

Large On-site Sewage Systems – How to Calculate Your Wastewater Flows Using Your Elapsed Time Meter Read

Please note if you have a variable rate pump(s), using the elapsed time meter method is not an accurate way to determine flow. Contact your design engineer to figure out the best way to calculate wastewater flows in your system.

You will need the following items:

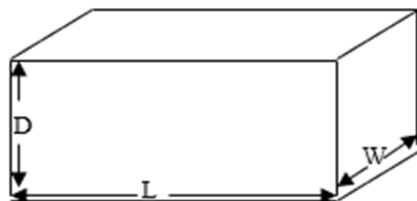
- Tape measure
- Flashlight
- Latex gloves (wear when accessing the pump chamber)
- Notepad and/or logbook
- Pencil
- Calculator
- Access to the control panel
- Access to the pump chamber

STEP 1 Determine the Gallons Per Inch of Depth in Your Pump Chamber

You may find this information on your Record Drawings or “As-builts”, in your Operation and Maintenance Manual, or from the septic tank manufacturer.

You can use the following steps to determine the gallons per inch of your pump chamber if it has a rectangular cross-section.

- A. Determine the total volume (V) of your pump chamber



D = Depth or Height in feet (ft)

L = Length (ft)

W = Width (ft)

V = Volume (gallons)

$$D \times L \times W \times 7.48 = V \text{ (gallons)}$$

- B. Determine the gallons per inch (Λ) in your pump chamber.

$$\frac{V}{D \times 12} = \Lambda \text{ (gallons /inch)}$$

If you have a round or cylindrical pump chamber and the gallons per inch information is not in your records, contact the tank manufacturer for the information for your specific septic tank model or contact your design engineer to determine it for you.

STEP 2 Determine the Pumping Rate

Do not run pump(s) dry.

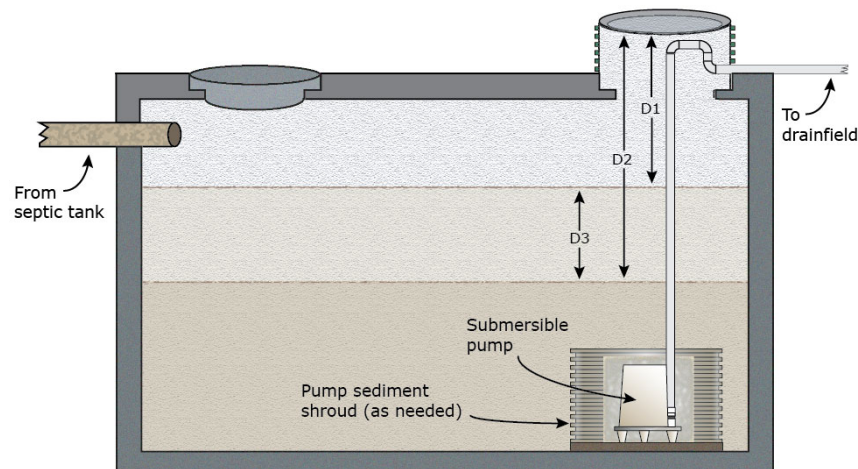
Make sure there is enough liquid in the tank to completely cover the pump intake.

Take all water depth measurements from a fixed point such as the top of the riser to reduce errors.

- See the drawing below.
 - Use the flashlight if it is difficult to see the liquid surface.
 - It is best to perform this test when there is no flow into the pump chamber. Flow into the pump chamber will make your calculations inaccurate. You might have to determine the pumping rate during the middle of the night, when few people are using water.
 - You will need to calculate the pump rate for **each** pump.
- A. Flip toggle switches for the pumps in your control panel to OFF. (Toggle switches to control each pump should have these settings: AUTO – OFF – MAN (manual).)
 - B. Measure the liquid depth (D1) in the pump chamber from the liquid surface to your fixed point. Write it down.
 - C. Switch the Pump 1 toggle switch to MAN and let pump run for 1 minute. Then toggle the switch to OFF. (You may have to run the pump longer if the gallons per inch reading is a high number, you may not be able to measure a difference in the liquid level after one minute.)
 - D. Measure the liquid depth (D2) in the pump chamber again from the same fixed point the measurement was taken in Step B. Write it down.
 - E. Subtract. $D2 - D1 = D3$ (inches of water pumped per minute)

If the pump runs for longer than one minute:

$$\frac{D2 - D1}{\text{pump run time (minutes)}} = D3 \text{ (inches of liquid pumped per minute)}$$



- F. Repeat Steps A through E for each pump.
- G. Return all toggle switches to AUTO and secure the control panel.

STEP 3 Determine the Pump Rate (R) in Gallons Per Minute for Each Pump

- A. Multiply the D3 in Step 2 by Λ in Step 1.

$$D3 \left(\frac{\text{inches of water}}{\text{minute}} \right) \times \Lambda \left(\frac{\text{gallons}}{\text{inch}} \right) = R \left(\frac{\text{gallons}}{\text{minute}} \right)$$

- B. Repeat step A for each pump.

STEP 4 Calculate the Flow Rate from the Elapsed Time Meter Readings

Your elapsed time meters (one per pump) must be read every month. For each pump, Record the meter reading for that month and the date read in your logbook. This logbook should be maintained for the life of the system and made available upon request.

- A. Subtract your previous meter reading from the current meter reading to determine the hours the pump has run (HR).

For example, if your previous meter reading was 157.2 and the current reading is 158.6:

$$158.6 - 157.2 = 1.4 \text{ hours}$$

- B. Convert the hours run (HR) to minutes run (MR) by multiplying by 60 minutes per hour.

$$HR \times 60 = MR \text{ (minutes)}$$

For example:

$$1.4 \text{ hours} \times 60 = 84 \text{ minutes}$$

- C. Multiply the minutes run (MR) by Pump Rate (R) calculated in Step 3 to determine the monthly wastewater flow (Flow). Make sure you use the pump rate calculated for the same pump the ETM reading was taken.

$$MR \text{ (minutes)} \times R \left(\frac{\text{gallons}}{\text{minute}} \right) = \text{Flow (gallons)}$$

- D. Repeat Steps A through C for each pump.
- E. Add the flows you just calculated for each pump together to determine total flow (Total Flow) to the system.
- F. Divide the Total Flow by the number of days (d) between the meter readings to determine the Average Daily Flow.

$$\frac{\text{Total Flow (gallons)}}{d \text{ (days)}} = \text{Average Daily Flow (gallons per day)}$$

- G. Record the Average Daily Flow (gallons/day) in your logbook and on the Operations and Maintenance form. You will send the Operations and Maintenance form to us each year when it is time to renew your operating permit.

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