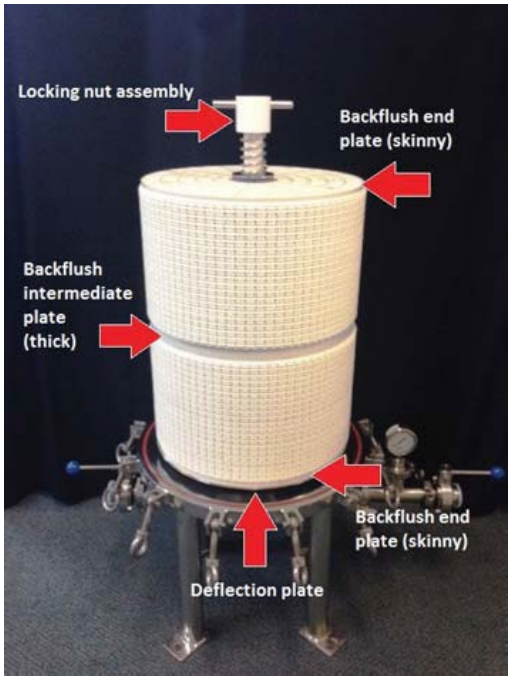


Click here to watch a video on lenticular setup and usage

Filter Module Installation

1. Select a center post and securely thread onto the base. Place the stainless steel deflection plate on the base of the housing. If the plate has a standing rolled edge, that side needs to be on the bottom in order for the surface of the plate to be level with the center point. If using Pall backflush plates, place end plate on top of the deflection plate with the flat side on the bottom and the convex center with tiny plastic protrusions on the rings, facing upwards.
2. Load filter modules over the center post and install intermediate backflush plates (if using) between each module. This is a thicker plate than the end plate. After top module has been placed of the center post, place the final backflush end plate on top with convex center and tiny plastic protrusions facing downwards and the flat side facing upwards.
3. Screw down locking nut assembly (cap, spring and closure spindle) on top of the center post to tighten, until the tightening nut seals with the cap o-ring and the spring is rigid (do not overtighten; this might damage locking nut assembly). Flat gaskets will seal once compression is complete.
4. The top backflush plate will be loose. This is normal. This plate is designed to move with the turbulence in the housing during a filtration and regeneration to assure even distribution of the liquid.

NOTE: Backflush support plates are only compatible with Seitz Supradisc II modules. Some modules (for example, Seitz Supradisc I or any other non-backflushable modules) are not backflushable and not compatible with backflush support plates. Please refer to the regeneration section below for more information.



Sanitizing Procedure

1. Properly wet the media first by running ambient water in a loop for 5-20 minutes (depending on the size of your setup) through the whole housing, making sure the housing is full and all air is vented out. The cellulose fibers in the media need to expand and absorb the water before a hot water or steam sanitization can take place without damaging the media.
2. If steaming, drain the housing, partially open the vent and drain valves. Open the outlet valve all the way and commence steaming 20 minutes once the temperature on the outlet measures 180°F.
3. For hot water sanitizing, continue flow after wetting with ambient water by introducing the hot water. Partially open the vent and drains and open the outlet valve all the way. Air should completely exit the vent and water should bubble out of both drain and vent ports during sanitization.
4. Flush for 20 minutes once the temperature at the outlet measures 180°F.
5. Cool very slowly and carefully if steam or hot water was used in order to avoid damage to the modules (thermal warping/cracking).
6. Purge water by attaching gas such as nitrogen, argon or air to the inlet side of the housing and blowing out the excess water with a low pressure of 3-5 psi. When no water comes out after a while, keep the gas pressure going and slowly close the outlet valve to bring the backpressure up to 5 psi then open the outlet valve all the way. This will force gas into the part of the media that still has water in it and you should see liquid draining out. Repeat 2-3 times until no more liquid drains out. Drain the residual liquid through the drain valves.

   Note: CO_2 tends to dissolve and not push out residual product very well.
7. Seitz Supradisc II modules can withstand up to 25 cycles of hot water or steam.
8. Other sanitizers can also be used instead of hot water or steam:

Chemical Sanitizing Solution Options for SDII Modules

Type	Contact Time	Notes
Nitric and Phosphoric acid/blends	Max 6 hours cumulative	Use at own risk. These acids damage the cellulose structure at longer contact times. Follow manufacturers recommended strength for sanitizing.
Peracetic acid	Max 6 hours cumulative	Use at own risk. Peroxy acetic acid can damage the cellulose structure at high concentrations and long contact times. Follow manufacturers recommended strength for sanitizing.
Citric acid 2% solution	Unlimited	Commonly used in combination with 50-200ppm of added SO_2.
Potassium meta bisulfite (SO_2)	Unlimited	200ppm up to 1000ppm by itself. Commonly used at lower concentrations in combination with an acid such as citric or tartaric acid to raise the efficiency. Difficult to rinse out sulfur smell/taste at high concentrations.
Caustic soda (NaOH or KOH)	Not recommended by manufacturer	Difficult to neutralize, high alkalinity can break down the cellulose structure quickly.
Ozone water/gas	Not recommended by manufacturer	Instant destruction of media.
Iodophor or other Iodine based sanitizers	Not recommended by manufacturer	Permanent staining and impossible to remove.

Filtration Procedure

1. Close the valve on the outlet side of the housing (discharge side).
2. Vent valve on top of the dome should be open. Slowly open inlet valve and allow liquid to fill the housing until all air is bled off from vent valve.
3. When liquid starts to exit the vent valve, close the vent valve and slowly open the outlet valve to bring filter into operation.
4. Regulate flow to the desired level and pressure. We recommend starting out under 5 dpsi and once everything looks good, dial up the pump speed so that the differential pressure drop (inlet-outlet pressure) over the housing reads 5-8 psi. Leave the pressure here to build-up by itself. Starting out at higher than 8 dpsi will lead to lower filtration efficiency.
5. If you still see bubbles on the outlet side after commencing filtration, it means that the pressure that you are filtering at, or the speed of the pump is too low to push out the excess air that may be trapped inside the media. To get rid of all the bubbles, simply close the outlet valve while the pump is running so that backpressure is at 3 psi. Then vent the housing on the top to release the excess gas. If you still see bubbles after this, make sure your O-rings aren't damaged and that connections are tight.
6. Check for leaks in connections and correct if necessary.
7. Periodically bleed the vent valve to release gas (likely CO_2).
8. You will notice little to no flow when you reach 20 dpsi. Terminal differential pressure (dpsi) will be at 30 psi but consider regeneration before 17 psi. If you wait until 20 psi, a regeneration won't have much effect.

Filter Module Regeneration

Regeneration is the action of backflush and/or forward flush to be able to get more life and throughput from your modules. *Non-backflushable modules can be regenerated by performing a forward flow regeneration only.*

Seitz Supradisc II
(backflushable)

Seitz Supradisc I
(cannot be backflushed)

Seitz Supradisc I AKS4 Carbon Embedded Module
(cannot be backflushed)

Notes on Backflushable vs. non-backflushable media:

Backflushable media can be effectively undergo a backflush cleaning cycle. This type of cleaning cycle is most effective for the removal of hard, non-deformable contaminants that cake well on the filter surface. Backflush efficiency is affected by fluid viscosity. The greatest cleaning efficiency will occur in filters used for water-based fluids such as beer, wine, soft drinks, etc.

In our experience, the most efficient way to regenerate a lenticular module is done before a dpsi of 17 psi. If you wait until you reach 20 psi to do a regeneration, the subsequent backflush and forward flow won't decrease the differential pressure and the module would be clogged permanently.

Filter Module Regeneration

The backflush and forward flush is a mechanical means used to clean and regenerate filters in order to improve operational economics and minimize production downtime. Our recommendation is to set the plugged (initiate cleaning) differential pressure at half the recommended final change out differential pressure. These cleaning cycles have significant practical and economic value. Experience has shown as much as a five-fold increase in filter life. For non-backflushable modules, start at the forward flow regeneration procedure below.

Hardware Considerations

1. The installation piping arrangement must allow for a dedicated backflush line, separate from the product line to prevent cross contamination. (See video)
2. For Supradisc II (SDII) modules, Pall recommended backflush support plates must be used to mechanically support element during backflush cycle. Backflush support plates are not compatible with dual grade (HP) modules or non-backflushable SDI style modules.
3. Pressure gauges need to be installed upstream and downstream of the housing so that the differential pressure can be accurately monitored during the backwash cycle. If cleaning at elevated temperature, inlet and outlet temperature probes are also recommended.

BACKFLUSH PROCEDURE

This type of cleaning cycle is most effective for the removal of hard, non-deformable contaminants that cake well on the filter surface. Backflush efficiency is affected by fluid viscosity. The greatest cleaning efficiency will occur in filters used for water-based fluids such as beer, wine, soft drinks, etc.

- To initiate a backflush, drain or push residual product out of filtration vessel. Connect water source to the outlet side and open the top vent. Direct backflush discharge line to drain.
- Backflush the modules for 5-10 minutes with ambient water or until discharge water is clear and free of solids.
- If desired, increase temperature to ≤120°F (50°C).
- If using warm water, stop flow & soak for 10 minutes, restart reverse flow & backflush to drain for 5 minutes.
- Do not exceed 7 psi (0.5 bar), but do try to get to 5 psi, even if just for a few seconds, for efficiency.

  Note: The regeneration procedure is best done before you reach a differential pressure of 17 psi. If you wait until you reach 20 psi to do a regeneration, the subsequent backflush and forward flow won't decrease the differential pressure and the module would be clogged permanently.

FORWARD FLOW PROCEDURE

A forward flow can provide the most effective means of reducing fouling in the depth of the filter media. Regeneration should be performed well before terminal differential pressure.

1. Clear housing of product by pushing out with gas or draining residual product.
2. Commence a forward flow with ambient water at equal or up to 2-3 times the product filtration flow rate.
3. Make sure the housing is full of water by periodically venting the top to check for liquid.
4. Gradually increase temperature to 120°F to ≤ 140°F (50-60°C). Continue at high flow rate (or reduced flow rate if hot water is limited), for 5 minutes.
5. Maintain this temperature for 5-10 minutes by switching off the pump and letting the modules soak. Gradually reduce temperature back to ambient water and resume high speed flow until the temperature is back down.
6. Recommence forward flow for another 5-10 minutes, then drain.
7. A hot water sanitization of 180°F for up to 30 minutes, can be performed after the soak at ≤140°F but not before as this will bake in some of the soluble compounds you're trying to remove and compromise the filter performance.
8. When complete, clear housing of water and recommence filtration. Alternatively, store the modules for future use.
9. Record the dP at startup after the CIP regeneration.

***** NOTE: ALL PRESSURE SHOULD ALWAYS BE RELEASED THROUGH DRAINS OR VENTS PRIOR TO REMOVING THE VESSEL LID. *****

How to Store Filter Modules

Please note: When storing media in a liquid solution, make sure the media is either purged with nitrogen (see lenticular operating instructions) or recirculate the solution through the media before removing it and storing in the same or fresh solution. The 16" media in particular has a large amount of surface area (5m^2) and placing a wet, unpurged module in a storage solution can dilute the storage solution to the point where it won't sufficiently protect the media over time.

How to store your modules between uses – Wine

How to store your modules between uses – Beer/Brewing

Maintenance

RECOMMENDATIONS

Parts on the lenticular housing that might need to be replaced periodically include:

- **Locking nut assembly**
  - The plastic thread can become stripped over time which can lead to bypass. This will affect your filtrate quality.
  - There is an O-ring in the stainless steel cap which makes the seal between the plastic nut and the assembly. It can become cracked over time and needs to be replaced before that happens.
- **The base O-ring**
  - It is a good idea to carry spare base O-rings. They can become damaged if they slip out of position before the dome is tightened down. This can lead to the dome cutting through the O-ring.
- **The eye bolts on the housing for tightening the dome to the base**
  - Keep the thread on these bolts lubricated with food grade grease to avoid pitting and from prematurely stripping the thread when tightening or loosening.