Cooling Towers
Chillers
Heat Exchangers
Test report on Vulcans (pulsed water treatment systems) installed as a preventive measure against scale buildups causing faulty of the cooling towers

Tested field: Factory of a pharmaceutical company
Installation sites:
2-1 cooling tower A: Makeup water piping size is 50A.
2-2 cooling tower B: Makeup water piping size is 50A.
1 cooling tower C: Makeup water piping size is 50A and circulating piping size is 80A.

Model installed:
Vulcan S25
(water treatment capacity: 25 m³/hour)

Date installed:
For the cooling towers A, B, and C: July 22
For the cooling tower C: October 6

Objectives:
1. To prevent scale buildups on the cooling towers.
2. To reduce chemicals used for water treatment
   (measure for complying with ISO 14001)
3. To save the energy cost by preventing the deterioration of the heat exchange effectiveness

Verification of the effectiveness:
After installation of the Vulcans, the statuses of the cooling towers A, B, and C were inspected without using any water treatment chemicals. Even after elapse of approximately six months, almost no scale build-ups were observed inside the refrigerators and the heat exchanger tubes, and no water pollution warning was displayed. (Usually, without water treatment chemicals, the water quality is deteriorated and water pollution warning is displayed.) Silica adhered on the cooling towers was easily removed with a finger. With these results, the effectiveness of the installation of the Vulcans could be confirmed.

Remarks (Summary)
The water treatment system, Vulcan, has the following features: (For details, refer to the brochure attached.)
Vulcan changes only the crystal structure of scales without changing the quality of water. Therefore, nothing is added or reduced to or from the ingredients of water. The water through Vulcan is soft and has an increased permeability. Vulcan can be used as better cooling water.
(*) The effectiveness of the water treatment in the water supply line will last for 2-7 days and for approximately 2 km in distance.

Major features include:
- Prevents buildups of rusts and scales
- Makes cleaning in the kitchen and bathroom much easier (toilets, showers, tiles, joints, etc.)
- Drastically reduces the clogging due to oil balls
- Eliminates the necessity of strong chemicals for removing scales.
- Eliminates the necessity of additives.
- Does not change the water quality.
- Prevents the clogging at the time of drainage
Development after installation of the Vulcan

Adhesion of silicia six month after the installation of the Vulcan

Silica is not removed by hosing, but can be peeled off with a nail.

The installation of the Vulcan in the circulation line seems to create the status equivalent to the cooling tower C.

Water quality tests on the cooling tower C

Quality tests of three types of water approximately six months after the installation of the Vulcan:

(1) Makeup water
(2) Circulating water
(3) Makeup water (raw water)
Cooling Tower Cost Savings with Vulcan
Japan

**Installation details**

- **Model:** Vulcan S100
- **Installation Area:** cooling tower for 100RT turbo chiller, 24-hour yearly operation
- **Circulation Water Capacity:** 120 m³/h
- **Pipe Diameter:** 150 A
- **Effect:** chemical treatment reduced

**Full Chemical-treatment vs. Vulcan-treatment Indicates:**
Under 1 year, with Vulcan treatment is already less costly than full chemical treatment

**Cost reduction by Vulcan 10-year warranty:**

<table>
<thead>
<tr>
<th></th>
<th>without Vulcan</th>
<th>with Vulcan S100</th>
<th>annual savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>water and electricity charges</td>
<td>39,902 USD</td>
<td>35,386 USD</td>
<td>4,516 USD</td>
</tr>
<tr>
<td>sterilization / anti-algae products</td>
<td>79,804 USD</td>
<td>66,541 USD</td>
<td>13,263 USD</td>
</tr>
<tr>
<td>anti-scale chemical treatment</td>
<td>119,706 USD</td>
<td>97,700 USD</td>
<td>22,006 USD</td>
</tr>
<tr>
<td>maintenance cost</td>
<td>199,510 USD</td>
<td>160,014 USD</td>
<td>39,496 USD</td>
</tr>
<tr>
<td>10th year</td>
<td>399,020 USD</td>
<td>315,807 USD</td>
<td>83,213 USD</td>
</tr>
</tbody>
</table>

**Further benefits**

- **Electric saving:** about 5-15%, by the scale prevention on the turbo chiller
- **Gas saving:** about 5-25%, by the scale prevention on the absorption chiller
- **Equipment life extension:** about 30-60%
To the Ackuritlabs team,

Please find below photos of the Vulcan Descaler installed in the Florida State University College of Engineering.

These pictures show 2 x Vulcan S100 units protecting the double chiller and pumps in the FAMU/FSU College of Engineering.

Regards,

The Florida State Engineering Team
Dear CWT Team,

Spokane schools now have 6 Vulcan units installed.

One of the first Vulcan units is on a small cooling tower and this stays absolutely clean during the season. The tower was full of scale when we started and after 4 weeks, scale started to fall off in big chunks and now it is completely scale free.

Our first installation in Spokane schools was in Shaw Middle School, 50 years old building and with rusty/dirty looking water.

This was installed before the school started in the fall. After Christmas this year, the water is always clean and the janitor does not have to flush the piping anymore.

Have a great day.
Ame Vestad
IWTN

Installation locations

Roosevelt Elementary School
333 West 14th Ave
Spokane, WA 99204-3627
USA

Shaw Middle School
4106 N. Cook St.
Spokane, WA 99207
USA
the State Council Office – Zhongnanhai
China

Installation details

Model:
2 x Vulcan S25

Location:
A heat supply station for daily life water in Zhongnanhai

Installed by:
Beijing Vulcan Water Environment Science & Technology Co. Ltd.

Zhongnanhai
It serves as the central headquarters for the Communist Party of China and the State Council (central government) of China, and also the houses and office of the President of the People's Republic of China.

In order to solve the scale problem on heat exchanger, 2 x Vulcan S25 were installed in a heat supply station for daily life water in Zhongnanhai.

www.vulcan-beijing.com
Yuqiao District Heating Station

China

**Yuqiao District Heating Station**

- **Model:** Vulcan S100
- **Location:** Yuqiao district heating station
- **Installed by:** Dalian Jiayifang
- **Installation reason:** to solve the scaling problem of heat exchanger in the heating station

Yuqiao district is located in Dalian city, with in total about 160,000 square meters, 1300 households and 3900 people.

Yuqiao district heating station is responsible for heating the entire district. The heat exchanger was scaled badly, so heat transfer efficiency was reduced, also affected the heating quality.

After Vulcan was installed for only one month, it already shows very good result: the scale in the valve before the heat exchanger can be easily wiped off, and the inner wall becomes smooth again.

Scale can be easily wiped off, and the pipe shows the smooth wall

Vulcan S100 was installed on the main circulation water supply, which is from the municipal water.

Vulcan S100 was installed on the main circulation water supply, which is from the municipal water.
Air Conditioner
China

Installation Location:
the headquarter building of Tong-Cheng Travel (Suzhou City, Jiangsu Province, China)

Installed by CWT distributor:
Jiangsu Xinriyuan Construction Energy Saving Technology Shareholding Co., Ltd.

Model:
1 x Vulcan S100

Installation application:
Tong-Cheng Travel is a Chinese tourism leading enterprise, CWT distributor- Xinriyuan took charge of the whole building air-conditioning works. The main part of the air-conditioning uses high efficiency evaporative system, and it requires very high quality water. To ensure the long-term efficient operation of the heat exchanger and also to avoid scaling occurred, Vulcan S100 was bundled with air-conditioning evaporative system.
Dear CWT Team,

This cooling tower is one of three protected by the Vulcan S25 units in this location. The building is one of 47 buildings owned by Neptune Foods in Vernon LA, and this particular building does mainly seafood processing and packaging for consumers.

This picture was taken after 4 months the installation of the Vulcan S25. The tower was dirty/not cleaned before the Vulcan was installed.

Since the Vulcan installation, the cooling towers have been scale free and there has been no need for any chemical treatment.

Best Regards,

Arne Vestad
Dear IWTNA,

Please find below the installation photos of the Vulcan S100 installed on the main line connected to 3 cooling towers.

Regards,

The Mt.Vernon Cold Storage Team

www.commercialcold.com
Dear Dick,

For the past two years, we have selected several of our existing customers and offered them the opportunity to have us install the Vulcan Non-Chemical Unit on their cooling towers, for the purpose of evaluating corrosion, scale and bacteria rates versus a traditional chemical treatment program.  We have installed 5 x Vulcan S25 & 2 x S10 units all in the upper New York State area.

Based on standard water test analysis, including Corrosion Coupon Testing and regular Bacteria Dip Slide results, we have concluded that the Vulcan Non Chemical System has been able to provide similar results, to those achieved using a chemical based treatment program.

Regards,

Michael Bromley
President
Water Wise of America Inc.
Rochester NY 14624

www.waterwiseofamerica.com
Chillers in a Cooling Tower
USA

Vulcan installed in a Chiller

Dear CWT Team,

Here are two pictures from a Chiller opened for a routine cleaning, but nothing to clean after two years with Vulcan treatment.

No scale formation after using Vulcan

This Chiller is connected to a Cooling Tower which is exposed to lots of air borne contamination from surrounding farms.

Best Regards

Arne Vestad
www.IWTNA.com
Dear CWT-team

Currently we have five devices from the Vulcan range in use.

Because of the high degree of hardness of our cooling tower water, we had to decalcify every few months. After we used the devices, the scale on the heat exchange pipes was drastically reduced. Thus the lifetime of these devices is getting longer.

Kind regards

DYNAMIT NOBEL AG
Werk Lülsdorf
Technical Department
**VacMet Coating & Engraving Service**  
**USA**

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**VacMet**  
**Coating & Engraving Service**  
**Coating of metals with plastic or resins**

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IWTNA  
Arne Vestad  
2607 Bridgeport Way West  
Suite 1J University Place  
WA 98466

**Vulcan anti-scale system**

Dear Mr. Vestad,

I have noticed a definite improvement in the operation of our boilers. Typically, we would have several cooling coil plug ups during the hot weather season (a greatly extended season this year) and since the installation of the Vulcan, we have had zero plug ups and that translates into the saving of many hours of down time.

Based on that saving alone, the Vulcan has already paid for itself.

An additional benefit has been in the greatly reduced amount of cooling tower maintenance. The calcium buildup has been miniscule and the little bit that has accumulated can be easily washed away with a garden hose and nozzle.

I have also noticed a huge reduction in the iron stains in the bathroom fixtures here at the factory as well as at home where I installed the second unit. At home, I eliminated my water softener that was running on potassium due to the ancient iron pipes that run all through the house and barn.

The water seems to feel and react just as well with the Vulcan as it did with the softener and I no longer need to buy the expensive potassium and break my back lugging around the heavy bags to reload the water softener. I don't mean to sound like a commercial for the unit, but those are the honest facts and observations.

Please feel free to stop by the next time you are in the area.

Kindest regards,

Chuck Nelson  
VacMet Inc. in California, USA  
www.vacmet.com
SUBJECT: INSPECTION OF TUBE HEAT EXCHANGER (2X) UHP FURNACE, OPEN SYSTEM 40/30 °C

Upon the agreement with Mr Petovar, we have concluded to inspect both tube heat exchangers on the secondary part of the UHP furnace. The front and rear covers of both exchangers shall be disassembled.

PRESENT AT INSPECTION:
Petovar – SŽ Metal Ravne, d.o.o. JUH OTO
Oderlap, Vučko, Potočnik, Jamšek, Zapušek – Energetika Ravne, d.o.o.

ESTABLISHMENTS:
The inspected tubes were clean; there were no signs of lime scale accumulation.
The device for electronic softening is functioning well.

CONCLUSION:
We suggest that the device is purchased.

After Vulcan installation Control of honey comb fill of cooling tower
Toray Industries
Korea

COMPANY INFORMATION
Toray Industries, Inc
Location: Gyeongbuk, Korea
Installer: DAWO INT Co., Ltd.
Model: Vulcan S25
Pipe size: 100 mm

SCALE PROBLEM AND APPLICATION
1. Scale problem on the plate heat exchanger
2. Regular (every 2-3 months) chemical cleaning of the pipes and heat exchangers

Before – without Vulcan

After 3 months – with Vulcan treatment. Up to now the installed pipe line needed no cleaning.

Toray Group
Toray Industries produce, process and sell the following products: Fibers and textiles, plastics and chemicals, IT-related products, carbon fiber composite materials, environment and engineering products and pharmaceuticals and medical devices.

Vulcan S25 installed at Toray Industries

www.vulcan-korea.com
Holcim Cement Factory
Vietnam

About Holcim cement factory
Holcim is one of the world’s leading suppliers of cement and aggregates, and Holcim Kien Luong is the biggest cement factory in Vietnam.

The factory has problems with hard water in chiller, grinder and water supply pipe. They planned to spend nearly 400,000 USD to build and buy chemical systems to solve the problems. However, after installing Vulcan units, all the problems are solved with only 30,000 USD. This is the best investment!

Before Vulcan installation:
• scale deposits in oil heat exchanger
• oil temperature >50°C: very high
• to clean every month
• heat exchanger has corrosion
• scale deposits clog the pipe

Installed Vulcan models:
2 x Vulcan S250
1 x Vulcan S100
1 x Vulcan 5000

Installation locations:
• the main water supply for the cooling tower
• the cooling tower for the big grinder
• the cooling tower for the small grinder

Purpose:
• clean scale deposits
• prevent new scale
• reduce maintenance costs
• replace chemical dosing and softener systems

After Vulcan installation:
• oil heat exchanger is clean
• temperature is stable at 37°C – 40°C
• no need to stop machines to clean anymore
• save 7% electric energy at grinders

Heat exchanger before Vulcan installation
Heat exchanger after 2 months Vulcan installation
THK Precision Industry

China

Installation details
Model: Vulcan S25
Location: THK Precision Industry
Installation area: The main water pipe of cooling tower
Installed by: Dalian Jiayifang

We used chemicals to remove the scale of cooling tower before. After Vulcan was installed, we stopped the dosing process, and all equipment is still running well. Vulcan completely replaced the chemicals and saves cost for the company.

In winter, the cooling tower runs with less water and full of ice, we observe every week and find that the scale is gradually reduced. After 4 months running with Vulcan, the scale in the water tank and cooling tower has been significantly reduced.

THK’s Linear Motion (LM) Guide devices are an indispensable component of mechanical and electronic systems in a wide variety of industries, which are manufactured by THK for supply to customers worldwide.
# Cooling Tower in a Medicine Factory

Japan

## Vulcan test report on cooling tower in a medicine factory

### Installation details

<table>
<thead>
<tr>
<th>Model:</th>
<th>Vulcan S100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installation Area:</td>
<td>cooling tower in a medicine factory</td>
</tr>
<tr>
<td>Circulation Water Capacity:</td>
<td>100 m³/h</td>
</tr>
<tr>
<td>Pipe Diameter:</td>
<td>150 A</td>
</tr>
</tbody>
</table>

### The purpose:

1. Prevents from scale
2. Prevents from heat exchanger effectiveness loss
3. Cleaning maintenance cost of plate heat exchanger can be reduced

### The effect:

After Vulcan was installed for some months, the scale in the cooling tower, plate heat exchanger and the pipe become soft; and it can be removed easily with a finger.

### Cooling Tower Grid

Before Vulcan was installed: the outside of the cooling tower.

After Vulcan was installed for 5 months: the scale can be removed easily with a finger.

Before Vulcan was installed: the inside of the cooling tower.

After Vulcan was installed for 5 months: the scale has been reduced.
The scale on the plate heat exchanger becomes soft.

After Vulcan was installed for 9 months: ready open the plate heat exchanger and clean.

The scale in the circulation pipe can also be easily removed with a finger.

Circulation pipe
Vulcan Effects on Cooling Towers

USA

Data and Observations of the Effects of the Vulcan Electronic Descaler on Cooling Towers

Installation site:
The unit was installed on the 10 inch diameter line that feeds twin cooling towers (CT-1 and CT-2) at the FAMU/FSU College of Engineering.

Model installed:
Vulcan S250

Objectives:
The objectives are to prevent scale buildup on the cooling towers, remove the existing scale, eliminate the need for chemicals or time-consuming cleaning procedures, and to reduce energy costs.

History:
The maintenance for these cooling towers previously involved continuous injection of descaling chemical cleansers. The use of these cleansers was discontinued over a year prior to the installation of the Vulcan. In that time, the cooling tower flutes became encrusted with both scale and biofilm. Throughout the time period described below, there were no cleaning procedures in place with these cooling towers besides the treatment provided by the Vulcan.

Observations over time after the Vulcan Installation:
Between the time of the installation on July 16th and examination on August 1st, the green biofilm had begun to recede and gradually disappear. The next visit was about 3 weeks after the installation, on August 9th. At that point, the green biofilm had been further reduced and the scale deposits had begun to separate from the flutes in coin-sized flakes.

By August 20th, about a month after installation, the green biofilm had almost completely disappeared from the surfaces in contact with the Vulcan-treated water. The flakes of scale previously observed had fallen off in most places. The cooling tower flute surface area covered with scale deposits had been decreased by over 60%. We are very optimistic about continued improvement with this application. In addition to these observations, water quality measurements were also obtained from each cooling tower and are summarized in the following charts.
Data and Observations of the Effects of the Vulcan Electronic Descaler on Cooling Towers

The Vulcan does not change the water quality beyond its affect on its propensity to cause scale buildup. As illustrated below, the pH, conductivity, dissolved oxygen level, and turbidity remained relatively constant during observation from before the installation to over a month after. Temperature is included, because of its affect on the other measurements and seems to correlate with the slight fluctuations observed.
The photographs above were taken of CT-1 about 3 weeks after the Vulcan was installed.

These photos were taken of CT-1 after about 6 weeks.

This photo was taken of the inside of CT-1.

It illustrates clean flutes that are in constant contact with Vulcan-treated water and a few dry (untreated) areas that still have some remaining green biofilm.

The photographs above were taken of CT-1 about 3 weeks after the Vulcan was installed.

Data and Observations of the Effects of the Vulcan Electronic Descaler on Cooling Towers

Vulcan S250 installed on a 10 inch diameter line that feeds twin cooling towers (CT-1 and CT-2)
German Certificates

CE Declaration of Conformity

Issuer's name and address:
Christiani Wassertechnik GmbH
Köpenicker Str. 154
10997 Berlin
Germany

Product:
Water conditioning appliance

Type designation:
Vulcan
3000/ 5000/ S10/ S25/ S50/ S100/ S150/ S250/ S500

The designated product is in conformity with the European Directive:
89/336/EEC including amendments


Full compliance with the standards listed below proves the conformity of the designated product with the essential protection requirements of the above-mentioned EC Directive.

DIN EN 61000-3-3 (VDE 0838 Teil 3): 2002-03; EN 61000-3-3:2000
DIN EN 61000-3-11 (VDE 0838 Teil 11): 2003-09; EN 61000-3-11

Offenbach, has tested and verified the product granting the VDE Approval for the mark(s) as displayed.

Certificate No.
94560
File Reference
1890010-452-001 / 7664 F(4) / FU

Berlin, 01.01.2017
(Place, Date)

Christiani Wassertechnik GmbH
Köpenicker Str. 154
10997 Berlin
Germany

(Certificate Issuing Authority of the Issuer)
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Excerpt from our client list worldwide

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