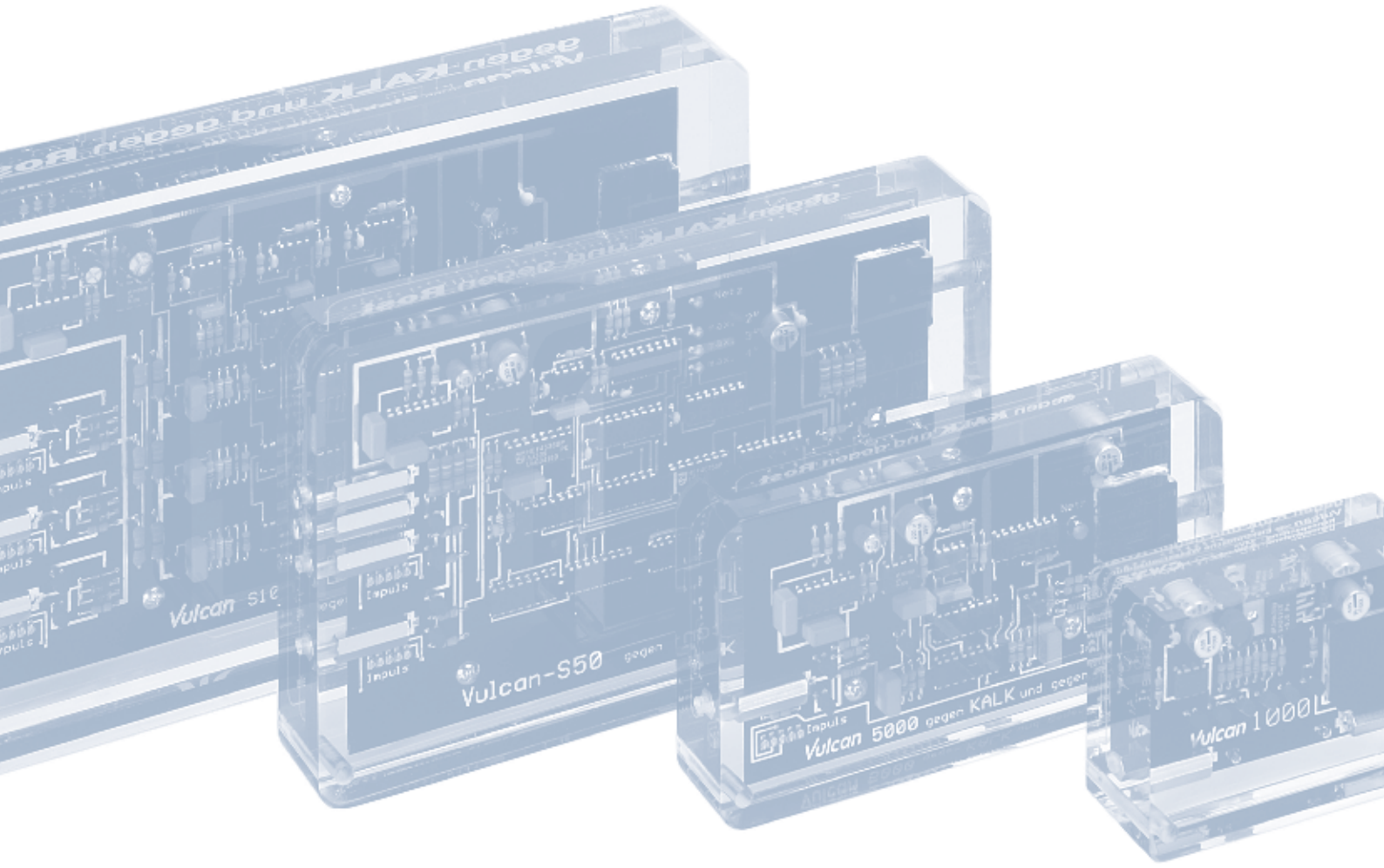
Against scale and rust

References / Quality / Studies



Contents

60 Years
Christiani Wassertechnik GmbH

1948 - 2008

CWT is a family owned and operated business with its own factory for water treatment technologies in Germany. The production of the highest quality devices with the most advanced technology together with the continual research and commitment led to the success of the product line:

Vulcan – against scale and rust.

In this booklet you will find a selection of references by private, commercial and industrial users of the Vulcan anti-scale units. A number of independent studies reflect on the eco-friendly technology of physical water treatment in general and on the Vulcan-Impulse-Technology in specific. You will also find numerous independent studies and scientific papers on the principle of the eco-freindly physical water treatment and on the Vulcan units.

Exhibition Center Cologne - Messe Köln

Germany

koelnmesse
Service

Catering managed by
Bayer Gastronomie

c/o Bayer Gastronomie GmbH · Deutz-Mülheimer Straße 30 · 50679 Köln · Deutschland

Christiani Wassertechnik GmbH
Heinrich-Heinestr. 15
52249 Eschweiler

Datum
07.09.2006
Durchwahl
+ 49 221 284- 9420
Telefax
+ 49 221 284- 9515

Vulcan 1000 Service Report

Dear Sir,

A few months ago we installed your Vulcan 1000 water treatment system in our catering services at the Cologne trade fair. In recent years we have had problems in particular with the coffee machines and dishwashers due to the hard water in Cologne.

The machines had to be maintained frequently and the cleaning costs of the kitchens were very high.

After the installation of your water treatment system in our bistros I noticed a clear improvement of the situation. The limescale deposits are now much easier to remove thus easing the workload of the staff. Less detergents are needed and I am altogether extremely satisfied with your device.

Unfortunately I am unable to give a long-term conclusion over the scale reduction at this point in time as it is not possible to see inside the pipes. I am convinced however by the effects visible outside the pipes and can therefore fully recommend Vulcan.

Yours Sincerely,

Gabor Ernoehazai
Technical Manager Cologne trade fair

Bayer Gastronomie GmbH
Deutz-Mülheimer Straße 30
50679 Köln
Deutschland
Telefon +49 221 284-9444
Telefax +49 221 284-9445
koelnmesse@bayer-gastronomie.de
www.bayer-gastronomie.de

Koelnmesse Service GmbH
Messeplatz 1
50679 Köln
Deutschland

Geschäftsführung:
Dr. Stefan Eckert
Vorsitzender des Aufsichtsrates:
Axel Kaske

Sitz der Gesellschaft und
Gerichtsstand: Köln
Amtsgericht Köln, HRB 33054

Mc Donalds Ltd.

Ukraine

я це люблю

McDonald's Ukraine Ltd.
7, Gryshka Str., Kyiv, 02140
"МакДональдз Юкрейн Лтд."
вул. Гришка, 7, Київ, 02140
+38 (044) 230-09-00
+38 (044) 230-09-01
www.mcdonalds.ua

Dear Mr. Christiani,

Thank you very much for your special attention for "McDonald's Ukraine Ltd".

From our side we're very grateful for your cooperation and support during the 10 years period of time.

Our company began to operate in Ukraine in the year 1987.

And during this period we've already opened 57 restaurants "Mc Donald's". Which is a good result.

In all of these restaurants we installed the equipment by CWT, which is in a good account in Ukrainian Market.

Besides this equipment is easy for installation and very handy in exploitation.

As for me I want to add that support of your company is very important for us.

Best regards,

Eugene Molodid

Equipment Coordinator

McDonald's Ukraine Ltd

МакДональдз Юкрейн Лтд.
№ 23744453

Mövenpick Restaurant

Germany

Bediente Gastronomie

Mövenpick Restaurant Sanssouci, Zur Historischen Mühle 2, D-14469 Potsdam

Firma
Christiani Wassertechnik GmbH
Charlottenstraße 18

10117 Berlin

MÖVENPICK
Restaurants

8. Dezember 2006

Referenzschreiben

Dear Sir,

our Mövenpick Restaurant opened in January 2000. After a short period of time we noticed a high level of limescale developing on the ice-cream makers. These calcifications could only be cleared bit by bit which is a time consuming process. To avoid potential losses a short-term limescale filter was installed. The operating time of this filter is limited however and thus results in high costs.

At a trade fair visit we consulted the company Christiani Wassertechnik GmbH about other possibilities.
We installed the limescale converter Vulcan 5000 and the ice-cream makers have been functioning smoothly for 10 months now.

The limescale, which accumulates especially in the crushed ice makers, can now be easily removed as it is converted into fine-grained structures.
We wish the company Christiani further success with their excellent products.

Yours Sincerely,

Marcel Charrier
Director

Mövenpick Zur Historischen Mühle Sanssouci
Zur Historischen Mühle 2
14469 Potsdam
Tel.: 0331 / 28 14 93
Fax 0331 / 281 49 50

Mövenpick Restaurant Zur Historischen Mühle Sanssouci, Zur Historischen Mühle 2, D-14469 Potsdam,
Phone +49 (0)331 28149-3, Fax +49 (0)331 28149-50, Direktor: Marcel Charrier
E-Mail: restaurant.potsdam-sanssouci@moevenpick.com, www.moevenpick.com
Mövenpick Restaurants Deutschland GmbH - Geschäftsführer: Dr. Hans Peter Rheinheimer, Dietmar Althof Sitz: Leinfelden-Echterdingen, Amtsgericht Nürtingen HRB 5437
Bankverbindung: Commerzbank Villingen-Schwenningen (BLZ 694 400 07), Kto-Nr. 157 949 9 – USt.ID.NR. DE 813471523 - USt. 99005/01679

Hans Krempl - Haustechnik GmbH (Specialized Shop)

Germany

Hans Krempl Haustechnik

HANS KREMPL · HAUSTECHNIK GMBH

Christiani Wassertechnik GmbH
Herrn Christiani
Heinrich-Heine-Str. 15

52249 Eschweiler

E-Mail: hans.krempl@krempl.de
Koblenz, 23.08.06
ma/gk

Dear Sir,

We have been selling your Vulkan 5000 water treatment system for over ten years. In this time we have successfully sold more than 1000 sets of equipment. We have consistently received positive feedback from our customers in view of the effectiveness of the system - patches of limescale which could previously only be removed by chemical detergents can now simply be wiped away with a cloth. What is more, the use of the system has notably reduced the calcification in the heating of electrical equipment (e.g washing mashines, dishwashers, kettles etc.).

We wish you and your company further success and in the above-mentioned matter would like to thank you for a succesful collaboration.

Yours Sincerely,

- Hans Krempl jun. -

August Horch-Straße 14, 55070 Koblenz, Telefon (0261) 89 09-0
Telefax (0261) 89 09 109
Gesellschafter und Beiratsvorsitzender: Hans Krempl
Gesellschaftsführer: Hans Krempl
Handelsregister Koblenz Nr. HRB 644
Ust-IdNr. DE811182753 bbn 40 16417 5

Blumen Kamm (Flower Shop)

Germany

Blumen Kamm GmbH • Rohrbach Straße 134 • 69126 Heidelberg

CWT-Christiani Wassertechnik GmbH
Herr Rolf Christiani
Köpenicker Str. 154
10997 Berlin

Vulcan 5000

Dear Christiani Wassertechnik Team,

I have installed a Vulcan 5000 in my house and I am very happy.
The water in the shower feels much softer and my coffee tastes better. It is very easy to install the unit and the new tap nozzles do no longer show scale incrustations.
I am very pleased with your product.
At the moment I consider to use Vulcan in my company [Kamm Flowers], so that I can use the improved water for my plants. This should end the scale spots on the leaves of the flowers.

Sincerly yours,

Bernd Kamm

Gärtnerei Rohrbacher Str 134
69126 Heidelberg
Telefon 0 62 21 - 37 20 93
Telefax 0 62 21 - 37 32 12

Geschäftsführer:
Bernd Kamm • Marion Klama
HRB: Heidelberg 331034
Gerichtsstand: Heidelberg

Bankverbindung
H+G Bank Heidelberg Kurpfalz e.G.
Kto.-Nr. 15111100
BLZ 67290100

USt.IdNr. DE 143260024
Steuer-Nr. 32019/07379

Private House Owner - Mr. Semle

Germany

Walter Semle • [redacted] • 67112 Mutterstadt

CHRISTIANI Wassertechnik GmbH
Heinrich-Heine Str. 15
52249 Eschweiler

29.08.07

Physical Water Treatment with Impulse-Technology

We are using the Vulcan since 1999 in our private house. We are pleased to report that we used to have scaled-up tap nozzles in the bathroom, the showers and the kitchen; and in the water kettle all the time. This has stopped and we almost see no single incrustation no more. We wash our clothes without any softening detergent, and we see positive effects with the hair and body when showering.
The plates and glasses that came out of the dishwasher used to show blurry surfaces before we started the treatment. After the Vulcan treatment, we even stopped to apply any salt to the dishwasher. The result was that we have the cleanest glasses ever. We definetely believe that this is due to the Vulcan 5000 installation, as we have not changed anything else in the setup. The hot water temperature was not altered at all.
Summing up, we would like to recommend such a unit for every household that experiences problems with scale, especially as the company Christiani Wassertechnik GmbH had kindly offered us to try the unit for 4 weeks.

Kind regards,

Walter Semle

Private House Owner - Family Wiechmann

Germany

Kai und Viktoria Wiechmann
82276 Adelshofen, 30.08.2005

CHRISTIANI Wassertechnik GmbH
Heinrich-Heine Str. 15
52249 Eschweiler

VULCAN 500 Service

Dear Mr. Christiani,

We came across your product after having to deal with the disadvantages of calcification for many years.

The possibility of testing the VULCAN water treatment system for 4 weeks under no obligation persuaded us to try it out.

We have after 2 weeks already found many of the statements in your product description to be impressively true.

Limescale deposits in the showers and sinks are now easy to remove. The inspection of the aerator after 4 weeks shows no accumulation of scale, in the past it was necessary to clean it every 4-6 weeks.

We are very satisfied with the product and will certainly continue to use the device and recommend it further.

Yours Sincerely,

Kai Wiechmann

Private House Owner - Mr. Hanau

Germany

Klaus Hanau • [redacted] • 30966 Hemmingen

CHRISTIANI Wassertechnik GmbH
Heinrich-Heine-Straße 15

D-52249 Eschweiler

Yur refrence	RC/RM
Message from	07.02.2006
Our reference	KH
Date	15.02.2006

VULCAN 5000

Dear Sir,

I would like to thank you for allowing us to use the Vulcan 5000 as a trial device in our family home. The self installation did not prove to be a problem.
On the first evening after the installation I was pleasantly suprised as I drank a glass of tap water. It has since then tasted different, cleaner and milder.
A few days after installing the VULCAN 5000 I was able to remove the scale in my shower cubicle with only a damp cloth which before could only be removed with dissolving agents.
The massage shower head in the shower cubicle has in the meantime recovered its full efficiacy without any effort on my part. This was previously only achievable through regular intensive cleaning and soaking in detergents for long periods of time. The taps and sinks, bathtubs and shower cubicles no longer have dull surfaces, instead they shine with no need for intensive cleaning. Also since then we have been able to reduce the amount of washing powder used in the dishwasher and washing machine by half. My wife and I look forward to a life without further 'calcification'.

I am pleased to be able to recommend the Vulcan 5000.

Yours Sincerely,

K. Hanau

Private House Owner - Ms. Hauser

Germany

Elisabeth Hauser
[redacted]

79365 Rheinhausen

Rheinhausen, den 02.09.2005

Christiani Wassertechnik GmbH
Heinrich-Heine-Str.15

52249 Eschweiler

Sehr geehrte Damen und Herren,

wir haben vor ca. 2 Monaten eine Vulcan 5000 Kalkschutzanlage in unserem Haus eingebaut. Das Wasser, das wir von unserer Gemeinde erhalten ist sehr kalkhaltig. Die Wirkung des Gerätes machte sich ca. 1 Woche nach Einbau bemerkbar.
Die Siebe in den Armaturen haben wir beim Einbau der Kalkschutzanlage ausgewechselt, sie sind seit dieser Zeit kalkfrei, ebenso verhält es sich mit dem Duschkopf.
Auf den Fliesen und Armaturen sind zwar weiterhin Kalkflecken sichtbar, diese lassen sich jedoch problemlos mit etwas Essigreiniger abwischen. (Früher musste man kräftig schrubben, um die Kalkablagerungen wegzubekommen, falls diese sich überhaupt entfernen ließen) .
Das Wasser fühlt sich insgesamt weicher an.
Wir können die Vulcan 5000 Kalkschutzanlage weiterempfehlen. Ihr Einbau hat sich für uns bereits jetzt gelohnt.

Mit freundlichen Grüßen

Elisabeth Hauser

Private House Owner - Mr. Pidoll

Germany

Herbert von Pidoll

82110 Germering, 19th of August, 2009

CWT Christiani Wassertechnik GmbH
Köpenicker Strasse 154

10997 Berlin

Purchase of the new generation of Vulcan 5000

Ladies and Gentlemen,

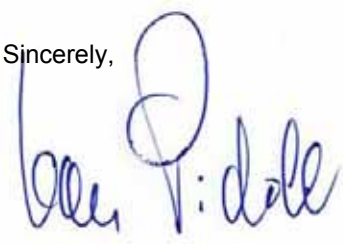
In connection with the purchase of the new generation of Vulcan 5000 I do not want to miss to mention that for many, many years we already use the previous edition of Vulcan 5000. We were and are enthusiastic about the functioning of the device and therefore have decided to purchase the latest version of the Vulcan 5000.

Of course we are very curious whether the new generation of Vulcan 5000 can even possibly achieve an increase in the mode of action. Based on our previous positive experience with Vulcan 5000 even our children have now – at our suggestion – each equipped their recently bought house with a Vulcan 5000.

Especially noteworthy is the simple installation method of Vulcan 5000, as also a layman in technical matters will not be overtaxed.

We hope that we remain as enthusiastic with the new device as before with the old generation of Vulcan 5000.

Sincerely,



Private House Owner - Ms. Fuchs

Germany

Patricia Fuchs
[redacted]
14656 Brieselang

Tel.: 033232[redacted]
Fax:0121253[redacted]

Christiani Wassertechnik
Heinrich-Heine-Straße 15
52249 Eschweiler

15. November 2005

Vulcan 5000

Dear Sir/Madam,

Many thanks for the free trial of your device Vulcan 5000. Unfortunately I am unable to purchase the device at this time, due to financial reasons. I will nevertheless keep it in my mind to come back to you at a later date.

In my experience:

- First of all: we have a water hardness of 24!
- There are certainly less limescale deposits on the tiling, the taps, and shower partitions as well as the in the sink, the bathtub and the shower floor (*previously everything dried up after use, but not during the trial period*
- The laundry is noticeably softer even without the use of fabric softener
- There is less residue on the crockery
- Tea and coffee do not taste any different from before
- Shampoo and soap do not foam more than before
- Our skin is no longer irritated after washing, it is no longer absolutely necessary to use cream (*we have allergies*)
- Contrary to your information, the kettle does not accummulate as much limescale
- There was no notable change in the water mains pipework or in the aerators, although it is admittedly a new building
- All mentioned changes occurred immediately after the installation of your device

I was skeptical before using your device as I was advised another, but have now recommended it to my friends and family.

I am happy to remain in contact with the nice lady who tried a while ago to reach me by telephone and am available for any possible queries.

Yours Sincerely,

Private House Owner - Family Janker

Germany

Firma
CHRISTIANI Wassertechnik GmbH
Zu Händen Fr. Susanne Caspary
Heinrich-Heine-Strasse 15

52249 Eschweiler

Angelika u. Harald Janker
[redacted]

85521 Ottobrunn

03.01.2005

Erfahrungsbericht betreffend VULCAN 5000Elektronische Wasserbehandlung

Sehr geehrte Frau Caspary,

nachstehend möchten wir Ihnen unsere Erfahrung mit dem Gerät VULKAN 5000 schildern.

Bereits im November 2003 hatten wir uns das Gerät VULKAN 5000 zum Test ausgeliehen. Nachdem das Ergebnis mit dem Gerät während des Probebetriebes positiv war und unserer Vorstellung eines Gerätes zur Entkalkung entsprach, stand dem Kauf eigentlich nur noch entgegen, dass wir Ihr Gerät als erstes hatten und noch auf 2 weitere Geräte zum Probebetrieb warteten.

Die beiden anderen auf Magnetismus beruhenden Geräte konnten dem mit dem vom VULKAN 5000 erzielten Ergebnis nicht standhalten. Bei dem einen Gerät war die Wirkung nicht vergleichbar, das andere Gerät ließ sich Aufgrund der Abmessungen nicht ordnungsgemäß montieren. Da es sich bei unserem 2 Familienhaus um einen Altbau und einen in 19991 zusätzlichen Anbau handelt, sind die Wasserleitungen in einem Abstand von lediglich 25 mm von der Wand bis zur Mitte der 1 Zoll Zulaufleitung verlegt. Beim VULKAN 5000 bereitet die Montage wegen der geringen Breite keinerlei Probleme (siehe beigefügtes Bild).

Nachdem wir Ihr Gerät als erstes und die beiden anderen Geräte kurz danach zurückgesandt hatten, wurde das Thema Wasserenthärtung, -entkalkung erst mal zurückgestellt. Als nun im November 2004 die Messe Heim & Handwerk wieder in München stattfand, waren wir uns sicher, dass wir wegen des hohen Kalkanteils in unserem Wasser dieses Gerät erwerben werden.

Seit der Installation haben wir die sofortige Wirkung eines weicheren Wassers sowie den Rückgang des Kalkanteiles feststellen können. Außer an den Perlatoren zeigt sich die Kalkreduktion auch sehr deutlich im durchsichtigen Wasserbehälter unserer Espressomaschine. Wir sind uns sicher, dass wir für unser Haus das richtige Gerät mit einem guten Preis- Leistungsverhältnis erworben haben.

mit freundlichen Grüßen

Harald und Angelika Janker

Private House Owner - Ms. Gottschalk

Germany

Christel Gottschalk, [redacted] 18435 Stralsund, Tel./ Fax 03831-39394

Christiani Wassertechnik GmbH
Heinrich-Heine-Straße 15

52249 Eschweiler

Stralsund, den 25.07.2005

Sehr geehrte Damen und Herren,

wir haben Ihren Vulcan 5000 seit 06.06.05 in unserer Doppelhaushälfte im Einsatz.
Nach Auskunft des örtlichen Wasserversorgers haben wir 26,6 ° dH Wasserhärte. Dem entsprechend waren an den Armaturen in Bad und Küche die Kalkablagerungen. Die Perlatoren waren nach kurzer Zeit zugesetzt. Erst kürzlich mußten wir den Spülkasten erneuern.

Seit der Vulcan 5000 angeschlossen ist, jetzt 7 Wochen, sind an den Perlatoren keine Kalkablagerungen zu erkennen.

Als Nebeneffekt ist mir aufgefallen, daß die Zirkulation des Warmwassers ohne Pumpe läuft.
Da der Speicher des Warmwassers im Keller steht. Küche im Erdgeschoß und Bad im Obergeschoß liegen, mußte zu bestimmten Zeiten die Zirkulationspumpe laufen, um unnötige Wasserverluste durch Ablaufen des kalten Wassers aus der Leitung zu vermeiden. Das hat sich jetzt erübrigt.

Wir sind nach diesen 7 Wochen Betriebszeit des Vulcan 5000 zufrieden, auch wenn der Preis des Gerätes sehr hoch ist.

Mit freundlichen Grüßen

Christel Gottschalk

Private House Owner - Family Kämke

Germany

Familie
Gabriele u. Klaus-Dieter Kämke
[redacted]
16348 Klosterfelde

CHRITIANI Wassertechnik GmbH
Heinrich-Heine-Straße 15

52249 Eschweiler

Klosterfelde, den 11.10.2005

Sehr geehrte Damen und Herren,

der VULCAN 5000 wird durch uns seit 4 Wochen getestet.

Schon nach wenigen Tagen konnten wir eine merkliche Veränderung hinsichtlich von Kalkablagerungen im Waschtisch und in der Dusche feststellen und erwarten nunmehr weitere positive Veränderungen.
Aus diesem Grund werden wir uns für den Dauergebrauch des Gerätes entscheiden.

Mit freundlichen Grüßen

Private House Owner - Mr. Heinz

Germany

Hans Jürgen Heinz
[redacted]
50170 Kerpen

Kerpen, 20.1.2007

Christiani WassertechnikmGmbH
Heinrich-Heine-Str.15
52249 Eschweiler

Test Vulkan 5000

Sehr geehrte Damen und Herren,

der Test ist positiv verlaufen.Der vorhandene Kalk ist lose, und lässt sich wegwischen.
Vorher war der Kalk nur mit Kalklöser zu entfernen.

Ich werde das Gerät behalten. Den Kaufpreis überweise ich auf Ihr Konto.

Mit freundlichen grüßen

Private House Owner - Ms. Lippok

Germany

DORIS LIPPOK DIETER LIPPOK
[redacted] D-13509 BERLIN TELEFON 0 30 / 4 33 78 69

26. Februar 2003

Christiani Wassertechnik GmbH
Heinrich-Heine-Str. 15

52249 Eschweiler

Betr.: VULKAN 5000

Sehr geehrte Damen und Herren,

seit einigen Wochen arbeitet in unserem Hause Ihre VULCAN Kalk- und Rostschutzanlage zu unserer Zufriedenheit.
Wir haben inzwischen festgestellt, dass die Qualität des Wassers besser geworden ist. Insbesondere ist dies anhand der Wäsche festzustellen. Wir hoffen auch, dass im Laufe der Zeit unsere Wasser-rohre in einen besseren Zustand versetzt werden als dies z. Z. der Fall ist.

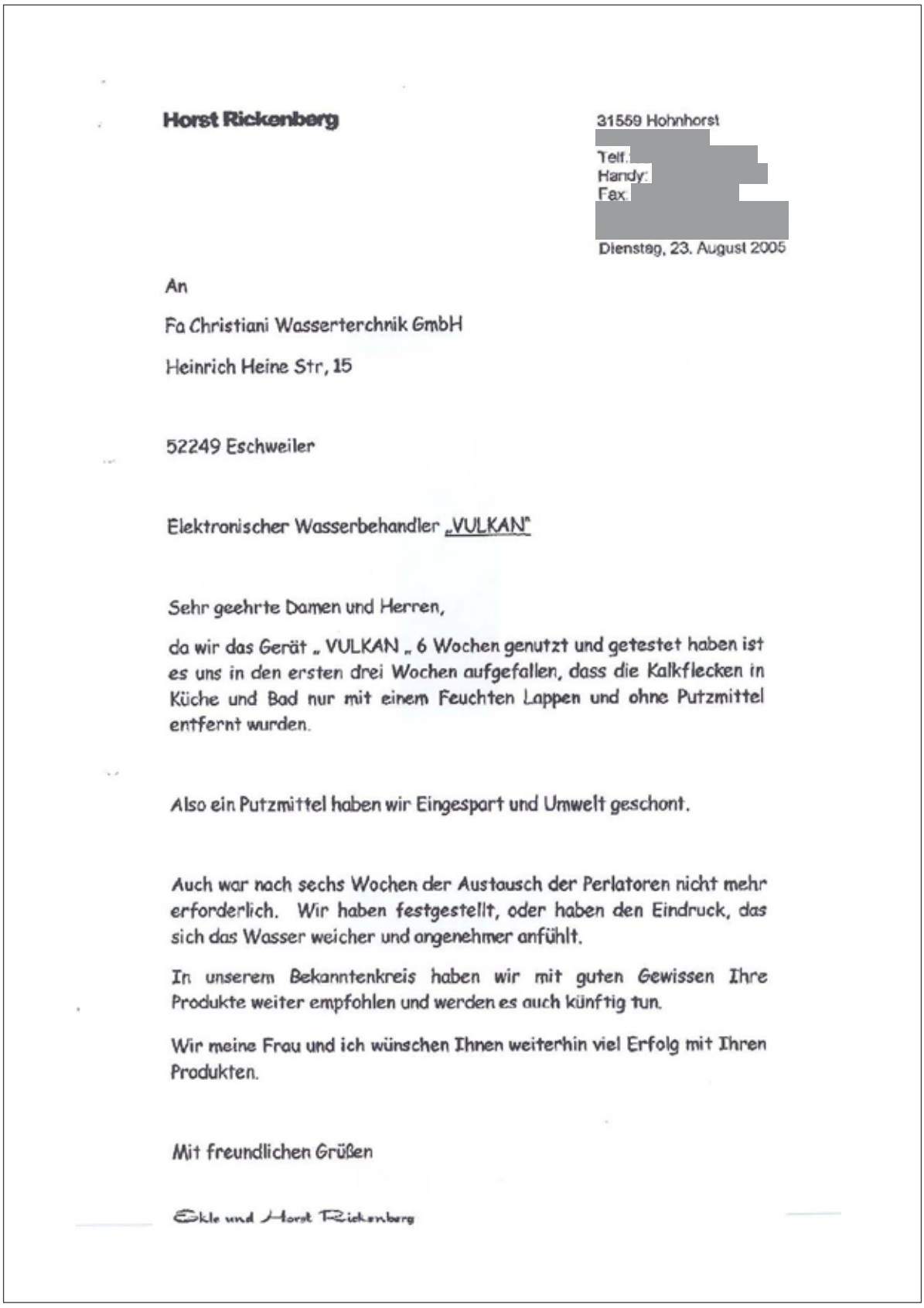
Wir haben uns entschlossen, die Anlage zu kaufen.

Mit freundlichen Grüßen

Dieter Lippok

Private House Owner - Mr. Rickenberg

Germany



Horst Rickenberg

31559 Hohnhorst
[redacted]
Telf.:
Handy:
Fax.
[redacted]

Dienstag, 23. August 2005

An

Fa Christiani Wasserterchnik GmbH

Heinrich Heine Str, 15

52249 Eschweiler

Elektronischer Wasserbehandler „VULKAN"

Sehr geehrte Damen und Herren,

da wir das Gerät „ VULKAN „ 6 Wochen genutzt und getestet haben ist es uns in den ersten drei Wochen aufgefallen, dass die Kalkflecken in Küche und Bad nur mit einem Feuchten Lappen und ohne Putzmittel entfernt wurden.

Also ein Putzmittel haben wir Eingespart und Umwelt geschont.

Auch war nach sechs Wochen der Austausch der Perlatoren nicht mehr erforderlich. Wir haben festgestellt, oder haben den Eindruck, das sich das Wasser weicher und angenehmer anfühlt.

In unserem Bekanntenkreis haben wir mit guten Gewissen Ihre Produkte weiter empfohlen und werden es auch künftig tun.

Wir meine Frau und ich wünschen Ihnen weiterhin viel Erfolg mit Ihren Produkten.

Mit freundlichen Grüßen

Ekke und Horst Rickenberg

Private House Owner - Mr. Hanebuth

Germany

Walter Hanebuth
[redacted]
30916 Isernhagen NB

Christiani Wassertechnik GmbH
Heinrich-Heine-Straße 15
52249 Eschweiler

Isernhagen, 30. May 2006

Vulcan 5000 - scale protection

I installed your device Vulcan 5000 against scale in my house at the end of February. For 8 years now I have been wondering how for example taps and safety valves can be kept free of scale and rust, now I know the reason why.

Plumbers sometimes give you the wrong information which then leads to high prices ranging between as much as three to five thousand euros and often comes to nothing.

At the trade fair in Langenhagen I spoke with Mr. Trögel who explained your water purification system, the 'Vulcan 5000' very well. I accepted his offer and was from the very first moment pleased with the device.

After I installed the device I noticed on my hands that the water was different and quite soft. Since then I have cleaned all of the water pipes and taps and the pressure control valve. My wife is very happy with how quick it is now to clean the bath fittings, we have five baths after all. We no longer suffer from irritation of the skin and I drink tap water every day. I am convinced too, that the washing machine and the boiler, as well as smaller electrical appliances benefit from the device and consequently use less electricity.

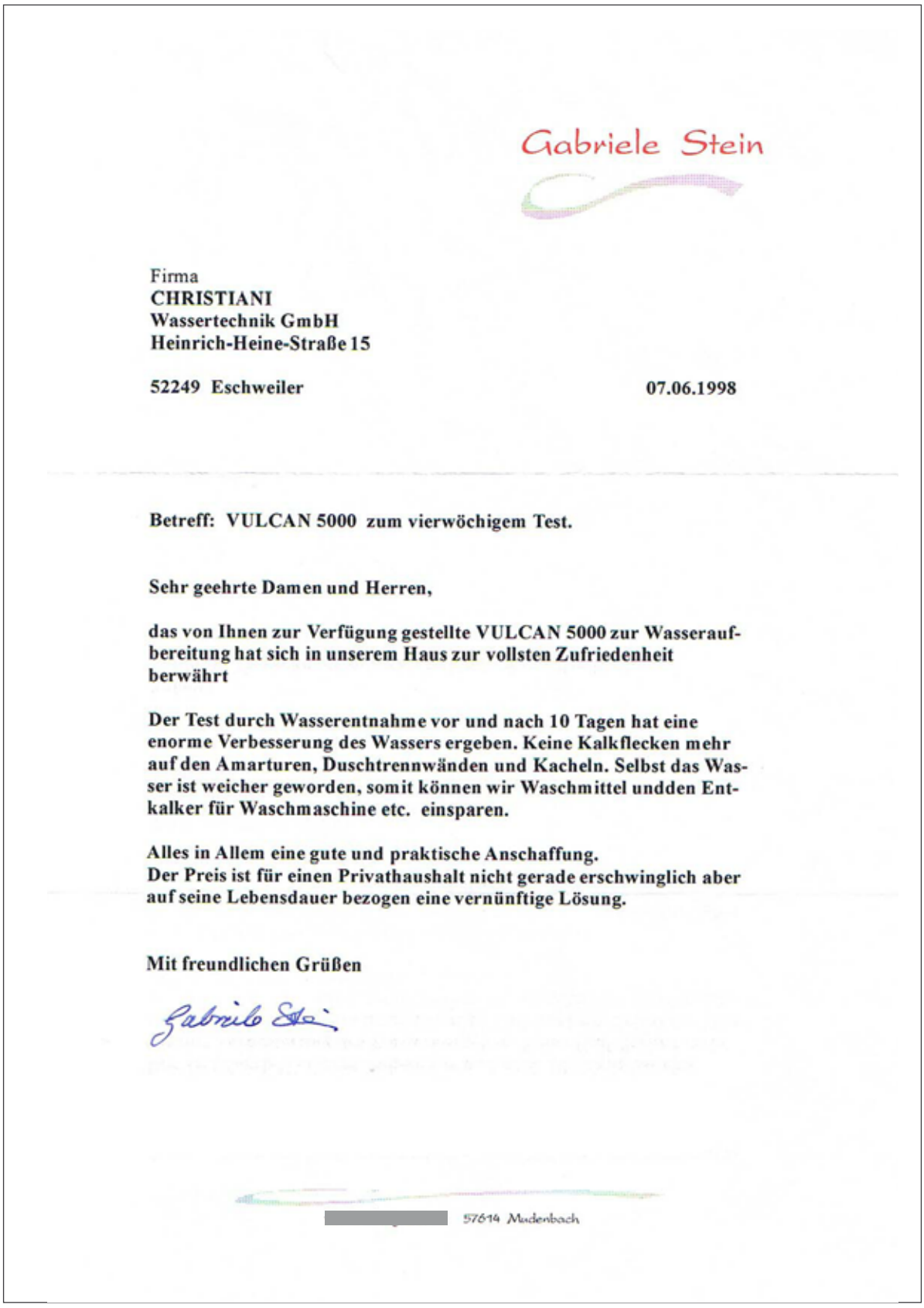
I am convinced that I will need the plumbers for small repairs far less now. I am also confident that I have made the right purchase. I will recommend your 'Vulcan 5000' to my family and friends.

Yours Sincerely,

Walther Hanebuth

Private House Owner - Ms. Stein

Germany



Gabriele Stein

Firma
CHRISTIANI
Wassertechnik GmbH
Heinrich-Heine-Straße 15

52249 Eschweiler **07.06.1998**

Betreff: VULCAN 5000 zum vierwöchigem Test.

Sehr geehrte Damen und Herren,

das von Ihnen zur Verfügung gestellte VULCAN 5000 zur Wasseraufbereitung hat sich in unserem Haus zur vollsten Zufriedenheit berwährt

Der Test durch Wasserentnahme vor und nach 10 Tagen hat eine enorme Verbesserung des Wassers ergeben. Keine Kalkflecken mehr auf den Amarturen, Duschtrennwänden und Kacheln. Selbst das Wasser ist weicher geworden, somit können wir Waschmittel undden Entkalker für Waschmaschine etc. einsparen.

Alles in Allem eine gute und praktische Anschaffung.
Der Preis ist für einen Privathaushalt nicht gerade erschwinglich aber auf seine Lebensdauer bezogen eine vernünftige Lösung.

Mit freundlichen Grüßen

Gabriele Stein

[redacted] 57614 Mudenbach

Private House Owner - Mr. Beckmann

Germany

Henning Beckmann [redacted] 52249 Eschweiler, 10.10.1996

CHRISTIANI Wassertechnik GmbH
z.H. Herrn Rolf Christiani
Heinrich-Heine-Str. 15

52249 Eschweiler

VULCAN 5000
Elektronischer Wasserbehandler

Sehr geehrter Herr Christiani,

nachdem ich Ihren VULCAN - Wasserbehandler nun fast 2 Jahre benutze, muß ich Ihnen nach anfänglicher Skepis bestätigen, daß ich mit diesem Gerät sehr zufrieden bin und Ihre Werbeaussagen zutreffend sind.

Kalkflecken in Bad und Küche sind leicht mit einem feuchten Lappen zu entfernen. Die Perlatoren mußte ich vorher fast alle 6 Wochen austauschen bzw. reinigen. Während des zweijährigen Einsatzes von VULCAN war der Austausch der Perlatoren nur zweimal fällig geworden.

Weiterhin hat meine Frau festgestellt, daß in der Waschmaschine bis zu ca. 30 % weniger Waschmittel und Waschzusätze verbraucht werden. Außerdem haben wir den Eindruck, daß sich das Wasser weicher und angenehmer anfühlt.

Wir haben Ihr Produkt deshalb bereits in unserem Bekanntenkreis mit gutem Gewissen weiterempfohlen und wünschen Ihnen auch künftig viel Erfolg mit Ihrem VULCAN 5000 - Kalkwandler.

Mit freundlichem Gruß

Henning Beckmann

Private House Owner - Mr. Miklis

Germany

Frank Miklis,
[redacted]
31020 Salzhemmendorf

Salzhemmendorf, 22.12.02
Tel.: [redacted]
Mobil: [redacted]
E-Mail: [redacted]

CHRISTIANI Wassertechnik GmbH
Heinrich-Heine-Str. 15

52249 Eschweiler

VULCAN 5000 - Elektr. Wasserbehandlung

Sehr geehrter Herr Christiani,

vielen Dank für die Übersendung Ihres Gerätes VULCAN 5000 und die Möglichkeit das Gerät 4 Wochen lang kostenlos testen zu dürfen.

Nachdem nunmehr die Probezeit fast vorüber ist und ich von der Wirkungsweise absolut überzeugt bin, habe ich mich zum Kauf entschlossen. Folgende Gründe waren dafür ausschlaggebend:

- ✓ Bereits kurz nach der Anbau an die Wasserleitung hatte ich das Gefühl, dass sich unser sonst sehr hartes Wasser weicher anfühlt.
- ✓ Nachdem sich sonst in unserem Wasserkocher bereits nach wenigen Anwendungen dicke Kalkablagerungen bildeten, ist er nun seit fast 2 Wochen trotz täglichem Betrieb annähernd kalkfrei.
- ✓ Meine Frau freut sich, dass Kalkrückstände auf Duschwänden nunmehr leicht mit einem feuchten Tuch zu entfernen sind.
- ✓ In den von Ihnen mitgelieferten Perlsieben für zwei Wasserhähne sind bis heute kein Kalkablagerungen sichtbar.
- ✓ Der Preis: Ihr VULCAN 5000 liegt etwa 60 Prozent unter dem Preis vergleichbarer Angebote unseres hiesigen Installationshandels.

Ich gehe davon aus, dass das Gerät einwandfrei arbeitet und ich die 5-jährige Vollgarantie nicht in Anspruch nehmen muss.

Mit freundlichem Gruß

Frank Miklis

Private House Owner - Mr. Roth

Germany

Alfred Roth [redacted] 54516 Wittlich

Montag, 12. April 2004

Christiani Wassertechnik
Heinrich Heine Str. 15
52249 Eschweiler

Betrifft: Vulkan 5000

Sehr geehrte Damen und Herren.

Am 23.3.04 lieferten Sie mir Ihren Vulkan 5000. Ich schloß das Gerät auch gleich an der Wasserleitung an. Schon nach wenigen Tagen stellte ich die Wirksamkeit fest. Das Wasser fühlte sich viel weicher an. Die Oberfläschenspannung war viel geringer. Das Wasser perlte nicht mehr an den Armaturen und an den Fließen, sondern floß wie nach der Behandlung mit einem Entkalker ab. Ich bin wirklich begeistert und kann nur jedem empfehlen sich den Vulkan 5000 anzuschaffen. Eine entsprechende Empfehlung habe ich schon gegeben.
Weithin viel Erfolg mit Ihren Geräten.

mit freundlichen Grüßen,
Ihr Alfred Roth

LATVIJAS BANKA

Latvia

LATVIJAS BANKA

Rīgā
2006. gada 18. septembrī
Nr. 14-08.1/586

ATSAUKSME
Par ūdens apstrādes iekārtu "VULCAN"

2003. gada jūnijā SIA "Junels" uzstādīja ūdens apstrādes iekārtu "VULCAN S-50 EV" Latvijas Bankas ēkā Rīgā, K. Valdemāra ielā 2A. Iekārtas iedarbības radītās izmaiņas tika konstatētas pēc apmēram 3 mēnešiem, kad noārdītā kaļķa un rūsas nosēdumu tīrīšanās rezultātā dažādās ūdens ņemšanas vietās parādījās ūdens ar kaļķakmens gabaliem.

2004. gada oktobrī SIA "Junels" uzstādīja ūdens apstrādes iekārtu "VULCAN 5000" Latvijas Bankas ēkā Jūrmalā, Poruka prospektā 12. Pēc apmēram 4 mēnešu lietošanas tika novērota karstā ūdens sistēmas intensīva attīrīšanās no kaļķakmens un rūsas nosēdumiem. Tā kā nosēdumu slānis bija liels, cauruļvadu tīrīšanās process ilga apmēram 24 mēnešus pēc iekārtas uzstādīšanas.

Turpinot lietot ūdens apstrādes iekārtas "VULCAN", ūdens maisītāju sietiņu un dušas sietiņu apkaļķošanās vairs nav novērojama.

Iekārtas veic savas funkcijas nepieļaujot kaļķakmens un rūsas nogulsnēšanos cauruļvados. Pieslēdzot iekārtas vecām ūdensapgādes sistēmām, ieteicams biežāk veikt cauruļvadu savienojumu apsekošana, jo attīrīšanas procesā novērojama pastiprināta neblīvo savienojumu sulošana.

Atsauksme par ūdens apstrādes iekārtām "VULCAN" uzrakstīta pēc SIA „Junels" līguma.

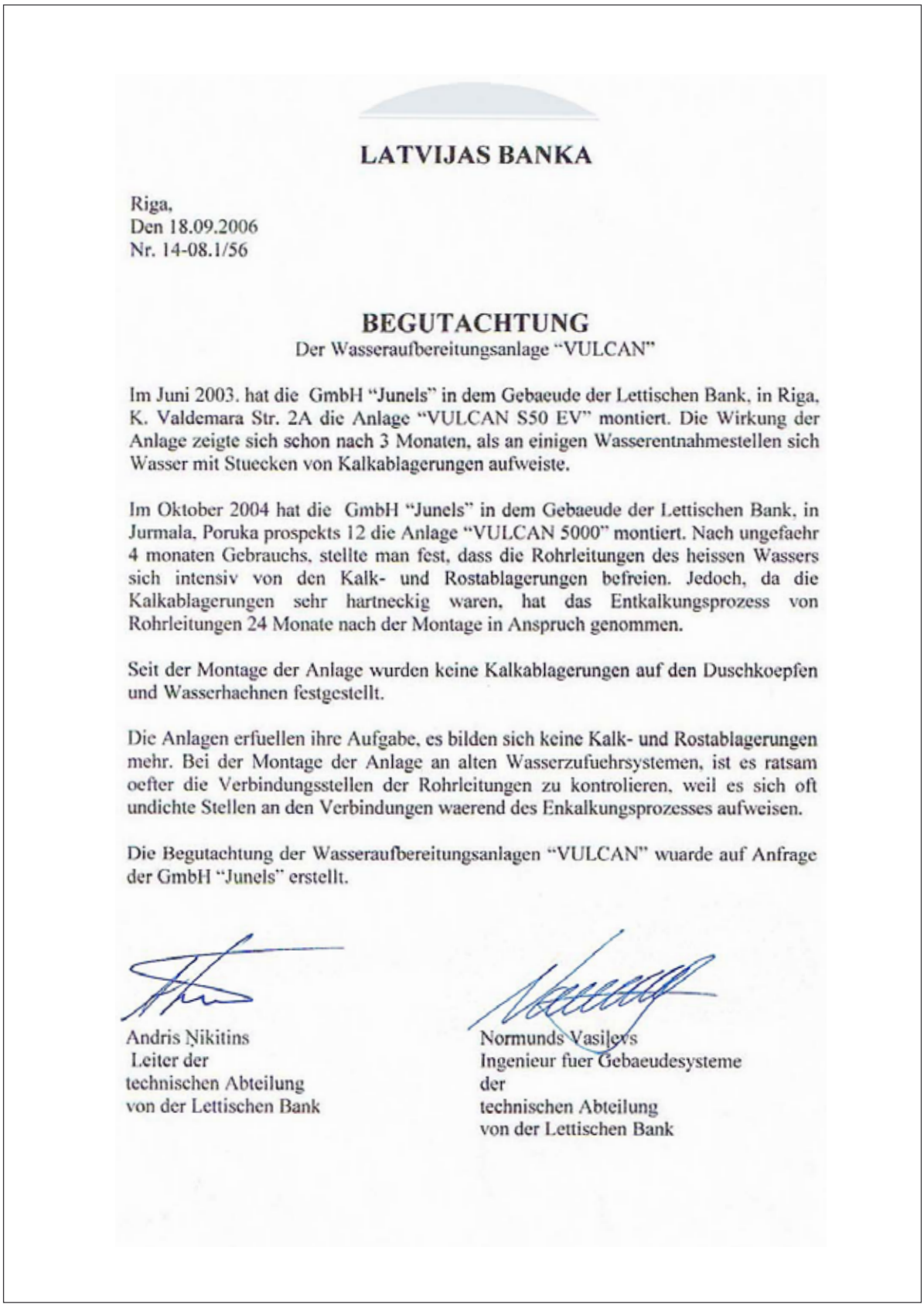
Andris Ņikitins
Latvijas Bankas
Tehniskās pārvaldes vadītājs

Normunds Vasiļjevs
Latvijas Bankas
Tehniskās pārvaldes
Ēku sistēmu daļas inženieris

LATVIJAS BANKA • K.VALDEMĀRA IELĀ 2A • RĪGA • LV-1050 • LATVIJĀ • TĀLRUNIS • 371 702 2300 • FAKSS • 371 702 2420 • WWW.BANK.LV • E-PASTS • INFO@BANK.LV

LATVIJAS BANKA (german translation)

Latvia



LATVIJAS BANKA

Riga,
Den 18.09.2006
Nr. 14-08.1/56

BEGUTACHTUNG

Der Wasseraufbereitungsanlage "VULCAN"

Im Juni 2003. hat die GmbH "Junels" in dem Gebaeude der Lettischen Bank, in Riga, K. Valdemara Str. 2A die Anlage "VULCAN S50 EV" montiert. Die Wirkung der Anlage zeigte sich schon nach 3 Monaten, als an einigen Wasserentnahmestellen sich Wasser mit Stuecken von Kalkablagerungen aufweiste.

Im Oktober 2004 hat die GmbH "Junels" in dem Gebaeude der Lettischen Bank, in Jurmala, Poruka prospekts 12 die Anlage "VULCAN 5000" montiert. Nach ungefaehr 4 monaten Gebrauchs, stellte man fest, dass die Rohrleitungen des heissen Wassers sich intensiv von den Kalk- und Rostablagerungen befreien. Jedoch, da die Kalkablagerungen sehr hartneckig waren, hat das Entkalkungsprozess von Rohrleitungen 24 Monate nach der Montage in Anspruch genommen.

Seit der Montage der Anlage wurden keine Kalkablagerungen auf den Duschkoepfen und Wasserhaehnen festgestellt.

Die Anlagen erfuellen ihre Aufgabe, es bilden sich keine Kalk- und Rostablagerungen mehr. Bei der Montage der Anlage an alten Wasserzufuehrsystemen, ist es ratsam oefter die Verbindungsstellen der Rohrleitungen zu kontrolieren, weil es sich oft undichte Stellen an den Verbindungen waerend des Enkalkungsprozesses aufweisen.

Die Begutachtung der Wasseraufbereitungsanlagen "VULCAN" wuarde auf Anfrage der GmbH "Junels" erstellt.

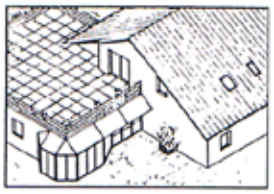
Andris Nikitins
Leiter der
technischen Abteilung
von der Lettischen Bank

Normunds Vasilevs
Ingenieur fuer Gebaeudesysteme
der
technischen Abteilung
von der Lettischen Bank

Hotel Cadolzburg

Germany

HOTEL-KURBAD
ZUM WASSERHAUS
CADOLZBURG



Firma
Christiani Wassertechnik GmbH
Heinrich-Heine-Str. 15

52249 Eschweiler

14. Juni 1994

Ihr Wasserbehandler "Vulcan 5000" - 4 Wochen Praxistest

Sehr geehrter Herr Christiani,

nachfolgend möchte ich Ihnen kurz unsere Erfahrungen mit Ihrem Wasserbehandlungssystem schildern.

Nachdem wir in Cadolzburg ca. 20° dH Gesamthärte im Wasser haben und als Kurbad überdurchschnittlich viel Wasser verbrauchen, hatten wir schon immer Probleme mit starken Verkalkungen aller Art.

Um dieses Ärgernis aus der Welt zu schaffen, hatten wir bereits zwei unterschiedliche Geräte anderer Hersteller, die nach ähnlichem Prinzip wie das Ihrige arbeiteten, ohne Erfolg getestet und wieder ausgebaut.

Umso skeptischer war ich, als ich Ihr einfaches System sah und zuschaute, wie dieses Ihr mittelfränkischer Mitarbeiter in nur wenigen Minuten ohne Werkzeug auf unser Eingangsrohr montierte. Doch nach wenigen Tagen stellte sich bereits eine deutliche Änderung des Kalkausfalls ein. Wo vorher feste Kalkflecken nur mit Putzmitteln zu entfernen waren, liegt jetzt eine mehlige, leicht zu entfernende "Kreideschicht". Auch die Wasserperlatoren und Duschköpfe zeigen keinerlei Tendenz mehr zu verkalken.

Selbstverständlich werden wir den Vulcan 5000 übernehmen, beigefügt erhalten Sie einen entsprechenden Verrechnungsscheck. Für Ihre weitere "Überzeugungsarbeit" bei Neukunden wünsche ich Ihnen und Ihrer Firma weiterhin viel Erfolg, und verbleibe

mit freundlichen Grüßen

Mitglied im
Verband Physikalische Therapie,
staatl. gepr. Masseure und med.
Bademeister

BAYERISCHER
HOTEL-UND GASTSTÄTTEN
VERBAND E.V.

Bankverbindung: Raiffeisenbank Zirndorf · BLZ 760 696 69 · Konto-Nr. 305 553
8501 Cadolzburg · Zum Wasserhaus 2 · Inhaber: S. R. Heidig · Telefon 09103/2575

Handwerkskammer Braunschweig

Germany

HANDWERKSKAMMER BRAUNSCHWEIG

BILDUNGSZENTRUM FÜR DAS STEINMETZ- UND BILDHAUERHANDWERK KÖNIGSLUTTER AM ELM

Bildungszentrum für das Steinmetz- und Bildhauerhandwerk · 38154 Königslutter

CHRISTIANI Wassertechnik GmbH
Heinrich-Heine-Str. 15

52249 Eschweiler

BILDUNGSZENTRUM KÖNIGSLUTTER

RESTAURATORAUSBILDUNG
MEISTERVORBEREITUNG
SEMINARE
EDV-SCHULUNG
ÜBERBETRIEBLICHE
LEHRLINGSAUSBILDUNG

Ihre Zeichen	Ihre Nachricht vom	Unser Zeichen	Datum
		Fl/Nes	3. Dezember 1999

Rechnung Nr. BS 99 C 003

Sehr geehrte Damen und Herren,

irrtümlich haben Sie Ihren Vulcan S 100 per Rechnung an unseren Hausmeister Klaus Müller geschickt.
Das Gerät ist im Bildungszentrum eingebaut und wir sind zufrieden.
Bitte schicken Sie die neue Rechnung an obige Adresse.
Können Sie uns ein Zahlungsziel bis zum 15.01.2000 einräumen?

Mit freundlichen Grüßen

HANDWERKSKAMMER BRAUNSCHWEIG
Bildungszentrum für das Steinmetz-
und Bildhauerhandwerk Königslutter
i. A.

Dipl.-Volksw. R. Flassig
Leiter des Bildungszentrums

LERNEN BILDEN WEITERBILDEN

Postanschrift:
Dr.-Heinrich-Gremmels-Straße 15
38154 Königslutter

Bankverbindung:
Postgiroamt Hannover
Nr. 1 6627-305
BLZ 250 100 30

Kommunikation:
Telefon: 0 53 53 / 95 15 - 0
Telefax: 0 53 53 / 95 15 20
E-Mail: Naturstein-BZ@t-online.de
Internet-Adresse:
http://home.t-online.de/home/Naturstein-BZ/Stein.htm

Siemens

Germany

SIEMENS

Firma
Christiani Wassertechnik GmbH
Diepenbenden 25

5100 Aachen

Wasseraufbereitungsanlage

Sehr geehrte Herren,

auf Ihren Wunsch hin bestätigen wir Ihnen gerne, daß wir eine Wasseraufbereitungsanlage in unserer Leiterplattenfertigung eingesetzt haben.

Um die Leistungsfähigkeit der Anlage zu testen, haben wir dieses Gerät vor eine Warmspüle (50 °C) vorgeschaltet.
Bei dieser Spüle mußten wir aufgrund unserer Wasserhärte täglich die Düsenstöcke, wöchentlich die gesamte Anlage entkalken.
Seit Inbetriebnahme Ihres Wasseraufbereitungsgerätes vor ca. 5 Wochen hat sich die verbleibende Kalkablagerung so stark reduziert, daß seitdem keine Entkalkung notwendig wurde.

Wir haben darüber hinaus festgestellt, daß alte Kalkschichten allmählich abgebaut werden.

Mit freundlichem Gruß

Postanschrift:
Siemens AG, Bereich Kommunikations- und Datentechnik
Werk für Systeme

Lp/Fe Verf/masch. Anlagen

Bearbeiter: Hr. Neumann

Fernwahl 0821

Fax

Vermittlung -

Postfach 11 18 09, D-8900 Augsburg 11

Siemens Aktiengesellschaft Bereich Kommunikations- und Datentechnik
Werk für Systeme - Werkleitung: Hartwig Rogge

Vorsitzender des Aufsichtsrats: Bernhard Plettner · Vorstand: Eckheinz Kasig, Vorsitzender · Mitglieder: Hans Baur, Gerhard Wonneberger, Hermann Franz, Hermann R. Franz, Ernst Gerhardt, Max Günther, Heinz Gumin, Erwin Hardt, Günther Kadegge, Claus Kessler, Eberhard Kill, Gerhard Kühne, Friedrich Kuhrt, Heribald Närger, Hans-Gerd Neglein, Werner Purschwitzer, Konrad Sandberger, Horst H. Schlitzberger, Carl Heinz Thomas, Hans Dürrer/Vogelsang · Sitz der Gesellschaft: Berlin und München, Handelsregister: Berlin-Charlottenburg, HRB 12300, München, HRB 6684

BOSCH und Siemens Hausgeräte GmbH

Germany

B/S/H/

BSH BOSCH UND SIEMENS HAUSGERÄTE GMBH

BSH Bosch und Siemens Hausgeräte GmbH, Postfach , 13623 Berlin

Fa. Christiani Wassertechnik GmbH
Herr Zahn
Heinrich-Heine Str. 15

52249 Eschweiler

Ihre Zeichen/Nachricht vom:
Unsere Abteilung/Kurzzeichen: TDI/schm-sw

Telefon: 030 386 20851
Telefax: 030 386 26394

E-Mail:
Berlin, 20.02.2001

Sehr geehrter Herr Zahn,

seit dem 17.05.2000 haben wir Ihren Vulcan Wasserbehandler S100 bei uns eingebaut und sind damit voll zufrieden.
Er behandelt das Nachspeisewasser, das aus 50% Stadtwasser, 30% enthärtetem Wasser und 20% VE-Wasser besteht, direkt am Hauptrohr DN 100 hinter der Speicheranlage.
Dieses Wasser speist die Verlustmenge von 8 Kühlturmanlagen nach.
Nach dem Einbau haben wir an allen Anlagen keine Probleme mehr mit dem Verkalken der sehr empfindlichen Leitwertsonden, die sonst regelmäßig alle 4 Wochen gesäubert werden mussten.
Diese Wartungsarbeit entfällt seitdem völlig.

Sollten wir in der Zukunft weiteren Bedarf an Wasserbehandlern haben, so werden wir selbstverständlich wieder Ihr Produkt einsetzen.

Mit freundlichen Grüßen

BSH Bosch und Siemens Hausgeräte GmbH
Produktbereich Wäschepflege
Technische Dienste Instandhaltung

H. Schmidt

Postanschrift: BSH Bosch und Siemens Hausgeräte GmbH, Postfach, 13623 Berlin
Besucher: Carl-Wery-Straße 34, 81739 München
Vermittlung: (0 89) 4 59-0, Fax (Zentrale): (0 89) 4 59-23 56
Vorsitzender des Aufsichtsrats: Jürgen Radomski
Geschäftsführung: Dr. Kurt-Ludwig Gutberlet (Vors.), Dr. Wolfgang Colberg, Dr. Wolfgang Dowe, Hans-Peter Hasse, Dr. Robert Kugler
Sitz: München; Registergericht: Amtsgericht München, HRB 75534

H. Zahn

AIGUES DE VALLIRANA

Spain

"AIGÜES DE VALLIRANA"
Conco de Tremp, 14
Urb. El Mirador
08759 Villirana (Barcelona)
Tel. + 436830756 – Fax. + 43 683 22 70

CALTRONAQUA
Pasaje Bon Retir, local 5
08759 – Vallirana
Prov. de Barcelona
Spanien

Sehr geehrte Damen und Herren, 22 Juli 2002

das hier vorliegende Gerät VULCAN 5000 überzeugt in seiner exzellenten Funktionsweise und weist eine große Nützlichkeit als Antikalksystem auf.
Wie sie wissen, haben wir vor ungefähr einem Jahr ein solches Gerät gekauft und in einem Wasser-Schwerkraft Leitungsrohr von 63 mm Durchmesser und ungefähr 500 m Länge von Quelle bis Reservoir und einem Höhenunterschied von 10 m installiert. Früher musste das Rohr oft von Kalkablagerungen gereinigt werden, jetzt ist das nicht mehr nötig.
Wir vertrauen auf eine nachhaltige Effizienz des Gerätes VULCAN 5000 und freuen uns über das Einsparen von Instandhaltungskosten.

Mit den besten Grüßen

Fdo. José Coma y Matute.
Bevollmächtigter Direktor

3G Gastrolux - Günther Göckes Gastrolux Bratpfannen

Germany

3G Gastrolux
Günther Göckes Gastrolux Bratpfannen

Inhaberin: Irmhild Göcke

Neuheitenvertrieb für täglichen
Bedarf im Gewerbehandel
Messeneuheiten

Mitglied im
Europaverband der Selbständigen CEDI
Deutschen Gewerbeverband
Bayerischen Landesverband der
Marktkaufleute und der Schausteller e.V.

3G Gastrolux R.G.Göcke Pfarrer Strasser Weg 6 85301 Schweitenkirchen

Christiani Wassertechnik
z.H. Frau Reichertz

Köpenicker Str. 154
10997 Berlin

Schweitenkirchen , den 1. Februar 2009

Vulcan 5000 EV, Ihr Schreiben vom 22.01.09

Sehr geehrte Frau Reichertz,
vielen Dank für die schnelle Bearbeitung und Austausch vom Vulcan 5000.
Ich habe mit dem neuen Gerät wieder vollen Erfolg.
Anbei das alte Gerät zur Überprüfung.
Erwähnen möchte ich noch, dass das Gerät nie angefasst wurde, bis auf die Abmontage.
Ein Defekt ist bei Glasdurchsicht zu erkennen.
Ob das alte Gerät bei Ihnen bleibt oder eine Reparatur gemacht wird, entscheiden Sie nach Prüfung.

Sollte das neue Gerät bei mir bleiben und ich höre nichts mehr von Ihnen,
verbleibe ich heute als treuer Kunde, (der immer gerne Reklame für Ihre Fa. macht,

mit freundlichen Grüßen

Heinz Göcke

Büro + Lager:	Privat:	Internet:	Banken:
Pfarrer-Strasser-Weg 6 85301 Schweitenkirchen Tel: 08444 / 809 od. 448 Fax: 08444 / 1388 Mobil 0171/ 6244351	Sentilostr. 44 81477 München Tel: 089 / 74 21 99 80 Fax: 089 / 74 21 99 84 Mobil: 0175 / 29 29 603	www.3G.Bratpfannen.de E-Mail info@3G-Bratpfannen.de	Vereinigte Sparkassen Pfaffenhofen BLZ 721516 50 Konto 77 65 Postbank München BLZ 700 100 80 Konto 55833-800

Laboratoy Interprofessional (Milk Factory)

Spain

Laboratori Interprofessional
Lleter de Catalunya
ALLIC
Associació Interprofessional Lletera de Catalunya

Following an enquiry by the company CALTRON AQUA, retailers of the VULCAN 5000 device, an analysis raw milk samples from a dairy in Cardedeu (Provinz Barcelona) was carried out.

The samples were taken from the openings of the pipes which transport the milk in two different areas, before and after the installation of the VULCAN 5000 device.

According to the bulletins published in the report, the samples taken* from after the installation of the device are marked under the reference „abans'' and corresponding code:

892/04
894/04
896/04
898/04.

The samples taken* from before the installation of the device are marked according to the report under the reference „després":

893/04
895/04
897/04
899/04.

After the comparison and analysis of the results no significant changes in the milk quality could be identified. The limescale content as well as other physical and chemical states all remained the same.

Anna Jubert i Rosich
Dirección Técnica ALLIC

ASSOCIACIÓ LLETERA INTERPROFESSIONAL DE CATALUNYA
ALLIC

Cabrils, 5 Mai 2004

(*) The taken samples were analysed in the Interprofesional Lechero de Cataluña laboratory and in accordance with the proprieter of the VICENÇ MANENT S.C.P. dairy in Cardedeu (Provinz Barcelona).

Ctra. Vilassar a Cabrils, s/n 08348 Cabrils (Adreça postal: Apartat 12 08340 Vilassar de Mar)
Telefon: +43 93750 88 56 Fax: + 43 93 750 89 53 CIF: G-60100310

Eberswalder Wurst GmbH (Sausage Production)

Germany

EWG Eberswalder Wurst GmbH

Eberswalder... Richtig gut die Wurst

EWG Eberswalder Wurst GmbH · Joachimsthaler Str. 100 · 16230 Britz

Christiani Wassertechnik GmbH
Heinrich-Heine-Str. 15

52249 Eschweiler

Ihr Zeichen:
Ihre Nachricht vom:
Unser Zeichen: HS/GR
Tel. Durchwahl: 03334 / 273448
Telefax: 03334 / 273593
e-mail: technik@eberswalder.de
Datum: 11.12.06

Dear Sir,

We have been using your patented Vulcan-Impulse-Technology for over a year with great success.

Despite the use of chemicals during the pasteurisation of vacuum-packed sausages such as hard water stabilising agents and corrosion inhibitors, heavy scale deposits accumulated in the pipes and the holding tanks which could only be cleared through intensive chemical purification several times throughout the year.

Six months following an intensive purification and the application of your „Vulcan" technology and without the use of chemicals, only very few deposits in the warming zone and none at all in the cooling zone could be found.

These deposits need now only to be cleared once a year at a considerably lower cost.

We wish you further success with your technology against scale and rust.

Yours Sincerely,

Helmut Schwendler
Director of Engineering

EWG Eberswalder Wurst GmbH
Sitz der Gesellschaft: Britz
Amtsgericht Frankfurt (Oder) HRB 8093FF
Ust. Id. Nr.: DE 219617354 · St. Nr.: 065/108/00887
Geschäftsführer: Dr. Eckhard Krone, Patricia Benz

Bankverbindung:
HSH Nordbank AG Hamburg/Kiel
BLZ: 210 500 00
Konto Nr.: 0063062181

Anschrift:
Joachimsthaler Str. 100
16230 Britz
Telefon: 03334 273 -0

Fritz Häcker - Gelatine Production

Germany

Fritz Häcker GmbH + Co. KG · Postfach 1265 · D-71655 Vaihingen/Enz

To
Christiani Wassertechnik GmbH (CWT)
Attn. Mr. Cedirc Christiani
Köpenicker Strasse 154

10997 Berlin

FRITZ HÄCKER
... for a top Tack
PLAKAL
GELTACK
GELBOND
MATCHTACK

30th July, 2009
-- / bo

Water Treatment System VULCAN

Dear Mr. Christiani,

We are a company in the adhesives industry originating from the gelatine production. Traditionally a high amount of water is required for the extraction process related to the production of gelatine. For this we have our own deep wells from which the required water is drawn. Due to the geology of the Enztales the water is relatively hard which inevitably results in thick layers of adherent limestone in the tanks some of which only were removable by chemically substances. The water heater as well calcified relatively quickly.

To remedy this, we have already taken one of your Vulcan systems into operation in the central hot water supply in 2003. We were stunned by its results, especially as the opinion about this kind of water treatment systems is very much divided.

The physical treatment of the water by VULCAN caused a significant reduction of adherent limestone in the tanks and piping surfaces. Decalcification actions had to be executed in considerably larger intervalls.

We are convinced of the viability of these systems and can only find words of praise for the service given should a defect occur. On this basis, we will certainly continue to work together.

Best regards

Fritz Häcker GmbH+Co.KG
General Management
Klaus Bohne

Kommanditgesellschaft Sitz Vaihingen/Enz, Registergericht: AG Vaihingen/Enz HRA 24
Komplementärin: Häcker Verwaltungsgesellschaft mbH Sitz: Vaihingen/Enz
Registergericht: AG Vaihingen/Enz HRB 89
Geschäftsführer: Gerd R. Clemens

Volksbank Ludwigsburg eG
BIC: GENODES1LBG
Kto.: 432 009 000, BLZ 604 901 50
IBAN: DE 31 6049 0150 0432 0090 00

Kreissparkasse Ludwigsburg
BIC: SOLADES1LBG
Kto.: 8 800 350, BLZ 604 500 50
IBAN: DE 12 6045 0050 0008 800350

Commerzbank AG Stuttgart
Kto.: 5448137, BLZ 600 400 71
IBAN: DE 23 6004 0071 0544 9137 00
SWIFT: COBADEFF600

Steuer Nr.: 55092/10451, Ust-Id. Nr.: DE 145082179

Im Holzgarten 18
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Tel. +49 (0)70 42 / 94 62-0
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E-mail: info@haecker-gel.de
Internet: www.haecker-gel.de

Garden Shop (Agriculture)

Greece

Dimitrios Vasileiadis
Garden shop
Papas-Vasileiadis-Loizidou OE.
Aerodromiou Sedes str & Aerodromiou Makedonia str.
570 01Thermi-Thessaloniki
Greece

Christiani Wassertechnik GmbH
Köpenicker Str. 154
10997 Berlin
Germany

24. November 2008

Dear CWT,

I am a professional cultivator of decorative plants and trees for more than 30 years. I have always hard water quality problems. This water, I irrigate with it, comes from a bore. This water is brackish, which means of course, it is very bad for the plants. Actually, I have been burning my plants all these years because of too much salt.

I also have to emphasize on the fact that all these years the leaves of the plants had a white colour and not the well known green colour. That is of course because of too much salt of the water.

Installing the Vulcan S 25 device, I found out that there are not any more white sedimentation on the leaves and soil Most of all I realize that there is a big improvement in the growth of my plants. I also found out that there is a better and quicker foam creation. Wherever we want to wash our hands or even clothes etc.

Finally, I must say that I really found the solution to my problem, which has been bothering me for all these years, using the Vulcan device.

I really have to thank you from the bottom of my heart.

Δημήτριος Βασιλειάδης

Hotel Q!

Germany

Q! Knesebeckstr. 67 D-10623 Berlin

CHRISTIANI Wassertechnik GmbH
Heinrich-Heine-Str. 15
D-52249 Eschweiler

Re: Letter of recommendation from Hotel Q! May, 10th 2005

Dear Mr Christiani,

It is a pleasure for us to inform you that we have been very satisfied with the Vulkan-S-50 lime-scale conversion-unit with which you have supplied us.

As we are engaged in the hotel business and committed to cleanness, doing our best endeavours to combat lime-scale is all the more important to us. In respect with the daily cleaning of the guest rooms as well as the hotel facilities in general it is of paramount importance to maintain everything clean, and the unit you have provided us with helps us a lot to attain this goal.

The "Vulkan S 50"-unit makes the daily cleaning of our hotel facilities easier and also allows us to save a lot on cleansing agents for it is no longer necessary to use as much of them as we used to before.

I would like to single out for praise the fact that the chalk converted by this device no longer settles on fittings and panes of glass as it usually did before, which enables us to maintain showers and fittings free of lime-scale without any trouble.

Therefore, our hotel will gladly recommend this unit to other clients. We would also like to thank you for granting us a trial period to test your device.

Yours sincerely

Gordon Deckelmann
Technical Director / Maintenance

Q!
Knesebeckstr. 67
D-10623 Berlin
tel. +49 (30) 81 00 06 - 0
fax +49 (30) 81 00 06 - 666
www.lock-hotels.com
q-berlin@lock-hotels.com

Hackescher Markt
Betriebsgesellschaft mbH
Amtsgericht Charlottenburg
HRB 66166

Hotel Mercure

Germany

Mercure
MÜNCHEN SCHWABING

Leopoldstr. 120 • 80802 MUENCHEN • GERMANY

Christiani Wassertechnik GmbH
Heinrich-Heine-Straße 15
52249 Eschweiler

Re: physical water treatment unit Vulcan S 100

Munich, November, 9th 1995

Dear Mr. Christiani,

We are pleased to inform you that the water treatment unit has been working perfectly and to our full satisfaction ever since its installation in july 1995.

Only a short time after that we observed that we no longer needed acetic or asorbic acid in order to clean the perlators and shower heads in out hotel, which has more than 65 guests rooms, since the chalk that builds up now is no more than a layer which is easy to wipe off. Due to the fact that the efforts employed at maintaining the sanitary facilities can be kept to a minimum, and resulting from the smaller electricity consumption, we are able to economise. Simultaneously, we also make an active contribution to environmental protection by renouncing on aggressive cleansing agents.

We are glad to own a water treatment unit that is compatible with the environment and which renders the optimum outpup at low running costs (approx. 10 € on electricity costs/ year). Moreover, this unit has finally provided us the solution to a problem we had been confronted with day by day and which was difficult to put up with.

Given our satisfaction it will allways be a pleasure for us to recommend your company and your produc to other clients.

Sincerely yours

Horst Schneider
Director

nivon Camping

Germany

CWT-Christiani Wassertechnik GmbH
Herr Rolf Christiani
Köpenicker Str. 154
10997 Berlin

Budel-Schoot, 16th August 2007

Dear Mr. Christiani,

I learned about your product Vulcan S100 anti-scale unit at the camping trade fair „Caravan Salon“ in August 2006 in Düsseldorf.

We installed the Vulcan S100 in our Campground “Naturfreunde” with 70 camping sites and the club house that sleeps another 80 people due to many problems we were facing with scale deposits. These deposits were in the showers and the dishwashers. After 6 months in use, the scale in the diswasher is to the minimum.

Once a year a specialized cleaning company cleans everything. Now, after half a year of extensive use of the showers, there are no new scale deposits to be seen.

This means a great saving in worktime and expenses, especially as there is a small number of people administrating the campground.

I would also like to thank you for the very nice consulting and your kind offer to try and use the Vulcan S100.

Kind regards,

Bert van Dokkum
Chairman of the Club Naturfreunde

General Cement Organization

Syria

Sworn Translator
Mohammad Ameen Hamad
M.A. English Literature
Arabic - English
Hama-Abdulbaki Bldg. Tel. 224848

الترجمان المحلف
محمد امين حمد
ماجيستير في الآداب الانكليزية
عربي – انكليزي
بناية عبد الباقي – هاتف ٢٢٤٨٤٨

Syrian Arab Republic
Ministry of Industry
General Cement Organization
Adra Cement & Construction
Materials Company

No. 1183/GH
Date : 21/6/2009

To Pure life Co.

Represented by the general manager Loay Kannan .

We indicate herein below the experiment of Adra Cement & Construction materials Company about the result of ***Vulcan*** instrument which is installed on a certain compressor circuit intended for generating compressed air:

1- Process of removal of calcification in the chiller where the instrument was installed took place after six months of installation.
2- Better thermal exchange safety through operation.
3- Doing without unfitting and fitting processes of thermal alternators.
4- Guarantees a longer life of the thermal alternator and the pipes of cooling circuit where it increases the life age of the thermal alternators due to non-accumulation of lime on it.

Thank you for your cooperation

General Manager

Chemist Ahmad Fouad Ataya

Seal & signature

Translated by me from the annexed Arabic document July 15.2009 .

Sworn translator of Hama city and its district : M.A.Hamad .

نصادق على ان الخاتم والتوقيع المحرر بي
هما خاتم وتوقيع الترجمان المحلف محمد امين حمد
دون أية مسؤولية في مايتعلق بمحتويات هذه الوثيقة
حماة في / /

Gegenbauer Healt Care Services GmbH

Germany

Gegenbauer

Facility Management seit 1925.

Gegenbauer Health Care Services GmbH • c/o St. Joseph Krankenhaus • Bäumerplan 24 • 12101 Berlin

Gegenbauer
Health Care Services
GmbH

c/o St. Joseph Krankenhaus
Bäumerplan 24
12101 Berlin

Firma
Christiani Wassertechnik GmbH
Charlottenstraße 18

10117 Berlin

14. April 2008

Ihr Ansprechpartner
John Behrens
Gegenbauer Health Care Services GmbH
im St. Joseph Krankenhaus
Bäumerplan 24
12101 Berlin

Vulcan S 250

Dear Mr. Christiani,

we are as a facility management company responsible fort he maintenance and repairs inside the St. Josep Hospital in Berlin. Due to the hard water in Berlin we used to have very bad problems with scale incrustations on the sanitary equipment. The maintenance and cleaning of the 2.500 shower equipment and bathrooms alone was at very high costs.

Since a couple of month we have the Vulcan S 250 installed inside the hospital. We can identify a considerate benefit of the unit installed. We can barely see any scale deposits on the shower heads for example any more now. This saves manpower and costs of the exchange of sanitary equipment.

We can honestly recommend the unit installed by CWT GmbH.

Mit freundlichen Grüßen

John Behrens
(Servicemanager)

Dynamit Nobel

Syria

Dynamit Nobel

AKTIENGESELLSCHAFT

WERK LÜLSDORF

DYNAMIT NOBEL AG, Werk Lülsdorf, 5216 Niederkassel

Firma
Christiani Wassertechnik GmbH
Diepenbenden 25
5100 Aachen

Water treatment device

Dear CWT-team

Up to now we had five devices from your company in use.

Because of the high degree of hardness of our cooling 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

Hospital - Evangelisches Krankenhaus Gladbach

Germany

EVANGELISCHES KRANKENHAUS BERGISCH GLADBACH

GEMEINNUTZIGE GESELLSCHAFT MIT BESCHRÄNKTER HAFTUNG
- AKADEMISCHES LEHRKRANKENHAUS -

Christiani Wassertechnik GmbH
Diepenbenden 25
5100 Aachen

Sehr geehrte Damen und Herren!

Seit Ende Dezember 1983 ist in unserem Seniorenheim eine Wasseraufbereitungsanlage installiert. Die Anlage ist seit 6 Monaten in Betrieb und funktioniert zu unserer vollsten Zufriedenheit.

Bei Kontrolle der Perlatoren und Duschen - es befinden sich im Hause insgesamt 478 Wasserentnahmestellen (289 Wasserhähne, 97 WC's, 92 Duschen) - stellen wir fest, daß die sonst übliche Verkalkung und Verstopfung ausbleibt. Zum Hause gehört ein Hallenbad, wo auch medizinische Therapien durchgeführt werden. Auch hier sind wir mit der Wirkung der Caltronic-Wasseraufbereitung voll zufrieden.

Gerade in unserem Bereich ist eine Wasseraufbereitung ohne Chemikalien und ohne Salze besonders wichtig. Bei einem jährlichen Wasserbedarf von ca. 12.000 cbm würde jede chemische Wasseraufbereitung beträchtliche Kosten und Mühen verursachen. Die Betriebskosten der Caltronic-Wasseraufbereitung, die bisher störungs- und wartungsfrei arbeitet, betragen nur ca. 50,00 DM im Jahr.

Mit freundlichen Grüßen

(BR. Klein)
Geschäftsführer

(A. Diecz)
Hausmeister

Independent Studies & Scientific Papers

How can an electric device that uses only very little energy have such a profound influence on scale and rust? Does it work? ... and moreover *how* does it work?
These are typical questions.

In the following you will find a number of independent studies on the principles of the Vulcan-physical water treatment:

The Physiological Institute of the University of Munich has proven and evaluated the Vulcan effects and the University of California Davis chose a more practical approach in order to understand the functions of the technology. Dr. Hartmut Jühnke, German scientist and one of the leading experts on physical water treatment, has written an extensive study on the topic in "Physical Water Treatment: How it works". His paper provides an excellent insight into the topic. The outcome in a heat-exchanger setting, a typical area for problems with lime scale, was tested by the Steinbeis Institute Transfer Center Applied and Environmental Chemistry, who reported tangible results.
As the topic of environmentally-friendly technology transfer has become a subject of interest, the issue was featured by the US Ashrae in their report on "Pulse-Powered Chemical-Free Water Treatment". The last study listed in the booklet examines the effect in a typical industrial setting and explores the question of how physical water treatment helps prevent scale incrustations in cooling towers.

Independent Studies & Scientific Papers

Physiological Institute - University Munich

Germany

PHYSIOLOGICAL INSTITUTE
Medical Faculty
Ludwig-Maximilians-University Munich
Directors: Prof.Dr.G. ten Bruggencate, Prof.Dr.E.Gerlach, Prof.Dr.Dr.h.c.K.Thurau)

Dipl.-Phys. Franz Rucker

Physiological Institute Pettenkoferstr.12 80336 München

Pettenkoferstraße 12
80336 München

Christiani Wassertechnik GmbH
z.Hd. Herrn Kleefisch
Heinrich-Heine-Str.15
52249 Eschweiler

18th of December 1996

Test of the electronic water-treatment system VULCAN 5000 for the cooling system of the laser Innova 90-K of the company Coherent GmbH (user report)

Dear Mr. Christiani

Referring to our telephone call on the 18th of December 1996 I would like to send you a description of our trial of your electronic water-treatment device Vulcan 5000.

The system Vulcan 5000 was installed at the end of March 1996 in the coolant inflow of a crypton gasions laser Innova 90-K manufactured by the company Coherent GmbH, supplied with water from the system of mains, to reduce or even avoid lime deposits on the ceramic covering of the laser tube (see picture, enclosure). Over the past years we constantly had difficulties with laser tubes which were not in working order any more and consequently had to be replaced due to thick lime deposits on the ceramic of the tubes through which the coolant flows with approx. 9 l/min and a pressure of approx.2,5 bar and at the same time heats up to a temperature between 60°C and 70°C depending on the gas discharge electricity (tube electricity) between 30 A and 40 A.

The system Vulcan 5000 is an economic alternative to expensive heat exchangers, i.e. closed circulations of coolant with treated water. These heat exchangers cost about 5.000 €. The device Vulcan 5000 has been used on a trial basis since the end of March 1996 to treat the coolant of our gas laser. On the 12th of December 1996 the company Coherent GmbH checked the laser tubes for lime deposits on the ceramic surface. No lime deposits were detected, therefore it is all in all a positive result (see service report of the company Coherent GmbH, enclosure).

During the test period the laser was in operation approx. 200 hours with a laser tube electricity ranging from medium to maximum and with operation times between four and eight hours. These operation periods and the accomplishment required correspond to the normal use of the laser in our fluorescence microscopic experiments. Laser tubes previously used in a similar way, which worked without a treatment of the coolant, showed considerable lime deposits.

z. Hd. Herrn Kleefisch
Heinrich-Heine-Straße 15

University of California, Davis

USA

UNIVERSITY OF CALIFORNIA, DAVIS

BERKELEY • DAVIS • IRVINE • LOS ANGELES • RIVERSIDE • SAN DIEGO • SAN FRANCISCO SANTA BARBARA • SANTA CRUZ

STUDENT HOUSING

ONE SHIELDS AVENUE
DAVIS, CALIFORNIA 95616-8712

October 18, 2008

Jorge Rebagliati
Vulcan Scale Protector
P.O. Box 6662
Santa Rosa, CA 95406

Dear Jorge,

UCDAVIS Student Housing Facilities Services has been actively exploring alternative water treatment/softening systems to traditional sodium exchange brine discharge systems for the last five-plus years. We have been doing so because of environmental and sustainability issues, as well as cost and safety concerns related to traditional systems.

About 5 years ago we began experimenting with magnetic treatment systems. We evolved from there to electro-magnetic systems about two years later. In August of this year we installed the Vulcan system in a 465 bed residence hall complex constructed in 1964 that uses ground water tested at 7 grains per gallon/120 parts per million of hardness that we had never treated before. We now have traditional water treatment systems in some buildings and the three alternatives mentioned above in others.

Although I believe that traditional water softening systems are the most effective, they are also the least environmentally friendly, (they actually contribute to environmental degradation), and the most costly. I have found the three alternate systems to have positive effects and the Vulcan system to have the greatest positive effects of the three. The Vulcan system reduces scale build up, changes the nature of the scale that does remain to a powdery type of scale that it is much more easily removed than typical flaky scale that etches onto tube bundles, pipe and tank surfaces, faucets, aerators, etc., changes the "feel" of the water for the better, and results in soaps, shampoos, and detergents being needed in reduced quantities and lathering better.

I am a believer in the Vulcan system and strongly encourage facilities personnel with water treatment needs who are concerned about the environment, sustainability, costs, and safety to give Vulcan a try.

Respectfully,

Clyde W. Froehlich, Assistant Director – Facilities (530) 752-2495

„Physical water treatment – how it works" by Dr. Ing. Hartmut Jühnke

Germany

Physical water treatment - this is how it works!

Dr.-Ing. Hartmut Jünke

1. Introduction

The physical water treatment has been used and discussed for the last two decades. During this time, it has proven its effectiveness that on the other hand is still questioned and denied. Why is that? If we follow the discussions, we can find various reasons that however are not going to be discussed here. It rather seems necessary to examine the physical foundations that can explain the mode of action of these processes and so to free them from the reproach of fraud and to recognize the black sheep that led to this reproach. The following is a try to clear these questions.

Apart from my own positive experience that clearly demonstrates the effectiveness, at least of the device installed on my pipes (1), there is a number of information coming from renowned institutions such as e.g. the Physiological Institute of the Ludwig-Maximilian-University Munich confirming the same. In this institution, the replacement of laser tubes because of furring through the coolant that had been necessary before, could be avoided after the installation of a physical water treatment device. Hotels and instruction companies as well as a lot of conversations with private users confirm the action, although the non- functioning is also often lamented. As in most cases the private users do not know the producer of the device (a lot of times it was said that the product was a cheap one bought in a superstore), we can only draw the conclusion that there are some devices that do not meet the physical conditions to be effective. But we cannot draw the conclusion that the treatment principle itself is useless and does not work.
Unfortunately, this impression is also often given in serious publications, a lot of times without giving any scientific proof or any proof orientated towards the action and that does justice to it.

Before the action of the physical water treatment is explained in a plausibility proof, first we have to clarify why water pipes fur up. Therefore we see the lime as target of the physical water treatment.

2. The Lime

Chemically speaking, lime is calcium carbonate ($CaCO_3$). This compound is not soluble in water. Question: How can it be dissolved in the water then? Answer: When water that contains carbon dioxide passes chalky grounds, lime is released and is present in the water as calcium hydrogen carbonate $Ca(HCO_3)_2$. This is possible as carbon dioxide CO_2 together with water H_2O forms carbon acid H_2CO_3. As everybody knows from the everyday household life, acidic cleaning agents are needed to remove lime deposits. It seems like splitting hairs to underline the difference between dissolved and undissolved lime, but this is exactly where the lack of argumentation in favour of the action of these devices lies.

Thereupon the following question is raised: why does lime separate anyway? The dissolved amount of calcium hydrogen carbonate in the drinking water never reaches the saturation limit that if exceeded leads to the separation of the dissolved substance as a crystal.

If we look at the points in the pipes where lime deposits, the answer is already given. Primary spots for lime deposits are pipe bends, branches and the ending points (faucets) and especially the warm water areas. In the last mentioned case we have to differentiate: warm water containers are generally speaking free from deposits; heating bars, heater spirals or heat exchangers, surfaces that transmit the heat to the water, are always affected.

Why these spots? The answer is pretty easy: there has to be an energy gradient that leads to the opening of the water cages (see below) around the dissolved ions so that they can react with each other. At the same time the so called lime -carbonic acid-balance has to be disturbed, this means that it has to come to a local lack of CO_2. Then the elements look for a crystallization point (nucleus) where to start the crystallization. These spots are always located on the walls of the pipes, these represent the solid base on which the crystals can grow. More and more elements deposit, the lime deposits grow and incrustations, also known as scale, develop. They consist of calcium carbonate mixed with magnesium compounds, gypsum, silicates and iron compounds (therefore the yellowbrownish colour). These sedimentations favour corrosion and worsen the heat transmission of heating bars and heat exchangers.

How is it possible that there are local energy differences in the water? In the case of heating bars it is easy, heat is transmitted to the water. In pipe bends the water is accelerated, the energy for

Physical water treatment - this is how it works!

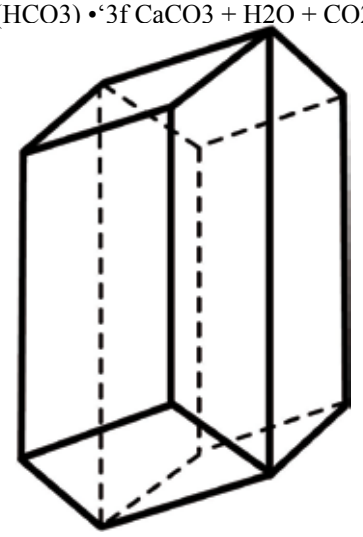
Dr.-Ing. Hartmut Jünke

this process comes from the inner energy of the water, pressure and temperature changes are the consequences. The same goes for branches and ending points. Here, turbulences are caused, also with the inner energy of the water and with the same consequences.

If we take a look at pipes that have been used over years, we can see that incrustations always start in pipe bends or branches and from there grow into the straight areas. When a pipe clogs up, the affected areas are normally these areas, while the predominant part of the pipe system is still completely in working order and able to let the water flow through.

What happens chemically during the crystallization? The following formula (1) explains it:

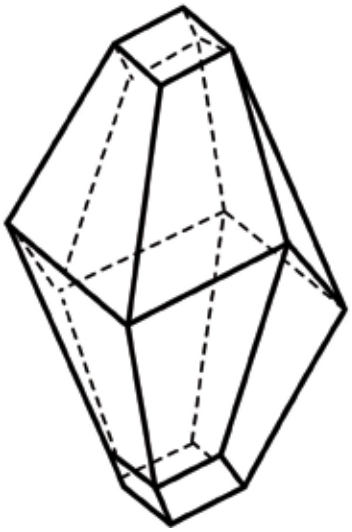
$$Ca(HCO3) \bullet `3f CaCO3 + H2O + CO2$$



Picture 1: Unit cell of an aragonite
(Rhombic system)

In the first place it is remarkable that the described reactions towards a lime formation can also take place the other way round, i.e. the lime can also dissolve again (see above). Which of the two reactions takes place depends on the lime- carbonic acid- balance. If there is a surplus of CO2, lime is dissolved, if not, lime is secreted. These processes are also dependent on pressure and temperature changes, therefore on physical parameters.

At this point, it is appropriate to say something about the lime crystal. It is known that almost all substances defined as solid are crystalline.
Crystals are divided in 7 crystal systems and 32 crystal classes, which differ from each other through their lattice structure.



Picture 2: Unit cell of a calcite
(Trigonal system)

Lime can crystallize in two different structures which are chemically completely identical. The lattice structures are different but related. Afterwards, the lattice type Aragonite (picture 1) or Calcite (picture 2) is formed. When the chemical structure is the same, it depends on thermodynamic circumstances (pressure, temperature) which modification is produced. As the pictures show, in both unit cells, one axis is longer than the others. This means that a crystal grows faster in this direction than in the others. The grow velocity is anisotropic, i.e. dependent on the direction.

That means that crystals that grow undisturbed develop a needle-shaped form. If the grow velocity was the same in all axis directions, globular crystals would develop. In the lattice type Calcite, there is also a crystallization of magnesium carbonate MgCO3 and FeCO3, and that is why these substances are also incorporated in the scale formation. On the other side, Anhydrite (dried gypsum or

Physical water treatment - this is how it works!

Dr.-Ing. Hartmut Jünke

gypsum [CaSo4 2H2O]) corresponds to the lattice type Calcite. In similar lattice types phosphates and sulphates such as silicates of calcium and magnesium also crystallize. This favours their incorporation in the deposits. Also for them present crystallization nuclei serve as a starting point for a segregation in the water and not for a deposit on the walls of the pipes or on heating bars, especially in warm water – in which these water companions often dissolve first.

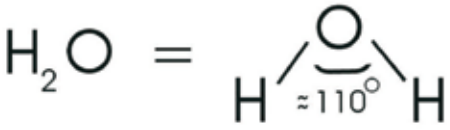
So what do devices do when they show the promised effects?

1. They do not convert lime. Into what should they? The devices cause that Calcium hydrogen carbonate Ca(HCO3)2 turns out as Calcium carbonate CaCO3, which is electrically and chemically neutral in water. And this is a solid with the special concomitant that the crystal does not crystallize on an already existing solid but is formed in the flowing water. Such a crystal forms according to laws of nature with typical parameters valid for every substance and it takes on a form according to the law of nature.

2. The result is that these crystals do not have special characteristics but special forms that do not attach to each other any more and therefore prevent calcification. At this point the described mechanism is effective.

3. Water

To understand the following processes, now some information about water are given. It is way more than what the formula H2O says. The two hydrogen atoms and the oxygen atom form a equilateral triangular and incircle a ~110° angle, as shown in picture 3.



Picture 3:
Angle structure of a water molecule

This is the reason for a lot of characteristics that distinguish water from other, similar molecules. Two gases that react with each other form a liquid and not a gas, as it is e.g. with carbon dioxide CO2 (solid substance and gas!), a molecule a lot heavier. Because of this angle position water molecules form chains and clusters that cause the fluid state.

This is possibly the reason why water may have a "memory" in which it adopts structures in the chains and clusters that do not change even when the water moves. These chains and clusters are held together by Van de Waals powers or dispersion powers or hydrogen bridges. The bond is based on the attraction of electric dipoles present in molecules with polarized bonds or angled structure.

At the University of Stuttgart, scientific researches are conducted concerning this problem and first results show that the behaviour of water is influenced by electric and magnetic fields. Such phenomenon have been known for a long time but have never been investigated scientifically.

This molecule form leads to a further special characteristic. Water shows a dipole character. Through the bond, both elements strive for an inert gas configuration in their outer electrons shells. In the case of hydrogen there are two electrons, in the case of oxygen eight. Oxygen is missing two and each hydrogen one electron. In the molecule the total of two bonding electrons is available for all three atoms, so that an inert gas configuration can be reached by all molecules.
In all homeopolar bonds of diverse atoms, the bond is polarized, i.e. the bonding electrons pair is moved towards the direction of the bonding partner with the higher electron affinity, in this case the oxygen atom. If the water molecule is put in an electric field, it lines up so that the oxygen shows towards the positive electric side and the hydrogen molecules towards the negative electric side. So the water molecule is charged a little bit more negatively on the side of the oxygen and a little bit more positively on the side of the hydrogen.

This fact, together with the molecule form, plays an important role for the dissolving ability of water and for the physical water treatment. At this point further anomalies are only briefly mentioned: when water passes to a solid state (ice) its density decreases. If the ice is put under pressure, it liquefies again. Normally, liquids under pressure pass to a solid, crystalline state. These few indication already show that there is probably a lot more about water than today's modern research has discovered so far and

Physical water treatment - this is how it works!

Dr.-Ing. Hartmut Jünke

that it surely contains up to now incomprehensible effects of the so called Plocher and Grander water. We should not rashly blame the water if we do not know anything about it.

4. Physics and chemistry

What happens physically and chemically when a physical water treatment device is used? As there are a lot of different application principles, from magnets introduced in the water pipes to the injection of seed crystals in the water, around which lime particles attach, in the following only one principle often offered and often controversially discussed is going to be examined.

The processes are described on the basis of a device with an appearance often found and which effects are questioned. The test explained here is based on the functioning and mode of action of this device. It is a blackbox from which two cables exit and are wound around the pipe. These cables transmit oscillations to the water that are supposed to "convert" the dissolved lime and render it harmless.

This formulation has been chosen intentionally because it essentially corresponds to the description of the function of offered devices and therefore already puts in doubt the repute and seriousness. What kind of oscillations are transmitted? Some descriptions do not even talk about calcium being converted, the producers seem to come from the times of the alchemist. Some say that the pipe material does not matter and that the device can even remove already existing lime incrustations. How can oscillations achieve all this? Seriously, who thinks to understand just a little bit of physics and chemistry already finds enough apparently scientific arguments to question the functioning.

What does a device do that really prevents lime deposits in pipes? At this point the first question has to be what it has to do to fulfil this demand? The answer is easy: It has to create the conditions under which the calcium hydrogen carbonate Ca(HCO3)2 is washed away with the water as a crystal and does not attach to the pipe walls as calcium carbonate crystal CaCO3.

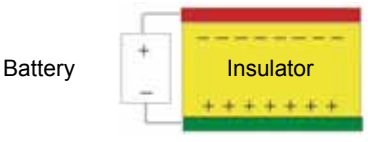
In the following, the physical and electrical possibilities that an effective physical water treatment system has to offer are examined. This simply means that it has to cause the effect that the dissolved lime does not attach in crystalline form to the walls or contact points with the pipes, to devices and fittings in contact with water. This is only possible if the dissolved lime crystallizes in the water before the contact with these areas. Therefore two conditions in the water have to be fulfilled:

1. Crystallization nuclei have to be present or created.

2. The lime- carbonic acid- balance has to be changed so that dissolved lime becomes solid.

Experience has shown that the introduction of magnetic or electric fields in the water can have such effects, even if with different success. In the following, only the effects of electric fields are examined, but from these the conditions under which magnetic fields can also be effective can be derived.

If we take a look at picture 4, we can see the two windings through which impulses are transmitted. A lot of producers call these windings "coils" because they look like coils, but electrically speaking they are not. So an "inductive" coupling is not possible and if it was inductance, the device would fail in the case of iron pipes, but it does not. The winding represents a part of a capacity, it is one capacitor surface, the other one is the water. This winding is a technological compromise, a metal foil placed around the pipe on the same length would have a slightly higher capacity, but would also have to be custom made for every pipe diameter. Normal loudspeaker cables instead are sold in metres and adapt to the different pipe diameters without any problems.



Picture 5: Charge separation through influence

How can, with this arrangement, an electric field be caused in the water even through every pipe

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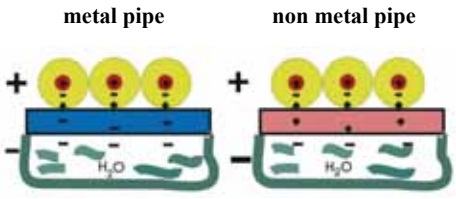
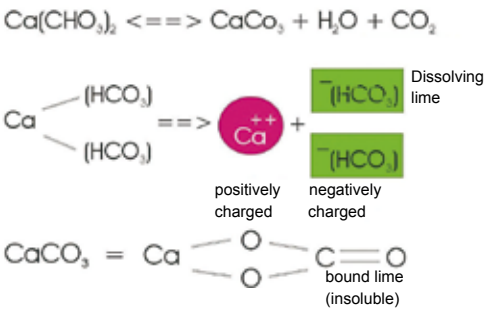
material? This is the point where most doubts begin. With this arrangement, it comes to a physical effect widely spread in the electric everyday life but not well known: the influence. In picture 5 the principle of the process is shown on the basis of a capacitor. When voltage is transmitted to the two capacitor plates, a charge displacement in the dielectric (insulator) is caused, which is the opposite of the charge of the plates. When the plates are discharged, the polarisation of the insulator also disappears as in the insulator electrons cannot move but only bound electrons are displaced. But if on the other hand e.g. two metal sheets laid on top of each other (electric conductor) are put into the electric field between the capacitor plates, the charge separation is the following: the surface of one metal sheet gets a negative charge (opposite of the positive capacitor plate) and the other one gets an equivalent negative charge. This phenomenon is called influence. If the two plates in the electrical field are separated, one of the plates shows a negative charge (surplus of electrons) and the other one a positive charge (shortage of electrons).

A capacitor is impermeable for direct voltage but not for alternating voltage. This fact is used when it comes to introduce electric alternating fields in the pipes. Picture 6 is an instant photograph of this process. You can see that the pipe material does not have any influence on the capacitor effect in the arrangement.



If the winding wire is charged by a pole of a power source, the same electric charge of the opposite sign is bound in the water pipe through influence (as the water comes from the earth).

If it is a temporal periodic charge transfer, or, respectively, a charge and discharge, a so called displacement current is produced - like in a capacitor (apparently) influenced by alternating current - between the insulated winding wire and the pipe wall (this can be calculated with the Maxwell equation). This is the continuation of an alternating (+-+-+-…) or pulsating (0+0+0+0…or 0-0-0-…) conduction current which develops between the pipe (including the water) and the ground. This results on the one hand from an alternating or pulsating electric field orientated in the longitudinal direction of the pipe and on the other hand from a magnetic eddy field centrically wound around the pipe. Measurements have shown that an effective voltage of •‘3f1 volt is produced between the winding and the water and that there is a displacement current of, 3f 5•A.



Picture 7: Schematic representation of dissolved and bound lime

At this point, some more attention has to be paid to the lime dissolved in the water. Picture 7 shows the connections. The dissolved lime – calcium hydrogen carbonate – dissociates in one double positively charged calcium ion and two negatively charged hydrogen carbonate ions. These ions are surrounded by a water cage. The water molecules settle around the calcium so that the oxygen points towards the calcium and the hydrogen towards the outside. Electrostatic powers hold these clusters together. The carbonate remnants are surrounded in the same way only that the oxygen atoms of the water molecules point to the outside. These clusters altogether show a positive or respectively negative charge. A schematic representation is given in picture 8, the clusters just have to be imagined as minute spheres. They have a diameter of 1 to 2 nanometers (nm), assuming that about 100 to 200 water molecules are involved. If the mass of these clusters is calculated, it results that the mass of the Ca- clusters as well as the mass of the

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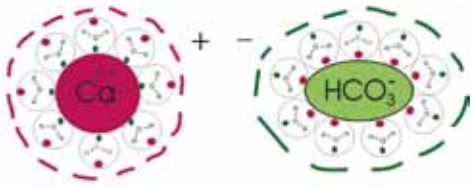
bicarbonate remnants is of 30x10^-22g up to 60x10^-22g. These results are interesting for the water treatment.



Picture 8: State of lime dissolved in water (schematic)

Coming back to the inducted electric alternating field, it is to say that that the periodically alternating field in the inside of the pipe influences the ions or dipolar molecules closed in water cages in the water in a way that they move from the one direction of the pipe to the other to the beat of the alternating field. The electric oscillation has lead to an oscillation of matter which spreads axially. Physically, this is a mechanical (acoustic) longitudinal wave or shock wave. Areas with overpressure and negative pressure alternate. In atomic and molecular fields, this locally causes an adhering of the CO2. If the oscillation frequency is suitable, the water cages disintegrate and this also leads to a local decrease of the CO2 concentration. The lime- carbonic acid-balance is locally disturbed and at the same time the dissolved lime ions that are freed from the water cage can meet and react with each other: a lime molecule has been produced which now serves as crystallization nucleus.*) Other molecules are taken up by this nucleus and form a lime crystal in the water. This lime crystal is electronically neutral and does not react in tap water any more. Therefore, this lime crystal is not taken up by existing lime deposits on the pipe walls anymore.

To cause these processes, the electric alternating field has to contain frequencies that if possible lead to resonance oscillations of the water cages. Since all tap waters that correspond to the German drinking water decree are different regarding the quantity of dissolved minerals, the pH-value and the conductivity, the formation of the electric alternating field is also influenced. Besides, there is the changing flow velocity. Devices that work with only one frequency can also successfully set off this cycle by chance, but most of the times they do not show any success.

A couple of technical data about the device examined here are known as well as positive experiences about the effect. Therefore, it makes sense to theoretically and (as far as possible) practically assess the effectiveness of the device by means of these information.

The device is provided with two windings. Each winding receives impulses with a clock frequency of 10 Hz, 50 ms pulse duration, 50 ms rest and de-energize. When one has the rest and de-energize, the other one receives the impulses. Each impulse has a frequency response of ca. 3 to 15 kHz, spread on 50 ms. As there was no suitable measuring technique, the frequency response could not be measured. If 10 oscillations are counted per kHz, the pulse duration is approximately reached. At this point it has to be particularly emphasized one more time that this is only an attempt to generally explain the effectiveness. The complexity of the excited oscillations including the overlapping of different waveforms (overtones) cannot be taken into consideration.

The device is supposed to safely treat 5000 litres of water per hour. In the case of a half inch pipe this means the flow of a water column of 11,3mm/ms, in the case of a one inch pipe it would be 2,8mm/ms and in the case of a two inch pipe 0,7mm/ms. As the length of the effect of an electric alternating field is of •‘98500 mm (the producer indicates •‘981000 mm), this means that this distance is just covered. Every ion water cage has enough time to fall apart.

What about the reaction velocity of the chemical components? The Max-Born-Institute for nonlinear optics and transient spectroscopy in Berlin has examined the velocity of the formation of molecules on the basis of water molecules with a special laser array. The result was a time between 10 and 20 femto seconds (1 fs = 10^-15 second). This time is as inconceivably short as the universe is inconceivably big. The distance light travels in 1 fs gives us an approximate idea of how short this time is: •‘3f0,3 •m. In the time light travels 6 mm, 1000 molecules can be formed. Therefore, it is very probable that the molecule formation and the formation of nucleus crystals take place in the section treated.

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5. Protective layers and incrustations

At this point the formation of incrustations is only briefly mentioned for the processes in pipe bends. The flowing water accelerates in the pipe bends. The water flowing in the outer radius is faster than the water in the inner radius. According to the simplified Bernoulli's equation (2), the sum of the static and the dynamic pressure is constant:

Pdyn + Pstat = const.

In the water that flows faster, the dynamic pressure increases and the static pressure decreases. This means that CO2 escapes from the inner radius towards the outer radius and the lime- carbonic acid- balance is disturbed. Lime is set free, looks for a crystallization point and finds this point on the walls of the inner radius. Little by little, a layer of lime epitaxially grows in which other minerals also deposit. On this irregular surface turbulences develop, the same happens in pipe branches because of pressure fluctuations, so that in both cases lime deposits develop. As water, and therefore also the CO2, evaporates in faucets and shower heads, also here lime deposits develop. On heated surfaces the CO2 is also removed from the closer surrounding area, so that theses surfaces are also favourite crystallization points for the lime. For two reasons, the presence of lime in drinking water is important and therefore a minimal amount that corresponds to a water hardness of 8,4°d is stipulated by the German drinking water decree. Firstly, the drinking water provides a big part of calcium the body needs and secondly, the bicarbonate remnants of the dissolved lime reacts with the metal of the pipe and so forms a metal carbonate protective layer. This is especially important in the case of copper pipes (see below). Picture 9 shows a detail of such a protection layer. You can see how the crystals grow on the metal surface. Such bundles of crystals cover the surface and protect the pipe against corrosion.

Picture 10 shows this even better. It is an electron microscopic picture of an artificially produced phosphate protective layer against corrosion. Phosphates crystallize in a similar crystal system as carbonates. In time, this desirable quality of lime becomes a disadvantage as more and more lime deposits grow in these protective layers since they are ideal crystallization points. Slowly, a pipe clogs

Picture 9 Lime protective layer

Picture 10 phosphate protective layer

Picture 11 Lime dust deposits

up, starting in the pipe bends and branches. As indicated above, from here theincrustations grow into the straight sections of the pipe. This process takes places as long as there is dissolved lime in the water. But most of the lime transported in the water is washed out of the pipe without depositing. After all, with a water consumption of 100 m³ per year and a water hardness of 28°d, about 45 kg of lime are transported through the pipes. If the lime has been transformed into crystals in the water as described above, the lime is washed out of the pipe with the water in form of a fine submicroscopic crystal, a crystallization on the walls of the pipes is not possible anymore. The lime crystals deposit irregularly, as shown in picture 11. This condition stays the same also in warm water. Applications have shown that further dissolved minerals deposit on the nuclei build of the lime crystals and sink to the bottom of e.g. water boilers in form of dust without growing on the heating bars. This way, 2 kg of lime dust deposits could be removed from a 150 litre water boiler after a year of operation, the heating bars were absolutely scale free. User report that the heat exchangers for the hot-water supply in the case of district heating also stay lime free on the secondary side. Since the installation of the examined device four years ago, no cleaning has been necessary. The lime has been made harmless but has not been removed and is still physiologically present. Another consequence of this is that water drops that dry on surfaces leave lime dust which can be removed with a humid cloth. But if it is left in a humid surrounding for a while, it can locally dissolve under the influence of the CO2 in the air and if it dries again, a crystallization on the surface is possible: This incrustation can only be removed with a decalcifier.

But these devices are also supposed to remove existing deposits and to prevent rust or corrosion. Is this possible? And if it is possible, how does it work?

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6. Removal of deposits and protection against corrosion

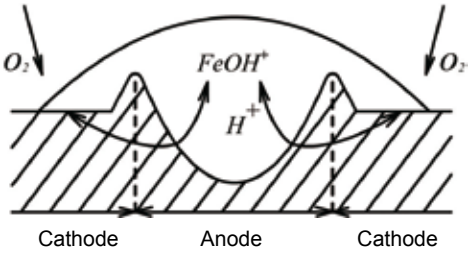
First of all, some information about the removal of lime deposits: If we take a closer look at the equation (1) we can see that the chemical reaction can not only take place from the left to right side (lime segregation) but also from the right to the left (lime dissolution). Here again, the lime- carbonic acid-balance plays a crucial role. If there is a surplus of carbonic acid, lime is dissolved. With each dissolved lime molecule crystallized in the water one carbonic acid molecule is produced. This carbonic acid gradually attacks and dissolves the lime deposits on the pipe walls and so removes the lime. Depending on the level of the incrustations in the pipe (water hardness, working life), this process can take between half a year and two years. During this time, light lime deposits outside the water develop again. When this process is finished, no more incrustations develop. The lime is removed, but the carbonate protective layer is maintained.

Of course the lime crystal in the water is also exposed to this influence. But the crystal produced in the water has been able develop in an almost weightless state and therefore a crystal structure forms that shows only a few lattice defects such as vacancies, interstitial atoms, substitution atoms and molecules, displacement and stacking faults. Therefore, this crystal offers less targets than the incrustation presenting these errors and therefore also a bigger surface and with that a higher inner energy. This is why this incrustation is attacked more, often with a selective dissolution, what leads to the eruption of coarser lime particles which can accumulate in the aerators.

Now the equation (1) represents a balanced stationary state. But in nature fixed equilibria do not exist, only flowing equilibria. At the melting point of water e.g. ice and water exist at the same time, therefore balanced. This means that statistically in one time unit the same amount of water molecules changes from the liquid to the solid state as water molecules melt from the ice.
The equilibrium is flowing. The lime segregation as well as the lime dissolution described in the equation (1) are also subject to this static process, if there is no intervention from the outside. The processes in the section treated will not catch all present molecules. Even if in smaller amounts, there will still be dissolved lime in the pipe which can also segregate but then be dissolved again. But since the physical water treatment intervenes in favour of the dissolution of the lime and the removal of the deposits, new incrustations do not form. Statistically, it is possible that during these processes surfaces that are not yet covered with metal carbonate crystals (see pictures 9 and 10) now form such crystals and so make the corrosion protection layer thicker.

The described mechanism of the formation of a protective layer is not the only effect preventing corrosion. Since there is already a protective layer, normally no corrosion should occur, but as experiences show corrosion does occur, in galvanized iron pipes as well as in copper pipes.

What is the reason?



Picture 12: Ventilation element

In technology there is a corrosion process called ventilation element. Picture 12 describes this process. Iron is an electric conductor, water is an electrolyte. When a water drop lies on the iron, an electrolytic element has been formed, the only thing missing is the electric voltage. At the edge of the water drop the oxygen contact towards the metal surface is stronger, the centre of the drop is less ventilated. Thus a potential difference between these two areas develops, the edge of the water drop becomes a cathode (surplus of electrons) and the centre of the drop an anode (shortage of electrons). Being an electrolyte, the water now enables the closed electrical circuit between anode and cathode. At the anode, positively charged ions of the prevailing metal dissolve, react with the water and deposit as rust, while the electrons take the way through the metal to the cathode. In principle, the process is the same in the case of copper.

Physical water treatment - this is how it works!

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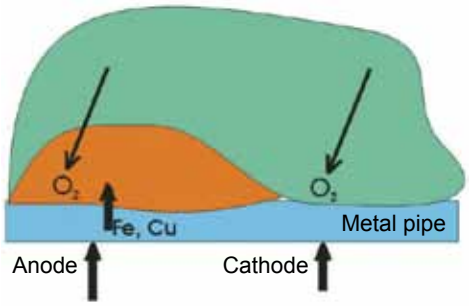


Picture 12a: Corrosion through lime deposits with different thickness

In principle, the same process takes places in our pipes, the only difference lies in the reasons for the different oxygen contacts to metallic surfaces. Picture 12a schematically represents this constellation. As long as the water is not physically treated, lime favours to deposit, as described above. Between the areas with strong lime deposits and the lime free areas, this causes that the more or less strong oxygen contact in the water effects the surfaces with a different concentration. This way, they same process as in the ventilation element is caused. As it is generally known, most of the times corrosion occurs in pipe bends, branches and Tpieces which show thick deposits. If these deposits are removed leaving only the protective layer, the oxygen contact is the same everywhere and an electric potential cannot develop anymore. This process is especially important for copper pipes, as with a high oxygen content and pH values lower than 6,5, copper is especially corrosion endangered and specially tends to pitting corrosion. In these cases a thick protective layer is especially important, also because of the impurity of the copper (supplier of cheap products) that favours the formation of local elements. Thus, more and more copper comes into the water and this is unfavourable for the health. According to the recommendations of the Federal Ministry of health, babies should not drink tap water in these cases. Water suppliers call copper the “lead of the 20th century”.

The dealt facts show that the effectiveness of the physical water treatment has not only been proven by users but that there are also theoretical and practical physical-chemical proofs. But a precondition is that the device offered more or less fulfils the described parameters. In general, the electronic-technological demand is pretty high, so that most of the times cheap devices cannot fulfil the demands.

The mode of action of these devices shows that the usual test procedures to determine the effectiveness, especially short tests have to fail and provide false results. A new testing procedure has to be developed which can also provide a quantitative proof of the theoretic connections described here.

I would like to thank Prof. Dr. H. Ungenannt, Mageburg, for the support during the interpretation of the electric processes, Mr. K. Matthies, Dipl.-Ing., Berlin, for the help concerning the measurement technology, Prof. Dr. W. Morgner, Eichenbarleben, for the critical discussions of the present work and the engineering firm for physical water treatment Helmut Siegmund, Königs- Wusterhausen, for the provision of the device.

Information about the device and the producer can be sought over the author or the engineering firm Siegmund, Herdstr. 7, 15711 Königs Wusterhausen.
Pictures:

- Pictures 1 and 2: W. Kleber, Einführung in die Kristallographie, Verlag Technik Berlin, 1956
- Picture 4: Information script from Christiani Wassertechnik GmbH
- Picture 9 and 11: Information script from Christiani Wassertechnik GmbH
- Picture 10: Information script from the BM Wmotorcycle factory Berlin
- Picture 12: W. Schatt (editor), Einführung in die Werkstoffwissenschaft, VEB Deutsche Verlag für Grundstoffindustrie, Leipzig, 1981

*) Coral animals build their coral sticks on the same basis. In their feet area, they have plant cells that contain chlorophyll. This produces organic material (carbohydrates) from water and CO2 by the means of sunlight. Thus, the lime- carbonic acid- balance is also disturbed (reduction of the Co2) and this leads to a secretion of lime forming the coral sticks. This is a reason why corals only exist in sun flooded shallow water, as only here there is enough sun energy for the photosynthesis process.

Steinbeis Institute

Germany

STEINBEIS-STIFTUNG FÜR WIRTSCHAFTSFÖRDERUNG
(Foundation of economic promotion Reutlingen)

TRANSFERZENTRUM REUTLINGEN ANGEWANDTE UND UMWELTCHEMIE
(Transfer Centre Applied and environmental chemistry)

Expertise

Concerning the effect of the water-treatment device

"VULCAN 5000"

Test subject: water-treatment device "VULCAN 5000"

Manufacturer: CHRISTIANI Wassertechnik GmbH
Heinrich-Heine-Str. 15
D- 52249 Eschweiler

Test instruction: A test should be carried out to determine whether VULCAN 5000 can reduce lime deposits in water pipes and household equipment in a purely physical manner without altering the water chemically.

Experimental demonstration of function: The effect was verified in a heat exchanger arrangement using two identical testing units.
Water was withdrawn from the water pipes simultaneously upstream and downstream of the device to be tested and calcium precipitation forced in the heat exchangers.
As lime deposits increase, the flow of water decreases. The more water flows through the experimental arrangement, the smaller tendency there is for the water to form scale on pipes and container walls.

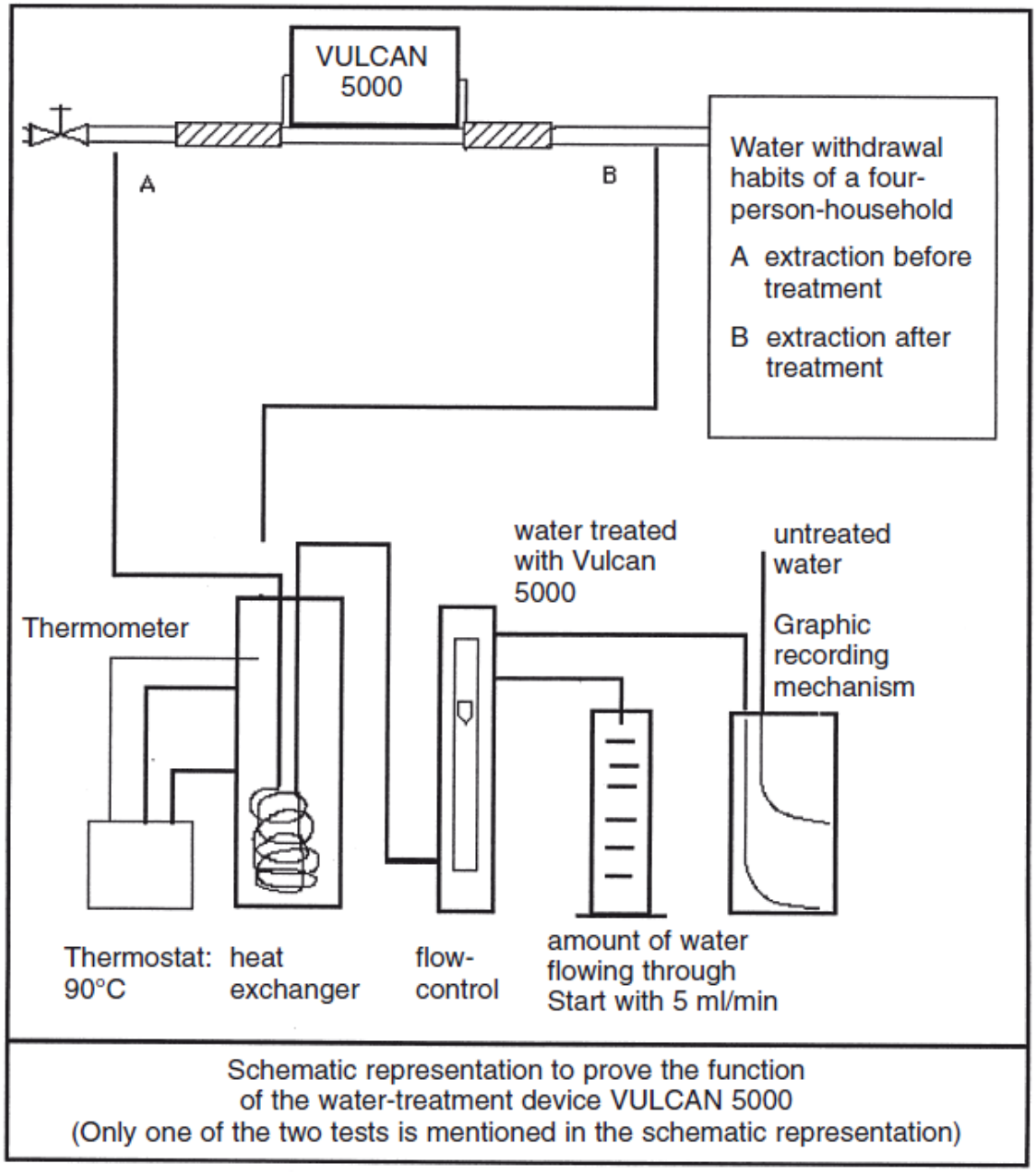
The test was carried out on the basis of the practice-related water withdrawal of a four-person household with the additional regular withdrawal of five litres of water at half hourly intervals for a total of six weeks.

This test showed that the tendency to form lime deposits is reduced considerably by the "VULCAN 5000" water-treatment device. In addition, the effect continues for some days after "VULCAN 5000" has been switched off. Seemingly, the effect is not only limited to a certain part of the pipe, but also passed into the water flowing nearby sections of the pipe.

Reutlingen, 14th of January 1998

(Prof.Dr.D. Frahne)

Enclosure:
test diagram



Schematic representation to prove the function
of the water-treatment device VULCAN 5000
(Only one of the two tests is mentioned in the schematic representation)

Pulse-Powered Chemical-Free Water Treatment Report, ASHRAE

USA

ASHRAE
Advancing HVAC&R to serve humanity and promote a sustainable world

ASHRAE GreenTip Nr. 14

Pulse-Powered Chemical-Free Water Treatment

TECHNOLOGY DESCRIPTION

Pulse-powered physical water treatment uses pulsed, electric fields (a technology developed by the food industry for pasteurization) to control scaling, biological growth, and corrosion. This chemical-free approach to water treatment eliminates environmental and health-and-safety issues associated with water treatment chemicals.

Pulse-powered systems do not require pumps or chemical tanks. Pulsepowered systems tend to be forgiving of operational upsets and promote cooling tower operation at higher cycles of concentration (therefore, less blowdown and less water usage) than standard chemical treatment. Independent studies have shown not only that the method is effective for cooling towers but that the performance of pulsepowered systems is superior to standard chemical treatment in biological control and water usage. The performance results of pulse-powered technology for chemicalfree water treatment, as documented by various independent evaluations, support the objectives of green buildings and have earned LEED points for certification in a number of projects.

WHEN/WHERE IT'S APPLICABLE

Pulse-powered technology is applicable on the recirculating lines of cooling towers, chillers, heat exchangers, boilers, evaporative condensers, fluid coolers, and fountains.

The technology produces a pulsed, time-varying, induced electric field inside a PVC pipe that is fit into the recirculating water system. The electric signal changes the way minerals in the water precipitate, totally avoiding hard-lime scale by insteadproducing a non-adherent mineral powder in the bulk wate r. The powder is readily
filterable and easily removed. Bacteria are encapsulated into this mineral power and cannot reproduce, thereby resulting in low bacteria populations. The water chemistry maintained by pulse-powered technology is noncorrosive, operating at the saturation point of calcium carbonate (a cathodic corrosion-inhibiting environment).

The low bacteria count and reduction or elimination of biofilm reduces concern about microbial influenced corrosion. The absence of aggressive oxidizing biocides eliminates the risk of other forms of corrosion.

PROS AND CONS

Pro

1. The potential for lower bacterial contamination while providing scale and corrosion control.
2. Lower energy and water use than in traditional chemical treatment.
3. Blowdown water is environmentally benign and recyclable.
4. Life-cycle cost savings compared to chemical treatment.
5. Reduction or elimination of biofilm.
6. Removes health and safety concerns about handling chemicals.
7. Eliminates the environmental impact of blowdown, air emissions, and drift from toxic chemicals.

Con

1. It does not work effectively on very soft or distilled water, since the technology is based on changing the way minerals in the water precipitate.
2. Water with high chloride or silica content may limit the cycles of concentration obtainable to ensure optimum water savings since the technology operates at the saturation point of calcium carbonate.
3. Energy usage is still required to operate.

ASHRAE
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KEY ELEMENTS OF COST

The following economic factors list the various cost elements associated with traditional chemical treatment that are avoided with chemical-free water treatment.
This is a general assessment of what might be likely, but it may not be accurate in all situations. There is no substitute for a detailed cost analysis as part of the design process.

- Direct Cost of Chemicals. This item is the easiest to see and is sometimes considered the only cost. For cooling towers in the US, this direct cost usually runs between $8.00 and $20.00 per ton of cooling per year.
- Water Softener. Water softeners have direct additional costs for salt, media, equipment depreciation, maintenance, and direct labor.
- OSHA and General Environmental Requirements. Many chemicals used to treat water systems are OSHA-listed hazardous materials. Employees in this field are required to have documented, annual training on what to do in the event of a chemical release or otherwise exposed contamination.
- General Handling Issues. Chemical tanks, barrels, salt bags, etc., take space. A typical chemical station requires 100 ft (9.3 m) of space.
- Equipment Maintenance. Lower overall maintenance for the systems as a whole may be possible.
- Water Savings. Cooling towers are often a facility's largest consumer of water. Most chemi cally controlled cooling towers operate at two to four cycles of concentration. Cycles of concentration can often be changed to six to eight cycles with chemical-free technology, with an annual reduction in water usage costs and the associated environmental impacts.
- Energy Savings. Energy is required to operate the pulse-powered system, but overall energy usage can be lower. The reduction or elimination of biofilm (a slime layer in a cooling tower) results in energy savings versus chemical treatment due to improved heat transfer. Biofilm has a heat transfer resistance four times that of scale and is also the bree ding ground for Legionella amplification. Preventing this amplification thus saves costs.

SOURCES OF FURTHER INFORMATION

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*Source: www.ashrae.org
ASHRAE: American Society of Heating, Refrigerating, and Air-Conditioning Engineers
Newsletter: http://www.ashrae.org/publications/page/573

Study - Physical Water Treatment as the Solution for Cooling Towers

Japan

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

February 24, 2007

Tested field: Factory of a pharmaceutical company
Installation sites: Cooling towers on the rooftop of the second building
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, 2006
For the cooling tower C: October 6, 2006

Vulcan installed on the makeup water piping (50A)

Used for cooling towers A, B and C

Vulcan installed on the circulating piping (80A)

Used for the cooling towers C

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 buildups 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 touch. 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 makes city water to drinking water and can be used as better cooling water.
(*) The effectiveness of the water treatment in the water supply line will last for 48 hours 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

Cooling Tower A Cooling Tower B

Cooling Tower C

Developments after installation of the Vulcan

Adhesion of silicia six month after the installation of the Vulcan

water is hosed

after the hosing

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

Silica is removed by simply hosing the water. (The remaining silica is pealed off with a touch of a finger.)

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)

LFU - Laboratory for environmental analysis Ltd. (Research of environmental damage)

Germany

LFU - Labor für Umweltanalytik GmbH
Umweltschadenuntersuchung
Saatwinkler Damm 24 · 13627 Berlin Tel. (030) 345 91 90 · Fax (030) 345 70 54

TESTREPORT 5565/02/96

Client	Mr. Wolfang Krahl Hillmannstraße 16 13467 Berlin
Trade mark	no details
Sample material	water
Place where the samples were taken	no details
Number of samples	2
Receipt of the samples	27.02.1996
Procedure of taking the samples	LFU didn't carry out the procedures of taking the samples. All the details about the identification of the samples (Place where the samples were taken et cetera) were given by the client.
Extent of the tests	Laboratory research – see page 3-
Subcontractor	none

LFU- Labor für Umweltanalytik GmbH

i. V. 1996

Knut Brauer
Manager

Berlin, 11th of March 1996

Dr.H.U.Sommer
Director of the laboratory

LFU - Labor für Umweltanalytik GmbH
Umweltschadenuntersuchung
Saatwinkler Damm 24 · 13627 Berlin Tel. (030) 345 91 90 · Fax (030) 345 70 54

TESTREPORT 5565/02/96

List of the results of the analysis:

Sample-Nr.: 5565-001 water before the installation of the water-treatment device
5565-02 water after the installation of the water-treatment device

Task:
To evaluate the effectiveness of a physical ("electrical") water-treatment device the client handed over two water-samples, which, according to him, were taken one before and one after the installation of the treatment device. According to the manufacturer, the influence of electromagnetic fields on the water, that flows through the pipes, changes the structure of the crystals of the depositing substances that are responsible for the hardness of the water (Calcium-hydrogen-carbonate-crystals), so that it is possible to avoid the sedimentation of hard deposits of boiler scale. To verify this effect, the contents of selected heavy metals, alkali and alkaline earth ions, responsible for the hardness of the water, dissolved carbon dioxide, carbonate hydrogen-carbonate, which the two water samples contained, were categorized and the remains after evaporating of the two water samples were also examined under a microscope on a clean glass-surface.

RESULT:

Sample / parameter	dimension	5565-001 water before the installation of the water-treatment device	5565-002 water after the installation of the water-treatment device
Iron	mg/l	0,042	0,44
Copper	mg/l	0,52	0,35
Zinc	mg/l	0,08	0,16
Sodium	mg/l	29,5	28,8
Potassium	mg/l	10,6	10,7
Calcium	mg/l	13,2	13,0
Magnesium	mg/l	11,6	11,3
Cadmium	mg/l	n.n.	n.n.
Cobal	mg/l	n.n.	n.n.
Chrome	mg/l	n.n.	n.n.
Manganese	mg/l	n.n.	n.n.
Nickel	mg/l	n.n.	n.n.
Lead	mg/l	n.n.	n.n.
Dissolved carbon dioxide	mg/l	n.n.	n.n.
Carbonate	mg/l	n.n.	n.n.
Hydrogen-carbonate	mg/l	23,49	22,57
Evaporation-remains	----	grey adhering no crystal-structure discernable	brownish easily removable no crystal-structure discernable

TÜV Nord Certificate

Germany

TÜV NORD GS geprüfte Sicherheit

TÜV NORD

Certificate

Registered No.
978/06 Rev. 1

Customer's reference	Date of order	File reference	Test report no.
Mr Christiani	28 February 2006	2.4-234/94 Men / A27	975/06

Name and address of the customer: **Christiani Wassertechnik GmbH, Heinrich-Heine-Str. 15, 52249 Eschweiler**

is authorized to provide the product mentioned below with the mark as illustrated: **TÜV NORD GS-Tested Safety**

Manufacturing plant: **Christiani Wassertechnik GmbH, Heinrich-Heine-Str. 15, 52249 Eschweiler**

Tested in accordance with: **DIN EN 60335-1:2005**

The product is conform with the requirements of the Equipment and Product Safety Act – GPSG § 7 (1)

Description of product (Details see Annex 1): Water treatment equipment, Type VULKAN xxxx

TÜV NORD CERT GmbH
Certification Centre for
equipment safety and medical products

Valid until: 22 March 2011

i.V.

Essen, 22 March 2006

Please also pay attention to the information stated overleaf

Langemarkstr. 20 – 45141 Essen – Tel. +49 (0) 201 825 5120 – Fax +49 (0) 201 825 3209

TÜV NORD

Annex 1 to Certificate n°: 978/06 Rev. 1
File reference: 2.4-234/94

Page 1 of 1
22 March 2006

Model:	VULKAN S25	VULKAN S100	VULKAN S250	VULKAN S500
Capacity:	25 m^3 l/h	100 m^3 /h	250 m^3 /h	500 m^3 /h
Voltage:	24 V DC	24 V DC	24 V DC	24 V DC
Power consumption:	2,25 W	2,5 W	2,75 W	3,25 W
Protection class :	III	III	III	III
Dimensions (w/d/h):	125/200/35	160/200/40	205/295/45	225/325/25
Frequency:	3 – 32 kHz	3 – 32 kHz	3 – 32 kHz	3 – 32 kHz
Switching power supply:	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
In:	100 – 240 V AC	100 – 240 V AC	100 – 240 V AC	100 – 240 V AC
Out:	24 V DC, 600 mA	24 V DC, 600 mA	24 V DC, 600 mA	24 V DC, 600 mA

Please note:

- product effectiveness not tested
- the power supply unit type FR 14, 100 – 240 V AC / 24 V DC, 600 mA has been tested as well.

The above mentioned products could be provided with the following marking:

TÜV NORD
GS-Tested Safety

TÜV NORD CERT GmbH
Certification Centre for equipment safety
and medical products

i.V.

CE Certificate

Germany

CE

EC Declartion of Conformity

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

Product: Water conditioning appliance

Type designation:
Vulcan 1000
Vulcan 5000
Vulcan S25
Vulcan S100
Vulcan S250
Vulcan S500

The designated product is in conformity with the European Directive:

89/336/EEC
including amendments

„Council Directive of May 1989 on the approximation of the laws of the Member States relating to electromagnetic compatibility".

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 55014-2 (VDE 0875 Teil 14-2): 2002-08; EN 55014-2:1997 + A1:2001
Requirements of category II
DIN EN 55014-1 (VDE 0875 Teil 14-1); 2003-09; EN 55014-1:2000 + A1:2001 + A2:2002
DIN EN 61000-3-2 (VDE 0838 Teil 2): 2001-12; EN 61000-3-2:2000
DIN EN 61000-3-3 (VDE 0838 Teil 3): 2002-05; EN 61000-3-3:1995 + Corr.:1997 +A1:2001

The VDE Testing and Certification Institute (EU Identification No. 0366), Merianstr. 28, 63069 Offenbach, has tested and certified the product granting the VDE Approval for the mark(s) as displayed.

Certificate No. 94050
File Reference 1898800-4521-0001 / 75684 FG43 / FU

Berlin, 17. Jan 2009
(place, date)

(Legally binding signature of the issuer)

Client List

SIEMENS

MÖVENPICK Restaurants

Mercure

UNIVERSITÄT MÜNCHEN

BOSCH

HYATT

ALCATEL

Hotel Q!

BAYER

VIESMANN

Dynamit Nobel

ST. JOSEPH KRANKEN HAUS

EBERSWALDER

Christiani Wassertechnik GmbH (CWT)
Köpenicker Str. 154
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GB/USA 12/2009