SAFE WATER TECHNOLOGIES, INC.

HOW TO ORDER BASIC COMMERCIAL / INDUSTRIAL EQUIPMENT IN 10 EASY(?) STEPS

Welcome to the Safe Water Technologies' Design-It-Yourself / Build-It-Yourself Commercial Systems Program. This tutorial is designed to save time, engineering, labor, shipping costs, and aid you in designing and building equipment the way you need it. This is a program for those of you who want to move into commercial markets, while learning and keeping expenses low. Engineering language has been kept to a minimum.

In Chapter Five of our catalog, we have prepared tables that do most of the calculation work for you. You just have to do a little quick cross referencing. For instance, the valve nests have been prepared as kits. They include all the necessary diaphragm valves, backwash flow controllers, and eductors when needed. And, we tell you standard industry flow rates and backwash rates and pipe sizes for the system you need. Then we make the choice of system controls (stagers/controllers) easy to choose also.

Please use the following steps to develop a rough idea of what you are looking for. These are the types of things we would need to know if you wanted us to design a system for you.

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1) Have a water analysis, and determine your final product water requirements.

2) Know your flow rate requirements.
- The total volume of water consumed daily and weekly.
- The normal average operating flow rate per minute and per hour.
- The peak water flow rate required per minute. (What is the maximum amount of water that will be needed at any given moment?)

3) How much total water volume or flow is available?
- Know the pipe sizes at the installation site. You may need to adapt pipe connection sizes up or down.
- How many gallons per minute (gpm) of water is available for backwashing heavier filter media.

4) One, two, or three tank system?
- Does the system need to run at a constant flow rate 24 hours per day, and/or have large amounts of water always available?
- Is there enough time in the middle of the night for a filter tank, or segments of the system, to go off-line or be bypassed for a while when it regenerates?
- Will there be any advantages to using two alternating tanks (vs. one big tank) in any of the filtration stages?
- Would it be better to use two smaller tanks in parallel instead of one large tank?
- Consider two smaller tanks may be better than one in case of malfunction, maintenance, or lack of spare parts. (The client can at least run on one tank while the other tank is being fixed.)
- Is there enough room for the tank(s) to fit in all doorways, the truck, and the shipping container?

5) Determine how fast you want the water to run through the filter media, and what quality of water you need.
- How truly critical is the application?
- The SWT Filter Media and Resin Specification Sheets are located in Chapters 6 and 7. Read them.
- The slower that water flows through a filter media bed, the better the filtration will be.
- The service flow for most softeners and carbon filters is calculated in terms of gallons per minute per cubic foot of media in the tank.
- Sediment filtration can be calculated in either gallons per minute per cubic foot and/or gallons per minute per square foot diameter of the filter bed in the tank. It all depends on the media, design, and application.
- All backwash rates are determined by the square foot diameter of the tank, media particle size, weight, density, and water temperature.

6) For water softeners...
- Are you sizing the tanks for flow rate or total hardness capacity in the tank?
- Are you more concerned with lower operating costs or initial installation costs?
- How many pounds of salt per cubic foot of resin do you want to use per regeneration?
- The less salt used per cubic foot of resin, the lower the operating cost, but the less total hardness capacity the softener will have between regenerations (which means more frequent regenerations unless you get a bigger tank), and the increased chance of hardness bleed through.
- Is zero grains of harness absolutely necessary, or can you save your customer a lot of money, by allowing ½ to 2 grains of hardness bleed through?
- Do you need to size for iron in the water?
- Do you need a heavy duty, or fine mesh softening resin, or chemical cleaners?

(Continued on back)

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7) Determine if you want the system to be constructed in composite plastic or steel.

- We recommend plastic whenever possible, and when the budget allows.
- Plastic tanks and valves are less corrosive, easier to work with, lighter, longer lasting, and better looking after years in service than steel. But, they take less physical abuse and are generally more expensive than iron or steel.
- Steel tanks have more welding options, but are heavier and much more expensive to transport.
- Most plastic systems are cemented or flanged. Most iron or steel systems are NPT or flanged.
- Iron valves and steel tanks are less costly initially, but more costly to ship and work on.
- Plastic tanks use either plastic, iron, or brass valves. Steel tanks use iron or brass, but seldom use plastic valves.

8) Choose a controller by determining the regeneration method, frequency, and start.

- Do you want the system to have manual initiation?
- Does the system need to have clock initiated regeneration at pre-set times on pre-set days?
- Does the system need to be metered for a specific number of gallons to initiate the regeneration?
- Will you need battery back-up?
- Consider the available voltages and power supply dependability when determining the automation of the system.

9) Some general guidelines to remember...

- SWT Commercial Water Softeners are designed at standard flow rates of 5 gpm per cubic foot of media, and are regenerated with 6 pounds of salt per cubic foot of resin. They will have a small leakage of hardness at this design, but this is a good trade-off between initial cost, on-going cost efficiency, and performance efficiency. Performance can be increased by increasing salt dosage or slowing the flow rate down at a later date.
- To achieve zero hardness leakage, flow rates may have to be slowed down to 2 to 3.5 gpm per cubic foot of resin, and salt dosage for regeneration may have to be increased to 10 to 12 pounds per cubic foot of cation resin.
- Peak flow rates of 10 gpm per cubic foot of resin can be achieved in some applications, for short periods of time. but many factors come into play such as hardness levels, amount of salt dosage, type of softening resin used, newness, cleanliness of the bed, and application.
- Sand filters are a thing of the past. Most people are converting over to a "FilterEase™ type" of filter media or to multimedia filters.
- FilterEase™ is an excellent sediment filter. Carbon, anthracite, and Birm® also make good sediment filters and are easy to backwash (with service flow rates and backwash rates being nearly identical). On the other hand, multimedia filters (while excellent for small micron and high service flow filters) and MetalEase™ filters can require a backwash rate that is 2 times the service flow rate. That means a lot more water, bigger pump requirements, and bigger, more expensive piping and valves.
- Consider the addition of high flow bag filters as secondary or post filters in micron critical applications.
- To achieve high quality water, calculate water flow at 2 gpm per cubic foot of material.
- To achieve good quality water, calculate water flow at 3.5 to 5 gpm per cubic foot of media.
- To achieve utility grade water, calculate water flow at 5 to 10 gpm per cubic foot of media.
- The finer the filtration and the faster the water flows, the higher the pressure drop will be.
- The finer the carbon mesh size, the better the performance of the carbon, but the higher the pressure drop. 8 x 30 mesh GAC carbon is the most often used in commercial applications, but 12 x 40 is used on occasion.
- A well designed system will have an operating pressure drop of less than 15 psi during normal service flows and 25 psi during peak flows.

10) Now from our catalog, all you have to do is...

- Choose the appropriate filter media and the amount of cubic feet needed per the customer's required flow rate. (Do not forget the underbedding.)
- Choose the appropriate tank size and openings. (Remember to leave 50% freeboard in the tank by multiplying the total tank volume x 0.67 for the amount of media to be used.)
- Choose the pre-matched valve nest kit that matches the media type and tank size.
- Choose the pre-matched timer and stager from the options determined by the system type.
- Choose the distribution system from the guide book. (Hint: Top mount, and top & bottom mount systems are the easiest to work with and the least expensive. Keep it simple, and always keep pipe sizes the same to match the valve kit's.)

That's all there is to it. All piping and plumbing fittings can usually be found locally. Still not sure? Call us with what you have, and we will be more than happy to help you determine your requirements.

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