WCS Group
Safe Efficient Compliance
MARLOWE Critical Services

CHLORINE DIOXIDE GENERATORS (ClO_2IX)

Proven new-generation
No storage of ClO_2
Safe - no chemicals are mixed
Reliable ClO_2IX generation
No dangerous by-products
Dilute, high quality solution
Dispenses 700mg/l low concentration solution without storage
Self-monitoring / correcting

Suitable for...

Biofilm eradication
Legionella control
Membrane systems
Water distribution systems
Cooling towers
Hospitals
Hotels
Horticulture
Breweries
Dairies
Food processing
Universities
Acid restriction sites
And more ...

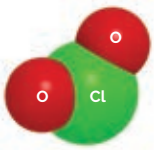
CHLORINE DIOXIDE GENERATORS

Modern-day chlorine dioxide water treatment using ClO_2IX offers distinct advantages.






ClO_2 – an effective, low concentration water disinfectant



ClO2IX is a tech-enabled chlorine dioxide solution that contains no chlorine, no ozone, has a high conversion rate (>75%), produces low concentration levels, is high purity (>98.5%), generated in a controlled reaction that is extremely safe, with no storage of ClO_2 because it is generated ON DEMAND.

Beneficial properties of ClO_2

- Effective over pH range of 2 – 10
- Doesn't produce THMs
- Reacts with odour-causing compounds
- Breaks down phenols
- Precipitates iron and manganese
- Can overcome organic loading
- Penetrates and destroys biofilm
- Potable and process water

Conventional ClO_2 generation negatives

- Hard to make and storage is a problem
- UV light, heat and time degrade it
- Chemical mixing generators create by-products, can be corrosive, produce low yield, require accurate dosing
- Electromechanical generators suffer poor conversion, require complex pre-treatment, are maintenance heavy, require accurate dosing

Introducing new generation, proven ClO_2IX chlorine dioxide generators

Solves all of the problems and perceived limitations of conventional ClO_2 generation and come in a range of models to provide 5KG to 90+KG/day of ClO_2.

WCS Group

Safe Efficient Compliance

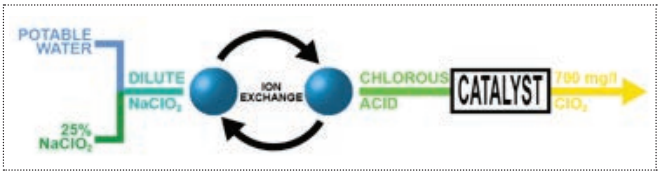
MARLOWE Critical Services

Why is ClO_2IX better?

ClO_2IX is a tech-enabled chlorine dioxide solution that contains no chlorine, no ozone, has a high conversion rate, uses low concentration levels, produces low concentration solution, high purity ClO_2, generated on a controlled reaction that is extremely safe, with no storage because it is generated ON DEMAND.

How it works

ClO_2 is made through the formation of chlorous acid. The ClO_2IX systems produce a solution of chlorous acid without residual Na^+ by using a special cation exchange resin in the H^+ form. This removes the Na^+ from sodium chlorite and replaces it with H^+ to form pure chlorous acid.



Once chlorous acid is formed, the reaction to ClO_2 can commence. Using catalytic technology, the ClO_2IX generator converts almost instantaneously (>98.5%) of the chlorous acid to ClO_2. The resultant 700 mg/l ClO2 or Chlorate product contains no chlorine, no ozone and virtually no chlorite. Because of the ability for the ClO_2IX system to dispense continuously on demand rather than batch process (it is a duplex system), high quality, low concentration ClO_2 is produced on demand, reliably.

Key system advantages

- Virtually zero chlorite and chlorate by-products in generation
- Super reliable chlorous acid generation
- Special catalytic technology in the Conversion Cartridge is more reliable, far quicker, safer and more efficient than older ClO_2 generator technology
- No excess acid is generated
- No chemical mixing is needed
- No electrochemistry is used
- ClO_2IX can be dosed proportionally into the process water
- ClO_2IX generators operate under pressure (pressurized line dosing enabled)
- Safer ClO_2 concentrations of less than 700 mg/l are produced with no need for storage

Attractive features

- From 0.1 to 120g/day of ClO_2
- Regenerable or Refillable IX
- Ideally suited for continuous production of ClO_2
- Better for RO plants because pinholes are not created in membranes
- Precursor and ClO_2 occurs in water and only when water flows through the system
- Reliable monitoring and self-correction is built-in
- Rugged construction and components
- Permanent or mobile solution
- Emergency incident solution or flushing aid
- Finance available inclusive of first year's maintenance

Common applications

Water distribution and Re-Use
All commercial and industrial sites where precise microbiological purity point-of-use water disinfection is required. Includes potable and process water. Includes water purification and water re-use.

Process water, especially in food production
Reliable, high purity water that can be recycled and re-used across multiple cycles minimising discharge and drawing of more expensive mains-water.

Rinsing and washing stations
Especially important where no taste, colour or residue is required and where hygiene has to be demonstrably maintained. Production plants wanting to re-use water and minimise drawing of more expensive mains-water.

Greenhouses and Horticulture
ClO_2IX does not react with the fertilisers commonly used in commercial greenhouses and horticulture. The ClO_2IX process produces a sodium-free product that does not affect pH or reduce chelated iron. ClO_2IX is ideal for reuse irrigation water.

Hospitals and care homes
Immuno-compromised patients are more susceptible to waterborne pathogens and bacteria. ClO_2 is a widely recognised pathogen control methodology and ClO_2IX is an efficient, safe secondary disinfection option (especially relevant for sites with a no acid policy).

Hotels and Leisure
ClO_2 is a favoured disinfectant route for many hotel and leisure site operators because of the reliability of water purity, odour and taste considerations. ClO_2IX is also produced on demand, dosed in a weak concentration and continuously available.

Reverse Osmosis (RO) plants
ClO_2 produced by ClO_2IX systems is chlorine free, ozone free and will not attack TFC membranes. Cleaning cycles and energy consumption can be reduced greatly by feeding <0.2 mg/l in to the RO feed water either continuously or intermittently as the application requires.

Closed water loops
ClO_2IX is ideal for chilled water loops to tackle contaminants and biofouling caused by system leaks, especially in large buildings. ClO_2IX is chlorine, corrosion and bromine-free and good for manual or auto dosing. Pace the feed of biocide using low dilution, pure 700 mg/l ClO_2IX. You can also shock-dose in to a sump tank. ClO_2IX is free of metal ions.

Water tanks (commercial, domestic system, agricultural)
ClO_2 is an ideal disinfectant for cold water storage tanks where low pressure may exist and where bacteria harbouring biofilm can thrive. Chlorine in incoming mains water may be insufficient to deal with biofilm. ClO_2IX can be an effective disinfectant to assist chlorine in mains water in protecting water safety and preventing biofilm regeneration once a tank is clean.

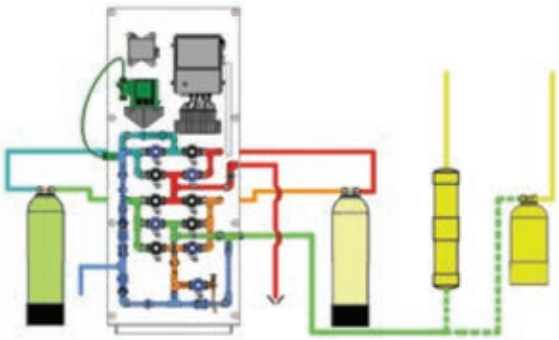
WCS Group

Safe Efficient Compliance

MARLOWE Critical Services

ClO_2IX INDUSTRIAL

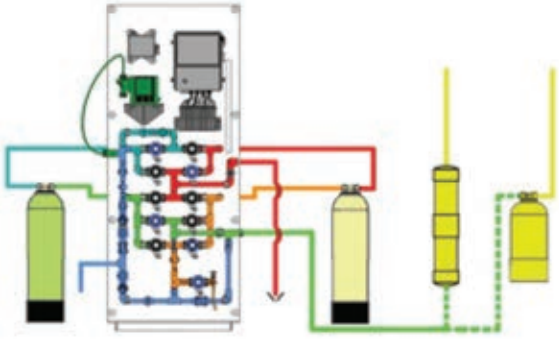
45g to 90Kg of ClO_2
Model Variants: 9
Permanent plant
Ion Exchange is Replaceable or Regenerated
Supplied with Generator
Ion Exchange Tank x 2
Pre-Filter 10" housing 30 micron filter x 1
Pre-Filter 10" housing 5 micron filter x 1
Floor space (M): 1.11 x 1.11 x 1.88m (L x W x H)
Generator Dimensions (M): 0.76 x 0.76 x 1.88 (W x D x H)
Ion Exchange Tank Dimensions (M): 0.15 x 0.89 (Dia x H)
Catalyst Cartridge has to be purchased SEPARATELY
Lease finance available including Year 1 maintenance



Inlet Potable Water	A potable water source is required for the system.
Sodium Chlorite	A 25% $NaClO_2$ solution is diluted with potable water such that the resulting concentration of $NaClO_2$ is 1,250 mg/l.
Chlorous Acid	The dilute $NaClO_2$ flows through the ion exchange vessels where the $NaClO_2$ is converted to $HClO_2$ through the exchange of the N^+ in solution for the H^+ on the cation resin.
Chlorine Dioxide	The HClOs is converted to dilute ClO_2 in the catalyst cartridge which produces a low concentration solution (700 mg/l).
Regeneration	The H^+ ion in the regenerant acid forces the Na^+ ion off of the exhausted cation resin. The system is a duplex system meaning that one cation vessel is converting $NaClO_2$ to $HClO_2$ the other vessel is in regeneration. When the system determines that the first vessel is exhausted, the system automatically switches sides so that $HClO_2$ production is not interrupted. To increase efficiency, the Impulse Regeneration Method is employed.
Drain	The waste regenerant containing the Na^+ ions is flushed to drain as part of the regeneration process. The system also primes itself to drain.

ClO_2IX MINI

45g to 55Kg of ClO_2
Model Variants: 1
Permanent plant
Ion Exchange is Replaceable or Regenerated
Supplied with Generator
Ion Exchange Tank x 2
Pre-Filter 10" housing 30 micron filter x 1
Pre-Filter 10" housing 5 micron filter x 1
Floor space (M): 1.11 x 1.11 x 1.88m (L x W x H)
Generator Dimensions (M): 0.76 x 0.76 x 1.88 (W x D x H)
Ion Exchange Tank Dimensions (M): 0.15 x 0.89 (Dia x H)
Catalyst Cartridge has to be purchased SEPARATELY
Lease finance available including Year 1 maintenance



Inlet Potable Water	A potable water source is required for the system.
Sodium Chlorite	A 25% $NaClO_2$ solution is diluted with potable water such that the resulting concentration of $NaClO_2$ is 1,250 mg/l.
Chlorous Acid	The dilute $NaClO_2$ flows through the ion exchange vessels where the $NaClO_2$ is converted to $HClO_2$ through the exchange of the N^+ in solution for the H^+ on the cation resin.
Chlorine Dioxide	The HClOs is converted to dilute ClO_2 in the catalyst cartridge which produces a low concentration solution (700 mg/l).
Regeneration	The H^+ ion in the regenerant acid forces the Na^+ ion off of the exhausted cation resin. The system is a duplex system meaning that one cation vessel is converting $NaClO_2$ to $HClO_2$ the other vessel is in regeneration. When the system determines that the first vessel is exhausted, the system automatically switches sides so that $HClO_2$ production is not interrupted. To increase efficiency, the Impulse Regeneration Method is employed.
Drain	The waste regenerant containing the Na^+ ions is flushed to drain as part of the regeneration process. The system also primes itself to drain.

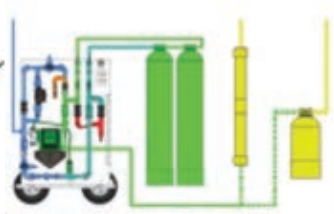
WCS Group

Safe Efficient Compliance

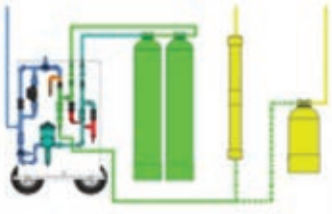
MARLOWE Critical Services

ClO_2IX PORTABLE REGENERATION (PRG)

225g to 9Kg of ClO_2
Model Variants: 2
Potable Design
Regenerable Ion Exchange Vessels
Electric and Water Driven Pump Models
Easy to Manoeuvre



PTG-GRU Electric Pump Series

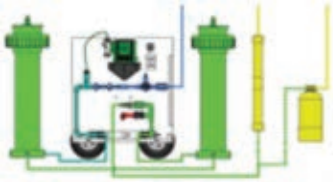


PTG-WTR Water-Driven Pump Series

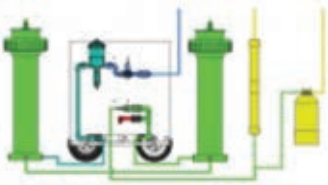
Inlet Potable Water	A potable water source is required for the system.
Sodium Chlorite	A 25% $NaClO_2$ solution is diluted with potable water such that the resulting concentration of $NaClO_2$ is 1,250 mg/l.
Chlorous Acid	The dilute $NaClO_2$ flows through the ion exchange vessels where the $NaClO_2$ is converted to $HClO_2$ through the exchange of the N^+ in solution for the H^+ on the cation resin.
Chlorine Dioxide	The HClOs is converted to dilute ClO_2 in the catalyst cartridge which produces a low concentration solution (700 mg/l).
Regeneration	The H^+ ion in the regenerant acid forces the Na^+ ion off of the exhausted cation resin. The system must be regenerated manually.
Drain	The waste regenerant containing the Na^+ ions is flushed to drain during the regeneration process.

ClO_2 PORTABLE REGENERATION (PRG)

225g to 9Kg of ClO_2
Model Variants: 2
Potable Design
Replacement Cartridges – no acid on site
Electric and Water Driven Pump Models



PTG-GRU Electric Pump Series



PTG-WTR Water-Driven Pump Series

Inlet Potable Water	A potable water source is required for the system.
Sodium Chlorite	A 25% $NaClO_2$ solution is diluted with potable water such that the resulting concentration of $NaClO_2$ is 1,250 mg/l.
Chlorous Acid	The dilute $NaClO_2$ flows through the ion exchange vessels where the $NaClO_2$ is converted to $HClO_2$ through the exchange of the N^+ in solution for the H^+ on the cation resin.
Chlorine Dioxide	The HClOs is converted to dilute ClO_2 in the catalyst cartridge which produces a low concentration solution (700 mg/l).
Drain	When the catalyst cartridges are changed, water is flushed through the system to drain.

WCS Group

Safe Efficient Compliance

MARLOWE Critical Services

ClO_2X Chlorine Dioxide Generation		**Ind IC-005**	**Ind IC-010**	**Ind IC-025**	**Ind IC-050**	**Ind IC-100**	**Ind IC-200**	**Ind IC-350**	**Ind IC-500**	**Ind IC-1000**
Catalyst Size										
ClO_2 Production	Kg / day	0.25	0.50	1.25	2.50	5.00	10.00	17.50	25.00	50.00
Normal Flow Rate	L / min	0.25	0.50	1.25	2.50	5.00	10.00	17.50	25.00	50.00
Min Flow Rate	L / min	0.13	0.25	0.63	1.25	2.50	5.00	8.75	12.50	25.00
ClO_2 Solution Production	L Soln / day *	360	720	1,800	3,600	7,200	14,400	25,200	36,000	72,000
ClO_2 Concentration	mg /L	650 - 750		650 - 750		650 - 750		650 - 750	650 - 750	650 - 750
ClO_2 Conversion	%	>75% at 25oC		>75% at 25oC		>75% at 25oC		>75% at 25oC	>75% at 25oC	>75% at 25oC
Catalyst Dimensions (Dia x H)	M **	0.05 x 0.66		0.05 x 0.66	0.1 x 0.66	0.2 x 0.46		0.18 x 0.89	0.20 x 1.12	0.36 x 1.19
Generator Dimensions (W x D x H)	M	0.76 x 0.76 x 1.88		0.76 x 0.76 x 1.88		0.76 x 0.76 x 1.88		0.97 x 0.97 x 2.03	0.97 x 0.97 x 2.03	0.97 x 0.97 x 2.03
Ion Exchange Tank Dimensions	M	0.15 x 0.89		0.20 x 1.11		0.36 x 1.65		0.46 x 1.65	0.50 x 1.58	0.91 x 1.83
Floorspace	M	1.11 x 1.11		1.22 x 1.22	1.27 x 1.27	1.68x 1.68	1.68x 1.68	2.06 x 2.06	2.24 x 2.24	3.15 x 3.56
Operating Parameters										
Max Feed Water Quality	ppm TDS	<1,500		<1,500		<1,500		<1,250	<1,100	<1,500
Max Feed Water Conductivity	µS	3,000		3,000		3,000		2,500	2,200	3,000
Ambient Temperature Range	oC	4.4 - 43.0		4.4 - 43.0		4.4 - 43.0		4.4 - 43.0	4.4 - 43.0	4.4 - 43.0
Water Temperature Range	oC	10 to 32		10 to 32		10 to 32		10 to 32	10 to 32	10 to 32
Remote Access Ports										
Ethernet Communication Port		Yes		Yes		Yes		Yes	Yes	Yes
System can connect to customer provided cell modem or network		Yes		Yes		Yes		Yes	Yes	Yes
Plumbing Connections to Generator										
Inlet Water		1/2" MPT		1/2" MPT		1/2" MPT		1" MPT	1" MPT	1" MPT
Product $HClO_2$		1/2" FPT		1/2" FPT		1/2" FPT		3/4" FPT	3/4" FPT	1" FPT
Drain		1/2" FPT		1/2" FPT		1/2" FPT		3/4" FPT	3/4" FPT	1" FPT
Inlet $NaClO_2$		1/4" Tubing		1/4" Tubing		1/4" Tubing		1/4" Tubing	1/4" Tubing	3/8" Tubing
Inlet Regeneration		3/8" Tubing		3/8" Tubing		3/8" Tubing		3/8" Tubing	3/8" Tubing	3/8" Tubing
Compressed Air		1/4" FPT Plug		1/4" FPT Plug		1/4" FPT Plug		1/4" FPT Plug	1/4" FPT Plug	1/4" FPT Plug
Weights (Shippping) inc packaging	Kg	172		192		192		294	318	318
Installation Electrical Requirements		90-240 VAC 2.7A 60/60 Hz		90-240 VAC 2.7A 50/60 Hz		90-240 VAC 2.7A 50/60 Hz		90-240 VAC 2.7A 50/60 Hz	90-240 VAC 2.7A 50/60 Hz	90-240 VAC 2.7A 50/60 Hz
Compressed Air Requirements		Filtered and Regulated Air		Filtered and Regulated Air		Filtered and Regulated Air		Filtered and Regulated Air	Filtered and Regulated Air	Filtered and Regulated Air
Air Pressure	Bar	7	7	7	7	7	7	7	7	7
Installation Plumbing Requirements										
Inlet Water Pressure	Bar	2.76 - 7.00		2.76 - 7.00		2.76 - 7.00		2.76 - 7.00	2.76 - 7.00	2.76 - 7.00
ΔP Across System	Bar	1.72		1.72		1.72		1.72	1.72	1.72
Drain Pressure		Atmospheric		Atmospheric		Atmospheric		Atmospheric	Atmospheric	Atmospheric
Precursor Requirements										
$NaClO_2$	%	25% Active		25% Active		25% Active		25% Active	25% Active	25% Active
Regenerant	%	10% or 31.45%		10% or 31.45%		10% or 31.45%		10% or 31.45%	10% or 31.45%	10% or 31.45%
Regenerant $H2SO_4$ (optional)	%	35% (softened water instead of HCl)		35% (softened water instead of HCl)		35% (softened water instead of HCl)		35% (softened water instead of HCl)	35% (softened water instead of HCl)	35% (softened water instead of HCl)
Precursor Usage										
$NaClO_2$ 25%	L / Kg	20 ClO_2 Produced		20 ClO_2 Produced		20 ClO_2 Produced		20 ClO_2 Produced	20 ClO_2 Produced	20 ClO_2 Produced
HCl 31.45%	L / Kg	6 ClO_2 Produced		6 ClO_2 Produced		6 ClO_2 Produced		6 ClO_2 Produced	6 ClO_2 Produced	6 ClO_2 Produced
HCl 10%	L / Kg	21 ClO_2 Produced		21 ClO_2 Produced		21 ClO_2 Produced		21 ClO_2 Produced	21 ClO_2 Produced	21 ClO_2 Produced
H_2SO_4 35% (optional)	L / Kg	6 ClO_2 Produced		6 ClO_2 Produced		6 ClO_2 Produced		6 ClO_2 Produced	6 ClO_2 Produced	6 ClO_2 Produced
Catalyst Cartridge		Order Separately	Order Separately	Order Separately	Order Separately	Order Separately	Order Separately	Order Separately	Order Separately	Order Separately

* At Nominal Flow Rate

** Catalyst May Need To Be Mounted

ClO_2X Chlorine Dioxide Generation		**MINI G-015**	**MINI G-030**	**MINI G-060**	**MINI G-120**
Catalyst Size					
ClO_2 Production	Kg / day	15.00	30.00	60.00	120.00
Normal Flow Rate	mL / min	15.00	30.00	60.00	120.00
Min Flow Rate	mL / min	15.00	15.00	30.00	60.00
ClO_2 Solution Production	L Soln / day *	21.6	43.2	86.4	172
ClO_2 Concentration	mg /L	650 - 750		650 - 750	
ClO_2 Conversion	%	>75% at 25oC		>75% at 25oC	
Catalyst Dimensions (Dia x H)	M **	0.04 x 0.35		0.04 x 0.35	
Generator Dimensions (W x D x H)	M	0.76 x 0.76 x 1.88		0.76 x 0.76 x 1.88	
Ion Exchange Tank Dimensions	M	Ion Exchange Tanks Sold Separately		Ion Exchange Tankls Sold Separately	
Floorspace	M	0.76 x 0.76		0.76 x 0.76	
Operating Parameters					
Max Feed Water Quality	ppm TDS	<1,500		<1,500	
Max Feed Water Conductivity	µS	3,000		3,000	
Ambient Temperature Range	oC	4.4 - 43.0		4.4 - 43.0	
Water Temperature Range	oC	10 to 32		10 to 32	
Remote Access Ports					
Ethernet Communication Port		Yes		Yes	
System can connect to customer provided cell modem or network		Yes		Yes	
Plumbing Connections to Generator					
Inlet Water		3/8" MPT		3/8" MPT	
Product $HClO_2$		3/8" FPT		3/8" FPT	
Drain		3/8" FPT		3/8" FPT	
Inlet $NaClO_2$		1/4" Tubing		1/4" Tubing	
Inlet Regeneration					
Compressed Air					
Weights (Shippping) inc packaging	Kg	125		125	
Installation Electrical Requirements		90-240 VAC 2.7A 50/60 Hz		90-240 VAC 2.7A 50/60 Hz	
Compressed Air Requirements					
Air Pressure					
Installation Plumbing Requirements					
Inlet Water Pressure	Bar	2.76 - 7.00		2.76 - 7.00	
ΔP Across System	Bar	1.72		1.72	
Drain Pressure		Atmospheric		Atmospheric	
Precursor Requirements					
$NaClO_2$	%	7.5% Active		7.5% Active	
Regenerant	%				
Regenerant $H2SO_4$ (optional)	%				
Precursor Usage					
$NaClO_2$ 7.5%	L / Kg	26 ClO_2 Produced		26 ClO_2 Produced	
HCl 31.45%	L / Kg				
HCl 10%	L / Kg				
H_2SO_4 35% (optional)	L / Kg				
Catalyst Cartridge		Order Separately	Order Separately	Order Separately	Order Separately

* At Nominal Flow Rate

** Catalyst May Need To Be Mounted

WCS Group

Safe Efficient Compliance

MARLOWE Critical Services

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/Secondary Disinfection Overview

Water Safety | Disinfection_Ultralox Fact Sheet

Water Safety | Disinfection_Genox Fact Sheet

www.wcs-group.co.uk

Enquiries: +44 (0)845 094 4300
alex.winter@wcs-group.co.uk

For a full list of our accreditations please visit: **www.wcs-group.co.uk/accreditations-respository**