Calcium and magnesium are dissolved in water as calcium bicarbonate (and magnesium bicarbonate); these and other salts, in cold water are in "liquid" state, so they are harmless. With the water heating, calcium bicarbonate dissociates and forms calcium carbonate, develops carbon dioxide and separates water; therefore calcium is transformed in a solid state, and deposits thus forming incrustations.

$Ca(HCO_3)_2$	*Calcium bicarbonate*

▼

Water heating

▼

$Ca\ CO_3$	*Calcium carbonate*

As calcium carbonate - scale – can be formed only starting from calcium bicarbonate (as simplified in the previous scheme), if we separate this latter (IONISATION) deposits and incrustations can be avoided (carbonates).

The principle of magnetic devices dates back to studies made by Faraday, who in 1833 demonstrated a magnetic field conviently oriented could separate elements of some solutions. The magnetic induction law, according to Faraday, says a non chemical conductor (electrolytic conductor) with a vein width L moving at a speed V in a plane perpendicular to strenght lines of a magnetic field having density B, receive a induction tension "e". If parameters B and L are constant, a tension directly proportional to speed V is derived and therefore:

$$e = B \times L \times V$$

However, in case of interference on nuclearisation of salts dissolved in water, you need a minimum contact or induction time, which limits the V value (in our case if 2 m/s max.)
Prof. Giorgio Piccardi, chemistry professor at the University of Florence, made various experiments on descaling of boilers and other ductworks. In a first time he arranged a process of water activation; this water activated in contact with a magnetic field. As the studies continued he could prove changes in the precipitation speed of these deposits. The activated water had anti-scale properties that could not be found in non-magnetised waters. It concluded water activated by conviently orienting a magnetic field, had a physical structure different compared to ordinary water.

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- *"Sulla disincrostazione delle caldaie"*, *L'Imbottigliamento*, n°3, luglio 1958, pag. 27-38.
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The ionisation conditioning of ***MAIC*** *takes place through the synergic and constant action of strong permanent magnets arranged according to a patended pattern, with alternating polarity.*

By effect of this transformation, with ***MAIC*** *a new crystal is formed – aragonite – which remains suspended in water and it is drained by the water running; the aragonite crystal does not deposit and it is less hard than calcium carbonate (calcite).*

MINERAL	COMPOSITION	COULOUR	CRYSTAL SYSTEM	HARDNESS	REFRACTION INDEX	SPECIFIC WEIGHT
Aragonite	$CaCO_3$	Coulourless, white	Ortho	2,5-2,7	1,68	1,95
Calcite	$CaCO_3$	Coulourless, white	Esa	3,5-4	1,78	2,71

Data reported in the table confirm a water not treated with suitable and adequate means leads to a crystal (calcite) which originates hard and resistant incrustations. Aragonite is not only less hard and with a lower specific weight, but it is above all a more stable crystalline system, smaller and with a low tendency to bind with other binders, as magnesium, or with molecules of analogue system.

Aragonite is, in addition, more soluble in water than calcite (average of 70%).

MAIC *technology develops in two steps:*

MAGNETIZATION — *the energy offered by permanent magnets triggers the phenomenon of molecular decomposition;*

IONISATION – patent- — *magnets positioned with polarity alternance decompose calcium bicarbonate molecules thus reducing their mass and volume;*

The evolution introduced by patented devices ***MAIC*** *is to avoid the precipitation of calcium and magnesium as deposits without changing water hardness and, therefore, without changing its chemical balance. In this way the quantity of salts in it will remain unchanged but they will not be able to precipitate as deposits. Soft water - poor in salts – as the one obtained by using chemical treatment (for instance ion exchange resins) would be corrosive and could favour the passage of metal solutions, even toxic, as lead which is always present in iron pipelines.*

MAIC *action can favour the detachment of existing scale. Indeed, scale deposits in layers; each new layer consolidates previous ones making them hard and resistent. By installing the descaler and then interrupting new scale deposits, the more recent layers, the ones more exposed to the water running, can detach by effect of natural phenomenon and actions among which: water-hammers, thermal expansion, water erosive action, etc. The phenomenon can be checked during the first weeks after descale device installation, by inspecting filters and aerators where pre-existing scale could deposit.*

*Furthermore, **MAIC** does not wear out and does not need maintenance; compared to other chemical devices, it does not imply maintenance costs.*

***MAIC** is independent and it does not require the addition of salts or other substances. Its life is unlimited over time.*

***MAIC** is made in compliance with EC decrees 80/778,98/83,89/336, 92/31 / 93/68.*

E.B.I.sas di Passoni G. & C.