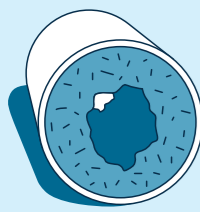


Limescale prevention

Essential for energy savings

Problems caused by Hard Water

Calcite, the main cause of scale, is the most common form of calcium carbonate and occurs as a natural ingredient of chalk, limestone and marble. Water passing over and permeating through such rocks dissolves calcite when this water subsequently flows through a water system the calcite precipitates out to form a very hard scale on surfaces.



When hard water is heated, or evaporation takes place, the problems are exacerbated. Calcite forms ever growing layers of rock-like deposits until eventually pipes, jets, and equipment become totally blocked.

The problem increases as the water gets hotter. Water containing 145ppm of calcite, flowing at 3.5 litres per minute, produces in one year 4.8 kilograms of scale at 60°C. At 80°C this rises dramatically to a massive 29.9 kilograms!

Scale wastes both energy and financial resources just one eighth of an inch of limescale **reduces heating efficiency by 25%**. It is also very expensive to remove, descaling pipes and boilers alone costs British industry over £800m each year.

It has been shown that a heat exchanger surface with 1mm limescale deposit requires approximately **8% more energy** to achieve the same output. Consequently, the energy saving benefits of a scale-free boiler are such that it makes sense to err on the side of caution.

For a modest outlay, the householder will see long term benefits in terms of reduced energy bills and fewer boiler breakdowns. Research indicates that modern high efficiency boilers work at higher temperatures than standard efficiency boilers, temperatures fluctuate more, waterways tend to be narrower and heat exchangers thinner, so limescale build up has a more serious effect on performance sooner than would otherwise be the case.

Helping your customers

Find out what the problem is

It is important to ascertain from your customer the problems they are experiencing with water hardness. This information will enable you to advise them on the correct product.

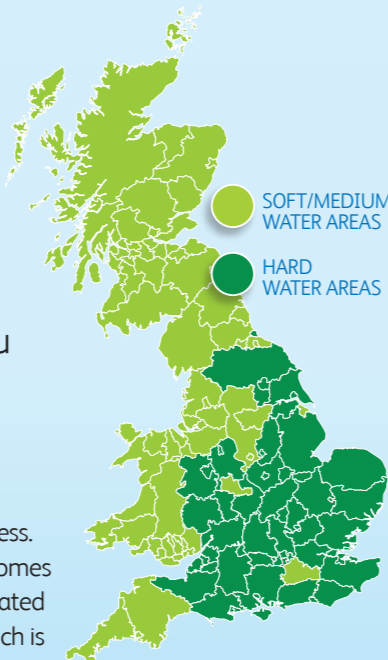
Tell tale signs

If you live in a hard water area, **60% of the UK does**, you will know the tell tale signs ~ furring of appliances, scale deposits in a heating system, noisy radiators and reduced flow and efficiency.

It is important to know the level of water hardness and putting the correct solution in place can save money.

Water hardness

There are two types of hardness. Temporary hardness, which comes out of the water when it is heated and permanent hardness which is unaffected by heating. Measuring the extent of water hardness and the effect on appliance efficiency is the key to providing the appropriate solution.



Guaranteed confidence in water quality

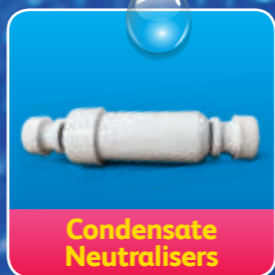
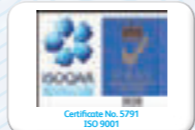
Calmag's **fresh, innovative approach** to water quality has led to the development of the most extensive and effective range of water treatment solutions within the UK water treatment industry – our products are designed with the **needs of our customers** in mind – the merchant, installer and consumer. Calmag's philosophy is based on providing products and services to meet the real needs of all our customers – we don't simply produce what we think you should buy - Calmag have the **unique design** and production capabilities to produce what you want - when you want it!

Beware of imitations!

There have been a number of instances when customers have been under the impression that they have bought a Calmag product but, in reality, have been supplied with an alternative and inferior product that fails to match the industry-leading performance and aesthetic appeal of ours. So we strongly advise customers to **ask for our product by name**. Other products may seem to offer similar qualities, but if it isn't Calmag, it simply won't perform to our standards.

There are **two key ways to check** that you've purchased a genuine Calmag product: they carry the **WRAS approval** on scale inhibitors, and **BuildCert** approvals on a range of chemical inhibitors.

Calmag is a member of and in partnership with:



Condensate Neutralisers



Water Softeners



Water Filtration



Powerflushing

For more information regarding all Calmag products and services please go to www.calmagltd.com

Tel: 01535 210320 Fax: 01535 210321 Email: sales@calmagltd.com

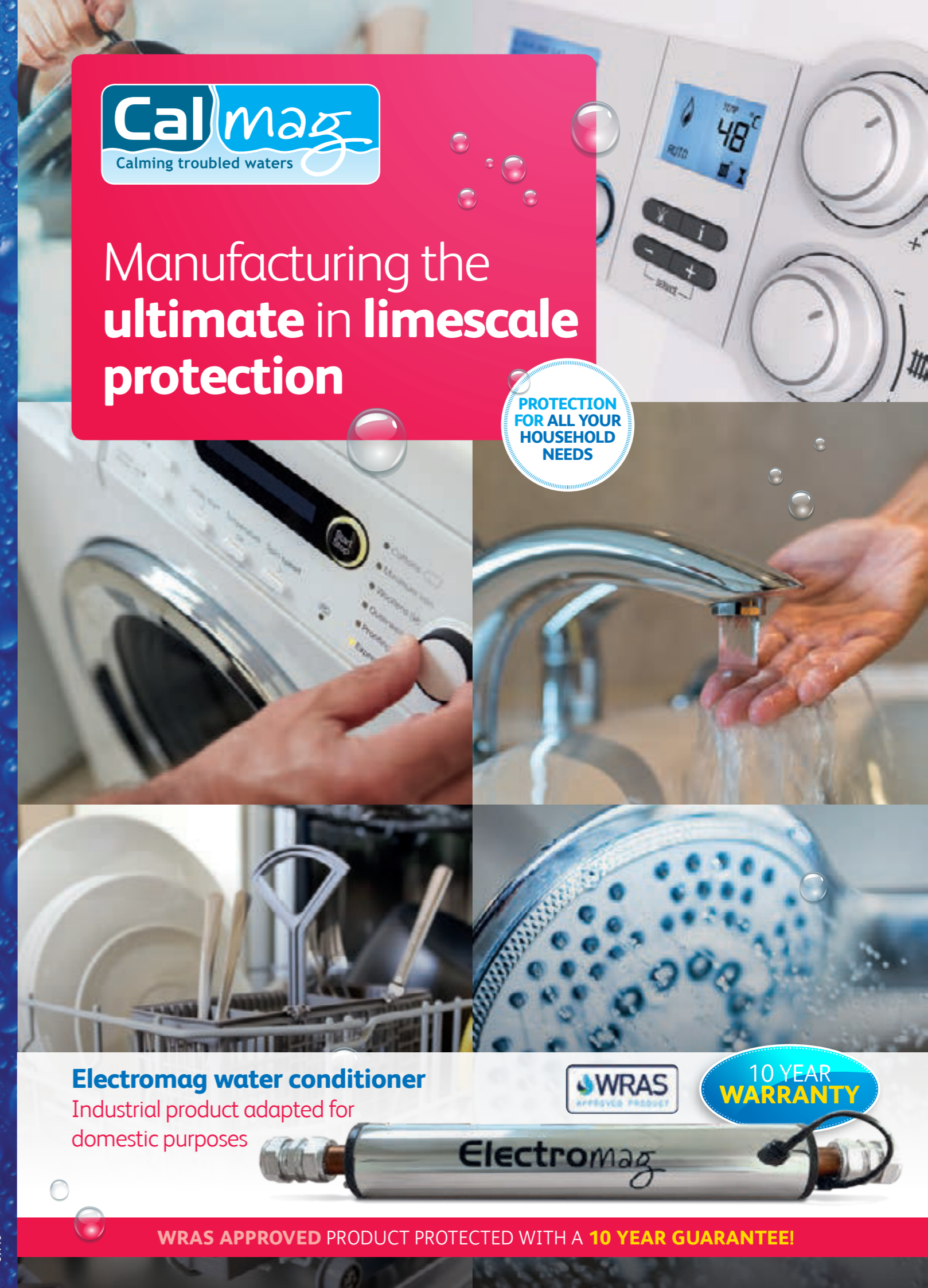
Calmag has a policy of continuous product development and reserves the right to alter any specifications without prior notice. Copyright Calmag Yorkshire Limited. All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior consent and permission of Calmag Yorkshire Limited. Calmag Yorkshire Limited hereby exclude all liability to the extent permitted by Law for any errors or omissions and for any loss, damage or expense (whether direct or indirect) suffered by a third party relying on any information contained in this brochure.

* All figures are taken from various published figures



Manufacturing the ultimate in limescale protection

PROTECTION FOR ALL YOUR HOUSEHOLD NEEDS



Electromag water conditioner

Industrial product adapted for domestic purposes



WRAS APPROVED PRODUCT PROTECTED WITH A 10 YEAR GUARANTEE!

The Science

How Electromag prevents scale

The purpose of the Electromag is to **prevent scale** (CaCO₃) adhering to heating elements and pipe work within a water system without changing the chemical composition of the water.

Efficient

The Physics related to the Electromag shows how this relates to helping with the above problem.

There are various elements contained within water, including focus on the scale forming varieties, Calcium Carbonate (CaCO₃)



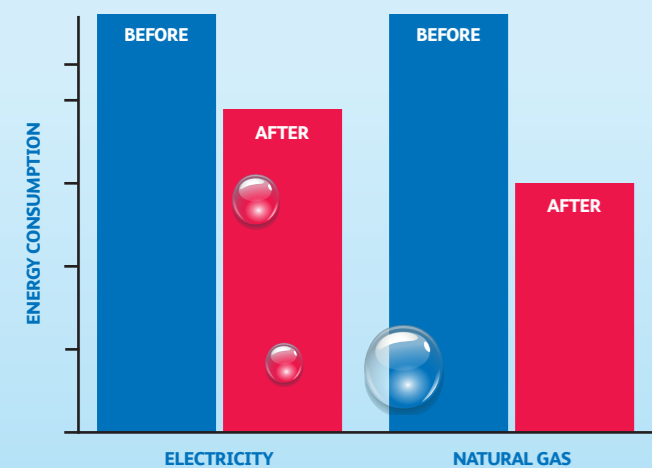
As per Coulombs Law Ca & CO₃ are attracted to each other.

When water flows through the activation chamber of the Electromag a positive polarity is created over the entire body of water, which has many beneficial effects.

The CaCO₃ ions will now repel each other due to their positive charge, preventing them from adhering to pipe work and heating elements.

Due to the electrostatic action, existing scale build up will be removed as it adheres to the positively charged ions passing through the water system, eventually leaving a system free of scale and working at peak efficiency.

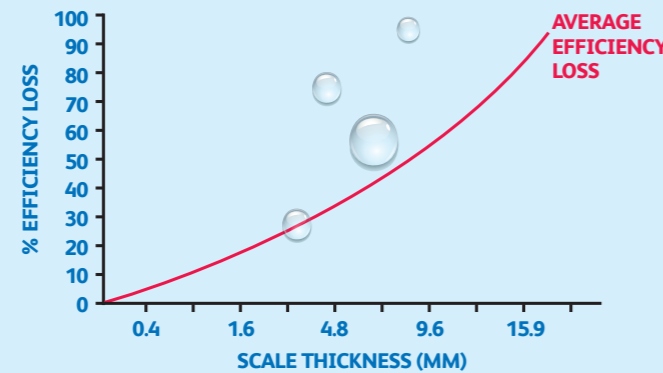
Energy savings after water treatment*



The Scale of Economy

The illustration below shows the efficiency lost, relative to scale accumulation.*

Average Efficiency Loss



With energy costs on the increase and predictions showing this trend will continue year on year, the Electromag offers an answer to costly efficiency loss due to hard water. See the energy lost, relative to scale accumulation* below:

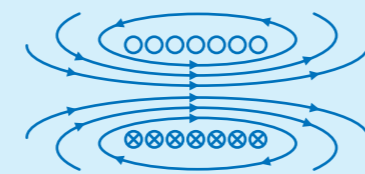
	SCALE THICKNESS							
	0.5	1	2	4	6	8	10	12.7
Decrease in Condensing Capacity	5%	9%	17%	23%	29%	34%	50%	56%
Average Increase in Temp (°C)	0.4	0.8	1.6	3.2	4.8	6.4	8	10
Increase in Energy Required	5.8%	10.6%	20.2%	29.4%	35.6%	46.8%	66%	76%

The Physics

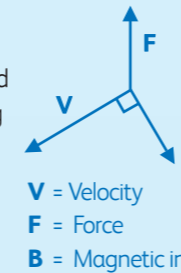
Physics related to Electromag:

Coulomb's Law, developed by physicist Charles Augustin de Coulomb in the 1780's may be stated in scalar form as follows:

The magnitude of the electrostatic force between two point electric charges is directly proportional to the product of the magnitudes of each charge and inversely proportional to the square of the distance between charges. (Below).



The right hand rule. In physics the right-hand rule is a common mnemonic for understanding notation conventions for vectors in 3 dimensions. It was invented by British physicist John Ambrose Fleming in the late 1800's for use in electromagnetism.



The magnetic field B (Below) can be defined by: **Lorentz Law**

$$\vec{F} = q\vec{v} \times \vec{B}$$

Positive test charge q

The implications of this expression include:

- The force is perpendicular to both the velocity v of the charge q and the magnetic field B.
- The magnitude of the force is $F = qv \sin \theta$ where θ is the angle < 180 degrees between the velocity and the magnetic field. This implies that the magnetic force on a stationary charge or a charge moving parallel to the magnetic field is zero. Right hand rule.
- The direction of the force is given by the right hand rule. The force relationship above is in the form of a vector product.

How Electromag Works

Hard water, which is 60-70% of the UK, has a drastic effect on the efficiency and lifespan of appliances. Limescale is a poor conductor of heat and any heat transfer surface, covered in scale will experience a reduction in efficiency.

The Electromag is an electromagnetic water conditioner, providing a **low cost solution to the build up of limescale**. The unit is an innovative product which not only protects appliances from future limescale build-up, but will also remove existing limescale to further enhance heat transfer efficiency.

Using the latest technology, the unit represents a **breakthrough in electromagnetic water conditioning technology**. Electromagnetic waves are formed by vibrations of electric and magnetic fields which are perpendicular to one another in the direction the wave is travelling – 90 degrees.

The magnetic field then unites with the fields of the other turns to produce a field around the entire coil making the total magnetic field stronger.

The Electromag units have all been designed and calculated at the maximum level prior to any "saturation" effect.

We believe that through our experience a **higher Gauss strength leads to a better performing product** and is produced by using larger diameter copper wire and therefore the power consumption relates to the diameter of the wire and the number of windings.

The whole concept of the product is that the minerals (limescale) are held in suspension in the water when conditioned so they do not come out of solution and therefore cannot build up inside the unit. Limescale will not build up inside the unit as all units are installed on cold water lines and limescale is not produced until the water is heated.

The **Electromag does not need maintenance** does not have any moving parts which would result in wear and tear. The mechanical parts of the product carries a **10 year warranty**.

Magnetic Flux Density

The magnetic flux density is typically measured in gauss and it is commonly accepted that electromagnetic technology within commercial applications provides the optimum results for scale control.

This technology has been adapted to enable Calmag to offer domestic electromagnetic water conditioners that provide an alternative, stronger solution to areas where the traditional methods of scale control have not been adequate

Typical gauss values

0.25-0.60
The Earth's magnetic field at its surface

100
An iron magnet scale inhibitor

1000-5000+
Electromagnetic water conditioner

10 YEAR WARRANTY



Benefits of using the Electromagnetic water conditioner

- ✓ **Chrome plated stainless steel housing** - Robust quality material
- ✓ **Electromagnetic technology** - Proven in industry
- ✓ **10 year guarantee** - Peace of mind and maintenance free
- ✓ **12 month money back guarantee** - Customer satisfaction
- ✓ **WRAS Approved** - Materials conform
- ✓ **Water remains potable** - Safe to drink
- ✓ **Manufactured in the UK** - Quality
- ✓ **Does not wear out** - Units that use a zinc sacrificial anode will gradually disperse
- ✓ **No moving parts** - Maintenance free
- ✓ **Use less detergents/cleaners** - Saves money
- ✓ **Cleaning is quicker** - Saves time
- ✓ **Long lasting effect** - Value for money
- ✓ **Uses power for optimum performance** - Efficient
- ✓ **Cost effective to run** - Inexpensive
- ✓ **No minimum flow rate required** - Easily sized
- ✓ **70 l/min max flow rate** - Copes with all appliances
- ✓ **15/22mm pipe size** - Whole house protection, one unit required
- ✓ **80°C Max temperature** - Materials tested
- ✓ **Less than 10 watts power consumption** - Cost effective
- ✓ **10 Bar pressure tested** - Quality build
- ✓ **12v Power supply** - Safe
- ✓ **No fouling** - Flow rate unaffected



*All data has been taken from various published figures