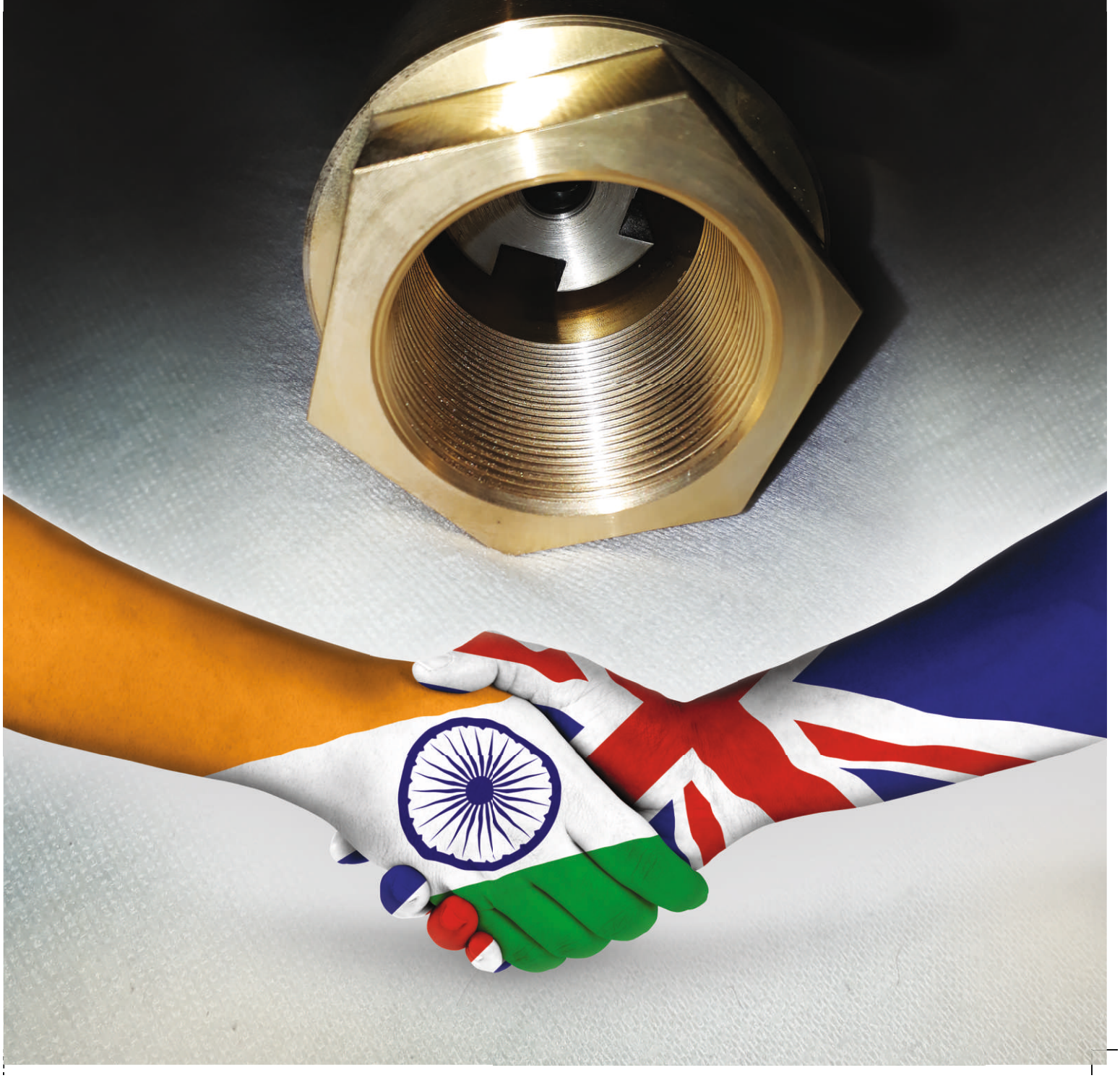
KiTEC INDUSTRIES (INDIA) PRIVATE LIMITED

IN ASSOCIATION WITH ADVANCED HYDRO (UK) LTD.

LAUNCH THE

ADVANCE CRYSTALLISATION PROCESS (ACP)™

SCALE CONTROL TECHNOLOGY



THE ADVANCED CRYSTALLISATION PROCESS (ACP)™: It is advanced technology with a proven record of scale control and corrosion protection. The ACP™ is technology driven and has been developed over many years by the team of Chemists and Engineers at Advanced Hydro Ltd. in the UK.

Based on sound scientific research and development, the ACP™ works by dosing a small quantity of Zinc into the water stream. This disrupts the calcite crystal formation. Such hard water minerals are then washed through the system preventing the build-up of problematic scale.

WHAT IS HARD WATER SCALE?

Lime scale or hard water scale, is known chemically as Calcium Carbonate ($CaCO_3$) which forms when hard water is heated. It exists in two forms - "Calcite" and "Aragonite". The characteristics of these are as follows:

An example of Calcite scale

CALCITE

It is a hard crystalline, brittle substance which forms hard scale deposits on plastics and metals. Calcite is the preferential form of solid $CaCO_3$ (over 95% under normal circumstances). It is insoluble in water, forms scale on heated surfaces or can drop out of solution and collect at the bottom of vessels. Calcite causes unnecessary energy loss, system and equipment failure.

ARAGONITE

It is a soft, light, fluffy form of $CaCO_3$. Although technically a solid it remains in solution as a suspended solid. It has a tendency not to form on or adhere to plastic or metal surfaces and does not form hard scale like Calcite.

WHAT PROBLEMS ARE CAUSED BY HARD WATER SCALE?

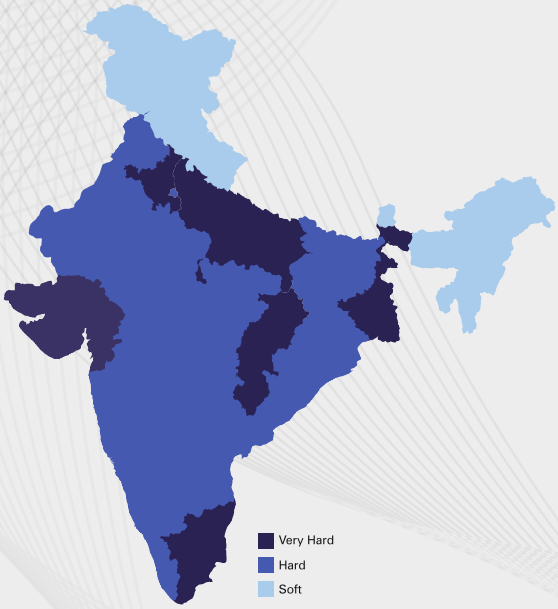
When hard water is heated Calcium Carbonate is formed in accordance to the following chemical equation.

$$Ca_{2+(aq)} + 2HCO_{3-(aq)} \text{ à } CaCO_{3(s)} + H2O_{(l)} + CO_{2(g)}$$

Calcium Carbonate ($CaCO_3$) as Calcite coats pipes, elements and equipment which reduces heat transfer (increasing energy costs), reduces flow and causes early equipment failure.

- Scale costs the UK industry over £1 billion p.a. in additional energy costs.
- Scale provides habitat and nutrition for Bacteria
- Scale formation reduces flow rates in systems
- Scale formation reduces plant and equipment life and adds service and maintenance costs

The following map shows that the vast majority of India suffers from either Hard Water or Very Hard Water.



WHAT DOES THE ADVANCED CRYSTALLISATION PROCESS (ACP)™ DO?

The Advanced Crystallisation Process (ACP) ™ prevents scale and protects against corrosion through anodic protection.

Hot water supply in both commercial and domestic buildings is generated by a boiler heating water to 60 ^{0}C. This heated water is used for building heating and/or supply of hot water.

The ACP™ will benefit any application where water is heated to 65 °C. The ACP™ is unaffected by the pH of the water, is safe for drinking, and hence can be used to protect the whole system.

Regarding bacterial growth, microorganisms are known to harbour and propagate (grow in number) within calcite scale. Under the right environment they can break out in large numbers and cause a significant risk to health. The ACP ™ reduces scale and reduces the opportunity for bacterial and microbes to fix and grow. Hence although the ACP ™ is not a biocide treatment it will help to maintain a cleaner water system.

ADVANCED CRYSTALLISATION PROCESS (ACP™): HOW IT WORKS

The ACP™ works by electrolytic action. It exploits a uniquely designed, high purity zinc anode which doses a minute quantity of Zinc ions into the water stream. The effect of these ions is to coalesce hard water minerals which then remain in solution and wash through the system without deposition on pipes and equipment. The net effect is a reduction in hard water scale of over 80%.

Effects of the Zinc ions:

- Delay initial crystallisation
- Retard and slow $CaCO_3$ crystal growth
- Form $Zn(OH)_2$ and $ZnCO_3$ which act as crystal nuclei in solution
- Cause $CaCO_3$ to form as Aragonite rather than rather than Calcite

The ACP™ will benefit any application where water is heated up to 65 °C. This covers virtually all buildings both commercial and domestic and some manufacturing and process water.

BENEFITS AND PAYBACK

The benefits of using the ACP™ Systems are:

- Prevents scale - saving on energy costs
- Prevents scale - saving on maintenance
- Prevents scale - saving on equipment failure
- Offers corrosion protection due to anodic action giving cathodic protection
  - Extending the life of the pipework
  - Reducing the effect of corroding pipes, coloured water, bacterial growth sites and systems leaks

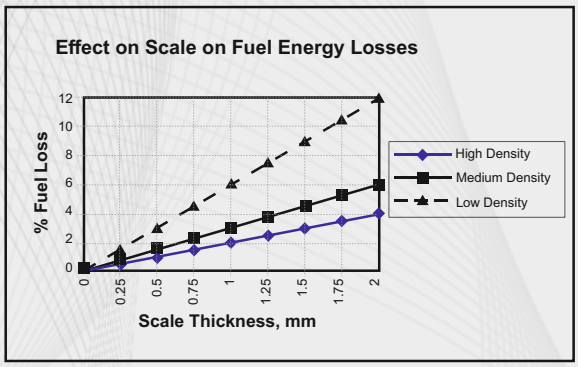
SCALE HAS A MASSIVE EFFECT ON ENERGY COSTS

Without treatment, hard water when heated, deposits scale on pipework and equipment. This reduces flow and significantly increases the energy demand and associated cost.

Over time the scale increases in thickness causing ever increasing costs, maintenance and equipment failure.

- **New Pipe**: Smooth water flow with clean and clear pipe work with hard water minerals in water stream.
- **After 1 Year:** 1 to 2 mm scale deposit on pipe wall and equipment increasing power cost by up to 12%.
- **After 2 Years:** Scale continues to form and energy costs would increase to 12 - 17%. Additional maintenance required and some equipment failure may be seen.
- **At 5 – 10 Years:** Thick scale wall built, energy costs could increase to 50%, significantly more maintenance is required and equipment failure/replacement is common place.

The following graph shows the energy (and money) loss due to scale build up.



HOW CAN THE COST BENEFITS OF THE ACP™ BE EVALUATED?

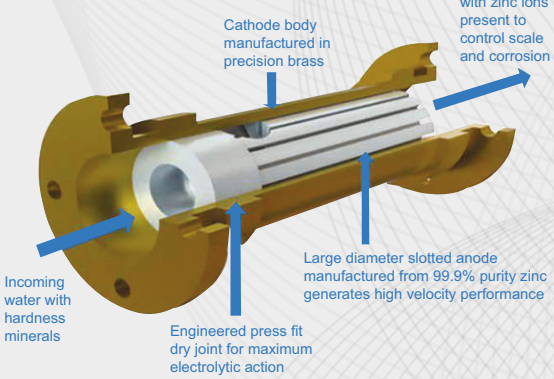
In hard water areas scale growth within a building water system can amount to heat losses of 7% in year 1, 12% in year 2 and 17% in year 3. Even without further scaling this would amount to unnecessary energy losses shown in the following table (UK case study):

Years	Cumulative Energy Loss %	Cash Loss	
		Energy Bill ₹ 13,65,000 pa	Energy Bill ₹ 22,75,000 pa
2	17	₹ 2,59,415	₹ 3,68,640
5	70	₹ 9,55,730	₹ 15,92,890
10	155	₹ 21,15,330	₹ 35,25,550

The cost of an ACP™ unit to treat the water supply to these building would be between ₹ 2,09,250 and ₹ 3,63,020 giving a **PAYBACK OF LESS THAN 2 YEARS**

Unlike powered systems, ACP ™ has no running cost and is 100% reliable. It has been designed to dose a set amount of Zinc into the water stream and as a passive system (non powered) will continue to work without power or maintenance for up to 10 years. A truly fit and forget system whose long lasting effect treats the whole systems not just the immediate pipework.

Advanced Crystallisation Process (ACP)™



Another significant benefit of the ACP ™ is the corrosion protection it offers. As the ACP ™ works by virtue of a depleting anode, by definition it offers cathodic corrosion protection to any system. This is a benefit of the ACP™ which electronic systems do not provide.

ADVANCED CRYSTALLISATION PROCESS (ACP)™: FEATURES AND BENEFITS

- Scientifically Proven UK Design
- Easy Low Cost Installation
- Developed to Give Optimum Zinc Ion Release
- Controls Scale and Protects Against Corrosion
- No Maintenance Required
- No Power Required
- Anode has a Minimum 10 Year Life (Domestic application)
- Environmentally Friendly
- Chemical Free With no Ongoing Costs
- Suitable for Potable and Non-potable Use
- Unit Sizes to Suit 0.3 to 40 l/s Flow
- WRAS Approved

ADVANCED CRYSTALLISATION PROCESS (ACP)™: APPLICATIONS

The ACP™ reduces hard water scale in any system that heats water up to 65 ^{0}C. It will also offer corrosion protection by anodic depletion similar to that used on ships and oil pipelines.

In the UK the ACP™ is sold in the following market segments:

- Construction, (the new build, commercial market such as hospitals, hotels, prisons, office buildings etc)
- Manufacturing & Process Industry
- Commercial Building Refit
- Executive Housing Market

The ACP™ has seen great success in the construction sector having been fitted to a number of prestigious new building projects in London and elsewhere. The ACP™ has been specified on a number of these projects by Multinational Consultancies such as Mott McDonald, Atkins Consulting, Building Design Partnership, Arup Consulting, BuroHappold Engineering, Hurley Palmer Flatt, all of which have offices in India.

SCIENTIFICALLY PROVED AND TESTED

The ACP™ was developed with the support of UK government funding which required a strict regime of testing and proof of concept work. The product was designed on known scientific laws and principles. The ACP™ forms Aragonite rather than Calcite which is supported by many scientific papers. Part for the funding conditions was successful testing and evaluation at the University of Surrey where ACP ™ proved to reduce Calcite scale by over 80%. In addition an unique benefit of ACP ™ is that it is the only anti-scale system to offer corrosion resistance.

ADVANCED CRYSTALLISATION PROCESS (ACP)™: PRODUCT RANGE – As available in UK

ACP Model	Pipe Size		Max. Flow Rate	Connections	Dimensions	
	(mm)	(inches)	(litres/sec)	)	Length (mm)	Diameter (mm
ACP 15	15	½	0.3	½" BSP Female	150	26
ACP 20	20	¾	0.6	¾" BSP Female	180	57
ACP 25	25	1	1.2	1" BSP Female	260	63
ACP 32	32	1¼	1.7	1¼" BSP Female	310	76
ACP 40	40	1½	2.6	1½" BSP Female	345	82
ACP 50	50	2	4.2	2" BSP Female	420	89
ACP 65	65	2½	6.5	2½" PN16 Flange	427	185
ACP 80	80	3	10.5	3" PN16 Flange	512	200
ACP 100	100	4	18	4" PN16 Flange	512	220
ACP 125	125	5	28	5" PN16 Flange	516	250
ACP 150	150	6	40	6" PN16 Flange	516	285

Note: Pressure drop at maximum flow < 0.3bar

Presently in India we are offering 1", 1½", 2" and 2½" ex stock. All other models will be imported against orders and hence delivery period will be 3 to 4 months.

COMPETING PRODUCTS

There are a number of anti-scale devices in the market including Ultra Filtration/Reverse Osmosis (UF/RO), Water Softeners, Magnetic, Electronic (Coil Wrap) and Chemical additives. Ho wever only ACP ™ offers the full spectrum of features and benefits listed in the following table.

Treatment	No Power Required	Corrosion Protection	Environment Friendly	Permanent Treatment	Easy to Install	Chemical Free	No Ongoing Ma
Chemical	3	X	X	3	3	X	X
Magnetic	3	X	3	X	3	3	3
Coil Wrap	X	X	3	X	3	3 X	
UF/RO	X	X	X	3	X	3	X
Electro Magnetic	X	X	3	X	3	3 X	
Water Softener	X	X	X	3	X	X	X
ACP	3	3	3	3	3	3	3

SUMMARY

The Advanced Crystallisation Process (ACP) ™ prevents formation of hard water scale in water systems heat ed up to 65 °C. It is the only anti-scale system that offers corrosion protection . It is suitable for potable drinking water, is environmentally friendly, requires no maintenance, no labour and no power. No other system gives the benefits and effective financial payback that ACP™ offers.

WRAS CERTIFICATION

The following Water Regulations Advisory Scheme (WRAS) Certificate is issued to Brightwater Technology Ltd the UK Distributor of the ACP ™. A WRAS Certification approves products for use on potable drinking water applications

WRAS
APPROVED PRODUCT

This certifies that

BRIGHTWATER ENVIRONMENTAL LTD

has had the undermentioned product examined, tested and found, when correctly installed, to comply with the requirements of the United Kingdom Water Supply (Water Fittings) Regulations and Scottish Water Byelaws.

ACP15, ACP20, ACP25, ACP32, ACP40, ACP50, ACP65, ACP80, ACP100, ACP125 & ACP150 ELECTROLYTIC WATER CONDITIONERS

The certificate by itself is not evidence of a valid WRAS Approval. Confirmation of the current status of an approval must be obtained from the WRAS Directory (www.wras.co.uk/directory)

The product so mentioned will be valid until the end of:

September 2021

1609096

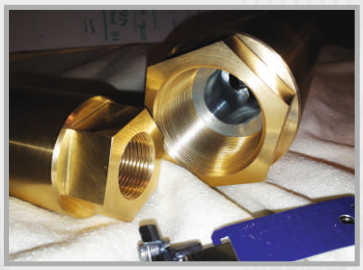
Certificate No.

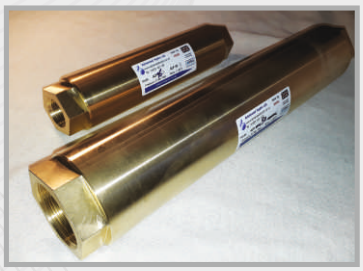
J Furnival

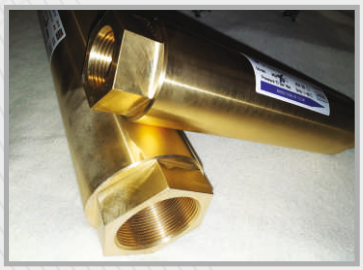
Secretary

K. Lusby

Chairman, Product Assessment Group







Rewriting the Standards

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