

Water Quality Fundamentals

Water Quality Fundamentals:

The three foundational domains of water quality are filtration, water balance, and sanitation. Normal use and proper care of CRYOTherm as described in **Weekly Cleaning Procedure** section of this manual is usually effective in maintaining a balanced and sanitary condition of water without the need for chemical treatment. Certain factors may however affect the condition of the water to the point that some chemical treatment may be needed. We recommend periodic testing of the water to evaluate water quality.

The following is a simple guide to testing and, if necessary, treating the tank water in order to assure CRYOTherm is safe and comfortable for your athletes.

Filtration:

Mechanical filtration of water removes particles from the water that can make it cloudy and discolored; it does not remove bacteria or viruses. 100% circulation through replaceable cartridge filters keeps CRYOTherm's water clear and free of debris. The cartridges need to be cleaned regularly and replaced periodically to assure they are working properly

Water Balance:

Water balance refers to a state of water in which the proper amount of dissolved material exists in the water to make it an optimal environment for hydrotherapy. Balanced water creates an environment that is comfortable for the user, naturally sanitized, and also protects the components of the CRYOTherm from damage. Water with too much dissolved material can result in deposits forming in the CRYOTherm system, called scaling, while water with too little or no dissolved material can result in corrosion of the surfaces and components. Water balance is more a factor of preserving equipment than a health issue for the user.

CRYOTherm water balance is affected by organics that accumulate over time. Commonly referred to as bio loading, these organics come from body oils, perspiration, proteins, wastes, cosmetics, lotions, soaps, and other sources that are introduced to CRYOTherm water by users and the surrounding environment. Signs of increased organics include foaming, cloudy water, development of a water line, odors, and accumulation of debris in the system.

Source water in certain locales may also exhibit relatively high levels of dissolved metals, minerals, and other contaminants resulting in unbalanced and discolored water which may stain or damage the tank and other components.

The factors that can be measured to evaluate water balance are as follows; the ideal range for each is also indicated:

- pH Ideal range is 7.4 to 7.6 (acceptable 7.2 to 7.8)
- Total alkalinity Ideal range is 80 to 120 ppm
- Calcium hardness Ideal range is 200 to 400 ppm

These factors are easily measured using commercially available test strips and easily adjusted to ideal range using commercially available chemical additives. If applicable, see the water testing and water treatment section.



Contact us at (800) 223-5395 or grimmscientific.com when you need assistance.

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Sanitation:

Sanitation refers to the process of destroying microorganisms that might cause human disease. Sanitation, also known as disinfection, results in water that is free of bacteria, algae, and other nuisance organisms that affect water quality and pose a health risk to the user. Water temperature, pH, environmental wastes, and user contamination are all factors that can affect sanitation. CRYOTherm is designed to limit, or even remove, the need for chemical treatment of water to achieve sanitation. That being said, we recommend periodic culturing of the water to confirm that no harmful pathogens exist.

Some CRYOTherm owners routinely use commercially available sanitizers to assure the cleanliness of water in the system. There are a number of ways this can be done but in each instance, be sure to strictly follow the manufacturer's instructions for use, storage, and disposal of the chemicals being used. If applicable, see the **water treatment** section for more information and suggestions regarding the use of sanitizers in CRYOTherm.

Water Testing:

The factors that determine water balance are easily measured using test strips that are dipped into the water and then compared to color coded scales to evaluate levels. Characteristics of the source water, amount of use, cleanliness of users, cleaning schedule, temperature of water, and other factors can affect water balance. The most important parameter for CRYOTherm users to monitor and adjust is pH. Signs that you may have a pH or other water balance problem are as follows:

Signs of high pH, total alkalinity, and/or calcium hardness

- Cloudy water
- Accumulation of scale
- Reduced circulation from clogged filters, heaters, or piping
- Eye/skin irritation

Signs of low pH, total alkalinity, and/or calcium hardness

- Etching or staining of surfaces
- Corrosion
- Foaming water
- Eye/skin irritation

Test kits are also available to evaluate the amount of various mineral and metal contaminants in the source water. Your local pool store may also provide this service for you. Based on findings, the water can be treated to remove the damaging materials.

If the decision is made to treat the water with a disinfectant (chlorine or bromine), it will be important to test the water to evaluate the levels of residual disinfectant to make sure it is effectively sanitizing the water without causing irritation of the skin or eyes of the users. Test strips are the easiest way to test for the disinfectant levels in the water. It is important to strictly follow manufacturer's instructions when testing the water and when adding chemicals to the water. Ideal ranges are as follows:

FC	Free Chlorine	2 to 4 ppm ideal range, 1 to 4 ppm acceptable
TBr	Total Bromine	range 3 to 5 ppm ideal range



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Water Treatment

The first step to any chemical treatment of water is to determine if any change in water chemistry is necessary. Because CRYOTherm's water is continuously refreshed with normal use and completely replaced at least weekly by the user, you may find that chemical treatment of the water is not warranted. If routine testing shows values that are not within acceptable ranges, chemical adjustment may be needed.

We have found that pH is the most important factor. When pH is in ideal range, all other factors tend to fall in line. If you are having trouble maintaining an ideal pH, you may first need to adjust Total Alkalinity which serves as a buffer to resist changes to pH levels.

Follow these guidelines after filling the CRYOTherm:

- If there is a known water source problem the water should be treated first pursuant to an established protocol
- to remove the potentially harmful contaminants.
 - Your Grimm representative can assist you with establishing proper protocol.
- If Total Alkalinity (TA) is not in ideal range adjust it first.
 - **SpaPure Alkalinity Increaser**
- Adjust pH once TA is within ideal range and stabilized
 - High pH – adjust with **SpaPure pH Down**
 - Low pH – adjust with **SpaPure pH Up**
- If using a sanitizer, add sanitizer only after TA and pH are within ideal ranges and stable, this will assure it works most effectively and reduce the amount you need to use.
- Treat water with **ORB-3 Spa Enzyme No Foam** approximately 30 minutes after introducing sanitizer.

Note: When using chemicals always read the labels and strictly follow the manufacturer's instructions regarding dosage, handling, storage, and disposal. All of the products needed to comply with these recommendations can be purchased directly from Grimm Scientific.

Sanitizers

Sanitizers that are part of the chemical family known as halogens are the most utilized method of water disinfection. These products kill microorganisms, including bacteria, by attacking their cell walls through oxidation. They destroy the enzymes and structures inside these cells, which renders them harmless.

- Chlorine and Bromine are the most widely used sanitizers and come in various forms. Chlorine is probably the most recognized water treatment. Typically added to water in a granular form, it is an effective sanitizer for all applications. It is important to maintain chlorine concentration to within acceptable ranges.
- Bromine is another effective sanitizer; it is preferred by some because it is less likely to produce odors and skin irritation. Bromine is considered the best sanitizer for warm water applications since it does not dissipate rapidly. Using bromine tablets in a floating dispenser is a simple and effective way

Factors to consider when choosing the best disinfectant to use in your CRYOTherm and the best method of application are:

- Water temperature
- Usage load
- Source water chemistry
- Chemical storage and safety concerns
- Supervision and maintenance concerns



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Water Testing and Treatment Checklist

Note: ALWAYS carefully read and strictly follow all manufacturer's instructions and recommendations when storing, handling, and adding any chemical product to your CRYOTherm water.

1. After each scheduled weekly cleaning fill tank(s) with water as described in the **Set Up and Operation** section.
2. With pump(s) turned off, use a test strip according to manufacturer's instructions to evaluate the **Total Alkalinity (TA)** and **pH** of the water.
3. If **pH** is out of range (**7.2 – 7.8**) adjust it using **SpaPure pH Up or pH Down**.
If **TA** is out of range adjust it first using **SpaPure Alkalinity Increaser**.
4. If using a sanitizer add it now and turn the pump(s) on.

SpaPure Bromine Tablets in feeder

Note: Floating dispensers should be removed while the tank is in use

5. 30 minutes after introducing the sanitizer, treat the water with the appropriate amount of **ORB-3 Spa Enzyme No Foam**
6. Recheck **pH** and **sanitizer** levels periodically throughout the week to assure the water is staying in range and adjust as necessary. After a few weeks, you will establish a workable routine.
7. If, after 3-4 days of operation, the water shows signs of imbalance, treat water with **SpaPure Oxidizing Shock** and add additional **ORB-3 Spa Enzyme No Foam**. **

Note: If shock and enzyme product does not bring the water into balance consider draining and cleaning the tank.

8. Contact your Grimm consultant with questions, problems or any specialized needs

Associated Products



#231005 Alkalinity
Increaser – 16 oz.
\$4.00 each



#231004 pH
Decreaser – 24 oz.
\$5.00 each



#231003 pH
Increaser – 16 oz.
\$4.00 each



#231002 Spa
Oxidizing Shock
– 20 oz.
\$11.00 each



#230301 7 Way
Test Strips
– 100 strips
\$18.00 each



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