



Certified to
NSF/ANSI/CAN 60



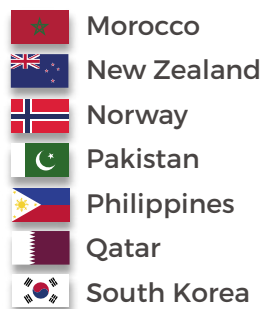
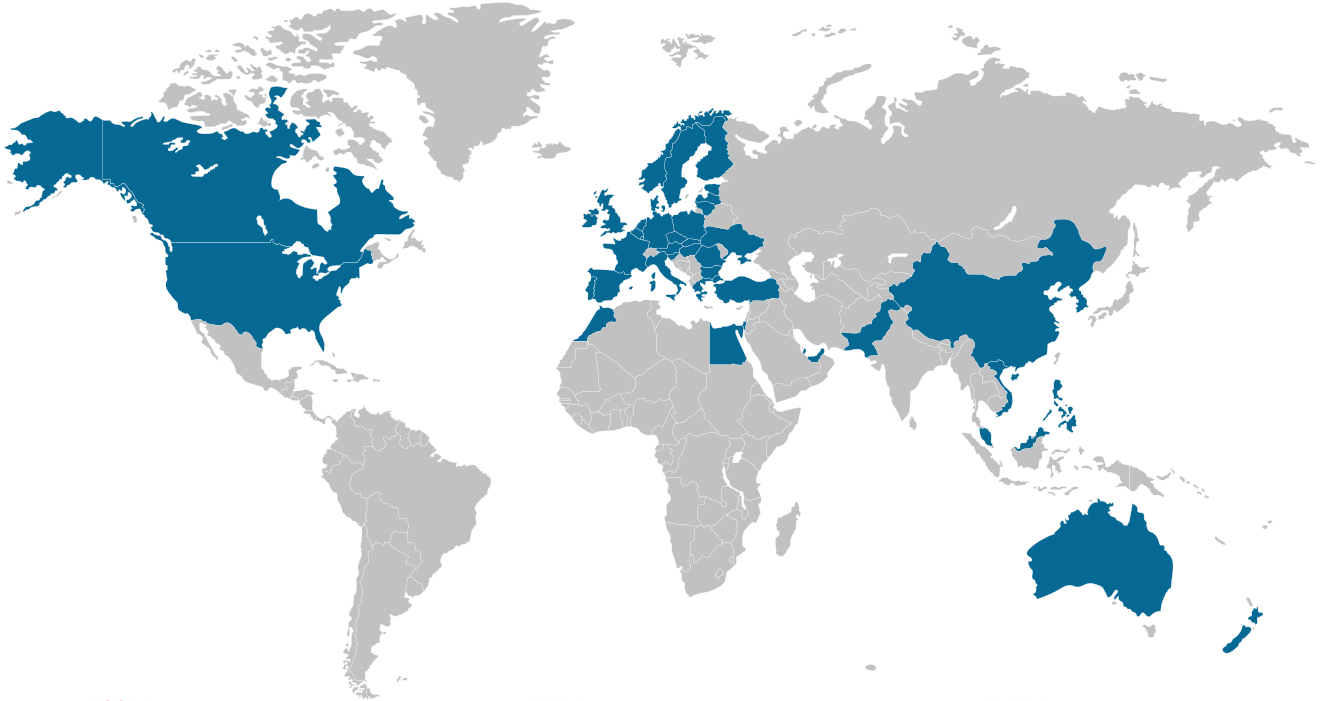
EndoSan[®]

**LEGIONELLA CONTROL &
WATER TREATMENT**



EndoSan®

Approved & Used Globally



“... the most developed of the stabilised hydrogen peroxides now available has proved particularly effective against biofilms and biofouling in water systems. Independent testing shows it provides a very wide spectrum of biocidal activity against bacteria, viruses, spores, fungi, amoebae (such as Amoeba acanthus which can act as host to Legionella bacteria) and algae.”

Dr T. Makin - Independent Review of EndoSan

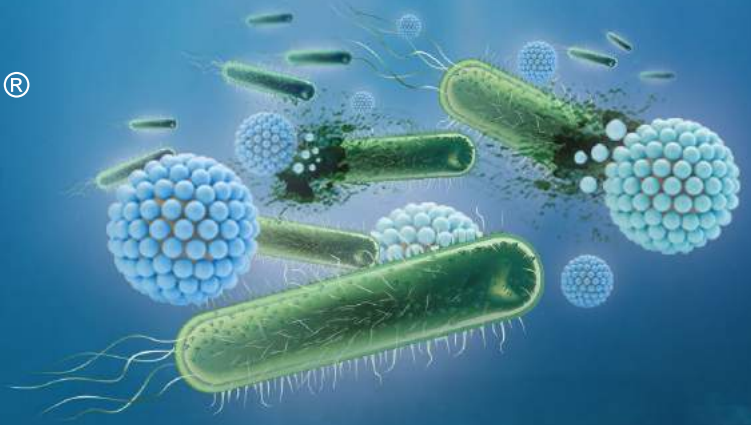
Co-author of the HSE Approved Code of Practice and Guidance (ACOP) -
The Control of Legionella Bacteria in Water Systems (L8)

Co-author of the Department of Health Technical Memorandum HTM 04-01 - Legionella Control in Healthcare Premises



EndoSan®

THE MOST ADVANCED STABILISED HYDROGEN PEROXIDE



INTRODUCING ENDOSAN

EndoSan is a powerful, highly effective, broad spectrum disinfectant that is both stable and safe.

EndoSan is a solution of Hydrogen Peroxide (H_2O_2) that is stabilised using a unique, proprietary chemistry.

When correctly applied to water or surfaces EndoSan will disinfect through an oxidation process, destroying micro-organisms and pathogens and degrading into only water and oxygen without any harmful disinfection by-products (DBPs).

EndoSan is chlorine and alcohol free, and compatible with usual materials of construction found in water systems and cooling towers with no corrosive effects during application.

MARKET LEADING
**ULTRA STABILISED
HYDROGEN PEROXIDE TECHNOLOGY**

HYDROGEN
OXYGEN
UNIQUE STABILISER
OXYGEN
HYDROGEN

**H₂O₂
HYDROGEN
PEROXIDE**

EndoSan®

**LEGAL FOR SALE
IN UK AND EU**

HOW ENDOSAN WORKS - A CLOSER LOOK

BEFORE

H₂O₂

ENDOSAN IS MADE UP OF STABILISED HYDROGEN PEROXIDE - H₂O₂

DURING

ENDOSAN IS ATTRACTED TO MICRO-ORGANISMS AND DISINFECTS VIA A STRONG OXIDISING PROCESS

AFTER

H₂O **O₂**

THE DISINFECTION BY-PRODUCTS OF ENDOSAN IS SIMPLY WATER (H₂O) AND OXYGEN (O₂)

Representation for illustrative purposes only

The Problem: Legionella & Biofilm

WHAT IS LEGIONELLA?

The bacterium *Legionella pneumophila* and related bacteria are common in natural water sources such as rivers, lakes and reservoirs, but usually in low numbers. Unfortunately, given the right conditions, *Legionella* bacteria can prosper in purpose built water systems in any type of premises.

When water contaminated with *Legionella* bacteria forms small droplets suspended in the air (aerosol or vapour), there is a very high risk of inhalation and the potential contraction of Legionnaires disease.



HIGH RISK LEGIONELLA AREAS

Cooling towers, evaporative condensers, spa pools/jacuzzis, hot and cold water systems. Systems that feature outlets like showers are particularly problematic, as water is turned to an aerosol and dispersed into the atmosphere.

Hospitals and nursing homes are higher risk as vulnerability to Legionnaires' disease increases with age and pre-existing health issues.



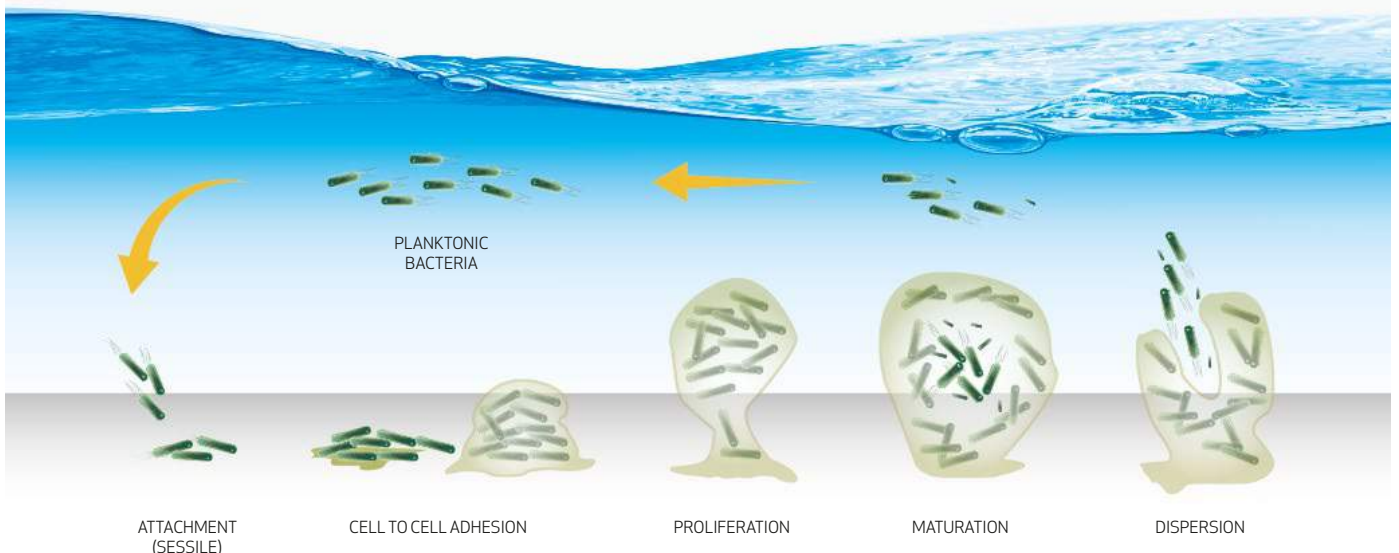
BIOFILM

A biofilm is a group of micro-organisms in which cells stick to each other and adhere to a surface. Biofilms provide bacteria a habitat that is the ideal environment for survival and replication. Additionally, the dispersal stage of the biofilm life cycle (illustrated below) enables the spread and colonisation of additional surfaces.

Biofilms can be found where:

- Pipework that contains deposits that could provide a source of nutrient.
- Water temperature is between 25°C and 45°C.
- Dead legs and/or low water flow areas exist.
- Water is stored and /or recirculated.

BIOFILM LIFE CYCLE:



The Solution: EndoSan Stabilised Hydrogen Peroxide

EndoSan Stabilised Hydrogen Peroxide is formulated to sustain the effectiveness of hydrogen peroxide's strong oxidising disinfection power.

Unlike chlorine-based disinfectants, EndoSan is highly effective at removing obdurate biofilms and forms no unwanted disinfection by-products (DBP). EndoSan simply degrades into water and oxygen, and leaves no detectable taint, unpleasant taste or odour.

Methods of Application



Depending on the purpose of use EndoSan has multiple application methods. It can be sprayed directly on to surfaces and tools, manually dosed into water systems or cost-effectively constant dosed via EndoSan proportional, automated dosing systems.

Checking the concentration of EndoSan in use is also very easy with instant result, simple test strip indicators.

BENEFITS

- ✓ Highly effective against bacteria, viruses, mould, fungi and amoeba.
- ✓ Forms no harmful disinfection by-products (DBP).
- ✓ Forms no toxic gases.
- ✓ Decomposes into water and oxygen.
- ✓ Non corrosive at RTU concentrations.
- ✓ Compatible with a wide range of materials.
- ✓ No residual colour, taste or odour.
- ✓ Very stable - 3 year shelf life.
- ✓ Ready to use formulas with no dilution required.
- ✓ Zerya certified no residuals.
- ✓ Certified Vegan, Kosher and Halal product.

Suggested Dose Rates

Dosage	Contact Time	Disinfection Type	EndoSan Required
500ppm	1 Hour	Maintenance Shock Dose Well maintained system Legionella control	1 Litre per 1,000 Litres
2,000ppm	1 Hour	Maintenance Shock Dose Well maintained system Control Legionella, Pseudomonas Aeruginosa, E. Coli, E. Hirae, Staphylococcus aureus	4 Litres per 1,000 Litres
2,000ppm	8 Hours	Major System Disinfection All pathogens controlled Effective Biofilm Removal	4 Litres per 1,000 Litres

EndoSan is Highly Effective Against Biofilms

The natural growth and subsequent removal of biofilm using EndoSan was tested using a biofilm generator. Plastic tubes representing the water system pipework were filled with contaminated water and system usage behaviour was mimicked by a daily flow/no-flow schedule.

Water quality was determined by measuring the amount of adenosine triphosphate (ATP) as a marker for micro-organisms. When the growing biofilm was clearly visible by eye and water ATP measurements stabilised, the continuous addition of an extremely low ppm level of EndoSan was started to investigate its effect on the biofilm.

During the biofilm growing period, the water ATP count rapidly increased up to 1,662 RLU, indicating severely polluted water (Figure 2a). After the continuous low maintenance addition of EndoSan, the RLU count rapidly decreased within a short time-frame and remained low, as the measurement in week 19 shows with an RLU value of 66.

The ATP measurements rapidly increased within 6 weeks (Figure 2b) to an almost two million-fold (1.9×10^6) increase. The subsequent continuous addition of EndoSan quickly resulted in a two million-fold (log 6) decrease, demonstrating the fast and effective removal of microbiological contamination from the surface of the inserts and inner lining of the tubes.

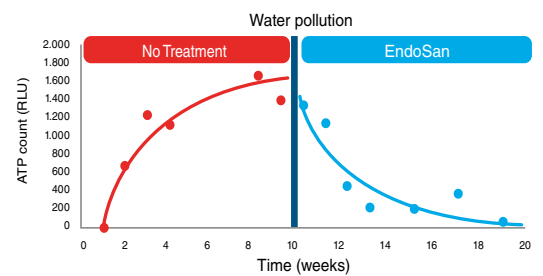


Figure 2 a – Water pollution before (red) and after (blue) the continuous addition of EndoSan.

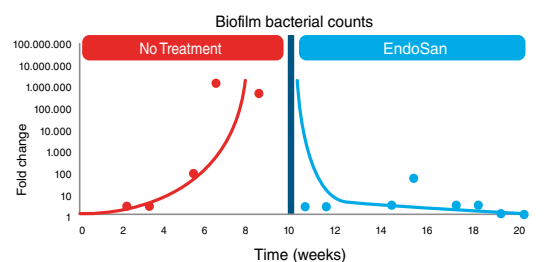


Figure 2 b – Biofilm bacterial counts before (red) and after (blue) the continuous addition of EndoSan. Please note that the bacterial counts are plotted on a logarithmic scale.

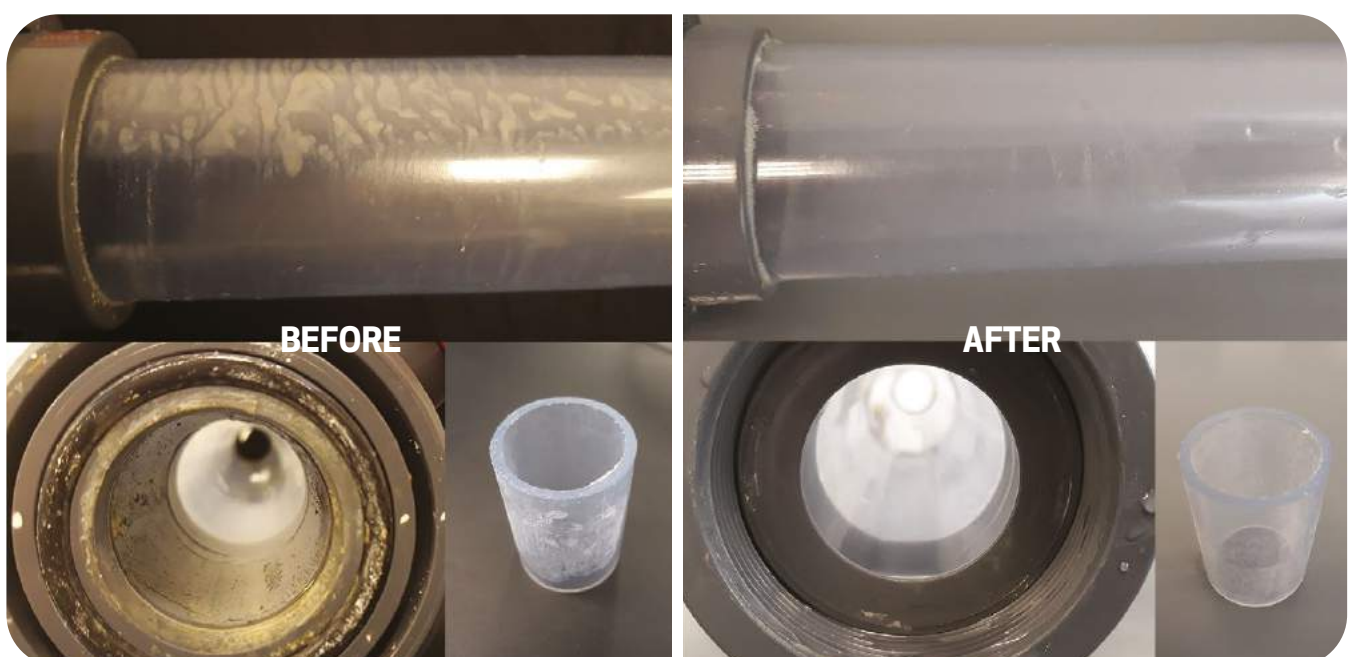


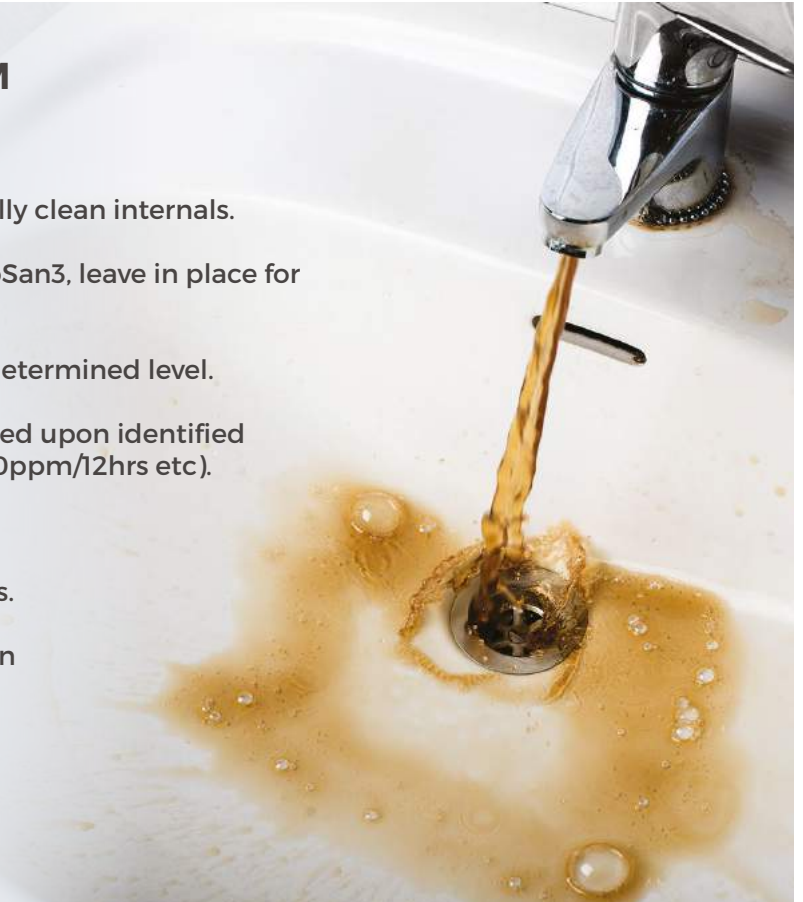
Figure 1 – Visual appearance from the outside of the tube (top) inside the water system (bottom left) and on the inserts (bottom right) before (left) and after (right) the continuous addition of EndoSan to the water.

Water System and Tank Disinfection



TYPICAL TANK AND SYSTEM DISINFECTION PROTOCOL

- ▶ Drain system feed tank and physically clean internals.
- ▶ Spray feed tank internals with EndoSan3, leave in place for 60mins.
- ▶ Re-fill feed tank with water to pre-determined level.
- ▶ Top up with EndoSan50 in tank based upon identified contact time (1000ppm/24hrs, 2000ppm/12hrs etc).
- ▶ Pull dosed water through to every system outlet from tank - Use test strips used to confirm residual levels.
- ▶ Leave for the designated disinfection dwell time (24hrs, 12hrs, etc).
- ▶ Allow tank to refill with fresh water and then flush through at every outlet.



Note: Ensure systems have suitable venting to release generated oxygen build-up during disinfection/biofilm removal. Use biocides safely. Always read the label and product information before use.



WARNING: SHOCK DOSING POTABLE WATER SYSTEMS REQUIRES THE SYSTEM TO BE TAKEN OFF-LINE. NO USERS SHOULD DRAW WATER UNTIL THE RESIDENCY TIME HAS ELAPSED AND THE SYSTEM FLUSHED.



WARNING: ENDOSAN SHOULD NEVER BE USED IN DIALYSIS WATER FEED. A FULL RISK ASSESSMENT MUST BE COMPLETED TO ENSURE WATER SYSTEM DOES NOT SUPPLY DIALYSIS.



CONTACT OUR TECHNICAL SUPPORT TEAM FOR ASSISTANCE
FOR ADVICE SUITABLE FOR YOUR OWN REQUIREMENTS T: +44(0) 1925 747 101 E: enquiries@endosan.com

Constant Dosing = Constant Protection



Once a tank and water system disinfection has taken place, constant dosing is a simple yet reliable means to ensure a continuous, fixed and optimal amount of EndoSan is dosed to maintain water quality going forward.

Complete dosing solutions are ready to use without considerable installation costs. The following page displays a summary feature list of available systems that are ready to order.

Constant Dosing Systems



It is recommended that a shock disinfection using EndoSan is undertaken on water systems to remove any historic biofilm that is present. However biofilms can re-form very quickly, meaning untreated water systems are left vulnerable to re-contamination.

Installing a 'Guardian Dosing System' ensures that your water is protected with a continuous and controlled concentration of EndoSan. EndoSan is injected directly into the water system providing a biocidal barrier against a broad spectrum of micro-organisms including Legionella, E-coli and Pseudomonas. This automated system is extremely accurate and doses proportionally to the water usage. Requiring very little maintenance it also allows the building manager or owner to save energy by reducing the temperature of the calorifiers*.

ENDOSAN GUARDIAN PULSE PLUS DOSING SYSTEM



Pulse fed, proportional dosing system with traffic light chemical indicator, lance, cable, bund, pump and associated ancillary equipment.

- ▶ 'Plug and Play' system.
- ▶ Proportional dosing via direct injection.
- ▶ Drum level monitoring, warning on low readings.
- ▶ High quality pump with de-gassing head.
- ▶ Completely mounted in bespoke bund.
- ▶ Stress tested.

ENDOSAN GUARDIAN SMART DOSING SYSTEM



Smart Dulcometer (H_2O_2 sampling), monitoring and communication system intelligently controlling proportional dosing system with traffic light chemical indicator, lance, cable, bund, pump and associated ancillary equipment.

- ▶ Fully automated 'smart monitoring' and dosing.
- ▶ Automated adjustment via H_2O_2 probes.
- ▶ H_2O_2 sensor up to 200ppm.
- ▶ Probe housing with flow detection
- ▶ User friendly, large, colour changing display.
- ▶ Drum level monitoring, warning on low readings.
- ▶ High quality pump with de-gassing head.
- ▶ Doser completely mounted in bespoke bund.
- ▶ Optional LAN or BMS interface.
- ▶ Optional control via mobile device (tablet, phone)

ENDOSAN GUARDIAN INSTALLATION & SERVICE



We offer a full Installation, calibration and commissioning package carried out by a fully qualified engineer on site. This includes an extra visit to site within 12 months and a 2 year extended warranty.

* In line with HSG274. Specific RAMS available on request.



Summary of Relevant Anti-Microbial Activity Against Test Organisms

TEST ORGANISM	CERTIFIED TEST METHOD							
	EN1656:2009	EN13697:2015	EN13623:2010	EN14349:2012	EN13697:2015	EN16438:2014	EN1276:2009	EN1500
<i>Aspergillus Brasiliensis</i>					✓	✓		
<i>Campylobacter Jejuni</i>							✓	
<i>Candida Albicans</i>					✓	✓		
<i>Enterococcus Hirae</i>	✓	✓		✓				
<i>Escherichia Coli</i>		✓		✓			✓	✓
<i>Legionella Pneumophila</i>			✓					
<i>Proteus Vulgaris</i>	✓			✓				
<i>Pseudomonas Aeruginosa</i>	✓	✓		✓			✓	
<i>Salmonella Typhimurium</i>							✓	
<i>Staphylococcus Aureus</i>	✓	✓		✓				

The EndoSan dossier has been submitted to the HSE, under the newly formed Great Britain Biocidal Product Regulation - GB BPR.

Following the end of the Transition Period on 31 December 2020, Great Britain is no longer part of the EU scheme for regulating biocides. The Health & Safety Executive (HSE) are now the Biocidal product regulator in Great Britain. The existing EU Biocidal Products Regulation (EU BPR) have been mirrored and updated in GB law by the HSE to enable them to authorise product use.

The active substance/ingredient of EndoSan, Hydrogen peroxide, is approved for PTs 1, 2, 3, 4, 5 and 6 and the supplier is an Article 95 listed supplier.

All dossiers for the product are still under review after being submitted before 29th June 2021. Stabilised Hydrogen Peroxide (H₂O₂) is in this category. During this time EndoSan is legally for sale in both the UK and EU.

EndoSan entered the GB BPR process within the specified time with a complete and up to date record of technical properties, efficacy and product uses, fully supported by strong case studies in all relevant PT classes.

Under dossier ref BC-QU029364-11, EndoSan is already authorised in some EU member states via national authorisation in the following:

- PT2: Disinfectants not intended for direct application to humans or animals.**
- PT3: Veterinary hygiene disinfectants.**
- PT4: Food and feed area disinfectants.**
- PT5: Drinking water disinfectants.**



Testing Solutions

Hygiene monitoring has a new hero!

Our ATP reader is easy to use, with fast time to results and simple one-handed operation. The ergonomic design makes testing simple and with performance and breakthrough technology, you get results you can count on.

Easy to use

- ▶ Simple user interface with intuitive navigation/screen menus.
- ▶ One-handed operation allowing multitasking.
- ▶ User-friendly touch screen.
- ▶ Easy to read colour display.

Robust hardware

- ▶ Stands up to harsh industrial environments.
- ▶ Durable, impact-resistant casing.
- ▶ Capless design for easy access and accurate results.
- ▶ Flip out foot allows device to stand upright.

Accurate data, trusted results

- ▶ Accurate data, trusted results
- ▶ Self-diagnostic check on start-up.
- ▶ Faster time to results for increased efficiency.
- ▶ Secure data cannot be changed on hardware.

Using simple swabs (one for surfaces, one for water) an indication of all living cells present in a sample can be given.

This allows quick detection of contamination or demonstration of cleaning/disinfection efficacy.



TEST STRIP INDICATORS

Checking the residual concentration of EndoSan in water is made very simple by test strip indicators. There are three types of EndoSan test strip available :

- ▶ **LOW RANGE** - Test peroxide levels up to 100ppm.
- ▶ **HIGH RANGE** - Test peroxide levels up to 1000ppm
- ▶ **EXTRA HIGH RANGE** - Test peroxide levels up to 5000ppm



DIP



SHAKE



WAIT



COMPARE



CHLORINE BASED DISINFECTANTS

Vs

EndoSan® STABILISED HYDROGEN PEROXIDE

BIOFILM	
<ul style="list-style-type: none"> Chlorine is ineffective at penetrating and removing biofilms. 	<ul style="list-style-type: none"> EndoSan is highly effective at penetrating and removing biofilms.
EFFICACY	
<ul style="list-style-type: none"> Chlorine is an oxidiser unable to effectively penetrate biofilms. Chlorine is also ineffective against amoebae. 	<ul style="list-style-type: none"> EndoSan is a powerful oxidiser that effectively penetrates and destroys biofilms. EndoSan is bactericidal, virucidal, sporicidal, fungicidal, algaecidal and amoebicidal.
IRRITANT	
<ul style="list-style-type: none"> Even at low dose levels chlorine is irritating to the nose, throat and skin. 	<ul style="list-style-type: none"> At dose levels EndoSan causes no irritation to the nose or throat.
HEALTH CONCERNS	
<ul style="list-style-type: none"> When chlorinated products mix with acids or acidic liquids then toxic chlorine gas is released. When chlorine reacts with organic matter it creates Trichloromethanes (TCM) and Trihalomethanes (THM). Studies suggest that THM's are carcinogenic to animals and humans. The EPA regulates that there must be a THM presence of less than 80ppb in water systems. Chlorine vapours can be very aggravating to asthma sufferers. 	<ul style="list-style-type: none"> EndoSan releases no toxic gasses. EndoSan produces no TCM's or THM's. EndoSan is biodegradable, creating no harmful by-products. EndoSan simply degrades into water and oxygen.
CORROSION	
<ul style="list-style-type: none"> Chlorine is corrosive to metals, rubbers and fabric. This can cause an increase in repair and maintenance costs and requirements over time. 	<ul style="list-style-type: none"> EndoSan is non-corrosive at dose rates. This results in lower repair and maintenance costs and requirements over time.
pH	
<ul style="list-style-type: none"> Outside of a neutral pH range Chlorine decreases in efficacy. 	<ul style="list-style-type: none"> EndoSan is effective at a wide pH range. Outside of a neutral pH range EndoSan continues to be effective.
TEMPERATURE	
<ul style="list-style-type: none"> Chlorine decreases in efficacy at higher temperatures and becomes unstable above 45°C. 	<ul style="list-style-type: none"> EndoSan is stable and effective at a wide range of temperatures.
TAINT	
<ul style="list-style-type: none"> Chlorine has an obvious taint. It has a noticeable strong odour and taste. 	<ul style="list-style-type: none"> EndoSan has no taint. It has no colour, taste or odour at dose levels.
DISPOSAL	
<ul style="list-style-type: none"> Chlorine requires neutralisation before disposal. Incorrect neutralisation can be toxic to aquatic life. 	<ul style="list-style-type: none"> EndoSan has no neutralisation requirements at dose levels.

Approvals



Certified to NSF/ANSI/CAN 60

NSF International

EndoSan is certificated to NSF/ANSI/CAN 60 meaning it meets the regulatory requirements for the USA, Canada, Israel, Saudi Arabia, Spain and the UAE. NSF/ANSI 60 certification can often meet or fulfil the testing requirements for many other countries as well. Market leaders strive to attain NSF certification as a mark of distinction that provides their customers with assurance that the product is safe for use in drinking water.



HSE - Health & Safety Executive UK

Stabilised Hydrogen Peroxide is listed as an approved constant dose biocide in the HSE ACOP HSG274 Pt2:

'Silver stabilised hydrogen peroxide has a history of use in the control of legionella in water systems. A silver hydrogen peroxide solution is injected directly into the water system and if applied and maintained according to the manufacturers instructions, can be an effective means of control. However, this should not be used in water systems supplying dialysis units'.

HGS274 (2014) Technical guidance for legionnaires disease, part 2 (Page 39)



Department for Environment Food & Rural Affairs

EndoSan is DEFRA approved disinfectant for general orders and foot-and-mouth disease.

EndoSan[®]

LEGIONELLA CONTROL & WATER TREATMENT

		PRODUCT CODE	H ₂ O ₂ CONCENTRATION	VOLUME (LTRS)	WEIGHT (KG)	FULL PALLET QTY
ENDOSAN 50 IBC		23-50-IBC	50%	1,000	1,200	1
ENDOSAN 50 20 LTRS		23-50-020	50%	20	24	28
ENDOSAN 50 10 LTRS		23-50-010	50%	10	12	60
ENDOSAN 20 IBC		25-20-IBC	20%	1,000	1,100	1
ENDOSAN 20 10 LTRS		25-20-010	20%	10	11	75
ENDOSAN 8 IBC		25-08-IBC	8%	1,000	1,000	1
ENDOSAN 8 5 LTRS		25-08-005	8%	5	5	160
ENDOSAN 3 IBC		25-03-IBC	3%	1,000	1,000	1
ENDOSAN 3 5 LTRS		25-03-005	3%	5	5	160
ENDOSAN 3 1 LTRS		25-03-001	3%	1	1	660
ENDOSAN 3 500ml Trigger		25-03-SPR	3%	0.5	0.5	900



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ISO 9001