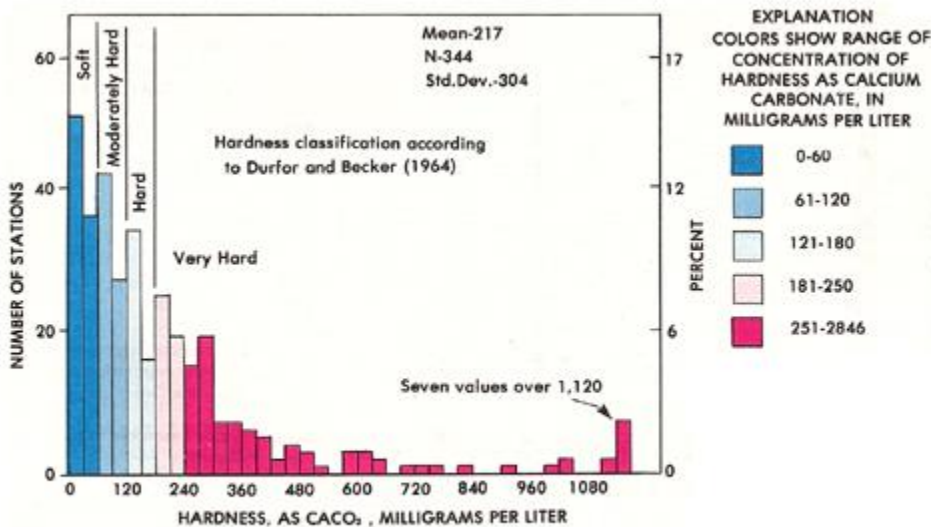




USGS Water Hardness Report (Source <https://water.usgs.gov/owq/hardness-alkalinity.html>)

Many industrial and domestic water users are concerned about the hardness of their water. Hard water requires more soap and synthetic detergents for home laundry and washing, and contributes to scaling in boilers and industrial equipment. Hardness is caused by compounds of calcium and magnesium, and by a variety of other metals. General guidelines for classification of waters are: 0 to 60 mg/L (milligrams per liter) as calcium carbonate is classified as soft; 61 to 120 mg/L as moderately hard; 121 to 180 mg/L as hard; and more than 180 mg/L as very hard.

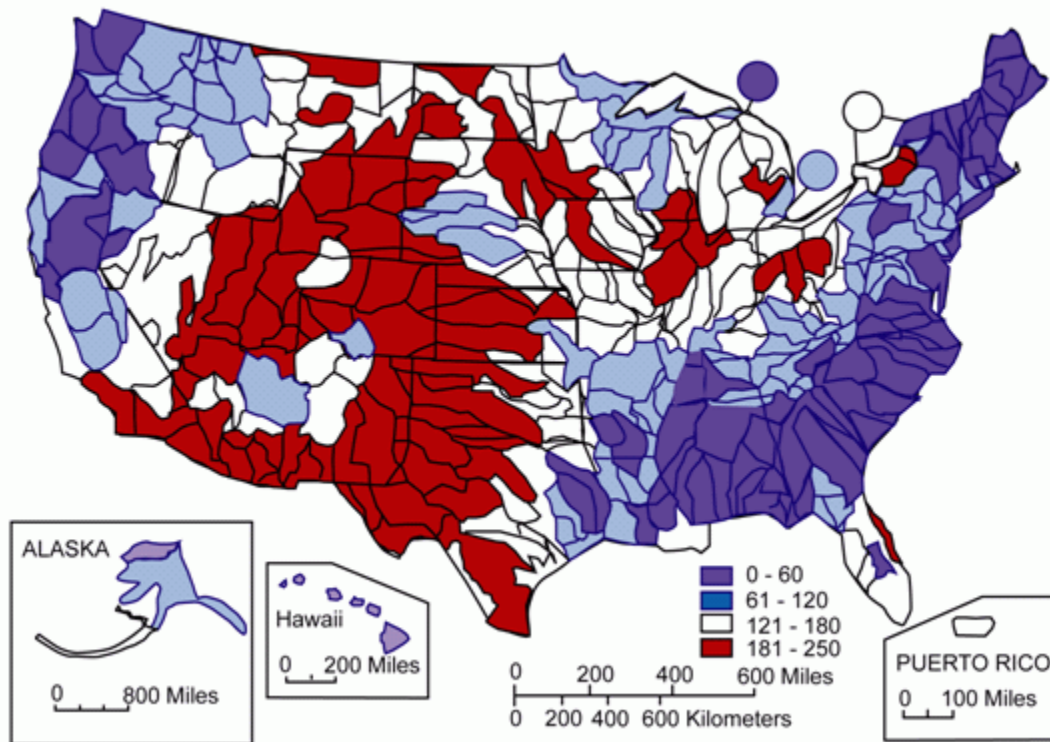
Mean values of hardness at 344 stations during the 1975 water year are represented by the [chart](#). The highest 7 values, those over 1,120 mg/L, are lumped in the last bar of the chart in order to maintain the scale. About half of the mean hardness values for the stations are in the soft to moderately hard categories, and about half can be classified as hard to very hard.



Source: [Briggs and others, 1977](#).

Patterns of hardness in the United States are shown on the [map](#) of accounting units below. Softest waters were in parts of New England, the South Atlantic-Gulf States, the Pacific Northwest, and Hawaii. Moderately hard waters were common in many rivers of Alaska and Tennessee, in the Great Lakes region, and the Pacific Northwest. Moderately hard waters were common in many rivers of Alaska and Tennessee, the Great Lakes region, and the Pacific Northwest. Hard and very hard waters were found in some streams in most of the regions throughout the country. Hardest waters (greater than 1,000 mg/L) were measured in streams in Texas, New Mexico, Kansas, Arizona, and southern California.

**CONCENTRATION OF HARDNESS AS CALCIUM CARBONATE,
IN MILLIGRAMS PER LITER**



Mean hardness as calcium carbonate at [NASQAN](#) water-monitoring sites during the 1975 water year. Colors represent streamflow from the hydrologic-unit area. Map edited by USEPA, 2005. Modified from [Briggs and others, 1977](#).

Note to Readers:

Water hardness is based on major-ion chemistry concentrations. Major-ion chemistry in ground water is relatively stable and generally does not change over time. Although the map illustrates data from 1975, these data have been found to be accurate and useful in current assessments.

There are, however, several caveats about the nature, use, and interpretations of these data: (1) the data illustrated represent water hardness on a national and regional scale and must be so interpreted; (2) the 1975 data are not designed to be used to make local decisions or decisions on the scale of individual homeowner property; and (3) information that is directly relevant to water hardness and other chemical properties at a home or immediate locale should be provided by the local health agency, local water utility, or by the vendor of a local water-softening system.

(From Briggs, J.C., and Ficke, J.F., 1977, Quality of Rivers of the United States, 1975 Water Year -- Based on the National Stream Quality Accounting Network (NASQAN): [U.S. Geological Survey Open-File Report 78-200](#), 436 p.)

About USGS:

https://www2.usgs.gov/aboutusgs/who_we_are/

The **USGS** serves the Nation by providing reliable scientific information to describe and understand the Earth; minimize loss of life and property from natural disasters; manage water, biological, energy, and mineral resources; and enhance and protect our quality of life.



The Vulcan Electronic Descaler to Combat Hardness - Frequently Asked Questions

Basic things to consider when adding a Vulcan Descaler

1. The first step is to know the **size of your treatments**. It may be determined by knowing the diameter of your inlet water pipes, or pipe circumference, or maximum water flow capacity in GPM or GPH. Any of these parameters will give us the information needed to properly size your unit. If you are a hotel or hospital, please indicate if you have special high demand times during the day and provide your estimated max. water demand in GPM or GPH.
2. Second concern is the **power source**. You will need 120/240V - 50/60Hz of power to plug each Vulcan unit. You may also use solar plates with two 12V batteries (=24V). If you decide to go solar, you may buy the components from us or we may provide you the exact part specifications so you can buy and build your own solar system locally. Unlike the Vulcan units that are light and compact, solar power parts are usually big and heavy, therefore expensive to be transported by air to some countries. Another thing you shall take into consideration is that unlike the Vulcan control box, the Vulcan power cord adapter that goes into your power outlet **is not waterproof**, for that reason it is advisable to insulate it from water damage using an epoxy sealant, silicone or any other way of waterproofing. Having a few extra power cords available is always advisable as they are inexpensive. The unique specifications of the Vulcan power cord make it very difficult to find anywhere else, even online. Contact TMS.
3. Third concern will be the **location of your Vulcan units**. The Vulcan control box is waterproof and designed to sustain almost everything. It is encapsulated into an acrylic block; therefore, direct sunlight will eventually tarnish the acrylic. Since the Vulcan is meant to last for decades, it is recommended to use a protection case if you are going to be using it outdoor. Contact Techno Mechanical Solutions for details.

What makes Vulcan a commercial and industrial water treatment device?

1. The amount, quality and strength of the micro crystals produced by the treatment provide top performance.
2. Effectiveness on the impulse signal traveling through water contained in your pipes, with a Vulcan is 1.2 miles.
3. Vulcan treatment effects last up to seven days after water leaves your pipes, before it returns to its normal state. This is important when you store water in tanks after treating it.
4. Engineering design and quality of manufacturing materials. Vulcan is solid state technology fully encapsulated into an acrylic block, totally waterproof and almost indestructible. Built to comply with heavy duty, commercial and industrial performance standards. Vulcan is designed to last for 30 years.
5. Vulcan is effective on running or standing water with hardness levels up to 1000ppm (59 grams per gallon).

Who manufactures the Vulcan?

Christiani Wassertechnik GmbH is the oldest manufacturer of physical water treatment in the world and has been doing water treatment research since 1948. Their specialization in the physical water treatment field began in 1977. CWT has constantly evolved into developing better technology through the years.

Vulcan International Warranty

Vulcan has a 30 year plus expected life span. Your Vulcan Investment is protected by a 10-year product replacement warranty that will cover your unit no matter in which country you are using it. This limited warranty is subject to the terms and conditions of Christiani Wassertechnik GmbH established in the Warranty Registration Card. It covers all manufacturing defects that may arise. Damage by negligence or force majeure is not covered. Contact us for more details.

All warranty related issues are serviced by your Vulcan distributor and its network of dealers. At the moment of purchase a warranty registration card is handed over to every customer. To be valid it must contain the following information on the back of the card: Transaction Date – Original Owner’s Name and Address - Authorized Distributor Name and Address

You shall keep your Warranty Registration Card safe in your records. The distributor will fill the registration card and include it inside your Vulcan package box. If you buy a Vulcan unit in second hands, please make sure to also get the Warranty Registration Card from the original owner. Only authorized Vulcan distributors can process warranty claims. **Do not buy a Vulcan unit from non-authorized merchants as you will not be covered by any warranty.**

How will I know if my water is hard? (USGS Water Hardness maps, charts and information on pages 7 and 8)
 Believe us when we say, you will notice fast enough to want to deal with it. Your local waterworks provides detailed information on the chemical composition of your water in gpg (grains per gallon) or ppm (parts per million).

Standard Water Hardness Scale		
Grains Per Gallon	Milligrams Per Liter (mg/l) or Parts Per Million (PPM)	Classification
Less than 1.0	Less than 17.1	Soft Water
1.0 - 3.5	17.1 - 60	Slightly Hard
3.5 - 7.0	60 - 120	Moderately Hard
7.0 - 10.5	120 - 180	Hard
Over 10.5	Over 180	Very Hard Water

What is the maximum water hardness level that may be treated with a Vulcan?

Vulcan is effective on water with hardness levels up to 1000ppm (59 grams per gallon).

What type of pipe materials may be treated?

Vulcan is suitable for all types of pipe materials or mixture of materials.

Does insulation material over pipes affects Vulcan performance?

Thin coatings for corrosion protection will not affect the Vulcan treatment. Thick insulation material must be removed at the place of installation before installing the Vulcan. The area may be re-insulated after the impulse bands are installed.

Do plastic and copper pipes need scale protection?

Yes, they are prone to calcification. It will take longer for the first layer of calcification to form on plastic but once it is formed the scaling process will be just as fast.

How long does it takes for Vulcan to clean your pipes?

Vulcan utilizes the Laws of Nature to remove scale. The removal process will usually take the same time it took to develop.



Where should I install a Vulcan?

Vulcan shall be installed at the point the incoming water supply line is going into the building or equipment that you wish to protect. In case of water wells the best location will be anywhere (3-5 feet) after the pump and filters.

Will the scale removed block my pipes or faucet's aerators?

No, the scale is slowly dissolved back into solution and washed away with the water as a fine powder. Depending on the condition of your building pipes at the moment of your Vulcan installation, you may need to remove and clean the aerators located at the tip of your faucets after a few months from the initial treatment, to remove solid particles like corrosion cleaned from your pipes. To remove simply turn the aerators counterclockwise, backflush with water and re-install.

Can I install a Vulcan in a heavily encrusted equipment like a cooling tower?

It is always recommended to clean your system first. Vulcan will keep your system clean automatically from thereafter. Successful installations have been performed in dirty cooling towers keeping in mind close inspections and increasing the intervals of sump drainage, filter changes, and water blow downs the first weeks with the Vulcan treatment.

Shall I keep my water treatment chemicals after installing a Vulcan on a Cooling Tower?

Chemical water treatment systems sample your CT water and inject the necessary chemicals to maintain a proper water balance, this process is costly and uses hazardous chemicals. When installing a Vulcan on your CT you will keep your chemical system running as normal, without making any changes. As the Vulcan treatment does its job, you will notice a dramatical reduction in the amounts of chemicals being injected into your water.

Does the location of filters and pumps shall be taken into consideration?

As a general rule, it is better to install a Vulcan after a pump and after a filter, if the setting in your installation area allows it. Crude filters above 50 microns do not remove the mono crystals and may be ignored. For more sensitive filters under 50 microns, install Vulcan after the filter. Whenever possible install Vulcan 5 ft. away from pumps operated by VFDs to prevent possible electric noise from interfering with the Vulcan impulse field.

Pipe temperatures

Vulcan may be used on pipes with temperatures under 150°F (65°C). If the pipe temperature is above 150°F place a piece of wood or plastic material to insulate the unit from the heat and use plastic wrap around the pipe before installing the impulse bands. Contact Techno Mechanical Solutions for details.

How long will the Vulcan treatment effects remain in the water?

Once water is not reached by the Vulcan signal because it exited the pipes, treatment effects will last up to seven days. Water will then return to its normal state. The term will be shorter in cold water starting from a minimum of two days.

Will Vulcan treatment be affected by unusual high levels of metals in the water?

Fe: Iron concentration in your water shall not exceed 1mg/l or (1 ppm)

Mn: The manganese level should not exceed 0.1 mg/l (0.1 ppm)

Check your city water provider's quality reports, available at their website. Concentrations above require a filter.

Does the Vulcan treatment have a softening effect on the water?

The Vulcan physical water treatment does not change the overall water hardness. Water treated with Vulcan does not lose minerals like calcium and magnesium. On a chemical level, the natural composition of the water elements remains the same before and after the treatment. However, the treatment makes minerals lose its adhesive characteristics, making it impossible for limestone to form. Due to a change in the water surface tension your skin will feel remarkably softer.

I heard of similar products that don't work?

Almost all other electronic products on the market are working with inductive electromagnetic technology. This technology is outdated. You may easily recognize them by the way their cables are installed in the pipe. They loop from the electronic unit to the pipe and then back to the unit.

Vulcan work with capacitive impulses that guarantee a stable impulse output. Its patented impulse bands cover a large area and end in the pipe, like an antenna. The Vulcan electronic control box uses far wider frequencies that range from 3,000 Hz to 32,000 Hz.

Vulcan Patented
Impulse Bands



Is it difficult to install a Vulcan?

Depending on the size of the unit Vulcan may be installed in 15-30 minutes without using any tools.

Would I have to call a plumber to install my Vulcan?

If your plumbing pipes are exposed the required amount of space, you will not need a plumber. Otherwise you do.

In geographic areas, where hard water problems are common, buildings and homes are usually pre-piped with a water loop and power outlet, to connect a water softening device. If you have this type of setting you will not need a plumber provided two sides of your loop are long enough to fit your Vulcan unit impulse bands. If the loop sides are smaller you will need to enlarge them. The easiest way is by attaching a metal flexible hose to your pipe with PEX compression connectors. Your local plumber will be able to help you, or you may find the materials needed at your local hardware store and do it yourself. Once your loop is long enough, Vulcan may be installed in just 15 minutes without using any tools. Just wrap the bands around the pipe, fix the control unit to your dry wall and connect the power plug to your power outlet. Contact Techno Mechanical Solutions for details.



How do I know my Vulcan is emitting the impulse signal correctly?

Alternating red pilot lights indicate that the impulse generator is operating efficiently. It is perfectly normal for the lights to illuminate on and off at different intervals as the frequency range changes. In case the lights are not illuminated please check your power supply. If there is power to the unit and any of the lights are not on, contact Techno Mechanical Solutions

What kind of voltage do I need for the Vulcan power supply?

The Vulcan power supply is suitable for use at any single-phase voltage from 87 to 260 Volts in either 50 or 60 Hz.

How do I know if Vulcan is manufactured to the highest standards?

Vulcan is manufactured to the highest performance standards in the world and has the following quality certifications.

UL Approval



Underwriters Laboratories Inc. (UL) is an international institution for safety and quality based in Illinois, USA. The UL-mark signifies that UL has evaluated and tested the electronics within the product to ensure that it fulfills strict guidelines for safety. **All switching power adaptors for Vulcan comply with international standards and meet these safety requirements.**

CE Approval



The CE mark indicates that a product meets **German and EU consumer safety**, health and environmental regulations. "CWT hereby declares that this product is operating in accordance with the following EU guidelines: 73/23/EG; 89/336/EG, which are certified by the CE-mark. The equipment corresponds to the requirements of the German Industrial Safety ACT and European low-voltage guidelines."

The German TÜV/GS



The TÜV is an independent German institute that determines product reliability and safety. The TÜV/GS mark indicates that a product has passed tests, follows the TÜV/GS's strict guidelines and is certified for safety in accordance with the "German Equipment Safety Law." The GS mark includes regular factory inspections and certifies system **quality in the production process**. The law requires frequent assessment by inspectors to assess whether or not the manufacturer can maintain the production specifications. During factory inspections, quality system inspection, quality system implementation, the production environment, and other tests related to production and measurement equipment are assessed.

Certificate of Origin: Germany



The CO (Certificate of Origin) officially indicates the country in which goods originate. In Germany, this certificate is issued by the German Chamber of Commerce (IHK). It indicates German origin after a comprehensive investigation as to the origin of each of the product's individual parts and the **production site in Germany**.

May I install a Vulcan where there is no electrical power available to connect the unit?

For field applications where there is no electrical power available, Vulcan may be powered by a Solar plate. Contact Techno Mechanical Solutions for details.

Vulcan outdoor installation under direct sunlight

The Vulcan control box is designed to sustain almost everything, it is encapsulated in an acrylic block, therefore direct sunlight will eventually tarnish the acrylic. Since the Vulcan is meant to last for decades, it is recommended to use a protection case if you are going to use it outdoor. Contact your authorized distributor for details.

Does Vulcan work well in standing water like pools?

Yes, the Vulcan impulse treatment is very effective regardless water movement. Even on standing water.



Is the Vulcan unit waterproof?

Yes, the **Vulcan unit is waterproof** and impervious to water or moisture.

Do I need to reset the Vulcan programming if I have a power outage?

No, The automatic memory program resets the unit to the last program used once the power is back.

How many units do I need to protect my Building?

Typically, one larger unit gets installed at the incoming water supply line to the building. If you have a cooling tower, pool, boiler or solar water heater, another smaller system will go in that water loop.

What is the effective distance of the Vulcan treatment in the pipe system?

The Vulcan treatment is effective for 1.2 miles or 2 kilometers of pipe.

How many days will the effects of Vulcan last in the water after it leaves the pipes?

The effects of the Vulcan treatment on calcium carbonate will last up to 7 days after water leaving your pipes.

Where can I find references and case studies about Vulcan installations?

A book of references and case studies is available online at: www.vulcan-texas.com

How to order?

sales@techno-ms.com 512-551-0923 1-800-603-1015

For Technical Support; sales@techno-ms.com

How do I make payment of my order?

Techno Mechanical Solutions LLC accepts all major credit cards, PayPal, Cash, Checks or Money Orders

USA and International shipping. Order processing time

Techno Mechanical Solutions ships from CWT warehouse in Berlin Germany to any location in the World. In USA, after clearing import duties, your order is shipped to your address via UPS. The whole process will typically take 10-15 days.

