WCS Group
Safe Efficient Compliance
MARLOWE Critical Services

- WATER TREATMENT
- WASTEWATER
- WATER HYGIENE
- AIR HYGIENE
- WATER ENGINEERIN
- TRAINING SERVICES
- ASBESTOS

Protect your water

Water safety, disinfection and secondary disinfection

Choosing an appropriate solution

Adherence to the UK, Northern Ireland and Scotland Drinking Water Regulations
Compliance with ACoP L8
Meeting WHO Guidelines for Drinking Water Quality
Protecting patients, your workforce and building visitors

Protecting your water and water system

Safeguarding staff, patients, vulnerable people and choosing appropriate disinfection and secondary disinfection technologies.

Relevance:

Food & Beverage
- Disinfection of product and process water
- Bottle cleaning, rinsing and pasteurisers
- Disinfection in CIP (cleaning in place systems)
- Water vapour treatment in dairies
- Fruit, vegetable, seafood, fish, poultry processing
- Breadcoolers
- Water Reclaim and Re-use

Industry
- Cooling water treatment
- Legionella control
- Disinfection in process water
- Removal of odorous substances in air scrubbers
- Slime control in the paper industry
- Secondary disinfection of potable / process water
- Effluent Remediation
- Water Reclaim and Re-use

Water companies
- Disinfection of potable water
- Disinfection of wastewater

Alternative to mains water
- Borehole
- River

Hospitals, hotels, care homes, sports centres etc
- Legionella and microbes (Pseudo, MRSA etc) protection in cold / hot water systems
- Secondary disinfection of potable water
- Disinfection in cooling towers and air conditioning systems
- High risk (hydro-pools etc)

Market Gardening
- Disinfection of irrigation water in plant cultivation
- Pig / Poultry feed water for livestock

Swimming pools
- Regular disinfection of filters
- Combatting Legionella (showers etc)
- Regular disinfection of pool water

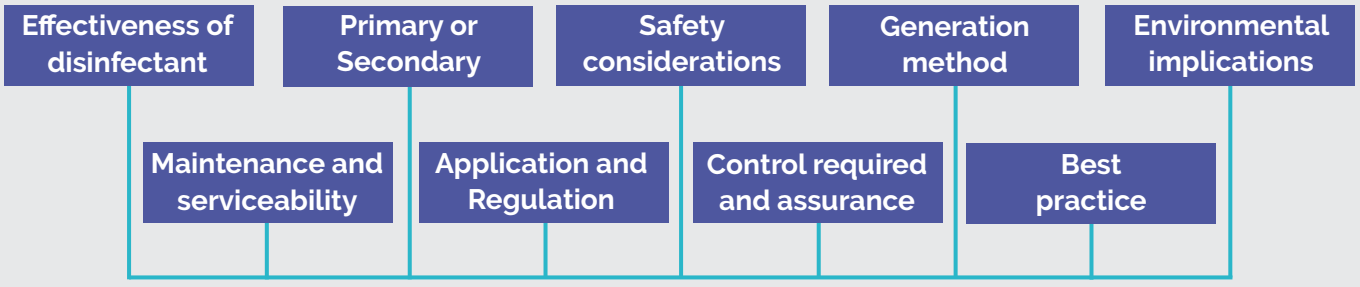
UK hospitals generate an average annual water consumption of between **193** and **415 m³/bed**.[1]

Disinfection is an important step in ensuring that potable (drinking) water is safe. UK water companies are required to meet the EU Drinking Water Directive by disinfecting public water to the point of supply. They have to kill or inactivate disease-causing organisms in the water supply.

There are two principals of disinfection: **primary disinfection** achieves the desired level of mircroorganism kill or inactivation, while **secondary disinfection** provides enhanced protection by preventing the regrowth of microorganisms harmful to human health between incoming public water supply to your building and the water distribution system inside your building right up to point of use – tap, shower etc.

Choosing the optimal solution

When you partner with WCS Group, we will work with you to guide you to the most effective solution for your building / system / requirement. We are water safety and Legionella compliance experts taking in to consideration;



Which is the right system for you?

Chlorination (Liquid)
Electrolytic Chlorine Generation
Chlorine Dioxide Generation
Ozonation
Ultraviolet Light (UV)
Ultralox®
Combination tailored to you?

[1] Audit Commission for Local Authorities in England and Wales. Untapped savings: Water Services in the NHS, National Health Service: London, UK.

Comparing common disinfection techniques

Traditional Sodium Hypochlorite

Sodium Hypochlorite (NaOCl) is one of the most commonly used compounds for water purification, especially across large scale surface purification, bleaching, odor removal and water disinfection in cooling towers for example.

Advantages

Sodium hypochlorite is one of the most widely used and accepted disinfectants, cost effective and simple to dose.
It can easily and be stored and transported when it is produced on-site. Dosage is simple. Transport and storage of sodium hypochlorite are safe. Sodium hypochlorite is as effective as chlorine gas for disinfection. Sodium hypochlorite produces residual effect.

Limitations

Sodium hypochlorite is a hazardous and corrosive chemical in concentration. While working with it, safety measures have to be taken to protect workers and the environment. Sodium hypochlorite does not deactivate Giardia Lambia and Crptosporidium. Its activity is highly pH dependant and mainly used in waters less than pH8, at higher pH values Sodium Hypochlorite efficacy is severely reduced.

Process

Sodium Hypochlorite is typically pumped into a water system proportionally to flow and usage, alternatively in industrial uses or swimming pools a controller may be used to deliver and maintain a set reserve of chlorine.

Equipment

Sodium hypochlorite is delivered and stored in appropriately sized tanks and bunds, typically from 25KG up to 1000KG IBCs.

Water meter or proportional flow controllers, dosing pumps and Chlorine Analysers.

Chemicals

Liquid Sodium Hypochlorite.

Usage

<1m³/day up to 1000m³/day and larger industrial processes.

Chlorination (Hypochlorous Acid Generation)

The GENOX generator produces a colourless liquid which is generated on-site, on-demand without buying, mixing or handling toxic chemicals. Direct electrolysis of brine, creates an oxidant NEUTHOX® on demand.

Advantages

Low cost (from 4.0 pence/m³) biocide. No hazardous chemicals are mixed, stored or handled. Inexpensive to operate and maintain. Direct injection in to the water system. Primary and Secondary disinfectant particularly effective against bacteria, water-borne pathogens, microbes and prevents biofilm reforming in water pipes. Effective Legionella control. NEUTHOX® contains hypochlorous acid as an active agent, the same style defence mechanism produced by the human immune system to fight infection.

Limitations

The solution decomposes and should not be stored for more than one month and is best generated on-demand in real time.

Process

Hypochlorous Acid (HOCl) is generated onsite by electrolysis of brine in a special wall-mounted or free-standing generator. This is controlled by a water meter and sensor which influences automatic dosing between 0.2-1.5ppm NEUTHOX® or higher for shock-dosing.

Equipment

Sodium chlorite /salt tank. NEUTHOX® buffer tank. Injection unit for NEUTHOX®. Built-in dosing pump and back-up. Sensor. Stainless steel cabinet. Remote monitoring option.

Chemicals

None (HOCl is generated from GENOX salt).

Usage

< 20m³/day up to 400m³/day for large process water applications.

Comparing common disinfection techniques

Chlorine Dioxide (new style Catalytic Generation) or ClO_2IX

A universally effective primary and secondary disinfectant without the usual limitations of chemical mixing, handling or storage.

Advantages

Disinfectant effect is independent of pH. Sustained release effect means long-term stability in the water piping system Destroys biofilms in pipework and tanks, offering reliable protection against Legionella for entire water systems. Does not react with ammonium. Does not form chlorophenols and other strong-smelling compounds. Does not form trihalomethanes (THMs) and other chlorinated hydrocarbons (AOX). Good conversion rates (> 75%). High yield (> 98.5%). New-style Catalytic Chlorine Dioxide Generators lower the risk from chemical handling and mixing toxic ClO_2 gas.

Limitations

Less effective in very hot water systems.

Process

In Catalytic Chlorine Dioxide ($ClO_2IX^®$) generation, to make Chlorine Dioxide, chlorous acid must first be formed. The $ClO_2IX^®$ systems produce a solution of chlorous acid without residual Na^+ by using cation exchange resin in the H^+ form. This removes the Na^+ from the sodium chlorite and replaces it with H^+ to form pure chlorous acid. By utilising catalytic technology, the $ClO_2IX^®$ systems convert virtually all (> 98.5%) of the chlorous acid to Chlorine Dioxide instantaneously. The resultant dilute 700 mg/l Chlorine Dioxide product contains no chlorine and virtually no chlorite. Continuous generation also means no required onsite storage of ClO_2. This is a duplex system for uninterrupted ClO_2 generation.

Equipment

Modern Catalytic Chlorine Dioxide ($ClO_2IX^®$) systems incorporate ion exchangeand catalytic technologies, a duplex cation resin and catalyst cartridge to ensure consistent chlorine dioxide generation for large fixed (industrial) or mobile (portable) systems for field trials and emergency disinfection.

Chemicals

Sodium Chlorite and HCl.

Usage

< $20m^3$ / day up to $800m^3$ / day for larger process water applications.

Chlorine Dioxide – WRAS Approved Pureox 3500

A universally effective primary and secondary disinfectant, generated using a patented Safe Generation per Batch (SGB) technology.

Advantages

Disinfectant effect is independent of pH. Sustained release effect means long-term stability in the water piping system Destroys biofilms in pipework and tanks, offering reliable protection against Legionella for entire water systems. Does not react with ammonium. Does not form chlorophenols and other strong-smelling compounds. Does not form trihalomethanes (THMs) and other chlorinated hydrocarbons (AOX). >98.6% Conversion efficiency of yield. The Pureox 3500 range is WRAS Approved to remove any obstacle for installation onto a drinking water system.

Limitations

As with any ClO_2 dosing system the residence time of treated water in a drinking water system needs to be minimal to avoid build up of oxidants that will breach the DWI limits of <0.5ppm total oxidants (as measured by ClO_2 and chlorite).

Process

The Pureox 3500 generator utilises two precursor chemicals, which are mixed in the SGB reaction chamber. The SGB process ensures an efficient conversion of pre-cursor chemicals and a consistent high yield of ClO_2 and negligible degradation whilst the batch is held in the SGB Chamber. The output from the generator is ClO_2 with minimal chlorite by-products.ClO_2 is then dosed from the batch into the water stream, and a new batch created when required.

Equipment

A Pureox 3500 generator is retailed as a packed system to cover the following equipment:

- Generator unit incorporating a central controller and peristaltic pump
- ClO_2 chemical dosing pump
- Stock tanks and bunds (sizes based on site specific requirements)
- ClO_2 and Chlorine probes
- Gas Alarm

Central controller provides detailed maintenance records and service schedule, can be configured for different set points and upgrades to provide GPS and BMS outputs.

Can dose multiple systems of the same generator.

Chemicals

Two precursors – Cloxide GST (Chlorite 7%) and HCl 1:1 ration.

Usage

The range of eight different model generators.

Pureox 10 – up to $480m^3$ per day
Pureox 20 – up to $960m^3$ per day
Pureox 30 – up to $1400m^3$ per day
Pureox 40 – up to $1920m^3$ per day
Pureox 50 – up to $2400m^3$ per day
Pureox 60 – up to $2880m^3$ per day
Pureox 80 – up to $3840m^3$ per day
Pureox 100 – up to $4800m^3$ per day

Comparing common disinfection techniques

Ozonation

Ozonation is a water treatment process that destroys microorganisms and degrades organic pollutants through the infusion of ozone, a gas produced by subjecting oxygen molecules to high electrical voltage.

Advantages

Requiring a shorter contact time and dosage than chlorine, ozone can be added at several points throughout the treatment system for both primary and secondary disinfection in water systems. Usually it is recommended to use ozone for pre-oxidation, before a sand filter or active carbon filter. After ozonation, these filters can remove the remaining organic matter. Odour and taste neutral. Enhancer of the flocculation / coagulation decantation process. Effective in large scale effluent treatment to reduce BOD and COD. Can also reduce some disinfection by-products.

Limitations

Ozone is an unstable gas and must be generated onsite. Use requires an additional disinfection control because ozone has a short life, is unstable and often has a limited residual effect in water. Capital cost is relatively high. Operating is complex and electricity costs can account for a significant percentage of total operating and maintenance costs for a small system.

Process

The five elements of an ozonation system are; air preparation or oxygen feed, electrical power supply, ozone generation (corna discharge cell with two electrodes), ozone contact chamber, ozone exhaust gas destruction.

Equipment

Air preparation equipment, ozone generator, contactor, destruction unit, instrumentation and controllers.

Chemicals

None but pure oxygen is a more efficient feed gas.

Usage

< 30m³/day and up to 300 m³/day in large industrial applications and swimming pools

Ultraviolet Light (UV)

Ultraviolet (UV) radiation is generated by a special lamp. When it penetrates the cell wall of an organism, the cell's genetic material is disrupted and the cell is unable to reproduce

Advantages

UV radiation effectively destroys bacteria and viruses. UV radiation can be attractive especially in small systems because it produces no known toxic residuals, requires short contact times and the required equipment is easy to install and maintain.

Limitations

UV radiation may not always reliably inactivate Giardia lamblia or Cryptosporidium cycts and should be used only by groundwater systems not directly influenced by surface water – where there is less risk of protozoan cyst contamination. UV radiation can be unsuitable for water with high levels of suspended solids, turbidity, colour or soluble organic matter because these can absorb and shadow UV radiation, reducing disinfectant performance.

Process

The effectiveness of UV radiation is dependent on energy dose absorbed by the organism, measured as a product of UV light intensity and absorption. If the exposure duration or energy dosage is insufficient, the organism's genetic material might only become damaged and not wholly destroyed. Ideally, energy dose and UV lamp intensity and duration of exposure should be higher than needed to meet disinfection requirements.

Equipment

Controller, UV lamps, hours run meter. Can also add a UV monitoring system and automatic wiper system.

Chemicals

None and no by-products.

Usage

< > 20m³/day and large scale 2000m³/day in effluent and aquaculture applications for example

Ultralox 40®

A Regulated, stable, highly effective low concentration form of chlorine and particularly efficacious fast-acting biocide.

Advantages

Only one chemical required. No generator required. No danger of Chlorite overdose. Low concentration solution. Particularly efficacious fast-acting biocide highly effective against bacteria and waterborne pathogens. Fully Article 95 compliant. Biocidal Product Regulation approved for potable and process water. Drinking Water Inspectorate Approved for potable and process water. Used widely across NHS sites. Can be dosed into incoming mains, break tank or via fixed or mobile control system. For domestic hot and cold-water systems. Low hazard. Breaks down and inhibits biofilm at nominal operating conditions. Long shelf-life. Colourless. Available in 25L, 200L and 1,000L. Used for flushing, shock-dosing, mobile and emergency disinfection and continuous disinfection in acute (critical) applications. pH 3-6.

Limitations

Primarily for smaller applications or critical applications (eg acute hospital systems). May impact pH. Generates THMs.

Process

Chemical solution. 1-2 day retrofit solution. Dosing is achieved via monitoring the active halogen via a chlorine analyser directly controlling the dose and doubling as a monitoring device.

Equipment

Chlorine analyser / controller, 2 x 25L drum bund (or larger bund with 200L drum), backboard control management system, flow meter, dosing pump(s), power supply fused switch, injection tubing and foot valve.

Chemicals

Hypochlorous Acid (HOCl)

Usage

< 20m³/day up to 60m³/day in domestic water systems. Can also be used through 1,000L delivery for significantly larger process water demands.

Complete systems for EVERY requirement

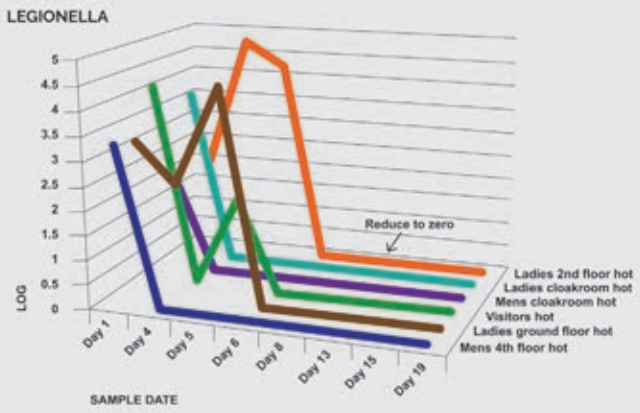
Whatever your starting point or priority, there is a viable, dependable water safety and disinfection solution available to meet your process requirements.

We will guide you through:

- Safe drinking and process water principles
- Development and execution of Water Safety Plans
- Key determinates are understood: Effectiveness of disinfectant | Primary or Secondary | Safety considerations | Generation technique | Maintenance and serviceability | Application and Regulation | Control required and assurance | Cost of ownership | Reputational risk | Return on Investment (ROI)
- Proactive and preventative contamination measures and control
- Using multiple disinfection methods to uncompromised water safety
- Greatest risks we see based on hard evidence and deep sector knowledge
- Waterborne pathogens risks – a reality check
- Problematic pipes and troublesome water system
- Particularly critical and vulnerable applications (healthcare, food processing etc)
- The last meters to the tap where drinking water quality is at risk
- Design of disinfection and management systems for water systems
- Pre-commission cleans, system improvement, handover, expert witness
- Water system microbiological chemical and physical control methods
- Water quality guidelines and expectation on public health
- Disinfection methods to counter contamination risks on site
- Best practice water sampling, testing and analysis
- Specialist water treatment needs, cooling towers and RO water
- Private water supplies
- Swimming pool, spa and leisure applications
- Risk assessment, Legionella risk and control
- ACoP L8 compliance
- Water hygiene surveillance and critical incident management
- Water Re-cycling, Reclaim and Re-Use

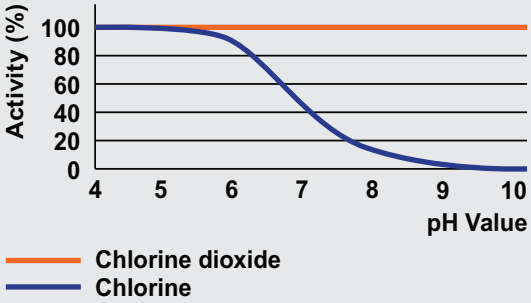
Disinfection solutions and water safety systems

Tailored to what you need on site. Efficacious, proven disinfection solutions backed with evidence and experience.



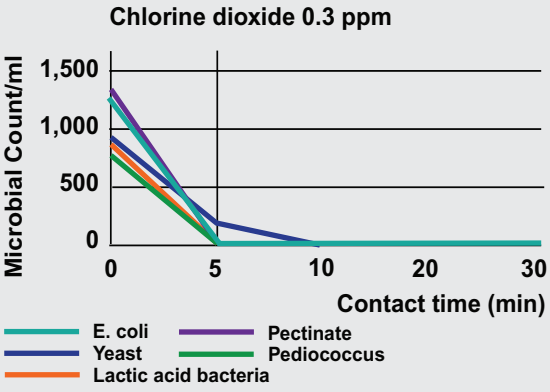
Ultralox40®

Shock-dosed for 24 hours before maintenance 1.0ppm in a Food and Beverage site transformed a stubborn Legionella issue quickly. With no recurrence.



pH dependency

Unlike chlorine, chlorine dioxide (ClO_2) is not affected in the pH range of 4-10.
The independence of chlorine dioxide of pH value makes it an attractive disinfectant option.



Disinfectant action of chlorine dioxide

Even in low concentrations, ClO_2 has a strong disinfectant effect. At a concentration of just 0.3ppm for example, it reliably reduces the microbiological count from around 1,000 CFU/ml to zero and does not produce THMs.

GENOX unit electrolysis of brine to generate HOCl, an effective form of chlorine and powerful biocide

V

Catalytic Chlorine Dioxide (ClO_2IX®) pH independent

Ultimate disinfection – how to do it?

Chemical alternatives like Ultralox40®, or a super-efficient, cost effective of generating an effective biocide like NEUTHOX® through the electrolysis of brine, or state-of-the-art Catalytic ClO_2 Generators? Each has their place.

Examples

Ultralox40®

Approved, low concentration, highly efficacious biocide. Particularly effective against pathogens and biofilms. Plug and play mobile, temporary or permanent retrofit disinfection systems for domestic systems and larger applications.

Low hazard, long residual effect available in 25Kg to 1,000L.

Chlorine Dioxide - Pureox 3500

WRAS Approved. High purity, 2-pack generation of ClO_2.

GENOX producing NEUTHOX®

Natural choice partner across healthcare, food and beverage, horticultural and many industrial applications – low generation cost and ecological.

Model T05

Model T10

Model T20

Catalytic Chlorine Dioxide Generators

State of the art, highly dependable chlorine dioxide generation.5KG to 90KG/day.

Industrial

Mini ClO_2 system

Portable

WCS Group
Safe Efficient Compliance
MARLOWE Critical Services

A Marlowe Critical Services company

WCS Group is the 'Water Treatment and Hygiene' division of the Marlowe Critical Services Group owned by parent Marlowe plc.
Marlowe plc provides one access point for specialist 'highest standards' across;
'Compliance & Facilities Software', 'Health and Safety Compliance', 'Retained HR, Employment Law & Health and Safety', 'Occupational Health Services', 'eLearning and Training Services', 'Fire Safety & Security Services', 'Water Treatment & Hygiene Services', 'Air and Ventilation Compliance', 'Asbestos Management Services'.
All nine divisions can be accessed singularly or in combination.
The Group shares many common customers and collectively employs 2,200+ specialists, servicing around 30,000 customers.

Compliance. Assured.

Further reading

Water Safety | Disinfection_Ultralox Fact Sheet

Water Safety | Disinfection_Genox Fact Sheet

Water Safety | Disinfection_ClO₂IX Fact Sheet

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