

## 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.



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## PRODUCT SPECIFICATIONS

|   |  |
|---|--|
| <b>Options</b>                                | <ul style="list-style-type: none"> <li>• <i>Residential System</i> – SM Models (Switchmode Self Cleaning), AC Models (Standard) and RP Models (Self Cleaning)</li> <li>• <i>Commercial System</i> – SM Models (Switchmode Standard) and SMC Models (Switchmode Self Cleaning)</li> </ul>   |
| <b>Colours</b>                                | <ul style="list-style-type: none"> <li>• <i>Residential System</i> – power supply is grey</li> <li>• <i>Commercial System</i> – cell housing is navy, supporting frame is metallic copper finish</li> </ul>  |
| <b>Warranty</b>                               | <ul style="list-style-type: none"> <li>• <i>Residential System</i> – 3 years</li> <li>• <i>Commercial System</i> – 3 years</li> </ul>  |
| <b>Expected Life</b>                          | 5 - 7 years  |
| <b>Indicative Costs</b>                       | Contact supplier   |
| <b>Purchase Options</b>                       | Contact supplier   |
| <b>Constituents</b>                           | <p><i>Residential System</i></p> <ul style="list-style-type: none"> <li>• Plastic components (Electrode, PVC Sheathing, Impact Resistant Acrylic and PC/ABS), 33% b/w</li> <li>• Titanium, 11% b/w</li> <li>• Aluminium, 11% b/w</li> <li>• PCB and components, 20% b/w</li> <li>• Copper, 14% b/w</li> <li>• Miscellaneous components (Steel, ruthenium, brass, rubber and other), less than 11% b/w</li> </ul> <p><i>Commercial System</i></p> <ul style="list-style-type: none"> <li>• Aluminium, 28.2% b/w</li> <li>• PVC, 16.3% b/w</li> <li>• Copper, 13.2% b/w</li> <li>• Acrylic, 5.8% b/w</li> <li>• Titanium, 5.8% b/w</li> <li>• PCB and components, 5.9% b/w</li> <li>• Miscellaneous components, 8.3% b/w (Brass, Powdercoating, Cooling liquid, Steel, Rubber, Ruthenium)</li> </ul> |
| <b>National &amp; International Standards</b> | <ul style="list-style-type: none"> <li>• CE</li> <li>• EN 50082-1</li> <li>• AS/NZS 3136-2001 including amendment 1</li> </ul>   |



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|                          |   |
|--------------------------|---|
|                          | <ul style="list-style-type: none"> <li>• AS/NZS 3100:2002 including amendment 1-2</li> <li>• RoHS Compliant</li> </ul>  |
| <b>Country of Origin</b> | Brisbane, Australia   |
| <b>Availability</b>      | <p><i>Oceania</i></p> <ul style="list-style-type: none"> <li>• Australia, New Zealand, East Timor, Papua New Guinea, Fiji, New Caledonia, Samoa, French Polynesia, Cook Islands</li> </ul> <p><i>Asia</i></p> <ul style="list-style-type: none"> <li>• India, Nepal, Maldives, China, Taiwan, South Korea, Singapore, Thailand, Philippines, Malaysia</li> </ul> <p><i>Middle East</i></p> <ul style="list-style-type: none"> <li>• United Arab Emirates, Saudi Arabia</li> </ul> <p><i>Africa</i></p> <ul style="list-style-type: none"> <li>• Nigeria, Republic of Seychelles</li> </ul> <p><i>Europe</i></p> <ul style="list-style-type: none"> <li>• United Kingdom, Ireland, Spain, France, Italy, Holland, Sweden, Czech Republic, Cyprus, Turkey, Serbia and Montenegro, Russia, Ukraine, Kazakhstan</li> </ul> <p><i>Americas</i></p> <ul style="list-style-type: none"> <li>• USA, Canada, Mexico, Colombia</li> </ul> |
| <b>Projects</b>          | <ul style="list-style-type: none"> <li>• Sea Temple Resort (7*), Port Douglas, Australia</li> <li>• The Esplanade City Council Pool, Cairns, Australia</li> <li>• The Airlie Beach Lagoon, Australia</li> <li>• Dreamworld, Gold Coast, Australia</li> <li>• Baku Water Park, Canary Islands</li> <li>• Cegep of Rimouski, Canada</li> <li>• Military Base of Valcartier, Canada</li> <li>• Oasis Park, Canary Islands</li> <li>• Waterbomb Water Park, Jakarta, Indonesia</li> <li>• Laucala Island Resort, Fiji</li> </ul>  |
| <b>Preparation</b>       | Contact supplier  |



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## ECOSPECIFIER LIFE-CYCLE ASSESSMENT

### INTEGRATED DESIGN AND POLICY ISSUES

The system is able to substitute potable water for saltwater/seawater (with a variety of salt levels), which may assist projects where there is restricted potable water access. Self cleaning and 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*<sup>™</sup> 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.



### 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 plasticised and unplasticised PVC. Plasticised PVC contains phthalates. Information is not available on the phthalate used.

#### 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 swimming pools.

#### Indoor Environment Quality

Not applicable

#### Electromagnetic Radiation

Product is EMC compliant to EU EMC Directive immunity requirements.

#### Safety

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

#### Accessibility

Not applicable



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## ECOLOGICAL QUALITY

### Terrestrial Pollution

*Emissions* – The production of metals used to in the system leads to localized emissions to terrestrial environments around production facilities.

*Physical* – The process of extracting metals used to 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 localized lead contamination of soil and biodiversity impacts if components are landfilled at end of life.

### Aquatic Pollution

*Emissions* – 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 landfilled 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 Pollution

*Greenhouse (GHG)* – System contains materials with very high energy requirements in production, particularly the aluminium and titanium components. However, most system models provide 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* – Information not available

*Transport intensity* – Product is manufactured in Brisbane, Australia. Switchmode Autochlor models reduce overall system size and will reduce transport intensity of product compared to traditional chlorinator systems.

Energy and GHG intensities for shipping product are shown below. Shipping port from country of origin is Brisbane, Australia. *Autochlor*<sup>TM</sup> systems are available in a wide range of models with greatly varying weights and sizes.

Below are weights for common residential and commercial models to help calculate shipping transport intensity.

| Product weight  | Energy Intensity - Container Shipping | GHG Intensity - Container Shipping |
|---|---------------------------------------|------------------------------------|
| <ul style="list-style-type: none"><li><i>Autochlor</i><sup>TM</sup> Residential Model, SM 20 - 4.3kg (packed weight)</li></ul>  | 0.000135MJ / kg.km                    | 0.000011kgCO <sub>2e</sub> / kg.km |
| <ul style="list-style-type: none"><li><i>Autochlor</i><sup>TM</sup> Commercial Model, SRC 300 - 115kg (packed weight)</li></ul> |                                       |                                    |



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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 <sub>2e</sub> / kg.km | 0.000195kgCO <sub>2e</sub> / kg.km | 0.000169kgCO <sub>2e</sub> / 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*<sup>TM</sup> 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.

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

*Toxics and Pollutants* – 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.

*Ozone Depletion* – Not applicable

*Urban Heat Island Effects* – Not applicable

*Noise* – Information not available

### **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 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 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.



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System contains 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 copper's value, it is commonly recycled.

System contains 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**

Information not available

#### **Embodied Water**

Information not available

#### **Durability**

System incorporates corrosion, overheat, overload, no flow, ingress and over pressure protection.

#### **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 does not normally require the addition of chlorine to purify water, 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.



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### **Maintenance**

System is low maintenance due to 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)**

No

## **CORPORATE AND SOCIAL SUSTAINABILITY**

### **Audits and Environmental Reporting**

No

### **Convictions**

No

### **Environmental Policy**

Yes

### **Social Enhancement Programs**

No

### **Technology Transfer Programs**

No

### **Environmental Management Systems (EMS)**

No

## **ECOSPECIFIER ISSUES OF CONCERN / RED LIGHTS**

System contains a high percentage of aluminium. Aluminium has a high embodied energy.



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## ECOSPECIFIER GREENRATE GREEN BUILDING SCHEME PRE-ASSESSMENT

### LEED® for Commercial Interiors - 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**

### LEED® for New Construction & Major Renovations - Version 2.2 (see LEED® 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.

*Points Available*

**10\***

\* 2 points mandatory performance level

##### 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.

**1**

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

#### ENERGY

|   |  |
|---|--|
| <u>Ene-1: Energy Efficiency</u><br><br>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> .   | <b>Conditional</b>                       |
| <u>Ene-2: Energy Improvements</u><br><br>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. | <i>Points Available</i><br><br><b>12</b> |

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

#### ENERGY

|   |  |
|---|--|
| <u>Ene-1: Energy</u><br><br>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> .  | <b>Conditional</b>                       |
| <u>Ene-2: Energy Improvement</u><br><br>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. | <i>Points Available</i><br><br><b>15</b> |

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

#### ENERGY

|  |  |
|--|--|
| <u>Ene-: Conditional Requirement</u><br><br>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 <sub>2</sub> /m <sup>2</sup> /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. | <b>Conditional</b>                       |
| <u>Ene-1: Greenhouse Gas Emissions</u><br><br>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 <sub>2</sub> /m <sup>2</sup> /annum. Full points are available for carbon-neutral base buildings.  | <i>Points Available</i><br><br><b>20</b> |



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**Green Star™ Retail v1 Compatibility** (see Green Star™ disclaimer below)

ENERGY

Ene-1: Greenhouse Gas Emissions

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 *Retail Centre V1* Energy Calculator.

*Points Available*  
**20**

**Green Star™ Education v1 Compatibility** (see Green Star™ disclaimer below)

ENERGY

Ene: Conditional Requirement

Product is likely to assist in a project obtaining the conditional requirement by meeting the green house gas emissions ‘*benchmark*’ determined by the energy calculator.

**Conditional**

Ene-1: Greenhouse Gas Emissions

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.

*Points Available*  
**20**

**Green Star™ Industrial Compatibility** (see Green Star™ disclaimer below)

ENERGY

Ene 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 Industrial Pilot Energy Calculator.

**Conditional**

Ene-1: 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 the Energy Calculator.

*Points Available*  
**20**



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**Green Star™ Multi Unit Residential v1 Compatibility** (see Green Star™ disclaimer below)

ENERGY

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|--|--|
| <p><u>Ene: Conditional Requirement</u></p> <p>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.</p>   | <p><b>Conditional</b></p>                    |
| <p><u>Ene-1: Greenhouse Gas Emissions</u></p> <p>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.</p> | <p><i>Points Available</i><br/><b>20</b></p> |

**Green Star™ Healthcare v1 Compatibility** (see Green Star™ disclaimer below)

ENERGY

|   |  |
|---|--|
| <p><u>Ene-Con: Energy Conditional Requirement</u></p> <p>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>.</p>               | <p><b>Conditional</b></p>                    |
| <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><br/><b>20</b></p> |

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

ENERGY

|  |  |
|--|--|
| <p><b>Ene-1: Conditional Requirement</b></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><b>Conditional</b></p> <p><b>+10 points</b></p> |
| <p><b>Ene-2: Greenhouse Gas Emissions</b></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></p> <p><b>10</b></p>    |

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

ENERGY

|  |  |
|--|--|
| <p><b>Ene-1: Conditional Requirement</b></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><b>Conditional</b></p> <p><b>+10 points</b></p> |
| <p><b>Ene-2: Greenhouse Gas Emissions</b></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></p> <p><b>10</b></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><b>Conditional</b></p>   |
| <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 2,000m<sup>2</sup> 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></p> <p><b>20</b></p> <p>or</p> <p><b>4</b></p> |

**Green Star SA™ Retail Pilot 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><b>Conditional</b></p>                       |
| <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></p> <p><b>20</b></p> |

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.



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**The Pearls Design System for ESTIDAMA  
New Buildings Rating Method**

**RESOURCEFUL ENERGY**

|  |                         |
|--|-------------------------|
| <u>RE-r1: Energy Conservation: Minimum</u>   | <b>Requirement</b>      |
| 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.  |                         |
| <u>RE-1: Energy Conservation Improvement: Carbon Reduction</u>   | <i>Points Available</i> |
| 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. | <b>20</b>               |
| Up to 3 credit points may be achieved by products/materials in combination for passive environmental design.   |                         |

**BREEAM Issue 3**

**ENERGY**

|  |                         |
|--|-------------------------|
| <u>Ene 1 – Reduction of CO<sub>2</sub> emissions</u>   | <i>Points Available</i> |
| 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 CO <sub>2</sub> emissions. Number of points awarded is dependent on percentage improvement over the established baseline. | <b>15</b>               |

**BCA Greenmark Landed Houses v1**

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

**BCA Greenmark Non-Residential Buildings v3**

**ENERGY EFFICIENCY**

|  |                         |
|--|-------------------------|
| <u>1-9(b) Energy Efficient Practices &amp; Features</u>  | <i>Points Available</i> |
| 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. | <b>11</b>               |



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### BCA Greenmark Office Interior v1

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

### BCA Greenmark Infrastructure v1

#### 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**

### BCA Greenmark Residential Buildings v3

#### ENERGY

##### 1-7 Energy Efficient Practices & Features

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.

*Points Available*

**7**

### Green Building Index Non-Residential New Construction Version 1

#### ENERGY EFFICIENCY

##### EE5 Advanced EE Performance

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.

*Points Available*

**15**

### Green Building Index Residential New Construction Version 1

#### ENERGY EFFICIENCY

##### EE5 Advanced EE Performance

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.

*Points Available*

**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.

### **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**

#### **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

- Reduced, or no toxicity/ carcinogens/mutagens/teratogens or ionizing agents through life cycle

### HABITAT & BIODIVERSITY CONSERVATION

- Reduced aquatic impacts

### AIR POLLUTION

- Reduced Ozone Depleting Substances (ODSs)
- Reduced Greenhouse Gas (GHG) emissions

### RESOURCE DEPLETION

- Water production (potable)
- Water production (non-potable)
- Least processed materials

### CORPORATE SOCIAL RESPONSIBILITY, ENVIRONMENTAL MANAGEMENT AND REPORTING

- Environmental policy

### OTHER VITAL SIGNS

- Documented manufacturer claims
- Expert Assessment



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## MANUFACTURER DETAILS

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