

Australian Innovative Systems – Autochlor™

Overview

Low maintenance, self cleaning, energy efficient, saltwater chlorination system for swimming pools, suitable for use with all natural saline waters in residential and commercial applications.



Product Description

Autochlor™ is a low level salt chlorination system for treating salt water swimming pools. The system can potentially reduce (or eliminate) the use of potable water in swimming pools with substitution of saltwater/seawater. The residential system can operate in water with a salinity concentration from 0.3% up to 3.5% (i.e. rivers, canals, ocean, etc.). The commercial system can use saltwater with salinity from 0.1% up to 36% (brine).



The system dramatically reduces maintenance requirements and typically does not require the direct addition of chlorine. Models are available in standard and self-cleaning units. Self cleaning units reverse the polarity of the electrodes periodically to reduce the build up of calcium deposits on the cells.

Most *Autochlor™* models utilise Switch Mode Power Supply (SMPS) which can result in energy reductions. The SMPS, in combination with a unique electrolytic cell using an active anode coating on the cell plates, can increase energy efficiency up to 30 - 50%. The use of SMPS results in smaller unit sizes, less excess heat generation, and longer cell life in comparison to conventional chlorine generator systems.

The system is available in a range of residential and commercial models. The chlorine generator (chlorinator) system consists of a power supply unit with control board and electrolytic cell. The system can be fitted to an existing or new pool pump system.

The water pump circulates water through the electrolytic cell of the chlorine generator which uses the process of electrolysis to split salt dissolved in the water into its basic components and after series of reactions, forms Sodium Hypochlorite, an active sanitiser.

The *Autochlor™* system can also be adapted for use in small and large scale (i.e. utility distribution) treatment of potable water, sanitation of cooling tower water in commercial and industrial applications and treatment of intake water for desalination plants.

PRODUCT SPECIFICATIONS

Options	<ul style="list-style-type: none">• <i>Residential System</i> – SM Models (Switchmode Self Cleaning), AC Models (Standard) and RP Models (Self Cleaning)• <i>Commercial System</i> – SM Models (Switchmode Standard) and SMC Models (Switchmode Self Cleaning)
Colours	<ul style="list-style-type: none">• <i>Residential System</i> – power supply is grey• <i>Commercial System</i> – cell housing is navy, supporting frame is metallic copper finish
Warranty	<ul style="list-style-type: none">• <i>Residential System</i> – 3 years on the power supply and electrolytic cell• <i>Commercial System</i> – 1 years on the power supply and electrolytic cell



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Expected Life	5 - 7 years
Indicative Costs	Contact supplier for more information.
Purchase Options	Contact supplier for more information.
Constituents	PVC –21.70% Teflon Plastic – 0.42% Acrylic Plastic – 6.91 % Copper – 6.16% Aluminium – 12.46% Brass – 2.40% Titanium – 6.10% Ruthenium salt based ceramic coating – 0.15% Black Steel – 3.13% Hot Galvanized Steel – 35.28% Process Control Board & Components – 4.50% Rubber – 0.15% Powder coating – 0.64%
Technical Specifications	Click here for technical specifications. Or Click here for product catalogue.
National & International Standards	<ul style="list-style-type: none"> • AS/NZS 3136-2001 including amendment 1 • ISO 9001 Time switch assembly compliant with: <ul style="list-style-type: none"> • CE • EN 50082-1 • AS/NZS 3100:2002 including amendment 1-2 • RoHS Compliant
Country of Origin	Brisbane, Australia
Projects	<ul style="list-style-type: none"> • Sea Temple Resort (7*), Port Douglas, Australia • The Esplanade City Council Pool, Cairns, Australia • The Airlie Beach Lagoon, Australia • Dreamworld, Gold Coast, Australia • Baku Water Park, Canary Islands • Cegep of Rimouski, Canada • Military Base of Valcartier, Canada • Oasis Park, Canary Islands • Waterbomb Water Park, Jakarta, Indonesia • Laucala Island Resort, Fiji
Preparation	Contact supplier for more information.



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Awards

2005 Yellow Pages® Business Ideas Grants - winner
2008 Gaia Award - Big 5 Dubai -Silver Medal
2009 QLD Telstra Business Awards -Winner
2009 International Stevie Award - Most Innovative Company in Asia - Winner
2009 Gaia Awards - Gold winner
2009 Piscina Innovation Award BCN - Winner
2010 ATS QLD technology pitch
2010 SPLASH! 2010 Environmental Awards:Most Environment – Friendly Sanitisation Product - winner
Environment-Friendly Water Saving Category - finalist

ECOSPECIFIER LIFE-CYCLE ASSESSMENT

INTEGRATED DESIGN AND POLICY ISSUES

The system is able to substitute potable water for saltwater/seawater with a much wider variety of salt levels compared to ordinary saltwater chlorinators, (normally 0.4-0.6% salt concentration is required for ideal operation) which may assist projects where there is restricted potable water access. Lower threshold of operation means less salt needs to be added and higher threshold means a much wider variety of water sources can be used, such as saline groundwater.

The 'Self cleaning' feature means that there is less need for acid washing electrodes and better energy efficiency has significant effects on operational energy inputs. Traditional swimming pools are treated using liquid, gas or powder chlorine. This requires the storing, handling and potential direct exposure to the hazardous chemical chlorine, a known skin and respiratory irritant. *Autochlor*™ facilitates the use of salt water pools which require no (or very little) direct addition of chlorine.

The system can be integrated into any existing pump system. Residential and commercial systems will require plumbing work to be carried out during installation. In addition, commercial systems will also require electrical work to be undertaken.

Overall significant reductions in resource inputs, reduction in use of dangerous chemicals and less maintenance time is achieved.



HUMAN HEALTH

Health

The system chlorine generator maintains a consistent low concentrated level of chlorine eliminating algae growth and user over exposure to excessive levels of chlorine. System uses mineral salt as the base for the chlorine generator. Salt is a mild, natural antiseptic.

System contains Polyvinyl chloride (PVC) in its unplasticised form PVC and hence contains no plasticisers.

The un-reacted raw materials in the powder coating include minute levels of Titanium Dioxide. Precautions for workers such as reducing exposure to product in dust form and using appropriate Protection Equipment or Personal Protective Equipment (PPE) mitigate potential issues to *low* risk in



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accordance with an **ecospecifier** Risk Assessment. Refer to Material Safety Data Sheet for further information.

Autochlor™ has positive aspects on the healthy disinfection of water.

Comfort

Saltwater pools are generally considered to provide better occupant comfort, due to reducing skin and eye irritation associated with traditional chlorination methods. The electrodes of the chlorine generator eliminate *chloramines* in the water, which cause a strong chlorine smell and potential irritation of the eyes found in traditional chlorinated swimming pools.

Indoor Environment Quality

Not applicable.

Electromagnetic Radiation

Product is Electromagnetic Compatibility (EMC) compliant to EU EMC Directive immunity requirements.

Safety

Product eliminates the need to handle and store chlorine. Chlorine emits a toxic gas.

Self cleaning facility means there is no need for acid washing electrodes, eliminating a further dangerous process.

Accessibility

Not applicable.

ECOLOGICAL QUALITY

Terrestrial

Emissions – Reduced acidic emissions from electrode washdown. The production of metals used in the system leads to localised emissions to terrestrial environments around production facilities.

Physical – The process of extracting metals used in the system results in the removal and stockpiling of topsoil and sub-soil, and from removing overburden and inter-burden, resulting in modified soil profiles, topography and drainage.

Lead is a heavy metal used in the solder used to join components together. Lead based materials can create localised lead contamination of soil and biodiversity impacts if components are sent to landfill at end of life.

Aquatic

Emissions – Reduced saline levels in backwash water, in some instances. The extraction of metal ores and the production metals has localised emissions to aquatic environments around production facilities. Lead contamination of groundwater can occur if products are sent to landfill at end of life.

Physical – Systems contain plastics derived from petroleum. Petrochemical production can contribute to oil spills at sea.

The extraction of metal ores and the production metals has minor localised physical impacts on aquatic environments around production facilities. Aluminium production creates bauxite residues of red mud which are disposed of in dams. Bauxite residue (chemically stable and non-toxic) is pumped to disposal dams where the mud is allowed to settle. The excess water is discharged into marine environments.

Atmosphere

Greenhouse (GHG): Improved energy efficiency means reduced GHGs compared to traditional saltwater chlorinators. System contains small volumes of materials with very high energy requirements in production, particularly the aluminium and titanium components. However, most system models provide



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energy reductions compared to traditional systems which will more than offset GHG's created in the production phase of the product over the life-cycle of the product.

Greenhouse intensity – Total Greenhouse Intensity of Autochlor™ is quite small compared to the benefits they provide:

- 17.44 kgCO₂e/kg for Residential System (model of 3.5kg SM-20 for reference).
- 597.55 kgCO₂e/kg for Commercial System (model of 120kg SRC-300 for reference).

Transport intensity – Product is manufactured in Brisbane, Australia. Local manufacture reduces embodied energy and greenhouse gases associated with international transportation of Autochlor™, however some materials used to manufacture Autochlor™ are sourced from overseas.

Table below provides land transportation greenhouse intensity figures to help calculate the greenhouse gas intensity of land transportation from shipping port.



Light commercial vehicle	Rigid Truck	Articulated Truck
0.001451kgCO ₂ e / kg.km	0.000195kgCO ₂ e / kg.km	0.000069kgCO ₂ e / kg.km

Transport intensity figures sourced from Australian National Greenhouse Gas Inventory 1990, 1995 and 1999 and WWF International, Inland Navigations and Emissions, 2005.

Operational efficiency – Most Autochlor™ models utilise Switch Mode Power Supply (SMPS) with less excess heat generation, and provides more efficient power which prolongs cell life in comparison to conventional chlorinator systems.

The SMPS, in combination with a unique electrolytic cell using an active anode coating on the cell plates, can increase energy efficiency up to 50% in comparison to conventional chlorine generator systems according to manufacturer.

Re-use Efficiency – System can be easily disassembled and reinstalled. Parts can be reconditioned and sold as second-hand reconditioned parts.

Toxics and Pollutants – Are significantly reduced with the reduced use of chlorine and cell washing acids. The production of metals used in this product, particularly copper, create localised air pollutants including dioxides and particulates, which can have significant environmental and human health effects.

While the system is usually not installed indoors, and most domestic drainage piping is PVC, it should be noted that if burnt, PVC is highly toxic in small quantities.

Ozone Depletion – Not Applicable.

Urban Heat Island Effects – Not Applicable.



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Noise – Information not available.

Biodiversity

Reduced use of chlorine and cell washing acids have less damaging impacts to onsite and wider biodiversity. The extraction of petroleum and mineral ores for materials used in the system will disrupt local landscapes and alter local ecosystems. In the event of an oil-spill, while rare, significant localised biodiversity impacts can result.

RESOURCE DEPLETION

Resource Efficiency

System reduces the consumption of the chlorine supply chain raw materials, salt and cell cleaning acids. It is a very lightweight system dematerialising ordinary systems significantly. Even though it is lightweight, overall it contains a high percentage of various plastic components. Polymers for plastics are derived from diminishing and non-renewable reserves of petroleum. An undefined percentage of plastic components in the system are recycled at end-of-life.

System contains small volumes of aluminium. Aluminium is the third most abundant metal on Earth and the most abundant in the Earth's crust. The primary mineral source for aluminium and component in cement is the bauxite ore, a non-renewable mineral resource with an estimated supply of 180 years based on current Reserve Life Index (RLI) (Source: Meyer, 2004, Availability of bauxite reserves, Journal of Natural Resources Research, p. 161). Aluminium is a very efficient material to recycle with significant energy savings over virgin material.

System contains small volumes of copper. Recent research suggests that by 2100, the global demand for copper will have surpassed the amount actually extractable from the ground (Source: Cohen, D. 2007, Earth's Natural Wealth: An Audit, New Scientist, Issue 2605). However, due to coppers' value, it is commonly recycled.

System contains small volumes of titanium and steel. Both metals are relatively abundant in comparison to other non-renewable metals. Globally, steel is the most recycled building material. However, while recycling of titanium is common, typical titanium applications such as electrodes, require high purity and therefore a high percentage of virgin material to be added to recycled content.

A small percentage of ruthenium is added to the titanium used in the electrodes of the electrolytic cells to act as a catalyst during the process of electrolysis. Ruthenium is a non-renewable resource and is considered a very rare metal.

Embodied Fossil Fuel Energy

Total Embodied Energy of Autochlor™ is:

- 319.23 MJ/ unit for Residential System (model of 3.5kg SM-20 for reference)
- 10944.92MJ/ unit for Commercial System (model of 120kg SRC-300 for reference)

Transport intensity – Product is manufactured in Brisbane, Australia. Local manufacture reduces embodied energy and greenhouse gases associated with international transportation of *Autochlor™*, however some materials used to manufacture *Autochlor™* are sourced from overseas.

Embodied Water

Information not available.



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Durability

System incorporates corrosion, overheat, overload, no flow, ingress and over pressure protection. High quality materials and safety features ensure long life cycle.

Reusability

System is able to be fully disassembled and reinstalled. Parts can be reconditioned and sold as second-hand reconditioned parts. The titanium used in the cells can be reused in new cell manufacture.

Repairability

System is able to be fully disassembled and components repaired, reconditioned or replaced.

Design for Dematerialisation

System uses less salt or a greater variety of water sources, saving either salt or potable water and does not normally require the addition of chlorine to purify water, nor require acid cell washing, thereby reducing demand for chemical use.

Design for Disassembly

System is able to be fully disassembled.

Recyclability

Products major components are able to be commercially recycled. Approximately 80% of the product is able to be recycled.

Maintenance

System is low maintenance due to the self cleaning feature of the chlorine generator regulating the chlorination process. The occasional direct addition of chlorine maybe required when chlorine levels are low due to unmanaged salt content in the pool or adverse weather conditions (e.g. heavy rain).

The chlorine generator electrodes, contained within the electrolytic cell, require cleaning in a mild hydrochloric acid solution every 6 months on average. The commercial systems are equipped with a semi automatic acid wash system.

Product Takeback Scheme

Yes, manufacturer will take back product at end of life. Product will be disassembled and all components recycled and/or reconditioned.

Extended Producer Responsibility (EPR)

Yes, product takeback sheme offered by manufacturer.

CORPORATE AND SOCIAL SUSTAINABILITY

Audits and Environmental Reporting

No.



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Convictions

No.

Environmental Policy

Yes.

Social Enhancement Programs

Yes –Australian Innovative Systems participated in various programs run by Rotary International.

Technology Transfer Programs

No.

Environmental Management Systems (EMS)

No.

ECOSPECIFIER ISSUES OF CONCERN / RED LIGHT

None.

ECOSPECIFIER GREENRATE GREEN BUILDING SCHEME PRE-ASSESSMENT

The Pearls Design System for ESTIDAMA

RESOURCEFUL ENERGY

<p><u>RE-r1: Energy Conservation: Minimum</u></p> <p>Product may assist in a project obtaining this requirement if the building meets the prescribed energy performance requirements, such as the required Prescriptive or Performance Requirements.</p>	<p>Requirement</p>
<p><u>RE-1: Energy Conservation Improvement: Carbon Reduction</u></p> <p>Product may assist in a project obtaining this credit for Energy Conservation Improvement to reduce energy consumption and carbon emissions during building operation compared to either Budget Building or Benchmark building including renewable energy inputs or offsets.</p> <p>Up to 3 credit points may be achieved by products/materials in combination for passive environmental design.</p>	<p><i>Points Available</i></p> <p>20</p>



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LEED® for Commercial Interiors - Version 3 (see disclaimer below)

ENERGY & ATMOSPHERE

EA Prerequisite 2: Minimum Energy Performance

NOTE needed in relation to interior water feature use or the like

Product may assist a project meet the Rating System Energy Prerequisite, when appropriately included in combination with other elements and assessed using a computer simulation model, to comply with the nominated standard or the local energy code (whichever is more stringent).

Required

LEED® for New Construction & Major Renovations - Version 3 (see disclaimer below)

ENERGY & ATMOSPHERE

EA Prerequisite 2: Minimum Energy Performance

Product may assist a project meet the Rating System Energy Prerequisite, when appropriately included in combination with other elements and assessed using a computer simulation model, to comply with the nominated standard or the local energy code (whichever is more stringent).

Required

EA Credit 1: Optimize Energy Performance

Product may assist in a project obtaining credits, when appropriately designed in combination with other elements and assessed using a computer simulation model, for increasing the level of energy performance above the nominated baseline prerequisite standard.

Exemplary Performance: Innovation in Design & Process: Optimize Energy Performance
(*additional 1 point*)

Possible achievement when minimum energy cost savings of 45.5% for New Buildings and 38.5% for Existing Buildings are obtained when using EA Credit 1 Option 1. An Innovation in Design & Process credit point is not available for Option 2, 3 or 4.

Points Available

10*

* 2 points mandatory performance level

1

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BREEAM Issue 3 (see disclaimer below)

ENERGY

Ene 1 – Reduction of CO₂ emissions

Product is likely to assist in a project obtaining credits as it demonstrates an improvement in the energy efficiency of a building's systems and therefore achieves lower operational related CO₂ emissions. Number of points awarded is dependent on percentage improvement over the established baseline.

Points Available

15

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BCA Greenmark Landed Houses v1 (see disclaimer below)

Product does not assist in the achievement of credits in this rating tool.

BCA Greenmark Non-Residential Buildings v3 (see disclaimer below)

ENERGY EFFICIENCY

1-9(b) Energy Efficient Practices & Features

Product is likely to assist in a project obtaining credit points through the use of energy efficient features that translate into energy savings over the total building energy consumption. Number of points awarded is determined by percentage of energy savings.

Points Available

11

BCA Greenmark Office Interior v1 (see disclaimer below)

Product does not assist in the achievement of credits in this rating tool.

BCA Greenmark Infrastructure v1 (see disclaimer below)

ENERGY

2a-1 Energy Efficiency

Product is likely to assist in a project obtaining credit points by improving the energy efficiency of the project compared to code compliance facility or industry norm. Number of points awarded is determined by the percentage energy savings from the norm.

Points Available

13



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BCA Greenmark Residential Buildings v3 (see disclaimer below)

ENERGY

<u>1-7 Energy Efficient Practices & Features</u>	<i>Points Available</i>
Product is likely to assist in a project obtaining credit points through the use of innovative energy efficient features that translate into energy savings over the total building energy consumption. Number of points awarded is determined by the level of impact of the item.	7

BCA Greenmark Non-Residential Existing Buildings v2 (see disclaimer below)

ENERGY EFFICIENCY

<u>1-1 Energy Efficiency</u>	<i>Points Available</i>
Product is likely to assist in a project obtaining credit points by contributing to increased energy efficiency of the building. Number of points awarded is determined by the percentage improvement from the specified benchmarks.	22

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Green Building Index Non-Residential New Construction Version 1 (see disclaimer below)

ENERGY EFFICIENCY

<u>EE5 Advanced EE Performance</u>	<i>Points Available</i>
Product is likely to assist in a project obtaining credit points by assisting in reducing the Building Energy Intensity (BEI) through energy efficient measure. Number of points awarded is determined by the amount of reduction below the baseline BEI.	15

Green Building Index Residential New Construction Version 1 (see disclaimer below)

ENERGY EFFICIENCY

<u>EE5 Advanced EE Performance</u>	<i>Points Available</i>
Product is likely to assist in a project obtaining credit points by assisting in reducing the Building Energy Intensity (BEI) through energy efficient measure. Number of points awarded is determined by the amount of reduction below the baseline BEI.	15



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National Australian Built Environment Rating System (NABERS) Compatibility

Product may assist in the achievement of ENERGY credits in this rating tool.

BASIX Building Sustainability Compatibility

Product may assist in the achievement of ENERGY credits in this rating tool.

Green Star™ Office Interiors Version 1.1 Compatibility (see disclaimer below)

ENERGY

<p><u>Ene-1: Energy Efficiency</u></p> <p>Product is likely to assist in a project obtaining the conditional requirement for the design of a base building that achieves a predicted rating of 4 stars or greater using the Australian Building Greenhouse Rating (ABGR) scheme's <i>Validation Protocol for Tenancy Energy Estimation Version 2005-02</i>.</p>	<p>Conditional</p>
<p><u>Ene-2: Energy Improvements</u></p> <p>Product is likely to assist obtaining credits for improvement in the overall energy efficiency of a project. Credit points achieved are determined by the star rating achieved above the conditional 4 star Australian Building Greenhouse Rating (ABGR). Product contribution to credit points is determined by project energy load simulation and needs to be included in the model to provide beneficial credits.</p>	<p><i>Points Available</i></p> <p>12</p>

Green Star™ Office Design Version 2 Compatibility (see disclaimer below)

ENERGY

<p><u>Ene-1: Energy</u></p> <p>Product is likely to assist in a project obtaining the conditional requirement for the design of a base building that achieves a predicted rating of 4 stars or greater using the Australian Building Greenhouse Rating (ABGR) scheme's <i>Validation Protocol for Tenancy Energy Estimation Version 2005-02</i>.</p>	<p>Conditional</p>
<p><u>Ene-2: Energy Improvement</u></p> <p>Product is likely to assist in obtaining credits for improvement in the overall energy efficiency of a project. Credit points achieved are determined by the star rating achieved above the conditional 4 star Australian Building Greenhouse Rating (ABGR). Product contribution to credit points is determined by project energy load simulation and needs to be included in the model to provide beneficial credits.</p>	<p><i>Points Available</i></p> <p>15</p>



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Green Star™ Office Version 3 Compatibility (see disclaimer below)

ENERGY

<u>Ene-: Conditional Requirement</u> Product is likely to assist in a project obtaining the conditional requirement for the design of a base building in which the project's greenhouse gas emissions do not exceed 110 kgCO ₂ /m ² /annum as determined using the Australian Building Greenhouse Rating (ABGR) <i>Validation Protocol for Computer Simulations</i> or by using the final and current version of the Green Star™ Energy Calculator.	Conditional
<u>Ene-1: Greenhouse Gas Emissions</u> Product is likely to assist in obtaining credits for minimising the greenhouse gas emissions of a project. Credit points achieved are determined by determining the reduction in predicted greenhouse gas emissions below the Conditional Requirement of 110 kgCO ₂ /m ² /annum. Full points are available for carbon-neutral base buildings.	<i>Points Available</i> 20

Green Star™ Retail Centre Version 1 Compatibility (see disclaimer below)

ENERGY

<u>Ene-1: Greenhouse Gas Emissions</u> Product is likely to assist obtaining credits for improvement in the operational energy consumption of a project. Credit points achieved are determined by the predicted percentage of greenhouse gas emissions reduction below the "standard practice benchmark". This benchmark is determined by the <i>Retail Centre V1</i> Energy Calculator.	<i>Points Available</i> 20
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Green Star™ Education Version 1 Compatibility (see disclaimer below)

ENERGY

<u>Ene: Conditional Requirement</u> Product is likely to assist in a project obtaining the conditional requirement by meeting the green house gas emissions ' <i>benchmark</i> ' determined by the energy calculator.	Conditional
<u>Ene-1: Greenhouse Gas Emissions</u> Product is likely to assist obtaining in a project obtaining credits for designs that minimise greenhouse gas emissions associated with operational energy consumption. Credit points achieved are determined by the predicted % reduction of greenhouse gas emissions below the conditional requirement.	<i>Points Available</i> 20



Green Star™ Industrial Version 1 Compatibility (see disclaimer below)

ENERGY

<u>Ene Conditional Requirement</u> Product is likely to assist in a project obtaining the conditional requirement by meeting the green house gas emissions bench mark, determined by the Green Star Industrial Pilot Energy Calculator.	Conditional
<u>Ene-1: Greenhouse Gas Emissions</u> Product is likely to assist obtaining credits for improvement in the operational energy efficiency of a project. Credit points achieved are by the further reduction below the conditional requirement determined by the Energy Calculator.	<i>Points Available</i> 20

Green Star™ Multi Unit Residential Version 1 Compatibility (see disclaimer below)

ENERGY

<u>Ene: Conditional Requirement</u> Product is likely to assist in a project obtaining the conditional requirement for energy consumption and minimisation of greenhouse gases, through improved thermal performance. Average thermal performance for dwellings must be improved by 10% compared to the thermal performance standard in the relevant jurisdiction.	Conditional
<u>Ene-1: Greenhouse Gas Emissions</u> Product is likely to assist obtaining credits for improvement in the operational energy efficiency of a project. Credit points achieved are determined by the predicted percentage of greenhouse gas emissions reduction below the “ <i>standard practice benchmark</i> ”. This benchmark is determined by the <i>Multi Unit Residential Centre V1</i> Energy Calculator.	<i>Points Available</i> 20

Green Star™ Healthcare Version 1 Compatibility (see disclaimer below)

ENERGY

<u>Ene-Con: Energy Conditional Requirement</u> Product is likely to assist in a project meeting the energy conditional requirement. The project’s predicted greenhouse gas emissions must be equal to or an improvement, in the ‘ <i>bench mark</i> ’ building determined using <i>Healthcare v1 Greenhouse Gas Emissions Calculator</i> .	Conditional
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<p><u>Ene-1: Greenhouse Gas Emissions</u></p> <p>Product is likely to assist in a project obtaining credits for reduction in operational energy consumption and greenhouse gas emissions of the base building. One point is achieved for every 5% reduction against the '<i>bench mark</i>' building and zero net operating buildings receive 20 credit points.</p>	<p><i>Points Available</i> 20</p>
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Green Star SA™ Office Version 1 Compatibility (see disclaimer below)

ENERGY

<p><u>Ene: Conditional Requirement</u></p> <p>Product is likely to assist in a project obtaining the conditional requirement by improving energy performance equal to or better than a notional building constructed to the 'deemed to comply' fabric and building services clauses of SANS 204:2008 <i>Energy Efficiency in Buildings</i> demonstrated by using the Green Star SA energy calculator or fully comply with ASHRAE <i>Advanced Energy Design Guide for Small Office Buildings</i>.</p>	<p>Conditional</p>
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<p><u>Ene-1: Greenhouse Gas Emissions</u></p> <p>Product is likely to assist in obtaining credits for minimising the greenhouse gas emissions of a project. Credit points achieved are determined by demonstrating the reduction in predicted greenhouse gas emissions below the Conditional Requirement. Full points are available for carbon-neutral base buildings.</p> <p>Alternatively this product may assist in a project obtaining 4 points for offices smaller than 2,000m² UA by assisting in demonstration of compliance with ASHRAE <i>Advanced Energy Design Guide for Small Office Buildings</i>.</p>	<p><i>Points Available</i> 20 or 4</p>
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Green Star SA™ Retail Centre Version 1 Compatibility (see disclaimer below)

ENERGY

<p><u>Ene: Conditional Requirement</u></p> <p>Product is likely to assist in a project obtaining credits by reducing operational energy consumption and maximising operational energy efficiency so that the predicted carbon emissions of the building are less than or equal to the predicted carbon emissions of the notational building in the same location established by the requirements of the <i>Retail Centre PILOT</i> Energy Calculator and the Modelling Protocol Guide.</p>	<p>Conditional</p>
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<p><u>Ene-1: Greenhouse Gas Emissions</u></p> <p>Product is likely to assist in a project obtaining credits for improvement in the operational energy consumption of a project. Credit points achieved are determined by the predicted percentage of greenhouse gas emissions reduction below the “standard practice benchmark”. This benchmark is determined by the <i>Retail Centre PILOT</i> Energy Calculator.</p>	<p><i>Points Available</i> 20</p>
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Green Star™ is a registered mark of the Green Building Council of South Africa (GBCSA). The listing constitutes an **ecospecifier** Technical Opinion and is not endorsed by the GBCSA or its agents. For detailed technical information about Credit requirements refer to the Green Star™ Technical Manuals. Rating Tools and Technical Manuals are subject to change by the GBCSA, and any decision regarding the award of credits towards a Green Star rating is at the sole discretion of the GBCSA.

Green Star NZ™ Office 2009 Compatibility (see disclaimer below)

ENERGY

<p><u>Ene-1: Conditional</u></p> <p>Product is likely to assist in a project obtaining the conditional requirement for the design of a base building in which the project’s greenhouse gas emissions do not exceed 105 kWh/m2 as determined using the Green Star NZ modelling method outlined in the additional guidance and off-axis scenarios are adopted to ensure the validity of energy models.</p>	<p>Conditional</p>
<p><u>Ene-2: Greenhouse Gas Emissions</u></p> <p>Product is likely to assist in obtaining credits for minimising the greenhouse gas emissions of a project. Credit points achieved are determined by determining the reduction in predicted greenhouse gas emissions below the Conditional Requirement of 105 kWh/m2. Full points are available for carbon-neutral base buildings.</p>	<p><i>Points Available</i> 20</p>

Green Star NZ™ Office Interiors 2009 Compatibility (see disclaimer below)

Product does not assist in the achievement of credits in this rating tool

Green Star NZ™ Education 2009 Compatibility (see disclaimer below)

ENERGY

<p>Ene-1: Conditional Requirement</p> <p>Product is likely to assist in a project obtaining the conditional requirement by meeting the green house gas emissions bench mark, determined by the Green Star NZ- Education 2009 Energy Calculation Guide.</p> <p>Credit points are determined using the Energy and GHG Emissions Calculator</p>	<p>Conditional +10 points</p>
<p>Ene-2: Greenhouse Gas Emissions</p> <p>Product is likely to assist obtaining credits for improvement in the operational energy efficiency of a project. Credit points achieved are by the further reduction below the conditional requirement determined by Green Star NZ- Industrial 2009 Greenhouse Industrial Energy Calculation Guide. Credit Points are determined using the Energy and GHG Emissions Calculator.</p>	<p><i>Points Available</i> 10</p>



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Green Star NZ™ Industrial 2009 Compatibility (see disclaimer below)

ENERGY

Ene-1: Conditional Requirement Product is likely to assist in a project obtaining the conditional requirement by meeting the green house gas emissions bench mark, determined by the Green Star NZ- Education 2009 Energy Calculation Guide. Credit points are determined using the Energy and GHG Emissions Calculator	Conditional +10 points
Ene-2: Greenhouse Gas Emissions Product is likely to assist obtaining credits for improvement in the operational energy efficiency of a project. Credit points achieved are by the further reduction below the conditional requirement determined by Green Star NZ- Industrial 2009 Greenhouse Industrial Energy Calculation Guide. Credit Points are determined using the Energy and GHG Emissions Calculator.	<i>Points Available</i> 10

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ASSESSMENT COMPARISON

Chlorine injection, Ionisation, Ozone and Brine water treatment.

RELATED TOPICS

Cooling – Equipment; Landscaping & Outdoor; Pools & Spas; Water & Gas; Water – Industrial; and Water – Potable.

CSI CATEGORY & NUMBER

13 11 49 Swimming Pool Cleaning Equipment
22 51 19 Swimming Pool Water Treatment Equipment
23 25 00 HVAC Water Treatment
33 13 00 Disinfecting of Water Utility Distribution
44 40 00 Water Treatment Equipment
44 42 00 General Water Treatment Equipment
44 44 16 Water Chlorinators

NBS CATEGORY & NUMBER

Building and Residential Services

Commercial Engineering & Services
S12 Water treatment equipment
S18 Swimming pool water treatment systems



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ASSESSMENT CRITERIA SATISFIED

WORKPLACE OH&S, OCCUPANT HEALTH, HUMAN WELL-BEING	
✓	Low/Reduced offgassing
✓	Reduced, or no toxicity/ carcinogens/mutagens/teratogens or ionizing agents through life cycle
✓	Improved Occupational Health and Safety (OH&S)
HABITAT & BIODIVERSITY CONSERVATION	
✓	Reduced terrestrial impacts
✓	Reduced aquatic impacts
AIR POLLUTION	
✓	Reduced, or no toxicity/ carcinogens/mutagens/teratogens or ionizing agents through life cycle
✓	Reduced smog-forming potential
✓	Reduced urban heat island potential
RESOURCE DEPLETION	
✓	Reduced water consumption
✓	Water production (non-potable)
ENERGY RESOURCES	
✓	Contributes to downstream reduction of energy use
CORPORATE SOCIAL RESPONSIBILITY, ENVIRONMENTAL MANAGEMENT AND REPORTING	
✓	Environmental policy
✓	Social or environmental enhancement programmes
OTHER VITAL SIGNS	
✓	Material Safety Data Sheet (MSDS)
✓	Quality Management System
✓	Documented manufacturer claims
✓	Expert Assessment

MANUFACTURER DETAILS

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