

"Salus per Aquam"
Health and Thermal Energy
come through your tap water

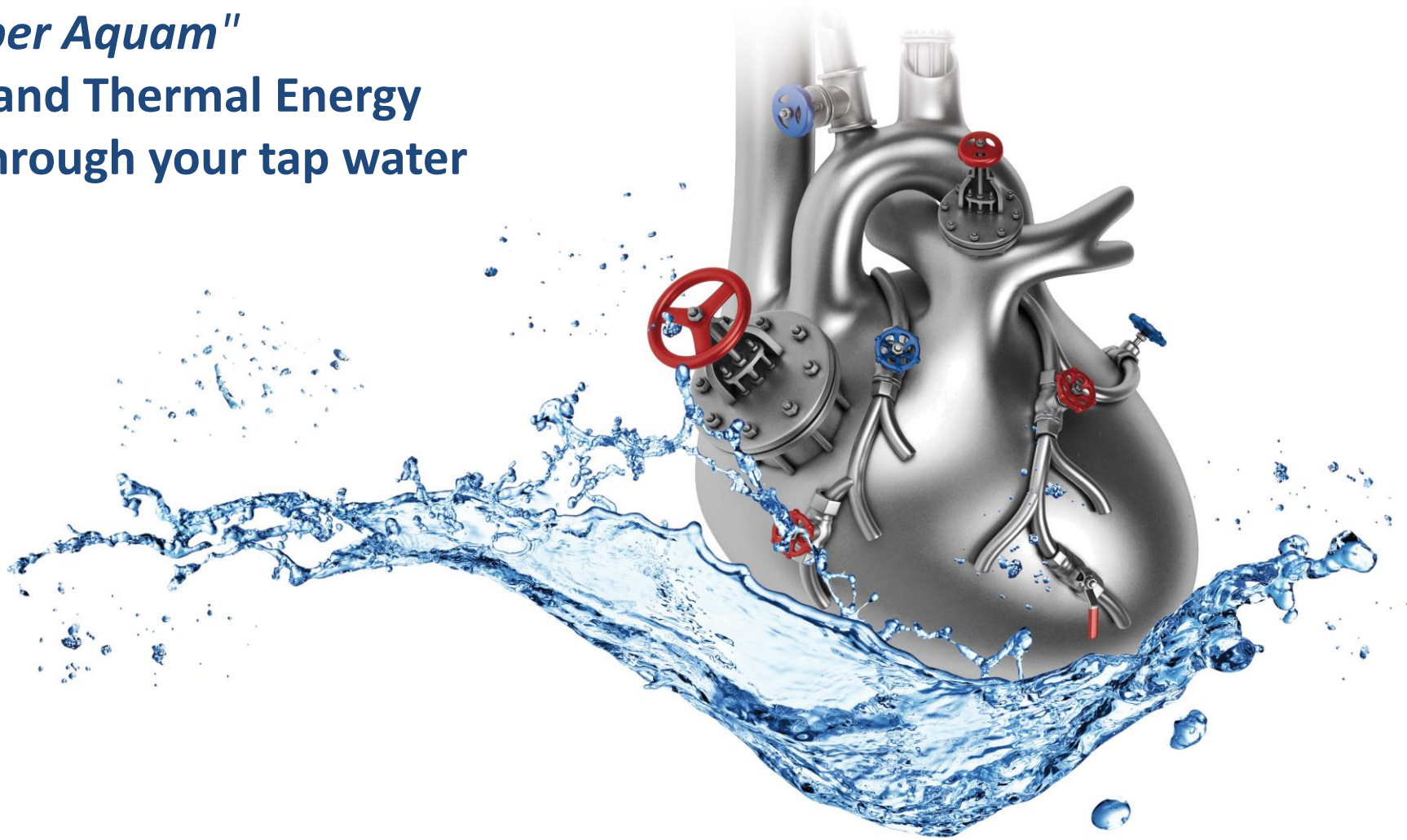


Physico®

Treatment for water intended for human consumption
maintenance-free, without chemical additives, self-sanitizing

"Salus per Aquam"

Health and Thermal Energy
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UNIVERSAL MACROELEMENT and THERMAL VECTOR

THE HARDNESS OF THE WATER INTENDED FOR HUMAN CONSUMPTION

effects on our health

Extract from the Epidemiological Study performed in the U.K. And issued by the Superior Health Institute in 2007

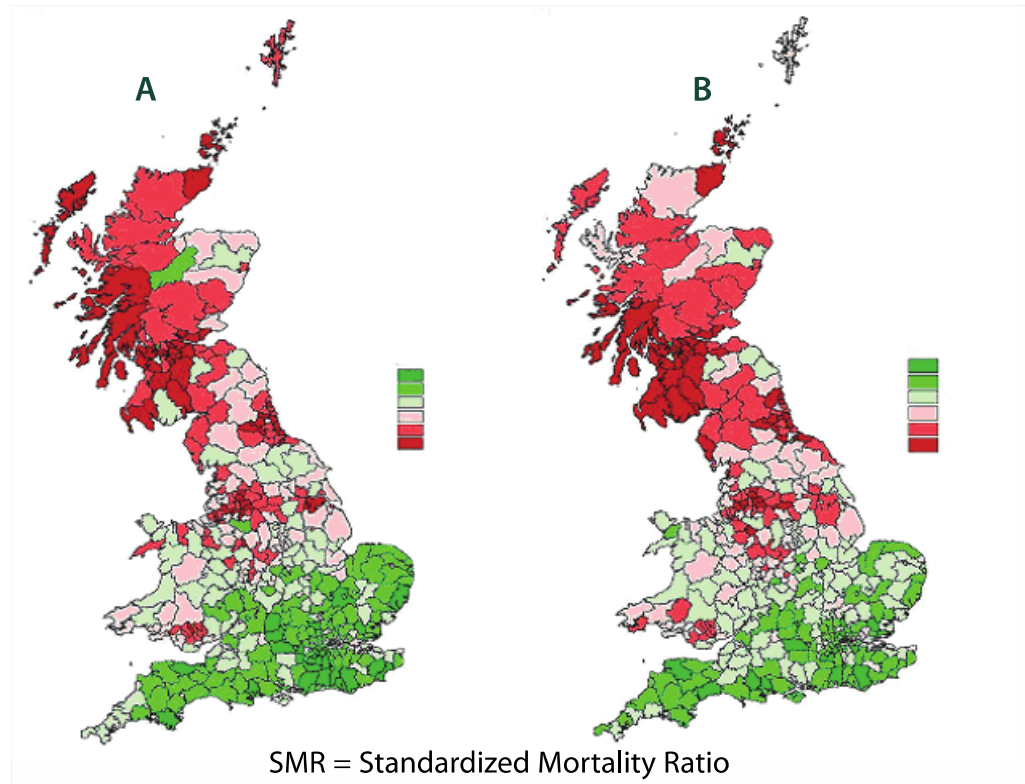


Figure 1 - Geographical distribution of male mortality (A) and female mortality (B) due to CVDs in the UK

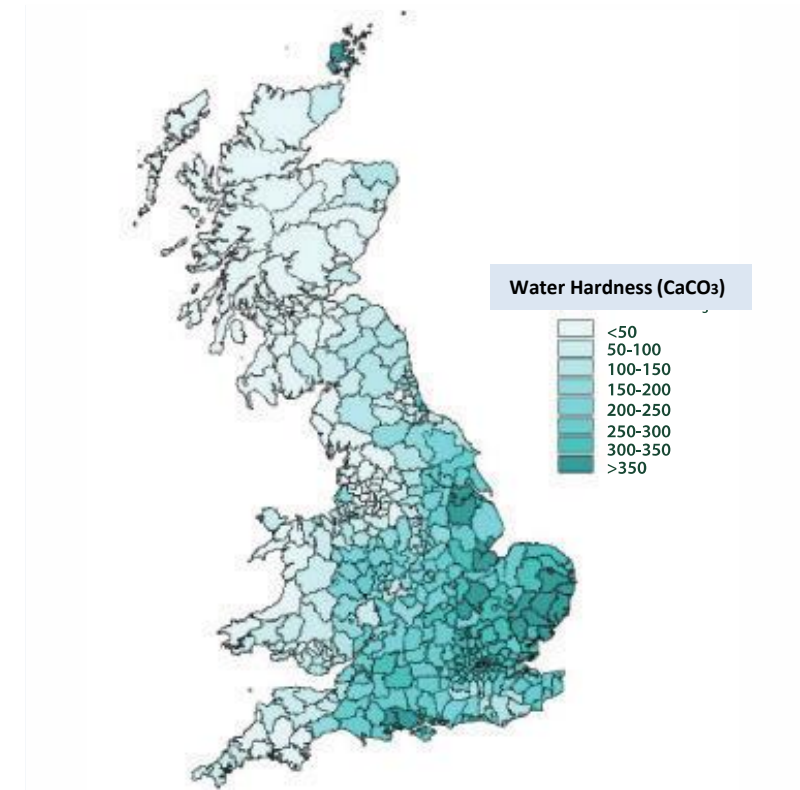


Figure 2 - Hardness of water destined for human consumption in mg/l in different districts in the UK

THE HARDNESS OF THE WATER INTENDED FOR HUMAN CONSUMPTION

effects on our health

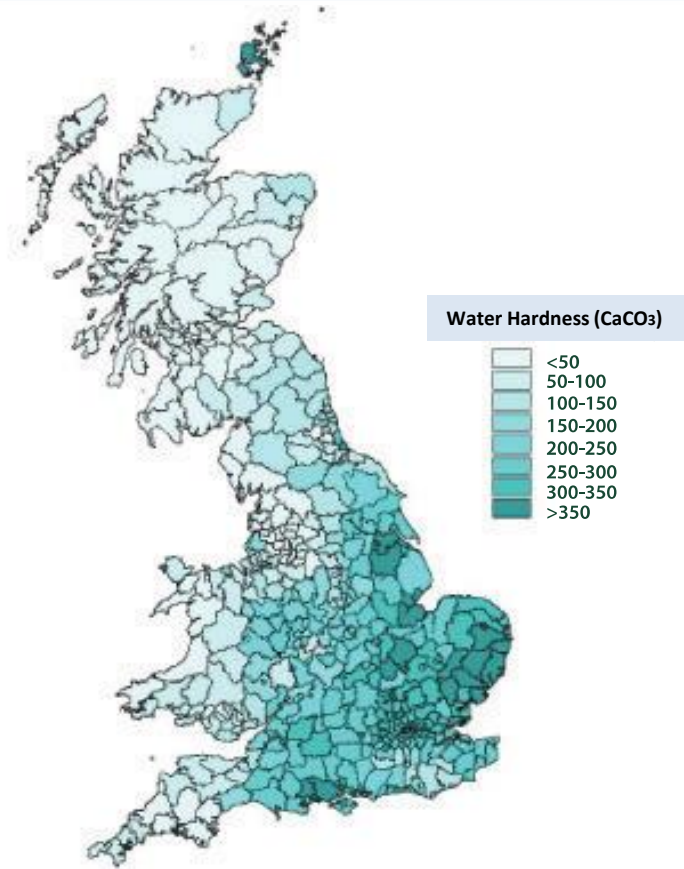


Figure 2 - Hardness of water destined for human consumption in mg/l in different districts in the U.K.

«inverse correlation between the intake of Magnesium and/or Calcium in drinking water (hardness) and the incidence of cardiovascular pathologies»

The National Academy of Sciences of United States, after numerous epidemiological studies, has indicated that

the optimal hardness of water intended for human consumption can reduce the mortality rate for cardiovascular diseases by at least 17%

(Nat. Res. Council, Drinking Water and Health. Vol. I: 477. Washington DC, 1977).

Drinking Water and Water intended for human consumption



The presence of mineral salts such as **Calcium, Potassium, Magnesium and other micronutrients** present in water act as **deterrents for Cardiovascular Diseases (CVDs).**

Drinking Water (*if poor in Mineral Salts/mineral water*):
it is recommended to drink it only for short periods of life.

Water intended for Human Consumption (*rich in Mineral Salts/alkaline*):
The OMS recommends that people drink this water for their entire life
in order to achieve the health benefits shown in epidemiological research.



WATER INTENDED FOR HUMAN CONSUMPTION

REFERENCE HEALTH REGULATIONS CORRENTLY IN FORCE



- **European Directive n. 98/83/CE** relevant to the quality of water for human consumption.
- **Legislative Decree n. 31/2001** in application of the directive, biological and chemical parameters.
- **M.D. (Ministerial Decree) n. 174/2004** Regulations relevant to materials which can be used in the plants of reception, treatment, adduction and distribution of water for human consumption.
- **M.D. (Ministerial Decree) n. 25/2012** Technical Provisions for the chemical and physical water treatment devices.
- **Guidelines 20th March 2013** applying Ministerial Decree n. 25/2012.
- **HACCP Food Safety Protocol**

EUROPEAN DIRECTIVE n. 98/83/EC

relevant to the quality of water intended for human consumption

GENERAL PRINCIPLE

OBLIGATION

The **aqueduct companies** have to **SUPPLY**
water intended for human consumption
at the POINT OF ENTRY (*WATER METER*)
in accordance with the quality requirements
given and set by the
Legislative Decree n. 31/2001.

OBLIGATION

The **user must keep**
the water quality UNALTERED
from the POINT OF ENTRY (*WATER METER*)
up to the POINT OF USE (*TAP*)
in order to achieve
the recognized health benefits.

Legislative Decree 2nd February 2001 n. 31

applying the European Directive n. 98/83/EC



Recommended hardness values

from 15°F to 50°F

1°F = 10 mg/l

(as useful deterrents for cardiovascular diseases - CVDs)

Maximum acceptable threshold of Sodium

200 mg/l

(beyond this threshold water is hypertensive, if drunk increases blood pressure)

M.D. (Ministerial Decree) n. 25/2012 and the GUIDELINES issued in 2013
relevant to technical provisions for
EQUIPMENT INTENDED FOR HUMAN CONSUMPTION

EACH DEVICE MUST BE NAMED ACCORDING TO ITS SPECIFIC FUNCTION:

- ION EXCHANGE SOFTNER
- CHEMICAL ADDITIVES FEEDER (POLYPHOSPHATES, CHLORINE....)
- ELECTROMAGNETIC INDUCTOR
- PERMANENT MAGNET INDUCTOR
- REVERSE OSMOSIS
- MECHANICAL FILTER

It is **FORBIDDEN** to use the word «**PURIFIER/PURIFICATION**»
because no traded device intended for water treatment achieves this function.

M.D. (Ministerial Decree) n. 25/2012 and the GUIDELINES issued in 2013
relevant to technical provisions for
EQUIPMENT INTENDED FOR HUMAN CONSUMPTION

PURPOSES OF TREATING WATER

To get the **ENERGY EFFICIENCY** by means of eliminating or decreasing
the formation of limescale deposits in heat exchangers.

*The formation of limescale deposits is due to the presence of mineral salts
dissolved in cold water such as:
CALCIUM, POTASSIUM, MAGNESIUM ...*

**The formation of limescale deposits occurs only when water is heated
both for TECHNICAL and SANITARY purposes.**

M.D. (Ministerial Decree) n. 25/2012 and the GUIDELINES issued in 2013 relevant to technical provisions for EQUIPMENT INTENDED FOR HUMAN CONSUMPTION

Compulsory separation of the pipelines of water intended for **Technical** purposes and water intended for **Sanitary** use **(or intended for human consumption)**
in order to keep unaltered the quality of water for sanitary use.

On existing system:

The section of the water system for Technical use must be identified and separated by means of a check valve to prevent the contamination of the Sanitary water line.

On new system:

The Sanitary and Technical lines must be separated to avoid any contamination due to chemical treatments that might affect water intended for human consumption.



HACCP Food Safety Protocol



Food Sanitary Safety

One of the primary requirements for being authorized to work in the food production lines is that the water used for food and beverage **must always meet** the chemical and biological parameters listed by Legislative Decree n. 31/2001 *at the point of use* whether it is a connection or a tap.

USERS' RESPONSABILITIES



Serious financial and criminal sanctions are applied to **ALL USERS** if the parameters of the water plant section they are responsible for (*from the water meter to the tap*) are not respected.

The people in charge of the sanitary and technical regulations are the following:

- **Private and public users and companies**
- **Apartment block administrators**
- **People in charge of public and private systems**

COMPULSORY TECHNICAL REGULATIONS

in force for the treatment of water intended for technical uses only



- **UNI 8065 and Italian President Decree n. 59/09** are compulsory technical regulations that must be applied to water intended for Technical use only.
- Chemical treatments, such as water softeners or additive feeders, cannot be applied to water intended for human consumption because the original chemical composition of water supplied at the water meter (*point of entry*) cannot be changed.

Water Treatment and Energy Efficiency

The main purpose of treating water is to prevent the formation of limescale deposits in heat exchangers. Limescale deposits works as an insulating layer that drastically reduces the heat exchange.



Limescale Deposits

Limescale deposits are caused by **mineral salts such as Calcium, Potassium e Magnesium** that are dissolved in cold water.

Because of the temperature increase in heat exchangers, mineral salts split into gas (Carbon Dioxide) and solid crystals (Calcium Carbonate).

Crystals have different sizes and shapes (Aragonite and Calcite) and they attach themselves to each other and adhere to the walls of the heat exchangers.

The thickness of limescale deposits can be so thick that they can drastically reduce the thermal exchange.



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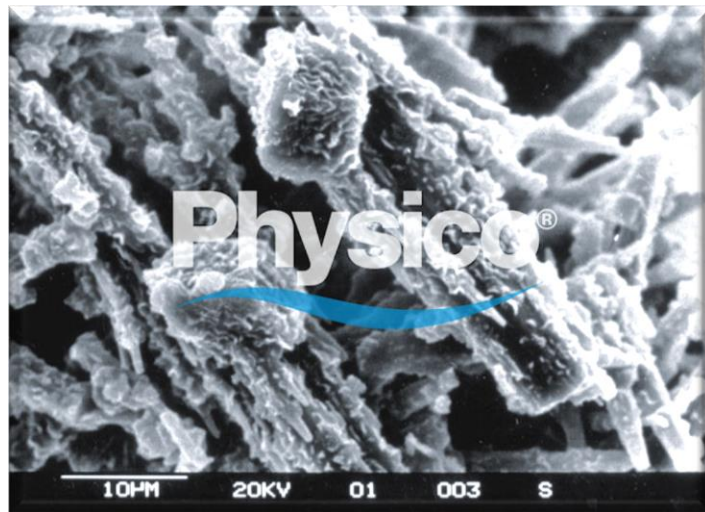


Physico®

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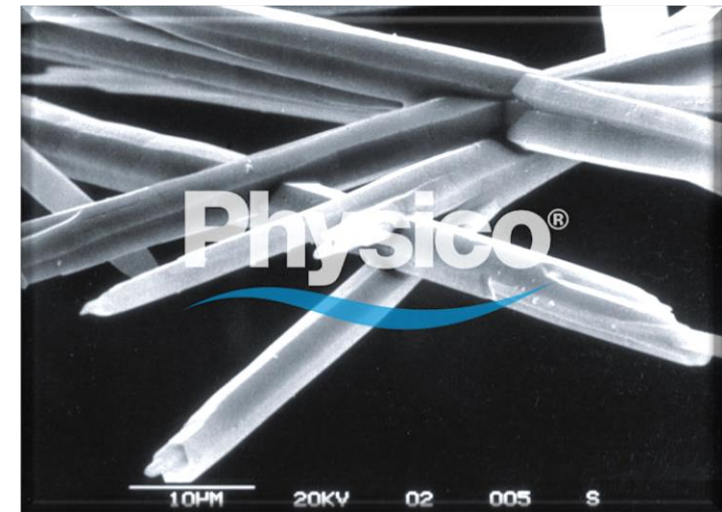
PHYSICAL effects produced by the treatment

Water as it is
Calcite: 40% Aragonite: 60%
(Calcium Carbonate)



Crystals x 2.000

Treated Water
Calcite: 0% Aragonite: 100%
(Calcium Carbonate)



Crystals x 2.000

Analysis of the limescale deposits obtained from boiling water (dry residue at 180°C)

PHYSICAL effects produced by the treatment

Visual inspection of the external layer of copper heat exchangers
after the laboratory tests with water thermostated at 55°C

Coil with
untreated water

Calcite: 30 %
Aragonite: 70 %



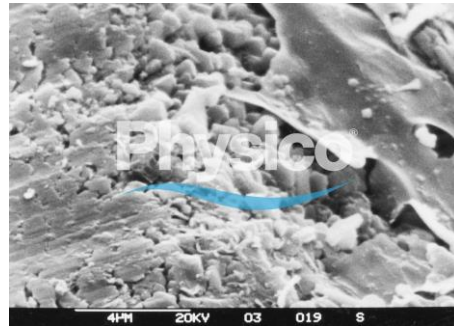
Coil with
treated water

Calcite: 0 %
Aragonite: 100 %

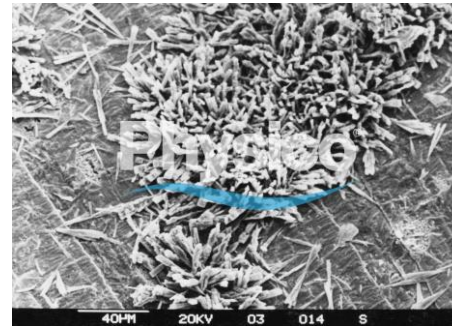
PHYSICAL effects produced by the treatment

Inspection by electronic microscope of the internal condition of the copper heat exchangers
after the laboratory tests carried out at the University laboratory of Industrial Chemistry

Section and inner surface
Untreated Water
Thickness



Crust x 8.000 **10/20 μ**

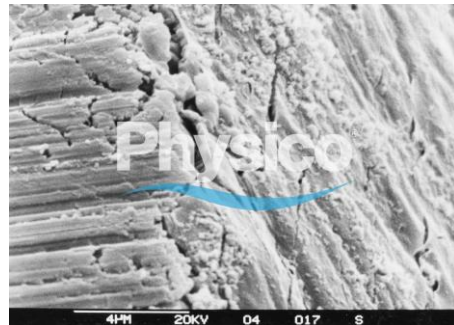


Crystals x 500 **10/20 μ**

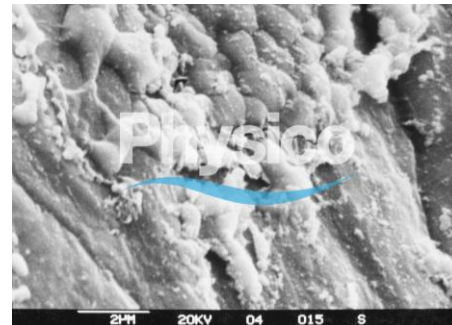


Crystals x 5.000 **10/20 μ**

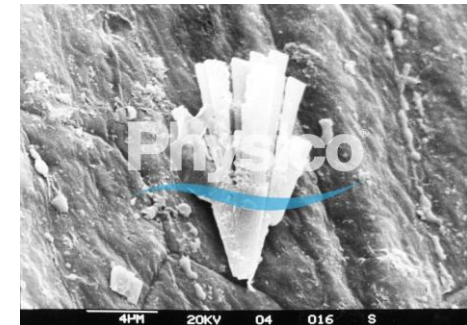
Section and inner surface
Treated Water
Thickness



Crust x 8.000 **0,03 μ**



Crystals x 10.000 **0,03 μ**



Crystals x 5.000 **0,03 μ**

PHYSICAL effects produced by the treatment



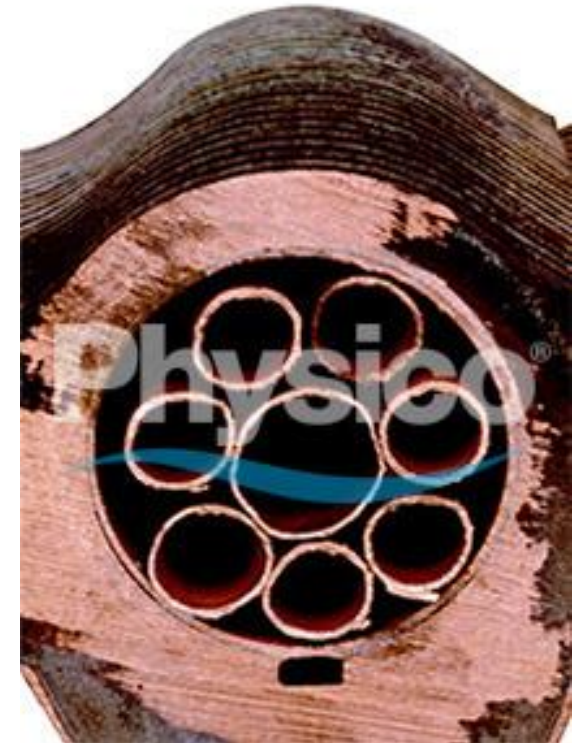
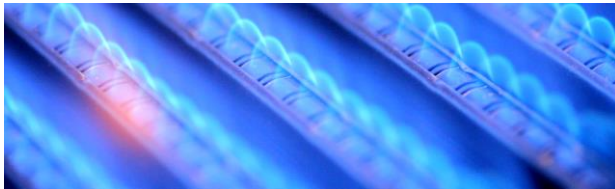
Test carried out on a gas boiler equipped with an instantaneous tube bundle heat exchanger.

Test duration: 500 h

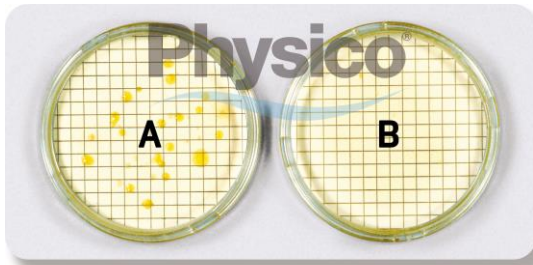
Water hardness: 38°F

Water temperature: 60°C

Visual inspection after the test.



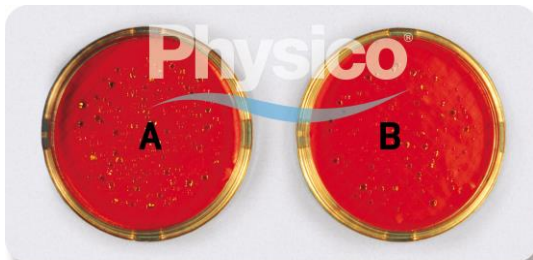
BIOLOGICAL effects produced by the treatment



Well water
Effects on the total
bacterial load at 37°C

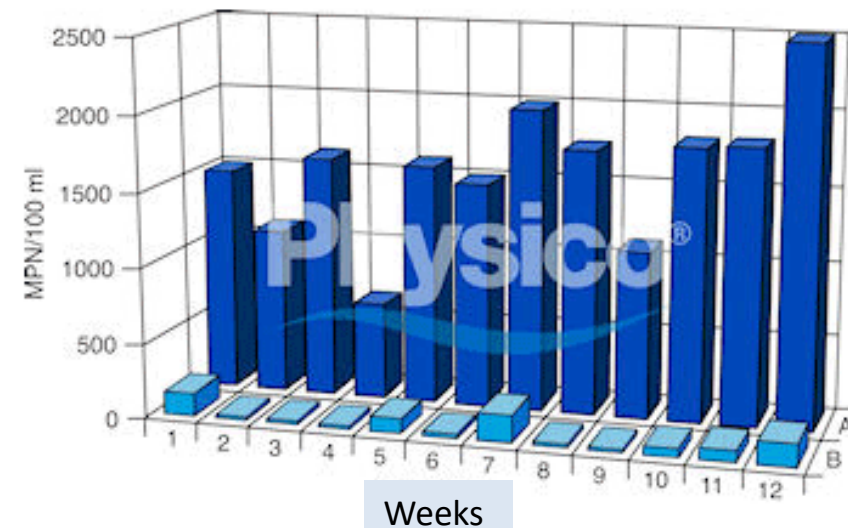


River water
Effects on faecal coliforms



River water
Effects on total coliforms

REDUCTION OF BACTERIAL LOAD WEEKLY INSPECTION



A: Untreated water
B: Treated water



SANITARY effects produced by the treatment *(if installed in substitution or as an alternative to the common chemical treatments)*



The maintenance of the presence of mineral salts such as **Calcium, Potassium, Magnesium** and other micronutrients (*TDS, Total dissolved solids*) **can reduce the mortality rate for Cardiovascular Diseases by at least of 17 %.**
Water intended for human consumption must be rich of Mineral Salts, therefore «hard».

(Nat. Res. Council water an Health. Vol I: 477. Washington DC, 1977)

National Academy of Sciences of Unites States

Drinking Water (if poor in Mineral Salts/mineral water):
it is recommended to drink it only for short periods of life.

Water intended for Human Consumption (rich in Mineral Salts/alkaline):
The OMS recommends that people drink this water for their entire life in order to achieve the health benefits shown in epidemiological research.



Physico® - Where to install it



Mod. PH 200
Installed on bypass

It is installed in the main inlet pipe of cold water by means of a bypass.

It is installed downstream of the meter or downstream of the autoclave, if any.

It is sized on the peak of maximum contemporaneity (the maximum water supply capacity of the main inlet pipe)



Mod. PH 350/3
Installed on bypass

Conclusions and main advantages

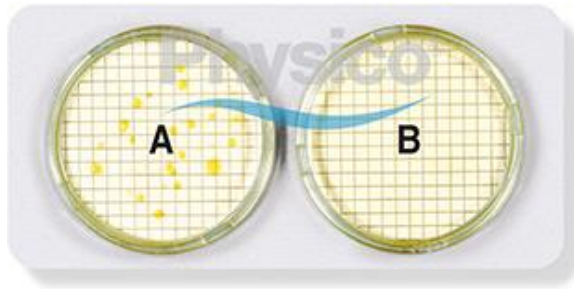


Drastic reduction of limescale deposits with a consequent increase in Energy Efficiency

*due to the micro-crystallization of Calcium Carbonate crystals produced in **pre-treated water** with a size of **0,03 μ** compared to **untreated water** producing crystals with a size of **10/20 μ***



Conclusions and main advantages



Well Water
Effects on total bacteria count at 37°C

**Constant reduction of 80/90 %
of the bacteria count, if any**

tested strains :

- *Faecal Coliforms*
- *Total Coliforms*
- *Escherichia coli*
- *Salmonella*
- *Legionella Pneumophila*
(total elimination of UFC)



Conclusions and main advantages

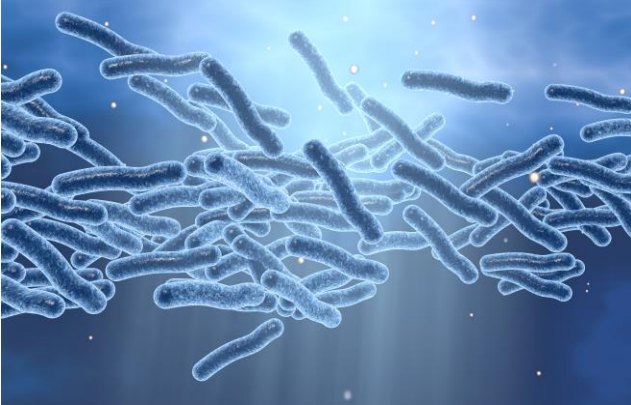


Protection from cardiovascular diseases (CVDs)
*(if applied in substitution of as an alternative
to the common chemical treatments)*

The maintenance of the presence of
mineral salts in the water for human consumption
such as **Calcium, Potassium, Magnesium**
and other micro-nutrients
reduces the mortality rate
for cardiovascular diseases by at least 17 %



Conclusions and main advantages



Continuous sanitization of water systems
against the proliferation of
Legionella Pneumophila

The result is maintained
over time due to the effect of the
self-sanitizing properties the water takes on
from the treatment with

Physico[®]



Conclusions and main advantages

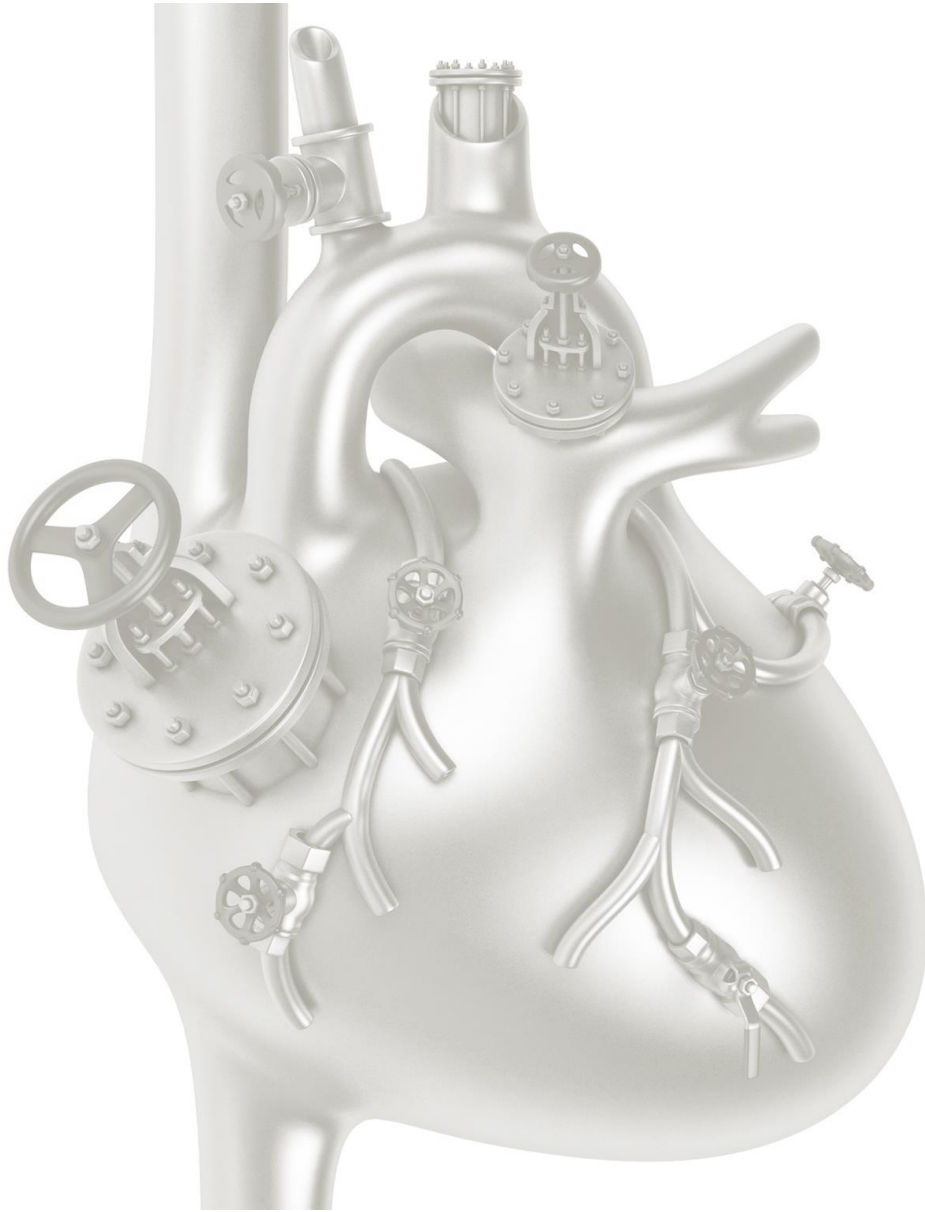


It can be installed in all new and existing systems
Total absence of maintenance and chemical additives

Constant effectiveness over time
Average life 20/25 years, 10 years warranty

Environmental Sustainability
*Returns water to the environment as received
(without pouring tons of salts or polyphosphates into waste water)*





We thank the following:

- Universities
 - Research Institutes
 - Certification Laboratories
 - Consultants
 - Designers
 - Collaborators
- who took part in developing
our project.*

