

LOWeFLOW™ Treatment System
Design Manual, Idaho
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Manufactured by:

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Introduction:

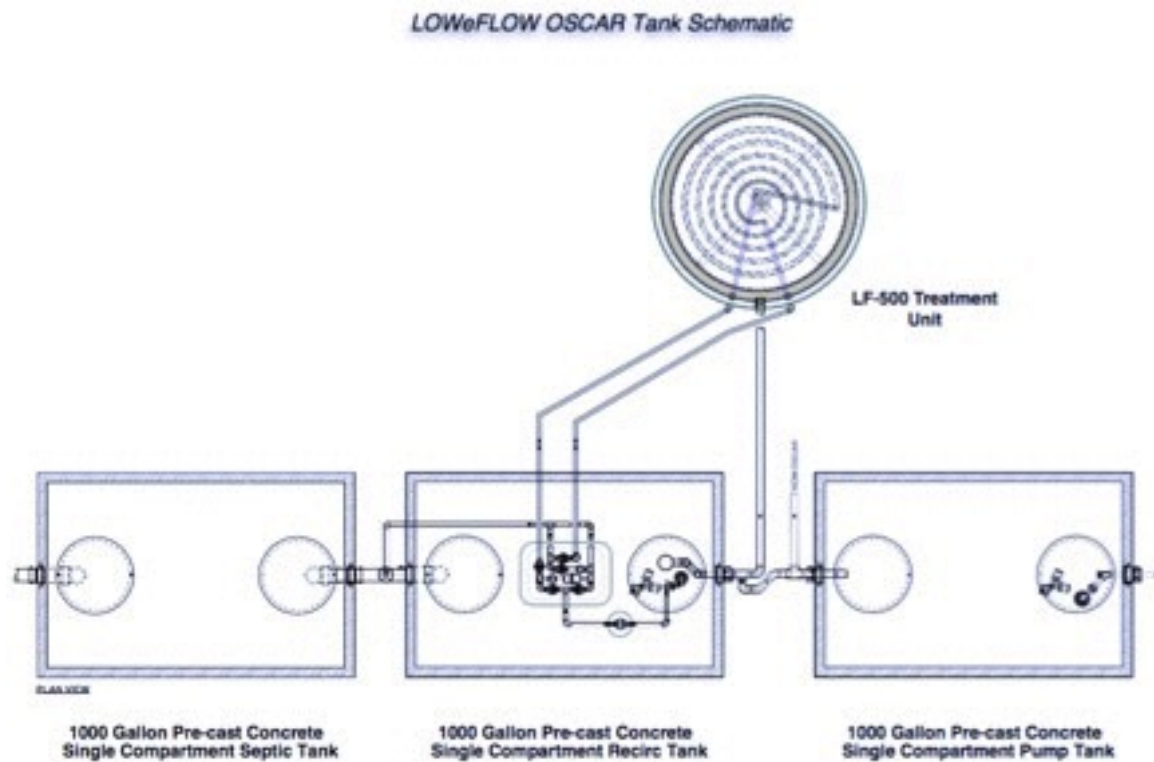


Figure 1. Septic tank, recirc tank, discharge/clarifier tank, and *LOWeFLOW* filter.

LOWeFLOW[™] Treatment Unit

The *LOWeFLOW*[™] treatment unit is comprised of the *LOWeFLOW*[™] recirculation filter, a septic tank, recirculation tank, discharge/clarification tank, headworks, and control equipment.

Wastewater is collected in a standard septic tank where gross solids are settled out and primary treatment occurs. Septic tank effluent flows from the septic tank into the recirculation tank. Liquid in the recirculation tank is mixed with treated filtrate from the *LOWeFLOW*[™] filter. The mixed liquid is dosed to a drip tubing network called a *Coil* in the top of the *LOWeFLOW*[™] filter. Treated filtrate trickles down through the media and is collected in the underdrain. From there it flows from the *LOWeFLOW*[™] filter back to the recirculation tank through the split flow tee. The position of the splitter valve determines the flow path of the filtrate. When the liquid level in the recirculation tank is high

enough to seat the splitter valve, all of the filtrate passes to the discharge/clarification tank, otherwise, all or a portion of the returning filtrate returns to the recirculation tank.

Installers and Operations and Maintenance providers must be certified by *Lowridge Onsite Technologies, LLC*. Contact *Lowridge* for certification training. Installers and Operations, Maintenance and Monitoring service providers must be certified by *Lowridge Onsite Technologies, LLC*. Contact *Lowridge* for certification training. An Idaho complex alternative system installer's registration permit is required to install this system. An Idaho service provider certification is required to perform operation, maintenance, or monitoring. Contact a Idaho Public Health District to obtain the alternative system installer's registration permit and service provider certificate; annual renewal required.

Expected treatment level from the *LOWeFLOW* unit is 5 mg/l biological oxidation demand (CBOD5), and 9 mg/l total suspended solids (TSS).

Effluent from the clarifier/discharge tank can be gravity feed, timed dosed, or demand dosed to the final dispersal. (see appendix F)

Design Criteria

There are four segments to the *LOWeFLOW*[™] Treatment unit design: filter sizing, number of *Coils*, tanks, and pump/control equipment. The standard residential *LOWeFLOW*[™] unit (*LF-500*) is a 500 gpd kit with some field assembly required (for parts list see appendix C). For system design flows greater than 500 gpd see appendix "B".

Filter sizing:

A standard residential 500 gpd unit is sized based on 25 gpd/sq. ft. or 20 sq. ft. The media for the *LOWeFLOW*[™] filter shall be *Growstone, LFGS-30*. The depth of the media required between the tubing and underdrain is 30". There is an additional 3" of media covering the drip tube and 3" deep layer of media for the underdrain. The over-all height of the *LOWeFLOW*[™] filter is 36". Child proofing mesh, included in the standard packages, must be placed over the coils prior to final cover of media.

Drip Tubing Network Layout:

The tubing used in the *LOWeFLOW*[™] treatment unit is custom Netafim Bioline[™], 0.42 gph emitters, manufactured to *Lowridge*'s specifications. Each residential *LOWeFLOW*[™] unit is equipped with four (4) 100 foot laterals configured in a pre-assembled *Coil* containing 800 emitters, 40 emitters per sq. ft. For design flows of greater than 500 gpd see appendix B for details.

The *LOWeFLOW*[™] unit is intended to be operated at a 4:1 recirculation ratio or greater. See appendix D for details on timer settings.

Tanks:

All tanks must be approved by Idaho Department of Environmental Quality as wastewater containment vessels. Minimum liquid volumes for a 500 gpd design flow are:

- Settling (septic) tank (see below)
- Recirculation tank **400 gallons** (see below)
- Clarification volume **250 gallon** (see below)

Septic tank: The minimum standard septic tank arrangement for a 4 bedroom house is a 1,000 gallon septic tank. For each additional bedroom add 250 gallons. (IDAPA 58, Title 01, Chapter 03, 007 Septic Tanks Design and Construction Standards, 07. Minimum tank capacities, a & b).

Recirculation tank: The recirculation tank shall have the capability of maintaining 2 times the design flow. The minimum size tank shall be 1,000 gallons. (See Figure 1.)

Clarifier: The *LOWeFLOW*[™] system must incorporate at least 250 gallons of clarifying capacity for a 500 gpd design flow. For design flows above 500 gpd the clarification volume must be at least 50% of the design capacity. In a pump tank the clarification capacity is the minimum liquid in the discharge tank to submerge the discharge pump. Example: if the discharge pump is 22" tall, a standard 1,000 gallon pump tank has a volume of 20 g/inch. (Check with the tank manufacturer for exact figures). When the pump is submerged, there are 440 gallons of minimum volume in the tank. This volume is in excess of the 250 gallons needed for the clarification volume.

For systems that are gravity fed, the clarifier tank can be a small 250 gallon unit.

Emergency storage for the clarification/pump chamber is achieved in the recirculation tank through the control panel. When a high level condition occurs in the clarifier/discharge tank the recirculation pump is overridden off and no flow will progress from the recirc tank to the clarifier/discharge tank until the high level condition in the clarifier/discharge tank is correct.

Pumps/Control Equipment

The *LOWeFLOW™* Treatment system incorporates a recirculating pump which has two functions: dose the *LOWeFLOW™* filter and flush the *Coil* and disc filter.

The standard control panel used in most residential application is the *LF2P-RF-OS* which will accommodate the recirculation/flush pump, a discharge pump, and the *LOWeFLOW™* headworks. A high level alarm in the discharge tank overrides off the recirculation pump. Emergency storage for pump failure is only needed in the recirculation tank.

Appendix A

Media:

LOWeFLOW

Growstone, LFGS-30. Two tote bags per each 500 gpd basin.

Appendix B:

Design flow greater than 500 gpd.

Design parameters:

Tanks, minimum liquid volumes:

Settling tank	200% of design flow
Recirc. Tank	150% of design flow
Clarifier capacity	50% of design flow
Filter basin:	1-LFB-500 per each 500 gpd design flow
<i>Coil</i>	1-LF-500 per each 500 gpd design flow
Child proofing mesh	

For flows over 500 gpd additional *LOWeFLOW™ Coils* can be added in increments of 500 gpd. All system designs over 500 gpd are considered “custom” and will require some design assistance from *Lowridge Onsite Technologies*.

Appendix C:

Parts list for standard residential, 500 gpd kit:

- *LOWeFLOW™* basin & *Coil* (with child proofing mesh)
- Headworks: disc filter, solenoid valves, pressure gauges
- Splitter valve
- Splitter tee

- Recirculation pump: 1/2 hp, 30 gpm turbine pump
- *LF2P-RF-OS* Control panel
- Floats for recirculation and discharge pumps
- King fittings: allows piping network to drain
- 2 bags of LFGS-30 media

Appendix D: Timer Settings for Recirculation Pump

The goal is to achieve a recirculation ratio of 4:1 of the average daily flow. The table below gives the timer settings for a variety of average daily flows. Note that the “ON” time is always **30 seconds**. The standard 500 gpd *Coil* has an estimated flow rate of 5.5 gpm. Actual flow may vary.

<u>Ave. Daily Flow</u>	<u>Recirc. Flow rate</u>	<u>“ON” Time</u>	<u>“OFF” Time</u>
100 gpd	400 gpd	30 seconds	9.5 min
150	600	“	6.0
200	800	“	4.5
250*	1000	“	3.5
300	1200	“	3.0
350	1400	“	2.5
400	1600	“	2.0
500	2000	30 seconds	1.5 min

*Factory default setting.

Appendix E: *LOWeFLOW* cover options.

There are a couple of different cover options in addition to the recommended child proof mess. One option is a small deck.

- The LFB-500 poly basin can be fitted with a wood or synthetic wood frame on the top lip. A protective deck can then be attached to the frame. The deck must have deck boards with 1/8” to 1/4” spacing for proper air ventilation. The deck is bolted to the frame with four bolts for future removal.
- The *LOWeFLOW* can be planted with small rooted plant like perry winkle. The roots need to have all the soil washed off and planted in the center of the coil.

Appendix F: Disposal Component Requirements:

Drainfield Trenches

1. Distances shown in Table 4-21 of the TGM must be maintained between the trench bottom and limiting layer.
2. Capping fill may be used to obtain adequate separation distances from the

- limiting layers but must be designed and constructed according to the guidance for capping fill trenches in section 4.3 of the TGM.
3. Pressure distribution may be used with the following design considerations:
 - A. The pressure distribution system related to the drainfield is designed according to section 4.19 of the TGM.
 - B. The recirculation tank for the LOWeFLOW filter may not be used as the dosing chamber for the drainfield.
 4. The drainfield shall be sized by dividing the maximum daily flow by the hydraulic application rate for the applicable soil design subgroup listed in Table 4-22 of the TGM.

Drip Dispersal

The LOWeFLOW system can be followed by a drip dispersal system designed and installed according to section 4.5 of the TGM.

Table 4-21. Intermittent sand filter vertical setback to limiting layers (feet).

Limiting Layer	Flow < 2,500 GPD	Flow ≥ 2,500 GPD
	All Soil Types	All Soil Types
Impermeable layer	2	4
Fractured rock or very porous layer	1	2
Normal high ground water	1	2
Seasonal high ground water	1	2

Note: gallons per day (GPD)

Table 4-22. Secondary biological treatment system hydraulic application rates.

Soil Design Subgroup	Application Rate (gallons/ square foot/day)
A1	1.7
A2a	1.2
A-2b	1.0
B1	0.8
B2	0.6
C1	0.4
C2	0.3