TECHNICAL MANUAL
GREEN STAR SA
INTERIORS PILOT v0.1

Rev.0
September 2014

Change Log:		
Revision:	**Changes:**	**Date:**

Green Building Council of South Africa
Green Star SA – Interiors PILOT
Technical Manual
First Edition October 2013

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Authorisation & Disclaimer

The Green Star SA Rating System and the rating tools have been developed with the assistance and participation of representatives from many organisations. The rating tools are subject to further development in the future. The views and opinions expressed in this Technical Manual have been determined by the GBCSA and its Committees.

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Acknowledgements

GREEN STAR SA – INTERIORS PILOT RATING TOOL

The Green Star SA – Interiors PILOT rating tool has been adapted from the Australian Green Star – Interiors Tool, under license from the Green Building Council of Australia. The tool has established individual environmental measurement criteria with particular reference to the South African marketplace and environmental context.

The Green Building Council of South Africa (GBCSA) would like to acknowledge all the parties who have worked on and supported the development of the Green Star SA – Interiors PILOT rating tool.

SPONSORSHIP

Green Star SA – Interiors PILOT tool sponsors, Standard Bank and Saint Gobain provided much-needed financial support to develop the rating tool.

SUPPORT

The Green Building Council of South Africa acknowledges the support of the Green Building Council of Australia in providing their Green Star intellectual property and assisting the GBCSA in adapting it for the South African market.

ADDITIONAL EXPERTISE

The GBCSA also thanks all the individuals and organisations who provided feedback and expertise to the technical development of the Green Star SA – Interiors PILOT rating tool and Technical Manual. Their advice and guidance is greatly appreciated.

The following individuals deserve special acknowledgement:

Acknowledgements

Technical Consultant: Arup

With special thanks to Jaco Kemp, Georgina Smit, Dianne Kirkman, Ed Hoare, Tessa Brunette, Andy Feldman and Adam Ozinsky

Technical Consultant: Solid Green

With special thanks to Chilufya Lombe and Warren Gray

Specialist input

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Gale McAll –Clicks Group

Geoffrey Bennett - Collaboration

Atisha Gopichund – Saint Gobain

Ivan Lin – Pro-acoustic

Karen Ahrends – Source IBA

Mike Aldous - Mott MacDonald PDNA

Moegammad Ismail – ASAP Projects

Peter Kowalski – Formfunc

Peter Townshend – Giant Leap;

Richard Humphrey – Aecom

Acknowledgements

Robbie Strang – ExecuFlora

Robyn Berzen – Metaform Architects

Rudd van Deventer - SpaceWorx

Trevor Dean – Standard Bank

Green Star SA Technical Advisory Group Members

Whilst not mentioned individually, the GBCSA would like to thank all Technical Advisory Group members who continuously contribute to the technical refinement of Green Star SA rating tools.

2013 GBCSA TECHNICAL STEERING COMMITTEE

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Technical content and support provided by:

green building council australia

Green Star SA Certification

The property industry is well-placed to deliver significant long-term environmental improvements using a broad range of measures. More importantly, it is unique in that it can directly influence and create behavioural changes at all stages of the supply chain. However, there are inherent barriers within the industry that often act to ensure that efficiency measures are not adopted, despite the fact that a strong business case can be made for their implementation. Most significantly, these barriers relate to the developer/contractor/owner divisions or split incentives that often result in the benefits of efficiency or improved performance measures not accruing to the party that initiated them.

The Green Building Council of South Africa (GBCSA) was created in order to address some of these barriers. The GBCSA's objective is to promote sustainable development and the transition of the property industry towards sustainability by promoting green building programs, technologies and design practices. A key priority for the GBCSA has been the development of a comprehensive environmental rating system for buildings, known as Green Star SA.

Green Star SA separately evaluates the environmental initiatives of designs, projects and/or buildings based on a number of criteria, including energy and water efficiency, indoor environment quality and resource conservation.

Green Star SA was created to:

- Establish a common language and standard of measurement for green buildings;
- Promote integrated, whole-building design;
- Identify building lifecycle impacts;
- Raise awareness of green building benefits;
- Recognise environmental leadership; and
- Transform the built environment to reduce the environmental impact.

Green Star SA will have rating tools for different phases of the building lifecycle (design, construction, operations, refurbishment or fitout) and for different building classes (office, retail, healthcare, education, residential, industrial, public buildings etc.).

Green Star SA has built on existing systems and tools in overseas markets, most notably the Green Star system developed by the Green Building Council of Australia (GBCA), by adapting and establishing individual environmental measurement criteria relevant to the South African marketplace and environmental context.

Green Star SA rating tools use the best regulatory standards to encourage the property industry to improve the environmental impact of development. The rating tools embrace local standards and guidelines, where applicable, to benchmark this improvement.

The GBCSA has developed Green Star SA to provide industry with an objective measurement for green buildings. In assessing those elements that should be rated and to drive change in the market, the GBCSA has been diligent in focusing on areas of environmental impact that are a direct consequence of a building's briefing, design, construction and maintenance – that is, those outcomes that can be directly influenced by stakeholders within the property industry.

Green Star SA establishes a number of categories under which specific key criteria are grouped and assessed. This framework is used by each and every Green Star SA rating tool.

The basic Green Star SA structure is shown below.

Green Star SA Certification

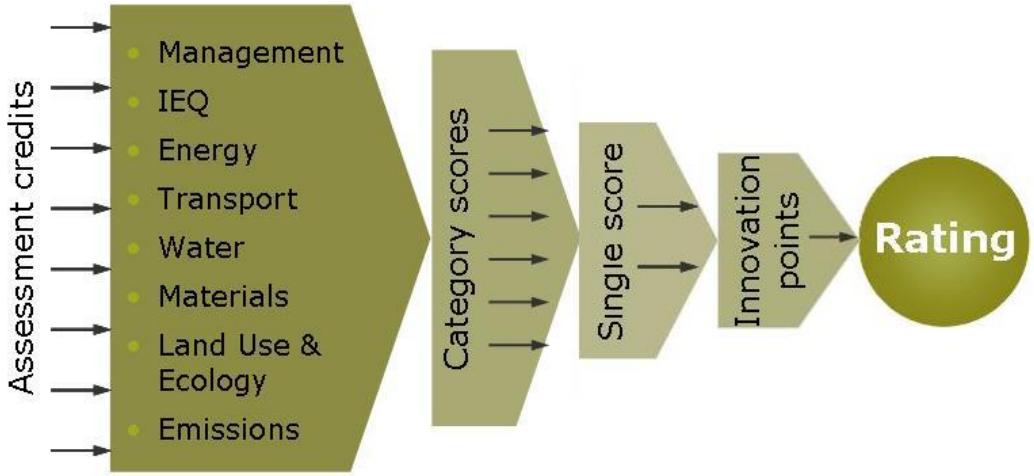

***Figure 1**: Structure of the Green Star SA rating system*

Green Star SA rating tools include nine separate environmental impact categories:

- Management;
- Indoor Environment Quality;
- Energy;
- Transport;
- Water;
- Materials;
- Land Use and Ecology;
- Emissions; and
- Innovation.

The categories are divided into credits, each of which addresses an initiative that improves or has the potential to improve a design, project or building's environmental performance. Points are awarded in each credit for actions that demonstrate that the project has met the overall objectives of Green Star SA and the specific aims of the Green Star SA rating tool.

To encourage the development and spread of innovative technologies, designs and processes that could improve buildings' environmental performance, an 'Innovation' category is included in each Green Star SA rating tool. The Innovation category is not subject to an environmental weighting factor as the innovation could fall under any number of Green Star SA categories.

Category Score

The Category Score is determined for each category based on the percentage of credits achieved, as follows:

$$\text{Category Score} = \frac{\text{Number of points achieved}}{\text{Number of points available}}$$

For example, if 10 Energy points are achieved out of a total available of 26 then the Category Score is 38.5%.

Single Score

The single (i.e. overall) score is determined by adding together all the Category Scores plus the Innovation points. The maximum possible score for the categories is 100, with an additional ten points available for Innovation, making the maximum attainable score in Green Star SA – Interiors PILOT tool 105.

The Green Star SA rating is determined by comparing the overall score with the rating scale shown below.

Overall Score	Rating	Outcome
10-19	One Star	Not eligible for formal certification
20-29	Two Star	Not eligible for formal certification
30-44	Three Star	Not eligible for formal certification
45-59	Four Star	Eligible for Four Star Certified Rating that recognises/rewards 'Best Practice'
60-74	Five Star	Eligible for Five Star Certified Rating that recognises/rewards 'South Africa Excellence'
75+	Six Star	Eligible for Six Star Certified Rating that recognises/rewards 'World Leadership'

***Table 1**: Green Star SA rating tool scores*

As indicated above, the minimum Green Star SA rating is One Star and the maximum is Six Stars. In keeping with its position that Green Star SA recognises and rewards market leaders, the GBCSA will only formally certify interior fitouts that achieve a Green Star SA rating of Four, Five or Six Stars.

GREEN STAR SA ACCREDITED PROFESSIONALS

To encourage the adoption of environmental initiatives from the earliest project stages throughout design, construction and operation of a building, all Green Star SA rating tools award points in the Management category to projects that have a Green Star SA Accredited Professional as a member of their team. In the case of Green Star SA – Interiors, a separate Interiors AP accreditation will exist, distinct from that of the Design / As Built tools.

Green Star SA Accredited Professionals are experienced building industry representatives who have demonstrated their understanding of the Green Star SA rating system and the benefits of high environmental performance. To become a Green Star SA Accredited Professional, candidates must attend a GBCSA Green Star SA Accredited Professional course and pass the associated exam. Refer to the GBCSA website (http://www.gbcsa.org.za) for further details. The GBCSA has developed an on-line directory of Green Star SA Accredited Professionals (see http://www.gbcsa.org.za) to enable easy identification and provide the contact details of these qualified service providers.

Green Star SA Certification

ASSESSMENT CREDITS

The Green Star SA – Interiors PILOT rating tool is divided into nine environmental categories, each of which has a number of credits.

For each credit the following topics are described in this Technical Manual:

- Aim of Credit;
- Credit Criteria;
- Documentation Requirements;
- Additional Guidance;
- Background; and
- References & Further Information.

Points are awarded within credits for achieving performance-based objectives and for adopting policies and procedures to improve a project's environmental impact.

In some instances credits (or points within credits) may not be applicable. This situation usually depends on the nature of the building and the inclusion or otherwise of a variety of typical building features. These specific instances are clearly defined in this Technical Manual. Whenever a credit is deemed 'Not Applicable', points are not awarded, and instead are excluded from the Points Available, used to calculate the Category Score. This modification prevents distortion of the Category Score (up or down) for issues that cannot be addressed and are not applicable to the project.

CONDITIONAL REQUIREMENT

Green Star SA – Interiors PILOT has one criterion that must be achieved (known as 'Conditional Requirement') in order to obtain a Green Star SA – Interiors PILOT certified rating of 4 stars or above. The Conditional Requirement falls within the Energy category. Please refer to the 'Eligibility' section below, as well as the Energy section of the Technical Manual for further details.

ELIGIBILITY*

Note that the Eligibility Criteria below are a proposed draft to be tested before v1 release. Eligibility of Pilot Projects will be determined on an individual basis.

To be eligible for Green Star SA - Interiors PILOT rating assessment, projects must meet each of the following four Eligibility Criteria.

1. Spatial Differentiation
2. Space Use
3. Conditional Requirements
4. Timing of Certification

Green Star SA Certification

ELIGIBILITY CRITERION 1: SPATIAL DIFFERENTIATION

To be eligible for a Green Star SA - Interiors PILOT rating, the project must be clearly distinct. Functionally distinct projects are those that are clearly differentiated from another project in the same space. Note that the rating can only be for the entire fitout (as defined by the lease agreement between the tenant and the building owner) and not part of a fitout.

Shared building services (e.g. HVAC plant or water treatment) or amenities (e.g. waste rooms or bicycle facilities) do not affect the projects' eligibility for Green Star SA assessment. Typically such spaces are governed by a lease/contract or are building owner occupied spaces - this would typically determine what the entity is that is being certified. Where this is not the case, projects are required to submit a pre-submission eligibility query to the GBCSA via greenstarsa@gbcsa.org.za.

ELIGIBILITY CRITERION 2: SPACE USE

To meet the Space Use criterion, the project must be a fitout project within a building. The fitout must be a single type, or a combination of the following space types as defined by SANS 10400:

A1	Entertainment and public assembly
A2	Theatrical and indoor sport
A3	Places of instruction
A4	Worship
B1	High risk commercial service
B2	Moderate risk commercial service
B3	Low risk commercial service
C1	Exhibition hall
C2	Museum
D1	High risk industrial
D2	Moderate risk industrial
D3	Low risk industrial
D4	Plant room
E2	Hospital
E3	Other institutional (residential)
E4	Health care
F1	Large shop
F2	Small shop
F3	Wholesalers' store
G1	Offices
H1	Hotel
H2	Dormitory
H3	Domestic residence
H4	Dwelling house
H5	Hospitality

Table 2: *Eligible Space Types*

Note that these building types will be tested further during the PILOT period for applicability before the release of v1.

ELIGIBILITY CRITERION 3: CONDITIONAL REQUIREMENT

The Green Star SA rating tools have a number of Conditional Requirements (such as minimal energy efficiency and protecting land of high agricultural value). Regardless of how many other credits the building achieves, it will not be eligible for a Green Star SA Certified rating unless all of the rating tool's Conditional Requirements are met.

There is one Conditional Requirement in Green Star SA – Interiors PILOT:

- Ene – 0 Conditional Requirement

  Refer to the energy category of the rating tool and accompanying Technical Manual for further details.

ELIGIBILITY CRITERION 4: TIMING OF CERTIFICATION

Green Star rating tools correspond to specific phases within a building project, and as such certification must be achieved within the timeframe applicable to the relevant rating tool.

- Submissions must be received within 12 months of the practical completion date or if there is no practical completion date, then the beneficial occupation date.

CONFIRMING ELIGIBILITY

It is the responsibility of each project team to check the most current Eligibility Criteria on the GBCSA website at the time of registration and to ensure that their project is eligible.

Whenever unsure, project teams can request an eligibility confirmation from the GBCSA by forwarding a brief description of the project to greenstarsa@gbcsa.org.za.

Registration does not guarantee assessment; no project will be assessed if it is deemed ineligible against the Eligibility Criteria current at the time of registration.

The GBCSA reserves the right to deny eligibility to assessment of any project that is deemed to compromise the Green Star SA brand, and to revise these criteria to better achieve the goals of the Green Star SA rating tools.

Green Star SA Certification

CERTIFICATION PROCESS

Up to date information on the Green Star SA certification process is outlined in detail on the GBCSA website (www.gbcsa.org.za). Templates, forms and checklists will be made available on this website to guide projects through the process.

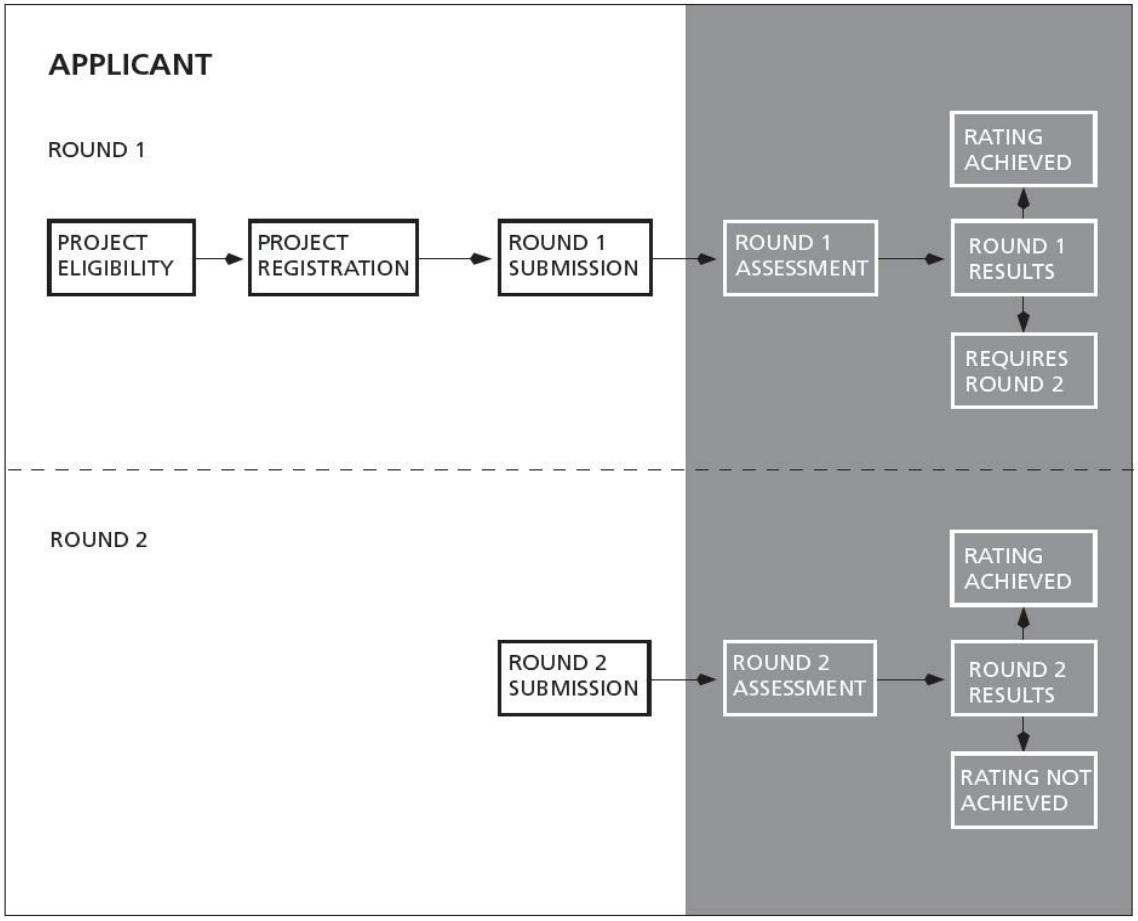

Figure 2: *Overview of certification process.*

Registration

Registering a project with the GBCSA declares the intent to pursue certification under a specific rating tool and is the first step in the certification process. Registration establishes a connection with the GBCSA and gives the project access to essential information and assistance with the submission process. Projects should register as soon as possible during the project, though there is no deadline during the design or construction process. Registration takes place through a form in the Green Star SA certification section of the GBCSA website (www.gbcsa.org.za).

Green Star SA Certification

Preparing the Submission(s)

Once your project is registered, the project team should prepare documentation to satisfy the Green Star SA credit documentation requirements. The Green Star SA – Interiors Accredited Professional (whether externally appointed or part of the internal building management team) should take responsibility for the quality of submission.

It is important to ensure that documentation for all claimed credits adheres to the Documentation Requirements outlined in the Green Star SA – Interiors PILOT Technical Manual.

Assessors will not award the point(s) unless it is demonstrated that all the requirements have been met exactly as detailed in the Technical Manual.

Round 1 Submission

From the date of receipt of the project's submission of all targeted credits (Round 1), the GBCSA provide the assessment results in 7 weeks.

The full balance of the Certification Fee (less registration payment) will be invoiced at this point and results will be issued upon payment.

Projects must submit the following for assessment:

- Completed pre-submission checklist
- Completed 'Rating Tool' showing points targeted
- Completed Submission Templates for each credit with all supporting documents as called for in the templates

The GBCSA will conduct a pre-assessment submission quality review of a project submission prior to the commissioning of a review by the Assessors. A project may be required to resubmit the submission prior to assessment if the submission quality review suggests that the quality of the submission would result in an erroneous or extended assessment. There is no fee associated with the pre-assessment completed by the GBCSA.

Round 1 Assessment

The Assessor(s), will review the submission. Recommendations will then be made to the GBCSA on the rating which should be awarded. The GBCSA reserves the right to question the findings of the Assessor(s).

The GBCSA will forward the results of the Assessment to the project contact and the applicant. At this point a rating could be achieved and the certification process completed.

However, the Assessors may request additional information from the applicant supporting their claims, or may request corrections to certain credits not achieved. In such a case, the project team must submit the required documentation for credits 'to be confirmed' in a Round 2 submission.

Round 2 Submission

Upon receipt of the results of the Round 1 Assessment, the project may be required to submit documentation for credits 'to be confirmed'. The project will be required to provide the Round 2

submission within 1 month of Round 1 Assessment results being issued. Each project has only one opportunity for resubmission (Round 2), which may include:

- Additional/revised documentation to demonstrate fulfilment of Credit Criteria;
- New credits not targeted in Round 1. Note however that there will not be the opportunity for two rounds of assessment on these credits.

From the date of receipt of the Round 2 submission at the GBCSA offices, the GBCSA provide the Round 2 assessment results in 5 weeks.

Round 2 Assessment

Assessment of the Round 2 submission will follow the procedures outlined above for Round 1 assessment.

CERTIFIED RATING AWARDED

If the assessment validated the project's achievement of the required score, the GBCSA will award a Certified Rating and notify the Applicant.

Certified Rating not Awarded

If a desired Certified Rating is not achieved, the project may in certain circumstances be eligible to Appeal select credits for a fee to re-asses. Please contact the GBCSA for further details.

Technical Clarifications and Credit Interpretation Requests

The Green Star SA Technical Clarifications (TC) and Credit Interpretation Request (CIR) rulings provide an essential source of information to all projects undertaking Green Star SA assessment. They are available on the GBCSA website (www.gbcsa.org.za).

Technical Clarifications often represent the GBCSA answers to technical queries and complement Green Star SA Technical Manuals (e.g. the Assessment Team will use the Technical Clarifications as public precedent). They do not amend but clarify the Credit Criteria or Compliance Requirements. They are an extension of the Technical Manual; it is the responsibility of the project teams to stay up-to-date with this section of the GBCSA website.

The CIR rulings offer alternative compliance options whenever those have been deemed equivalent in meeting the Aim of Credit. A registered project may submit a CIR if the project team feels that the Aim of Credit has clearly been satisfied via a solution that does not adhere to the stated Credit Criteria/Additional Guidance of the relevant Technical Manual.

Updating Green Star SA- Interiors

Updating the Green Star SA – Interiors PILOT rating tool

Green Star SA – Interiors PILOT was developed on the basis of information available at the time of its development. Some issues have not been addressed in Green Star SA – Interiors PILOT due to the following:

- Cost of undertaking assessment and concerns of the reliability and accuracy of data relevant to South Africa (e.g. embodied energy, Life Cycle Assessment etc.);
- Lack of clear benchmarks or guidelines relating to buildings; and
- Lack of standards of measurement in South Africa and availability of suppliers' data (e.g. material toxicity).

As more research is undertaken in the green building area, Green Star SA rating tools are updated to reflect new information, practices, tools and references.

Green Star SA rating tools may also be updated as a result of credit interpretations from the certification process. In these cases, the GBCSA reviews the credit and, if the new credit interpretation is adopted, the relevant Green Star SA rating tool and the associated Technical Manual is updated to reflect the change. All Green Star SA tools have an allocated version number to reflect these changes.

Green Star SA rating tools may also be revised on the basis of stakeholder feedback.

Within the PILOT Programme, there may be up to four updates of this Technical Manual issued. Project teams may choose whether to incorporate such updates into their submission or not.

Feedback on Green Star SA – Interiors PILOT

The GBCSA encourages feedback on all Green Star SA rating tools, including Green Star SA – Interiors PILOT.

Feedback is to be sent to interiors@gbcsa.org.za for consideration by the GBCSA.

Glossary

Accredited Professional - A building professional who has attended the Green Star SA Accredited Professional training course, has passed the associated examination and is registered with the Green Building Council of South Africa as an Accredited Professional.

Active Cooling/Heating - A heating or cooling process or system which consumes a form of primary energy to store, collect and distribute thermal energy in order to provide space heating or cooling within a building.

Active Solar Strategies - Mechanisms, such as photovoltaics, which are designed to actively collect the energy of sunlight and use it.*

Admittance – A measure of how easy it is for heat to be absorbed/emitted by a construction: the rate of heat flow between the internal surface of a construction and the environmental temperature in the space, for each degree of deviation of the space temperature about its mean value (W/m2K).

Air Exchange Rate – The rate at which outside air replaces indoor air in a given space.*

Air Handling Unit (AHU) - Equipment that includes a fan or blower, heating and/or cooling coils, regulator controls, condensate drain pans, and air filters.*

Alternative Energy - Energy from a source other than the conventional fossil fuel sources of oil, natural gas and coal.

Alternative Energy Sources - Energy sources that can be substituted for the conventional sources such as fossil fuels (coal, oil, natural gas), nuclear power, and large scale hydroelectric power, e.g. solar, wind, geothermal, biomass.

American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) - See http://www.ashrae.org.

Asbestos - A naturally occurring soft fibrous mineral commonly used in fireproofing materials and considered to be highly carcinogenic in particulate form.

Assessor - A person or persons, independent of the GBCSA, independent of the project client, design team and contractor, nominated by the GBCSA, knowledgeable and with experience in the green building industry, or who has such other appropriate assessment qualifications as the GBCSA may from time to time determine.

Biodiversity - The totality of living animals, plants, fungi and micro-organisms in a region; the variety of life in all forms, levels and combinations.*

Glossary

Biomass – Biological material from trees, grasses, agricultural crops or waste. It can be used as a material for manufacturing, though it is most commonly used to generate electricity or heat. It is considered a renewable resource, with a low CO_2 coefficient.

Blackwater - Water which has been mixed with waste from toilets. Blackwater requires biological or chemical treatment and disinfection before reuse.

Building - The base building development seeking Green Star SA certification.

Building Envelope - The exterior surface of a building's construction: the walls, windows, roof and floor; also referred to as 'building shell'.*

Building Management System (BMS) - The BMS automatically controls the building services systems to maintain temperature, humidity, ventilation rates and lighting levels to pre-determined load requirements and to provide safe, efficient operation of equipment.

Building Research Establishment Environmental Assessment Method (BREEAM) - The UK based BREEAM green building rating system assesses the environmental performance of both new and existing buildings. See http://www.breeam.org

Carbon Dioxide (CO_2) - Odourless gas commonly sourced by respiration, and is the result of the oxidation (including active combustion and respiration) of carbon based substances; it has been widely used as a measure of the ventilation adequacy of a space; a principal greenhouse gas.

Carbon Monoxide (CO) - An odourless gas that is given off during the process of incomplete combustion. Breathing in of CO gas reduces the ability of the blood to absorb oxygen and can be fatal.

Chartered Institute of Building Services Engineers (CIBSE) - See http://www.cibse.org

Chlorofluorocarbons (CFCs) - An organic compound made of chlorine, carbon, and fluorine. Commonly used in refrigerants or blowing agents which cause ozone depletion when released in the atmosphere.

Client - The building/project owner or tenant responsible for the development/refurbishment of the building and for the engagement (directly or indirectly) of the design team and the contractor.

Climate Change - The change expected to occur to the world's climate due to human activities that emit greenhouse gases, such as burning fossil fuel (cars and electricity generation) and deforestation.

Chain of Custody (CoC) - A tracking system that allows manufacturers and traders to demonstrate that timber comes from a forest that is responsibly managed in accordance with the FSC Principles and Criteria. It tracks the flow of certified wood through the supply chain and across borders through

each successive stage - including processing, transformation and manufacturing - all the way to the final product.

Cogeneration - The simultaneous production of electrical or mechanical energy (power) and useful thermal energy from the same fuel/energy source.*

Commissioning - The process of putting building services systems into active service. This includes testing and adjusting HVAC, electrical, plumbing and other systems to assure proper functioning and adherence to design criteria, and instructing building representatives in their use.

Computational Fluid Dynamics (CFD) - Numerical analysis of fluid flows. A computer is used to perform the millions of calculations required to simulate the interaction of fluids, for example looking at air movement within buildings.

Contaminant - A substance that is not naturally present in the environment or that is present in unnatural concentrations or amounts, and which can (in sufficient concentration) adversely alter an environment.

Contract Value - The Rand value that will be required to complete the works for the entire project, including site works (landscaping, external paving, etc). The contract value must include contractor fee, contingencies and any other items included as part of the contract amount, but exclude demolition works, consultants fees, design fees, project management fees, VAT, works outside the site area, and buildings or areas within the site that are not being assessed for purposes of Green Star SA.

Contractor - The main contractor or builder engaged to complete the scope of works for the project.

Construction Commencement - The time at which the Project Site is handed over from the Principal Agent to the Contractor to commence the scope of works of the contract.

Conventional delivery - A space that, prior to fitting out, was delivered with:

- Ceilings, floor coverings and lighting systems; and
- Ducts from air supply and return risers, electrical and hydraulic services are installed above the ceiling from the riser throughout the fitout areas.

Credit Interpretation Request (CIR) – CIRs are submitted prior to assessment by a project that clearly meets the Aim of Credit but does not adhere to the stated Credit Criteria of the relevant Technical Manual. CIRs are considered by the GBCSA with the consultation from the Technical Advisory Group and other independent consultants, and the resulting rulings may set precedent and be used to update Green Star SA rating tools.

Glossary

Cross Ventilation - When air flows naturally along one or more breeze paths, between ventilation openings on opposing or adjacent walls of a space or via a combination of wall and roof openings.

Daylight Autonomy (DA) - The fraction of occupied times per year, when the required minimum illuminance level at a point can be maintained by daylight alone.

Daylight Factor (DF) - The proportion of internal illuminance (light level) compared to the external illuminance, expressed as a percentage. Daylight Factor represents the proportion of external light which illuminates a given internal surface.

Daylight Illuminance (DI) - The illuminance (light level) achieved from daylight

Deemed to Satisfy (DTS) - Prescriptive provisions which satisfy performance requirements, or stated level of performance

Design Team - The professionals normally engaged in the design and contract administration of a building project. These typically include architects, engineers (e.g. structural, civil, mechanical, electrical, hydraulics, fire etc.), project manager, cost consultant and building surveyor plus other specialists including green building consultant, landscape architect, acoustics consultant, façade engineer, lighting consultant, etc.

Eligible Project - A project that complies with the requirements contained in the Green Star SA Eligibility section of this Technical Manual.

Embodied Energy -Energy that is used during the entire life cycle of the commodity for manufacturing, transporting and disposing of the commodity as well as the inherent energy captured within the product itself; this term does not always correlate to the life cycle environmental impact.*

Emissions - The release of gases, liquids and/or solids from any process or industry; liquid emissions are commonly referred to as effluents.*

Emission Controls - Any measure that reduces emissions into air, water or soil. The most effective emission controls involve the redesign of the process so less waste is produced at the source.*

Environmental Impact - Any change to the environment, whether adverse or beneficial, wholly or partially resulting from human activity, industry or natural disaster.*

Equivalent Area - The area of a sharp edged circular orifice which would pass the same air flow rate and at the same applied pressure difference as a ventilation opening.

Fair Market Value - The equivalent market value of an existing item or material within a project which is claimed as reused for the purposes of Green Stare SA.

Glossary

FSC Certification - A certification system for timber products which confirms that timber has been harvested in a sustainable manner.

Global Warming Potential (GWP) - Global Warming Potential provides a measure of the potential for damage that a chemical has relative to one unit of carbon dioxide, the primary greenhouse gas.

Green Building - A Building that incorporates design, construction and operational practices that significantly reduce or eliminate its negative impact on the environment and its occupants; an opportunity to use resources efficiently while creating healthier environments for people to live and work in.

Green Building Council of South Africa (GBCSA) - A national, not-for-profit organisation that is committed to developing an environmentally sustainable property industry for South Africa by encouraging the adoption of green building practices. See http://www.gbcsa.org.za.

Greenhouse Effect - (1) The warming of the earth‘s surface and lower atmosphere as a result of carbon dioxide and water vapour, which absorb and reradiate infrared radiation, in the atmosphere; (2) An intensification of this warming effect from human-induced increase in carbon dioxide and other greenhouse gases in the atmosphere from the burning of fossil fuels.*

Greenhouse Gases (GHGs) - are gases in an atmosphere that absorb and emit radiation within the thermal infrared range. This process is the fundamental cause of the greenhouse effect.*

Greywater - Waste water recovered from basins, showers, washing machines and other water sources that do not contain food or human waste.

Grid - A term used to describe the network of wires and cables which transport electricity from a power plant.*

Ground Water - Water beneath the earth's surface that fills pores between materials such as sand, soil or gravel. Groundwater is a major source of water for agricultural and industrial purposes and is an important source of drinking water.

Hazardous Waste - Waste that is particularly dangerous or destructive; specifically characterised by one or more of the following properties: ignitable, corrosive, reactive or toxic.*

Heating, Ventilation and Air Conditioning (HVAC) - Mechanical systems that provide heating, ventilation and air conditioning in buildings

Heat Recovery Ventilation - A system that reclaims the heat from warm exhaust air exiting a building and uses it to pre heat entering fresh air.*

Glossary

Hydrochlorofluorocarbons (HCFCs) - HCFCs are found in refrigerants and blowing agents that cause ozone depletion when released in the atmosphere.

Hydrofluorocarbons (HFCs) - HFCs are commonly used to replace HCFC refrigerants and blowing agents to reduce the ozone depletion potential (ODP); however, HFC products have a high Global Warming Potential (GWP).

Illuminance - The luminous flux incident on a unit area of a surface. The unit is the lux which is one lumen per square meter.

Independent Commissioning Agent - An experienced and qualified commissioning agent who carries out commissioning on behalf of the building owner or tenant

Indoor Environment Quality (IEQ) - Covers issues such as indoor air quality, thermal comfort, illumination, daylight, views, acoustics and occupant control of building systems.

Integrated Fitout - A fitout where the tenancy design and construction is fully coordinated with the base building design and construction. This includes finishes, services and fitout to all areas, both common and fitout-specific, with services fully installed at each floor. The definition of integrated fitout for purposes of Green Star SA is a fitout space where:

- All ceilings, floor coverings, lighting systems, mechanical, electrical and hydraulic services, partition walls, and finishes are installed, fit for purpose for the fitout occupant, prior to leasing.

Interdependent Projects - Projects that share services and amenities.

ISO 14001:2004 - An international standard published by the International Organisation for Standardization (ISO) which specifies a set of management standards that help organisations administer and control a company's environmental impact and compliance with regulations.

Landfill - An area where solid waste is deposited. In a suitable area, a hole in the ground is lined so that materials will not escape, and is filled with layers of rubble/waste as the waste is progressively deposited. When completely filled, it is typically capped and sealed.

Leadership in Energy and Environmental Design (LEED) - The US-based LEED Green Building Rating System® is a voluntary, consensus based national standard for developing high performance, sustainable buildings. See http://www.usgbc.org/leed.

Life Cycle - All phases associated with the life of a product (i.e. creation, distribution, sale, installation, use, care and disposal/reuse/recycle).*

Glossary

Life Cycle Assessment (LCA) - An evaluation of the environmental effects of a product or activity holistically, by analysing the entire life cycle of a particular material, process, product, technology, service or activity. The LCA consists of three complimentary components: inventory analysis, impact analysis, and improvement analysis, together with an integrative procedure known as scoping.*

Light Pollution - Waste light from buildings that is directed upward to the sky or is directed away from the site.

Luminous Efficacy - A measure of how well a light source produces visible light; the ratio of luminous flux to power

Maintained illuminance - The average illuminance over the reference surface at the time maintenance has to be carried out by replacing laps and/or cleaning the equipment and room surfaces (if applicable).

Material Cost - The cost of a material may include transport/shipping costs to the project site, but may not include installation costs, equipment for installation, contractor fee, contingencies, VAT or any other amounts.

Mechanical Ventilation - Ventilation systems which use fans or other electrically operated air movement devices to provide ventilation to a building. Wind driven turbine ventilators and mechanically operated windows are not classified as ‘mechanical ventilation’.

Mechanically Assisted Natural Ventilation (MANV) systems - Systems that rely, partially or fully, on fans to move non-conditioned air through a space

Mixed-Mode Ventilation - An approach to ventilating a building that relies on natural ventilation in certain seasonal conditions and is supplemented by mechanical ventilation when needed to maintain occupant comfort

Mould - Mould is a fungus that typically grows in a filamentous cobweb like mass under damp conditions and is capable of producing staggering numbers of reproductive spores in as little as a few days. Moulds are non-chlorophyll containing entities, which require organic matter, living or dead, for survival. Moulds are extraordinarily diverse in character and their relationship with humans span the positive (e.g. food, antibiotics) to the negative (e.g. pathogens, antigens, toxins).*

Natural Ventilation -The process of supplying and removing air in building spaces by natural means, by using openings in the façade (e.g. windows), non-powered ventilators, solar chimneys and infiltration processes.

Glossary

Nominated Area – A credit specific dynamic area definition used to delineate the area that is relevant to individual credits. Refer to each credit and the modelling protocol guide for the definition of the nominated area.

Non-Potable Water - Water collected on-site, such as rainwater or stormwater, or recycled/recovered from a previous use such as blackwater or greywater recovery. It does not include water from rivers, lakes or groundwater (bore water) unless the water has previously been used.

Non Renewable Resources - Resources that cannot be replaced in the environment (e.g. fossil fuels) because they form at a rate far slower than their consumption.*

Occupied Space - Areas that are predominantly:

- Work spaces (e.g. cellular offices, open plan offices, meeting rooms, food preparation areas, laboratories, consulting rooms, workshops - small scale and high density it work spaces);
- Large event spaces (e.g. dry sports halls, swimming pool areas, halls, arts theatres, libraries, assembly areas, sales areas – general, sales areas – chilled, performance areas (stage), check in areas, baggage reclaim areas, security check areas, fitness suites, gyms, fitness studios and ice rinks);
- Common areas (e.g. receptions, waiting rooms, eating/drinking areas, laundries, common rooms/staff rooms/lounges, public circulation areas, foyers and lobbies); and
- Learning spaces (e.g. classrooms and lecture rooms) are all expected to form part of the Occupied Space.
- Most corridors are to be excluded from the calculation of Occupied Space. Where corridors are exclusively used for transit between spaces (i.e. do not act as a foyer, lounge, waiting space, or reception), and where these corridors are bound in both sides by a wall these are to be excluded. Where a corridor is part of a shared space, this corridor, or section of a corridor, cannot be excluded and is considered part of the adjacent space. Occupied Space also excludes enclosed fire stairs, storage areas, toilets, tea kitchens, changing facilities, bathrooms, display areas, IT equipment rooms and plant-rooms.

Ozone (O3) - A naturally occurring, highly reactive, irritating trace gas comprising of tri atomic oxygen formed by recombination of oxygen in the presence of ultraviolet radiation.*

Ozone Depletion - Destruction of the Earth's ozone layer, which can be caused by the photolytic breakdown of certain chlorine and/or bromine containing compounds (e.g. chlorofluorocarbons), which catalytically decompose ozone molecules.*

Ozone Depleting Potential (ODP) - ODP provides a measure of the potential damage that a chemical has relative to that of refrigerant type CFC11. CFC11 has an ODP of one and is the most damaging of CFCs.

Glossary

Ozone Hole - A thinning break in the ozone layer. Designation of the amount of such depletion as an 'ozone hole' is made when the detected amount of depletion exceeds 50%. Seasonal ozone holes have been observed over the Antarctic and Arctic regions, part of Canada, and the extreme northeast United States.*

Ozone Layer - The protective layer in the stratosphere layer of the atmosphere, about 24 kilometres above the ground, that absorbs some of the sun's ultraviolet rays, thereby reducing the amount of potentially harmful radiation that reaches the earth's surface.*

Passive Cooling/Heating - A process of cooling/heating a building in which no power or fuel is consumed. This is distinct from natural ventilation, which relates only to air supply and extract, although natural ventilation may provide passive cooling in some weather conditions. Other examples of passive cooling include cooling from thermal mass, while passive heating strategies include heating using solar gains through windows and reducing infiltration to prevent heat escaping.

Passive Design - Design that reduces the energy consumption of a building by taking advantage of natural heating, cooling and lighting.*

Passive Solar Design - Design that uses the inherent characteristics of a building rather than mechanical systems to capture heat and light from the sun.*

Photovoltaics - The use of semiconductor technology to generate electricity directly from the sunlight.*

Pollution - Generally, the presence in the environment of a substance that, because of its chemical composition or quantity, prevents the functioning of natural processes and produces undesirable environmental and health effects; can be seen as the human-induced alteration of the physical, biological, chemical and radiological integrity of water and other media.*

Post-Consumer Recycled Content - A product composition that contains some percentage of material diverted from the product user's waste stream.

Post Industrial Recycled Content - A product composition that contains some percentage of manufacturing waste material that has been reclaimed from a process generating the same or a similar product. This includes returns of material from the distribution chain, but excludes re utilisation of materials such as re work, re grind or scrap generated in a process and capable of being reclaimed within the same process that generated it.*

Potable Water - Water that is drinkable i.e. safe to be consumed.

Glossary

Practical Completion - The stage of completion where the works or a section thereof, as certified by the principle agent, is substantially complete and can effectively be used for the purpose intended (JBCC Series 2000).

Precautionary Principle - The decision-making principle that advises that, in face of uncertainty, the best course of action is to assume that a potential problem is real and should be addressed.*

Predicted Mean Vote (PMV) - PMV is an index that predicts the mean value of the votes of a large group of persons on the 7-point thermal sensation scale, from +3 (hot) to -3 (cold), based on the heat balance of the human body. Thermal balance is obtained when the internal heat production in the body is equal to the loss of heat to the environment. In a moderate environment, the human thermoregulatory system will automatically attempt to modify skin temperature and sweat secretion to maintain heat balance. A PMV of –1 to +1 corresponds to a Predicted Percent Dissatisfied (PPD) of no more than 25% (i.e. 25% of people are dissatisfied or uncomfortable). A PMV of –0.5 to +0.5 corresponds to a PPD of 10%. A PMV of zero would still mean 5% of occupants are dissatisfied or uncomfortable.

Predicted Percent Dissatisfied (PPD) - PPD is an index that establishes a quantitative prediction of the percentage of thermally dissatisfied people who feel too cool or too warm. For the purposes of the international standard (ISO 7730) quoted in the Technical Manual, thermally dissatisfied people are those who will vote hot, warm, cool or cold on the 7-point thermal sensation scale (PMV).

Principal Agent - The party named in the contract data and/or appointed by the employer with full authority and obligation to act in terms of the agreement (JBCC Series 2000).

Primary Function - The space function accounting for over 50% of the GFA

Project Site - The land or place on, over, under, in or through which the scope of works is to be completed, as defined for the purposes of Green Star SA certification.

Project Team - Comprising the Design Team members and Construction Team members; generally those responsible for the definition, delivery and completion of the scope of works for the project.

Psychrometric Chart - A chart showing the air's dry and wet bulb temperatures, humidity, moisture content and enthalpy. It is used by mechanical engineers to illustrate the condition (temperature, humidity and enthalpy) of air at each point of the air conditioning process. This information assists with sizing air conditioning equipment to maintain comfortable internal air temperatures and relative humidity.

Reclamation - Restoration of materials found in the waste stream to a beneficial use that may be other than the original use.*

Glossary

Recyclable - Commonly referred to as the ability of a product or material to be recovered from, or otherwise diverted from, the solid waste stream for the purposes of recycling.*

Recycled Content - Materials that have been recovered or otherwise diverted from the solid waste stream, either during the manufacturing process (pre consumer) or after consumer use (post-consumer). Pre consumer material does not include materials normally reused by industry within the original manufacturing process, and is also termed 'post-industrial'.*

Recycling - A process by which materials that would otherwise become waste are collected, separated or processed and returned to the economic mainstream to be reused in the form of raw materials or finished goods. Horizontal Recycling – A recycling system that turns a majority of the original product back into a similar product as the original. Downcycling – a term coined to disparagingly describe creation of a product of lesser intrinsic value manufactured from a material at the end of its service life that had higher initial end use value. Upcycling – a subjective term used to describe the creation of a product with higher intrinsic value, manufactured from a material at the end of its useful life, which had a lower initial end use value.*

Refurbishment - The upgrading of either (or both) a building's fabric and services with the aim of enhancing its ability to attract tenants, improve rental growth and maximise market value. Refurbishment (Full) – Where a building, or portion of a building, is vacated and withdrawn from stock for refurbishment, including replacement of plant and services. Refurbishment (Partial) – Where a building or portion of a building is vacated and withdrawn from stock for refurbishment, which normally is restricted to cosmetic improvements.

Relative Humidity RH) - Ratio of the amount of water vapour in air at a specific temperature to the maximum capacity of the air to hold moisture at that temperature.

Remediation - Efforts to counteract some or all of the effects of pollution after it has been released into an environment.*

Renewable Energy - An energy source that, from an earth perspective, is continually replenished*

Renewable Resources - Resources that can be replenished at a rate equal to or greater than its rate of depletion (i.e. solar, wind, geothermal and biomass resources). *

Reverberation - In simple terms, the persistence of sound in a space, or echo

Schematic Design - First phase in the design of a project in which an architect interior designer or engineer prepares schematic diagrams that provide a general view of the components and the scale of the project after detailed discussions with the client (owner).

Glossary

Shared Building Infrastructure - Infrastructure shared by two or more buildings, including, but not limited to: waste services, delivery yards, toilet facilities and car parks

Shell and core - A space that, prior to fitting out, was delivered with:

- no ceilings, floor coverings, lighting systems and partition walls, and
- Ducts from air supply and return risers finish within 1m of the face of the riser.

Sick Building Syndrome - (1) A human health condition in which infections linger, caused by exposure to contaminants within a building as a result of poor ventilation; (2) Building whose occupants experience acute health and/or comfort effects that appear to be linked to time spent therein, but where no specific illness or cause can be identified. Complaints may be localised in a particular room or zone, or may spread throughout the building and may abate on leaving the building.*

South African Bureau of Standards (SABS) - See http://www.sabs.co.za

South African National Standard (SANS) - Standards written by SABS which are normally not mandatory unless referenced by legislation.

South African Property Owners Association (SAPOA) - See http://www.sapoa.org.za

Source Reduction - As applied to solid waste, reducing the generation of waste in the first place (as opposed to later re-using or recycling waste).*

Specifications - Specifications refer to written documentation that are prepared for and submitted to a contractor, at the tender stage of a project, in order for a contractor to price a building development. Many credits require extracts from specifications to be submitted to show compliance with their Credit Criteria. Circumstances under which alternatives to extracts to specifications are allowed to be submitted in compliance with the Documentation Requirements of a credit, are provided in the 'Standard Documentation Types – Guidance' section of this Technical Manual.

Suitably Qualified Professional - A person suitably experienced by profession, training, or demonstrable experience, to calculate, confirm, commit or provide comment on, the field, subject or topic as required for the purpose of 'Documentation Requirements' as necessary.

Supporting Documentation -With reference to 'Documentation Requirements'; other documentation submitted within the same credit of a submission.

Technical Working Group (TWG) - An advisory panel convened by the GBCSA and designated as the 'Technical Working Group'.

Glossary

Tenancy Fitout Guide (TFG) -A detailed guide for the design team responsible for the fitout containing information on the green building features of the base building and recommendations on how to achieve the green building potential of the tenancy.

Test Reference Year (TRY) -A year's worth of recorded hourly weather data which represents a 'typical' year of weather data for that specific location.

Thermal Comfort - A means of describing occupant comfort which takes into account air temperature, radiant temperature, humidity, draught, clothing value and activity rates.

Tri-Generation - A form of energy generation where electrical energy is produced on-site (typically via gas) whilst at the same time waste heat is extracted from the equipment to provide energy to other systems (such as mechanical systems).

Uniform Design Sky - A modelled design sky with a standard, constant illuminance across the entire hemisphere.

VAV Systems - Variable Air Volume air conditioning systems

Ventilation - The process of supplying and removing air in building spaces by natural or mechanical means.

Ventilation Opening - An opening in the external wall, floor or roof of a room, which is designed to allow air movement into or out of the building or room by natural, passive means.

Virgin Materials - Previously unprocessed materials. A tree that is cut into lumber to make pallets is an example of a virgin material. Lumber recovered from broken pallets to make new pallets is not a virgin material but a recyclable material (US EPA).

Visual Light Transmittance (VLT) - Refers to the amount of visual light a material allows to be transferred through itself.

Volatile Organic Compounds (VOCs) - VOCs are organic compounds that produce vapours readily at room temperature and normal atmospheric pressure.

Waste Management Plan (WMP) - A document which outlines how construction and demolition waste will be collected for recycling and recycled, and how the recycling of that waste will be recorded.

Work Setting - A table or workstation with a chair. Tables which have more than one chair provided are considered to be equivalent to one work setting for each two chairs provided. **Xeriscape** - Water-conserving landscape or landscape requiring no additional watering. For Green Star SA purposes, it

Glossary

is acceptable to irrigate a xeriscape garden during the first year, but once established the landscape must not be irrigated.

* Definitions taken from ‗Glossary: Green Glossary for High Performance Green Buildings' (2004), produced in partnership by Antron and IFMA (International Facility Management Association).

Acronyms

AFFL – Above Finished Floor Level

ASHRAE - American Society of Heating, Refrigerating, and Air Conditioning Engineers

BREEAM - Building Research Establishment Environmental Assessment Method

CIBSE - Chartered Institute of Building Services Engineers

CIR –Credit Interpretation Request

CSIR - Council for Scientific & Industrial Research

DEAT - Department of Environmental Affairs and Tourism (South Africa)

DHW – Domestic Hot Water

DOH - Department of Health (South Africa)

DOT - Department of Transport (South Africa)

DWA - Department of Water Affairs (South Africa)

EPA – Environment Protection Authority/Agency

EMP – Environmental Management Plan

EMS – Environmental Management System

FFL – Finished Floor Level

GBCSA – Green Building Council of South Africa

GFA – Gross Floor Area

GLA –Gross Lettable Area

GWP –Global Warming Potential

HCFCs – Hydro-chlorofluorocarbons, see Chlorofluorocarbons

HFCs – Hydro-fluorocarbons, see Chlorofluorocarbons

Acronyms

HVAC –Heating, Ventilation and Air-conditioning

HVAC&R – Heating Ventilation, Air-conditioning & Refrigeration

IAQ – Indoor Air Quality

IEQ – Indoor Environment Quality

IPCC – Intergovernmental Panel on Climate Change

LEED – Leadership in Energy and Environmental Design

MDS – Manufacturer's Data Sheet.

NLA – Net Lettable Area

O&M – Operations and Maintenance

ODP – Ozone Depleting Potential.

OFA – Occupied Functional Area.

OH&S – Occupational Health & Safety

PPB – Parts Per Billion

PPM – Parts Per Million

RCA – Recycled Concrete Aggregate.

TVOC – Total Volatile Organic Compounds

UFA – Usable Floor Area

VAV systems – Variable Air Volume air-conditioning systems

VLT – Visual Light Transmittance

WC – Water Closet (i.e. toilet)

WHB – Wash Hand Basin

Technical Manual & Submission Guidance

A GUIDE TO THE STRUCTURE OF GREEN STAR SA CREDITS

Aim of Credit

Asserts which environmental issue this credit is targeting, what the guiding principles behind the credit are, and what the desired environmental outcomes are.

Credit Criteria

Explains clearly how the Aim of Credit section is to be met. Where the Aim of Credit is the guiding principle, Credit Criteria outlines measures that must be undertaken within a project
to achieve it. It is important to read this section carefully as every project must meet the criteria outlined in this section for the credit to be awarded. This section also outlines how points are either awarded or 'Not Applicable' within the Green Star SA rating tool.

Documentation Requirements

Describes the requirements that a project needs to meet for its submission to be successful when assessed by the Assessors.

All projects must meet the Documentation Requirements to be awarded the credit points. Please note that the Assessors are not in a position to make assumptions on this matter, but must make a decision based on evidence provided. All documentation must therefore be provided to the letter of the Technical Manual. In addition, the Assessors reserve the right to request additional documentation in order to clarify any credit point.

Each credit has a submission checklist that lists the documentation requirements for the assessment of a rating. All evidence collated must meet requirements set out in the documentation section of each credit in the Technical Manual

Additional Guidance

This section contains additional information which is applicable to some projects. All information in Additional Guidance is mandatory. The Assessors reserve the right to determine whether or not the project needs to meet the requirements of this section.

Background

Explains why the issue in the credit is important, with relevant information and statistics; it also explains how the issue is pertinent to the type of project addressed by the tool.

References & Further Information

All credits within the Green Star SA rating tools are based on research; some of this research is provided as reference material in this section.

LIST OT AREAS

Common spaces - Areas used by two or more tenants and/or third parties and not under the control of any one tenant such as common entrances, lobbies, corridors, stairs, and elevators.

Gross Floor Area (GFA) - The total floor area of all parts of a building that are permanently covered and can be protected from the elements but excluding car parking areas, measured at each covered floor level over the external walls to the external finished surface. For the purposes of the Green Star SA submission, Gross Floor Area must be calculated as the building Construction Area, less the area of car parking, as per Section 4.2.1 of the SAPOA publication 'Method for Measuring Floor Areas in Buildings'. Gross floor area should be defined and used consistently throughout the Green Star SA submission.

Gross Lettable Area (GLA)[1] - The GLA is the total area of the building enclosed by the dominant face, adjusted by deducting major vertical penetrations. It comprises the usable area plus common areas of the building but excludes car parking. GLA is therefore the area assigned for exclusive use by occupants / tenants, including common areas such as:

- Building entrance foyers
- Plant and sever rooms on tenant floors
- Toilet areas on tenant floors
- Access or circulation areas on tenant floors

Nominated Area (NA) - A credit specific dynamic area definition used to delineate the area that is relevant to individual credits. Refer to each credit and the modelling protocol guide for the credit-specific definition of the Nominated Area.

Occupied Space (OS) - Occupied Space refers to all areas within the building where a person is expected to work for periods longer than one continuous hour per day. Occupied areas include, but are not limited to office, retail areas, communal areas, changing facilities, kitchens, laboratories (provided that other functional requirements do not supersede the credit requirements), first aid facilities, lobby, and similar.

[1] Method for Measuring Floor Areas in Buildings -SAPOA

Occupied Space excludes any warehouse, shop floors, or any other areas related to the industrial process activity, except for those outlined above. Enclosed circulation areas, fire stairs, storerooms, toilets, tea kitchens, changing facilities, bathrooms, display areas, IT equipment rooms and plant rooms are also excluded from this definition.

Primary space - All areas where a person is expected to work, or remain for an extended period of time, including, but not limited to:

- Offices, either open plan or private;
- Classrooms, laboratories, computer labs;
- Ward rooms, nurse's stations, clinic rooms;
- Kitchen and preparation areas where food is being sold;
- Retail / sales floor, exhibition halls, galleries (unless exclusion is justified), multi-purpose rooms (as a general setting); and,
- Industrial spaces, warehouse areas, shop floors, work stations.

These examples are indicative, and the project is encouraged to submit a Credit Interpretation Request to ensure that all spaces have been accurately defined. The predominant use of the space determines the space type classification. Where the functional requirements of the space demand specific ventilation conditions (e.g. laboratories, auditoriums, cinemas, or archives) the exclusion must be justified by the project team in a Credit Interpretation Request.

Secondary space - All areas used to support the principal activity of the primary space. These spaces will be regularly occupied; however a single person is unlikely to remain within for more than 2 hours. Examples of secondary space include:

- Meeting rooms, boardrooms;
- Auditoriums, gyms, seminar rooms (if not intended for regular classes);
- Waiting rooms, and any diagnostic area where no specific lighting requirements exist;
- Cafeterias, restaurants, seating areas, office breakout areas, food courts;
- Stockrooms.

Where the project team is unsure of whether a space is primary or secondary, it is recommended that the project team either submits a Credit Interpretation Request for confirmation, or, classify the space as a primary space.

Corridors that are exclusively used for transit between spaces (i.e. do not act as a foyer, lounge, waiting space, or reception), and are bound on both sides by a wall these are excluded from the nominated area. Where a corridor is part of a shared space, this corridor, or section of a corridor, cannot be excluded and is considered part of the adjacent space.

Tertiary space - All areas which are either transient spaces, or accessed intermittently. Examples of these areas include: back of house areas, corridors, hallways, plant rooms, storage facilities, or similar.

Usable Area[2] - Area capable of exclusive occupation by the tenant. The total area of the building enclosed by the Dominant Face, adjusted by deducting all Common Area and Major Vertical Penetrations.

[2] Method for Measuring Floor Areas in Buildings -SAPOA

Credit List

Management Category

Green Star SA Accredited Professional

Commissioning & Tuning

Tenant Users Guide

Environmental Management

Construction Waste Management

Work space efficiency

Green Lease

Learning Resources

Indoor Environment Quality

Quality of Internal Air

Thermal Comfort

Lighting Comfort

Visual Comfort

Acoustic Comfort

Hazardous Waste

Reduced Exposure to Air Pollutants

Mould Prevention

Ergonomics

Indoor Plants

Universal Access

Energy Category

Greenhouse Gas Emissions

Energy Sub-metering

Transport Category

Commuting Mass Transport

Local connectivity

Alternative Transport

Water Category

Potable Water

Water Sub-Metering

Materials Category

Operational Waste Management

Furniture

Assemblies

Flooring

Wall Coverings

Local Sourcing

Sundries Materials Sourcing

Land Use & Ecology Category

Site selection

Emissions Category

Atmospheric Deterioration Avoidance

Light Pollution

Innovation Category

Innovative Strategies & Technologies

Exceeding Green Star SA Benchmarks

Environmental Design Initiatives

Credit List

Management

The Green Star SA – Interiors Management Category encourages and rewards the adoption of features and attributes that enable and support good environmental management practices throughout the different phases of a project's development and its on-going operation.

The intention throughout the category is to improve the environmental performance of projects by influencing areas where decision-making is critical. It rewards the implementation of processes and strategies that minimise negative environmental impacts during fitout construction. The category also promotes practices that ensure a fitout project will be used to its maximum operational potential.

Man-1 Green Star SA Accredited Professional

POINTS AVAILABLE **1**

AIM OF CREDIT

To encourage and recognise the engagement of professionals who can assist the project team with the integration of Green Star SA aims and processes throughout all stages of a fitout's design and construction phases.

CREDIT CRITERIA

One point is awarded where:

- A member of the design team is a Green Star SA Accredited Professional and has;

  – Been contractually engaged by the Tenant or Building Owner to provide green building advice based on Green Star SA from the schematic design phase through to practical completion;

AND

  – Provided guidance to the project team regarding, or was responsible for, the Green Star SA documentation submission compilation.

DOCUMENTATION REQUIREMENTS

Green Star SA – Interiors PILOT
Submit all the evidence and ensure it readily confirms compliance.
1. Proof of accreditation 2. Statement of confirmation

Proof of accreditation must take the form of either:

- A copy of the nominated Green Star SA Accredited Professional – Interiors' accreditation certificate;

OR

- A screenshot of the relevant page of the online Green Star SA Accredited Professional - Interiors Directory, found on the GBCSA website.

Statement of confirmation from the client in the form of signed correspondence, confirming the engagement/appointment of the Green Star SA Accredited Professional – Interiors by;

- Detailing the date of engagement/appointment (i.e. dates from/to); and

- Describing their scope of works and confirming that they have provided guidance to the project team regarding, or were responsible for, the Green Star SA submission compilation from the time of schematic design until construction completion.

ADDITIONAL GUIDANCE

There is no additional guidance section for this credit.

BACKGROUND

The Green Star SA Accredited Professional credit rewards the on-going involvement of a Green Star SA Accredited Professional-Interiors throughout all stages of a fitout's design and development. The involvement of qualified individual(s) from a project's outset ensures that many major sustainability initiatives can be implemented in the earliest stages of that project's design and construction, resulting in better environmental outcomes.

To be deemed 'engaged', in line with the Aim of Credit, the Green Star SA Accredited Professional must contribute substantially to the project and the submission compilation.

Where the Green Star SA Accredited Professional's scope of works is outlined in a fee proposal provided to the Building Owner, upon which they are engaged, the fee proposal may be submitted to demonstrate the 'scope of works' aspect of the 'Statement of confirmation', or the fee proposal itself is signed by the Building Owner..

Should the role of the Green Star SA Accredited Professional be fulfilled by different individuals throughout the project program, the evidence listed under Documentation Requirements must be submitted for each Accredited Professional. Where the 'Statement of Confirmation' makes reference to the company appointed for Accredited Professional services, and not the individual Accredited Professionals, a signed letter from the appointed company must be provided listing all individuals fulfilling the role of Accredited Professional on the specific project.

REFERENCES & FURTHER INFORMATION

GBCSA Website – Accredited Professionals directory
http://www.gbcsa.org.za/network/directories/accredited-professionals/

Man-2 Commissioning and Tuning

POINTS AVAILABLE **2**

AIM OF CREDIT

To encourage and recognise effective commissioning and tuning processes during a project's design and construction phase that ensure all services and installations can operate to their optimal design potential.

CREDIT CRITERIA

Up to two points are awarded independently as follows:

Commissioning

One point is awarded where:

- Comprehensive pre-commissioning and commissioning activities are performed for all nominated systems.

AND

- The works outlined above are done in exact accordance with the CIBSE Commissioning Codes or ASHRAE Commissioning Guideline 1-1996.

OR

For small tenants (less than 2500m^2), one point is awarded where:

- Commissioning is contractually required to be performed for all applicable services provided within the fitout in accordance with system/equipment/appliance manufacturer‘s commissioning specifications or requirements;

Tuning

One point is awarded where:

- Prior to occupation, the Tenant commits to a tuning process of all nominated systems and implements a comprehensive tuning program that;
- Continues for a period of no less than 12 months after commencement;

AND;

- An Operations and Maintenance Manual has been developed in accordance with a nominated standard;

AND;

- The owner has engaged all parties to tune the nominated systems. This engagement includes requirements for:
    - Verification that nominated systems are performing to their design potential;
    - Reviews of environmental performance against environmental targets;

- Collection of user feedback to match the occupant's needs and the system performance;
- Adjustment of all the systems to account for all deficiencies; and
- Management, communication, and assignment of responsibilities for the tuning process within the team.

DOCUMENTATION REQUIREMENTS

Green Star SA – Interiors PILOT
Submit all the evidence and ensure it readily confirms compliance.
Where the point for commission is being claimed 1. Short report 2. Extract(s) from the Commissioning Report *Where the point for tuning is being claimed* 3. Tuning contract

Short report prepared by a suitably qualified professional that describes how the Credit Criteria has been met by:

- Identifying each system that is to be pre-commissioned and commissioned;
- Identifying the parties responsible for the commissioning, and
- Identifying what commissioning process will be applied
- Describing the basic function and operation of the services incorporated in the fitout, including initiatives intended to enhance energy efficiency, minimise greenhouse gas emissions, conserve water, and improve indoor environmental quality

Extract(s) from the commissioning report clearly demonstrating:

- That all systems have been commissioned in accordance with either CIBSE Commissioning Codes, or ASHRAE Guidelines or according to manufacturer specifications;
- Commissioning dates, records of all commissioning testing undertaken, list any future
- testing, and a written list of outstanding commissioning issues (if applicable); and
- The outcomes and changes made to the systems as a result of the commissioning process, accounting for all of the recommendations;

Tuning contract(s) signed by the Tenant and relevant design team member, clearly demonstrating the contractual requirement for;

- The scope of works, program, milestones/dates, and deliverables of the fitout tuning program;
- Listing the roles and responsibilities of the various parties to be involved during this period
- A 'Tuning Report' to be generated by the tuning team once the fitout tuning program has been finalised.

ADDITIONAL GUIDANCE

Nominated Systems

Examples of systems that may need to be commissioned include, but are not limited to:

- Lighting controls;
- Electrical systems (such as electrical generation, electrical supply, distribution systems, sensors, timers, security and alarm systems);
- Hydraulic systems (such as gas and water supply distribution systems, rainwater, greywater, blackwater, and stormwater systems);
- Mechanical systems (such as HVAC and refrigeration systems; mechanically operable systems such as blinds and actuated shading devices);
- Management and Control System (BMCS); and
- Any other system that will have an impact on the indoor environment quality, or the energy or water consumption of the building.

Commissioning

A project can demonstrate compliance with this criterion by showing that the pre-commissioning and commissioning activities have been performed based on the approved standards. As such, to demonstrate compliance, the following must be documented:

- The contractual documentation for each nominated system must clearly list the design parameters for the system; the required commissioning activities; how each system is intended to operate; and the acceptable tolerances during commissioning.
- The contractual construction documentation must list the requirements for commissioning each system. It cannot simply be stated that systems must be commissioned to the relevant standard. Instead, the documentation must list the design parameters for the system; the required commissioning activities; how each system is intended to operate; and the acceptable tolerances during commissioning. For example, documentation must include divisions of responsibilities, pre-commissioning procedures, commissioning requirements, witnessing requirements, phased completion requirements (if needed), post occupancy checks, and any training requirements for the operator.
- A commissioning plan must have been developed. This plan must, as a minimum, include: the objectives, or basis, of the design; the scope of the plan; list the commissioning team; their responsibilities and interface matrix; the general sequence of commissioning; the proposed commissioning procedures; witnessing requirements; the commissioning program; and requirements for subcontractor commissioning manuals.

Chartered Institution of Building Services Engineers (CIBSE) Commissioning Codes

Commissioning is defined by CIBSE as the advancement of an installation from the state of static completion to full working order to the specified requirements. It includes the setting to work of an installation, the regulation of the system and the fine-tuning of the system.

Commissioning of buildings and building services is vitally important to the safe and energy efficient operation of buildings but it is not always carried out – or carried out systematically. The CIBSE Commissioning Codes set out clearly and systematically the steps required to commission building services in a proper and timely manner and will make a significant contribution to achieving properly commissioned buildings. This key step in the construction of a building enables the systems to operate as they were designed to do.

CIBSE Commissioning Code M: Commissioning Management

This code provides an overview of the management arrangements required to ensure that building services systems are commissioned to meet the objectives of the U.K Building Regulations. It is applicable to the management of commissioning of all building services systems, including new-build and retrofit applications. Commissioning of specific systems is addressed by the following:

- CIBSE Commissioning Code A: Air distribution systems
- CIBSE Commissioning Code B: Boilers
- CIBSE Commissioning Code C: Automatic Controls
- CIBSE Commissioning Code L: Lighting
- CIBSE Commissioning Code R: Refrigerating systems
- CIBSE Commissioning Code W: Water distribution systems

ASHRAE Guideline 1-1996 - The HVAC Commissioning Process

The purpose of this guideline is to describe the commissioning process that will ensure heating, ventilating, and air-conditioning (HVAC) systems perform in conformity with design intent. The procedures, methods, and Documentation Requirements in this guideline cover each phase of the commissioning process for all types and sizes of HVAC systems, from predesign through final acceptance and post-occupancy, including changes in building and occupancy requirements after initial occupancy. This guideline provides procedures for the preparation of documentation of:

- Owner's assumptions and requirements;
- Design intent, Basis of Design, and expected performance;
- Verification and functional performance testing; and
- Operation and maintenance criteria.

This guideline specifically details the process for:

- Conducting verification and functional performance testing and
- Maintaining system performance to meet the current design intent after initial occupancy.

This guideline also includes a program for training of operation and maintenance personnel.

Demonstrating the application of the CIBSE Commissioning Codes

To provide Project Teams with further guidance regarding the information which would be expected to be included within Commissioning Report(s) demonstrating the use and adherence to the CIBSE Commissioning Codes, this information, as per the Codes, may include, but is not limited to, the following;

- Particular and definitive commissioning specifications from the design engineer of each service/discipline setting out clearly what is expected of the commissioning specialist (independent or otherwise). This should include commissioning tolerances on all commissioning parameters and a clear description of how it is intended that the system should operate and the design parameters. The design engineer should also produce ‘cause and effect’ sheets showing how the design is intended to operate. Also, commissioning specification details of safety controls and interlocks to protect the equipment and personnel during the commissioning process;
- Requirements for witnessing including full details of tolerances applicable to all parameters;

- Commissioning program including specific period of time for client witnessing;
- Appropriate health and safety risk assessment and method statements for the tasks to be completed;
- Commissioning method statement for each system;
- Pre-commissioning checklists for each system;
- Commissioning checklists; and,
- Commissioning certification for each system countersigned by the design engineer, commissioning specialist (independent or otherwise) and the accepting authority (where relevant), and including the record sheets provided in each CIBSE code.

The above items have been determined from a review of the CIBSE Commissioning Codes identifying key issues to be addressed with regards to the correct documentation of a CIBSE Commissioning Code compliant commissioning process of building services.

This list is not exhaustive and it is expected that all Project Teams complete their own review of the CIBSE documents and synthesize the important information which they, in their professional opinion and experience, believe are important and represent an improvement from conventional commissioning practices in South Africa and demonstrate the use of the CIBSE Commissioning Codes.

Commissioning Reports

Commissioning Reports are intended to provide a concise overview of the entire commissioning process and outcomes for each discipline (as applicable). It is a summary document of the key findings and outcomes as indicated in the commissioning records. Complete sets of actual commissioning datasheets or commissioning records should not be submitted, however Project Teams are encouraged to submit extracts to support the commissioning report (i.e. for major plant and equipment only).

Tuning

Prior to occupation, the tenant must commit to a tuning process of all nominated systems. At a minimum, the commitment must include quarterly measurement via a formal tuning process. The tuning must utilise data measured from the monitoring of the systems and via occupant feedback of conditions. At the end of the tuning period, the client must commit to take steps to adjust the nominated systems to account for all deficiencies.

This requirement can be performed every three months during the first 12 months of occupation, or every three months during the first 24 months of occupation. The scope of the tuning works will determine the relevant tuning period.

BACKGROUND

The Commissioning & Tuning credit aims to ensure that commissioning and tuning are undertaken to the highest possible standard, so that projects operate to their optimum operational potential throughout the building life cycle.

Few spaces work as initially intended by their design teams. As responsibility passes from the design team to the occupant or Management Entity, there are significant opportunities for processes to go wrong, for misunderstandings, and for strategy to give way to practical expediency.

Man-2 Commissioning and Tuning

POINTS AVAILABLE **2**

Evidence suggests that the initial cost of implementing good design, commissioning and tuning processes are recovered many times over through operational savings, improved staff performance, and the avoidance of costly construction and/or service problems. An effective design review and well documented commissioning and tuning processes can assist projects in meeting their design intent and realising their sustainability targets. Conversely, poorly executed or documented commissioning and tuning can result in projects that perform below their operational capacity.

REFERENCES & FURTHER INFORMATION

American Society of Heating, Refrigeration and Air-Conditioning Engineers
http://www.ashrae.org

Building Commissioning Association
http://www.bcxa.org

The Building Services Research and Information Association
http://www.bsria.org

California Commissioning Collaborative
http://www.cacx.org

Chartered Institution of Building Services Engineers
http://www.cibse.org

Commissioning Specialists Association
http://www.csa.org.uk

The Building Services Research and Information Association, Feedback for Better Building Services Design (AG 21/98), 1998
http://www.bsria.co.uk

Man-3 Occupant users' guide

POINTS AVAILABLE 1

AIM OF CREDIT

To encourage and recognise information management that enables fitout occupants and users to optimise the fitout's environmental performance.

CREDIT CRITERIA

One point is awarded where:

- A simple and easy-to-read 'Occupant Users' Guide', which includes information relevant for the end users, is created and made available to the fitout owner and occupants;
  AND
- The Occupant Users' Guide, at a minimum, contains the sections and information in accordance with the Additional Guidance.

DOCUMENTATION REQUIREMENTS

Green Star SA – Interiors PILOT
Submit all the evidence and ensure it readily confirms compliance.
1. Occupant Users' Guide

Occupant Users' Guide which includes all required information outlined in the Additional Guidance section.

ADDITIONAL GUIDANCE

The Occupants Users' Guide, at a minimum, must include the following sections and information (where appliance):

Design Initiatives:

– Descriptions of the project systems and design initiatives related to energy (and associated greenhouse gas emissions), water efficiency and waste;

– Descriptions of the Green Star SA initiatives intended to enhance and minimise energy and water use and the measures that must be taken during operation to maximise their effectiveness;

Targets & Benchmarks:

– Outline the energy and water targets or benchmarks;

– Describe the automated metering strategy for the dwellings and common property (if applicable);

– Information on simple strategies for saving energy and water within dwellings;

Basic Functions:

–Description of basic function and operation of the nominated systems, whom to contact for maintenance information, or complaints;

– Details and links to other information such as websites, publications, and organisations relating to energy and water conservation, efficient building operation, indoor air quality or sick building syndrome, and environmentally friendly design features.

Water Use

– General User – details of water saving features and their use and benefits, e.g. aerating taps, low flush toilets, leak detection, metering etc.

Transport Opportunities:

– Details on the alternative transport facilities (such as cyclist facilities) available and including (where applicable), local public transport information, maps and timetable links, bike paths, access to and the location of, local amenities;

Waste & Recycling:

– Include information on recycling, including what can be recycled, where the waste storage areas are and the schedules for waste and recycling removal;

– Information on any other waste management processes present, such as composting or worm farm facilities (where applicable);

Appliances:

– Descriptions of any energy and/or water efficient appliances provided within the development;

– Information on the applicable certification scheme under which the appliances are certified;

BACKGROUND

This credit addresses the need to properly inform fitout occupants, users and owners about the best ways to use and operate their Green Star rated fitout and the positive impact that sustainable construction has on the environment.

In order for the sustainable benefits of a Green Star SA rated fitout to be fully realised, all user groups need to take an active role in the operation of that fitout. Often, new technology installed in sustainable fitouts can be confusing to occupants that are unfamiliar with such systems, which can result in sustainable technology that is not operated as intended or that operates below its full potential.

An example of incorrect usage resulting in inefficiencies would be when building users are not informed on how to correctly use a motion detection lighting system. If those occupants turn main light switches on and off manually, rather than utilising the motion detection system as intended, the energy use efficiencies associated with the system are effectively negated. Similarly, recycling

facilities are only beneficial if fitout users are educated and informed about how and why such facilities should be used and how they benefit the environment.

Sustainable projects also represent a valuable opportunity for the education of fitout occupants and general public on the environmental benefits of sustainable design and construction. With appropriate signage and educational spaces situated throughout a fitout, useful information can be displayed to the benefit of all user groups and, more broadly, the community.

The Occupant Users' Guide must be a concise and user-friendly document, suitable for a layperson. It is not intended as a supplementary document to the Operations & Maintenance

Manual for maintenance staff, and as such must not include detailed information on maintenance and spare parts, etc.

Simplified diagrams are aimed, and intended, for the use of the fitout occupants and need to communicate the depicted service/system in a very basic and clear way that can be readily understood by the general public. Any drawing/diagram that contains technical detail generally is not considered to be "simplified".

For basic function and operation, it is not necessary to describe the function of simple amenity taps, or lighting systems without automatic control features. The intent of providing information on basic function and operation is only intended for those systems whose use and operation may not been immediately intuitive to fitout occupants. For example, the basic functions of a lighting system that includes daylight sensors or occupancy sensors would need to be described; however a lighting system with only simple manual controls (i.e. on/off switches) would not.

The provision of a building Operation and Maintenance (O&M) manual does not meet the Building Users' Guide requirement. The O&M manual typically only provides detailed specialist information required by building manager and staff/contractors, not information intended for occupants.

REFERENCES & FURTHER INFORMATION

Bobenhausen, C., 'Sustainable O&M Practices', Whole Building Design Guide, 2008 www.wbdg.org/resources/sustainableom.php?r=health_care.

Green Building Council Australia, Clean Up Your Business Guide, 2007 http://www.gbca.org.au/publications/gbca-clean-up-your-business-guide/1417.htm

Queensland Government - Department of Public Works, Ecologically Sustainable Office Fitout Guideline, 2000 http://www.hpw.qld.gov.au/SiteCollectionDocuments/EcologicallySustainableOfficeFitoutGuideline.pdf

Sydney Harbour Foreshore Authority, Green Building User Guide: Enabling a Sustainable Future, 2008 http://www.shfa.nsw.gov.au/content/library/documents/24FF67C1-FB9B-965C-AE1E7766A6CDC65E.pdf

Man-4 Environmental Management

POINTS AVAILABLE **1.5**

AIM OF CREDIT

To encourage and recognise the adoption of a formal environmental management system in line with established guidelines during construction.

CREDIT CRITERIA

Up to 1.5 points are awarded independently as follows:

Half a point is awarded where:

- The Contractor implements a comprehensive, project-specific Environmental Management Plan (EMP) throughout the construction phase of the project (i.e. from construction commencement to practical completion) in accordance with table Man-4.1 provided in the additional guidance;

  AND

- The Contractor and Sub-Contractors demonstrate compliance with the EMP;

  AND

- The EMP explicitly addresses how the energy, water, waste, and indoor air quality impacts from construction works are managed, reported, and minimized through the implementation of an environmental management plan, in accordance with the Additional Guidance.

Half a point is awarded where:

- The Contractor has valid ISO14001 Environmental Management System (EMS) accreditation throughout the construction phase of the project (i.e. from construction commencement to practical completion);

  AND

- All Sub-Contractors working on the project and engaged by the Contractor adhere to all applicable ISO14001 or EPA requirements.

OR

- The Contractor has a valid EMS in place, in accordance with the EPA South Australia Small Business Environmental Management Solutions, in accordance with table Man-4.2 provided in the Additional Guidance.

Half a point is awarded where:

- The construction impacts from energy, and water usage, as well as waste generation have been monitored, and tracked and documentary evidence of this is submitted to the GBCSA

DOCUMENTATION REQUIREMENTS

Green Star SA – Interiors PILOT

Man-4 Environmental Management

POINTS AVAILABLE **1.5**

Submit all the evidence and ensure it readily confirms compliance.
Where first point claimed: 1. Environmental Management Plan, in accordance with table Man-4.1 in the Additional Guidance *Additionally where second point claimed:* 2. Current ISO14001 certificate OR EMS deemed to satisfy criteria, in accordance with table Man-4.2 in the Additional Guidance OR External Auditor verification 3. Statement of confirmation from Contractor *Additionally, where the third point claimed* 4. Construction environmental management monitoring data

Environmental Management Plan prepared by a suitably qualified professional that is comprehensive and project-specific, and:

- Is based on the EMP template provided in Table Man-4.1 below, which is adapted where necessary for site conditions and where additional information or specific details are required
- Demonstrating that energy, water, waste, and indoor air quality impacts from construction works are managed, reported, and minimized through the implementation of an environmental management plan.
- Demonstrating an Indoor Air Quality (IAQ) management plan, compiled in accordance with the criteria set out in Chapter 4 of the SMACA guidelines that clearly outlines the adopted control measures in accordance with the following sections:
  - Section 3.2.1 ‘HVAC protection: supply side’
  - Section 3.2.2 ‘HVAC protection: central filtration’
  - Section 3.2.3’HVAC protection: return side’
  - Section 3.3.6 ‘Cover seal’ if the VOC credit is not pursued
  - Section 3.5 ‘Housekeeping’
- Demonstrating that sub-contractors are obliged to adhere to the provisions of the EMP.
- Outlining the roles and responsibilities of each individual involved in environmental management of the construction site and designating the individual responsible for monitoring and auditing compliance with the requirements of the EMP.
- Signed off by the Contractor confirming implementation of the EMP from commencement of construction.

ISO14001 certificate of the Contractor that is current and valid throughout the entire construction phase of the project, demonstrating that an appropriate EMS is operating within the company

EMS deemed to satisfy criteria, in accordance with table Man-4.2 in the Additional Guidance

External Auditor verification from a suitably qualified external auditing entity, confirming that all conditions stipulated in table Man-4.1 have been successfully implemented into the Principal Contractor’s operations.

Statement of confirmation in the form of signed correspondence from the Contractor confirming;

- The dates of construction commencement and practical completion; and

- That any Sub-Contractors who worked on project did adhere to all applicable ISO14001 requirements.

Construction environmental management monitoring data must be submitted to the GBCSA, in the format prescribed in the Additional Guidance.

ADDITIONAL GUIDANCE

Environmental Management Plan

Table Man-4.1 below provides an EMP template that project teams can use during construction. The EMP template must be adjusted with any relevant project specific information and details. The EMP must be produced by a suitably qualified professional or the Contractor, be specific to the project and it must be clear that the Contractor and all Sub-Contractors are contractually required to adhere to it. Compliance with the relevant sections of the EMP must be demonstrated as below in table Man 4.1.

√		PRE – CONSTRUCTION PHASE CHECKLIST
	Statutory Requirements	• Prior to any construction works commencing, it is the responsibility of the Client to provide a list of all applicable environmental, land use and building permitting conditions together with the respective approved permits to the independent appointed ESO (Environmental Site Officer). • The EMP must be signed off by the appointed Contractor and ESO prior to Site Works commencing.
	Works Demarcation of Site Works	• It is the responsibility of the appointed Contractor to physically demarcate the area that site works will take place within, prior to construction works commencing. • Should there be no external works (i.e. outside the physical bounds of the tenant space, then site demarcation is not required. • Access to the site will be restricted to authorised personal and members of the public must be prohibited from the site unless prior arrangements have been made with the Contractor. Access to the site will be through designated and security controlled access points.
	Induction Training	• The Contractor and Site Managers are to undergo at least one environmental induction training session facilitated by the appointed ESO. • The Contractor is to ensure that all staff and sub-contractors are familiar with the requirements of the EMP. .
	Working hours	• Working hours shall be determined by the local authority and the Contactor shall abide by these at all times. • Any adjustments to the approved working hours shall be in writing from the local authority and in consultation with the appointed ESO.

	Responsibilities	• The EMP must clearly define the roles and responsibilities of the appointed Contractor, ESO, Site Manager, Principal Agent and the Local Authority.
√		CONSTRUCTION PHASE CHECKLIST
	Public Awareness	• All occupants of directly adjoining properties must be notified of the proposed construction phase activities at least two (2) weeks before construction works commence.
	Fuels and Lubricants	• A dedicated and demarcated area must be defined with drip trays beneath any equipment that utilises fuels or lubricants • On site spill remediation measures (such as but not limited to Spillsorb) must be in place and the Contractor must be familiar with how to operate the equipment in the event of a spill. • A fuel/lubricant spill management protocol must be produced by the Contractor and approved by the ESO prior to construction commencing. • Material Safety Data Sheets (MSDS) must be available where fuel and lubricant products are stored, to ensure that appropriate action can be taken in the event of a spill. • Spilled fuel and lubricants are considered hazardous waste and as such must be disposed of as hazardous waste and be collected by suitably licensed Contractor. • Chain of Custody documentation must be provided for all waste collections on site. • Any spills are to be recorded in the On-Site Environmental Register, and this must include any remedial actions.
	Liquid Waste Management	• Cement /Screed / Tile Grout / Paint contaminated water must be fed to a lined and bundled container, drum or sedimentation pond, neutralised and suitably regularly disposed of (e.g. decanted to a drum and collected by a licensed waste contractor). • Chain of Custody documentation must be provided for all waste collections on site. • Contaminated water must not be directed to any stormwater systems.

Man-4 Environmental Management

POINTS AVAILABLE 1.5

	Solid Waste Management	• The National Waste Management Strategy waste hierarchy illustration is shown below and this will also be used as a guideline by the Applicant for all design informants and operations on Site.  Figure 1: Waste management hierarchy The objects of the Waste Act are structured around the steps in the waste management hierarchy, which is the overall approach that informs waste management in South Africa. Therefore, the NWMS follows the waste management hierarchy approach. The waste management hierarchy consists of options for waste management during the lifecycle of waste, arranged in descending order of priority. All stakeholders must apply the waste management hierarchy in making decisions on how to manage waste. • Solid Waste must be clearly categorised by the Contractor into separate waste streams. • No dumping may take place on site or in any instance related to the site works. • The Contractor must provide clearly marked waste receptacles for categorised as well as a storage area for identified hazardous waste (to be collected by a licensed Contractor). • Waste receptacles must be regularly serviced and emptied to ensure that there is no overflow. • In instances of receptacles exposed to the external atmosphere (i.e. outside of the tenant/occupant space being fitted) and elements (such as wind), then shade netting shall be used to cover he receptacles to limit possible airborne impacts.
	Hazardous waste management	• Separate storage areas for hazardous materials must be identified and demarcated prior to site works commencing. • Should hazardous materials be stored or used on site in any form or manner then the Contractor shall have appropriately trained and experienced personnel (in line with statutory) requirements) to attend to any emergencies on site relating to hazardous material spills or exposures to site staff or visitors. • The Contractor shall provide proof of the above.
	Ablution facilities	• Chemical Toilets are to be provided on site at a ratio of at least on chemical toilet for every 15 workers. Clean water and soap shall be made available on site for use by workers. • Should Chemical toilets be located externally then these toilets are to be secured in a manner that ensures that they are not blown over by the wind.
	Fire safety	• The Contractor shall have appropriately trained and experienced personnel (in line with statutory requirements) to attend to any fire related emergencies on site. • Proof of the above must be provided by the Contractor. • Fire equipment on site must be provided by the Contractor and must be in line with statutory requirements.
	Health and Safety	• Contractors will at all times comply with the Occupational Health and Safety Act (1993) and ensure that suitably trained personnel audit the site on a weekly basis to ensure compliance. • Proof of the above must be provided by the Contractor.

	Noise Impacts	• Statutory requirements oblige Contractors to ensure that they cannot make 'unreasonable' noise at the following times:
		  o Sundays and public holidays
		  o Before 06H00 and after 17H00 on Saturdays
		  o Before 08H00 and after 18H00 on any other day than those listed above.
		• These requirements can only be adjusted if there is an emergency that threatens life or property; or if the authorities have given special permission.
		• The Contractor must ensure that suitable measures are in place to mitigate potential noise impacts through the use of appropriate equipment, appropriate scheduling of noisy activities and proactive engagement with surrounding tenants/occupants to timeously advise them of any potential noise impacts.
		• The Contractor will ensure that there is no music on site that causes a disturbance to surrounding tenants/occupants.

	Demolitions Works	• The Contractor will ensure that any demolition works is carried out by a suitably qualified and experienced service provider. • All materials generated through demolition works will be clearly catalogued and sorted for possible re-use, recycling or disposal (through a licenced service provider).
	Traffic Impacts	• The Contractor shall ensure that all potential traffic related impacts (from demolitions and constructions works) are identified and approximately quantified prior to site works commencing. • The Contractor shall ensure that any traffic related impacts are mitigated in consultation with the local authority traffic services or a suitably qualified traffic engineer, prior to construction works commencing.
	Resource Management	• The Contractor must develop a method statement that explains the impacts associated with energy, water and waste on the project and identify appropriate measures to manage, report and mitigate these impacts.

	IAQ	• The Contractor must implement measures to manage the indoor air quality (IAQ) in accordance with recommended control measures of Chapters 3 and 4 of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guidelines for Occupied Buildings under Construction, 2008. In particular, the Contractor IAQ management plan, compiled in accordance with the criteria set out in Chapter 4 of the SMACA guidelines must demonstrate how the following sections in Chapter 3 have been implemented in the project:
		  o Section 3.2 HVAC protection:
		  o 3.2.1 'HVAC protection: supply side'
		  o 3.2.2 'HVAC protection: central filtration'
		  o 3.2.3'HVAC protection: return side'
		  o 3.3.6 'Cover seal' if the VOC credit is not pursued
		  o 3.5 'Housekeeping'

		POST CONSTRUCTION CHECKLIST

Table Man 4.1 - Interiors Fitout EMP template

Man-4 Environmental Management

POINTS AVAILABLE 1.5

Indoor Air Quality (IAQ) Management Guidelines

The EMP must include provisions for managing the indoor air quality for the construction works. The provisions must meet or exceed the recommended control measures of Chapters 3 and 4 of the Sheet Metal and Air Conditioning National Contractors Association IAQ Guidelines for Occupied Buildings under Construction, 2008. This standard was developed primarily to address the air quality and pollution controls of the HVAC system during construction and renovation works of a building. While the guideline is primarily intended to be used on an occupied building, the information contained within it is equally applicable to new construction.

As a minimum, the IAQ provisions of the plan must include:

i. The protection of the ducting and HVAC equipment during construction and

ii. The reduction of project materials' capacity to absorb emissions from significant sources of contaminants by protecting them during construction.

Environmental Management System

ISO14001 Certification

ISO14001 is a requirement of the Contractor and must be valid for the entire construction phase of the project. All Sub-Contractors working on the project and engaged by the Contractor must adhere to the requirements of the EMS.

ISO14001 alternatives

For smaller organisations (fewer than 20 full time employees) simpler tools other than ISO14001 are acceptable where the results are externally available to customers and the public and internally to staff and other building occupants. An external auditor's report confirming evidence of effective use of the EPA South Australia Small Business Environmental Management Solutions checklist below must be provided to achieve the credit, or alternatively the Contractor must supply the relevant information outlined in table Man-4.2.

EPA EMS Deemed to satisfy criteria: Table Man-4.2

Action	Documentation required to demonstrate compliance
Checklist step 1: Has the principal Contractor committed to addressing the environmental issues related to the organisation's activities, products and services?	Statement of confirmation listing some of the organisations activities/products that demonstrate a commitment to environmental issues
Has the principal Contractor written an environmental policy that includes a commitment to: a) Prevent pollution b) Continuous improvement c) Comply with environmental regulations?	Environmental Policy
Has this policy been provided to all staff?	Statement of confirmation
Is the environment policy displayed in the workplace and available to the public?	Statement of confirmation/Photograph
Checklist step 2: Have all the business' aspects and impacts been identified?	Aspects and Impact register

Has the principal Contractor's staff been consulted on these impacts?	Statement of confirmation and a short description of how this was done
Have the impacts been prioritised using the risk assessment rating system in the EPA reference?	Aspects and Impact register
Have all the legal requirements for the business been established and documented?	Legal register
Has an Environmental Action Plan been documented for these impacts?	Action Plan
Has each action been allocated to the responsible person?	Responsibilities identified in the Action Plan
Checklist step 3: Has the hierarchy of controls been used to decide on actions to eliminate or reduce impacts on the environment?	Environmental Action Plan
Has/have a procedure / s for implementation of the Environmental Action Plan been developed and communicated to all staff?	Statement of confirmation and a short description of how this was done
Has an emergency response plan been prepared and documented?	Emergency response plan
Has this been communicated to all staff?	Statement of confirmation and a short description of how this was done
Have training needs been identified?	Training assessment
Has this training been undertaken?	Evidence of training provided
Checklist step 4: Has a procedure been developed for regularly checking the environmental impacts of the business and activities?	Environmental Action Plan
Has the principal Contractor audited their Environmental Management System?	Review register
Is regular monitoring taking place, and being documented?	Track record of resources being monitored and how often (at a minimum, energy water and waste should be monitored)
Is there a procedure in place to ensure that the business' compliance with legal requirements is updated and documented?	Aspects and Impacts register
Has a procedure been developed for reporting and correcting non-conformance?	Environmental Action Plan
Checklist step 5: Has the Environmental Management System been reviewed on a regular basis?	Review register
Has this review evaluated the suitability, adequacy and effectiveness of the Environmental Management System, and taken into account any non-conformance?	Review register
Have any changes that the review has identified, been implemented (including an update of the	Review register

Environmental Action Plan)?	
Has the review and any changes been documented?	Review register

In the event that an external auditor is not employed to verify that the EPA EMS has been implemented, the deemed to satisfy criteria checklist must be accompanied by the documentation outlined in table Man-4.2 above, summarised below as:

1. An environmental action plan that includes:
    a. Aspects and Impact register
    b. Review register
    c. Emergency response plan
2. An environmental policy
3. A statement of confirmation from the Contractor confirming:
    a. Some of the organisations activities/products that demonstrate a commitment to environmental issues
    b. That all policies and related documentation have been communicated to staff, explaining how this was done
    c. Evidence of training provided

CONSTRUCTION RESOURCE MONITORING

Project teams are required to monitor and record the following environmental resource impacts during the construction period:

- Energy consumption
- Potable water consumption
- Waste generation
- Waste recycled

These results must be communicated to the GBCSA, via the credit submission documentation. The total amounts that must be communicated to in submission documentation are:

- Total energy consumption in kWh
- Total potable water use in kL
- Total waste generated in kg
- Total waste recycled in kg

Energy and water meters are readily available for teams to track their consumption during construction.

Man-4 Environmental Management

POINTS AVAILABLE 1.5

BACKGROUND

The aim of the credit is to encourage and recognise the adoption of a formal environmental management system in line with established guidelines during construction. It rewards project teams for three things:

- Implementing an EMP (Environmental Management Plan)
- Implementing an EMS (Environmental Management System)
- Monitoring construction resource impacts

Fitout construction can result in environmental impacts, especially at the local level. These arise from pollution and waste generation from such activities which include painting, flooring installations and on site joinery installation, and water and energy use. It is important that responsibility is taken for creating and executing management procedures to minimise or avoid these impacts by developing project specific EMPs and adopting an EMS.

EMPs aid project teams in developing a clear and detailed action plan as to how environmental impacts will be mitigated. An EMS provides management and systems tools for organisations or project teams to control their environmental impacts and to improve their environmental performance. Both the EMP and an EMS are tools that can provide significant tangible economic and environmental benefits, including:

- Reduced raw material/resource use;
- Reduced energy consumption;
- Improved process efficiency;
- Reduced waste generation and disposal costs; and
- Utilisation of recoverable resources

REFERENCES & FURTHER INFORMATION

National Environmental Management Act, 107 of 1998, as amended: Environmental Impact Assessment Regulations R543; 18 June 2010.
http://www.environment.gov.za/polleg/legislation/natenvmgmtact/natenvmgmtact.htm

National Environmental Management Act, 107 of 1998, as amended: Environmental Impact Assessment Regulations R544; 18 June 2010: Listing Notice 1: List of Activities and Competent Authorities identified in terms of Sections 24(2) and 24D.
http://www.environment.gov.za/polleg/legislation/natenvmgmtact/natenvmgmtact.htm

National Environmental Management Act, 107 of 1998, as amended: Environmental Impact Assessment Regulations R545; 18 June 2010: Listing Notice 2 & 3: List of Activities and Competent Authorities identified in terms of Sections 24(2) and 24D.
http://www.environment.gov.za/polleg/legislation/natenvmgmtact/natenvmgmtact.htm

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DEAT (2004) Environmental Management Plans, Integrated Environmental Management, Information Series 12, Department of Environmental Affairs and Tourism (DEAT), Pretoria.

CSIR (2005) Guidelines for Environmental Management Plans, Western Cape available for download at http://www.westerncape.gov.za/eng/your_gov/406/pubs/guides/G

EPA South Australia Small Business Environmental Management Solutions available for download at http://www.epa.sa.gov.au/businesses/eco-efficiency/publications_and_links

Sheet Metal and Air Conditioning Contractors' National Association (SMACNA) http://www.smacna.org/

International Organization for Standardization ISO14001 – Environmental Management Systems http://www.iso.org

Man-5 Construction Waste Management

POINTS AVAILABLE **1.5**

AIM OF CREDIT

To encourage and recognise management practises that minimise the amount of demolition and construction waste going to disposal.

CREDIT CRITERIA

Up to 1.5 points are awarded where:

- The Contractor develops and implements a Waste Management Plan (WMP) throughout the construction phase of the project (i.e. from construction commencement to practical completion);

  AND

- The Contractor retains waste records and issues regular reports to the Tenant;

  AND

- The Contractor diverts a minimum percentage (by mass) of all demolition and construction waste for reuse or recycling, awarded as follows:
  - 30% for half a point;
  - 50% for one point;
  - 70% for 1.5 points

DOCUMENTATION REQUIREMENTS

Green Star SA – Interiors PILOT
Submit all the evidence and ensure it readily confirms compliance.
1. Short report 2. Waste Management Plan 3. Regular waste reports

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Short report prepared by a relevant project team member that demonstrates how the Credit Criteria have been met by:

- Providing a tabulated summary of all categories of waste with their corresponding total quantities (in mass) as identified in the regular waste reports in accordance with the Additional Guidance
- Demonstrating that the diversion from landfill disposal percentage was achieved for the project; and
- Referencing appended receipts and other appropriate records (e.g. evidence of reuse).

Waste Management Plan developed in accordance with the Additional Guidance and implemented for the project.

Man-5 Construction Waste Management

POINTS AVAILABLE 1.5

Regular waste reports issued to the Tenant showing the categories of waste, their corresponding quantities (in mass) for the period, the percentage diverted from disposal and how that diverted is reused/recycled. Please refer to the Additional Guidance with regards to the regularity of reporting.

ADDITIONAL GUIDANCE

Waste Management Plan

The Waste Management Plan must detail, as a minimum, the following;

- How all generated waste was monitored;
- Which type of waste streams were collected for recycling or reuse; and
- The roles and responsibilities of those involved in the waste management process

Waste Exclusions

Any waste that is not normally sent to conventional disposal (i.e. landfill) is not addressed by this credit, such as hazardous waste that must be disposed of in accordance with applicable legislation (e.g. asbestos, contaminated fill/topsoil etc.). Quantities of such wastes must be excluded from calculations to demonstrate compliance with the credit criteria.

Waste reused on site

Projects that reused any waste must include these materials in the credit calculations as reused /recycled. For example, if project teams crush and reuse existing concrete, masonry or asphalt on site (that would otherwise be hauled off-site) or process debris into a recycled content commodity with a market value (e.g. alternative daily cover material, land reclamation material, foundation/road sub-base), these must be included in the credit calculation as reused or recycled material.

Informal recycling

Where informal recycling is utilized, the waste material must be weighed beforehand and a record of the informal recyclers collectors must be kept including their acknowledgement of collection of such materials and quantities.

Offsite waste management

Waste can be managed offsite if space constraints prohibit a tenant to effectively store and manage recycles on the project sites available space.

Waste reports

It is recommended that for projects lasting less than two months, a report every two weeks is generated, for projects of 2 - 4 months a waste report should be generated every month, and for any project longer than 4 months, a waste report should be generated every two months, thereby ensuring that an average of 4-6 waste reports are also generated for fitout projects.

Waste reports should include the following information, as a minimum:

- An identification of all relevant waste streams generated on site;
- A breakdown by estimated weight (using volume to weight conversion factors) of most common material types removed from site (e.g. carpet timber, plasterboard, concrete, plastic packaging);

- Breakdown by location of where the waste was taken for recovery;
- Total amount of waste from the site diverted from landfill, reported by weight;
- Total amount of waste residual from the site that was sent to landfill, reported by weight; and
- The fate of recovered materials, by material types, detailing what the recycled product outputs from the processing facilities engaged by the waste contractor to receive C&D waste from site are.

For guidance, an example template for communicating waste streams is provided below:

Date	**Disposal site** (location and service provider)	**Disposal Receipt/slip reference**	**Non-recyclable Waste streams**			**Recyclable waste streams**			
…									Recycled use
Metric			kg	kg	kg	kg	kg	kg	
….									
…									
…									
TOTAL			kg			kg			
Total waste sent to landfill			%						
Total waste diverted from landfill						%			

Conversion of volume to mass

If waste is measured by volume rather than mass, the data must be converted to mass using the densities provided in Table Man-7.1.

Material (1 cubic metre = Tonne)	**Density**		
Aluminium cans – whole	0.026	Steel cans – flattened	0.13
Aluminium cans – flattened	0.087	Steel cans – baled	0.226
Aluminium cans – baled	0.154	Wood / Timber	0.3
Asphalt / Bitumen	0.8	Hazardous Wastes	0.2
Bricks	1.2	Insulation	0.05
Car Batteries	**0.375**	Litter trap	0.75

Carpets	0.3	Metals	0.9
Cement Sheet	0.5	Oil	0.8
Ceramics	1	Other Textiles	0.15
Clean Soil	1.6	Others	0.3
Cobbles / Boulders	1.4	Paint	0.8
Commingled containers (plastic, glass, steel and aluminium cans)	0.063	Paper / Cardboard	0.1
Concrete	1.5	Plasterboard	0.2
Garbage	0.15	Plastic containers – whole	0.01
Garden / Vegetation	0.15	Plastic containers - whole, some flattened	0.013
Glass bottles – whole	0.174	Plastic containers – baled	0.139
Glass bottles - semi-crushed	0.347	Rubber	0.3
Steel cans – whole	0.052	Soil / Rubble<150mm	1.4

Table Man-7.1: *Densities to be assumed for various solid waste types*

For any materials that are not listed in Table Man-7.1, Project Teams may propose their own densities along with accompanying calculations and justifications by Credit Interpretation Request (CIR). Project teams must demonstrate within the CIR how the density was arrived at and how calculations were done. The densities of some materials can vary widely depending on their composition and manufacture (e.g. concrete could include asphalt, gravel or many other materials). The CIR must also demonstrate that calculations have taken into account the difference between the density of the material in transport/crushed form, rather than in solid form/in situ.

BACK GROUND

The Construction Waste Management credit assesses the reductions in the amount of construction and demolition waste that is sent to landfill from Green Star SA projects. It recognises that there are numerous strategies which can be used to avoid the creation of construction and demolition waste and provides designers and contractors the opportunity to implement their own waste avoidance strategies rather than prescribing specific waste avoidance measures.

Diverting waste from landfill has important environmental impacts. Firstly, resources are diverted back into a supply chain of value, thereby replacing the need for finite virgin or raw materials. Secondly, landfills in South Africa are rapidly reaching their capacity limits and serve as sources for both soil and water pollution as well as methane production.

Man-5 Construction Waste Management

POINTS AVAILABLE 1.5

Fitout installations have a role to play in achieving the 50% waste reduction target, as well as the ultimate goal of zero waste in 2022 by aiming to recycle as much construction waste as possible, which can often be significant.

Construction waste generated in a typical fitout might include joinery items, ceiling installations, walling and flooring tiles, the packaging associated with items, off cuts and disassembled internal walls. South Africa has a growing number of recycling service providers that can assist project teams to dispose of their construction waste without having to send it to the municipal landfill. Furthermore, certain manufacturers are in the position to take back construction waste generated in a fitout to recycle and reuse.

REFERENCES & FURTHER INFORMATION

DEAT (2004) Waste Management Plans, Integrated Environmental Management, Information Series. Department of Environmental Affairs and Tourism (DEAT), Pretoria.

EcoRecycle Victoria Waste Wise Toolkit (page 46): www.ecorecycle.sustainability.vic.gov.au/resources/documents/WWE_Toolkit_(Full_Version).pdf

E - Waste Association of South Africa (EWASA) http://www.ewasa.org/

My Waste website http://www.mywaste.co.za/

National Recycling Forum website http://www.recycling.co.za/

The Institute of Waste Management of Southern Africa (IWMSA) http://www.iwmsa.co.za/

Onsite Minimising Construction Waste, Maximising Competitiveness http://onsite.rmit.edu.au

Polokwane Declaration http://www.environment.gov.za/ProjProg/WasteMgmt/Polokwane_declare.htm

Terry, A. & Moore, T. [eds] (2008), 'Waste and Sustainable Commercial Buildings' Your Building: Profiting from Sustainability http://www.yourbuilding.org/library/Waste%20and%20sustainable%20commercial%20buildings.pdf

Matt Rendell (Cyril Sweett Ltd) and Dr David Moon (WRAP) Reducing waste in smaller construction and refurbishment projects and programmes of minor works November 2009

Man-6 Work Space Efficiency

POINTS AVAILABLE **2**

AIM OF CREDIT

To encourage and recognise the design of workspaces that promotes spatial efficiency and improvement of productivity and occupant performance.

CREDIT CRITERIA

Up to two points are awarded as follows:

Minimum Compliance (Fit for Purpose)

One point is awarded where:

- It can be demonstrated how the purposes for which the fit-out is created are transferred from inception to the implemented design

Spatial Efficiency

An additional half a point is awarded where:

- The 1st point above is achieved;

AND

- The criterion has been met to demonstrate how the fit-out is encouraging a more efficient use of space.

Well Being / Occupant Performance

An additional half a point is awarded where:

- The 1st point above is achieved;

  AND
- A Post-Occupancy User Survey/ Evaluation is conducted to measure the fit-out success

For the purposes of this credit, the nominated area includes all primary spaces. Staff rooms must be included in the nominated area where these are in use for more than two hours per day by the same individual.

DOCUMENTATION REQUIREMENTS

Green Star SA – Interiors
Submit all the evidence and ensure it readily confirms compliance.
1. Short Report 2. Copy of the contract OR Signed Confirmation

Short Report prepared by a suitable professional that describes how the Credit Criteria has been met by:

- Demonstrating how the purpose for which the fit-out is created are transferred from inception to the implemented design by including within the Short Report or as separate documents the following:
    - Company vision and Organisational chart
    - The design brief
    - Bubble diagrams indicating spatial relationships with the different areas
    - Marked up plans/layouts indicating the final design and how it relates to the process indicated above

Where the half point of Spatial Efficiency is claimed:

- Describing the benchmarks according to the following:
    - Compliance with SANS 10400 part A:2010 – Class of Occupancy for Buildings and Design Population,
      OR
    - A ratio of net useable area to net internal area (NUA:NIA) to be measured (80%);
    - Indicating that versatile/shared space has been provided, including furniture and fittings that can be used for different activities.

Copy of the Contract or Signed Confirmation clearly demonstrating the contractual requirement to undertake a Post-Occupancy Survey / Evaluation within the first 6-12 months of occupation

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ADDITIONAL GUIDANCE

This credit is applicable to all the buildings types identified in the Space Use criterion, with the exception of Hotels, which includes only “back of house” areas.

To demonstrate spatial efficiency a short report must be prepared by a suitable professional describing how the benchmarks have been achieved by using SANS 10400–A (2010): Class of Occupancy for Buildings and Design Population, e.g. Hospital (E2) is 1 person per 10 square meters or by using a ratio of net useable area to net internal area. The ratio (i.e. NUA: NIA) can be measured and benchmarked at 80%. The report can also describe how different areas, furniture and fittings can be used for multi-purpose activities e.g. a standing informal meeting area in an office can double up as storage space underneath and a canteen can also be used as a training area for the staff.

Note that the following definitions and exclusions apply:

Nominated area - For purposes of this credit, the nominated area includes all primary spaces. Staff rooms must be included in the nominated area where these are in use for more than two hours per day by the same individual.

User - The user, for purposes of this credit, is defined as the person/staff member who will be using a single piece of furniture or equipment non-continuously for at least two hours during a given day.

Net Internal Area (NIA)- NIA is defined as the usable area within a building measured to the internal face of the perimeter walls at each floor level. It includes kitchens and cleaners cupboards. (Atria and entrance halls should be measured separately.) It excludes toilets, stairwells, plant rooms, fire corridors, and internal structural walls, columns, internal projections and vertical ducts.

Net Useable Area (NUA)
The NUA is the NIA less the main corridors or primary circulation. These corridor routes are required to maintain life safety in emergency situations such as fire, but do not include the

routes used to access workstations off the main corridor (i.e. secondary circulation is included in NUA).

NUA:NIA = ratio of 80%
Represents an efficiently designed office building from a tenant's point of view, where primary circulation does not reduce the usable area unreasonably.

Post Occupancy Survey / Evaluation
Post occupancy survey / evaluation, for the purpose of this credit means a systematic evaluation of opinion about buildings in use, from the perspective of the people who use them. It assesses how well buildings match users' needs, and identifies ways to improve psychological wellbeing, physical wellbeing, work performance or productivity.

People Practice Practitioner
People Practice Practitioner is either an industrial psychologist, personnel practitioner or ergonomics professional.

Certified Professional Ergonomists
Certified Professional Ergonomists are those certified by the Ergonomics Society of South Africa.

Post – Occupancy Survey/ Evaluation

A survey must be conducted for all users. For fitouts with 30 or fewer users, the tenant must conduct a post occupancy survey / evaluation referring to the standard questionnaire given in Table Man-6.1 below or utilizing one of free websites such as http://www.snapsurveys.com/ or http://www.surveymonkey.com/. The submission must contain evidence in the form of survey templates, analysis reports and any other data relevant to the survey.

Man-6 Work Space Efficiency

POINTS AVAILABLE **2**

	Sample Questions
"Work" area attributes	What is the best description of the "work" area (e.g. open-plan office, cubicle, closed office, kitchen, laboratory, warehouse, home, clothing shop, teller, etc.)?
	What is the length of time (e.g. months) since moving into this "work" area?
	How many hours per day do you spend in this "work" area
	What proportion of the time are you expected to (a) sit, (b) stand, (c) move around, or (d) lie in this "work" area?
	How close is a person to the following: (a) external window, (b) atrium, (c) balcony, (d) courtyard, (e) garden?
Space layout and ergonomics	What is the occupant's satisfaction with their ability to use relevant furniture/appliances in the "work" area without physical space problems?
	What is the occupant's satisfaction with personal storage space?
	What is the satisfaction with the ability of the space to enable the occupant to interact with colleagues (or family where relevant) when necessary?
	What is the satisfaction with the ability of the space to enable the occupant to collaborate with colleagues (or family where relevant) when necessary?
	What is the satisfaction with the ability of the space to enable the occupant space to work/operate without interruptions?
	What is the satisfaction with the ability of the space to enable the occupant private space when necessary?
	What is the satisfaction with the ability of the space to be adapted to the individual preferences of the occupant (within their "work" area)?
	What is the satisfaction with the ability to move throughout the "fitout' without being impeded by "work" area obstacles?
Wellbeing	Physical wellbeing. Appropriate measures might be standardised measures of: ▪ a Sick Building Syndrome Survey ▪ Satisfaction with various physical fitness aspects (such as a lack of headaches, a healthy appetite, no problems with aerobic activity, etc.)
	Psychological wellbeing. Appropriate measures might be standardised measures of: ▪ Mental wellbeing (e.g. General Health Questionnaire or the Warwick-Edinburgh Mental Wellbeing Scale) ▪ Job satisfaction (where appropriate)
Effectiveness	Estimate your current level of performance/productivity at your "work" area (e.g. 0% to 100%)
	Estimate how you think your level of performance/productivity has changed after moving to your current "work" area (e.g. -30%, +20%, etc.)

Table Man-6.1: Sample Questionnaire

For fitouts with more than 30 users, a post occupancy survey / evaluation assessment has to be completed and a People Practice Practitioner must be engaged. Alternatively one of the following standardised instruments can be used:

- Building Occupancy Survey System Australia (BOSSA)
- Building Use Studies (BUS) Methodology
- Centre for the Built Environment (CBE)

BOSSA - The Building Occupants Survey System Australia is an IEQ assessment system for Australia's office buildings. Buildings surveyed during this project will underpin an on-going program

of architectural science research aimed at improving occupant's health, comfort and productivity outcomes from sustainable office buildings in Australia.

The BUS methodology is the original method of evaluating occupant satisfaction and has been developed over the last 30 years. It is an established, tried and tested way of benchmarking levels of occupant satisfaction within buildings against a large database of results for similar buildings. Results can be used to create solutions to improve the occupant experience and optimise building performance. The BUS methodology uses a structured questionnaire designed to extract as much information as possible from as few questions as possible. Respondents rate various aspects of performance on a scale of 1-7 and can also provide comments so both quantitative and qualitative feedback is obtained.

The CBE has two methods of evaluating occupant satisfaction: Firstly, the CBE develop new ways to "take the pulse" of buildings in operation: measuring the occupants' responses to their indoor environments, and linking them to improved physical measurements of indoor environmental quality. Secondly, the CBE study technologies that hold promise for making buildings more environmentally friendly, more productive to work in and more economical to operate. This helps the manufacturing partners to target their product offerings, and facility management and design partners to apply these new technologies effectively.

Survey Categories

For an occupant survey to be deemed compliant, the following survey categories need to be included:

- Work area attributes
- Space layout and ergonomics
- Wellbeing
- Effectiveness

Survey Sample Size Determination

Table Man-6.2 below summarizes the number of responses needed to create a representative sample size, depending on the number of users in the fitout (i.e. fitout occupants including full time contractor employees).

Survey Responses needed for 95% Confidence with 5% Margin of Error	
Population Size	Responses Needed (Sample Size)
30	30
50	40
100	81
150	110
200	134
300	172
400	201
500	222
1000	206
5000	370
10000	385

Table Man-6.2: Determining survey sample size

Man-6 Work Space Efficiency

POINTS AVAILABLE **2**

BACKGROUND

All building types are designed around specific functions or purposes and how these related to the spaces constructed around them. This credit aims to reward efficient use of space for the different types of occupancies. This is achieved through design and how design can maximise efficient and effective space use by using the least amount of space without compromising individuals comfort and productivity.

Space efficiency must be balanced against its effectiveness and will encourage a reduction in rental, energy and operational costs, while improving the environment.

In the private and public sector, there has become a trend to minimise the amount of space against which rent, rates and other property rates are paid.

REFERENCES & FURTHER INFORMATION

British Council for Offices http://www.bco.org.uk/

Space Management Group (Promoting space efficiency in building design)
http://www.smg.ac.uk/rep_efficiency.html

IPD Occupiers (Efficiency standard for office space.pdf)

Indoor Environment Quality and Occupant Productivity in the CH2 Building (Post occupancy summary)

Ergonomics Society of South Africa http://www.ergonomicssa.com/

Building Occupancy Survey System Australia – University of Sydney (BOSSA)
http://www.bossasystem.com/

Building Use Studies – Arup (BUS Methodology) http://www.busmethodology.org.uk

Centre for the Built Environment – University of California, Berkeley (CBE)
http://www.cbe.berkeley.edu/

Snap Surveys
http://www.snapsurveys.com/

Survey Monkey
http://www.surveymonkey.com/

Man-7 Green Lease

POINTS AVAILABLE **2.5**

AIM OF CREDIT

To encourage and recognise collaboration between the building owner and tenants in order to manage and operate the building along environmentally sustainable principles whilst realising mutual benefit.

CREDIT CRITERIA

Up to 2.5 points are available as follows:

One and half points are awarded where:

- The tenant has a signed agreement with the building owner/landlord that demonstrates that the tenant is committed to on-going performance that requires the tenant to participate in the following environmental initiatives while occupying the space:
  - Electrical energy monitoring & reporting (minimum quarterly) and have submitted an energy management plan at the beginning of each year to the landlord;
  - Water monitoring & reporting (minimum quarterly) and have submitted a water management plan at the beginning of each year;
  - Waste reduction/recycling monitoring & reporting (minimum quarterly) and have submitted a waste management plan at the beginning of each year;
  - The preparation of a procurement policy at the beginning of each year regarding the use of environmentally friendly consumables (cleaning products, toiletry products, paper and plastic consumable products).

An additional point is awarded where:

- The tenant has a signed agreement with the building owner/landlord is in the form of a Performance Agreement.

DOCUMENTATION REQUIREMENTS

Green Star SA – Interiors PILOT
Submit all the evidence and ensure it readily confirms compliance.
1. Extracts from the signed agreements OR Signed Confirmation

Extract(s) from the signed agreements OR a **Signed Confirmation** by the tenant that addresses the credit criteria.

ADDITIONAL GUIDANCE

Signed Agreement

The 'signed agreement' document mentioned above must take the form either of the following:

- A memorandum of agreement (MOA)
- A mutual disclosure agreement
- A performance agreement (for the second half point available)

i. MEMORANDUM OF AGREEMENT

The memorandum of agreement (MOA) is the first level of formalising the move towards green building performance. With an existing lease, where it is not appropriate to renegotiate all the material terms, an MOA is the simplest way to bring sustainability into the contractual discussion.

An MOA is a document written between parties to cooperate on an agreed upon project or meet an agreed objective, in this case sustainability objectives. The purpose of an MOA is to have a written understanding of the agreement between parties.

An MOA serves as a legal document and describes the terms and details of the agreement. A contractually-binding MOA appended to an existing lease could include the provision of new sustainability clauses upon renewal of the lease. The MOA should include a timeframe for moving towards a formal green leasing agreement.

The content of the MOA and the content of the already existing lease agreement should not be in conflict.

ii. MUTUAL DISCLOSURE AGREEMENT

The most accessible formal green leasing schedule is a mutual disclosure of environmental performance between the tenant and the landlord. This should build on the contents of the MOA but also require the tenants and landlord to participate in the monitoring and reporting of environmental initiatives. The MDA requires the tenant and landlord to disclose on all areas which are required by both parties.

iii. PERFORMANCE AGREEMENT

A performance agreement is a method of establishing expectations, accountability and consequences for not meeting a set standard of expected performance levels. Parties agree on the actions required and the expected results from the actions.

Where improvements in operational performance are of specific importance to either party, the mutual disclosure lease can be augmented with targets for improvement for both the tenants and the landlord. It sets standards to which each party must perform.

Targets should be set using the baseline established through the monitoring and reporting of building performance. Where no building performance information exists, targets should be framed using specific improvement benchmarks.

In instances where there is an existing standard lease agreement, the documents listed above can be incorporated as an addendum / annexure, in order to constitute a green lease.

Also please refer to GBCSA Green Lease Toolkit for any other information regarding benefits, formation and application of a green lease.

Man-7 Green Lease

POINTS AVAILABLE **2.5**

BACKGROUND

What is the Goal of a Green Lease?

The fundamental concept that underpins a green lease is that of mutual understanding. While the details may vary from one agreement to another, the primary purpose of a green lease is:

- To improve the operational performance of green buildings; and
- To deliver to landlords and tenants an equitable share of the incremental value provided by green buildings.

A green lease seeks to achieve these goals by securing long-term operational performance through a transparent, mutually beneficial agreement between tenants and landlords that governs:

- The base building and fit-out quality in buildings;
- The contractual requirements of facilities managers;
- The behaviour of tenants from an environmental perspective; and
- Regulation of governing bodies (through continuing education).

What is a Green Lease?

'Green Lease' is a general term that describes a document for negotiating green building attributes between the owner and the tenant of a building. It does not necessarily refer only to a lease agreement but could also represent:

- A Service Level Agreement (SLA)
- Memorandum of Agreement (MOA)
- Lease annexures
- Special lease terms and conditions
- Building/property/facility management guidelines or rules

A green lease is an adaptation of a traditional lease. It is primarily a set of legally binding rights and obligations - a contract. The parties both agree that the landlord will provide the temporary use and enjoyment of the premises in return for the payment of rent by the tenant. It must contain the essential terms of a contract and, in particular:

- There must be consensus on the essential elements of the contract;
- Both parties must have the capacity to enter into the contract;
- Performance of the contract must be physically possible; and

- It must include any legal formalities such as the length of the lease and lease termination requirements.

The key difference with a green lease is the assignment of responsibilities and financial obligations related to occupying and owning a green building. The responsibilities to do, and to pay, are often split. Typically, the tenant carries the responsibility to pay and the landlord the responsibility to do.

Please refer to GBCSA Green Lease Toolkit for any other information regarding benefits, formation and application of a green lease.

REFERENCES & FURTHER INFORMATION

GBCSA Green Lease Toolkit, South Africa 2012

The Green Lease Handbook, Council of Australian Governments (COAG), 2012
http://www.gbca.org.au/gbc_scripts/js/tiny_mce/plugins/filemanager/Green-Lease-Handbook-20120907-PDF.pdf

Tenants Guide to Green Leases, Council of Australian Governments (COAG), 2012
http://www.gbca.org.au/gbc_scripts/js/tiny_mce/plugins/filemanager/Tenants-Guide-to-Green-Leases-20120907-PDF.pdf

The Real Property Association of Canada
http://www.realpac.ca
Jones Lang LaSalle, Perspectives in sustainable tenants strategies, 2013
http://www.joneslanglasalle.co.za/GSP/en-gb/Documents/GSP/GreenLeases-10reasonswhyyoushouldhaveone.pdf

Green Lease – Commercial Lease Arrangement s for Sustainable Buildings
http://www.ogierproperty.com/commercialproperty/commercialguides/greenleasescommercialleasearrangementsforsustainablebuildings/

Pinsent Masons, The Pinset Masons Sustainability and Energy Toolkit, 2012
http://www.pinsentmasons.com/PDF/DevelopmentofGreenLeasees.pdf

Man-8 Learning Resources

POINTS AVAILABLE 1

AIM OF CREDIT

To encourage and recognise sustainability initiatives implemented in the fitout as learning resources for fitout users and visitors.

CREDIT CRITERIA

One point is awarded where:

• Within the fitout, the following 'Learning Resources' are provided for fitout occupants and visitors:

- A minimum of one sustainability initiative related to a Green Star SA Interiors Energy Credit is described and displayed, and the resulting energy use and greenhouse gas emissions are continuously presented;

AND

- A minimum of one sustainability initiative related to a Green Star SA Interiors Water Credit is described and displayed, and the resulting potable water savings are continuously presented;

AND

- A minimum of one sustainability initiative related to a Green Star SA Interiors Credit and not related to energy and water is described and displayed, and the resulting benefit(s) are presented.

DOCUMENTATION REQUIREMENTS

Green Star SA – Interiors PILOT
Submit all the evidence and ensure it readily confirms compliance.
1. Short report 2. As Built drawings or Photographs

Short report prepared by a relevant project team member that describes how the Credit

Criteria have been met by:

• Summarising each initiative, including;

- Stating which Green Star SA – Interiors v1 credit it relates to; and, occupants and visitors;
- Describing how data for water and energy initiatives are continuously displayed; and
- Including photographs of the installed learning resources (As Built rating only) where appropriate.

As Built drawings or photographs showing the location of all initiatives and associated displays.

Man-8 Learning Resources

POINTS AVAILABLE 1

ADDITIONAL GUIDANCE

Sustainability initiative

For the purpose of this credit, a sustainability initiative refers to any design attribute, structural or landscape component, system, service, equipment or strategy rewarded under a Green Star SA credit, and incorporated in the project's Green Star SA submission.

To be eligible to receive the point in this credit, at least one point in each of the Green Star SA – Interiors PILOT credits addressing all three sustainability initiatives described above must be achieved.

Learning resources

Sustainability initiatives must be described and displayed as follows:

• Description:

- A description of a sustainability initiative refers to a clear explanation of what the initiative is, how it works, and what is the expected sustainability benefit resulting from its inclusion in the project scope.

• Display:

- Display of descriptions of sustainability initiatives to fitout users includes but is not limited to the use of educational display boards, exhibits, screens, cutaway sections of the building fabric, audio, printed information, etc.

Energy and water savings are to be continuously presented as follows:

–The display provided must make provision for water and energy savings to be presented and regularly updated (period between updates not longer than daily) i.e. screens, signs or educational display boards used should have the functionality for energy and water savings to be displayed and updated on a regular basis.

Location of learning resources

Learning resources, including the display of real-time data (for energy and water) must be permanently located in an area where all fitout occupants and visitors will be exposed to them. Examples of such areas include, but are not limited to:

• Front desks and receptions;

• Waiting areas;

• Atria;

• Entrances; and

• Exhibition areas.

Learning resources can also be located next to the sustainability initiative (e.g. outside the building next to rainwater collection tanks, photovoltaic panels, co-generation or water treatment plants). When this is the case, signage directing building users to these areas must be provided in locations where all of the building occupants and visitors can see them. Where the initiative is not accessible to building occupants and visitors (e.g. located in the plant room), then the learning resources / information should be located in a central and accessible location such as reception or lobby area.

Man-8 Learning Resources

POINTS AVAILABLE 1

BACKGROUND

The Learning Resources credit aims to educate fitout occupants on how the sustainability initiatives that have been implemented in the fitout work, and the associated environmental benefits of these initiatives.

Making sustainable initiatives and features visible and interactive can provide a valuable education and learning opportunity for fitout users to develop awareness about the fitout's impacts on the natural environment and resources. By incorporating important concepts such as energy, water and material efficiency, fitouts can become interactive learning tools.

REFERENCES & FURTHER INFORMATION

BREEAM Schools
http://www.breeam.org/page.jsp?id=20.

Innovative Design, Sustainable school guidelines – Buildings that teach sustainability,
http://www.innovativedesign.net/pdf/03bldgteach.pdf.

Steele-Saccio, E. (2007), 'Education by Design', in GOO D Magazine, 13 August, 2007,
http://www.goodmagazine.com/section/Features/education_by_design.

Indoor Environmental Quality

The Indoor Environment Quality (IEQ) category aims to encourage and reward initiatives that enhance the comfort and well-being of fitout for occupants.

The credits within the category address issues including air quality, pollutants and occupant comfort and rewards project teams that achieve increased comfort and well-being and provide comfortable and healthy spaces for their occupants.

Through the IEQ category, Green Star SA - Interiors aims to achieve environmental performance improvements in a manner that also improves occupants' experience of the space. For example, reductions in energy consumption could easily be achieved by avoiding the installation of heating and/or cooling systems, but this would potentially be at the expense of the occupant comfort and wellbeing. The IEQ category recognises that buildings are designed for people and as such improvements to sustainability should never be made at the expense of occupant health and wellbeing. By rewarding both energy efficiency and indoor environment quality, the Green Star SA rating system promotes and rewards a holistic approach to sustainability that results in multiple benefits.

IEQ-1 Quality of Internal Air

POINTS AVAILABLE 4

AIM OF CREDIT

To encourage and recognise projects that provide high quality air to occupants.

CREDIT CRITERIA

Entry of outdoor pollutants

Half a point is available where:

- It is demonstrated that a contract exists requiring the regular replacement of air filters and maintenance of the fresh air ducting.

Provision of outside air

Up to two points are awarded as follows:

Naturally ventilated spaces

Up to two points are awarded where:

- It is demonstrated that 95% of the Nominated Area is naturally ventilated in accordance with SANS 10400-O:2011;

Mechanically ventilated spaces

Up to two points are awarded where:

- It is demonstrated that for 95% of the Nominated Area, outside air is provided at rates greater than the l/s per person requirements of SANS 10400-O:2011, awarded as follows:

– 33% improvement for one point;
– 66% improvement for two points;

Mixed-mode ventilated spaces

Up to two points are awarded where:

- Both modes of operation individually satisfy the relevant criteria for naturally ventilated spaces and mechanically ventilated spaces. Points awarded are limited to the maximum points awarded under the mechanically ventilated space criteria.

Underfloor displacement ventilated spaces

Up to two points are awarded where:

- It is demonstrated that for 95% of the Nominated Area, outside air is provided at rates greater than the requirements of SANS 10400-O:2011, awarded as follows:
  - 10% improvement for one point;
  - 40% improvement for two points;

IEQ-1 Quality of Internal Air

POINTS AVAILABLE **4**

Use of CO_2 control

Up to one point is awarded where:

- It is demonstrated that CO_2 is monitored and outside air rates are controlled such that CO_2 levels are kept at:
  - 700ppm for half a point;
  - 600ppm for 1 point.

Exhaust of pollutants

Half a point is awarded where:

- It is demonstrated that a dedicated room is provided to house photocopy and print equipment, and that this room is provided with a dedicated exhaust riser;

OR

- All printing or photocopy equipment located throughout the project is certified in accordance with one of the following test methodologies: ECMA-328, RAL-UZ 122 or GGPS.003. The test certificate must state the emission limits detailed in the standard have been met.

  Test certificate for printing equipment is the means to evidence compliance, certificates must be issued by a NATA or ISO 17025 accredited laboratories. Relevant limits are as follows:

Substance	Emission rate (mg/h)
TVOC	18
Benzene	0.05
Styrene	1.8
Ozone	3.0
Dust	4.0

OR

- No photocopy or print equipment is used in the space

For the purposes of this credit, the **'Nominated Area'** is **Occupied Space.**

DOCUMENTATION REQUIREMENTS

IEQ-1 Quality of Internal Air

POINTS AVAILABLE 4

Green Star SA – Interiors PILOT

Submit all the evidence and ensure it readily confirms compliance.

1. Short report
2. As Built drawing(s)

Additionally for mechanically ventilated spaces:

3. Extract(s) from Commissioning Report(s)
4. Test certificate OR Manufacturer datasheet(s)

Short report prepared by a suitably qualified professional demonstrating how the Credit Criteria have been met by:

- Providing a tabulated summary of all occupied spaces within the building, for each indicating their ventilation mode(s) and areas as indicated on the tender/as built drawings;

Additionally for naturally ventilated spaces:

- Providing a tabulated summary of each occupied space, listing its floor area and the area of external openings in that occupied space expressed as a percentage of the occupied space floor area, demonstrating compliance with the 5% minimum requirement in SANS 10400-O:2011; and,
- Providing a tabulated summary of all occupied spaces, indicating the provision of CO2 monitors and confirming that monitoring is provided for every room or 100m2; and,
- Confirming that the system provides an alarm if CO2 levels rise above 600ppm, with reference to supporting documentation;

Additionally for mechanically ventilated spaces:

- Providing a tabulated summary of each occupied space, listing the AHU(s) or fan(s) that serve each space and the minimum outside air rate supplied, clearly demonstrating compliance with the credit criteria; and.
- Confirmation that the ventilation system(s) have been commissioned and operate as intended by the design.
- Confirming the provision of CO2 sensors to each zone or 100m2, to no less than 95%
- of the Nominated Area, and that the system facilitates the continuous monitoring and
- adjustment of outside air rates;

As Built drawing(s) clearly marked up to show:

- For naturally ventilated spaces: Architectural floor plans and elevations showing the locations of ventilation openings.

- For mechanically ventilated spaces: Mechanical services drawings, indicating the space served and nominating the outside-air supply rates.

Where the point for Exhaust of pollutants is claimed:

- The location of the dedicated exhaust risers and the exhaust system provided to each printing/copy room.

Test certificate OR **Manufacturer datasheet(s)** clearly stating the emission limits and the test methodology.

ADDITIONAL GUIDANCE

The systems claimed for this credit must be documented consistently throughout the submission, especially within related credits (IEQ-2: Thermal Comfort or Ene-1: Greenhouse Gas Emissions).

Supplementary outside air systems

Supplementary outside air systems can be incorporated. However, note the following:

- The project must operate and deliver the air to the occupied space whenever the air conditioning system is in operation (as per the Credit Criteria provided). Enabling users to connect to the system will not suffice; and
- The supplementary system must be installed and operated (including energy and maintenance provision) by the base building.

Naturally ventilated spaces

It must be clearly demonstrated that areas nominated as ‘naturally ventilated’ have opening areas which meet the requirements of SANS 10400-O:2011.

Mechanically ventilated spaces

Projects are required to use the design occupancy, not default occupancy from relevant standards, for all credits that address mechanical ventilation systems.

It must be clearly demonstrated that:

- The documentation shows the minimum outside air rates for each separately served space in the building;
- The HVAC system has been clearly sized to accommodate the increased outside air rates;
- The design ventilation rates represent the required increase on SANS 10400-O:2011 and that these minimum outside air rates are clearly documented in the project design; and
- The minimum outside air rate required by the standard is quoted. This will demonstrate to the assessor the percentage improvement for each mechanically ventilated space in the building.

Mixed-mode ventilated spaces

A space or building cannot be considered mixed-mode ventilated unless it independently satisfies the criteria for both naturally ventilated and mechanically ventilated spaces, regardless of the proportion of time the space operates in either mode.

Underfloor displacement ventilated spaces

For an underfloor air distribution system to qualify as a displacement ventilation system, the air velocity at the diffuser **may not exceed 0.2m/s** (*Displacement Ventilation* ASHRAE Journal, September 2004) and return air must be at ceiling level. Supply air must always be provided at a temperature below room air temperature. Note that floor supply of warm air with a ceiling return has a low air change effectiveness (± 0.7). As such, for a system to qualify as displacement ventilation, if heating is provided, it may not be provided at floor level with ceiling return.

The ASHRAE article *LEED and Standard 62.1* from the ASHRAE Journal, (Vol. 47, No. 9, September 2005 notes that "virtually every laboratory and field study has shown that air change effectiveness is always greater than 0.9 when supply air is cooler than room temperature regardless of diffuser location or design."

Table 6.2 of ASHRAE Standard 62.1 specifies that a system supplying cool air at ceiling level has an air distribution effectiveness of 1.0. Comparatively, a floor supply of cool air and ceiling return, characterised by low velocity displacement ventilation achieving thermal stratification has a typical air distribution effectiveness of 1.2. (Reference: ANSI/ASHRAE Standard 62-2001)

Thus lower flow rates are permitted for displacement ventilation systems, and are taken to achieve the equivalent air distribution effectiveness with lower resultant flow rates, scaled by a ratio of approximately 0.2.

BACKGROUND

SANS 10400-O:2011 sets minimum permissible ventilation rates, giving consideration to health and ventilation amenity. It does not cover other requirements associated with comfort such as temperature, humidity, air movement or noise. The minimum ventilation rates specified are intended to maintain general contaminants (e.g. body odours, volatile organic compounds, etc.) at concentrations below exposures that have potential to cause adverse health effects to a substantial majority of occupants.

The World Health Organisation estimates that up to 30% of new and remodelled buildings worldwide may be subject to excessive complaints related to indoor air quality. Employers, building owners, product manufacturers, engineers, architects and builders are all at risk of litigation arising from claims based on indoor air pollution and poor indoor environment quality.

Clearly there is a balance to be struck between providing adequate outside air in recirculation systems to dilute contaminants and the loss/gain of heat with the resulting increased energy consumption needed to maintain comfort levels.

IEQ-1 Quality of Internal Air

POINTS AVAILABLE 4

REFERENCES & FURTHER INFORMATION

American Society of Heating, Refrigerating and Air-Conditioning Engineers, U.S (ASHRAE) ASHRAE Fundamentals Handbook 1997.
http://www.ashrae.org

ASHRAE 62 (2007) Ventilation for Acceptable Air Quality

CIBSE A guide (2006) Environmental Design
http://www.cibse.org
SABS (South African Bureau of Standards)
http://www.sabs.co.za

IEQ-2 Thermal Comfort

POINTS AVAILABLE 2

AIM OF CREDIT

To encourage and recognise fitouts that achieve a high level of thermal comfort.

CREDIT CRITERIA

Up to two points are available for the credit. Projects are required to select Compliance Route 1 OR Compliance Route 2. Projects are NOT required to demonstrate compliance to all routes.

Compliance Route 1 - Modelling

Up to two points are awarded where a high level of thermal comfort is achieved for the occupied area on an area-weighted basis:

Mechanically Ventilated Spaces, Mixed Mode and Naturally Ventilated Spaces

Up to two points are awarded where:

- The Predicted Mean Vote (PMV) levels, calculated in accordance with ISO7730 using standard clothing and metabolic rate values, are within the following limits for at least 98% of occupied hours:
  - One point for PMV levels between -1 and +1 (inclusive);
    OR
  - Two points for PMV levels between -0.5 and +0.5 (inclusive).

Naturally Ventilated Spaces

An alternate method to show compliance is available in naturally ventilated spaces.

Up to two points are awarded where:

- Internal operative temperatures are within the *ASHRAE Standard 55-2004 Acceptability Limits* for at least 98% of occupied hours, awarded as follows:
  - One point for meeting the 80% *Acceptability Limits*;
    OR
  - Two points for meeting the 90% *Acceptability Limits*.

Compliance Route 2 - Deemed-to-Satisfy (DTS) Criteria

One point is awarded where:

- No seating is provided within two metres of the external façade

One point is awarded where:

- Occupants have localised control of either air velocity or temperature. Note that for naturally ventilated spaces this can be in the form of openable windows.

For the purpose of this credit **'Nominated Area'** is defined as **Occupied Space.**

IEQ-2 Thermal Comfort

POINTS AVAILABLE **2**

DOCUMENT REQUIREMENTS

Green Star SA – Interiors PILOT

Submit all the evidence and ensure it readily confirms compliance.

1. Thermal comfort report
2. As Built drawing(s)

Thermal comfort report prepared by a suitably qualified professional that describes how the credit criteria have been met by:

- Describing the HVAC system (where applicable) and passive design strategies used to achieve thermal comfort;
- Confirming which thermal comfort methodology has been used (i.e. ASHRAE 55-2004 Acceptability Limits or ISO7730 PMV values), with justification for the selection based on the Credit Criteria;
- Describing the software package used for determining thermal comfort levels;
- Describing the weather data used and its source, demonstrating that it complies with the weather data requirements of the Additional Guidance;
- Providing marked-up plan drawings clearly showing the zones modeled for thermal comfort and that no perimeter zone exceeds 4m in depth;
- Providing a tabulated summary of all zones modelled, indicating the area of each and confirming all of the UA has been included in the analysis;
- Confirming the occupancy schedule and total number of hours assessed for thermal comfort;
- Confirming that all modelling inputs are in exact accordance with the modelling presented in Ene-1 Greenhouse Gas Emissions;

Additionally where ASHRAE 55-2004 Acceptability Limits methodology used:

- Confirming all spaces assessed are provided with openable windows, and not provided with mechanical cooling systems;
- Providing a table of the mean monthly outdoor air temperatures and resulting acceptability range;
- Providing a summary table of all zones assessed for thermal comfort and the hours below, within and above the Acceptability Limits of operative temperatures, clearly demonstrating compliance with the Credit Criteria.

Additionally where PMV ISO7730 methodology used:

- Confirming that the CLO and MET values used are in accordance with the Additional Guidance;
- Demonstrating that the air velocity value selected is justified for the actual system design.
- Providing a summary table of all zones assessed for thermal comfort and the hours below, within and above the stipulated PMV levels, clearly demonstrating compliance with the Credit Criteria.

As Built drawings marked-up to clearly demonstrate

- Plans marked up to indicate all zones assessed for thermal comfort;

- Façade, roof and, wherever relevant, section drawings showing the materials in the design; and
- For naturally ventilated spaces, indicating and dimensioning all ventilation openings, inlets and outlets.

ADDITIONAL GUIDANCE

All inputs into the modelling or calculations (e.g. building form, materials and air conditioning system(s) etc.) must be referenced consistently throughout the rest of the submission (i.e. in related credits such as Ene-1: Greenhouse Gas Emissions or IEQ-1: Quality of Internal Air) and be clearly justified by the documented evidence.

On-site thermal comfort measurement is not an acceptable way to demonstrate compliance with the Credit Criteria.

ASHRAE 55-2004 Adaptive Comfort Temperatures

The ASHRAE guide defines a range of temperatures which are deemed comfortable for a naturally ventilated space, where occupants have control over openings. These depend on the mean monthly outside air temperature, based on the fact that people living in warmer areas can tolerate higher internal temperatures than those living in cold areas. An approximate summary of the data is as follows:

Mean monthly outdoor temp °C	Min internal temp (80% acceptability) °C	Min internal temp (90% acceptability) °C	Max internal temp (90% acceptability) °C	Max internal temp (80% acceptability) °C
10	17.5	18.5	23.5	24.5
15	19	20	25	26
20	20.5	21.5	26.5	27.5
25	22	23	28	29
30	23.5	24.5	29.5	30.5

Table IEQ-2.1: *Adaptive Comfort Temperatures as defined in ASHRAE 55-2004*

These internal temperatures are ‘operative’ internal temperatures, defined in ASHRAE Fundamentals 2001. For occupants not sitting in direct sunlight, this can be approximated as the mean of the air temperature and the mean radiant temperature.

ISO7730

The purpose of the ISO7730 is to present a method for predicting the thermal sensation and the degree of discomfort (thermal dissatisfaction) of people exposed to moderate thermal environments and to specify acceptable environmental conditions for comfort. It applies to healthy men and women and was originally based on studies of North American and European subjects but agrees also well with recent studies of Japanese subjects and is expected to apply with good approximation in most parts of the world. It applies to people exposed to indoor environments where the aim is to attain thermal comfort, or indoor environments where moderate deviations from comfort occur.

The Predicted Mean Vote (PMV) is an index that predicts the mean value of the votes of a large group of persons on the following 7-point thermal scale:

PMV (Predicted Mean Vote)	PPD (Predicted Percentage Dissatisfied)	Thermal Scale
+3		hot
+2	70%	warm
+1	25%	slightly warm
0	5%	neutral
- 1	25%	slightly cool
- 2	70%	cool
- 3		cold

Table IEQ-2.2: *PMV index*

The PMV index can be determined when the activity (metabolic rate) and the clothing (thermal resistance) are estimated, and the following environmental parameters are measured:

- Air temperature;
- Mean radiant temperature;
- Relative air velocity; and
- Humidity.

A PMV of between –1 and +1 corresponds to a Predicted Percent Dissatisfied (PPD) of no more than 25% (i.e. 25% of people are dissatisfied or uncomfortable). A PMV of between –0.5 and +0.5 corresponds to a PPD of no more than 10%. Note that when the PMV is zero, there are still 5% of occupants dissatisfied or uncomfortable, which illustrates the point that it is impossible to have 'perfect' comfort conditions since different people have different preferences.

Occupied area

The area used in the simulation may be defined as the area occupied and used for the primary purpose of the space type.

Building properties

Building properties shall be assigned in the model as defined in the Green Star SA – Interiors PILOT Energy Calculator.

Model zoning

Perimeter zones of less than four meters from the façade shall be modelled independently to prevent averaging of heat fluxes and temperatures from invalidating the results. No perimeter zone may be larger than 100m^2.

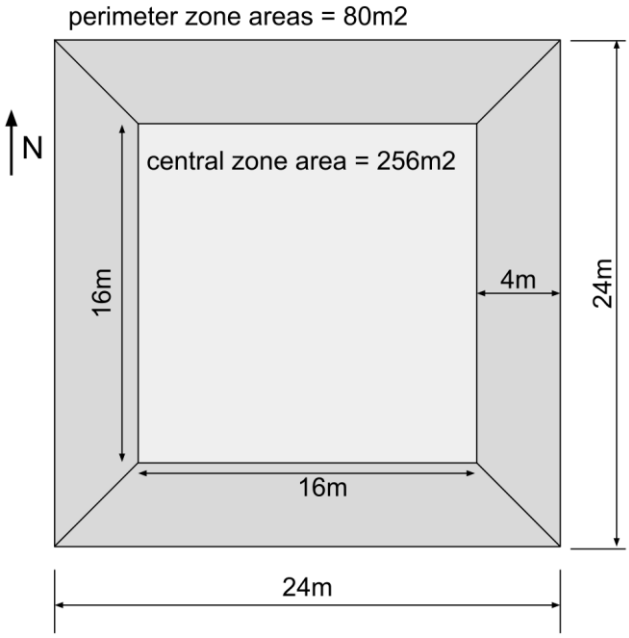
Operating schedules

Should operating schedules of HVAC equipment be used as part of the energy performance or thermal comfort strategy (e.g. night flushing of the building), the actual HVAC plant operating schedules for the related equipment as supported by tender documentation (Design) or commissioning data (As Built) may be used for the thermal comfort model. Please

note that if any overrides over timer-based controls are included in the system (e.g. CO2 or temperature overrides) these should be accounted for accurately or assumptions conservatively justified – alternatively the HVAC plant operating schedules in the Energy Modeling Protocol should be used.

Area weighting

Area weighting is to be done as a post process whereby resultant compliant and non-compliant hour totals for each zone are to be weighted based on their floor area. An example of this is included, based on the single-floor building shown below:



Below is an example of a building that meets the credit criteria for this credit:

Zone	Area	Hours below PMV = -0.5 (using CLO= 0.95)	Hours within PMV -0.5 to 0.5	Hours above PMV = 0.5 (using CLO= 0.6)	Percentage hours within PMV thresholds	Area weighted hours within PMV thresholds
Central zone	256	7	3180	13	99.4%	1 413
North perimeter	80	24	3161	15	98.8%	439
South perimeter	80	87	3113	0	97.3%	432
East perimeter	80	9	3158	33	98.7%	439
West perimeter	80	13	3132	55	97.9%	435
TOTAL	**576**					**3 158**
			TOTAL WEIGHTED RESULT			**98.7%**
Total hours in schedule	3200		**Compliant with credit criteria?**			**Yes**

Below is an example of a building that does not meet the credit criteria for this credit:

Zone	Area (m^2)	Hours below PMV = -0.5 (using CLO 0.95)	Hours within PMV -0.5 to 0.5	Hours above PMV = 0.5 (using CLO 0.6)	Percentage hours within PMV -0.5 to 0.5 (%)	Area weighted hours within PMV limits
Central zone	256	17	3143	40	98.22%	1 397
North perimeter	80	106	3007	87	93.97%	418
South perimeter	80	139	3044	17	95.13%	423
East perimeter	80	42	2997	161	93.66%	416

West perimeter	80	31	2982	187	93.19%	414
TOTAL	**576**					**3 068**
			TOTAL WEIGHTED RESULT			**95.87%**
Total hours in schedule	3200		**Compliant with credit criteria?**			**No**

Weather data

A Test Reference Year's (TRY) worth of weather data must be used to calculate hourly thermal comfort values for each location where one is available. Where no TRY is available, the applicant will be expected to demonstrate that the weather data is typical of that locality.

Standard variables

Standard Hours of Occupancy are defined in the Green Star SA – Interiors PILOT Energy Calculator.

When using the Predicted Mean Vote thermal comfort model:

Variable	Value	Notes
Warm condition CLO	0.6	For determining frequency of PMV > 0.5 or PMV > 1
Cold condition CLO	0.95	For determining frequency of PMV < -0.5 or PMV < 1
Met	1.2	1 Met = 58.2W/m^2 [ISO 7730, p. 3]
Air velocity	0.14 m/s	Typical value representative of an artificially ventilated space. [ASHRAE-55 p.8]

Using alternative air velocities

If a non-standard air velocity is used (such as in the case of natural ventilation or the implementation of ceiling fans), the chosen air velocity should be justified by the design team.

BACKGROUND

The Thermal Comfort credit seeks to ensure that fitout occupants are provided with a thermal environment that can be maintained at a comfortable level, and that users can control thermal comfort levels within their immediate environment.

Most buildings are designed using air-temperature design conditions. Whilst this metric is the most easy to measure for the determination of comfort, it is often a poor indicator of how comfortable spaces actually are. This is because the sensation of comfort is based on a wide range of parameters which include air temperature, mean radiant temperature, humidity, air movement, clothing and metabolic rates. In practice, a high level of thermal comfort is considered to occur when a high proportion of fitout occupants are predicted to be satisfied with thermal conditions, based on consideration of the above factors.

This credit aims to encourage projects to design for comfort, rather than temperature. To assist, the credit reference relevant standards for thermal comfort that were developed to measure thermal comfort, rather than temperature, to assess the comfort of building occupants.

IEQ-2 Thermal Comfort

POINTS AVAILABLE 2

REFERENCES & FURTHER INFORMATION

ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) (2004), ASHRAE 55P – *Thermal Environmental Conditions for Human Occupancy*
http://www.ashrae.org/publications

ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) (1997), *ASHRAE Fundamentals Handbook 1997*
http://www.ashrae.org/publications

CIBSE (Chartered Institution of Building Services Engineers, U.K.) (1992), Standard 55-1992 - *Thermal environmental conditions*
http://www.cibse.org

ISO (International Organisation for Standardisation). ISO7730: *Moderate thermal environments – Determination of the PMV and PDD indices and specification of the conditions for thermal comfort*
http://www.iso.org/iso/en/ISOOnline.frontpage

IEQ-3 Lighting comfort

POINTS AVAILABLE 3

AIM OF CREDIT

To encourage, recognise and reward well-lit spaces that provide appropriate levels of lighting comfort to occupants.

CREDIT CRITERIA

Minimum compliance

- It is a condition of this credit that all lights, where relevant, contain high frequency ballasts, and that the lights accurately address the perception of colour in the space.

Projects are only eligible to achieve points for this credit where the above minimum compliance requirement is met first.

General Illuminance

One point is awarded where:

- Lighting levels provided in the nominated area are appropriate to the tasks performed in each space type.

Nominated area
For purposes of this credit criterion, the nominated area includes all primary and secondary spaces. A space can be excluded if the use of the space (for example, a cinema) justifies different appropriate lighting levels.

Individual Control

One point is awarded where:

- Each occupant in the nominated area has the ability to control the lighting levels in their immediate environment.

Nominated Area
For purposes of this credit criterion, the nominated area includes all primary spaces. A space can be excluded if the use of the space (for example, a cinema) justifies the exclusion of individual control.

Glare

One point is awarded where:

- Glare from bare lamps in all working spaces is eliminated.

In certain circumstances the Individual Control point can be claimed as Not Applicable and excluded from the Indoor Environmental Quality Category score. See Compliance Requirements

Nominated area
For purposes of this credit criterion, the nominated area includes all primary spaces. A space can be excluded if the use of the space (for example, a cinema) is unlikely to lead to glare discomfort.

IEQ-3 Lighting comfort

POINTS AVAILABLE 3

DOCUMENTATION REQUIREMENTS

Green Star SA – Interiors PILOT
Submit all the evidence and ensure it readily confirms compliance.
1. Short Report 2. As built documentation

Short report prepared by a suitably qualified professional demonstrating how the Credit Criteria has been met by:

- Providing a summary table that identifies the space serviced by the lighting layout, the location of the area, the maximum maintained illuminance levels as required by the Credit Criteria, the area of the space, the area that is compliant in both square meters and percentage compliance, and identifies the lighting layout and description and whether such layout is typical. The summary table must also demonstrate that the total compliant area is more than what is required by the Credit Criteria; and
- Describing the modelling or measurement methodology and all inputs used.
- If the glare point is claimed, describing the method of glare control, and any modelling if required.
- In addition, the short report must describe the modelling or measurement methodology used and all inputs used. All relevant modelling results must be included in the report and referenced to the appropriate Credit Criteria.

As-Built Documentation such as reflected ceiling plan (RCP) drawings or manufacturer's datasheets showing for each lighting layout:

- The size of the area served by each lighting layout and the relevant lighting identifier;
- The location of all luminaires;
- The lamp type for each luminaire;
- The ballast type for each luminaire;

ADDITIONAL GUIDANCE

Minimum compliance

For the purpose of this credit, lighting with high frequency ballasts refers to luminaires that have either:

- A minimum Class A1 ballast;
- High frequency ballasts for all fluorescent lamps, or
- Electronic ballasts in High Intensity Discharge (HID) lighting.

To address the perception of colour, all lamps must have a minimum Colour Rendering Index (CRI) of 80, unless the project team can demonstrate that, in a particular area, the activity is not impeded by a lower CRI. The project team shall support their justification by ensuring their selection complies with the guidance provided Table IEQ-3.1 (taken from) SANS: 10114 below:

Table 3 — Lamp colour-rendering groups

1	2	3	4	5
Colour-rendering group	**Colour-rendering index range**	**Colour appearance**	**Examples of use**	
			Preferred	**Acceptable**
1A	$R_a \geq 90$	Warm Intermediate Cold	Colour matching Clinical examinations Picture galleries	—
1B	$90 > R_a \geq 80$	Warm Intermediate	Houses, hostels, restaurants, shops, offices, schools, hospitals	
		Intermediate Cold	Printing, paint and textile industries, demanding industrial work	
2	$80 > R_a \geq 60$	Warm Intermediate Cold	Industrial work	Offices, schools
3	$60 > R_a \geq 40$	Cold	Rough industries	Industrial work
4	$40 > R_a \geq 20$	Warm	—	Rough industries, industrial work with low-order colour - rendering requirements
NOTE If so desired, colour-rendering group 2 can be subdivided into groups 2A and 2B in a way that corresponds to the subdivision of group 1.				

Table IEQ-3.1: Lamp colour rendering groups

General Illuminance

The appropriate lighting levels for each task within each space type is defined as lighting with a maintained illuminance that meets the levels recommended in the relevant standard and does not exceed these levels by more than 25%. The relevant table in the standard for the different space types and activity types are listed in table IEQ-3.2 adapted from SANS 10114-1:2005.

Type of area, task or activity	**Illuminance range (Lux)**
Outdoor circulation and work areas	20 -50
Circulation areas, simple orientation or short temporary visits	50 -150
Rooms not used continuously for working purposes	100 - 200
Tasks with simple visual requirements	200 - 500
Tasks with medium visual requirements	300 -750
Tasks with demanding visual requirements	500 -1000
Tasks with difficult visual requirements	750 - 1000
Tasks with special visual requirements	1000 - 2000
Performance of very exacting visual tasks	>2000

Table IEQ-3.2: Typical illuminance ranges for different areas, activities and tasks

The maintained illuminance should be calculated on an area-weighted average for each distinct space or area. A space may contain areas with illuminance levels above what is required in the standard as long as it is balanced to achieve an average of less than the credit requirement over the whole space. The maintained Illuminance values must achieve a uniformity of no less than what is specified in Table IEQ-3.2 with an assumed standard maintenance factor of 0.8. Where maintained illuminance values for a particular space are not specified, the values to be used must relate to the closest type of task as defined in Table IEQ-3.2. These values must be justified in the short report. If a different maintenance factor is used, please submit a CIR prior to the submission for approval.

Demonstrating compliance

Compliance with this credit can be demonstrated through modelling of the whole fitout or just a representative floor or section. The modelled area must be representative of the typical lighting

layouts found throughout the entire design. Fitout items (e.g. partitions, equipment, and furniture) must be included in the modelling. Where the model has been simplified, the reason for the simplifications must be justified. The lighting engineer must then justify how the area is representative of the design, and certify that all other areas comply with this criterion.

Individual Control

Demonstrating compliance
For this criterion to be satisfied, the individual must have control over the light levels in their work settings. This includes turning the lights on and off and adjusting their light levels. The relevant light is the light shone in the work setting.

One light can be controlled by one or more individual, however, the project team must justify why and how, this is conducive to individual control. For example, in an open plan office a single light can be controlled by two adjacent tables. However, in a hospital, a single light is unlikely to provide satisfactory results when controlled by two individuals. This would also be the case in a classroom, where a single control panel for the entire space is not acceptable, even if the space is zoned.

This criterion can be met by providing a two component lighting system, individual desk lamps, or a more sophisticated digital dimmable lighting control system, provided that the user has control over their environment through a manual dimming switch or a computer interface linked to a digital lighting control system.

A work setting where occupants are expected to remain for less than one continuous hour per day can be excluded. Where at least 90% of the work settings in the fitout can be excluded, the Individual Control point of the credit is deemed Not Applicable to the project. In this event, in place of documentation requirements to claim the Individual Control point, project teams must provide a schedule of work settings in the fitout including relevant percentages and justification, establishing that Not Applicable can be claimed.

Glare

Options for demonstrating compliance
To consider this credit criterion met, glare from lamps must be eliminated from the nominated area. There are three methods for achieving this, two prescriptive method, and a performance methods.

Option A
All bare lamps directing light onto workstations have been fitted with baffles, louvers, translucent diffusers, or other means that directly obscure the lamp from all viewing angles by staff, including looking directly upwards.

Option B
The Unified Glare Rating (UGR) calculated for the lighting of work spaces on a representative floor does not exceed the maximum values listed in Table 1 - Minimum maintained illuminance values of SANS 10114-1:2005. This is achieved by using luminaires with the same UGR value in the nominated area as listed in the manufacturer's datasheet.

Option C (Performance method)
The Unified Glare Rating (UGR) calculated for the lighting of work spaces on a representative floor does not exceed the maximum values listed in Table 1 - Minimum maintained illuminance values of SANS 10114-1:2005.
The UGR rating must be calculated in accordance with the procedure outlined in Section 15.3.3 of SANS 10114-1:2005. Either the CIE (International Commission on Illumination) unified glare rating (UGR) system or the British (UK) Glare Index (GI) system can be used to demonstrate compliance with this option.

Demonstrating compliance
Compliance with this credit can be demonstrated through modelling of the whole fitout or just a representative floor or section. The modelled area must be representative of the typical lighting layouts found throughout the entire design. Fitout items (e.g. partitions, equipment, and furniture)

must be included in the modelling. Where the model has been simplified, the reason for the simplifications must be justified. The lighting engineer must then justify how the area is representative of the design, and certify that all other areas comply with this criterion.

BACKGROUND

The Lighting Comfort credit addresses the quality of lighting within a fitout space. The credit addresses five particular aspects of lighting that directly correspond to the most common complaints of building users relating to lighting.

The first key issue addressed is that of the potential health impacts that can result from flickering and the negative impacts on comfort that can result from poor colour temperature and reproduction.

Flickering lights can lead to headaches, eye strain and general eye discomfort. Flickering can be addressed by replacing magnetic ballasts with electronic, or by installing solid state lights. Poor colour rendering is another negative impact resulting from badly lit spaces. Poor colour rendering strains the eyes, and can cause significant discomfort for building occupants. Utilisation of lighting with appropriate colour rendering relative to space-use results in higher levels of lighting comfort.

The second key issue is that of the amount of general lighting levels within a space (general illumination). Different spaces and different activities require different amounts of light. Fitout spaces often encounter problems of too little or too much light. Projects must therefore consider a space's intended use, and consult the Australian Standard for Lighting when developing a fitout's lighting design.

The remaining two impact issues relate to lighting in spaces where occupants spend significant amounts of time. Office spaces, patient areas and classrooms, are all examples of spaces where lighting issues can significantly impact learning, health or productivity outcomes.

REFERENCES & FURTHER INFORMATION

The Illuminating Engineering Society of North America (IESNA) (2000), The IESNA Lighting Handbook, 9th ed., Publication Department IESNA, New York, USA.

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New York City Department of Design and Construction (2006) Manual for Quality, Energy Efficient Lighting.

Paevere, P. & Brown, S. (2007), Indoor Environment, Productivity and Sustainable Commercial Buildings
www.yourbuilding.org

'Indoor Office Lighting-Lighting Design', Knisley, Joe, ECM Magazine,
http://ecmweb.com/mag/electric_practical_guide_indoor/

IEQ-4 Visual Comfort

POINTS AVAILABLE 3

AIM OF CREDIT

To encourage and recognise the delivery of well daylit spaces that provide high levels of visual comfort and views to occupants.

CREDIT CRITERIA

Up to three points are awarded independently as follows:

Daylight Glare Control
One point is awarded where:

- The glare in the nominated area from sunlight through all viewing façades is reduced through a combination of blinds (to have a visual light transmittance (VLT) of ≤ 10%), screens, fixed devices, or other means.

Daylight
One point is awarded where:

- A minimum percentage of 30% of the floor area (occupied space) has a Daylight Illuminance level of at least 250 lux,

OR

- A minimum percentage of 30% of the floor area (occupied space) has a Daylight Factor of not less than 2.0% at desk-height level (under a uniform sky), measured through either a Daylight Factor, Daylight Illuminance or Daylight Autonomy model / calculation.

Views
One point is awarded where:

- A minimum percentage of 60% of the occupied area has a direct line of sight to a high quality internal or external view.

For purposes of this credit, Nominated area, is defined as Occupied Space.

DOCUMENTATION REQUIREMENTS

Green Star SA – Interiors PILOT
Submit all the evidence and ensure it readily confirms compliance.
1. Short report 2. As built drawings 3. Daylight modelling report 4. Manufacturer data sheet(s)

Short report prepared by a suitably qualified professional that describes how the Credit Criteria for Daylight have been met by:

Where the point for Glare control is being claimed:

- Identifying all spaces within the Nominated Area where glazing elements are provided and glare is to be controlled; and
- Nominating the solution(s) used to minimise glare in each space;

Additionally where internal blinds/screens are used:

- Confirming that the blinds/screens provided have compliant VLT and that occupants can control the operation of the blinds/screens.

Where the point for Views is being claimed:

- Providing calculations of the total Nominated Area within eight metres of vision glazing and compliant day lit atrium; and
- Providing a summary table demonstrating that compliant nominated area jointly accounts for the stipulated percentage of the nominated area.

Daylight modelling report showing the daylight factor or daylight illuminance for the claimed spaces and

- Providing a summary table showing each space or floor, their nominated area, and the compliant area in both square meters and as a percentage basis; and
- Providing the daylight model showing the amount of floor area that is compliant, and the daylight values.

Where the point for daylight is claimed, and manual calculations are used to demonstrate compliance, the drawings must show:

- The height and length of windows and any area of any skylights;
- The window properties;
- The amount of floor area that is compliant.

Where the point for views is claimed, the following must be included:

- The amount of compliant area;
- The lines of sight showing that no obstructions exist;
- Any internal features, if claimed, or, showing that no obstructions exist externally.

As-built drawings marked up and showing the following:

- Location of all blinds / shutters, or any glare control devices
- Floor plans marked up to show the location of vision glazing and all Nominated Area within eight metres of vision glazing or daylight atrium and indicating sight lines where relevant;
- Elevation drawings showing the location and dimensions of vision glazing.

Manufacturer product datasheet(s) or equivalent indicating the type and visual light transmittance of the blinds/screens

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ADDITIONAL GUIDANCE

As glare can be experienced from any orientation, all facades must meet the credit criteria regardless of the façade / atrium orientation.

The following definitions and exclusions apply:

IEQ-4 Visual Comfort

POINTS AVAILABLE 3

Exclusions
For the purposes of this credit, spaces that for functional reasons do not allow daylight in the space are excluded. This includes, but is not limited to theatres, cinemas, performance areas (stages), art galleries, and archives.

User
The user, for purposes of this credit, is defined as the user / employee who will be using a single piece of furniture or equipment non-continuously for at least two hours during a given day or in the case of education and healthcare facilities the users include students and patients.
For example:

- In an office, the project user's day to day activities in a primary space occur in workstation. Therefore at least 50% of the workstations must have access to sufficient daylight.
- In a retail environment, the project users are considered to be the retail staff. Therefore, they must have access to daylight to perform the day to day activities. In most retail environments, these are the cashiers' tills, and the staff rooms.

Overcast sky
Overcast sky is a defined as a sky with a completely closed cloud cover (100 %). This is the sky condition applied in daylight factor calculations (ISO 15469:2004 or CIE S 011:2003).

Uniform sky
Uniform sky represents a sky with a constant value of luminance. Thus, no matter where in the sky you look, the model has the same value (ISO 15469:2004 or CIE S 011:2003).

CIE Design Sky
Figure IEQ-XX illustrates the various CIE design skies that are used for daylight modelling. For the purposes of Green Star SA, the Daylight Factor method must be used with either the Overcast Sky or Uniform Sky, however for the Daylight Illuminance method, a Clear Sky must be used.

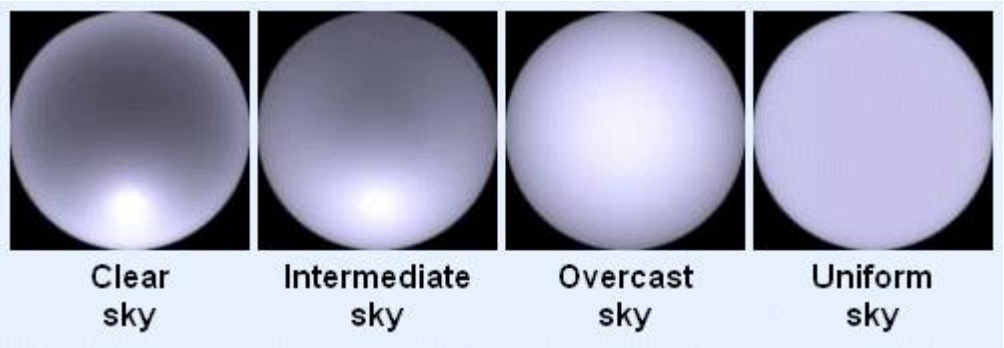

Figure IEQ-4.1: Illustration of the different CIE design skies.

Viewing Façades
Viewing façades, for purposes of this credit, are defined as any part of the building's façade through which occupants can view the external environment. In walls, glazing and perforated façades are considered viewing façades. In the roof, transparent skylights are considered viewing façades. Translucent sheeting in the roof and walls is excluded from the credit.

Nominated Plane
This nominated plane must be justified based on the type of activity held in each space, e.g. for offices the nominated plane is 720mm AFFL. Where a space is purpose built for a specific activity, the nominated plane and standard occupancy hours can be selected by project teams provided justification is given.

IEQ-4 Visual Comfort

POINTS AVAILABLE 3

Nominated Hours
The business day of 8am to 6pm is to be used as a standard day for calculating 80% of the nominated hours. If the space is purpose built for a specific activity, nominated hours can be selected by project teams. These must be justified based on the type of activity held in each space.

Minimum Requirement required for the credit:
Daylight Glare Control:
A combination of the methods outlined below, can be used to achieve reducing glare for this credit.

Option A
Fixed devices must be shown to shade the nominated plane, 1.5 meters in from the centre of the viewing façade. The nominated plane must be shown to be shaded from direct sun for 80% of the nominated hours for each day of the winter and spring equinox as well as the summer and winter solstices.

Option B
Blinds/Screens must be either manual or automated. Internal, in-glazing, or external blinds may also be used.
Where automated blinds are used, these can be controlled either by a management system or by a manually activated switch. All automated blinds and screens must be equipped with a manual override function accessible by occupants for each individual space.

All blinds must meet the following criteria:
- The blinds must eliminate 95% of all direct sunlight penetration;
- Blinds must be controlled by all affected occupants within each space within each individual space; and
- Blinds must have a visual light transmittance (VLT) of ≤ 10%.

Option C
A combination of tinted glazing and fixed shading devices can be used to meet the credit criteria, provided that it will result in a reduction of glare to the user equivalent to that which is stated in the credit criteria. The following must be provided:
- A description of the methodology used to create the daylight glare model and the software used;
- A description of how the selected points for modelling represent the areas that would be effected by glare;
- All terms clearly defined;
- All names, types, glazing properties, and location of glazing; and
- Justification of how the results in the model are equivalent to that of the credit criteria.

Daylight - Sufficient daylight relevant to their activities
The users must have good access to daylight in order to perform their activities. There are three methods for achieving this criterion, one is a prescriptive method, and the other two are performance methods. A combination of methods is acceptable for demonstrating compliance.

Option A - Deemed to Satisfy
It is acceptable to calculate the daylight access using manual calculations for simple designs. To use manual calculations, there must be negligible overshadowing of glazed areas and separate calculations must be provided for each space.
A line designating the compliant floor area is to be drawn at a distance of 1.5 times the height of the windows from the wall. Any area within this distance is considered compliant.
The following are conditions and assumptions to be considered:
- The line of compliant floor area may not be drawn past solid or glazed partitions.

- Any partition or furniture over 1.5m in height must be included and treated as a partition.
- External shading must not impinge a direct 45 degree line from the window. This must include surrounding buildings. Glazed areas where this condition applies should be considered solid for this manual calculation.

Note that this method is likely to yield more conservative results i.e. less daylight coverage. A full computer model may reveal more accurate figures and indicate greater daylight penetration than the manual method.

Option B - Compliance using Daylight Factor
The Daylight Factor describes the proportion of internal illuminance over external illuminance, expressed as a percentage.

Daylight Factor = Internal Illuminance (Lux) / External Horizontal Illuminance (Lux) x 100%

(Where the External Horizontal Illuminance is from a point with an unobstructed hemispherical view of the sky). The Daylight Factor is a useful method for benchmarking the effectiveness of a design, because it measures the proportion of daylight entering a building and is not climate specific. A typical external horizontal illuminance might be 10,000 Lux for many parts of South Africa. A space achieving a daylight factor of 2.0% means that internal light levels average 200 Lux at this particular outside lighting level.

Daylight Factor (DF) is most commonly calculated using CIE (Commission International de l'Eclairage) overcast sky. However Green Star recommends the use of a uniform sky as it allows easier comparison with the Daylight Illuminance method. Calculation using CIE overcast sky is acceptable, but this method will usually give lower results than that calculated using a uniform sky.
Note that is the software does not have a preset option for a uniform design sky; it can often be set up manually as follows:

Design sky values should be derived from a statistal analysis of outdoor illuminance levels for the particular project location, representing a horizontal illuminance level that is exceeded 85% for the time between the hours 8am and 6pm through the working year. Thus they also represent a worst-case scenario that a building can be designed to and ensure it will meet the desired light levels at least 85% of the time.

With a uniform sky, no matter where in the sky you look, the sky has the same illuminance value. The shading effect of the immediate surrounding building and any obstructions still have to be taken into account.

Option C - Compliance using Daylight Illuminance
As an alternative method of compliance, light levels inside the building should be simulated at 12 noon on the equinox (21st March/September). A clear sky should be assumed. The simulation should be carried out on a 1m calculation grid and areas where the light level calculated at 720mm AFFL is above 250 Lux can count towards the credit.

Option D - Manual Calculation for Daylight Factor:
While daylight modelling is encouraged because it gives much better information on the spread of daylight within the space, the manual calculation method described in BS 8206 Part 2 is accepted as an alternative. To use this method, there must be limited overshadowing of glazed areas and separate calculations must be provided for every occupied space.

The daylight factor D is estimated using the following equation:

$$D = \frac{T\ Aw\ \theta}{A\ (1-R^2)}$$

Where:
T = the diffuse light transmittance of the glazing, including a correction factor for the effect of dirt (see below);

Aw = the glazed area of the window in m², including a correction factor for the effect of the frame (see below);

θ = the angle subtended by the visible sky (degrees). It is measured in a vertical plane normal to the glass, from the window reference point which is at the centre of the window as illustrated below

A = the total area of the ceiling, floor and walls, including windows, in m²; and

R = the area-weighted average reflectance of the interior surfaces (A). In initial calculations for rooms with white ceilings and mid-reflectance walls, this may be taken as 0.5.

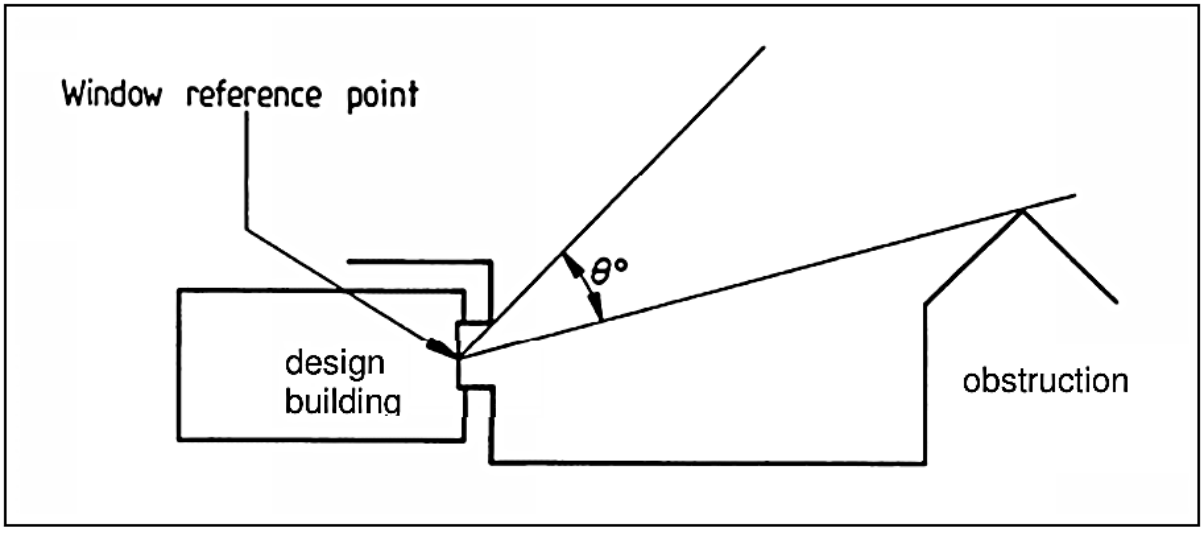

Figure IEQ-4.1: Diagram illustrating angle to be used in hand calculation of daylight factor.

Option E - Compliance using daylight Autonomy
The Daylight Autonomy (DA) at a point of interest in a building is defined as the fraction of the occupied times per year, when the required minimum illuminance level at the point can be maintained by daylight alone.

The percentage of the nominated area has a Daylight Illuminance (DI) of at least 160 lux based on an annual dynamic simulation model, for 80% of the standard occupied hours.
The daylight autonomy (DA) model can be done assuming that all shading devices are static, including all blinds. Blinds can be assumed to be open. The climate data, and standard hours of occupancy used must be the same as that used in the 'Greenhouse Gas Emissions' credit. Time intervals must be set at intervals of no more than one hour.
There are a number of dynamic simulation software programs that can be used to show compliance with the credit criteria. Daysim, ESP-r, Lightswitch Wizard, and SPOT (>ver 4.0) can be used. Where other programs are used, the project team must demonstrate that it is based on the radiance simulation engine, and that it uses the statistical sky, the daylight coefficients & Perez, or the annual CIE sky simulation algorithms.

Modelling guidance
Permanent partitions must be included within the modelling of this credit. Temporary partitions can be excluded only if they are shown to not be in place for most of the occupied hours in the building (for

instance, auditorium partitions). All fitout partitions must be included. Large fitout items, including workstations must be included. Movable items can be disregarded.

Calculation Grid
All software calculates Daylight Factor at points on a plan. Some systems calculate the Daylight Factor for an almost infinite number of points, providing very accurate results. Other modelling programs request the user to identify the points matrix on the floor plan. If using computer modelling to calculate the Daylight Factor, it must be calculated for at least 1 point per each square metre of floor area.
A maximum 1sqm grid must be overlaid over the floor plan to determine these points and at all perimeters, each 1sqm must begin at the façade. Daylight factor is then calculated in the centre point of each box in the grid.

Reflectance Values
The following reference reflectance values are to be used whenever actual reflectance values are not known. If the actual values substantially differ from these reference values, these must be justified. Inputs used for this credit must be consistently referenced throughout the submission.

- 0.2 for floor (assumes a light-coloured flooring);
- 0.5 for walls (assumes walls are painted white); and
- 0.7 for ceilings (assumes ceilings are painted white).
- 0.3 for internal partitions
- 0.2 for ground

Overshadowing
Overshadowing must be taken into account in the calculations. Projects must include shading from any shutters or overhangs.

- A nearby building or feature (such as a cliff face) must be accounted for in overshadowing where the building height is at least a third of the height of the proposed building design; and
- where the angle between the nearest point at the top of that building and the nearest point base of the proposed building is greater than the 21 June (winter) midday altitude of the sun.

Demonstrating Compliance
Compliance for this credit cannot be demonstrated by measurement of actual daylight levels in the building. Compliance with this credit can be demonstrated through modelling of a representative floor. The modelled floor must be representative of the typical daylight access found throughout the entire project, and account for overshadowing by adjacent buildings. Where the model has been simplified, the reason for the simplifications must be justified. The engineer responsible for modelling must then justify how the floor is representative of the design, and certify that all other floors comply with this criterion.

Views - High quality internal or external views
The users must have good access to views. There are two methods for achieving this criterion, both are prescriptive methods. A combination of methods is acceptable for demonstrating compliance

Option A - Internal views
Where compliance is achieved through internal views, the view must extend from the user to a high quality internal view and be unblocked by any permanent solid structure or high partition.
A high quality internal view is defined as a view towards an internally landscaped area such as a green wall or an atrium with high plant density, or a water feature.
The sight line is to be measured by extending a perpendicular line from the atrium or window; a line at 45 degrees can be used at the corners of atria or windows, as per Diagram IEQ-XX. Sight lines must take into account thickness of external walls (there must be a clear line of sight to the outside).

IEQ-4 Visual Comfort

POINTS AVAILABLE **3**

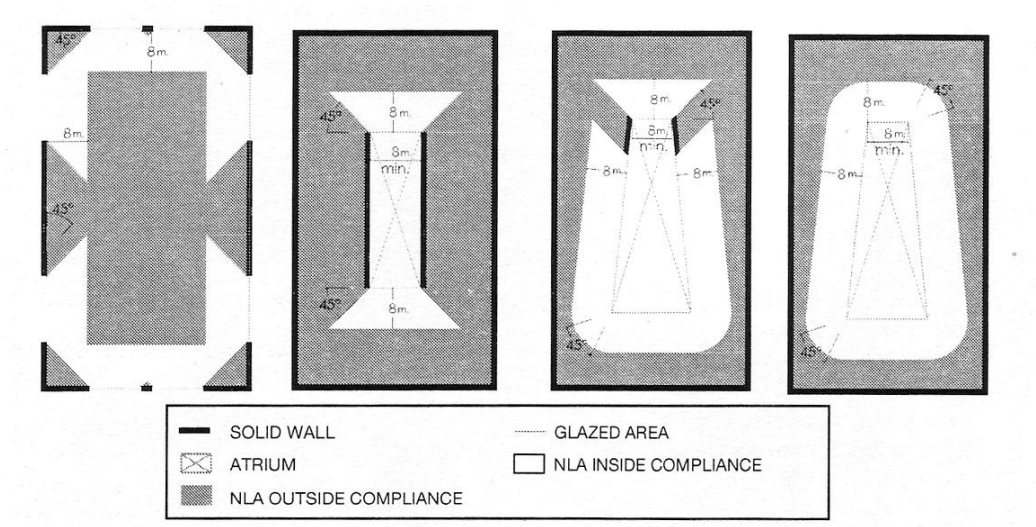

Figure IEQ-4.2: Diagrams illustrating areas that comply with the Credit Criteria given various atria shapes.

Option B - External views
Where compliance is achieved through external views, the view must extend from the user to the outside and be unblocked by any permanent solid structure or high partition. The view must then extend to the outside towards natural elements such as large bodies of vegetation, a body of water, frequent movement (people, vehicles, or animals, though not into other buildings), or sky.

Calculating the line of sight towards a view
The line of sight is defined as the horizontal distance between a point in space and the eye line of the person at work (for example seating down in an office workstation, or standing up in an industrial setting). The horizontal view angle is 45 degrees, and it can be assumed that the person will look towards the right or the left from their typical working position.

Exclusions:
Windows below 720mm or above 2400mm AFFL, including skylights should not be included in the calculation. Spaces where daylight is not allowed for functional reasons (see definition above) are also excluded.

BACKGROUND

This credit addresses factors that influence user satisfaction, comfort and wellbeing within a fitout including glare, access to daylight and external views.

This credit encourages the provision of natural light, as daylight can positively influence the health of the user, improve efficiency and productivity. International research has found that students studying in environments with natural light have better attention rates, are less prone to being distracted or disruptive and have a better health than fellow students in artificially lit rooms.

The impact of circadian rhythms on our productivity and health is well documented. These rhythms are based on the body's understanding of the time and day, which is driven by access to daylight. The natural changes in the light that occur over the course of the day drive the circadian rhythms and remind the body that it is not evening.

IEQ-4 Visual Comfort

POINTS AVAILABLE 3

Natural light can also reduce the need for artificial lighting and thus energy saving. However direct sunlight or patches of sunlight on internal surfaces, including reflections of windows on computer screens, can also cause problems with glare.

Research proves that conventional internal blinds are marginally effective, so this credit requires that as a condition that this is addressed by fixed shading, screens, daylight control, tinted glass or blinds, but still allowing for natural daylight penetration to the fitout.

Daylight Autonomy has been included as an indicator as it provides a more accurate representation of the availability of daylight in a space throughout the year and recent advances in software development is making the extensive simulations required to determine the DA more accessible to projects. In combination with ray tracing software, light bouncing interventions (complex or simple) can now be reflected in a design to a level of accuracy compared to other indicators. This is particularly relevant in predominantly sunny climates like South Africa where energy and indoor environmental quality performance can benefit significantly through optimisation of daylight within buildings.

This credit also encourages external views and recent studies have linked access to views to the relief of boredom, anxiety, stress as well as to greater productivity.
Windows not only allow daylight to penetrate the interior space, but provide occupants with a greater sense of time, weather and access to contextual focal points in the distance. Access to views can be provided internally, through the provision of line of sight to a courtyard or atrium, or externally.

REFERENCES & FURTHER INFORMATION

Haworth (Why Daylight and Views Matter pdf)
http://www.haworth.com/home/resources/research/white-papers

CCSE (Daylight for Energy Savings and Psycho-Physiological Well-Being in Sustainable Built Environments) November 2008 www.ccsenet.org/journal/index.php/jsd/article/download/1198/1160

Daylight Modeling
http://www.daylightmodeling.com/faq.htm

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IESNA (Illuminating Engineering Society of North America), Lighting Handbook, 10th edition
www.iesna.org/

British Standard BS 8206: Part 2: 1992, Lighting for Buildings: Code of Practise for Daylighting
http://www.bsi-global.com

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http://www.h-m-g.com/DaylightPlus/Daylight_Metrics.htm

Massachusetts Institute of Technology (MIT) (2006), 'Daylight Savings: Building with Natural Light', ScienceDaily, 15 November 2006 www.sciencedaily.com/releases/2006/11/061114194440.htm

Standards Australia (2006), AS/NZS 1680.1-2006: Interior and workplace lighting – General principles and recommendations www.standards.org.au

IEQ-5 Acoustic quality

POINTS AVAILABLE 2

AIM OF CREDIT

To encourage and recognise fitouts that are designed to provide appropriate acoustic qualities to enable the functionality of the space.

CREDIT CRITERIA

Two points are available in this credit. Each point is independent from the other.

Internal noise levels

Half a point is awarded where:

- Internal sound levels in the nominated area are appropriate and relevant to the activity type in the room in accordance with SANS 10103:2008. This includes the influence of all sound generated by the building systems and the outside constant noise sources such as external mechanical plants.

Reverberation

Half a point is awarded where:

- The nominated area has been built to provide appropriate sound reverberation characteristics not to impact on the functionality of the space in accordance with AS/NZS 2107.

Interference

Half a point is awarded where:

- The interior of the building has been designed/built to minimize interference between spaces

Speech privacy

Half a point is awarded where:

- Enclosed spaces have been created to provide appropriate speech privacy levels, if applicable in accordance with SANS10218:2012 Part 1.

DOCUMENTATION REQUIREMENTS

Green Star SA – Interiors PILOT
Submit all the evidence and ensure it readily confirms compliance. 1. Acoustic report

Acoustic report prepared by a Qualified Acoustic Consultant that describes how the Credit Criteria have been met by:

IEQ-5 Acoustic quality

POINTS AVAILABLE 2

For the Interior Noise Levels criterion

- Providing a table summary of the applicable requirements of SANS 10103:2008 pertaining to equivalent continuous rating levels for all example areas;
- Describing all relevant internal noise sources and quantified levels from building services, or confirming lack thereof;
- Describing the supporting external noise level measurements and measurement methodology, or justification why external noise level measurements may not be required;
- Describing the noise control features required to achieve the Credit Criteria, with references to relevant supporting documentation;
- Providing a tabulated summary of Example Areas indicating where noise control features are included and compliance with the Credit Criteria is achieved;
- Providing a summary table of the Example Areas tested and the measured internal noise levels in each space, clearly indicating compliance with the credit criteria;
- Confirming the test methodology used, the conditions under which the testing was done, including the time of testing and confirming that the spaces tested are representative and 'worst case'
- Providing a conclusion that supports compliance with the Credit Criteria.

For the Reverberation criterion

- Providing a table summary of the applicable requirements of AS/NZS 2107 for each of the Example Area in the nominated areas.
- Demonstrating the provision of compliant products to the required surface areas in accordance with the Credit Criteria, with reference to supporting documentation; OR
- Demonstrating through calculation that the reverberation time is in compliance with the Credit Criteria.

For the Interference criterion

- Describing the initiatives implemented to address Interference for each Example Area (see additional Guidance)

For the Speech Privacy criterion

- Nominate the 'acoustic sensitive areas'
- Providing a table summary of the applicable requirements of SANS10218:2012 Part 1 for each of the acoustic sensitive areas
- Confirming the initiatives used to demonstrate compliance with the Credit Criteria, with reference to supporting documentation.

ADDITIONAL GUIDANCE

Area Categories and Example Areas in the nominated area

The qualified acoustic consultant is to provide a baseline document including a table that categorizes the nominated areas and the relevant acoustic properties associated with each area. This must be in accordance with the recommended values as listed in SANS10103:2008, SANS10218:2012 Part 1 and AS/NZS 2107. An Example Area is to be identified and used to demonstrate compliance. A short description is required to explain why the example area chosen can justifiably be used as an example to demonstrate compliance.

The Qualified Acoustic Consultant is to audit and quantify that the example chosen for each category does indeed meet the specific credit requirement. Only when all the example areas of all categories meet the specific credit criteria, will the points be awarded.

IEQ-5 Acoustic quality

POINTS AVAILABLE 2

Qualified Acoustic Consultant

A qualified Acoustic Consultant must have a deep knowledge of the specific credit area(s) and have been actively involved in the architectural acoustic designs. A Qualified Acoustic Consultant must be a registered Professional Architect or Professional Engineer or Professional Technologist with relevant registration institutions, or have a relevant tertiary qualification from a publically recognized institution.

SANS01013:2008

Interior Noise Levels

Noise sources to be included are building services equipment, noise emission from outdoor sources such as traffic, and (where known) noise from any noise generation process. Regardless of ventilation mode, occupational noise can be disregarded.

In naturally ventilated buildings it is assumed that mechanical ventilation will not be an issue - therefore, in this instance the Building Services Design point refers to hydraulic services only.

All calculations must be carried out with ventilation openings open and any extract fans running as required for normal operation of the building.

The GBCSA does not explicitly require that external noise level measurement surveys be conducted. It is at the discretion of the qualified Acoustic Consultant if external noise level measurement surveys are required to appropriately inform the acoustic design response. Where not deemed necessary, the qualified Acoustic Consultant must justify within the documentation as to why external noise level measurement surveys are not required

<u>External noise level measurements</u>

Where deemed necessary and conducted, external noise levels must be measured on the actual project site and not on a neighbouring site, in order to accurately reflect true conditions. The period of measurement is also at the discretion of the Qualified Acoustic Consultant, however must be selected such that all potential sources of noise (of concern) are measured

To consider this credit criterion met, the internal sound levels in the Example Areas are no more than 3 dB above the “Maximum equivalent continuous rating level” is allowed.

Reverberation

To consider this credit criterion met, the reverberation time in the Example Areas must be below the maximum stated in the “Recommended Reverberation Time” provided in table 1 of AS/NZA 2107:2000. Note although a 0.6 to 0.8 sec range is recommended in AS/NZS 2107:2000, for rooms with teleconferencing applications, a reverberation time range of maximum 0.6 sec should be achieved.

Where note 3 of AS2107:2000 applies and requires that reverberation times be minimised as far as practicable, acoustic absorption should be installed to meet the relevant reverberation time proposed by a qualified acoustic specialist.

Interference

To consider this credit criterion met, it must be shown that the interior environment includes design features (e.g. partitions with adequate height, good acoustic ceiling, a well-designed sound masking system, provision of “quiet rooms” or “telephone rooms”) that minimise the noise interference (people talking, equipment noise, telephonic conversations etc.) to the primary activities of the space, a point may be awarded.

Speech Privacy

Confirming the initiatives used to demonstrating compliance with the Credit Criteria, with reference to supporting documentation.

IEQ-5 Acoustic quality

POINTS AVAILABLE 2

To be considered this credit criterion met, the project must address speech privacy and noise transmission between spaces. This criterion applies to acoustically sensitive spaces. Where no acoustically sensitive spaces exist; such as in the case of a small retail shop; the point is “not applicable” and is excluded from the points available used to calculate the Indoor Environment Quality Category score.

There are two methods for demonstration compliance with this criterion A prescriptive method and a performance method.

Option A

The partition between each example area and the surrounding spaces should be constructed to achieve a weighted sound reduction index (Rw) that complies with SANS 10218:2012 Part 1.

Option B

The sound insulation between acoustically sensitive example rooms and other occupied spaces complies with Dw + LAeq,T > 75

This is defined as:

- Dw is the weighted sound level difference between the two spaces
- LAeq,T is the design (or measured) indoor ambient noise level in the space adjacent to the acoustically sensitive example room.

The sound test from which Dw is derived must be measured in accordance with SANS 140-4:1998. Measurement must be based on finished rooms, accounting for any carpets and acoustically absorbent ceilings specified. The measurement can be conducted in either furnished or unfurnished spaces.

BACKGROUND

Ambient noise level is a measure of ‘background sound’ usually of low intensity and present for the majority of the time. In a building, ambient noise refers to the noises caused by things such as HVAC operations, equipment, lighting systems, computers and general activity sounds, however excludes specific 'one-off' sources, such as a person talking in an adjacent space. Excessive levels of ambient sound can cause stress and impede an individual’s productivity or comfort.

The Acoustic Comfort credit seeks to achieve an acoustically superior environment through design that is sensitive to a fitout's intended use. The credit also seeks to minimise sound reverberation and achieve optimal privacy in rooms where it is required, such as in the case of meeting rooms.

REFERENCES & FURTHER INFORMATION

SANS 10103:2008 – The measurement and rating of environmental noise with respect to annoyance and to speech communication

SANS10218:2012 Part 1 - Acoustical properties of buildings Part 1: Grading criteria for the airborne sound insulation properties of buildings

AS/NZS 2107:2000 The measurement and rating of environmental noise with respect to annoyance and to speech communication

IEQ-6 Hazardous Waste

POINTS AVAILABLE .5

AIM OF CREDIT

To encourage and recognise actions taken to reduce health risks to occupants from the presence of hazardous materials.

CREDIT CRITERIA

For half a point:

- A comprehensive hazardous material survey has been carried out on the project site, as defined by the South African Occupational Health and Safety Act (OH&S);

AND

- Wherever Hazardous Materials are found they have been treated in accordance with the standards listed under Table IEQ-6.1.

Where this falls under the landlord's responsibility and is not in the tenant's control (as per the lease agreement), the credit is 'Not Applicable' and is excluded from the points available.

DOCUMENTATION REQUIREMENTS

Green Star SA – Interiors PILOT
Submit all the evidence and ensure it readily confirms compliance.
1. Hazardous materials survey report *If Hazardous materials are identified and deemed necessary to remove:* 2. Disposal receipts *Where the credit is claimed as 'Not Applicable'* 3. Statement of confirmation from the tenant

Hazardous materials survey report prepared by a suitably qualified professional demonstrating how the Credit Criteria have been met by:

- Describing the hazardous material survey scope (i.e. what buildings or structures are included), in accordance with the relevant legislation set out in Table IEQ-6.1;

Where survey has been completed and no hazardous materials were identified:

- Confirming that no asbestos, lead and/or PCBs were identified in the existing buildings and/or structures on the project site.

Where survey has been completed and hazardous materials were identified:

- Detailing in a tabulated summary, all hazardous materials identified as present within all existing buildings and/or structures on the project site;
- Confirming that all hazardous materials identified in the initial 'Hazardous Material Survey Report' have been treated, and disposed of if necessary, in accordance with standards listed under Table IEQ-6.1.

Disposal receipts from the recipient of the hazardous waste confirming the disposal of the identified hazardous materials. This is only necessary in the case of hazardous materials being found and deemed necessary for disposal.

Statement of confirmation from the Tenant stating that this falls within the Landlord's responsibility with reference to supporting evidence such as a lease agreement.

ADDITIONAL GUIDANCE

This credit considers only those hazardous materials which may be present in existing buildings or structures within the project site.

The comprehensive hazardous materials survey must be carried out on the project site prior to any construction works commencing, and where hazardous materials are identified in buildings or structures, the materials must be evaluated for removal in accordance with the applicable standards.

Hazardous Materials	Relevant Standards or Legislation
Asbestos	South African National Occupational Health and Safety Act, 1993, National Environmental Management: Waste Act, 2008 and associated regulations.
Lead	South African National Occupational Health and Safety Act, 1993, National Environmental Management: Waste Act, 2008 and associated regulations.
PCBs	South African National Occupational Health and Safety Act, 1993, National Environmental Management: Waste Act, 2008 and associated regulations

Table IEQ-6.1: *List of relevant legislation and standards*

The disposal receipts must account for all hazardous materials in all locations as identified in 'Hazardous Materials Survey Report'. Where disposal receipts do not account for all hazardous materials in all locations identified, the credit will not be rewarded.

The documentation requirement 'Hazardous materials survey report' may consist of two individual reports; an initial survey report and a post-decontamination report, with the latter referencing the former.

BACKGROUND

The use and disposal of hazardous materials in South Africa is governed by the Occupational Health and Safety (OSH) act and the Hazardous Substances Act, which currently covers:

- Asbestos
- Cadmium
- Chlorinated polyethylene and chlorosulfonated polyethlene (CSPE)
- Chlorofluorocarbons (CFCs)
- Chloroprene (neoprene)
- Formaldehyde
- Halogenated flame retardants
- Hydrochlorofluorocarbons (HCFCs)

- Lead
- Mercury
- Phthalates
- Polyvinyl chloride (PVC)
- Wood treatments containing creosote, arsenic or pentachlorophenol
- PCBs

With regards to the list above, some common hazardous materials that could most likely be found in an interiors fit out, include:

Possible existing hazardous Material	**Commonly found in the following existing building elements:**
Asbestos	• Insulation (ceiling, wall, HVAC, ductwork, electrical, fireproofing or vermiculite) • Old ceiling tiles and wallboard • Old non - wood flooring (e.g. vinyl floor tiles) • Can be found in plaster, glazing compound, caulking compound, adhesives, acoustical materials and exterior siding materials
Lead	• Old paint (on walls, windows, cabinets, wallboards) • Old sinks, faucets, tubs, galvanized pipes, solder, connectors, roof flashing, fasteners
PCBs	• Electrical devices such as capacitors, transformers, fluorescent light ballasts, motors, pumps • Some caulking, adhesives, sealants, insulation, plastics
Mercury	• Fluorescent light bulbs • Thermostats, switches, load meters, supply relays and medical equipment

Project teams are awarded, in this credit, for incorporating professional expertise to examine the existing building and thereby minimise the risk posed by hazardous materials which may be encountered in the usual scope of fitout work.

Asbestos

Although asbestos is now rarely used in construction, many asbestos-containing products and materials may still be found in existing buildings. These include vinyl asbestos tiles, laboratory table tops, roofing felts, suspended ceiling tiles, and asbestos cement products (including pipes, roof and wall cladding). These types of materials do not present a significant health risk unless they are tooled, cut, drilled, sanded or otherwise abraded or machined so as to release asbestos dust.

Sprayed insulation materials containing asbestos may occur throughout buildings and other structures, especially those built from the 1950s to the mid-1980s. Such buildings will often have asbestos used in sprayed-on fireproofing/soundproofing/thermal insulation, and acoustic plaster soundproofing.

Asbestos is composed of many very small fibres. Because they are very fine, when they become airborne the fibres are easily inhaled or swallowed. When they are inhaled, the lung's defence cells try but cannot break down or destroy the fibres, which results in the asbestos fibres permanently remaining in the lungs causing scarring and inflammation for decades. This can further cause various lung-based diseases (mesothelioma, asbestosis, lung cancer) which can take up to 40 years to develop.

Asbestos was used extensively in structures such as buildings, processing plants, ships, trains and motor vehicles in the 1950s, 1960s and early 1970s. The known adverse health consequences of asbestos exposure dictate that some control is required.

Polychlorinated Biphenyl (PCBs)

Polychlorinated biphenyls (PCBs) are covered by the Stockholm Convention on Persistent Organic Pollutants (POPs). The convention provides measures to eliminate or reduce the presence of these materials in the environment.

The convention identified the main PCB uses in industry being within heat exchange fluids; electric transformers and capacitors; and as additives in paint, carbonless copy paper, sealants and plastics. PCBs are most commonly found in the ballasts of fluorescent light fixtures.

A broad range of health problems is associated with exposure to PCBs. These health effects increase with the amount of PCBs and the length of exposure. PCBs accumulate in the body with repeated exposure and are stored in fat tissue and body organs including the liver, kidneys, lungs and brain. PCB exposure can cause:

- Chloracne (a severe, persistent acne-like rash) is the most commonly observed symptom in people exposed to high levels of PCBs;
- Liver damage;
- Respiratory disorders;
- Thyroid gland disorders;
- Muscle and joint pain, headaches, loss of appetite, nausea, vomiting and abdominal pain;
- Cancer - PCBs are classed as Carcinogen Class 2 (probable human carcinogen); and
- Reproductive problems in animals. These include increased spontaneous miscarriage rates, still births, underweight births and decreased post-natal survival.

When PCBs are exposed to extreme heat they may form dioxins, which are highly toxic.

Lead (Pb)

Large amounts of lead in the body can cause pain in joints and muscles. Other symptoms of lead exposure include anaemia, nausea headaches, high blood pressure and gastric, sleep and concentration problems. In children, the symptoms of lead exposure can be poor development of motor abilities and memory, reduced attention span, and colic and gastric problems.

Lead is absorbed if dust or fumes that contain lead are swallowed or breathed in. Although small amounts of lead do not cause any specific symptoms, as much as 10% of the lead that enters an adult's body stays there, and so even small amounts can gradually build up in the body.

Lead was also used in paint products. Paints containing as much as 50% lead were used on the inside and outside of houses built before 1950. Until the late 1960s, paint with more than 1% lead was still being used. By 1970, the lead content of paint was limited to 1%. Thus the disturbance or removal of old paint can still create a health hazard to both humans and surrounding soil.

Any amount of lead can be a health risk for pregnant woman because the unborn baby is exposed to lead in the mother's blood. A large amount of lead in the mother's body can cause premature birth, low birth weight, or even miscarriage or stillbirth.

Lead was used for centuries in water pipes, water jugs, and bullets because it is easy to mould into different shapes. However, its use is now restricted to products that are not used for food or drink.

Mercury

Short term and long term exposure to mercury can have detrimental health impacts, associated with damage to one's nervous, digestive and immune systems and causing irritation to the lungs, eyes, kidneys and skin**.** The World Health Organisation (WHO) considers mercury to be one of the top ten chemicals (or groups of chemicals) that pose a significant risk to human health. Mercury is particularly dangerous to foetal development, and to those who are exposed to regular dosages (for example, people who eat fish regularly or industrial workers) because of its cumulative impact.

Mercury can be absorbed through inhalation, ingestion and via skin contact, with its toxicity dependent on several variables. However, even a small mercury leakage in a fit out application should be treated with caution as its vapour can cause negative health impacts.

REFERENCES & FURTHER INFORMATION

Stockholm Intervention on Persistent Pollutants
http://www.pops.int

South African National Occupational Health and Safety Act, 1993: various chapters.
http://www.acts.co.za/ohs/index.htm

Regulations for the prohibition of the use, manufacturing, import and export of asbestos and asbestos containing materials
http://www.environment.gov.za/HotIssues/2007/asbestos/asbestos.html

Sustainable Home Design, Chemical products
http://www.sustainablehomedesign.co.za/

National Environmental Management: Waste Act, 2008.
http://www.info.gov.za/view/DownloadFileAction?id=97351

Minimum Requirements for the Handling, Classification and Disposal of Hazardous Waste, Department of Water Affairs and Forestry, Republic of South Africa, 1998
http://www.dwaf.gov.za/Dir_WQM/docs/Pol_Hazardous.pdf

ANZECC Guidelines Polychlorinated Biphenyls Management Plan
http://www.environment.gov.au/settlements/publications/chemicals/scheduled-waste/pubs/biphenyls.pdf

Northeast Recycling Council (NERC), 2012. Reuse tips for Builders and Remodelers

Havel, Gregory in Construction Concerns: Hazardous Building Materials in Fire Engineering Online. Available at http://www.fireengineering.com/articles/2010/02/construction-concerns.html

Perkins and Will hazardous materials list for buildings http://transparency.perkinswill.com/Main

IEQ-7 Reduced Exposure to Pollutants

POINTS AVAILABLE **5**

AIM OF CREDIT

To encourage and recognise projects that safeguard occupant health through the reduction of internal air pollutant levels.

CREDIT CRITERIA

Up to five points are available independently as follows:

Paints

One point is awarded where:

- At least 95 % of all internally applied paints in the nominated area meet the Total VOC limits stipulated in Table IEQ-7.1 below
  OR
- No paint is applied in the nominated area

Adhesives and sealants

One point is awarded where:

- At least 95% of all internally applied adhesives and sealants in the nominated area are less than the Total VOC limits stipulated in in Table IEQ-7.2 below

OR

- No adhesives and sealants are applied in the nominated area

Carpets and flooring

One point is awarded where:

- At least 95% of all carpets and flooring in the nominated area meet the Total VOC limits stipulated in in Table IEQ-7.3 below

OR

- No new carpets or flooring installed in the nominated area

Engineered wood products

Two points are awarded where:

- All engineered wood products are less than the formaldehyde limits stipulated in in Table IEQ-7.4 below

OR

- No new engineered wood products are used in the project.

Note that the nominated area for all projects is defined as the internal area of the project.

DOCUMENTATION REQUIREMENTS

Green Star SA – Interiors PILOT
Submit all the evidence and ensure it readily confirms compliance.
1. Short report 2. Manufacturer datasheets

Short report prepared by a suitably qualified professional that describes how the applicable Credit Criteria have been met by:

- Listing all the products relevant under this credit that are used in the fitout (that are within the scope of the Credit Criteria);
- Listing the compliant low-VOC products used by describing the amount, type and supplier of the paint, adhesive and sealants, carpets and flooring and engineered wood products (whichever relevant) used in the project.

Manufacturer product datasheet(s) must be official manufacturer product datasheets, be provided for each compliant product, and:

- Clearly indicates the compliant TVOC level as referenced in the short report;
- States the calculation method used to determine the TVOC level; and
- For paint finishes only; states that the paint product does not contain added lead.

ADDITIONAL GUIDANCE

It must be clear that all finishes of a product category have been addressed by the documentation. If points are claimed for avoiding the use of a product type, it must be clearly stated within the documentation.

The following definitions apply:

Volatile Organic Compounds (VOCs) - VOC is a term used to describe several hundred organic chemicals which have a boiling point range falling below 250 degree C at 101.3kPa or a vapour pressure of 0.01mm of Hg at 21 degree C.

Formaldehyde - Formaldehyde is a widely used industrial chemical (generally as a solution in water) and is a gas at room temperature. Formaldehyde resins are used to bond the constituent parts together in particleboards, fibreboards, plywood, veneer, MDF and decorative overlaid wood panels.

Manufacturer product datasheets
For the purposes of the IEQ-7: Reduced Exposure to Pollutants credit, a 'Manufacturer product datasheet' is defined as:

- Compliance certificate or report– Where products have been certified by a third party certification that complies with the same testing methodology and TVOC content limits required by the IEQ-7 credit, certificates and or reports must be provided from the third party certification scheme which confirms the certification of the specific product specified in the project. If not stated on the certificate or report, supporting documents must also be submitted that state the testing method and demonstrate that the TVOC content limits required by the certification body are in line with those set out in the IEQ-7 credit in the Green Star SA - Interiors PILOT Technical Manual. For carpets, as the testing method and TVOC limits referenced in the IEQ-13 credit have been based on the Carpet and Rug Institute Green Label (U.S.), for products that are Green Label or Green Label Plus certified, only the compliance certificate need be provided as the testing method and TVOC limits are known to be in line with the requirements of the Green Star SA – Interiors PILOT Technical Manual.

OR

- Laboratory test reports or test certificates – Product TVOC test reports/certificates must be issued by an ISO/IEC 17025 certified testing laboratory and must state the product name, TVOC result and the testing method used.

OR

- Material Safety Data Sheets (MSDS) – Where a product MSDS includes TVOC information, it must include the numerical result expressed in g/litre of product and the test method used to obtain the results.

OR

- Manufacturer product data sheet(s) – Official manufacturer datasheets must be provided for each compliant product and must clearly indicate the compliant TVOC levels and state the calculation method used to determine the TVOC levels. The product data sheets must demonstrate that TVOC is based on theoretical calculations of the subtotal of the known VOC values of the product's raw material components.

  Where the TVOC content of individual components is not known, it must be determined experimentally by one of the appropriate test methods listed in the Additional Guidance section of this credit. The manufacturer prepared VOC datasheets must contain the following:
  - Numerical TVOC results expressed in g/litre of product (the total VOC content or sum, not the itemized calculation);
  - Manufacturer's statement that the results have been obtained based on the subtotal of the known VOC values of the product's raw material components.

  Alternatively, project teams must submit a signed letter from the manufacturer containing the above requirements. Screen captures of website information is not an acceptable form of to demonstrate a product's compliance with the Credit Criteria.

Measurement by content

Where TVOC content for individual items is known, a theoretical calculation based on the subtotal of the known VOC values of the products raw material components is acceptable. This is not relevant to carpets and engineered wood products.

Paints

Paints are defined as any liquid applied to surface finishes, including varnishes protective coatings. This criterion addresses internal applications of all types of paint, adhesives and sealants applied on exposed and concealed applications.

The following items are excluded from this credit:

- Glazing film, tapes, and plumbing pipe cements;
- Paints, adhesives and sealants used off-site, for example applied to furniture items in a manufacturing and later installed in the fitout;
- Adhesives and mastics that are used for temporary formwork and other temporary installations.

Total VOC (TVOC) values should reflect the final product ready to use, inclusive of paint tints (in the case of paints) and irrespective of the number of coatings or amount used. TVOC content results must be made in grams of VOC per litre (g/L) of ready to use product.

Where the TVOC content of individual components is not known, it must be determined empirically by one of the following testing methods as appreciate:

- ISO Method 17895 (2005), for a material with a presumed VOC content < 1%,
- ISO Method 17890-2 (2006), for a material with a presumed VOC content < 15%,
- ISO Method 11890-1 (2007), for a material with a presumed VOC content > 15%;

OR

- ASTM D3960, which is comprised of four individual testing procedures that measures

TVOC (D2369) as well as density (D1475), water content (D4017), but not excluding exempt compounds (D4457).

The product(s) must comply with the following table:

Product Category	Max TVOC in grams per litre (g/L) of ready to use product
Walls and ceilings – interior semi-gloss	16
Walls and ceilings – interior low sheen	16
Walls and ceilings – interior flat washable	16
Ceilings – interior flat	14
Trim – gloss, semi-gloss, stain, varnishes and wood stains	75
Timber and binding primers	30
Latex primer for galvanized iron and zincalume	60
Interior latex undercoat	65
Interior sealer	65
One and two pack performance coatings for floors	140
Any solvent based coatings whose purpose is not covered in table	200

Table IEQ-7.1 Maximum TVOC Content limits for Paints, Varnishes and Protective Coatings

Adhesives and Sealants

An adhesive is a material that joins two surfaces together by bonding them. It is usually applied as a thin layer between the two surfaces. Sealant is a material designed either to fill up a space, or applied to a surface for waterproofing or stopping leaks. The spaces can be joints, gaps or cavities between two surfaces.

This criterion addresses internal applications for adhesives and sealants, including both exposed and concealed applications. VOCs are to be in conformance with the grams per litre (g/L) content limits set out in the table below.

Where the TVOC content of individual components is not known, it must be determined empirically by ASTM D3960, which is comprised of 4 individual testing procedures that measures TVOC (D2369) as well as density (D1475), water content (D4017) but not excluding exempt compounds (D4457).

The product(s) must comply with the maximum TVOC limits in the following table:

Product Category	Max TVOC in grams per litre (g/L) of ready to use product
Indoor carpet adhesive	50
Carpet pad adhesive	50
Wood flooring and laminate adhesive	100

Rubber flooring adhesive	60
Sub-floor adhesive	50
Ceramic tile adhesive	65
Cove base adhesive	50
Dry wall and panel adhesive	50
Multipurpose construction adhesive*	70
Structural glazing adhesive	100
Architectural sealants, acoustic sealants, waterproofing membranes and sealant, fire retardant sealants and adhesives	250

Table IEQ-7.2: Maximum TVOC Content limits for Adhesives and Sealants

Carpets and Flooring
This criterion addresses all new carpets and flooring, or installed as part of a previous provision to 'make good'. Reused carpets and flooring or carpets and flooring already installed in the fit out space are excluded.

The TVOC levels of at least 95 % of carpets and flooring used must be in conformance with the TVOC emissions limits set out in the table below. If carpet has an underlay or carpet pad, the underlay or pad must also be included in the carpet product VOC calculations for this credit.

There are two methods for demonstrating that carpets and flooring complies:

ASTM D5116 (Carpets and other flooring products):	
Total VOC limit	0.5 mg/m^2 per hour
4-PC (4-Phenylcyclohexene) limit	0.05mg/m^2 per hour
ISO 16000 (Flooring products other than carpet):	
TVOC at 3 days	5mg/m²/h
TVOC at 28 days	0.5mg/m²/h

Table IEQ-7.3: Maximum TVOC Content limits for Carpets and Flooring

Engineered Wood Products

Engineered wood products is a range of a derivative wood products which are manufactured by binding the strands, particles, fibres, or veneers of wood, together with adhesives, to form composite materials.

This criterion addresses all engineered wood products which include particleboard, plywood, medium density fibreboard (MDF), laminated veneer lumber (LVL), high pressure laminate (HPL), compact laminate and decorative overlaid wood panels.

This includes engineered wood products for items that may be addressed in the other credits in the materials category, such as those addressed in the Assemblies, Furniture, Flooring and Wall Coverings credits. A timber veneer is not an engineered wood product, however in most cases a veneer would be adhered to an engineered wood product.

IEQ-7 Reduced Exposure to Pollutants

POINTS AVAILABLE 5

The emission levels must be established by a NATA or ISO/IEC17025 registered laboratory as per the testing methodologies provided in table below:

Test Protocol	Emission limit/ Unit of measurements
AS/NZS 2269:2004, testing procedure AS/NZS 2098.11:2005 method 10 for Plywood	≤ 1.0 mg/L
AS/NZS 1859.1:2004 - Particle Board, with use of testing procedure AS/NZS 4266.16:2004 method 16	≤ 1.5 mg/L
AS/NZS 1859.2:2004 - MDF, with use of testing procedure AS/NZS 4266.16:2004 method 16	≤ 1.0 mg/L
AS/NZS 4357.4 – Laminated Veneer Lumber (LVL) Japanese Agricultural Standard MAFF Notification No.701 Appendix Clause 3 (11) – LVL	≤ 1.0 mg/L ≤ 1.0 mg/L
JIS A 5908:2003- Particle Board and Plywood, with use of testing procedure JIS A 1460	≤ 1.0 mg/L
JIS A 5905:2003 - MDF, with use of testing procedure JIS A 1460	≤ 1.0 mg/L
JIS A1901 (not applicable to Plywood) ≤ 1.0 mg/L ASTM D5116	≤ 0.1 (+/- 0.0005) mg/m²hr*
ISO 16000 part 9, 10 and 11 (also known as EN 13419)	≤ 0.1 (+/- 0.0005) mg/m²hr (at 3 days)
ASTM D6007	≤ 0.1 (+/- 0.0005) mg/m²hr (at 3 days)
ASTM E1333	≤ 0.12mg/m³**
EN 717-1 (also known as DIN EN 717-1)	≤ 0.12 mg/m³***
EN 717-2 (also known as DIN EN 717-2)	≤ 3.5mg/m^{2}hr*
JAS 233 for Plywood	≤ 0.12mg/L
EN 120 for particle board and MDF	≤ 9mg/(100g)
For plywood	≤ 6mg/(100g)

* mg/m^{2}hr may also be represented as mg/m2/hr.
** The test report must confirm that the conditions of the above Table IEQ-7.4 comply for the particular wood product type, the final results must be presented in EN 717-1 equivalent (as presented in the table) using the correlation ratio of 0.98.
*** The final results must be presented in EN 717-1 equivalent (as presented in the table), using the correlation ratio of 0.98.
Note, test methods and limits applicable to glulam timber, HPL and compact laminates are JIS A 1901, ASTM D5116 and ISO16000 part 9, 10 and 11. EN717-1 and EN717-2 are also applicable to glulam timber.

Table IEQ-7.4: Formaldehyde Emission Limit Values for Different Testing Methods

IEQ-7 Reduced Exposure to Pollutants

POINTS AVAILABLE 5

BACKGROUND

Volatile Organic Compounds (VOCs) are concentrations of organic chemicals (e.g. formaldehyde) that have a high vapour pressure at original room temperature conditions. This causes large molecules to evaporate and enter the surrounding air. High concentrations of VOCs in internal air have been shown to result in a number of negative health impacts. VOCs are a leading contributor to building related illness (previously known as “sick building syndrome”) and key symptoms associated with exposure to VOCs are eye, nose and throat irritation, headaches, dizziness, loss of coordination, nausea, damage to the liver, kidneys and central nervous system. Some organic compounds are suspected to cause cancer in humans.

The Reduced Exposure to Pollutants credit rewards projects that minimise these negative impacts by selecting paints, adhesives, sealants, carpets and engineered wood products that are low VOC emitting. The introduction of plants into a fitout is also rewarded, as this can further enhance indoor air quality and reduce pollutant levels.

REFERENCES & FURTHER INFORMATION

United States Environmental Protection Agency http://www.epa.gov/iaq/voc.html

Vermont Department of Health http://healthvermont.gov/enviro/indoor_air/voc.aspx

UIS SEDIBA Laboratory http://www.uissl.co.za/index.php/green-building-materials-testing

South African National Accreditation System http://www.sanas.co.za/

South African National Occupational Health and Safety Act, 1993: various chapters http://www.acts.co.za/occupational-health-and-safety-act-1993/index.html

South Coast Air Quality Management District (US), Rules and regulations http://www.aqmd.gov/rules/rulesreg.html

Carpet and Rug Institute, Green Label Testing Program http://carpet-rug.com

Liteplo, R. G. & Chénier, R. (2002), Concise International Chemical Assessment Document 40 – Formaldehyde, World Health Organization http://whqlibdoc.who.int/hq/2002/a73769.pdf

International Agency for Research on Cancer (IARC) (2006), IARC Monographs Vol. 88 – Formaldehyde, 2-Butoxyethamnol and 1-tert-Butoxypropan-2-ol, International Agency for Research on Cancer http://monographs.iarc.fr/ENG/Monographs/vol88/volume88.pdf

IEQ-8 Mould Prevention

POINTS AVAILABLE. .5

AIM OF CREDIT

To encourage and recognise the design of services that reduce the risk of mould growth and its associated detrimental impact on occupant health.

CREDIT CRITERIA

Half a point is awarded where it is demonstrated that for 95% of the nominated area:

- The mechanically air-conditioned ventilation system maintains humidity levels at no more than 60% relative humidity in the space and no more than 80% relative humidity in the supply ductwork;

  AND

- For fit outs in which existing HVAC supply ducting and equipment is being re-used, a visual inspection for mould is to be carried out and, if any mould is found, it must be appropriately cleaned.

  OR

- The fitout is naturally ventilated.

If the air conditioning system is of such a design that it has no supply air ducting then the credit is 'Not Applicable'

If the air conditioning air handling plant does not service the fit out exclusively then the credit is 'Not Applicable'. As an example, if the fit-out encompasses only a few floors in a building with a central HVAC system for the whole of the building, or a similar type of arrangement then the credit will be 'Not Applicable'. This is because the benefits from duct cleaning are only achieved if the whole system is cleaned; if the whole system is not cleaned, the non-cleaned elements will re-contaminate the cleaned elements as the air flows through the system.

DOCUMENTATION REQUIREMENTS

Green Star SA – Interiors PILOT
Submit all the evidence and ensure it readily confirms compliance.
For naturally ventilated spaces: 1. Opening area schedule 2. As Built Drawings *For mechanically ventilated spaces:* 1. Short report 2. As Built Drawings 3. Confirmation from a suitably qualified professional *(only if existing HVAC equipment is being used)*

Opening Area Schedule prepared by a suitably qualified person that describes how the Credit Criteria have been met by:

- Listing each habitable room, its floor area and the area of external openings (openable windows/external doors) in that room. The schedule must include the openings area expressed as a percentage of the room floor area, to clearly demonstrate compliance with the 5% minimum requirement in SANS 10400-O: 2011. The position and arrangement of opening areas must be in accordance with SANS 10400-O: 2011 clause 004.

As Built drawing(s) marked-up to clearly demonstrate:
For naturally ventilated spaces

- The openings and ventilation inlets and outlets.

For mechanically ventilated spaces:

- Humidity sensors installed in the ductwork and confirming that they are connected to an automated HVAC control system

Short report prepared by a suitably qualified professional that describes how the Credit Criteria have been met by:
Where the fitout is naturally ventilated:

- Confirming that no less than 95% of the Nominated Area is naturally ventilated in accordance with SANS 10400-O:2011, as demonstrated by two points in the Provision of Outside air criterion for IEQ-1;

Where the fitout is air conditioned:

- Describing the humidity control system and its operation; and,
- Confirming that the Credit Criteria are met both within the space and within the ducts.

Note that if the humidity levels are maintained by undercooling air and then reheating it without the need of controls, a psychometric chart showing how 80% humidity is maintained, is to be provided in the short report.

Confirmation from a suitably qualified professional, if the existing supply ductwork or equipment is used, that confirms:

- That the ductwork and equipment has been visually inspected for mould. The mould inspection must be done by inspecting duct pieces that were taken down or opening up two to three sections for inspection. Where mould is found, it must be clear that the inside of air handling units, cooling coils and filters have been appropriately inspected.
- Additionally, where mould is found, confirmation that all duct work and plant was cleaned before being made operational again.

ADDITIONAL GUIDANCE

ASHRAE Standard 62-2001 recommends maintaining indoor relative humidity levels between 30% and 60%. Humidity levels less than 30% trigger respiratory discomfort in some people while humidity levels over 70% near surfaces for extended periods of time promote the growth of some forms of mould and fungi.

The U.S. Department of Labour Occupational Safety and Health Administration OSHA 3304-04N 2006 states that indoor relative humidity should be maintained below 70% (25-60%, if possible).

Systems that rely on humidity monitoring only or humidity control by coil selection only do not satisfy the Credit Criteria.

Naturally ventilated spaces
The areas nominated as naturally ventilated must be designed to meet the requirements of SANS10400-O: 2011.

IEQ-8 Mould Prevention

POINTS AVAILABLE. .5

For purposes of this credit, where the fitout is claiming IEQ-1 'Ventilation' by meeting the requirements for 'Naturally Ventilated Spaces' this credit is automatically achieved and no additional documentation is required. Where the project does not achieve full points for the Provision of Outside air criterion in the IEQ-1 credit, the point will not be awarded for this credit through this deemed-to-satisfy route.

Mechanically air-conditioned spaces
Humidity sensors must be provided in the ductwork and linked to automated HVAC control system to ensure that humidity control can be maintained both during and after commissioning. It must be clear from the documentation that an active humidity control system has been incorporated in the project. Extracts from the Commissioning Records will be needed, showing measured humidity levels in the ductwork and in the occupied space for all modes of operation.

Mixed-mode ventilated space
Mixed-mode ventilated spaces must comply with the criteria for mechanically air conditioned spaces.

BACKGROUND

Mould is a type of fungus. There are numerous naturally occurring species present outdoors and inside buildings. Typically, they pose no hazard to people but problems may arise when quantities of mould grow beyond usual limits or when particular species are introduced into a building.

The health effects of concern from exposure to mould contamination in an indoor environment can be common allergy building-related illnesses such as allergic rhinitis, allergic asthma, and hypersensitivity pneumonitis (also called extrinsic allergic alveolitis) as well as infections such as histoplasmosis and ryptococcosis. Mycotoxins can also produce toxin-mediated adverse health effects.

Ultra-violet systems located in the ductwork, just after cooling coils, can reduce the risk of mould growth but do not eliminate the risk.

Excessive moisture in various building materials and systems can provide a conducive environment for mould growth. Controlling humidity and moisture is the primary way to prevent unhealthy mould growth and build up. This must be combined with an effective maintenance programme.

If mould is found in duct work or HVAC components it should be cleaned. All components of the system must be cleaned. Failure to clean a component of a contaminated system can result in re-contamination of the entire system. Water-damaged or contaminated porous materials in the ductwork or other air handling system components should be removed and replaced. Ventilation system filters should be checked regularly to ensure that they are seated properly. Filters should be replaced on a routine schedule.

REFERENCES & FURTHER INFORMATION

Preventing Mould-Related Problems in the Indoor Workplace a Guide for Building Owners, Managers and Occupants: U.S. Department of Labour Occupational Safety and Health Administration OSHA 3304-04N 2006

ASHRAE – Minimizing Indoor Mould Problems Through Management of Moisture in Building Systems

ASHRAE - The ASHRAE Guide for Buildings in Hot and Humid Climates 2008

Ska rating Good practice measures for offices Version 1.1 Clean existing air supply ductwork

IEQ-9 Ergonomics

POINTS AVAILABLE **3**

AIM OF CREDIT

To encourage and recognise the choice of equipment and design of spaces that promotes wellbeing, efficiency and effectiveness

CREDIT CRITERIA

Up to three points are awarded, provided the minimum compliance is met.

Design
One point is awarded where:

- Only ergonomically-designed furniture and equipment are specified for the project. Product data sheets must be provided for each new furniture item (chair, desk, screen environment) to demonstrate ergonomic design features. Any re-used furniture requires a short report written by a suitably trained professional describing the specifications and indicating the dimensions.

Implementation
One point is awarded where:

- An ergonomics assessment is conducted for each user.

Operation
One point is awarded where:

- An on-going ergonomics operational plan is established to ensure that good ergonomics principles are employed throughout the design life.

DOCUMENTATION REQUIREMENTS

Green Star SA – Interiors PILOT
Submit all the evidence and ensure it readily confirms compliance.
1. Short Report 2. Manufacturer Data Sheet(s) 3. Workplace Assessor Training/ Certification / Contract 4. Ergonomics Manual OR Signed Confirmation

Short Report prepared by a suitably trained professional that demonstrates how the Credit Criteria has been met by:

- Listing all the products relevant under this credit that are used in the fitout, indicating the design, selection of each work setting and the supplier/ manufacturer (refer to Additional Guidance)
- Confirming that an Ergonomics Assessment must be conducted for all for non-computer users and computer users.

Where re-used furniture is claimed

- Describing how the re-used furniture has met the ergonomic design features.

IEQ-9 Ergonomics

POINTS AVAILABLE **3**

For fitouts with less than 100 users

- Describing the process undertaken in the fitout design and selection of furniture aimed at maximising ergonomic comfort and confirmation that the resulting design achieves this aim.
- Confirming that there is a trained workplace assessor, an ergonomist manual and a workstation assessment/ display screen equipment assessment form available to the user.

For fitouts with more than 100 users

- Describing the process undertaken in the fitout design and selection of furniture aimed at maximising ergonomic comfort and confirmation that the resulting design achieves this aim.
- Confirming that there is a trained workplace assessor, an ergonomist manual and a workstation assessment/ display screen equipment assessment form available to the user.

Note that for over 100 users, the short report must be written by a certified professional ergonomist.

Manufacturer product data sheet(s) must be provided from the supplier/manufacturer for each new furniture item (chair, desk, screen environment) to demonstrate the ergonomic design features.

Workplace Assessor Training / Certification / Contract must be provided indicating that a user/ employee has been trained as a basic workplace assessor to identify problems and to ensure that good ergonomics principles are employed throughout the design life of the fitout; and

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An ergonomist manual for non-computer users and computer users must be provided to assist with the setup of the users work setting / work place
OR
Signed confirmation from the Tenant stating that a Workstation Assessment / Display Screen Equipment (DSE) Assessment must be carried out by each user whenever the user changes work settings or the work setting is modified or significant new work equipment, change of equipment or new technology is introduced or at regular six monthly intervals

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ADDITIONAL GUIDANCE

The following definitions and exclusions apply:

Ergonomics - Ergonomics refers to “the study of people and their relationship with the environment around them." This considers the physical capabilities and limits of the worker as he or she interacts with tools, equipment, work methods, tasks and the working environment.

Products - Products, for the purpose of this credit, include, but are not limited to desks, workstations, work benches, surfaces, teller counters, chairs, VDU’s, laptops, keyboards and mouse.

Nominated area
The nominated area, for the purposes of this credit, includes all primary spaces. Staff rooms must be included in the nominated area where these are in use for more than two hours per day by the same individual.

User - The user, for purposes of this credit, is defined as the person/staff member who will be using a single piece of furniture or equipment non-continuously for at least two hours during a given day.

IEQ-9 Ergonomics

POINTS AVAILABLE 3

Work setting/work place - A work setting / work place is a desk, workstation, retail counter, teller counter, reception counter, a laboratory, a library bench or similar furniture designed for a specific task. A work setting / work place may be a workstation in an office, a teller counter in a bank, a bench in a retail store, laboratory, and a hospital or similar. The design or selection of a work setting must be shown to address the ergonomic needs of the specific user.

Suitably trained professional - A designer, ergonomist or an individual that has undertaken an ESSA approved course in Workplace Ergonomics.

Certified Professional Ergonomists - Certified Professional Ergonomists are those certified by the Ergonomics Society of South Africa, see www.ergonomicssa.com/

Workstation Assessment / Display Screen Equipment (DSE) Assessment - A workstation assessment /display screen equipment assessment for the purposes of this credit, refers to an analysis or risk assessment of a user / employee work setting/ work place. These requirements can be incorporated into the risk assessment form as a checklist and this can indicate compliance or non-compliance of the user. (Example: NHS Health Scotland - Display Screen Equipment Workstation Assessment – see References and Further Information).

For fitouts less than 100 users the project team must refer to the ergonomic considerations made using the 'Performance Oriented Ergonomic Checklist For Computer (VDT) Workstations' produced by Cornell University or VDU Health and Safety Risk Assessment produced by Rossiter and Co or a recognized standard (refer to References and Further Information).

In fitouts designed for over 100 users the project team is required to engage a certified ergonomist to provide advice and recommendations to the project as relevant to the need of the user, aimed at maximizing ergonomic comfort in the fitout.

For the furniture and equipment to be considered ergonomic, the ergonomic characteristics must be an attribute of the item, not an ad hoc solution (i.e. stating that a monitor is adjustable because it can be placed on top of a box does not fulfil this requirement).

The furniture and equipment must address, amongst other things, adjustability, size and comfort. Equipment placed near or on works settings, including specialised equipment must be taken into account. Common equipment includes computers, cashiers, medical equipment stool and chairs.

In addition, to identify the needs of the users and provide the necessary furniture and equipment, the project must provide an ergonomic manual containing information and guidance to the users;
The information provided must include at least:

- How to properly position and adjust furniture and equipment; and
- Acceptable postures for the head, neck, shoulders, upper arms, wrists, back, legs and feet.

To ensure that on-going good ergonomics principles are adhered to, the user must do a workstation assessment / display screen equipment assessment whenever the user changes work settings or the work setting is modified or significant new work equipment, change of equipment or new technology is introduced or at regular six monthly intervals (refer to References and Further Information).

At least one user / employee must be trained as a basic workplace assessor to identify problems and to ensure that good ergonomics principles are implemented.

BACKGROUND

Since ergonomics in South Africa is a relatively new discipline, there is both a lack of understanding of and awareness of ergonomics within the South African environment.

IEQ-9 Ergonomics

POINTS AVAILABLE 3

Ergonomics is a tool which can be considered to help mitigate injuries in the workplace as it reduces the risk of injury by adapting the work to fit the person instead of forcing the person to adapt to the work.

This credit considers human beings' comfort as an essential part of every business process and critical to delivering quality products and services. It also recognises the lack of productivity that can result from a badly designed work environment.
Work-related musculoskeletal disorders may not immediately be obvious, but tend to develop over a long period of time.

"Work-related musculoskeletal disorders are disorders of the muscles, skeleton and related tissues that have been empirically shown or are suspected to have been caused by a workplace activity", one example is Carpal Tunnel Syndrome. Employees reporting symptoms and receiving treatment early greatly improves the likelihood of preventing a serious injury.

In addition to injury prevention, ergonomics is also concerned with enhancing work performance, by removing the barriers that exist in many work places that prevent employees from performing to the best of their abilities. Therefore, another benefit of applying ergonomics to office work is that it helps people work more effectively, efficiently, and productively.

REFERENCES & FURTHER INFORMATION

Cornell University Ergonomics (Performance Oriented Ergonomic Checklist For Computer (VDT) Workstations) http://ergo.human.cornell.edu/cuvdtchecklist.html

Office Ergonomics (Practical Solutions for a Safer Workplace)
http://www.lni.wa.gov/IPUB/417-133-000.pdf

System Concepts http://www.system-concepts.com/ergonomics/ergonomics-standards.html

NHS Health Scotland (Display Screen Equipment Workstation Assessment) (DSE Form)
http://www.healthyworkinglives.com/document?ItemID=55122

Rossiter and Co (VDU Health and Safety Risk Assessment) http://www.vduhealthandsafety.org/

The Ergonomics Society of South Africa (ESSA) www.ergonomicssa.com/

European Agency for Safety and Health at Work (Work-related musculoskeletal disorders: Back to work report) https://osha.europa.eu/en/publications/reports/7807300

ANSI/HFES 100-2007 Human Factors Engineering of Computer Workstations

CSAZ412-00 (R2011) - Guideline on Office Ergonomics

ISO 9241-11 1998 Ergonomic requirements for office work with visual display terminals (VDTs) -- Part 11: Guidance on usability

IEQ-10 Indoor Plants

POINTS AVAILABLE **1**

AIM OF CREDIT

To encourage and recognise the installation of indoor plants that both improves the indoor environment quality and also provides occupants with a connection to nature.

CREDIT CRITERIA

One point is awarded where:

- Provide one Plant Unit for every 50m^2 of regularly occupied space in the project or a number of plants equalling 0.5 Plant Units per Full Time Equivalent occupant, whichever is greater;

  AND;

- At least 70% of the plants incorporated into the fitout are suited to the indoor environments~~;~~

  AND

- An Indoor Horticultural Maintenance Plan with an Interior Landscape Contractor must be in place for a minimum of two (2) years to ensure that the health and number of plants in the space is maintained.

Note that the table below provides the Plant Units for typical planting applications:

10-15cm Grow Pot	0.33 Units
20cm Grow Pot	0.5 Units
25-32cm Grow Pot	1 Unit
40cm Grow Pot	2 Units
55cm Grow Pot	4 Units
70cm Grow Pot	8 Units
Bed & Vertical Planting	Determine number of equivalent grow pots and divide by this to provide plant units

DOCUMENTATION REQUIREMENTS

IEQ-10 Indoor Plants

POINTS AVAILABLE **1**

Green Star SA – Interiors PILOT
Submit all the evidence and ensure it readily confirms compliance.
1. Statement of confirmation 2. Horticultural Maintenance Plan 3. As-built Floor Plan 4. Extract from maintenance contract

Statement of confirmation from the plant supplier that the quantity and species of the plants supplied and that the plants were selected for their suitability to indoor environments;

Horticultural Maintenance Plan must, as a minimum, include/address the following:

- The location and density of plants;
- Service intervals;
- Policy regarding the maintenance of soil moisture, pH and nutrients;
- Watering and cleaning requirements;

As-built floor plan OR **Photographs** indicating the location and size of the plants/planters

Extract from maintenance contract that demonstrates at least a two year commitment to the Horticultural Maintenance Plan;

ADDITIONAL GUIDANCE

Suitability to indoor environments

For additional guidance in selecting plants that are suited to the indoor environments and have been scientifically demonstrated to produce substantial benefits to indoor air quality, please refer to the " Approved Plantings for Biofiltration for Indoor Air, Green Plants for Green Buildings available at http://www.greenplantsforgreenbuildings.org/attachments/contentmanagers/1/Approved%20Plantings%20For%20Biofiltration%20of%20Indoor%20Air.pdf

Decorative Soil Coverings

Research conducted by Wolverton Environmental Services Inc. revealed that 50-65% of VOC removal can be attributed to root and soil microbes. With the roots being one of the primary sources of air filtration light weight soil and decorative soil coverings need to be used to avoid compaction of soil e.g.13mm bark soil mix is recommended as the basis for the potting soil. Decorative soil coverings could include bark chip or "Eco-Bark "which is made from recycled plastic or rubber. We do not recommend the use of pebbles or gravel as this compacts the soil.

Decorative Pot Selection

IEQ-10 Indoor Plants

POINTS AVAILABLE 1

Pots made from bio-degradable, environmentally friendly / recyclable products should be considered where ever possible.

BACKGROUND

Research has found that indoor plants contribute to the health and wellbeing of building occupants. The introduction of plants into a fitout is rewarded under this credit, as this can further enhance indoor air quality and reduce pollutant levels.

The potted-plant microcosm has been shown to reduce air-borne concentrations of Volatile Organic Compounds (VOCs). Research findings demonstrate that the ability of plants to metabolise VOCs increases with extended exposure to VOCs, provided the potted-plant system is kept in optimum condition.

According to many research studies, people and nature are intertwined, with people's need for a connection to nature having a strong link to their psychological and bodily well-being.

Studies have also shown that indoor plants can also

- reduce dust levels;
- stabilise humidity and temperature;
- baffle noise;
- reduce CO_2 levels; and
- reduce levels of Volatile Organic Compounds.

The presence of indoor plants has also been shown to decrease complaints of symptoms associated with respiratory illness and poor indoor air quality. Several studies have also shown lower workplace stress, a decrease in fatigue and enhanced productivity.

REFERENCES & FURTHER INFORMATION

Burchett, M. Torpy, F. Tarran, J. (2008), Interior Plants for Sustainable Facility Ecology and Workplace Productivity, Faculty of Science, University of Technology, Sydney, http://www.interiorplantscape.asn.au/Downloads/M_B_Papers/BurchettM3_UTS_Ideaction_08_PAPER_W.pdf

Approved Plantings for Biofiltration for Indoor Air, Green Plants for Green Buildings: http://www.greenplantsforgreenbuildings.org/attachments/contentmanagers/1/Approved%20Plantings%20For%20Biofiltration%20of%20Indoor%20Air.pdf

IEQ-11 Universal Access

POINTS AVAILABLE **1**

AIM OF CREDIT

To encourage and recognise designs which provide universal access, to and within fitouts, to meet the changing needs of occupants.

CREDIT CRITERIA

One point is awarded where:

- All fitouts, including peripheral exterior access to, are designed wholly in accordance with the requirements of SANS 10400-S: Facilities for persons with disabilities;
  AND
- For all fitouts, the design of at least one toilet facility on the entry level of the interior space facilitates wheelchair user access in accordance with the requirements defined in Additional Guidance.

DOCUMENTATION REQUIREMENTS

Green Star SA – Interiors PILOT
Submit all the evidence and ensure it readily confirms compliance.
1. Short report

Short report prepared by a suitably qualified professional, demonstrating how the Credit Criteria have been met by:

- Describing the design's compliance with the requirements stipulated in SANS 10400-S for:
  – General (Section 4.1)
  – Signage (Section 4.2)
  – Parking (Section 4.3)
  – External and internal circulation (Section 4.4)
  – Floor or ground surfaces (Section 4.5)
  – Doorways and doors (Section 4.6)
  – Ramps (Section 4.7)
  – Stairways (Section 4.8; where applicable)
  – Handrails (Section 4.9)
  – Lifts (Section 4.10; where applicable)
  – Toilet facilities (Section 4.11)
  – Finishes (Section 4.12)
  – Reach Positions – Controls, switches and power points (Section 4.13)
  – Warning signals (Section 4.14)
  – Lighting (Section 4.15)

- Describing the design's compliance with the requirements stipulated in Additional Guidance for wheelchair access spatial provisions associated with WCs within fitouts; and,
- Confirming that the design is in compliance with the Credit Criteria.

ADDITIONAL GUIDANCE

Interpretation of SANS 10400-S

SANS 10400 Part S applicability clauses state that design for disability is applicable to all buildings, with the *following exceptions*:

a) Any building of which the whole of the ground storey compromises one or more of occupancies classified in terms of the regulation A20 as B1 (High Risk Commercial Service), B2 (Moderate Risk Commercial Service), D4 (Plant Room), H4 (Dwelling House), J1 (High Risk Storage) or J2 (Moderate Risk Storage).
b) Any building classified as H1 (Hotel) in terms of regulation A20 where such building has less than 25 bedrooms and it can be reasonably proven that it is not possible to included wheelchair access in certain aspects of the design; and
c) Any storey above ground floor level of a building classified as H3 (Domestic Residence) in terms of regulation A20 and not provided with a lift.

For the purpose of the Green Star SA Interiors PILOT rating tool, the following SANS 10400 Part S applicability interpretations must be adhered to:

- If there is a lift in the building, the complete building must comply with SANS 10400-S.
- If there is no lift in the building, the ground floor, or the principal entrance storey for the fitout space must comply with SANS 10400-S; and/or
- If the ground floor compromises a sole occupancy other than H3 (Domestic Residence) or combination of occupancy types including H3, the complete building must comply with SANS 10400-S.

SANS 10400-S should be read in conjunction with *SANS 10246-Accessibility of Buildings to disabled persons*.

Supplementary Disabled WC Spatial Requirements to SANS 10400-S

In addition to compliance with SANS 10400-S, IEQ-11 Universal Access' requires that at least one toilet facility on the entry level of all fitouts accessible by wheelchair, is spatially designed to facilitate wheelchair user access. All fitouts located on the ground floor and on storeys provided with lift access must be considered to be 'accessible by wheelchair'. For the purpose of the Green Star SA Interiors PILOT rating tool in the absence of an equivalent SA best practice document, the *UK Building Regulations Part M Section 10* is selected as the design reference for definition of wheelchair access spatial requirements. This supplementary requirement is included to address the issue that SANS 10400-S disabled WC criteria relates to the provision and design of communal disabled WC toilet facilities only.

Accordingly, at least one toilet facility on the entry level of all fitouts accessible by wheelchair must satisfy the following design requirements:

- No stair(s) should obstruct the pathway between the WC room and habitable rooms;
- The door to the WC compartment must open outwards. It is acceptable that the door to the bathroom open inward provided sufficient turning area is provided, a sliding door is also acceptable, where it meets the requirements; however the door to the actual WC compartment must open outwards (see Figure IEQ-11.1);
- The position of the door to the WC must provide clear wheel chair access;
- The width of the doorway must comply with the relevant minimum doorway clear opening widths defined in Table IEQ-11.2; The basin in the WC compartment must not impede the movement of the wheelchair within the WC compartment; and,
- The WC compartment must provide enough space for a wheelchair to access the WC in both frontal access and oblique access scenarios, as defined in Figure IEQ 11:2.

For the purpose of this credit, a 'suitably qualified' person is defined as a qualified Architect or Accessibility/Disability Consultant.

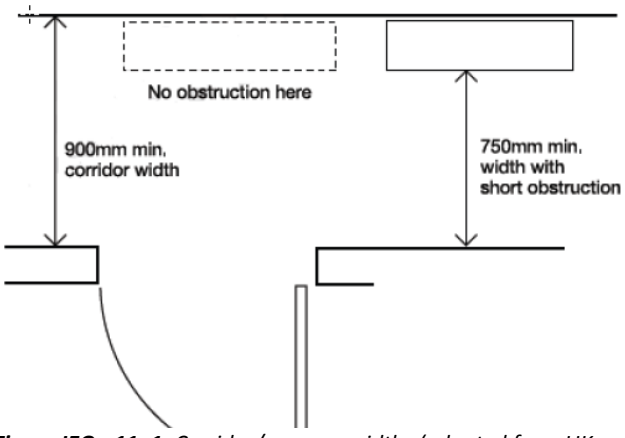

Figure IEQ - 11. 1: *Corridor/passage widths (adapted from UK National Building Regulations, Part M, 2004:72)*

Doorway clear opening width (mm)	Corridor/Passageway width (mm)
750 or wider	900 (when approach is head on)
750	1050 (when approach is not head on)
775	1200 (when approach is not head on)
800	900 (when approach is not head on)

Table IEQ - 11. 1: *Minimum doorway and passageway widths for wheelchair WC access*

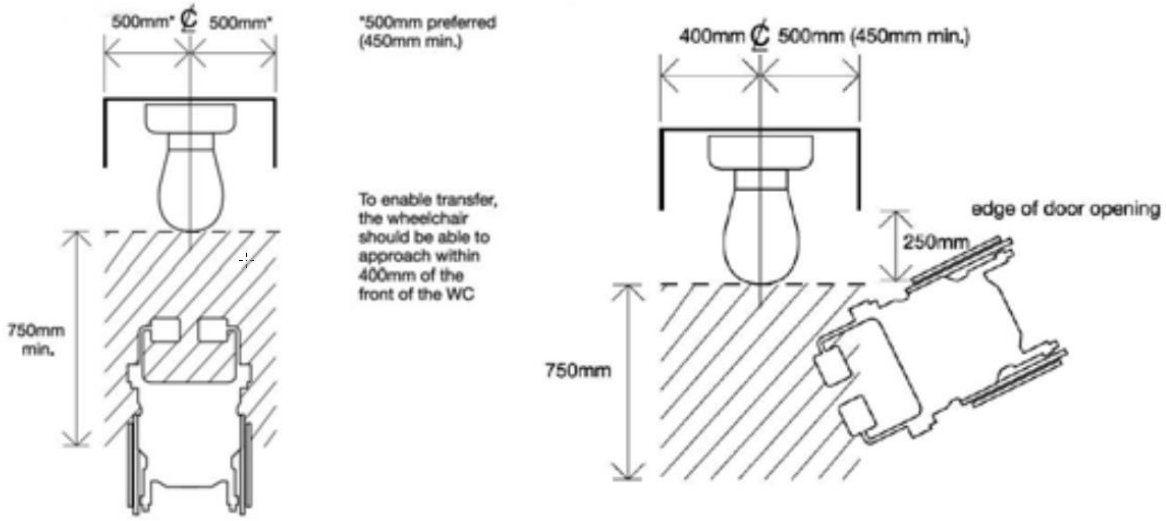

Figure IEQ - 11 2: *Wheelchair spatial provision for frontal access to WC (left) and for oblique access to WC (right) (from UK National Building Regulations, Part M, 2004:72)*

BACKGROUND

Disabled persons, including the elderly, the young, those temporary disabled as a result of an injury or health issues, require equal access to and within the built environment as able bodied persons. Attention to design details that aid the removal of barriers for movement, vision and audio perception are considered a basic consideration for facilitating access to and within buildings for disabled persons.

Disabled persons are protected in South Africa by several laws, namely:

- The Constitution
- The Employment Equity Act
- The Occupational Health and Safety Act
- The promotion of Equality and Prevention of Unfair Discrimination Act

Section 28 of Promotion of Equality and Prevention of Unfair discrimination Act of 2000., Special measures to promote equality with regards to race, gender and disability' states that the state, any organisation and any person may not utilise any laws, codes of practise or actions that place a person in a disadvantaged position due to a disability.

From a legal perspective, buildings can therefore be interpreted as vehicles which facilitate discrimination if they do not accommodate access to, access within and facilities within living or working spaces for disabled persons. International precedent indicates that designing for universal access is an established and understood building practise. However, in South Africa, design for disabled persons and universal access is not as established as an industry practise.

From an environmental perspective, the subsequent retrofitting of buildings for disabled persons will involve materials and energy consumption that could be avoided if considered in the original building design.

IEQ-11 Universal Access

POINTS AVAILABLE **1**

REFERENCES & FURTHER INFORMATION

SABS.2010. Draft SA Standard 10400. The Application of National Building Regulations. Part S: Facilities for persons with disabilities. 3rd Edition (Draft). SABS, South Africa.
South African Bureau of Standards.

SABS. 1993. South African National Standard (SANS) 10246.Accessibility of Buildings to disabled persons. SABS, South Africa. Edition 1.
South African Bureau of Standards.

Office of the Deputy Prime Minister. 2006. The Building Regulations 2010. Part M: Access to and use of buildings. 2004 Edition.
www.planningportal.gov.uk/buildingregulations/approveddocuments/partm/

US Department of Justice (1994), American Disability Act (ADA) Standards for Accessible Design, Appendix A, Excerpt from 28 CFR Part 36.

Energy

The Energy category aims to reward fitouts that can reduce their predicted overall operational energy consumption below that of a comparable standard practice fitout.

Such reductions help to reduce greenhouse gas (and other related) emissions, lower overall energy demand as well as maximise fitouts' operational efficiency and reduce operating costs for building owners and users.

The category aims to facilitate reductions in operational energy consumption by facilitating efficient energy usage and encouraging the utilisation of energy generated by low-emission sources. It also seeks to encourage further maximisation of efficiencies through the selection of low-energy appliances and equipment, and the implementation of good lighting design.

Ene-0 Energy Conditional Requirement

AIM OF CREDIT

To encourage and recognise projects that minimise the greenhouse gas emissions associated with operational energy consumption, and maximise potential operational energy efficiency of a tenant fitout.

CONDITIONAL REQUIREMENT CRITERIA

To meet the Ene-0 Conditional Requirement, the project must demonstrate compliance using one of the two compliance routes described below:

NOTE: *Projects are required to select Compliance Route 1 OR Compliance Route 2. Projects are NOT required to demonstrate compliance to all routes.*

Compliance Route 1 – Energy modelling (up to 20 points)

The predicted greenhouse gas emissions of the actual fitout are less than or equal to the predicted greenhouse gas emissions of a 'benchmark fitout' in the same location when modelled in accordance with the Green Star SA – Interiors PILOT Energy Calculator & Modelling Protocol Guide.

Compliance Route 2 – Deemed to Satisfy (up to 10 points)

The project must meet the alternative prescriptive requirements related to the fitout's systems including lighting, HVAC and equipment.

DOCUMENTATION REQUIREMENTS

Documentation is not required to be submitted for this Conditional Requirement. It must be clear from the documentation submitted for Ene-1 Greenhouse Gas Emissions that the applicable minimum requirements have been achieved.

ADDITIONAL GUIDANCE

This Conditional Requirement must be met for the Project to be eligible for a Green Star SA – Interiors PILOT certification. For further details, please refer to the Green Star SA – Interiors PILOT Energy Calculator & Modelling Protocol Guide**.**

BACKGROUND

Please refer to Refer to Ene-1 Greenhouse Gas Emissions for further background information.

REFERENCES & FURTHER INFORMATION

Please refer to Refer to Ene-1 Greenhouse Gas Emissions for references and further information.

least 3 points in this route.

Up to 10 points are available for this credit as follows:

Part A - Artificial lighting

Up to two points are awarded where:

- The effective installed lighting power density for at least 95% of the tenancy area is less than the values prescribed in the below table (adapted from SANS 10400 and ASHRAE 90.1)

Building Code Classification	Occupancy	For 1 point (W/m^2)	For 2 points (W/m^2)
A1	Entertainment and public assembly	7	5
A2	Theatrical and indoor sport	7	5
A3	Places of instruction	7	5
A4	Worship	7	5
B1	High risk commercial service	16.8	12
B2	Moderate risk commercial service	14	10
B3	Low risk commercial service	10.5	7.5
C1	Exhibition hall	10.5	7.5
C2	Museum	3.5	2.5
D1	High risk industrial	14	10
D2	Moderate risk industrial	14	10
D3	Low risk industrial	14	10
D4	Plant room	3.5	2.5
E2	Hospital	7	5
E3	Other institutional (residential)	7	5
E4	Health care	7	5
F1	Large shop	10.5	7.5
F2	Small shop	10.5	7.5
F3	Wholesalers' store	10.5	7.5
G1	Offices	7.7	5.5
H1	Hotel	7	5
H2	Dormitory	3.5	2.5
H3	Domestic residence	3.5	2.5
H4	Dwelling house	3.5	2.5
H5	Hospitality	7	5

Part B – Lighting controls

Up to two points are awarded independently as follows:

One point is awarded where:

- Occupancy sensors that control lighting are installed for at least 75% of the tenancy, excluding open plan desk areas

One point is awarded where:

- Photocell sensors that control lighting are installed for at least 25% of the tenancy, excluding open plan desk areas

Part C - Equipment

Up to two points are awarded as follows:

One point is available where:

- 75% of appliances and equipment (either by rated power or number of appliances) installed in the fitout are energy efficient.

OR

Two points are available where

- 90% of appliances and equipment (either by rated power or number of appliances) installed in the fitout are energy efficient.

An energy efficient appliance is defined to be one which has achieved either a minimum B rating of the European Energy Rating labelling system or has an ENERGY STAR® rating.

Note: this requirement applies to appliances, office equipment, electronics, and commercial food service equipment. Excluded are HVAC, lighting, and building envelope products.

Part D - Plug Load Control

One point is awarded where:

- Plug load controls are used for 75% of plug points. These may be either motion sensors or timer based. Equipment includes but is not limited to computers, washing machines; televisions and AV equipment, printing and photocopy equipment

Equipment includes but is not limited to: computers; refrigerators; washing machines; televisions and AV equipment; printing and photocopy equipment.

Only appliances and equipment that are not regularly removed from the space, such as laptops, tablet and mobile phones, are considered for this criterion.

Part E - HVAC

Two points are awarded where:

- The fitout is naturally ventilated

OR

Ene-1 Greenhouse Gas Emissions

POINTS AVAILABLE **10**

Two points are awarded where:

- The equipment in the fitouts meets the minimum efficiency as per the table below

Equipment	Performance requirement
Unitary console and split type	3.2 COP*
Packaged and Split Air Conditioning	3.2 COP*
Water cooled chiller	5.05 IPLV**
Air cooled chiller	3.5 IPLV**

* COP includes indoor fan unit at 35°C outdoor temperature
**ESEER or any other standard rating system can be used provided performance is shown to be equal or superior to IPLV figures used above.

OR

- Any one of the initiatives below have been implemented:
  - Economy cycle for systems serving at least 90% of the occupied area
  - Evaporative cooling
  - Ammonia based heat rejection
  - Heat recovery chiller, heat pumps or ventilators
  - Radiant Cooling systems
  - Variable refrigerant flow systems

For systems not included in the list above, the project team can submit a CIR showing that the proposed system has equal or improved performance over at least one of the systems listed above.

Part F - Space Heating

One point is awarded where:

- The fitout makes no use of resistive heating for space heating purposes

DOCUMENTATION REQUIREMENTS

Note: *Project Teams must select Compliance Route 1 OR Compliance Route 2. Projects Teams are NOT required to demonstrate compliance to both routes.*

Compliance Route 1 – Energy Modelling

Green Star SA – Interiors PILOT (Modelled Route)
Submit all the evidence and ensure it readily confirms compliance.
1. Energy modelling report 2. Completed Green Star SA – Interiors PILOT Energy Calculator 3. As-Built drawings

Ene-1 Greenhouse Gas Emissions

POINTS AVAILABLE **10**

Additionally for naturally ventilated spaces:

4. Natural ventilation report

Energy modelling report in accordance with the Green Star SA – Interiors PILOT Energy Calculator & Modelling Protocol Guide

- Following the structure defined in the Green Star SA – Interiors PILOT Energy Calculator & Modelling Protocol Guide;
- Clearly identifying all assumptions made for tenant and other loads (e.g. occupant density);
- Clearly identifying all of the design-driven inputs and referencing drawings; and
- Clearly corresponding to the design.

Whenever assumptions are used, they must be justified and conservative

Completed Green Star SA – Interiors PILOT Energy Calculator to show what energy values have been entered for the actual and benchmark fitout.

Extracts from as-built documentation demonstrating that all the inputs used in the energy simulation are reflected in the installation.

Natural Ventilation Report prepared by a mechanical engineer that describes how the fitout has been designed to be naturally ventilated and confirms that analysis has been carried out to check that internal conditions will be acceptable to the occupants. This is to avoid rewarding fitouts which will overheat or be uncomfortable and require air conditioning to be retrofitted.

The report should include:

a) Opening Area Schedule of openings room by room, showing that each naturally ventilated space has an opening of area at least 5% of floor area (as required by SANS 10400-O).

b) Thermal Analysis of all typical spaces in the fitout, using hourly weather data to show that internal conditions meet the following criteria:

internal operative temperatures are within the 80% Acceptability Limits given in ASHRAE Standard 55-2004 for 90% of occupied hours in the year; OR

PMV (Predicted Mean Vote) levels are within -1.0 and +1.0 for 90% of occupied hours in the year.

The report must clearly show the geometry and materials of the model, and list all assumptions made such as clothing levels, etc. Occupancy times, equipment and lighting heat gains should be modelled using the same assumptions as the Green Star SA – Interiors PILOT Energy Calculator & Modelling Protocol Guide. The report should include a summary of the mean radiant temperatures and air temperature results from the simulation and details of the weather data used. Refer to credit IEQ-9 for more details of calculation method.

Note that if a naturally ventilated building fails to achieve the above criteria, it can still be entered for Green Star SA – Interiors PILOT assessment, but the energy modelling must include a notional air conditioning system in the actual fitout (refer to Green Star SA – Interiors PILOT Energy Calculator & Modelling Protocol Guide for more details). This is because with such a building there is a significant risk that future occupants will retrofit air conditioning systems).

Ene-1 Greenhouse Gas Emissions

POINTS AVAILABLE **10**

Compliance Route 2 – Deemed-to-Satisfy (DTS)

Green Star SA – Interiors PILOT
Submit all the evidence and ensure it readily confirms compliance.
1. Short Report 2. Contractual documentation

Short Report prepared by a suitably qualified professional clearly outlining the compliance route chosen and providing a summary table of how the various point are achieved.

Contractual documentation – this can be in the form of As-built drawings or a signed confirmation from the tenant stating all relevant equipment installed for the tenancy. All calculation inputs used for the short report must be referenced in this documentation.

ADDITIONAL GUIDANCE

Modelling and supporting documentation

Refer to the Green Star SA – Interiors PILOT Energy Calculator & Modelling Protocol Guide for details of how to carry out the modelling.

Renewable energy, off-sets and carbon credits

Where the project produces its own energy on site, this production can be included within the energy modelling; any greenhouse gas-neutral energy will directly reduce the fitout's predicted greenhouse gas emissions.

Carbon credits, off-sets and commitments to purchase renewable or 'green' power from an electricity supplier are an operational matter, rather than an inherent building attribute; as a result 'green' power generated off-site cannot be included in energy modelling.

BACKGROUND

The Greenhouse Gas Emissions credit is a conditional requirement of the Green Star SA- Interiors rating tool, meaning minimum credit requirements must be met in order for a Green Star SA – Interiors certified rating to be achieved.

Through the Greenhouse Gas Emissions credit, predicted greenhouse gas emissions are calculated to determine improvement over that of a comparable 'benchmark fitout' as determined by the Greenhouse Gas Emissions Calculator.

REFERENCES & FURTHER INFORMATION

ANSI-ASHRAE 104:2004 *Standard Method of Test for the Evaluation of Building Energy Analysis Computer Programs*

CIBSE TM33:2006 *Tests for Software Accreditation and Verification*

Energy Efficiency Strategy of the Republic of South Africa – Department of Minerals and Energy, March 2005

ASHRAE 90.1-2004 *Energy Standard for Buildings Except Low-Rise Residential Buildings*
http://www.ashrae.org

SANS 204:2008 *Energy Efficiency in Buildings*
http://www.sabs.co.za

SANS 10400 Part XA: 2011 *Energy Efficiency in Buildings*
http://www.sabs.co.za

International Energy Conservation Code, 2006 edition
http://www.iccsafe.org

Energy Efficiency Strategy of the Republic of South Africa – Department of Minerals and Energy, March 2005

ASHRAE 90.1-2004 *Energy Standard for Buildings Except Low-Rise Residential Buildings*
http://www.ashrae.org

SANS 204:2008 *Energy Efficiency in Buildings*
http://www.sabs.co.za

SANS 10400 Part XA: 2011 *Energy Efficiency in Buildings*
http://www.sabs.co.za

International Energy Conservation Code, 2006 edition
http://www.iccsafe.org

Ene-2 Energy Sub-metering

POINTS AVAILABLE **3**

AIM OF CREDIT

To encourage and recognise the installation of energy sub-metering that facilitates on-going management of energy consumption.

CREDIT CRITERIA

Up to three points are awarded as follows:

Two points are awarded where:

- Electrical sub-metering is provided for all substantive electrical energy uses within the project

AND

- An effective monitoring system is installed to monitor all sub-meters and a metering strategy is prepared

An additional one point is awarded where:

- The above point is achieved;

AND

- Electrical sub-metering is provided separately for lighting and separately for power consumption. Where the tenancy is greater than one floor, this must be provided separately for each floor.

DOCUMENTATION REQUIREMENTS

Green Star SA – Interiors PILOT
Submit all the evidence and ensure it readily confirms compliance.
1. Short report 2. As Built drawing(s) 3. Metering strategy

Short report prepared by a suitably qualified professional describing how the Credit Criteria have been met by:

• Providing a summary table of all separately sub-metered lighting and power groups for the fit out;

• Providing a summary table of all separately sub-metered spaces and substantive loads in the fitout, or justifying their exclusion through calculations;

• Describing how the energy is effectively monitored during then fitout's operation and how fitout occupants have access to their consumption data

Ene-2 Energy Sub-metering

POINTS AVAILABLE **3**

As Built drawing(s) marked-up to clearly show the location of all sub-meters and the loads of all substantive energy demands as referenced in the short report.

Metering strategy document that describes:

• The frequency of meter readings, data collection and storage, and reporting method; and,

• How metering errors are to be identified and provide guidance on future calibration or verification requirements (where applicable).

ADDITIONAL GUIDANCE

The documentation must account for all of the substantive electrical demands in the fitout, and clearly identify the location, number and respective loads of all submeters.

Effective monitoring system

There must be an 'effective' system for collecting, recording and monitoring data from all sub-meters. In most cases, the requirement for an effective system will lead to the inclusion of automated monitoring systems. Manual monitoring of sub-meters is an acceptable way to meet the Credit Criteria.

Substantive electrical loads

Substantive electrical loads are those where electrical sub-metering is deemed sensible and beneficial for energy saving and monitoring by a suitable qualified professional. These are expected to include the following:

- Centralised hot water, heating, cooling or ventilation systems (electric and gas metering as appropriate);
- Car park lighting & ventilation;
- Common area lighting/general power;
- External lighting;
- Lifts (if collectively over 20 kVA)
- Chillers;
- Hot water plants for space heating;
- Air handling fans;
- Lifts/escalators;
- Building-related process energy systems and equipment; and
- Any additional item that carries an energy use greater than 25kVA.

Metering strategy

The metering strategy for sub-metering must describe;

Ene-2 Energy Sub-metering

- The frequency of meter readings, data collection and storage, and reporting method; and,
- How metering errors are to be identified and provide guidance on future calibration or verification requirements (where applicable).

This document must be based on what the actual methodology will be that the fitout will adopt for sub-metering. The strategy document need not be exhaustive and must be written in easy-to- read language for a non-technical reader.

BACKGROUND

The Energy Sub-Metering credit encourages the provision of energy use information to fitout users as a meaningful deterrent to wasteful behaviour and a powerful way to raise awareness of the financial benefits of reduced energy consumption.

Metering is an integral part of energy and resource conservation during a fitout's operational life. In successfully managing energy consumption it is important that sufficient data is available to the tenant to allow them to monitor consumption and compare historical records. Sub-metering allows the tenant of fitout managers to fine tune operational procedures to minimise consumption and to detect any operational problems early.

REFERENCES & FURTHER INFORMATION

CIBSE TM39:2006 Building Energy Metering – A Guide to Energy Sub-metering in Nondomestic Buildings

International Performance Measurement & Verification Protocol
http://www.ipmvp.org

Transport

The Transport category aims to reward projects that can facilitate a reduction of the dependency of occupants on private car use as an important means of reducing overall greenhouse gas emissions.

Motor vehicles in general and private cars in particular, are responsible for many forms of pollution. Climate change is impacted by motor vehicle use indirectly due to the high amounts of energy (and therefore emissions) required to manufacture cars and build supporting infrastructure and services, as well directly as the transport fuels combusted lead to greenhouse gas emissions within exhaust fumes. Car exhaust fumes also increase the levels of polluting particles in the air, which are a contributing cause of asthma and other respiratory illnesses.

If reliance on motor vehicle transportation is to be reduced, it is necessary to maximise alternative options. Rather than limiting access to private fossil fuel vehicles, the Transport category aims to encourage and reward initiatives that reduce the need for their use. This may include initiatives that encourage and make possible the use of mass transport like trains, buses and minibus taxis, as well as pedestrian and cycling opportunities. Of all of these alternatives, walking is the most ‘sustainable’, with no associated embodied energy or pollutants; cycling similarly does not pollute the environment.

Tra-1 Commuting Mass Transport

POINTS AVAILABLE **1**

AIM OF CREDIT

To encourage and recognise the selection of sites/premises that are near public transport and facilitate the use of mass transport.

CREDIT CRITERIA

One point is available where:

- The project is located within 1000m of a mass transport facilities (i.e. bus station, train station and taxi rank);

DOCUMENTATION REQUIREMENTS

Green Star SA – Interiors PILOT
Submit all the evidence and ensure it readily confirms compliance.
1. Short report 2. Site Plan extending to surrounding areas OR Google Maps

Short report prepared by a suitable professional including a tabulated summary of the public transport stops surrounding the site in compliance with the distance requirement;

Site plan extending to surrounding areas drawn to scale showing the project site and surrounding area, including:

- The major entrances to the building;
- The relevant mas transport stop(s); and
- The walking distance from the building entrance to the relevant transport stop(s).

ADDITIONAL GUIDANCE

There is no additional guidance for this credit.

Tra-1 Commuting Mass Transport

POINTS AVAILABLE 1

BACKGROUND

The Commuting mass transport credit addresses the importance of choosing appropriate sites as it relates to commuter transport access.

Access to quality public transport can have a significant impact on travel habits and result in better environmental outcomes across a variety of impact categories. When a development is poorly located in proximity to transport nodes (stops, stations and interchanges) and/or and the frequency of service is poor, then it is unlikely that fitout occupants will use mass transport to travel to work or complete other errands. Conversely, developments that are within close proximity of good transport nodes with frequent service can encourage fitout occupants to use mass transport.

REFERENCES & FURTHER INFORMATION

City of Cape Town's Integrated Transport Plan
http://www.capetown.gov.za/en/IDP/Statutory%20plans%202011%20%202012/AnnexureK_Integrated_Transport_Plan_Revised.pdf

VicHealth (1999), Trends in Transportation in Moving to Healthier People and Healthier Places, Victorian Government, Melbourne, Australia.
http://www.vichealth.vic.gov.au/~/media/ProgramsandProjects/PlanningHealthyEnvironments/Attachments/vhtransch3.ashx

Urban non-motorised transport (NMT) (2001) A critical look at the development of urban NMT policy and planning mechanism in South Africa from 1996 -2006
http://www.up.ac.za/dspace/bitstream/2263/5953/1/017.pdf

Tra-2 Local Connectivity

POINTS AVAILABLE **1**

AIM OF CREDIT

To encourage and recognise tenants that choose to locate their premises within walking distance of high quality amenities such as shops and parks, thus reducing private vehicle use and the associated negative environmental impacts.

CREDIT CRITERIA

One point is awarded where:

- At least five amenities listed below are located, within 1000m unimpeded walking distance of the tenancy's building entrance, or are within the building itself.

Accepted amenities:

- Hardware store
- Public sports field
- Pharmacy
- Gym, pool or sports facility
- Library
- Bank or ATM
- Cinema or theatre
- Places of worship
- Officially designated 'Trading Area'
- Community centre
- Hospital, clinic or healthcare centre
- Registered childcare centre
- Post office
- Retail shop
- School, University or Technikon
- Hair Salon
- Community food garden
- Supermarket or grocery store
- Laundromat
- Convenience store
- Restaurant or food outlet
- Recycling depot
- Garden nursery
- Car Wash
- Playground

Projects within a retail centre or a mixed use development can use amenities within the development to demonstrate compliance with this credit.

Tra-2 Local Connectivity

POINTS AVAILABLE **1**

DOCUMENTATION REQUIREMENTS

Green Star SA – Interiors PILOT
Submit all the evidence and ensure it readily confirms compliance.
1. Short report 2. Site Plan OR Google Maps

Short report prepared by a suitable professional that includes a summary table for all amenities, with the type and the distance to the building stated as well as evidence these amenities exist.

Site plan OR Google maps indicating to scale the location of all the amenities needed to achieve the credit, that highlights the walking route and distance to each amenity. (This could be in the form of a AutoCAD drawing or Google map screen shot, for example).

ADDITIONAL GUIDANCE

There is no Additional Guidance for this credit.

BACKGROUND

The Local Connectivity credit addresses the importance of selecting sites that are easily accessible and are located within walking distance of a variety of high quality amenities. Where amenities are located within close proximity, the likelihood of building occupants choosing to walk or cycle these short distances increases, and satisfaction increases due to increased convenience and reductions to travel time. Access to quality public transport can have a significant impact on travel habits and result in better environmental outcomes across a variety of impact categories.

Sites that are located within walkable distance to other amenities and public transport facilities also result in significant environmental benefits such as reduced necessity for carbon-intensive private transport. Reduced private transport leads to subsequent decreases in the demand for

Tra-2 Local Connectivity

POINTS AVAILABLE 1

car-parking facilities, thus making land available for more environmentally, socially, or economically beneficial uses.

REFERENCES & FURTHER INFORMATION

City of Cape Town (2005), City of Cape Town NMT Strategy
http://www.sustainable.org.za/transit/resource-library/non-motorised-transport/7.html

City of Johannesburg, (2007) City of Johannesburg Planning Framework for NMT in JHB
http://www.joburg-archive.co.za/2009/pdfs/transport/nmt_framework09.pdf

http://www.vichealth.vic.gov.au/~/media/ProgramsandProjects/PlanningHealthyEnvironments/Attachments/vhtransch3.ashx

Tra-3 Alternative transport

POINTS AVAILABLE **1**

AIM OF CREDIT

To encourage and recognise projects that promote and facilitate the use of alternative modes of transport over the use of private cars.

CREDIT CRITERIA

One point is available for this credit. Each half point is independent of each other.

Cyclist facilities

Half a point is awarded where:

- Common users have access to secure bicycle storage, secure showers and lockers/personal storage space.

Note that it must be convenient for staff to arrive at the project, lock their bicycle, go to a location where they can securely store items in a locker or otherwise, take what is needed for a shower and change clothes.

Parking or Reduced use of private fossil fuel vehicles

Half a point is available where:

- 5% of the tenant parking spaces provided for occupants and visitors are kept for mopeds, scooters, motorbikes, carpooling and electric vehicles

OR

Half a point is available where the operational travel is further reduced by encouraging the reduction of private car use through any of these initiatives:

- No parking is provided for staff
- Provide electric vehicles electric vehicles and charging facilities for staff to encourage the use of this vehicle during work travel by staff.
- Provide access to car sharing programs
- Provide access to bicycle share programs for fitout staff
- Providing leased or purchased bicycles

Tra-3 Alternative transport

POINTS AVAILABLE **1**

DOCUMENTATION REQUIREMENTS

Green Star SA – Interiors PILOT
Submit all the evidence and ensure it readily confirms compliance.
1. Short report 2. As Built drawings 3. Evidence of alternative transport facilities

Short report prepared by a suitable professional that describes the submission for this credit. The short report should detail:

- The points being claimed; and
- A short description how each of the credit criteria that is being claimed has been met with a correlation to the documentation submitted as described below.

Where the point for 'Cyclist facilities' is claimed including:

- the location and provision of the cyclist facilities, including showers and lockers provided and referencing as built drawings or images;
- Stating how convenience access and security is provided;

Where the point for 'Parking or Reduced use of private fossil fuel vehicles' is claimed including:

- A description of the available services available for use by the staff referencing receipts, contracts or as-built drawings documenting how at least one the credit
- options is provided.
- Describing the policy in place to ensure the services will be used.

As -built drawings showing relevant feature relating to credit compliance, such as including location of showers, lockers, bike parking, meeting rooms, charging facilities or a map of the site showing the location of the pod, the site and the relevant walking distance.

Evidence of alternative transport facilities in the form of receipts or contracts for the purchase or lease of the alternative modes of transport provided as well as car and bicycle sharing programs implemented.

ADDITIONAL GUIDANCE

Cyclist facilities

Tra-3 Alternative transport

POINTS AVAILABLE 1

For this criterion to be met, staff must have access to a sufficient number of high quality cyclist facilities. For the purposes of this criterion high quality cyclist facilities are defined as:

- Secure bicycle storage; and
- Secure showers and lockers, and a space to change clothes.

There are a number of methods to fulfil this requirement. Regardless of the method, it must be convenient for staff to arrive at the project, lock their bicycle, go to a location where they can securely store items in a locker or otherwise, take what is needed for a shower and change clothes. For example, a staff member must not need to store their belongings at their desk or have to go through a large public area between the location of lockers and showers

Sufficient number

Secure cyclist facilities must be provided for at least 3% of the fitout staff. For all staff calculations, the number of staff should be the maximum number of staff that will work in the fitout at the same time during a month of standard operation. The figures should include all staff: i.e. not only staff employed by the main fitout user, but also staff such as temporary exhibitors, event staff, security personnel, staff in leased areas as well as maintenance stuff such as cleaners. For each bicycle parking space one locker must be provided. For every 10 parking spaces one shower must be provided.

Bicycle storage

Secure bicycle storage for staff is to be protected from the elements and provided in close proximity to the entrance to the car park or office area, in a location that is highly visible, well lit, well signposted and with good passive surveillance.

Secure tenant bicycle storage can be achieved by one of the following two methods:

- Racks/rails which are covered and protected from the elements, and designed to allow both a wheel and the frame to be locked securely to the structure;

OR

- A locked bicycle shed, with access for staff only. Sufficient space must be provided to store all bikes without having to move other bikes or rely on a bike's integral stand. Fixtures to lock bikes in this case are not required.

Railings, lamp posts or other non-purposeful bike parking facilities do not comply.

Showers

Showers and changing facilities must be protected from the elements and available for both male and female users. These facilities can be available for non-cycling users of the building.

Tra-3 Alternative transport

POINTS AVAILABLE 1

The total required number of showers and lockers does not have to be provided in one area. However, all cyclist facilities must be accessible to all staff.

Showers must either have a space for changing, or be located next to a changing amenity with a temporary storage space or lockers. Both showers and changing areas must be able to be locked and provide full privacy to the user. The showers must also provide a space to hang or store dry towels and clothing items and change areas away from wet areas.

Showers cannot be located within a toilet or disabled bathroom facility. Note that toilets do not count as changing facilities unless there is sufficient private space and lockers. Even if toilets are fitted out as changing rooms, the minimum number of disabled toilets mandated by statutory requirements cannot contribute to the total number of changing facilities provided, as doing so may detract from their availability for use by disabled persons. Disabled showers do contribute towards the total number of showers provided when they are not stipulated in statutory requirements for the project.

To be deemed adjacent, changing facilities must be immediately adjacent to the showers or for refurbishments, be located on the same floor with direct access that avoids crossing of public spaces such as lift lobbies, reception areas or primary circulation space.

Lockers

Lockers can be provided in a changing amenity where the showers are located and within a location next to the shower. Lockers cannot be located in another area of a building that a person is not likely to have access to.

Additional notes for this criterion

The total required number of showers and lockers does not have to be provided in one area. Showers and changing amenities can be available for other users than cyclists. Unisex facilities can meet the requirements for the credit criteria if a level of privacy is provided for the showering and changing (i.e. opaque partitions and private changing amenities adjacent to or within the showers).

Provide electric vehicles for staff use.

Demonstrate that electric vehicles and charging facilities are provided as part of the project. One electric vehicle and charging facility must be provided for every 100 staff or one vehicle and one charging facility must be provided if the total number of staff is less than 100. A policy must be put in place to encourage the use of this vehicle during work travel by staff. A nominated member of staff must be trained in the use of the vehicle and will train all other staff members on the use of the vehicle as required. Alternatively, both the Operational information and Maintenance information points are achieved in the 'Use and Maintenance Information' credit and where the use of the electric vehicle is addressed in this credit.

Tra-3 Alternative transport

POINTS AVAILABLE 1

Electric car charging facilities may be provided within car-parking facilities that are part of the project or in car-parking facilities which are leased for use by the project in the building, neighbouring buildings or car-parking facilities. The leased parking must be no further than 500 metres walking distance from an entry to the building where the project is located.

When documenting the provision of electric vehicles, provide receipts or contracts for the purchase or lease of a plug-in electric vehicle and the provision of appropriate car charging facilities. Where charging facilities are provided in neighbouring buildings or car parking facilities, provide drawings showing the route and distance taken from the car park to the closest entry to the building. Additional documentation evidencing promotion of the vehicle for use by staff and accounting of the energy use as part of a renewable energy strategy must also be provided.

Provide access to car sharing programs

Demonstrate that fitout staff have access to a car sharing program with pods available to them within 500 metres walking distance. One pod must be available for every 100 staff or 1 pod must be available if the total number of staff is less than 100. A policy must be put in place to encourage the use of this vehicle for use during work travel by staff.

When documenting the provision of car or bicycle sharing program provide receipts or contracts for the provision of a car or bicycle lease of a non-petrol vehicle and the provision of appropriate car charging facilities. Where charging facilities are provided in neighbouring buildings or car parking facilities, provide a copy of the least for the car parking spaces valid for at least five years from the date of fitout completion as well as drawings showing the route and distance taken from the car park to the closest entry to the building.

If the existing car share provision is not sufficient, and newly provided pod(s) and vehicle(s) are provided, these must be publicly accessible to all members of the applicable car sharing program, the vehicle(s) of the car sharing program cannot be maintained for the exclusive use of a fitout tenant.

Provide access to bicycle share programs

Demonstrate that fitout staff have access to a bicycle share program, only possible where the cyclist facilities point of the credit has also been achieved. The number of bicycles provided must correlate with the number of bicycle parking facilities provided on the basis of the cyclist facilities criteria of this credit.

When documenting the provision of bicycle sharing program provide receipts or contracts for the provision of bicycles for the project.

Design and implement a video conferencing solution to minimise air travel

Provide either a central video conferencing solution, or a video conferencing solution in each meeting room, with sufficient bandwidth to support multiple video and desktop sharing streams

simultaneously. The video conferencing facility must be fully in place, not planned for future implementation.

Desktop video conferencing facilities can be used to demonstrate compliance with this criterion. However, each facility must be provided with a microphone or headset, as well as headphones. If this solution is used, it must be demonstrated that the office network and internet connection have sufficient capacity to hold simultaneous video conferences for at least 10% of staff at any given time without impacting the rest of the network speed.

A policy must be put in place to encourage the use of these facilities for use during work travel by staff. Training must also be in place to ensure these facilities are used.

Note for retail spaces

It is acknowledged that in some retail spaces the 'reduced use of private fossil fuel vehicles' criterion may not be relevant. PILOT projects are encouraged to contact the Green Building Council of South Africa and propose alternative criteria which will achieve the same aim and are relevant to the circumstances of the project.

BACKGROUND

The Alternative Transport credit addresses transport modes and technologies that are not addressed by other credits within the Green Star – SA Interiors PILOT Transport category. Alternative transport modes include cycling, electric vehicles, car-sharing and the provision of live conferencing technology in order to negate the necessity of travel altogether. The implementation or encouragement of alternative transport use can result in significant benefits to environmental, social and economic aspects of sustainability.

The use of all forms of alternative transport requires the provision or availability of at least some level of infrastructure within close proximity to a building. For example, if electric car use is to become a viable option for fitout users, access to car-charging facilities must be provided.

Tenants may choose to select sites where alternative transport infrastructure is already readily available, or to implement and spread such technologies or infrastructure in areas where they are not commonly available.

REFERENCES & FURTHER INFORMATION

Infrastructure policy, planning and design digest
http://www.ibike.org/engineering/infrastructure.htm

Framework for non-motorised transport, January 2009
http://www.joburg-archive.co.za/2009/pdfs/transport/nmt_framework09.pdf

Tra-3 Alternative transport

POINTS AVAILABLE **1**

City of Cape Town: NMT Policy and Strategy
http://www.cityenergy.org.za/transport/nmt

Water

The Water category aims to encourage and reward initiatives that reduce the consumption of potable water through measures such as the incorporation of water efficient fixtures and building systems and waste water reuse.

Reductions in operational water consumption may be achieved through maximisation of water-efficiency within a project, as well as through the utilisation of reclaimed water sources. In the case of fitouts, further water efficiencies can be gained through the selection of efficient appliances and equipment and the selection of base buildings that have already implemented efficient fixtures, fittings and systems.

Wat-1 Potable Water

POINTS AVAILABLE **6**

AIM OF CREDIT

To encourage and recognise interior fitouts that minimise potable water consumption.

CREDIT CRITERIA

Up to six points are awarded where the water efficiency performance of the fitout achieves a minimum percentage reduction in potable water consumption from a reference case using the Green Star SA – Interiors PILOT Potable Water Calculator.

DOCUMENTATION REQUIREMENTS

Green Star SA – Interiors PILOT
Submit all the evidence and ensure it readily confirms compliance.
1. Short report 2. Statement of confirmation (1) 3. Completed Wat-1 Calculator 4. Statement of confirmation (2) 5. Manufacturer product datasheet(s) OR Letter from the supplier 6. As Built drawing(s)

Short report prepared by a suitably qualified professional that describes how the Credit Criteria have been met by:

- Listing the key elements supporting the water efficiency strategy and key systems; and
- Providing a tabulated summary of fixtures and fittings included and nominating the water efficiency performance (i.e. L/min or L/flush) of each, with reference to supporting documentation.

Additionally where water based heat rejection is proposed/installed:

- Describing the heat rejection system proposed for the project;
- Listing the heat rejection loads as determined by the Energy Modeling, or calculated by mechanical engineer if no modelling was done for Ene-01; and
- Justifying all entries to the Calculator relating to water consumption by the heat rejection system (drift co-efficient, condenser water dT, cycles of concentration) by referencing supporting documentation where relevant.

Additionally where efficient outdoor landscaping is proposed/installed:

- Listing the landscape areas, sizes and microclimate, with reference to supporting drawings;

- Listing the plant schedule and identifying the projected water demand for each defined landscape area, in line with Appendix B of the Potable Water Calculator Guide; and
- Explaining the irrigation system and their controls for each defined landscape area in line with the Potable Water Calculator Guide.

Additionally where swimming pool(s) are proposed/installed:

- Listing the swimming pool(s), filtration system and initiatives to reduce potable water consumption; and
- Justifying all inputs to the Calculator with reference to supporting documentation.

Additionally where laundry facilities are proposed/installed:

- Listing the laundry facilities, laundry load estimates and equipment proposed/installed; and
- Justifying all inputs to the Calculator with reference to supporting documentation.

Additionally where large kitchen(s) are proposed/installed:

- Listing the kitchen fittings and equipment proposed/installed; and
- Including calculations demonstrating the estimated number of meals served; water demand per meal in line with the guidance provided in the Potable Water Calculator Guide.

Additionally where other major water uses are proposed/installed:

- Listing the major water use and the water saving initiatives; and
- Including calculations justifying the inputs into the Potable Water Calculator.

  Note: the project must clearly demonstrate the claimed water consumption through calculations and verification documentation.

Additionally where sustainable water supply is proposed/installed:

- Describing the type of sustainable water (recycled water, rainwater, other non-potable water supplies) initiatives and systems included in the project; and

Where grey/black water supply is recycled:

- Justifying all inputs into the Calculator with reference to supporting documentation, including but not limited to recycled water sources, non-potable water demands, and daily treatment, storage capacity and system operations.

Where rainwater is harvested and reused:

- Justifying all inputs into the Calculator with reference to supporting documentation, including but not limited to rainfall harvesting areas, non-potable water demand, and daily treatment, storage capacity and system operations.

Where other sustainable water supply is used:

- Justifying all inputs into the Calculator with reference to supporting documentation.

Additionally where off site reclaimed water is supplied to site:

- Describing the arrangement with the supply vendor; and

- Confirming the volumes supplied to the site.

Statement of Confirmation (1) from the Tenant confirming:

- Occupant inputs (occupant type, design number of occupants, occupancy profile, peak days per week, percentage of occupants who have access to shower);
- The number of staff that will work in the fitout simultaneously during standard operation; and
- The maximum number of visitors/students to the fitout simultaneously during standard operation.

Completed Wat-1 Calculator with all with all inputs correctly entered corresponding to all supporting documentation requirements provided.

Statement of confirmation (2) in the form of signed correspondence from the off-site reclaimed water supply vendor/designer confirming;

- The volume to be supplied (annually or otherwise); and
- The availability of the reclaimed water at the date of practical completion of the project.

Manufacturer product datasheet(s) OR Letter from the supplier clearly demonstrating:

- The water usage per flush or per minute of each fixture and fitting (WC's, urinals, WHB, and shower)

Additionally where water based heat rejection is installed:

- The operational parameters (drift co-efficient, condenser water dT, cycles of concentration) used for completion of the Potable Water Calculator

Additionally where efficient landscaping is installed:

- The relevant parameters of the irrigation controls used for completion of the Potable Water Calculator.

Additionally where swimming pool(s) are installed:

- The relevant parameters (pump flow rate, filtration system, filtration controls) of the filtration system and controls used for completion of the Potable Water Calculator.

Additionally where laundry facilities are installed:

- The water usage per kg of linen for each laundry machine.

Additionally where large kitchen(s) are installed:

- The water usage of each kitchen appliance or fitting

As Built drawing(s) marked-up to clearly demonstrate:

Where water based heat rejection is proposed/installed:

- Location and type of the water based heat rejection system.

Additionally where efficient outdoor landscaping is proposed/installed:

- The different landscaped areas, plant types, irrigation demands, external landscape area sizes, and microclimate necessary for completion of the Potable Water Calculator; and

- Where irrigation systems are proposed/installed: drawings showing irrigation system and irrigation system controls.

Additionally where swimming pool(s) are proposed/installed:

- The location, size and volume of the indoor/outdoor swimming pool, and
- Pool cover and pool filtration systems.

Additionally where sustainable water supply is proposed/installed:

- All applicable reclaimed/reuse water systems, storage capacity and the connections to end-uses (where applicable).

Additionally where off site reclaimed water is supplied to site:

- Showing the connection to off-site reclaimed water supply, and connection to water demands.

ADDITIONAL GUIDANCE

The Potable Water Calculator is a benchmarking tool only and must not be used to design harvesting and recycling systems. As such, it does not undertake detailed calculations of water storage efficiency and it is the responsibility of the design team to ensure appropriate storage capacities given building demands and available harvested sources

Flow restrictors, aerators or other flow controlling devices which can only be removed from a fixture or fitting through the use of specialist equipment or tools commonly used by wet services sub-contractors or building maintenance staff, are considered an “intrinsic attribute” of the fixture or fitting. Similar devices which can be removed without the use of such tools (i.e. by hand) are not deemed intrinsic and cannot be used to claim water efficiency improvements within the Green Star SA Potable Water Calculator. For fixtures and fittings with such ‘intrinsic’ devices, product literature or manufacturer datasheets must clearly state the necessary water efficiency performance of the complete assembly with the flow-controlling device for inclusion in the Green Star SA Potable Water Calculator. Water efficiency data for a fixture or fitting without such a flow-controlling device that is nominally adjusted for the benefit of such flow limiting devices is not acceptable.

Other major water uses

Where a project team feels that there is another major water demand in which they have reduced potable water consumption, which is not covered in the tool, they can include this in the Potable Water Calculator. The project must clearly demonstrate the claimed water consumption through calculations and verification documentation, approved by the GBCSA through a CIR process

Sustainable Water

Sustainable Water is defined as water that is collected on site or recycled/recovered from a previous use such as black water or grey water. Previously unused water from high-value fresh water sources (e.g. lake, river or groundwater) cannot contribute to the amount of sustainable water used. In addition, extracting ground water from any neighbouring fresh-water sources impacts on the water

table level and merely localises a problem what otherwise would take place on the municipal or provincial level.

Off-Site Reclaimed Water

The use of reticulated off-site reclaimed water is an acceptable way to reduce potable water consumption within the Green Star SA rating system.

Ground Water

Previously unused groundwater seeping into building basements cannot be used in this credit as sustainable water for amenities (WC's, urinals, etc.), unless it is used and then recycled within the building. Groundwater seeping into building basements may be included as sustainable water for landscape irrigation. However, project teams must submit calculations of the quantity of groundwater available for use, clearly demonstrating reasonable assurance that the quantity calculated will be available in future. These calculations must be submitted for approval via CIR prior to project submission.

Rainwater, Greywater & Blackwater

Collecting rainwater from roofs and other impervious surfaces can add to the amount of sustainable water available for use in buildings. Retail centres with large roof areas are particularly well suited for rainwater collection.

Grey water can be recovered from sinks and showers, washing machines, cooling towers and other water sources that do not contain food or human waste. This water can be stored for irrigation and toilet flushing but needs to be used within a short period following collection to avoid having extensive treatment requirements.

In locations where on-site black water treatment is generally not permitted, projects should consider contacting local authorities to discuss the benefits of on-site water treatment for the project and local infrastructure.

Water Efficiency Labelling Scheme

The South African Government, through the Department of Water Affairs (DWA), is currently working with the South African National Standards to introduce the Water Efficiency Labelling and Standards (WELS) Scheme that involves the introduction of national mandatory water efficiency labelling and minimum performance standards for domestic water-using devices.

Landscaping Water Efficiency

Potable water demand can be reduced through the installation of water-efficient irrigation systems (such as sub-soil or drip irrigation) or through the use of sustainable water for landscape irrigation.

A 'xeriscape garden' is defined as a water-conserving garden, or garden requiring no additional watering. Where a xeriscape garden has been installed, provisions must be made to remove any irrigation system within twelve months and ensure that the landscape will not receive watering after that time. Evidence will include, but will not be limited to, a report from the landscape architect confirming why the design can be classified as xeriscape.

Heat Rejection

Wat-1 Potable Water

POINTS AVAILABLE 6

The use of water based heat rejection systems that consume huge amounts of water through cooling towers is wide spread because of the high energy efficiency of such systems. Minimising or eliminating the use of potable water in heat rejection systems or completely eliminating the need for mechanical cooling in buildings can achieve significant savings in both energy and water. The use of non-chemical dosing (such as ionisation, UV treatment, etc) can save water by avoiding more frequent flushing of cooling tower water systems.

Laundry Equipment

The typical laundry utilises a washer technology called washer-extractors. This type of machine ranges in size from about 16 kg up to 1 766 kg in the largest laundries. The name washer-extractor is used because after each portion of the wash cycle (soak, suds, pre-wash, wash, rinse, or finish) an extraction imparting centrifugal force removes the water and detergent contents from the wash wheel to the drain.

Other equipment found in large industrial laundries are tunnel washers (or continuous batch washers), which is an industrial laundry machine designed for heavy loads. Tunnel washers are inherently water-efficient; water is used several times before being sent to the drain. Average water consumption of this type of equipment is 16 litres per kilogram of laundry, which is 2/3 of the typical washer extractor.

Water recycling in laundry processes can be done quite easily. The last rinse water used in an industrial washer can be reused as a pre-wash for the next wash cycle. Larger commercial and industrial laundries have been utilising this technology for decades. For smaller laundries it is not common practice due to the high upfront cost. However in recent year, washing machine manufacturers have been designing systems that are less expensive and require less space.

Most commercial washer-extractors can be retrofitted with a tank to save the final rinse water, which can then be reused as pre-wash in the next load. It is possible to cut the potable water consumption by 30% by reusing water from the final rinse cycle for the next load.

Large Kitchens

Inefficient use of water in kitchen operations is usually a result of equipment design and/or behavioural patterns. The main types of water using equipment found in kitchens are dishwashers, sinks, woks, steamers, pre-wash spray rinse units, ice-making machines and garbage disposal units.

<u>Dishwashers</u>

Substantial savings can be made with a new dishwasher, newer models use less water, also different type of dishwashers have different flow rates. Below are the most common ones with their average water consumption.

Type	Description	Litres per rack
Under counter	A machine with an overall height of 1 meter or less, in which a rack of dishes remains stationary within the machine while being subjected to sequential wash and rinse sprays, and is designed to be installed under food preparation workspaces.	13 ltr/rack

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Single Tank Door	A machine in which a rack of dishes remains stationary within the machine while subjected to sequential wash and rinse sprays. This definition also applies to machines in which the rack revolves on an axis during the wash and rinse cycles.	8.4 ltr/rack
Tank conveyor	A washing machine that employs a conveyor or similar mechanism to carry dishes through a series of wash and rinse sprays within the machine. Specifically, a single tank conveyor machine has a tank for wash water followed by a final sanitizing rinse and does not have a pumped rinse tank.	6.0 ltr/rack
Multiple Tank conveyor	A conveyor type machine that has one or more tanks for wash water and one or more tanks for pumped rinse water, followed by a final sanitizing rinse.	4.1 ltr/rack

Source: http://www.energystar.gov/index.cfm?c=comm_dishwashers.pr_crit_comm_dishwashers

***Table WAT-1.1**: Description of types of dishwashers.*

Commercial Car Wash Facility

Commercial Car Wash Facilities use large amounts of water. The amount of potable water to wash cars varies depending on the method used from bucket and hand wash to open hose spray and industrial high pressure conveyor carwash system.

One of the largest car rental companies of South Africa has invested in reducing and recycling the water used to wash the vehicles. They procured a conveyor bay type of wash system which washes a car within 45 seconds. It further included the construction of underground water filtration and recycling facilities that filters the waste water and reuses it in the wash cycle. Rainwater is also collected and used for car washing. Potable water is only used for the final rise, minimising potable water use to the bare minimum. All interventions saved the company approximately 100 million litre of water annually.

Laboratories

In meeting their large cooling and process water demands, most laboratories use significantly more water per square metre than standard commercial buildings (US EPA, 2005). As an example, the Australian National University has estimated that 45% of the 750 million litres of water used annually are consumed in its laboratories, compared to 25% used in accommodation and 15% in irrigation (ANU, 2008). This demand arises from space cooling requirements, water used in the activity of the laboratory and equipment cooling (the focus of this credit).

Single-pass or once-through systems are commonly used to cool a broad range of scientific and medical equipment from CAT scanners to mass spectrometers. These systems circulate water, typically directly from the public water supply, once through the piece of equipment and then discharges directly to the sewer. These systems are the most water intensive cooling methods used in laboratories; consuming approximately 40 times the water required by cooling towers to remove the same heat load (US EPA, 2005).

Wat-1 Potable Water

POINTS AVAILABLE 6

BACKGROUND

The Potable Water credit uses the Green Star SA – Interiors Potable Water Calculator to calculate a project's predicted potable water use in relation to a comparable 'benchmark project' as determined by the Calculator. The Potable Water Calculator must be used in accordance with the Potable Water Calculator Guide available from the GBCSA website **(http://www.gbcsa.org.za).**

The credit aims to encourage water-efficient fitout projects by rewarding the implementation of water-efficient systems and fixtures.

The Potable Water Calculator is a benchmarking tool only and must not be used to design harvesting and recycling systems. As such, it does not undertake detailed calculations of water storage efficiency and it is the responsibility of the design team to ensure appropriate storage capacities given building demands and available harvested sources

REFERENCES & FURTHER INFORMATION

South African Weather Service
http://www.weathersa.co.za

South Africa Rain Atlas
http://134.76.173.220/rainfall/index.html

South Africa Department of Water Affairs
http://www.dwa.gov.za

Water Efficiency South Africa
http://www.waterefficiencysa.co.za

SANS: 10252-1: 2004, Water Supply and Drainage for Buildings, Part 1 – Water Supply Installations for Buildings.

Landscape Irrigation Association of South Africa
http://www.liasa.co.za

Water Conservation & use in Agriculture.
http://www.wca-infonet.org

Water Conservation in the Professional Car Wash Industry (1999) International Car Wash Association
www.carwash.org

Alliance for Water Efficiency, Commercial Laundry Facilities
http://www.allianceforwaterefficiency.org/commercial_laundry.aspx

Best Practice Guidelines for Kitchen and Amenities, South East Water
http://www.sewl.com.au/SiteCollectionDocuments/Business/WaterMAP/1-SEW_IntroKitchensAmenities_WEB.pdf

Labs for the 21st century.
http://www.labs21century.gov/

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POINTS AVAILABLE 6

Water Efficiency Guide for Laboratories; Best Practices
http://www.labs21century.gov/pdf/bp_water_508.pdf

Wat-2 Water Sub-Metering

POINTS AVAILABLE **2**

AIM OF CREDIT

To encourage and recognise the design of systems that both monitor and manage water consumption.

CREDIT CRITERIA

Up to two points are awarded as follows:

One point is awarded where:

- Water meters are installed for all major water uses in the project.

An additional one point is awarded where:

- The above is achieved;
- A metering and verification strategy is developed for the project; and
- Occupants are provided with a dedicated visual display of the water consumption data, as provided by their sub-metering system

DOCUMENTATION REQUIREMENTS

Green Star SA – Interiors PILOT
Submit all the evidence and ensure it readily confirms compliance.
1. Short report 2. As Built drawing(s) Or contract document 3. Metering and verification strategy 4. Manufacturer product datasheet(s)

Short report prepared by a suitably qualified professional describing how the Credit Criteria have been met by:

• Providing a summary table of all major water uses in the fitout and the water sub-metering requirements.

Where additional point claimed:

• Describing how the water consumption data will be effectively monitored during then fitout's operation and how fitout occupants have access to their consumption data, demonstrating compliance with the Credit Criteria;

• Describing the functionality of the visual display provided;

As Built drawing(s) Or contract document marked-up to clearly demonstrate the inclusion of all sub-meters demonstrating that they are in an accessible location for occupants, as referenced in the short report.

Metering and verification strategy describing in not more than one A4 page a summary of the overall metering and verification strategy for the project

Manufacturer product datasheet(s) OR Letter from supplier for the visual display system, clearly demonstrating the systems' functionality.

ADDITIONAL GUIDANCE

'Major water uses' are considered to include the following as a minimum (where installed):

• Bathrooms;

• Evaporative heat rejection systems;

• Irrigation systems;

• Car wash facilities;

• Food preparation facilities;

• Laundry;

• Wash-down systems;

• Recycled/rainwater supply;

• Humidifiers; and

It may be necessary to provide separate sub-metering on other water uses within the building if they are deemed equally substantial and the assessors reserve the right to request this after the round 1 submission.

Water meter requirements

One water meter for all bathrooms is sufficient for meeting the Credit Criteria regardless of the size of the building, as long it covers both hot and cold water. Kitchenette and custodian sinks (regardless of number) do not require a separate meter. However, their water use must be monitored by being on one of the sub-metered lines, such as the bathroom line.

If the water consumption of one of the major uses can be determined by a simple (and in most cases automatic) subtraction of all the other metered uses from the building's total water consumption, it does not have to be separately sub-metered. For example, if all water going into the building and all water going out (e.g. for cooling towers) is sub-metered and if the difference equates to bathroom water consumption, it is not necessary to have a separate bathroom meter.

Metering and verification strategy

The metering and verification strategy must be based on what the actual methodology will be that the fitout will adopt for the sub-meters. It must highlight the frequency and methodology of meter reading,

data collection and storage, verification and reporting. The frequency of readings must be a minimum of once a month. The strategy document need not be exhaustive and must be written in easy-to- read language for a non-technical reader.

Visual display and analysis systems

The intent of the visual display is to enable quick, simple and effective communication of a fitout's water consumption to the occupants. The visual display can either be a visual display infrastructure provided within the fitout, installed in an easily accessible and visible location for use by the occupants or an online external website or intranet accessible system with access permissible by personal computer, interactive multimedia or cell phone.

BACKGROUND

Water is an economic and natural resource which traditionally has not been extensively sub-metered in the built environment. In many cities throughout the world, water metering when installed, has been limited to a building scale only, with a single meter provided to a single building with multiple tenants.

Sub-metering is now gaining popularity as an effective strategy for water resource management, as it permits the signalling of the marginal cost and increasing scarcity of water to consumers. These signals can assist in reducing per capita consumption within a distribution network.

The Water Sub-Metering credit encourages the provision of water use information to fitout users as a meaningful deterrent to wasteful behaviour and a powerful way to raise awareness of the financial benefits of reduced water consumption.

The implementation of appropriate metering and monitoring strategies allows project teams to conduct water audits to manage consumption. Effective monitoring practices also offer an effective method for detecting leaks within water systems and for fine tuning operational procedures.

REFERENCES & FURTHER INFORMATION

Waterwise (2007),'International experiences of sub-metering: An analysis of four case cities to inform planning for domestic metering in the Greater London Area', Commissioned by the Greater London Authority, Waterwise.
http://www.waterwise.org.uk/data/2007_Waterwise_submetering.pdf

City of Richmond (Canada) Water Meter Program
http://www.watermeter.ca/english/about.html

Materials

The credits within the Materials Category target the consumption of resources through selection and reuse of materials, and efficient management practices. The basic concepts of the category are to reduce the amount of natural resources used, reuse whatever materials can be reused, and recycle whenever possible.

The credits are intended to reduce the environmental impacts associated with the use of materials. This is done through credits that reward improvements across the range of fundamental considerations: responsible sourcing; embodied impacts, resource efficient design and health and safety.

Mat-1 Operational Waste Management

POINTS AVAILABLE **2**

AIM OF CREDIT

To encourage and recognise developments which provide a spatial allocation for recycling and an operational waste management plan to facilitate the recovery of resources used within the tenancy to reduce waste going to disposal.

CREDIT CRITERIA

Up to two points are available for this credit. The points are awarded independently of each other:

Recycling Waste Storage

For tenants who occupy the entire building:

One point is awarded where:

- A dedicated storage area for the separation and collection of recyclables is provided;

  AND

- Is sufficiently sized to handle the collection and sorting of all waste streams for the recyclables identified below as a minimum, in accordance with Table Mat 1.1 provided in the additional guidance:

  - Cardboard;

  - Paper Products;

  - Glass;

  - Plastics and

  - Metals

  AND

- Recycling waste collection areas for the tenants and/or visitors are provided in the fit out design

OR

For multi tenanted buildings where the landlord provides a shared waste collection and storage facility:

One point is awarded where:

- A storage area for the separation and collection of recyclables is provided for all tenants;

  AND

- Is sufficiently sized to deal with all waste streams, based on the projected waste profile of the tenants and the collection frequency of each waste profile, for the following waste streams, as a minimum:

  - Cardboard;

  - Paper Products;

- Glass;
- Plastics and
- Metals AND

- Is accessible by all tenants

Waste & Recycling Operational Management Plan

One point is awarded where:

- A comprehensive and project specific Waste & Recycling Operational Management Plan is developed for the tenant to reduce operational waste and increase recycling.

DOCUMENTATION REQUIREMENTS

Green Star SA – Interiors PILOT
Submit all the evidence and ensure it readily confirms compliance.
1. Short report 2. As built drawing(s) OR Contract between tenant and waste service provider 3. Supporting Evidence Additionally where second point claimed: 1. Operational Waste & Recycling Management Plan

Short report that clearly identifies:

- The relevant waste streams for the tenancy
- The spatial allocation of the recycling storage area by providing calculations that demonstrate that the area provided is adequately sized to handle the recyclable waste streams, based on:
  - A profile of projected waste generated
  - Collection frequency of each waste stream
- The transfer routes through the building to the recycling storage area

As Built drawing(s) marked up to show:

- Location of the recycling storage area(s) with dimensions indicated;
- Location of waste collection areas for the tenants and/or visitors and transfer routes through the building to the recycling storage areas;

Supporting Evidence that confirms any waste collection frequency claims as referenced in the short report, in the form of either:

- A letter of confirmation from the tenant or building owner confirming the municipal collection frequency
- A contract between the tenant/building owner and waste services provider confirming collection frequency.

Operational Waste & Recycling Management Plan outlining the plan for reduction of the overall operational waste. The plan must meet the requirements set out in the Additional Guidance. The submitted plan must be signed by the tenant representative.

Mat-1 Operational Waste Management

POINTS AVAILABLE 2

ADDITIONAL GUIDANCE

The type of waste management plan implemented within a fitout must take into account the size, function, number of occupants and collection frequency of recyclable material for the project. Effective waste management plans assist project occupants and external waste management service providers to segregate, store and collect recyclable materials, and helps to minimise the amount of recyclable material that ends up in landfill.

Recycling storage space (for tenants who occupy the entire building):

The recycling waste storage must effectively serve all building uses and occupants and be sufficiently sized to accommodate the storage of the following recyclables as a minimum: cardboard, paper products, glass, plastics and metals. Where kitchens are present, storage for grease, cooking oil, and organic compost material must also be provided. Although not specifically required for compliance with the credit criteria, other products that require appropriate disposal and/or recycling include printer and toner cartridges, organics, compact fluorescent (CFL) and other light bulbs, as well as computer and electronic equipment. Where there are large areas of landscaping it is also recommended to address disposal/composting of garden waste.

Table Mat-1.1 provides guidance as to the size of the storage area; however projects are encouraged to use their own calculations to inform sizing as the size of the storage area required depends on project specific issues such as the frequency of waste collection. For the building types not covered in the table below, project teams must resort to using their own calculations to justify appropriate sizing.

Min Area of recyclable space (% if GFA)					
GFA (m^2)	**Office**	**Retail**	**Restaurant**	**Library Theatre Centre Museum Art Gallery Sport Worship Community**	**Airport Bus/train Station**
500	1.5%	3.0%	4.5%	0.5%	0.75%
1,000	0.8%	1.6%	2.4%	0.3%	0.4%
5,000	0.35%	0.7%	1.45%	0.12%	0.17%
10,000	0.25%	0.5%	0.75%	0.8%	0.12%
20,000	0.15%	0.3%	0.45%	0.05%	0.07%

Table Mat-1.1: Recommended space requirements for recyclable waste storage

Mat-1 Operational Waste Management

POINTS AVAILABLE 2

Access requirements

- The recycling waste storage room must be located in a position convenient for both users and waste collection staff. The short report, and drawings where possible, must indicate:
    - That the waste disposal points for tenants and/or visitors are conveniently located and within close walking distance
    - Access pathways between central waste storage point within the fit out and the collection vehicle, or path that the service provider travels, must be free of steps or kerbs (or goods lifts are provided);
    - **for tenants who occupy the entire building**
        - The waste sorting and loading operation must operate on a level surface;
        - The waste storage room is located in the same level as the loading dock with clearly marked, signposted, convenient and guaranteed access routes which allows:
            - Level access from tenancies (or goods lifts are provided); and
            - Avoids the need for multiple handling of the waste.
        - Collection vehicles must be able to service the development with limited need to reverse.
        - Where collection takes place inside a building, appropriate clearances need to be allowed for the collection vehicle to enter the premises, clear the waste container and exit the premises. It must be noted that some systems require the waste container to be lifted above the collection vehicle to be emptied (front lift-bulk bin) or loaded (waste compactor).

External recycling waste storage

As Green Star SA assesses permanent attributes of buildings, external amenities can only be rewarded if they are provided for the life of the building to the same degree of service and certainty as internal facilities. As a result, the following applies to amenities (such as recycling waste storage) that are located on separate premises and not within the assessed building:

- The scope of assessment is not extended beyond the assessed building, i.e. the building within which the amenities are housed does not need to meet the Credit Criteria of any claimed credits; only the amenities assessed against the Credit Criteria of the credit towards which they contribute;
- The assessed building and the amenities are under the same ownership and cannot change ownership separately (i.e. they are on the same title or equivalent);
- The assessed building and the amenities are under the same management and cannot change management separately (e.g. the same facility management to ensure recycling waste storage is processed as designed);
- The recycling waste storage facilities are in close proximity to the assessed building and the access route is clearly marked and sign-posted, convenient, guaranteed, secure and without a step change;
- The amenities are completed by the date of practical completion of the assessed building; and;
- The amenities fully meet the Credit Criteria and are documented in strict accordance with the Technical Manual, including weather protection.

Waste collection areas for the tenants and/or visitors

Waste collection areas for recyclables must be provided for within the interiors fit out design. The number of bins must correlate with the stated recyclable waste streams identified in the short report. These areas must include appropriate signage, either on the bins or on the walls, to clearly communicate which recyclable waste each bin accommodates.

Operational Waste and Recycling Management Plan

Mat-1 Operational Waste Management

POINTS AVAILABLE **2**

The Operational Waste and Recycling Management Plan must address all waste (recyclable and non-recyclable) generated in the building (from occupants, common areas and visitors). As a minimum, it should describe:

- the common waste streams (paper, various plastics, and glass) and the additional waste streams specific to the fitout;
- an estimation of waste generation and frequency of collection to justify of the size of the recycling waste storage area and waste collection areas for the tenants and/or visitors;
- waste collection areas for the tenants and/or visitors;
- the waste storage areas, in terms of location, size, accessibility, easy access for manoeuvring bins and cleaning storage areas;
- the allocated waste collection areas for the tenants and/or visitors including a description of the bins that are provided and how these are distributed throughout the tenancy to allow for recyclable waste streams;
- the procedure and frequency of emptying bins and how this works together with the waste recycling storage area location and size;
- transfer of waste bins to storage areas; in terms of surface (free of steps, kerbs), distances, grades;
- signage and educational initiatives geared towards building occupants and customers;
- monitoring and reporting requirements, (minimum quarterly);
- on-going management and proposed roles and responsibilities of the involved parties;
- explicit annual operational waste reduction targets, for reduction in the amount (by weight or volume) of the building's overall operational waste or provide a plan to audit the operational waste stream for setting such targets; and
- the strategy to deal with electronic waste (electronic equipment and light bulbs) and how this is communicated to the staff responsible for replacing/disposing of these items.

BACKGROUND

While the Green Star SA- Interiors rating tool mainly addresses the sustainable aspects of fitout construction, the Operational Waste Management credit is included to address the impacts associated with the fitout operation post-construction. Compliance with the Operational Waste Management credit requires project teams to institute a management plan for recycling waste such as paper, plastics and glass.

The intention is to provide convenient and accessible recycling bins so as to promote higher recycling rates. Recycling operational waste diverts waste to landfill and contributes to job creation in South Africa.

REFERENCES & FURTHER INFORMATION

Department of Environment and Tourism

http://www.environment.gov.za/ProjProg/WasteMgmt/recycling/an-a.htm

National Waste Management Strategy Implementation Project, (2005).
http://www.sawic.org.za/documents/235.pdf

Paper Recycling Association of South Africa
http://www.prasa.co.za

Institute of Waste Management of Southern Africa
http://www.iwmsa.co.za/

City of Cape Town (2005) Smart Living Handbook, Cape Town, South Africa.
http://www.capetown.gov.za/en/EnvironmentalResourceManagement/Pages/SmartLivingHandbook.aspx

Polokwane Declaration
http://www.environment.gov.za/ProjProg/WasteMgmt/Polokwane_declare.htm

Sustainability Victoria (2006) Waste Wise
http://www.sustainability.vic.gov.au/www/html/2717-resourcesmart-waterwise.asp

Financial and Fiscal Commission Policy Brief: Making Solid Waste Management in South Africa Sustainable 6 / 2012
Plastics South Africa website http://www.plasticsinfo.co.za/

E - Waste Association of South Africa (EWASA) http://www.ewasa.org/

My Waste website http://www.mywaste.co.za/

Terry, A & Moore, T [eds] (2008) Waste and Sustainable Commercial Buildings, Your Building: Profiting from sustainability
http://www.yourbuilding.org

Wasiluk, K.L (2007), Business Case for Sustainable Commercial Buildings
http://www.yourbuilding.org

Mat-2 Furniture

POINTS AVAILABLE 8

AIM OF CREDIT

To recognise the selection of furniture that has a reduced environmental impact compared to available alternatives.

CREDIT CRITERIA

Up to eight points are awarded where the furniture used has a reduced environmental impact as determined by the Furniture Calculator against the five assessment criteria.

The five technical criteria are:

1. Furniture certified according to GBCSA recognised standards;
2. Reused furniture;
3. Furniture that is sold with a product stewardship commitment or furniture that has been designed for disassembly or furniture that has a manufacturer's or supplier's warranty defined under durability;
4. Furniture that contains re-used, recycled or certified content;
5. Furniture that is manufactured in facilities that are ISO 14001 certified.

The credit criteria for the Interiors Fitout Calculators are summarised in more detail in the table below. Project teams, however, must consult the Interiors Fitout Calculator Guide for a detailed description and additional information relating to the Furniture Calculator.

Calculator credit criterion	**Summarised definition of credit criteria**	**Calculator input options available to teams**	**Criterion score (%)**
Option 1			
GBCSA recognised schemes	80% of an item's total mass is certified to a Green Building Council of South Africa recognised standard	A	100
		B	90
		C	85
Option 2			
Reuse	80% by area, length, volume or mass of the item must be retained/reused	Yes	100
		No	0
Product Stewardship	An end of life use for the product of material exists, in the form of a take back scheme, design for disassembly or long term	Take back- lease	35
		Take back- purchase	30
		Designed for disassembly	35
		Durability – A (only for	35

	durability (only applies to furniture)	furniture)	
		Durability – B (only for furniture)	30
		Durability – C (only for furniture)	20
Reused, recycled or certified content	40% of the item's mass is either reused, recycled, or certified content (by a GBCSA recognised certification system), or a combination of the above.	Yes	25
		No	0
ISO 14001 manufacturers	80% of the mass of the product or materials must be sourced from manufacturing facilities that are certified to ISO 14001	Yes	25
		No	0

Table Mat-2.1: Score contributions for responses to the 5 criteria

DOCUMENTATION REQUIREMENTS

Green Star SA – Interiors PILOT
Submit all the evidence and ensure it readily confirms compliance.
1. Short report *For Criterion 1 – Reused products:* *2.* Supporting evidence *For Criterion 2 – Certified products:* *3.* Copy of the certification licence(s) *For Criterion 3 – Take back scheme:* 4. Copy of Contract 5. As Built Drawings 6. Comprehensive Disassembly Plan *For durability (furniture only)* 7. Warranty *For Criterion 5 – ISO 14001 manufacturing:* Copy of ISO 14001 certificate

Short report by a suitably qualified professional that describes how the Credit Criteria have been met by:

For reused products:

- Providing calculations and a summary table confirming the stipulated proportion of re-used materials in the project

For design for disassembly and reuse:

- Outlining the overall approach
- Identifying the elements designed for disassembly and reuse
- Identify potential reuse options for those items
- Providing calculations and a summary table confirming that the stipulated proportion of the relevant elements is designed for disassembly and reuse

For all items with at least 40% re-used, recycled, or certified content:

- Providing calculations showing how the proportion of re-used, recycled, or certified content was derived. The results must be tabulated to clearly demonstrate:
  - All components in the item
  - Mass of each component
  - Mass of re-used, recycled, or certified content in each component
  - Percentage of re-used, recycled, or certified content for an item

For all items provided from ISO 14001 certified manufacturing facilities:

- Tabulating the weight of each component and total complaint weight proportion
- Confirmation that each component is sourced from manufacturing facilities that are ISO 14001 certified

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Supporting evidence

If purchased from a second-hand retailer, such as an auction house

- Purchase receipts/delivery receipts

If materials were used on the current site by a previous occupant or installed by a building owner as part of make good processes prior to fitout works by the tenant:

- Confirmation from the tenant that the items were in use onsite prior to the project works and that they have now been re-installed onsite

If materials were relocated to the site from the new tenant's, or occupants', previous fitout or building:

- Mover's inventory from the previous location.

  OR

- Inventory/schedule or images from the previous fitout showing clearly the items that have been re-used in the new fitout

For recycled items:

- Suppliers/Manufacturer statement of confirmation confirming the recycled claims as referenced in the short report

Mat-2 Furniture

POINTS AVAILABLE 8

For certified content:

- A copy of the certification licence(s) for the items issued by the scheme. The licence and recognition of the certification standard must be current at the time of the installation of the item in the fitout. The certification standard must be in accordance with a GBCSA recognised certification standard levels (i.e. A, B or C). In the case of timber and bamboo products, a copy of the FSC or PEFC chain of custody certificates (CoC) must be submitted (in accordance with the additional guidance provided in the Interiors Fit Out Calculator Guide);

A copy of the certification licence(s) for the items issued by the scheme. The licence and recognition of the certification standard must be current at the time of the installation of the item in the fitout. The certification standard must be recognised by the GBCSA at the level entered in the Interiors Fitout Calculator.

A copy of the signed contract between the tenant and the manufacturer clearly stipulating:

- the terms and conditions of the take back scheme, confirming the commitment to take back the quantity of the product or material supplied to the project
- nominating the intended reuse of the product/materials
- The manufacturers details (registered name, address, email address, telephone number and website if applicable)

As Built drawing(s) marked-up to show detail drawings of connections demonstrating that the relevant building elements can be disassembled without cutting, material damage, or hindrance from adjacent materials.

Comprehensive Disassembly Plan that:

- Identifies which materials are designed to be recovered during building disassembly;
- Details how (in terms of technique, expertise and technology required) the identified materials and products should be recovered, indicating the order of disassembly to enable them to be extracted without material damage or interference from other building materials/elements.
- Is included in the O&M manual, that is issued to the tenant

For durability (furniture only):

Calculator category	Calculator options	Documentation requirements
Durability	A	A copy of the warranty contract. This must show that the items have been purchased by the building occupant or tenant under an agreement that includes a defined warranty period of more than 10 years.
	B	A copy of the warranty contract. This must show that the items have been purchased by the building occupant or tenant under an agreement that includes a defined warranty period of between seven and 10 years.
	C	A copy of the warranty contract. This must show that the items have been purchased by the building occupant or tenant under an agreement that includes a defined warranty period up to seven years.
	No	

A Copy of the manufacturer's ISO 14001 certification that is valid.

ADDITIONAL GUIDANCE

The GBCSA Interiors Fit Out tool has 4 calculators, one of which is the Furniture Calculator. Each of these calculators is evaluated against specific credit criteria, the results of which are captured in the calculator input excel sheets. The credit criteria evaluate to what extent interiors finishes are reused, contain certified content, have incorporated product stewardship in the consideration of the product/material, and have been manufactured in an environmentally responsible way.

Project teams must consult the Interiors Fitout Calculator Guide for detailed information regarding appropriate documentation requirements, criteria definitions, how the calculators operate and how to input into the excel sheets correctly. The information provided in the credit criteria and additional guidance merely summarises the key considerations and project teams must consult the Interiors Fitout Calculator Guide for further detailed additional guidance.

The credit criteria for the Interiors Fitout Calculators are summarised in table Mat-2.1 above.

The scope of the Furniture Calculator is as follows:

Furniture items in the project must include all seating's, surfaces, work settings, beds, storage units and demountable partitions used within project floor areas that are permanently covered and protected from the elements. Exclusions apply and are listed below.

The following inclusions, exclusions and definitions apply:

Furniture
Furniture includes, but is not limited to seating, surfaces, work settings, beds, and storage units.

User
The user, for purposes of this credit, is defined as the person who will be using a single piece of furniture non-continuously for at least two hours during a given day.

Seating
Seating includes, but is not limited to benches, chairs, stools, couches, ottomans and recliners. Chairs that are joined together, such as theatre or auditorium seating should be counted as one chair for every seat.

Surfaces
Surfaces include, but are not limited to tables, desks and work settings.

Work settings
Work settings includes, but is not limited to desks, workstations, work benches, surfaces or teller counters. A work setting includes both the work surface and the structure supporting the work surface. Elements that are attached to the work settings should be treated as part of the work settings, e.g. off desk screening, shelving, storage and monitor arms.
A work setting that is designed to accommodate more than one user, e.g. hot desks to be counted as one work setting per user.

Storage units

Mat-2 Furniture

POINTS AVAILABLE 8

Storage units includes, but is not limited to filing or stationery cupboards, cabinets, shelving units, moveable compact filing units, lockers, wardrobes, dressers, chests, bookcases and pantries. Storage units are units which are intended to be used as storage and are not custom made. These include items which are 'off the shelf' whether they are assembled offsite or onsite.

Exclusions
Custom made storage units are assessed as joinery under the Assemblies Calculator.

BACKGROUND

Environmentally responsible furniture design addresses the impact of furniture products on the environment by considering all aspects of the design and manufacturing process.

There are a number of ways for the furniture to reduce the impact on the environment, such as using recycled materials in the manufacturing process, using products that can be disassembled and recycled after their useful life and using products that have a durability/ longevity. The aspiration is for a closed-loop cycle in which materials and products are perpetually recycled so as to avoid disposal in landfills.

This credit rewards re-used furniture or furniture that has been certified according to GBCSA standards. Even though furniture may offer a certain percentage of recycled content, it could still be off-gassing VOCs and furniture manufacturers are encouraged to significantly reduce the harmful VOC content from their products. Having the products certified by a 3rd party ensures that the product meets the requirements.

Rewarding responsible choices for furniture encourages designers to design for disassembly with the use of non-specialist tools where parts can be separated for re-use, recycling or re-processing. One of the easiest ways to extend the life of furniture is to replace worn-out elements instead of the whole item. This credit awards the length of the manufacturer's or supplier's warranty of the product and encourages products with warranties over 10 years. Furniture should offer an extended life and easier serviceability. Choosing the correct furniture is important and ergonomics and height adjustability are key features that help make users more comfortable and productive.

Being ISO 14001 certified can assist companies to better manage the goal of reducing their environmental impacts. Benefits can include a reduction in waste and consumption of resources and operating costs.

1SO 14001 is an internationally recognized standard and a smart approach for the long term viability of businesses and could provide them with a competitive advantage against companies that do not adopt the standard.

REFERENCES & FURTHER INFORMATION

GBCSA Interiors Fitout Calculator Guide

Sustainable Furniture
http://www.buildings.com/article-details/articleid/14002/title/sustainable-furniture-specification-guide.aspx

http://www.buildings.com/article-details/articleid/16158/title/sustainable-furniture-makes-headway-with-leed.aspx
http://www.indiegogo.com/projects/aellon-beautiful-sustainable-furniture

Environmental Protection Agency (EPA) Product Stewardship website
http://www.epa.gov/epawaste/conserve/tools/stewardship/index.htm

Australian Government Product Stewardship website
http://www.environment.gov.au/settlements/waste/product-stewardship/index.html

ISO 14001 website http://www.iso.org/iso/home/standards/management-standards/iso14000.htm

Ecospecifier South Africa http://www.ecospecifier.co.za/

Eco Specifier Australia http://www.ecospecifier.com.au/

Eco standard South Africa http://ecostandard.co.za/home.php

Cement and Concrete Institute of South Africa (CNCI): http://www.cnci.org.za

South African Institute of Steel Construction: http://www.saisc.co.za

Steel Recycling Institute (US): http://www.recycle-steel.org

Forest Stewardship Council (FSC) http://www.fsc.org/

Programme for Endorsement of Certified Wood (PEFC) http://www.pefc.org/

Rainforest Alliance, Sustainable Forestry (SmartWood) http://www.rainforest-alliance.org/

http://www.rainforest-alliance.org/forestry.cfm?id=certification

Australian Forestry Standard http://www.forestrystandard.org.au

Mat-3 Assemblies

POINTS AVAILABLE **8**

AIM OF CREDIT

To recognise the selection of assemblies that has a reduced environmental impact compared to available alternatives.

CREDIT CRITERIA

Up to eight points are awarded where the assemblies used has a reduced environmental impact as determined by the Assemblies Calculator against five assessment criteria.

The five technical criteria are:

1. Assemblies certified according to GBCSA recognised standards;
2. Reused assemblies
3. Assemblies that is sold with a product stewardship commitment or that have been designed/installed for disassembly;
4. Assemblies that contain re-used, recycled or certified content;
5. Assemblies that are manufactured in facilities that are ISO 14001 certified.

The credit criteria for the Interiors Fitout Calculators are summarised in more detail in the table below. Project teams, however, must consult the Interiors Fitout Calculator Guide for a detailed description and additional information relating to the Assemblies Calculator.

Calculator credit criterion	**Summarised definition of credit criteria**	**Calculator input options available to teams**	**Criterion score (%)**
Option 1			
GBCSA recognised schemes	80% of an item's total mass is certified to a Green Building Council of South Africa recognised standard	A	100
		B	90
		C	85
Option 2			
Reuse	80% by area, length, volume or mass of the item must be retained/reused	Yes	100
		No	0
Product Stewardship	An end of life use for the product of material exists, in the form of a take back scheme, design for disassembly or long term durability (only applies to furniture)	Take back- lease	35
		Take back- purchase	30
		Designed for disassembly	35

Reused, recycled or certified content	40% of the item's mass is either reused, recycled, or certified content (by a GBCSA recognised certification system), or a combination of the above.	Yes	25
		No	0
ISO 14001 manufacturers	80% of the mass of the product or materials must be sourced from manufacturing facilities that are certified to ISO 14001	Yes	25
		No	0

Table Mat-3.1: Score contributions for responses to the 5 criteria

DOCUMENTATION REQUIREMENTS

Green Star SA – Interiors PILOT
Submit all the evidence and ensure it readily confirms compliance.
1. Short report *For Criterion 1 – Reused products:* *2.* Supporting evidence *For Criterion 2 – Certified products:* *3.* Copy of the certification licence(s) *For Criterion 3 – Take back scheme:* 4. Copy of Contract 5. As Built Drawings 6. Comprehensive Disassembly Plan *For Criterion 5 – ISO 14001 manufacturing:* 7. Copy of ISO 14001 certificate

Short report by a suitably qualified professional that describes how the Credit Criteria have been met by:

For reused products:

- Providing calculations and a summary table confirming the stipulated proportion of re-used materials in the project. The results must be tabulated to clearly demonstrate:
  - All components in the item;
  - Confirmation that the item is purchased or relocated; and

- The selected metric (area, mass, volume or length) with justifications.

For design for disassembly and reuse:

- Outlining the overall approach
- Identifying the elements designed for disassembly and reuse
- Identify potential reuse options for those items
- Providing calculations and a summary table confirming that the stipulated proportion of the relevant elements is designed for disassembly and reuse

For all items with at least 40% re-used, recycled, or certified content:

- Providing calculations showing how the proportion of re-used, recycled, or certified content was derived. The results must be tabulated to clearly demonstrate:
  - All components in the item
  - Mass of each component
  - Mass of re-used, recycled, or certified content in each component
  - Percentage of re-used, recycled, or certified content for an item

For all items provided from ISO 14001 certified manufacturing facilities:

- Tabulating the weight of each component and total complaint weight proportion
- Confirmation that each component is sourced from manufacturing facilities that are ISO 14001 certified

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Supporting evidence

If purchased from a second-hand retailer, such as an auction house

- Purchase receipts/delivery receipts

If materials were used on the current site by a previous occupant or installed by a building owner as part of make good processes prior to fitout works by the tenant:

- Confirmation from the tenant that the items were in use onsite prior to the project works and that they have now been re-installed onsite

If materials were relocated to the site from the new tenant's, or occupants', previous fitout or building:

- Mover's inventory from the previous location.

  OR

- Inventory/schedule or images from the previous fitout showing clearly the items that have been re-used in the new fitout

For recycled items:

- Suppliers/Manufacturer statement of confirmation confirming the recycled claims as referenced in the short report

For certified content:

- A copy of the certification licence(s) for the items issued by the scheme. The licence and recognition of the certification standard must be current at the time of the installation of the item in the fitout. The certification standard must be in accordance with a GBCSA recognised certification standard levels (i.e. A, B or C). In the case of timber and bamboo products, a copy of the FSC or PEFC chain of custody certificates (CoC) must be submitted (in accordance with the additional guidance provided in the Interiors Fit Out Calculator Guide);

A copy of the certification licence(s) for the items issued by the scheme. The licence and recognition of the certification standard must be current at the time of the installation of the item in the fitout. The certification standard must be recognised by the GBCSA at the level entered in the Interiors Fitout Calculator.

A copy of the signed contract between the tenant and the manufacturer clearly stipulating:

- the terms and conditions of the take back scheme, confirming the commitment to take back the quantity of the product or material supplied to the project;
    - nominating the intended reuse of the product/materials;
    - the manufacturers details (registered name, address, email address, telephone number and website if applicable).

As Built drawing(s) marked-up to show detail drawings of connections demonstrating that the relevant building elements can be disassembled without cutting, material damage, or hindrance from adjacent materials.

Comprehensive Disassembly Plan that:

- Identifies which materials are designed to be recovered during building disassembly;
- Details how (in terms of technique, expertise and technology required) the identified materials and products should be recovered, indicating the order of disassembly to enable them to be extracted without material damage or interference from other building materials/elements.
- Is included in the O&M manual, that is issued to the tenant

A copy of the manufacturer's ISO 14001 certification that is current and valid

ADDITIONAL GUIDANCE

The GBCSA Interiors Fit Out tool has 4 calculators, one of which is the Assemblies Calculator. Each of these calculators is evaluated against specific credit criteria, the results of which are captured in the calculator input excel sheets. The credit criteria evaluate to what extent interiors finishes are reused, contain certified content, have incorporated product stewardship in the consideration of the product/material, and have been manufactured in an environmentally responsible way.

Project teams must consult the Interiors Fitout Calculator Guide for detailed information regarding appropriate documentation requirements, criteria definitions, how the calculators operate and how to input into the excel sheets correctly. The information provided in the credit criteria and additional

guidance merely summarises the key considerations and project teams must consult the Interiors Fitout Calculator Guide for further detailed additional guidance.

The credit criteria for the Interiors Fitout Calculators are summarised in table Mat-3.1 above.

The scope of the Assemblies Calculator is as follows:

Items referred to as 'assemblies' include all internal walls, partitions (including demountable partitions), ceilings and joinery used within project floor areas that are permanently covered and protected from the elements. Exclusions apply and are listed below.

The following applies:

Internal walls and partitions: Internal walls and partitions are defined to mean non-load bearing space dividers that are not part of the building envelope.

Joinery: Joinery includes, but is not limited, to the following items:

> Toilet partitions; shower partitions including shower screens; doors; bench seats; vanities; lockers; kitchens; laundry cupboards; shelving units; bumper rails; decorative trim; built-in wardrobes; cupboards; and internal stairs.

Ceilings: Ceilings only include suspended ceilings. Reference to ceilings in the fitout calculators relates to the face material only, not the grid and other components of the suspended ceiling.

Demountable partitions: Demountable partitions are defined to be internal space dividers that are usually non-load bearing. Many of the partitions have a permanent finish which requires no decoration.

Exclusions

- Certain wall components are excluded, such as studs, insulation, skirting and cornices. Hardware, such as light switches, is also excluded from the assessment of internal walls.
- Storage units that may be purchased 'off-the-shelf' are excluded from the Assemblies Fitout Calculator. These are assessed under the Furniture Fitout Calculator as storage units.

Definition of area

For the purposes of the Assemblies Fitout Calculator, the area of an assembly item is defined as:

- Area of ceilings = area shown in ceiling plan.
- Area of walls, partitions and joinery = the total length of the item multiplied by its total height.

BACKGROUND

Environmentally responsible assemblies addresses the impact of assemblies products on the environment by considering all aspects of the design and manufacturing process.

Mat-3 Assemblies

POINTS AVAILABLE 8

There are a number of ways for the assemblies' products to reduce the impact on the environment, such as using recycled materials in the manufacturing process and using products that can be disassembled and recycled after their useful life. The aspiration is for a closed-loop cycle in which materials and products are perpetually recycled so as to avoid disposal in landfills.

This credit rewards assemblies that are re-used or have been certified according to GBCSA standards. Rewarding responsible choices of assembly materials encourages manufacturers, suppliers and users to have an environmental approach for the products' life cycles by having an agreement in place to return the flooring at the end of the life cycle for re-use or recycling. It also encourages assemblies to be designed for disassembly where this can be separated for re-use, recycling or re-processing.

Being ISO 14001 certified can assist companies to better manage the goal of reducing their environmental impacts. Benefits can include a reduction in waste and consumption of resources and operating costs.

1SO 14001 is an internationally recognized standard and a smart approach for the long term viability of businesses and could provide them with a competitive advantage against companies that do not adopt the standard.

REFERENCES & FURTHER INFORMATION

Environmental Protection Agency (EPA) Product Stewardship website
http://www.epa.gov/epawaste/conserve/tools/stewardship/index.htm

Australian Government Product Stewardship website
http://www.environment.gov.au/settlements/waste/product-stewardship/index.html

ISO 14001 website http://www.iso.org/iso/home/standards/management-standards/iso14000.htm

Ecospecifier South Africa http://www.ecospecifier.co.za/

Eco Specifier Australia http://www.ecospecifier.com.au/

Eco standard South Africa http://ecostandard.co.za/home.php

Forest Stewardship Council (FSC) http://www.fsc.org/

Programme for Endorsement of Certified Wood (PEFC) http://www.pefc.org/

Rainforest Alliance, Sustainable Forestry (SmartWood) http://www.rainforest-alliance.org/

http://www.rainforest-alliance.org/forestry.cfm?id=certification

Australian Forestry Standard http://www.forestrystandard.org.au

Mat-4 Flooring

POINTS AVAILABLE 6

AIM OF CREDIT

To recognise the selection of flooring that has a reduced environmental impact compared to available alternatives.

CREDIT CRITERIA

Up to six points are awarded where the flooring used has a reduced environmental impact as determined by the Flooring Calculator against five assessment criteria.

The five technical criteria are:

1. Flooring certified according to GBCSA recognised standards;
2. Reused flooring or the use of exposed concrete;
3. Flooring that is sold with a product stewardship commitment or flooring that has been designed/installed for disassembly;
4. Flooring that contains re-used, recycled or certified content;
5. Flooring that is manufactured in facilities that are ISO 14001 certified.

The credit criteria for the Interiors Fitout Calculators are summarised in more detail in the table below. Project teams, however, must consult the Interiors Fitout Calculator Guide for a detailed description and additional information relating to the Flooring Calculator.

Calculator credit criterion	**Summarised definition of credit criteria**	**Calculator input options available to teams**	**Criterion score (%)**
Option 1			
GBCSA recognised schemes	80% of an item's total mass is certified to a Green Building Council of South Africa recognised standard	A	100
		B	90
		C	85
Option 2			
Reuse	80% by area, length, volume or mass of the item must be retained/reused	Yes	100
		No	0
Product Stewardship	An end of life use for the product of material exists, in the form of a take back scheme, design for disassembly or long term durability (only applies to furniture)	Take back- lease	35
		Take back- purchase	30
		Designed for disassembly	35

Reused, recycled or certified content	40% of the item's mass is either reused, recycled, or certified content (by a GBCSA recognised certification system), or a combination of the above.	Yes	25
		No	0
ISO 14001 manufacturers	80% of the mass of the product or materials must be sourced from manufacturing facilities that are certified to ISO 14001	Yes	25
		No	0

Table Mat-4.1: Score contributions for responses to the 5 criteria

DOCUMENTATION REQUIREMENTS

Green Star SA – Interiors PILOT
Submit all the evidence and ensure it readily confirms compliance.
1. Short report *For Criterion 1 – Reused products:* *2.* Supporting evidence *For Criterion 2 – Certified products:* *3.* Copy of the certification licence(s) *For Criterion 3 – Take back scheme:* 4. Copy of Contract 5. As Built Drawings 6. Comprehensive Disassembly Plan *For Criterion 5 – ISO 14001 manufacturing:* 7. Copy of ISO 14001 certificate

Short report by a suitably qualified professional that describes how the Credit Criteria have been met by:

For reused products:

- Providing calculations and a summary table confirming the stipulated proportion of re-used materials in the project by the selected metric (area, mass or volume). The results must be tabulated to clearly demonstrate:
  - All components in the item
  - Confirmation that the item is purchased or relocated
  - The selected metric (area, mass, volume or length) with justifications
  - Confirmation that 80% of the selected metric is reused

For design for disassembly and reuse:

- Outlining the overall approach
- Identifying the elements designed for disassembly and reuse
- Identify potential reuse options for those items
- Providing calculations and a summary table confirming that the stipulated proportion of the relevant elements is designed for disassembly and reuse

For all items with at least 40% re-used, recycled, or certified content:

- Providing calculations showing how the proportion of re-used, recycled, or certified content was derived. The results must be tabulated to clearly demonstrate:
  - All components in the item
  - Mass of each component
  - Mass of re-used, recycled, or certified content in each component
  - Percentage of re-used, recycled, or certified content for an item

For all items provided from ISO 14001 certified manufacturing facilities:

- Tabulating the weight of each component and total complaint weight proportion
- Confirmation that each component is sourced from manufacturing facilities that are ISO 14001 certified

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Supporting evidence

If purchased from a second-hand retailer, such as an auction house

- Purchase receipts/delivery receipts

If materials were used on the current site by a previous occupant or installed by a building owner as part of make good processes prior to fitout works by the tenant:

- Confirmation from the tenant that the items were in use onsite prior to the project works and that they have now been re-installed onsite

If materials were relocated to the site from the new tenant's, or occupants', previous fitout or building:

- Mover's inventory from the previous location.

  OR

- Inventory/schedule or images from the previous fitout showing clearly the items that have been re-used in the new fitout

For recycled items:

- Suppliers/Manufacturer statement of confirmation confirming the recycled claims as referenced in the short report

For certified content:

- A copy of the certification licence(s) for the items issued by the scheme. The licence and recognition of the certification standard must be current at the time of the installation of the item in the fitout. The certification standard must be in accordance with a GBCSA recognised certification standard levels (i.e. A, B or C). In the case of timber and bamboo products, a

copy of the FSC or PEFC chain of custody certificates (CoC) must be submitted (in accordance with the additional guidance provided in the Interiors Fit Out Calculator Guide);

In the case of exposed concrete (for Flooring and Wall Covering Calculators only):

- Confirmation from the tenant that the 'exposed concrete' area entered in the Flooring Calculator has been provided without any wall covering

  OR

- As-built drawings that clearly indicate the area of exposed concrete. These must correlate with the 'exposed concrete' area entered in the Flooring Calculator

A copy of the certification licence(s) for the items issued by the scheme. The licence and recognition of the certification standard must be current at the time of the installation of the item in the fitout. The certification standard must be recognised by the GBCSA at the level entered in the Interiors Fitout Calculator.

A copy of the signed contract between the tenant and the manufacturer clearly stipulating:

- the terms and conditions of the take back scheme, confirming the commitment to take back the quantity of the product or material supplied to the project;
- nominating the intended reuse of the product/materials;
- the manufacturers details (registered name, address, email address, telephone number and website if applicable)

As Built drawing(s) marked-up to show detail drawings of connections demonstrating that the relevant building elements can be disassembled without cutting, material damage, or hindrance from adjacent materials;

Comprehensive Disassembly Plan that:

- Identifies which materials are designed to be recovered during building disassembly;
- Details how (in terms of technique, expertise and technology required) the identified materials and products should be recovered, indicating the order of disassembly to enable them to be extracted without material damage or interference from other building materials/elements.
- Is included in the O&M manual, that is issued to the tenant

A copy of the manufacturer's ISO 14001 certification that is current and valid.

ADDITIONAL GUIDANCE

The credit criteria for the Interiors Fitout Calculators are summarised in table Mat-4.1 above. The scope of the Flooring Calculator is as follows:

Flooring items in the project must include all exposed concrete, internal floor coverings and backing materials for floor coverings used within project floor areas that are permanently covered and protected from the elements. Exclusions apply and are listed below.

The following inclusions, exclusions and definitions apply:

Mat-4 Flooring

POINTS AVAILABLE 6

Flooring
Flooring includes but is not limited to exposed concrete, floor coverings and backing materials for floor coverings.
This includes flooring installed by a building owner as part of a tenancy make good processes prior to fitout works by the tenant.

Exposed concrete
Exposed concrete is an area of concrete floor surface that is not covered. This may be polished or sealed if required.

Floor covering
Floor covering may be fixed, supported or floating. Floor covering includes but is not limited to paint, carpets, carpet tiles, timber, resilient flooring, hard flooring and other floor coverings.

Backing materials for floor covering
Backing materials must be counted as a separate item to the floor coverings, e.g. carpet underlay. The area of the backing materials should be counted separately from the area of a floor covering.

Area
For the purpose of the flooring calculator, the area of a flooring item is defined as follows:

- Area of flooring = area shown in plain view

Include areas of flooring, backing materials and exposed concrete floor surfaces.

Exclusions
Rugs and sealants are excluded from the assessment.

Project teams must consult the Interiors Fitout Calculator Guide for detailed information regarding appropriate documentation requirements, criteria definitions, how the calculators operate and how to input into the excel sheets correctly. The information provided in the credit criteria and additional guidance merely summarises the key considerations and project teams must consult the Interiors Fitout Calculator Guide for further detailed additional guidance.

BACKGROUND AND ADDITIONAL GUIDANCE

Environmentally responsible flooring addresses the impact of flooring products on the environment by considering all aspects of the design and manufacturing process. There are a number of ways for the flooring products to reduce the impact on the environment, such as using recycled materials in the manufacturing process, using products that can be disassembled and recycled after their useful life and using products that have a durability/ longevity. The aspiration is for a closed-loop cycle in which materials and products are perpetually recycled so as to avoid disposal in landfills.

This credit rewards floor surfaces that are either uncovered, e.g. exposed concrete, or re-used flooring or flooring that has been certified according to GBCSA standards. Even though flooring products may contain a certain percentage of recycled content, they may still be off-gassing VOCs and flooring manufacturers are encouraged to significantly reduce the harmful VOC content from their products. Having the products certified by a 3rd party ensures that the product meets the requirements.

Rewarding responsible choices of flooring materials encourages manufacturers, suppliers and users to have an environmental approach for the products' life cycles by having an agreement in place to return the flooring at the end of the life cycle for re-use or recycling. It also encourages the flooring to be designed for disassembly where this can be separated for re-use, recycling or re-processing.

Mat-4 Flooring

POINTS AVAILABLE 6

Being ISO 14001 certified can assist companies to better manage the goal of reducing their environmental impacts. Benefits can include a reduction in waste and consumption of resources and operating costs.

1SO 14001 is an internationally recognized standard and a smart approach for the long term viability of businesses and could provide them with a competitive advantage against companies that do not adopt the standard.

REFERENCES & FURTHER INFORMATION

GBCSA Interiors Fitout Calculator Guide

Sustainable Flooring
http://www.nora.com/us/sustainability/environmental-responsibility/

Reco Floor Vinyl Take Back Scheme http://www.recofloor.org/

Carpet Recycling http://www.carpetrecyclinguk.com/

InterfaceFlor Carpet Take Back Scheme
http://urbanmining.org/2011/10/31/interfaceflor-sita-euro-wide-carpet-takeback/

Milliken Carpet Case Study http://www.wrap.org.uk

Environmental Protection Agency (EPA) Product Stewardship website
http://www.epa.gov/epawaste/conserve/tools/stewardship/index.htm

Australian Government Product Stewardship website
http://www.environment.gov.au/settlements/waste/product-stewardship/index.html

ISO 14001 website http://www.iso.org/iso/home/standards/management-standards/iso14000.htm

Ecospecifier South Africa http://www.ecospecifier.co.za/

Eco Specifier Australia http://www.ecospecifier.com.au/

Eco standard South Africa http://ecostandard.co.za/home.php

Cement and Concrete Institute of South Africa (CNCI): http://www.cnci.org.za

South African Institute of Steel Construction: http://www.saisc.co.za

Steel Recycling Institute (US): http://www.recycle-steel.org

Forest Stewardship Council (FSC) http://www.fsc.org/

Programme for Endorsement of Certified Wood (PEFC) http://www.pefc.org/

Rainforest Alliance, Sustainable Forestry (SmartWood) http://www.rainforest-alliance.org/

http://www.rainforest-alliance.org/forestry.cfm?id=certification

Australian Forestry Standard http://www.forestrystandard.org.au

Mat-5 Wall Coverings

POINTS AVAILABLE 3

AIM OF CREDIT

To encourage and recognise the selection of wall coverings that have a reduced environmental impact compared to available alternatives.

CREDIT CRITERIA

Up to three points are awarded where the wall coverings used have a reduced environmental impact as determined by the Wall Coverings Calculator against the five assessment criteria.

The five technical criteria are:

1. Wall coverings certified according to GBCSA recognised standards;
2. Reused wall coverings or the use of exposed concrete or materials;
3. Wall coverings that are sold with a product stewardship commitment or wall coverings that have been designed/installed for disassembly;
4. Wall coverings that contain re-used, recycled or certified content;
5. Wall coverings that are manufactured in facilities that are ISO 14001 certified.

The credit criteria for the Green Star SA - Interiors Wall Coverings Calculator are summarised in more detail in the table below.

Calculator credit criterion	**Summarised definition of credit criteria**	**Calculator input options available to teams**	**Criterion score (%)**
Option 1			
GBCSA recognised schemes	80% of an item's total mass is certified to a Green Building Council of South Africa recognised standard	A	100
		B	90
		C	85
Option 2			
Reuse	80% by area, length, volume or mass of the item must be retained/reused	Yes	100
		No	0
Product Stewardship	An end of life use for the product of material exists, in the form of a take back scheme, design for disassembly or long term durability (only applies to furniture)	Take back- lease	35
		Take back- purchase	30
		Designed for disassembly	35

Mat-5 Wall Coverings

POINTS AVAILABLE **3**

Reused, recycled or certified content	40% of the item's mass is either reused, recycled, or certified content (by a GBCSA recognised certification system), or a combination of the above.	Yes	25
		No	0
ISO 14001 manufacturers	80% of the mass of the product or materials must be sourced from manufacturing facilities that are certified to ISO 14001	Yes	25
		No	0

Table Mat-5.1: Score contributions for responses to the 5 criteria

DOCUMENTATION REQUIREMENTS

Green Star SA – Interiors PILOT
Submit all the evidence and ensure it readily confirms compliance.
1. Short report *For Criterion 1 – Reused products:* *2.* Supporting evidence *For Criterion 2 – Certified products:* *3.* Copy of the certification licence(s) *For Criterion 3 – Take back scheme:* 4. Copy of Contract 5. As Built Drawings 6. Comprehensive Disassembly Plan *For Criterion 5 – ISO 14001 manufacturing:* 7. Copy of ISO 14001 certificate

Short report by a suitably qualified professional that describes how the Credit Criteria have been met by:

For reused products:

- Providing calculations and a summary table confirming the stipulated proportion of re-used materials in the project

For design for disassembly and reuse:

- Outlining the overall approach

- Identifying the elements designed for disassembly and reuse
- Identify potential reuse options for those items
- Providing calculations and a summary table confirming that the stipulated proportion of the relevant elements is designed for disassembly and reuse

For all items with at least 40% re-used, recycled, or certified content:

- Providing calculations showing how the proportion of re-used, recycled, or certified content was derived. The results must be tabulated to clearly demonstrate:
  - All components in the item
  - Mass of each component
  - Mass of re-used, recycled, or certified content in each component
  - Percentage of re-used, recycled, or certified content for an item

For all items provided from ISO 14001 certified manufacturing facilities:

- Tabulating the weight of each component and total complaint weight proportion
- Confirmation that each component is sourced from manufacturing facilities that are ISO 14001 certified

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Supporting evidence

If purchased from a second-hand retailer, such as an auction house

- Purchase receipts/delivery receipts

If materials were used on the current site by a previous occupant or installed by a building owner as part of make good processes prior to fitout works by the tenant:

- Confirmation from the tenant that the items were in use onsite prior to the project works and that they have now been re-installed onsite

If materials were relocated to the site from the new tenant's, or occupants', previous fitout or building:

- Mover's inventory from the previous location.

  OR

- Inventory/schedule or images from the previous fitout showing clearly the items that have been re-used in the new fitout

For recycled items:

- Suppliers/Manufacturer statement of confirmation confirming the recycled claims as referenced in the short report

For certified content:

- A copy of the certification licence(s) for the items issued by the scheme. The licence and recognition of the certification standard must be current at the time of the installation of the item in the fitout. The certification standard must be in accordance with a GBCSA recognised certification standard levels (i.e. A, B or C). In the case of timber and bamboo products, a copy of the FSC or PEFC chain of custody certificates (CoC) must be submitted (in accordance with the additional guidance provided in the Interiors Fit Out Calculator Guide);

In the case of exposed concrete (for Flooring and Wall Covering Calculators only):

- Confirmation from the tenant that the 'exposed concrete' area entered in the Wall Covering Calculator has been provided without any wall covering

  OR

- As-built drawings that clearly indicate the area of exposed concrete. These must correlate with the 'exposed concrete' area entered in the Wall Covering Calculator

A copy of the certification licence(s) for the items issued by the scheme. The licence and recognition of the certification standard must be current at the time of the installation of the item in the fitout. The certification standard must be recognised by the GBCSA at the level entered in the Interiors Fitout Calculator.

A copy of the signed contract between the tenant and the manufacturer clearly stipulating:

- the terms and conditions of the take back scheme, confirming the commitment to take back the quantity of the product or material supplied to the project
- nominating the intended reuse of the product/materials.
- The manufacturers details (registered name, address, email address, telephone number and website if applicable)

As Built drawing(s) marked-up to show detail drawings of connections demonstrating that the relevant building elements can be disassembled without cutting, material damage, or hindrance from adjacent materials.

Comprehensive Disassembly Plan that:

- Identifies which materials are designed to be recovered during building disassembly;
- Details how (in terms of technique, expertise and technology required) the identified materials and products should be recovered, indicating the order of disassembly to enable them to be extracted without material damage or interference from other building materials/elements.
- Is included in the O&M manual, that is issued to the tenant

A copy of the manufacturer's ISO 14001 certification that is current and valid.

ADDITIONAL GUIDANCE

The GBCSA Interiors Fit Out tool has 4 calculators, one of which is the Wall Coverings Calculator. Each of these calculators is evaluated against specific credit criteria, the results of which are captured in the calculator input excel sheets. The credit criteria evaluate to what extent interiors finishes are

reused, contain certified content, have incorporated product stewardship in the consideration of the product/material, and have been manufactured in an environmentally responsible way.

Project teams must consult the Interiors Fitout Calculator Guide for detailed information regarding appropriate documentation requirements, criteria definitions, how the calculators operate and how to input into the excel sheets correctly. The information provided in the credit criteria and additional guidance merely summarises the key considerations and project teams must consult the Interiors Fitout Calculator Guide for further detailed additional guidance.

The credit criteria for the Interiors Fitout Calculators are summarised in table Mat-5.1 above.

Scope

The scope of the Wall Coverings Calculator is as follows:

Wall coverings in the project must include all exposed concrete, wall coverings and backing materials for wall coverings used within project floor areas that are permanently covered and protected from the elements. Exclusions apply and are listed below.

The following inclusions, exclusions and definitions apply:

Walling: is defined as an upright structure, but not limited to concrete, masonry, timber or plaster for wall coverings.

Exposed concrete or masonry or timber: is an area of concrete/masonry or timber wall surface that is not covered. This may be polished, varnished or sealed if required.

Wall covering: may be fixed, supported or floating. Wall coverings include, but are not limited to paint, vinyl, tiles, timber, cork, paper, digital printing, textiles, curtains and blinds.

Area
For the purpose of the wall coverings calculator, the area of a wall covering item is defined as follows:

- Area of wall covering = the total length of the wall covering multiplied by its total height.

Include areas of wall coverings and exposed concrete/masonry or timber wall surfaces.

Exclusions
Sealants are excluded from the assessment.
Internal walls and partitions are assessed as joinery under the Assemblies Calculator.

BACKGROUND

The choice of environmentally responsible wall coverings address the impact of wall covering products on the environment by considering all aspects of the design and manufacturing process.

There are a number of ways that the wall covering products may reduce the impact on the environment, by using recycled materials in the manufacturing process, using products that can be disassembled and recycled after their useful life and using products that have a durability/ longevity. The aspiration is for a closed-loop cycle in which materials and products are perpetually recycled so as to avoid disposal in landfills.

Mat-5 Wall Coverings

POINTS AVAILABLE 3

This credit rewards wall surfaces that are either uncovered, e.g. exposed concrete or exposed base material, or re-used wall coverings or wall coverings that have been certified according to GBCSA standards. Even though wall covering products may offer a certain percentage of recycled content, they could still be off-gassing VOCs and wall covering manufactures are encouraged to significantly reduce the harmful VOC content from their products. Having the products certified by a 3rd party, ensures that the product meets the requirements.

There is very little evidence in the market for product stewardship, which encourages manufacturers, suppliers and users to consider the products' life cycles by having an agreement in place to return the wall coverings at the end of the life cycle for re-use or recycling. Product stewardship also encourages the wall coverings to be designed for disassembly where they can be separated for re-use, recycling or re-processing.

Being ISO 14001 certified can assist companies to better manage the goal of reducing their environmental impacts. Benefits can include a reduction in waste and consumption of resources and operating costs.

1SO 14001 is an internationally recognized standard and a smart approach for the long term viability of businesses and could provide them with a competitive advantage against companies that do not adopt the standard.

REFERENCES & FURTHER INFORMATION

GBCSA Interiors Fitout Calculator Guide

Sustainable Wall Coverings
http://www.homeportfolio.com/article/sustainable-wallpaper-101
http://www.homeportfolio.com/article/how-to-choose-eco-paint

WA Sustainability Standard http://www.wallcoverings.org/?page=PowerSustainability

NSF
http://www.nsf.org/services/by-industry/sustainability-environment

Environmental Protection Agency (EPA) Product Stewardship website
http://www.epa.gov/epawaste/conserve/tools/stewardship/index.htm

Australian Government Product Stewardship website
http://www.environment.gov.au/settlements/waste/product-stewardship/index.html

ISO 14001 website http://www.iso.org/iso/home/standards/management-standards/iso14000.htm

Ecospecifier South Africa http://www.ecospecifier.co.za/

Eco Specifier Australia http://www.ecospecifier.com.au/

Eco standard South Africa http://ecostandard.co.za/home.php

Cement and Concrete Institute of South Africa (CNCI): http://www.cnci.org.za

South African Institute of Steel Construction: http://www.saisc.co.za

Steel Recycling Institute (US): http://www.recycle-steel.org

Forest Stewardship Council (FSC) http://www.fsc.org/

Programme for Endorsement of Certified Wood (PEFC) http://www.pefc.org/

Rainforest Alliance, Sustainable Forestry (SmartWood) http://www.rainforest-alliance.org/

http://www.rainforest-alliance.org/forestry.cfm?id=certification

Australian Forestry Standard http://www.forestrystandard.org.au

Mat-6 Local Sourcing

POINTS AVAILABLE **2**

AIM OF CREDIT

To encourage and recognise the environmental advantages gained, in the form of reduced transport emissions, by using materials and products that are sourced within close proximity to the site.

CREDIT CRITERIA

Up to two points are awarded independently as follows:

One point is awarded where:

- 50% of the project contract value is represented by materials and products that have manufactured within South Africa

One point is awarded where:

- 20% of the project contract value is represented by materials and products that have been extracted, harvested, processed and manufactured within South Africa.

DOCUMENTATION REQUIREMENTS

Green Star SA – Interiors PILOT
Submit all the evidence and ensure it readily confirms compliance.
1. Short report 2. Confirmation from supplier/manufacturer

Short report prepared by a relevant project team member that describes how the Credit criteria are met by:

- Providing a tabulated lists of all materials/products which are claimed as compliant with the Credit Criteria
- For each material/product, detailing all points of extraction and/or manufacture occur within South Africa, with reference to supporting documentation
- Providing calculations of the total value of the products that demonstrate compliance with the credit criteria, with reference to supporting documentation

Statement of confirmation from the supplier/manufacturer for each compliant material and/or product claimed in the form of signed correspondence confirming:

- The location of the extraction within South Africa
- The location of manufacturing within South Africa
- The quantity supplied to the project
- The weight of the product/material, where necessary

ADDITIONAL GUIDANCE

Mat-6 Local Sourcing

POINTS AVAILABLE 2

The project contract value is defined as the rand value that will be required to complete the works for the entire project. The following must be excluded from the contract value:

- demolition works
- consultants fees, design fees, project management fees
- works outside the site area
- Any works relating to buildings or areas within the site that are not being assessed for purposes of Green Star SA.

Manufacturing is defined as the process in which a raw material is converted into a finished product. Assembly is not considered to be manufacturing. A material must have gone through a significant process of material conversion to be considered within the scope of 'manufacturing'.

Sufficient proof must be provided, showing all points of extraction, harvesting and processing or manufacturing, demonstrating that these points occur within South Africa. If only a fraction of a product or material has been extracted, harvested and processed or manufactured in South Africa, then only that portion (by weight) shall contribute towards credit compliance. The cost of the product must be pro-rated, based on the proportionality of the weight of the various components. For example, if the steel legs of an office desk, which have been manufactured in South Africa, weigh 80% of the desk total mass, then 80% of the desks cost can contribute towards credit compliance.

In the case of reused or recycled products, the location from where the material was salvaged shall be equivalent to the point of extraction, and the location of the final vendor shall be the point of manufacture.

BACKGROUND

Local sourcing is defined to mean the use of construction materials that have been sourced within a certain geographic boundary or radius from a project site.

Local sourcing is a key consideration when attempting to deliver a project with environmentally responsible materials, delivering two important sustainability benefits. Buying locally means that there are fewer impacts in terms of road miles and air pollution. It also provides income to local businesses which help to support the local economy and provide employment opportunities, although this benefit is not addressed within this credit.

Transport emissions from the transport of products contribute to that product's embodied carbon. Suitably qualified professionals must make an informed decision as to whether using locally sourced, but high impact, materials is more environmentally beneficial than importing low impact materials, by looking at the project and context holistically

REFERENCES & FURTHER INFORMATION

DEFRA Carbon emission factors for transport http://naei.defra.gov.uk/data/ef-transport

Embodied carbon of materials http://www.bsria.co.uk/information-membership/bookshop/publication/embodied-carbon-the-inventory-of-carbon-and-energy-ice/

Hatch Design http://hatchdesign.ca/locally-manufactured-materials-part-1-the-why-and-the-how/

BedZED materials report
http://www.bioregional.co.uk/files/publications/BedZEDMaterialsReportSummary.pdf

Mat-7 Sundries Materials Sourcing

POINTS AVAILABLE **1**

AIM OF CREDIT

To encourage and recognise the selection of fitout finishes that have a reduced environmental impact when compared to available alternatives through responsible manufacturing, product stewardship and resource efficient design.

CREDIT CRITERIA

One point is awarded where the nominated products and materials contain one of the following responsible content options:

- 30% by cost is manufactured in ISO 14001 certified facilities;
  OR
- 40% by cost is eligible for a take-back scheme;

  OR
- 30% of all materials, by cost, contain reused or recycled content

If the materials that fall within the scope of this credit represent less than 1% of the project contract value, this credit is deemed 'Not Applicable'.

Note: The nominated products and materials are those that fall outside the scope of the fitout calculators as defined in more detail in the Additional Guidance.

DOCUMENTATION REQUIREMENTS

Green Star SA – Interiors PILOT
Submit all the evidence and ensure it readily confirms compliance.
Where 30% by cost is manufactured in ISO 14001 registered facilities: 1. Short report 2. Copy of ISO 14001 certificate (s) *Where 20% by cost is liable for a take-back scheme* 1. Short report 2. Signed contracts between tenant and take back scheme owner (s) *Where 30% of all materials, by cost, contain reused recycled content* 1. Short report For reused items: 2. Supporting evidence For recycled content: 3. Confirmation from supplier *If deemed non applicable:* *1. Short report*

Short report prepared by a suitably qualified professional that describes how the Credit Criteria have been met by:

- Confirming the total contract value attributable to the materials specified in accordance with the information in the Additional Guidance
- Providing tabulated calculations that demonstrate credit compliance

Where 30% by cost is manufactured in ISO 14001 certified facilities:

- Confirming which materials have been manufactured in an ISO 14001 certified facility, and providing the name of the supplier

Where 20% by cost is eligible for a take-back scheme:

- Confirming which materials and products are eligible for a take back scheme

Where 30% of all structural materials, by mass, are reused / recycled:

- Confirming which materials and products are reused or contain recycled content

If deemed non applicable:

Short report prepared by a suitably qualified professional that describes how the cost associated with the responsible content credit scope, as defined in the Additional Guidance, represents less than 1% of the total project contract value.

ISO 14001 certificate(s) from each supplier with a nominated compliant product or material

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A copy of the signed contract between the tenant and the manufacturer clearly stipulating:

- The terms and conditions of the take back scheme, confirming the commitment to take back the quantity of the product or material supplied to the project;
- Nominating the intended reuse of the product/materials;
- The manufacturer's details (registered name, address, email address, telephone number and website if applicable).

Supporting evidence

- If purchased from a second-hand retailer, such as an auction house:
  - purchase receipts/delivery receipts
- If materials were used on the current site by a previous occupant or installed by a building owner as part of 'making good' prior to fitout works by the tenant:
  - A statement from the interior designer or architect declaring that the items were in use onsite prior to the project works and that they have now been re-installed onsite
- If materials were relocated to the site from the new tenant's, or occupant's, previous fitout or building:
  - Mover's inventory from the previous location OR
  - As built drawings or inventory/schedule showing clearly the items that have been re-used in the new fitout

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Confirmation from manufacturers confirming the recycled claims as referenced in the short report

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ADDITIONAL GUIDANCE

Responsible content scope

The scope of this credit covers all materials not covered in the materials calculators, for example the following (but not limited to) are included in the scope of this credit:

- Mechanical installation (ducts, plant, pipes)
- Electrical installation (wiring, conduit, fittings/fixtures)
- General fixtures/fittings (e.g. ironmongery; blinds / curtains)
- Sanitary ware / brassware
- Structural adjustments (ie. load bearing walls or ceiling adjustments)

Project contract value

The project contract value is defined as the rand value that will be required to complete the works for the entire project. The following must be excluded from the contract value:

- demolition works
- consultants fees, design fees, project management fees
- works outside the site area
- Any works relating to buildings or areas within the site that are not being assessed for purposes of Green Star SA.

ISO 14001

In order to comply, 80% of the mass of the product or materials must be sourced from manufacturing facilities that are certified to ISO 14001.

An ISO 14001 certification is a management system tool designed to help an organisation administer and control its Environmental impact and compliance with regulations. ISO 14001 does this by helping to develop and implement policies, objectives and processes. ISO 14001 certifications are verified by independent external auditors and need to be reviewed annually for compliance and to maintain their validity. ISO 14001 certified facilities will have certificates that demonstrate their certification, stipulating the period of validity and the external auditing party who verified the certification.

ISO 14001 certified Environmental Management System (EMS) ensure that organisations:

- Commit to environmental objectives and targets
- Identify key environmental impacts and aspects associated with their business operations as well as mitigation measures, if necessary
- Develop systems and procedures for documentation, reporting and auditing the key environmental impacts and aspects
- Track and monitor their water and energy usage, as well as their waste generation and materials utilizations, with the aim of continually improving environmental performance over time.

Manufacturing

A ‘manufacturer’ is the maker who delivers a finished product. If there are several key manufacturers for a given product, ISO 14001 certification will be required from each manufacturer. This does not include parties who process or extract raw materials e.g. foresters, miners, etc.

A ‘manufacturing facility’ is where product components are manufactured from raw materials, whilst the final product may be assembled in this facility, a manufacturing facility is not the same as the warehousing or assembly only facility.

Take back scheme

Mat-7 Sundries Materials Sourcing

POINTS AVAILABLE 1

A take back scheme is a contract between a tenant and manufacturer, committing the manufacturer to taking back the material or product at its end of life, for the purpose of reusing or recycling the product as an input to a new value chain of goods. Take back schemes can either be part of formal programmes offered by manufacturers or suppliers, or they can be project specific arrangements. However, the nominated reuse of the product/material must be identified and clearly explained. The take back scheme needs to be a signed contract between both parties and cannot include exemptions related to limitations of timing of product return, or minimum quantity of product to be accepted.

Product stewardship is an environmental management approach that calls for increased responsibility by manufacturers, designers and consumers to consider the end of life impact of materials and products. Product stewardship can be achieved by several ways, take back schemes being ones of those. This approach acknowledges a shared responsibility in how we dispose of products and consider how the end of a products life will impact on the environmental and human health. This concept is alternatively referred to as extended product responsibility (EPR).

Reuse and recycled

80% of the products or material, by mass, must be reused in order for its associated cost to qualify towards credit compliance. For example, a joinery installation weighing 10 kgs, in which 8 kgs is reused wood, will be deemed a compliant products and the total cost associated with the joinery installation can contribute towards credit compliance.

40% of the products or material, by mass, must represent recycled content, in order for its associated cost to qualify towards credit compliance.

If only certain components of a product are reused, or contain recycled content, the relative proportion of weight of the compliant components, in comparison to the products total weight, can be used to proportion the products total cost.

Within a finite natural world, there are limits to be respected by human activities when it comes to production, consumption and the generation of waste. At the core of this agenda is good resource management, and an important component is resource efficiency across a product's full life cycle. A key way to promote resource efficient design is to procure products and materials that contain reused and recycled content.

Several fit out items can be sourced from reused products. For example, light fittings and carpets, can be reused. Similarly, recycled content can be incorporated into most structural materials (concrete, steel and masonry).

BACKGROUND

Responsible sourcing of materials (RSM) is an approach of supply chain management, responsible manufacture and product stewardship, and encompasses social, economic and environmental dimensions. Products can be considered "responsibly sourced" if they have come from a supply chain which has developed systems and/or processes to respond to certain environmental and socio economic issues (or issues which are deemed relevant to their operations).

REFERENCES & FURTHER INFORMATION

Environmental Protection Agency (EPA) Product Stewardship website
http://www.epa.gov/epawaste/conserve/tools/stewardship/index.htm

Australian Government Product Stewardship website
http://www.environment.gov.au/settlements/waste/product-stewardship/index.html

ISO 14001 website http://www.iso.org/iso/home/standards/management-standards/iso14000.htm

Mat-7 Sundries Materials Sourcing

POINTS AVAILABLE 1

Ecospecifier South Africa http://www.ecospecifier.co.za/

Eco Specifier Australia http://www.ecospecifier.com.au/

Eco standard South Africa http://ecostandard.co.za/home.php

Cement and Concrete Institute of South Africa (CNCI): http://www.cnci.org.za

South African Institute of Steel Construction: http://www.saisc.co.za

Steel Recycling Institute (US):http://www.recycle-steel.org

Land Use and Ecology

The Land Use & Ecology category aims to reduce the negative impacts on sites' ecological value as a result of urban development and rewards projects that minimise harm and enhance the quality of local ecologies.

Eco-1 Site selection

POINTS AVAILABLE **4**

AIM OF CREDIT

To encourage and recognise tenants that choose to occupy buildings/sites that have inherent credentials that support environmental sustainability.

CREDIT CRITERIA

Up to 4 points are available for this credit based on the base building's environmental attributes and performance.

Environmental attributes of the base building

Up to 1.5 points are awarded where the base building has a Green Star SA – Design rating at the time of certification as follows:

- Green Star SA – Design 4 star rating for 0.5 point;
- Green Star SA – Design 5 star rating for 1 point;
- Green Star SA – Design 6 star rating for 1.5 points.

OR

Up to 2 points are awarded where the base building has a Green Star SA – As Built rating at the time of certification as follows:

- Green Star SA – As Built 4 star rating for 1 points;
- Green Star SA – As Built 5 star rating for 1.5 points;
- Green Star SA – As Built 6 star rating for 2 points.

Note that a project cannot claim both Design and As Built rating points, only one of the two.

Environmental performance of the base building

Up to 2 points are awarded where the base building has a Green Star SA – Existing Building Performance rating at the time of certification as follows:

- Green Star SA – Existing Building Performance 4 star rating for 1 points;
- Green Star SA – Existing Building Performance 5 star rating for 1.5 points;
- Green Star SA – Existing Building Performance 6 star rating for 2 points.

Eco-1 Site selection

POINTS AVAILABLE **4**

DOCUMENTATION REQUIREMENTS

Green Star SA – Interiors PILOT
Submit all the evidence and ensure it readily confirms compliance.
Proof of certified rating

Proof of certified rating must take the form of either:

- A copy of the nominated Green Star SA Rating certificate for the building that clearly indicates the name of project, the achieved rating and year of certification;

OR

- A screenshot of the relevant page of the online Green Star SA certified projects directory, found on the GBCSA website.

ADDITIONAL GUIDANCE

There is no addition guidance for this credit.

BACKGROUND

Although the Green Star SA- Interiors rating tool is concerned with the sustainability aspects of fitouts rather than those of base-buildings, it is important that the sustainable attributes and performance of base buildings are considered at the fitout site selection stage. The Site selection credit recognises fitouts that have been developed within buildings where active steps have been taken to reduce negative environmental impacts as far as possible.

Green Star SA certification during building design, construction and operation indicate that building owners have already taken significant steps to protect the environment and conserve valuable resources, in addition to making available healthy indoor environments for building occupants. Green Star SA certified buildings deliver many economic benefits, such as reduced operating costs, enhanced asset value, improved productivity of building occupants, and optimized life-cycle economic performance.

Eco-1 Site selection

POINTS AVAILABLE 4

REFERENCES & FURTHER INFORMATION

Green Building Council of South Africa
http://www.gbcsa.org.za/projects/certified-projects/

Emissions

The Emissions Category aims to assess the environmental impacts of emissions generated by fitouts. Negative impacts commonly associated with fitout emissions include damage to the ozone layer through refrigerant leaks or disturbances to native animals and their migratory patterns as a result of light pollution.

Emi-1 Atmospheric Deterioration Avoidance

POINTS AVAILABLE **3**

AIM OF CREDIT

To encourage and recognise the avoidance of substances that contribute to the deterioration and long-term alteration of the Earth's atmosphere

CREDIT CRITERIA

Up to three points are awarded independently as follows:

Ozone Depleting Potential (ODP)

Refrigerants

Half a point is awarded where:

- For qualifying equipment provided, all refrigerants/gases have an Ozone Depletion Potential (ODP) of zero;

  OR

- No qualifying equipment is provided.

Insulants

Half a point is awarded where:

- No ozone-depleting substances are associated with either the manufacture or composition of all insulation materials in the development.

Global Warming Potential (GWP)

Up to one point is awarded where:

- The minimum percentage (by mass) of the total refrigerant charge of qualifying equipment that have a Global Warming Potential (GWP100) of 10 or less, is awarded as follows:
  - 50% (by mass) for 0.5 points;

    OR

  - 100% (by mass) for one point

Refrigerant Fugitive Emission Management

Half a point is awarded where:

- HVAC systems containing refrigerants are;
  - Contained in a moderately air tight enclosure;

  AND

- Are provided with a refrigerant leak detection system to cover high-risk parts of the plant;

OR

An automatic permanent refrigerant leak detection system is specified, which is NOT based on the principle of detecting or measuring the concentration of refrigerant in air.

An additional half point is awarded where:

- The half point above is achieved;

AND

- A refrigerant recovery system is installed that is:
  - Equipped with an automated pump-down system;

  AND

  - Sized to effectively and safely capture, isolate, and store 95% (by weight) of the maximum refrigerant charge.

Where no refrigerants are used in the project, OR if all refrigerants have an ODP of zero and a GWP of 10 or less, the point for refrigerant fugitive emission management is 'Not Applicable' and is excluded from the points available, used to calculate the Emissions Category score.

DOCUMENTATION REQUIREMENTS

Green Star SA – Interiors PILOT
Submit all the evidence and ensure it readily confirms compliance.
1. Short report 2. Manufacturer product datasheet(s) OR Letter from supplier 3. Evidence of properties

Short report prepared by a suitably qualified professional that describes how the Credit

Criteria have been met by:

•Providing a tabulated summary of each qualifying equipment within the interior fitout, and the type and mass of refrigerant/gas charge in each;

• *Additionally where ODP and/or GWP claimed:* Confirming the compliance of refrigerants/gases (ODP/GWP as applicable);

• Where no qualifying equipment provided; confirming that no qualifying equipment is provided, with details of the alternative equipment (where applicable);

• Listing all insulation applications proposed within the fitout, confirming for each application that the Credit Criteria is met with reference to the supporting documentation;

• *Additionally where refrigerant fugitive emission management claimed:*

• Outlining the design and intended operation of the refrigerant leak detection system(s) and if the additional point is claimed, of the refrigerant recovery system(s);

• Where a refrigerant recovery system provided; describing the refrigerant recovery system;

Evidence of properties of the refrigerant/gas clearly demonstrating for each refrigerant/gas referenced in the short report, the generally accepted ODP/GWP as published within reputable sources (see References).

Manufacturer product datasheet(s) OR **Letter from supplier** for

• Each qualifying equipment as referenced in the short report, clearly identifying the equipment, the type and mass of refrigerant/gas charge; and/or

• Each applicable (i.e. non-woven) insulation product referenced in the short report, clearly demonstrating that the product is free of ozone-depleting substances in both manufacture and composition.

BACKGROUND AND ADDITIONAL GUIDANCE

The Atmospheric Deterioration Avoidance credit addresses the significant greenhouse gas emissions that are associated with the use of refrigerants, and in particular their selection and leakage.

Ozone Depleting Potential & Global Warming Potential

Qualifying equipment is considered as refrigerant-based refrigeration and heat-pump equipment, and gaseous fire suppression equipment provided within the scope of the main contract of the development, and includes, but is not limited to;

- Air conditioning equipment (including reverse-cycle heat pumps), unitary or otherwise;
- Heat-pumps for domestic hot water generation; and,
- Fire suppression equipment.

It must be clear from the documentation that all qualifying equipment has been accounted for, the refrigerant/gas type(s) identified and quantified, and the refrigerants/gases demonstrated as compliant with the Credit Criteria.

Where qualifying equipment is not provided, the short report must describe the alternative equipment provided (e.g. domestic hot water heat-pump is not provided as heating provided by gas boilers), or explain that no alternatives are provided (e.g. building is naturally ventilated).

Emi-1 Atmospheric Deterioration Avoidance

POINTS AVAILABLE 3

Hand-held fire extinguishers are excluded from the scope of the Credit Criteria.

For refurbishments and redevelopments, existing equipment which is to be reused must comply with the Credit Criteria.

Table Emi-1.1 (over page) provides ODP & GWP for some commonly used refrigerants and gases.

Refrigerant/Gas	Global Warming Potential (GWP100)	Ozone Depletion Potential (ODP)
R11	4000	1.0
R12	8500	0.83
R22	1700	0.05
R134a	1300	0
R407c	1600	0
R410a	1900	0
R290 (propane)	3	0
R600 (butane)	3	0
R1270 (propene)	3	0
Ammonia	<1	0
Halon 1211	1300	3
HFC227ea (FM200)	2900	0
IG541	0	0
CO_2	1	0
Air	0	0
Water	<1	0

Table Emi-1.1: *ODP & GWP of some common refrigerants and gases*

Currently there are no Chlorofluorocarbon (CFC) and Hydrochlorofluorocarbon (HCFC) refrigerants available which meet the ODP requirements of this credit. The points can, however, be achieved through the use of Hydrofluorocarbons (HFCs) or hydrocarbon-based refrigerants within qualifying equipment.

The 100-year Global Warming Potential is considered for the purpose of the Green Star SA – Public & Education Building rating tool. The GWP provides a measure of the potential for damage that a chemical has relative to 1 unit of carbon dioxide. GWP is used to describe Global Warming Potential over 100 years and is used by the UN Intergovernmental Panel on Climate Change (IPCC).

Examples of achieving the 50% replacement may include replacing the refrigerant in either the secondary loop or the compressor of a split or variable refrigerant flow system, but not in a chilled water system (as the secondary refrigerant is commonly water). Rewarding partial change replacement encourages the uptake of natural refrigerants in a wider range of circumstances.

The primary refrigerant is the refrigerant in the compressor (or the only refrigerant in a packaged system). A secondary refrigerant is one that transfers the heat from the conditioned space to the compressor.

Where no refrigerants are used within the development, full points may be claimed for the ODP component of the credit.

The scope of the Credit Criteria addresses insulants manufactured using blowing agents only (e.g. rigid polystyrene, rigid polyurethane, polyolefins etc.).

Fibre-based woven insulation products (e.g. glass fibre, mineral wool, polyester etc.) and foil insulation are not within the scope of the Credit Criteria as these products are not manufactured using blowing agents. As such, manufacturer product datasheets are not required for fibre-based woven insulation nor foil insulation products.

Common applications of applicable insulation include, but are not limited to;

- Thermal insulation;
    - Chilled/hot water pipework;
    - Refrigerant pipework;
    - Ductwork;
    - Thermal storage vessels;
    - Fabric applications (walls, roofs, floors);
- Acoustic insulation.

Electrical conductivity insulation (e.g. wire or cable sheathing) is also excluded from the scope of the Credit Criteria.

All common applications of insulation should be nominated within the short report and the type of insulation used nominated.

The tender documentation must clearly stipulate all insulation to be free of ozone-depleting substances in both manufacture and composition.

Refrigerant Fugitive Emission Management
If a number of different systems are installed on a project, the documentation must account for and describe all systems within the project.

Plant rooms must be ventilated to comply with the South African building regulations, and this requirement must continue to be met in buildings with refrigerant leak detection systems.

The Credit Criteria for refrigerant leak detection is applicable to negative-pressure refrigerants, as the Aim of Credit is to detect any leaks of refrigerant from the vessel at any time, including those that occur when the system is not in operation.

High-risk parts of the plant include plant rooms containing chillers and other equipment with refrigerants but do not include evaporator or condenser coils.

Method based on air-sensing of refrigerant leak

The equipment must be in a moderately air-tight enclosure to allow the concentration of leaked refrigerant to build up to a detectable level. The documentation must demonstrate that the location,

size and intended operation of the sensors and openings within the enclosure will enable effective operation of the leak detection system, and will not prevent small refrigerant leaks being detected.

Method based on alternative detection of refrigerant leak

Full details must be provided of how the system will automatically detect a refrigerant leak, while not triggering an alarm due to normal variations in pressure etc. Such systems (for example based on sensing the presence of refrigerant vapour in liquid-carrying pipes) are now commercially available. Systems based on monitoring pressure drops within the pipe work are not necessarily compliant with the Green Star SA requirements. There are natural fluctuations to the pressure of the refrigerant due to changes in volume and temperature of the system, and to the ambient temperature of the surroundings. Low pressure and high pressure switches, which are standard equipment on refrigerant plant, are therefore not sufficient to award the credit.

Refrigerant detectors

For a new building, permanently installed multi-point sensing detectors are to be specified. Various types are available including corona discharge (hand held only and as such does not comply with the Green Star SA requirements unless a regular {at least once a week} monitoring system is confirmed), infrared, and semi-conductor.

Indicator dyes

Fluorescent or coloured dyes can be added to the refrigerant to show leakage sites. The use of the dye must be approved by the compressor manufacturer.

Halide torch detectors

This type of detection is only appropriate for chlorine-based substances such as CFCs and HCFCs. Compounds which do not contain chlorine (e.g. HFCs) cannot be detected by this method. Non-ozone-depleting refrigerants do not register on a halide torch leak detector.

Pump down

'Pump down' is the process of removing refrigerants from a refrigeration unit, and is usually undertaken to allow maintenance or repair of the unit. Automatic pump-down to either a separate storage tank or into the heat exchanger is acceptable but only where isolation valves are fitted to contain it once fully pumped down.

The provision of manual storage cylinders or any other system which is reliant on the diligence of the maintenance staff on site is not acceptable to achieve this credit.

Small packaged units

Small packaged units do not need to be fitted out with a leak detection system or a refrigerant recovery system as per the Credit Criteria for this credit if the total sum of refrigerants for these units is not more than 5% of the total refrigerant volume of the project. Where the exclusion is being claimed, a tabulated summary demonstrating that 100% of all refrigerants in the project have been accounted for must be provided at the time of submission. Small packaged units must still comply with the ODP & GWP requirements.

REFERENCES & FURTHER INFORMATION

Institute of Refrigeration

Emi-1 Atmospheric Deterioration Avoidance

POINTS AVAILABLE 3

http:www.ior.org.uk

F-gas regulations
http://ww2.defra.gov.uk/environment/quality/air/fgas/

Australian Institute of Refrigeration Air Conditioning and Heating (AIRAH) (2003), Refrigerant Selection Guide 2003. Melbourne
http://www.airah.org.au

United Nations Environmental Program Ozone Secretariat.
www.unep.org/ozone

US Environmental Protection Agency
http://www.epa.gov/ozone/

Emi-2 Light Pollution

POINTS AVAILABLE **1.5**

AIM OF CREDIT

To encourage and recognise interior fitouts that minimise light pollution into the night sky.

CREDIT CRITERIA

Internal light sources

One point is awarded where:

- The project lighting and light sources are automatically turned off when the project is not occupied. This can be achieved through a timer or occupancy sensors.

This criterion only applies to the time during which the project is not regularly occupied. For example, if a project is occupied for a partial time at night (say, a restaurant), the credit is only applicable from the time the project is unoccupied (after closing hours) to the morning.

External light sources

Half a point is awarded where:

- The impact from light pollution from external sources, including signage, is eliminated as far as possible.

For tenants that don't have external lighting or lit signage, this credit is 'Not Applicable' and is excluded from the point available.

DOCUMENTATION REQUIREMENTS

Green Star SA – Interiors PILOT
Submit all the evidence and ensure it readily confirms compliance.
1. Short report 2. As-built drawing(s) *Where external lighting is present, in addition to the above:* 3. As-built luminaire schedule OR Calculation Plots

Short report prepared by a suitably qualified professional that describes the submission for this credit. The short report should detail:

- The points being claimed; and
- A short description of how each of the credit criteria is being claimed, with a correlation to the documentation submitted as described below. The short report should detail:
    - The external lighting, and any internal lighting that would be seen from outside on the site; and
    - The method by which the impacts from internal and external lighting is addressed.

As-built drawing(s) showing the location of any relevant luminaires, awnings, blinds, windows, sensors, timers, skylights, etc., as required.

As-built luminaire schedule for all external lighting, nominating the type, lighting distribution, aiming point and mounting orientation and quantity of each luminaire and including the relevant photometric data showing that the luminaires do not have an upward light output ratio that exceeds 5%

OR

Calculation Plots for all external lighting, showing that all grid points on the calculation plane return a maximum reading of 0.5 Lux to the site boundary and no greater than 0.1 Lux to 4.5m beyond the site into the night sky.

ADDITIONAL GUIDANCE

Internal light sources

There are two methods for achieving this, both methods are prescriptive.

Option A
The project lighting and light sources are automatically turned off when the project is not occupied.

The lights can be turned off either by a timer, or through occupancy sensors. If the lights are turned off by a timer, these must turn off no later than an hour after closing time. If turned on by a sensor, the lights must turn off 15 minutes after no occupancy is detected. In both cases, a manual override can be present; however, the lighting must turn itself off one hour after a manual override.

A strategy for manually turning off all lights does not address this criterion.

It is also noted that janitor services are not considered regular occupation. In this case, lights can be turned on while cleaning occurs, though they must turn back off once cleaning has occurred.

In fitouts that are designed for 24 hour or nightly use this option is not relevant.

Option B
The project automatically blocks off all light coming from the fitout to the outside. This can be achieved through blinds with a minimum VLT of 10, or, through automated external louvers, or other similar means which achieve the same outcome. The method by which light is blocked off must be in place from closing time.

This criterion only applies to the time during which the project is not regularly occupied. For example, if a project is occupied for a partial time at night (say, a restaurant), the credit is only applicable from the time the project is unoccupied (after closing hours) to the morning.

Exceptions

The following may be excluded from the requirements of this credit criterion:

- Signage related to emergency exits;
- Emergency lighting (external) that only illuminates in the event of an emergency or power failure; and
- Safety lighting.

External light sources

There are two methods for achieving this, a prescriptive method, and a performance method.

Option A

Relative to its particular mounting orientation, no external luminaire or external light source has an Upward Light Output Ratio that exceeds 5%. Project teams must show that the Upward Light Output Ratio (ULOR) provided in the compliance documentation, is given relative to the mounting orientation of the luminaire. A luminaire with an ULOR ratio as nominated in a manufacturer's data sheet will have a different ULOR ratio when the mounting orientation of the luminaire is changed. In the event that any external luminaire is mounted in an orientation other than the one assumed by the manufacturer, the ULOR must be recalculated as part of the submission.

Awnings

Awnings can be used as a means of achieving compliance with the 5% ULOR requirement where a section drawing showing the light output of the luminaire can be provided, and where the awning has the effect of blocking 95% of the output of the lamp above the horizontal. Where it is not clear that the awning is a permanent structure, points of this credit may not be awarded.

Option B

Direct illuminance from external luminaire or external light source produces a maximum initial point illuminance value no greater than 0.5 Lux to the site boundary and no greater than 0.1 Lux to 4.5 metres beyond the site into the night sky, when modelled using a calculation plane set at the highest point of the building.

Calculation plane

The calculation plane must cover the area between the site boundary and building façade or vertical service to be illuminated. The horizontal calculation plane should be set at top of the building fabric – excluding spires. Calculation plane grid points to be in 0.5m spacing. All illumination results to be reported to 2 decimal places. Calculation plane 1 to extend to site boundary – maximum 0.50 Lux direct illumination at any point using initial lamp lumens. Calculation plane 2 to extend from the site boundary to 4.5m beyond the site boundary – maximum 0.10 Lux direct illumination at any point using initial lamp lumens.

Additional notes for this criterion

Perimeter lighting (or perimeter light sources) in a shop-front that is coming from inside the tenancy can be treated as either internal lighting, or external lighting. Regardless of how it is treated, the lighting or light sources cannot be excluded. Only light that is installed as part of the project scope, or that exclusively serves the tenant (say, as part of a terrace) is required to comply with the external lighting requirement. The exception to this is external signage in the building, if the external signage rights are owned by the applicant the signage must be included.

Exceptions

The following may be excluded from the requirements of this credit criterion:

- Signage related to emergency exits;

- Emergency lighting (external) that only illuminates in the event of an emergency/power failure; and
- Safety lighting.

External emergency lighting that is integrated into the general external lighting scheme must comply with the requirements of the credit. E.g. lights that act as general lighting but have a battery pack to ensure that they stay on in the event of a power failure

BACKGROUND

Light travelling up into the night sky (sky glow) or spilling on to neighbouring properties is a form of pollution. Lowering light pollution levels help reduce disruptions to the habits of animals within and around a site. The Light Pollution credit rewards best practice lighting as it relates to a fitout. All lighting associated with a fitout, be it internal or external is assessed and in some fitouts, light emanating from signage may also be included.

Light pollution harms the environment in many ways:

- Effect on migratory birds - nocturnal birds use the moon and stars for navigation and can become disorientated. In the US birds often crash into brilliantly-lit broadcast towers or buildings, or circle them until they drop from exhaustion;
- Disrupting biological rhythms and otherwise interfering with the behaviour of nocturnal animals and insects;
- Urban sky glow hinders professional and amateur astronomy and deprives the public of its view of the night sky; and
- Additional greenhouse gasses are emitted merely to light the night sky.

REFERENCES & FURTHER INFORMATION

Institution of Lighting Engineers
http://www.ile.org.uk

CIBSE Lighting Guide 6: 1992, The Outdoor Environment Chartered Institute for Building Service Engineers
http://www.cibse.org

International Dark-Sky Association
http://www.darksky.org
lluminating Engineering Society of North America (1999), IESNA Recommended Practice Manual: Lighting for Exterior Environments, Illuminating Engineering Society of North America, New York, US

Lewicki, M. (2008), Light Pollution, Astronomical Society of South Australia, Adelaide, Australia

Scottish Executive (2007), Controlling Light Pollution and Reducing Lighting Energy Consumption, Scottish Executive, Edinburgh, Scotland

Innovation

The Innovation category is included within Green Star SA – Interiors PILOT rating tool as a way of encouraging, recognising, and rewarding the spread of innovative practices, processes and strategies that promote sustainable communities and cities.

The Innovation category also acknowledges efforts which demonstrate that sustainable development principles have been incorporated into the wider process of designing and procuring buildings (such as collaborative working practices), as well as any positive environmental influence brought to bear on the wider geographic area in which the project is located. These efforts are recognised over and above any credit obtained in other categories.

Innovation points are awarded at the discretion of the GBCSA. Any single initiative will only be awarded to three projects under the same rating tool before no longer being considered 'innovative' and rewarded within this category. A database of innovative initiatives from certified projects will be accessible from the GBCSA website for projects to check before submission of documentation.

There is a maximum of five points available in total within the Innovation Category. By way of demonstration: It is possible for the same initiative to gain 4 points (a global 'first' innovation, resulting in a restorative environmental impact of greater than 5%) – note this by definition exceeds a current Green Star SA benchmark and hence cannot be outside the scope of the current Green Star SA tool. Thus it is not possible for a single initiative to obtain the full 5 points. It is possible for up to 5 initiatives to each gain a single point, for a total of 5 points within the category. These 5 initiatives could all be for eliminating the negative environmental impact targeted by an existing credit, for example. Combinations of initiatives are welcomed. A maximum of 5 initiatives can be used to claim the innovation credits.

Inn-1 Innovative Strategies and Technologies

POINTS AVAILABLE **2**

AIM OF CREDIT

To encourage and recognise pioneering initiatives in sustainable design, process or advocacy.

CREDIT CRITERIA

Up to two points are awarded for an innovation initiative where:

- The initiative is a technology or process that is considered a 'first' in South Africa or in the World;

OR

- The project substantially contributes to the broader market transformation towards sustainable development in South Africa or in the World.

Points are awarded as follows:

- One point is awarded when either of the above is true for the South African market;

OR

- Two points are awarded when either of the above is true for the Global market

Up to five innovation initiatives can be awarded points under this credit, but no individual initiative can achieve more than two points in this credit. Qualifying initiatives may achieve additional points in other Innovation Credits, however the maximum points available for any one building assessment under Inn-1, Inn-2 and Inn-3 is five (in total).

DOCUMENTATION REQUIREMENTS

Green Star SA – Interiors PILOT
Submit all the evidence and ensure it readily confirms compliance.
1. Short report

Short report prepared by a suitably qualified professional which describes how the Credit Criteria have been met by:

- Including a detailed description of each innovation initiative;

- Articulating the nature and magnitude of the environmental benefit achieved by the initiative(s);
- Referencing evidence and calculations, wherever appropriate, that support all claims; and
- Including any evidence necessary to demonstrate that the innovation claimed is first in the world or in South Africa (must be in the form of extracts from a peer-reviewed publication or other research acknowledgement).a suitable professional including a tabulated summary of the public transport stops surrounding the site in compliance with the distance requirement;

ADDITIONAL GUIDANCE

Innovation points are reviewed by the Assessors, awarded entirely at the discretion of the GBCSA, and any decision is final.

An Innovation submission must be a concise report that clearly articulates the nature and magnitude of the environmental benefit achieved by proposed initiative(s). The report must distinctly justify (and quantify whenever relevant) the environmental or advocacy benefits of the initiative. Submissions that are purely qualitative or unsupported by documented data will not be awarded Innovation points.

In reviewing the submission, the Assessors and GBCSA will consider the environmental benefit of the innovative initiative relative to existing Green Star SA – Interiors PILOT credits where relevant.

The metric used to demonstrate environmental benefit must, where possible, be the same as the metrics used in Green Star SA.

Information provided within the Innovation Credit applications may be used by the GBCSA to review the existing credits and/or develop new credits.

BACKGROUND

Compared to peer nations in North America and Europe, less is spent on building research and innovation in South Africa. This credit recognises the value that changes in design and technology can have, in terms of increasing occupant comfort and safety, and consuming fewer resources, and aims to reward organisations that seek to improve the built environment in a unique way.

Inn-1 Innovative Strategies and Technologies

POINTS AVAILABLE **2**

REFERENCES & FURTHER INFORMATION

The Building Research Establishment Innovation Den
http://www.bre.co.uk/innovationden

The South African Government Department of Environmental Affairs & Tourism
http://www.environment.gov.za

The South African Government Department of Science & Technology (Research & Development Tax incentives)
http://www.dst.gov.za/r-d

The Council for Scientific & Industrial Research
http://www.csir.co.za/Built_environment/

Earthlife Africa
http://www.earthlife.org.za/

The Sustainable Energy Society Southern Africa
http://www.sessa.org.za/

Inn-2 Exceeding Green Star SA Benchmarks

POINTS AVAILABLE **2**

AIM OF CREDIT

To encourage and recognise projects that achieve environmental benefits in excess of the current Green Star SA benchmarks.

CREDIT CRITERIA

Up to two points are awarded where there has been a substantial improvement on an existing Green Star SA credit, as follows:

- One point for a solution that results in the elimination of the specific negative environmental impact of the project targeted by an existing credit; and
- Two points for a solution that results in a substantial (e.g. 5% or greater above 'neutral') restorative environmental impact targeted by an existing credit.

Up to five innovation initiatives can be awarded points under this credit, but no individual initiative can achieve more than two points in this credit. Qualifying initiatives may achieve additional points in other Innovation Credits, however the maximum points available for any one building assessment under Inn-1, Inn-2 and Inn-3 is five (in total).

DOCUMENTATION REQUIREMENTS

Green Star SA – Interiors PILOT
Submit all the evidence and ensure it readily confirms compliance.
1. Short report

Short report prepared by a suitably qualified professional which describes how the Credit Criteria have been met by:

- Including a detailed description of each innovation initiative;
- Identifying the credit for which the project claims to exceed the Green Star SA benchmark;
- Substantiating why exceeding the top benchmark has a positive environmental impact;
- Quantifying, consistent with the approach of the credit with the initial benchmark, the margin by which the benchmark is exceeded; and
- Referencing evidence and calculations, wherever appropriate, that supports all claims.

Inn-2 Exceeding Green Star SA Benchmarks

POINTS AVAILABLE **2**

ADDITIONAL GUIDANCE

Innovation points are reviewed by the Assessors, awarded entirely at the discretion of the GBCSA, and any decision is final.

An Innovation submission must be a concise report that clearly articulates the nature and magnitude of the environmental benefit achieved by proposed initiative(s). The reports must distinctly justify (and quantify whenever relevant) the environmental or advocacy benefits of the initiative. Submissions that are purely qualitative or unsupported by documented data will not be awarded Innovation points.

The metric used to demonstrate environmental benefit must, wherever possible, be the same metric as the one used in the Green Star SA – Interiors PILOT credit that is being exceeded. For example if the building significantly reduced potable water consumption the metric used would be 'in L/person/day'.

In reviewing the submission, the GBCSA will consider how many points are awarded for the credit being exceeded, the relative environmental benefits and relative score as compared to other Green Star SA – Interiors PILOT credits. Category environmental weightings will also be taken into account.

This innovation credit applies to:

- Existing Green Star SA credits with numeric benchmarks;
- Credits where the highest threshold within the credit is set below 95%; and
- Credits where exceeding the current Green Star SA benchmark would have an environmental benefit (e.g. a larger recycling waste storage area may not have additional benefit).

BACKGROUND

The Green Star SA benchmarks were in a large part based on the capacity for a four star Green Star SA certified rating to be achieved by buildings within the top 25% of the industry, based on environmental performance.

The Innovation Credit is therefore designed to encourage and recognise environmental initiatives which go beyond existing benchmarks.

REFERENCES & FURTHER INFORMATION

The Building Research Establishment Innovation Den
http://www.bre.co.uk/innovationden

The South African Government Department of Environmental Affairs & Tourism
http://www.environment.gov.za

Inn-2 Exceeding Green Star SA Benchmarks

POINTS AVAILABLE **2**

The South African Government Department of Science & Technology (Research & Development Tax incentives)
http://www.dst.gov.za/r-d

The Council for Scientific & Industrial Research
http://www.csir.co.za/Built_environment/

Earthlife Africa
http://www.earthlife.org.za/

The Sustainable Energy Society Southern Africa
http://www.sessa.org.za/

Inn-3 Environmental Design Initiatives

POINTS AVAILABLE **1**

AIM OF CREDIT

To encourage and recognise sustainable building initiatives that are currently outside of the scope of this Green Star SA rating tool but which have a substantial or significant environmental benefit.

CREDIT CRITERIA

One point is awarded where:

- An initiative in the project viably addresses a valid environmental concern outside of the current scope of this Green Star SA tool.

Up to five innovation initiatives can be awarded points under this credit, but no individual initiative can achieve more than one point in this credit. Qualifying initiatives may achieve additional points in other Innovation Credits, however the maximum points available for any one building assessment under Inn-1, Inn-2 and Inn-3 is five (in total).

DOCUMENTATION REQUIREMENTS

Green Star SA – Interiors PILOT
Submit all the evidence and ensure it readily confirms compliance.
1. Short report

Short report prepared by a suitably qualified professional which describes how the Credit Criteria have been met by:

- Including a detailed description of each innovation initiative and proposed credit;
- Demonstrating that the proposed credit requirements have been met by the project;
- Justifying how this credit would be different to other existing Green Star SA credits, and why it deserves to be included in Green Star SA;
- Articulating the nature and quantifying the environmental benefit achieved by the initiative(s);
- Referencing evidence and calculations, wherever appropriate, that support all claims; and
- Following the format set out in the Green Star SA credits to:
    - Identify the category that would hold this credit;
    - Propose the Aim of the Credit; and

- Establish Credit Criteria and outline Documentation Requirements, based on research and comparison with other credits within that category, which would be sufficient for demonstrating compliance.

ADDITIONAL GUIDANCE

Innovation points are reviewed by the Assessors, awarded entirely at the discretion of the GBCSA, and any decision is final.

The significance of the environmental benefit of the nominated innovation must be calculated and clearly conveyed in the submission. This credit is aimed at initiatives that provide an environmental benefit and have not been addressed by existing Green Star SA – Interiors PILOT Credit Criteria.

An Innovation submission must be a concise report that clearly articulates the nature and magnitude of the environmental benefit achieved by proposed initiative(s). The reports must distinctly justify (and quantify whenever relevant) the environmental benefits of the initiative.

In essence, the report for this credit must advocate that the initiative(s) claimed for this credit be addressed by a new credit within Green Star SA.

It must be demonstrated that there is a quantified significant environmental benefit associated with the nominated innovation initiative and that it is clearly documented and integrated into the project.

Where this credit is claimed, projects must justify how this innovation initiative differs from other existing Green Star SA credits, and why it deserves to be included in Green Star SA. To do this, the initiative must meet the following criteria, at a minimum:

- Address a valid environmental concern;
- Be at or beyond ‘best practice’ for the current South African context;
- Be quantifiable and capable of being assessed without subjective interpretation;
- Be related to attributes, not operations; and
- Be robust.

BACKGROUND

All Green Star SA rating tools recognise initiatives that have the potential to reduce the environmental impact of the development. Some project initiatives will provide significant environmental benefits that are not currently addressed by Green Star SA – Interiors PILOT credits.

Inn-3 Environmental Design Initiatives

POINTS AVAILABLE **1**

This credit is designed to recognise such innovative initiatives.

REFERENCES & FURTHER INFORMATION

The Building Research Establishment Innovation Den
http://www.bre.co.uk/innovationden

The South African Government Department of Environmental Affairs & Tourism
http://www.environment.gov.za

The South African Government Department of Science & Technology (Research & Development Tax incentives)
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The Council for Scientific & Industrial Research
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Earthlife Africa
http://www.earthlife.org.za/

The Sustainable Energy Society Southern Africa
http://www.sessa.org.za/