

# BEAM Plus Interiors

Commercial, Retail and Institutional

Version 1.0

(2013.08)

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# BEAM Plus Interiors

## Commercial, Retail and Institutional

An environmental assessment method for Interior spaces, including offices, shops, and related interior premises.

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<b>1</b>	<b>BEAM Plus Interiors</b>	<b>6</b>
1.1	Introduction	6
1.1.1	The BEAM Society Limited	6
1.1.2	The Hong Kong Green Building Council	6
1.1.3	Origins of BEAM Plus Interiors	6
1.1.4	Development of BEAM Plus Interiors	7
1.1.5	Disclaimer	7
1.1.6	Limitations	8
1.2	Application and Eligibility	8
1.2.1	Eligible Premises Types	8
1.2.2	Specialist Areas Excluded	9
1.2.3	Exempt Area	9
1.2.4	Types of Space Conditioning	9
1.2.5	Base Provisions within the Host Building	10
1.2.6	Schedule of Works to be Included	10
1.2.7	Assessment Coverage	11
1.3	Certification Framework	12
1.3.1	Certification Timing	12
1.3.2	Certification Process	13
1.3.3	Site Audit	13
1.3.4	Applicant Preparations Prior to Certification	14
1.3.5	Certificate Validity	14
1.3.6	Certification Fees	14
1.3.7	Credit Interpretation Request (CIR)	14
1.3.8	Appeal	15
1.3.9	BEAM Professionals (BEAM Pro)	15
1.3.10	BEAM Assessors (BAS)	15
1.4	Categories	15
1.4.1	Green Building Attributes (GBA)	16
1.4.2	Management (MAN)	16
1.4.3	Materials Aspects (MA)	16
1.4.4	Energy Use (EU)	16
1.4.5	Water Use (WU)	17
1.4.6	Indoor Environmental Quality (IEQ)	17
1.4.7	Innovation (IV)	17
1.4.8	Alternative Assessment Methods	18
1.5	Grading Methodology	18
1.5.1	Pre-requisite Credits	18
1.5.2	BEAM Plus Interiors Grading	19
1.6	Framework	19
1.6.1	BEAM Plus Framework	19
1.6.2	BEAM Plus Benefits	20
1.6.3	BEAM Achievements	21
1.6.4	Basis of Credits and Criteria	21
1.6.5	Assessment Principles	24
1.6.6	Development History	25
1.6.7	Continuous Improvement	26
1.7	Summary of Credits	27
<b>2</b>	<b>Green Building Attributes</b>	<b>34</b>
GBA 1	Green Building Attributes	34
GBA 2	Long-term Lease	37
<b>3</b>	<b>Management</b>	<b>38</b>
MAN P1	Construction Safety	38
MAN 1	BEAM Professional	39
MAN 2	Construction IAQ Management	40
MAN 3	Construction Noise	44
MAN 4	Green Cleaning	45

MAN 5	Corporate Social Responsibility Facilities	47
MAN 6	User Guidance	49
MAN 7	Occupational Health and Safety	50
<b>4</b>	<b>Materials Aspects</b>	<b>52</b>
MA P1	Use of Non-CFC Based Refrigerants	52
MA P2	Minimum Waste Recycling Facilities	53
MA P3	Timber Used for Temporary Works	54
MA 1	Waste Recycling Facilities	55
MA 2	Interior Components Reuse	57
MA 3	Furniture and Partitions	59
MA 4	Modular Design Materials	61
MA 5	Designed for Disassembly	63
MA 6	Sustainable Flooring Products	64
MA 7	Sustainable Ceiling Products	69
MA 8	Sustainable Wall and Door Products	72
MA 9	Zero PVC	75
MA 10	Ozone Depleting Substances	77
MA 11	Demolition and Construction Waste Reduction	78
<b>5</b>	<b>Energy Use</b>	<b>79</b>
EU 1	Energy Performance – Performance-based Approach	79
EU 1	Energy Performance – Prescriptive-based Approach	81
EU 2	Energy Efficient Appliances	83
EU 3	Commissioning	85
EU 4	Operations & Maintenance	88
EU 5	Metering and Monitoring	90
<b>6</b>	<b>Water Use</b>	<b>93</b>
WU1	Water Quality Survey	93
WU 2	Annual Water Use	95
WU 3	Effluent Discharge to Foul Sewers	97
WU 4	No Bottled Water	99
<b>7</b>	<b>Indoor Environmental Quality</b>	<b>100</b>
IEQ 1	Indoor Air Quality	100
IEQ 2	Indoor Planting	104
IEQ 3	Minimum Ventilation Performance	105
IEQ 4	Pre-occupancy Flush Out	106
IEQ 5	Tenant Exhaust	108
IEQ 6	Uncontrolled Ventilation	109
IEQ 7	Thermal Comfort	111
IEQ 8	Interior Lighting Quality	113
IEQ 9	Natural Lighting	115
IEQ 10	Views to Outside	117
IEQ 11	Acoustics	119
<b>8</b>	<b>Innovation</b>	<b>122</b>
IV 1	Innovative Techniques	122
IV 2	Performance Enhancements	122
<b>9</b>	<b>Appendices</b>	<b>124</b>
9.1	Assessment Framework of Energy Performance	125
9.1.1	Energy Assessment Framework	125
9.1.2	Energy Assessment Approaches	125
9.1.3	Performance-based Approach	125
9.1.4	Prescriptive-based Approach	129
9.2	Provisions for Energy Management	134
9.2.1	Commissioning Plan	134
9.2.2	Commissioning Report	134

**BEAM PLUS INTERIORS**  
**COMMERCIAL, RETAIL AND INSTITUTIONAL**

**INDEX**

9.2.3	Operations and Maintenance Manual	136
9.2.4	Energy Management Manual	137
9.3	Assumptions and Baselines for Water Consumption	138
9.4	Features Considered as Innovations	140
9.5	Interpretations and Abbreviation	141
9.7	Feedback Form	150
9.8	Submission Templates	151

## 1 BEAM PLUS INTERIORS

### 1.1 INTRODUCTION

This document describes the BEAM Plus Interiors rating system for benchmarking sustainability in the fit-out, renovation and refurbishment of non-domestic, occupied interior spaces.

Owned and operated by the BEAM Society Limited (BSL), BEAM Plus Interiors is one of a series of rating systems that also cover the design and construction of new buildings, and the operation and management of existing buildings.

BEAM Plus defines best practice criteria for a range of sustainability issues across the whole life-cycle of buildings and projects. Projects are submitted for certification on a voluntary basis, with the outcomes conveyed via the BEAM Plus certificate and grading Platinum, Gold, Silver or Bronze reflecting the level of performance achieved.

#### 1.1.1 THE BEAM SOCIETY LIMITED

The BSL is an independent, non-profit organisation whose membership is drawn from the many professional and interest groups that are part of Hong Kong's building construction and real estate sectors. BSL members work continuously and on a wholly voluntary basis to refine and enhance the BEAM Plus framework to meet the expectations of interested parties, including building users, and helps the local industry to move towards sustainable development.

The BSL owns and operates BEAM, and BEAM Plus. BSL TRC undertakes assessments, training and examinations as a basis for certification by HKGBC.

Oversight of BEAM Plus Interiors, including assessment monitoring and deliberation of Credit Interpretation Request (CIR), is performed by the BSL Technical Review Committee (BSL TRC).

#### **BSL Board of Directors (2012 – 2014)**

Chairperson – Prof John Ng

Vice Chairperson – Mr K M So

Honorary Treasurer – Mr Frankie So

Directors – Mr Michael Arnold, Ir Cary Chan, Ir Dr K L Chan, Ir Prof Daniel P C Chan, Mr Paul Y K Chan, Sr Sam Cheng, Ir Victor Cheung, Ir James Chiu OBE JP, Ir Prof Reuben Chu, Mr John A. Herbert, Sr Dick Kwok, Ms Cherrie H K Lai, Ir Sr Jonathan Lee, Ms Ivy Lee, Mr M K Leung, Ms Agnes Li, Mr Martin Wan, Mr Ivan Wong, Mr David Yau, Ir Dr Raymond Yau, Mr Ivan Yu, Mr Ringo Yu and Dr Conn Yuen.

Further information is available from [www.beamsociety.org.hk](http://www.beamsociety.org.hk).

#### 1.1.2 THE HONG KONG GREEN BUILDING COUNCIL

The Hong Kong Green Building Council (HKGBC) was established in 2009 as Hong Kong's industry body that coordinates efforts towards green building. HKGBC certifies BEAM Plus projects, BEAM Professionals, and BEAM Assessors.

#### 1.1.3 ORIGINS OF BEAM PLUS INTERIORS

First initiated in 1996, BEAM Plus (formerly known as HK-BEAM) is on a per capita basis one of the most widely used voluntary green building certification schemes of its kind in the world.

The BSL commissioned the creation of BEAM Plus Interiors in 2012 in response to strong market demand for a localised system for occupied interior spaces in Hong Kong. In creating a system to meet the needs of the Hong Kong marketplace, particular attention has been devoted to:

- i. the unique sustainability challenges associated with Hong Kong's high-rise, high density urban environment;

- ii. Hong Kong's comparatively short leasing periods, and often high turnover of occupancies;
- iii. local practices relating to design and construction management, and the procurement and sourcing of materials.

BEAM Plus Interiors can be used by the occupants or tenants of a new building, a new occupant in an existing building, or where an occupant renovates their existing space. More information on the history of BEAM is provided in [Section 1.6.6](#).

**1.1.4 DEVELOPMENT OF BEAM PLUS INTERIORS**

The development of BEAM Plus Interiors was led by a BSL Steering Committee comprising BSL members and invited experts. Industry stakeholders have been consulted via engagement workshops for feedback and opinion on areas including but not limited to the overall framework, performance categories and their relative emphasis, credit criteria, submission requirements, and rating system. Research and development was undertaken by an independent consultant. The BEAM Steering Committee members comprise:

Mr John A. Herbert - Chairman

Mr Benny Au	Mr Lennie Ong
Ms Christine Bruckner	Mr Dan Rusu
Ir Prof Daniel W T Chan	Mr Alan Sin
Ms Yvonne Leong	Mr Graeme Smith
Ir Sr Jonathan Lee	Ms Cecilia Wang
Ms Ivy Lee	Ir Dr Raymond Yau
Mr Derek Murphy	Ms Alice Yeung
Prof John Ng	Dr Conn Yuen
Ms Agnes Ng	

**1.1.5 DISCLAIMER**

The Building Environmental Assessment Method (BEAM) and suite of rating tools is intended for use by project teams engaged in new buildings and interiors design, and owners and operators of existing facilities as a guide to environmentally sustainable design and operation.

This method has been prepared with the assistance and participation of many individuals and representatives from various organisations. The final outcome represents a general consensus, but unanimous support from each and every organisation and individual consulted is not implied.

BSL reserves the right to amend, update and change this Manual from time to time without prior notice.

This document represents the BSL's effort to develop a rating tool that improves the performance of buildings and interiors using the latest techniques, practices and standards compatible with prevailing economic constraints. These are subject to changes, which will be included through periodic updating.

It should be noted that none of the parties involved in the funding BEAM, including BSL and its members, provide no warranty, implied warranty or liability for the accuracy, completeness or use of, or reliance on, any information contained in BEAM, or from any injuries, losses, or damages arising out of such use or reliance.

As a condition of use, users covenant not to sue, waive all rights, and release BSL and its members from any and all claims, demands and causes of actions for any injuries, losses and damages that users may

now or hereafter have a right to assert against such parties as a result of the use of, or reliance on BEAM.

**1.1.6 LIMITATIONS**

The BSL does not permit or endorse any self-assessed grade by the use of BEAM Plus Interiors rating tool.

The HKGBC offers the formal certification, this ensures and provides an independent third party review of credits claimed to ensure all credits can be demonstrated to be achieved by the provision of the necessary documentary evidence.

The use of BEAM Plus Interiors without formal certification does not entitle the user or any other party to promote any award or grade.

**1.2 APPLICATION AND ELIGIBILITY**

BEAM Plus Interiors covers the planning, design, construction and “as-built” condition of the fit-out, renovation and refurbishment of non-domestic, normally occupied spaces within buildings.

Certification under BEAM Plus Interiors is designed to take place as a one-stage process at the end of the fit-out, renovation or refurbishment works and associated testing and commissioning. This helps to ensure that design commitments have been implemented, construction practices met the required standards, and that testing and commissioning has verified the installation's performance. Projects cannot be certified before their completion.

It is the BSL's aim for certification to be granted as soon as possible upon project completion so that Applicants are able to promote their achievements at the earliest opportunity.

**1.2.1 ELIGIBLE PREMISES TYPES**

BEAM Plus Interiors targets the most frequently encountered non-domestic interior fit-out projects in Hong Kong, namely:

- i. office premises;
- ii. retail premises;
- iii. restaurants;
- iv. hotels, function rooms, and serviced apartments;
- v. educational facilities including classrooms, libraries;
- vi. institutional facilities including clinics, wards, etc.

Table A illustrates the typical functions and installations within the premises for which BEAM Plus Interiors criteria are provided.

**TABLE A - ELIGIBLE TYPES OF PREMISES**

**Office Premises**

Typical scope of works in:

- main office areas (open plan / cellular)
- entrance / reception areas
- conference / meeting rooms
- wet/dry pantry
- social areas
- printer / copier rooms
- washroom facilities (if included)

**Restaurants** (commercial kitchen area is excluded)

Typical scope of works in:

- eating / dining areas
- office / staff areas
- washroom facilities

**Clubhouse**

Typical scope of works in:

- library / reading rooms
- gym / playroom
- function rooms / social areas
- eating / dining areas
- washroom facilities

**Commercial**

Typical scope of works in:

- retail, storeroom
- dentist office
- doctor surgery
- washroom facilities (if included)

**Institutional (including educational facilities and hospitals etc)**

Typical scope of works in:

- classrooms / teaching rooms
- assembly / sports halls, etc.
- general wards / consultation rooms
- entrance / reception / circulation areas
- printer / copier rooms
- washroom facilities (if included)

**Retail Premises / Libraries**

Typical scope of works in:

- retail / library floor areas
- occupied office / administration areas
- including display racking, shelving areas
- printer / copier / multi-media / AV rooms
- washroom facilities (if included)

**Note:** process related equipment, services and functions that involve specialist requirements described in [Section 1.2.2](#), are excluded from assessment.

<b>1.2.2 SPECIALIST AREAS EXCLUDED</b>	To avoid undue complexity, BEAM Plus Interiors excludes areas and process related equipment including: <ul style="list-style-type: none"><li>– PABX, MDF, TBE areas;</li><li>– Switch rooms, meter rooms, equipment rooms;</li><li>– data centres, server rooms, water meter cabinets;</li><li>– auditoria, lecture theatres, karaoke rooms, clean rooms, cold rooms;</li><li>– commercial kitchens, kitchen equipment, walk-in freezers;</li><li>– swimming pools, spa pools, steam rooms, saunas;</li><li>– car parks, loading bay areas;</li><li>– balconies, roof, and terrace areas;</li></ul>
<b>1.2.3 EXEMPT AREA</b>	The Applicant may, using CIR process, apply to BSL TRC for a limited area in the <a href="#">project space</a> to be excluded from assessment. The total sum, for all exempt areas, shall not be more than 20 sqm. If approved the exempt area(s) shall be clearly indicated on ALL submission drawings.
<b>1.2.4 TYPES OF SPACE CONDITIONING</b>	The BEAM Plus Interiors rating system can be applied to different kinds of premises whether they are served by: <ol style="list-style-type: none"><li>i. central air-conditioning system (usually the host building/landlord's);</li><li>ii. de-centralised equipment provided by landlord / tenants (e.g.</li></ol>

**1.2.5 BASE PROVISIONS  
WITHIN THE HOST  
BUILDING**

- window unit, split-unit, or mechanical ventilation);
- iii. naturally ventilated (i.e. with operable windows);
- iv. any combination of the above;

The performance of any interior space is significantly influenced by the host building in which it is located (for example, the energy efficiency of the central air conditioning system). In this respect, it is important to note that BEAM Plus Interiors seeks to reflect the overall performance of the [project space](#) within the context of the [host building](#).

As such, certification covers all provisions within the space, whether these are original to the host building, have been retained but modified during the fit-out, or are newly installed for the occupant.

In other words, BEAM Plus Interiors credits are determined whether its criteria have been satisfied (or not) by the actions of the occupier / tenant, or by the actions of the building owner / landlord, or by the provisions within the host building.

This approach seeks to encourage the Applicant to select a host building with better sustainability attributes and performance levels (arising from the building's location, design, construction, and/or management).

**1.2.6 SCHEDULE OF  
WORKS TO BE  
INCLUDED**

The scope of work included in a fit-out project is defined by the Owner's Project Requirements (OPR). The OPR is a written document that details the functional requirements of a project and the expectations of how it will be used and operated. This includes project and design goals, measurable performance criteria, budgets, schedules, success criteria, owner's directives and supporting information. Whilst the scope can vary, BEAM Plus Interiors covers the following fundamental elements:

- i. site works and management;
- ii. HVAC&R, lighting, and electrical installations;
- iii. fixtures, finishes, and furniture;
- iv. occupant's chosen equipment and appliances;

Table B below highlights the key items most commonly included within each of the above. Applicants shall be required to clearly declare the scope of work at the start of certification.

**TABLE B - TYPICAL SCHEDULE OF WORKS**

**Site Works / Management**

- Planning and sequencing of works
- Site preparation and management
- Occupational health and safety measures
- Noise / dust protection (adjacent premises)
- Temporary protection materials
- Temporary utilities connection
- Co-ordination and liaison with other parties
- Shop drawings / As-built drawings
- Demolition / modification / builders works
- Dismantling (ceiling, wall, floor finishes, etc.)
- Waste separation / recycling / disposal
- Storage of materials
- Testing & commissioning
- Submission of O&M manuals
- Demonstration and training

### **Fixtures & Finishes**

Installation methods  
Flooring (carpeted / tiled / reconstituted, etc.)  
Ceiling (exposed / false ceiling)  
Walls / partitions<sup>1</sup>  
Doors (internal / entrances)  
Paints / adhesives, etc. (wall, floor, ceiling)  
Fixed furniture (reception, pantry, cabinets, etc.)  
Acoustic panels / signage

### **Furniture & Fittings**

Workstations / desks  
Conference tables / coffee tables  
Chairs / seating  
Planter boxes  
Blinds / curtains / solar glazing film

### **Electrical Installations**

MCB board / power cabling  
Power & ELV wiring / trunking / conduits  
Power points / outlets / sockets  
Lighting panels / luminaires / switching  
Fixed lamps / control ballasts  
Desk / task / spot lighting  
Photo sensor / control panel  
Telephone / IT conduit points  
Security system / emergency signage  
Entrance call bell / motorised doors  
Energy metering systems

### **MVAC Installations**

Supply / return air ducts / grilles  
Fan coils / VAV boxes  
Air handling units / exhaust systems  
Motors / insulation  
Thermostatic / motion / user controls  
Energy metering systems

### **Plumbing & Drainage / Fire Services**

Pantry / sink / drinking water points  
Water check meter  
Sprinkler heads / piping  
Alarm system / conduit / wiring  
Portable extinguishers  
Hose reel / pre-action hydrant cabinets

### **Appliances**

Computer / server / telecoms / IT  
Pantry (refrigerator, heater, oven, etc.)  
Drinking fountain  
Air purifiers (pantry and printing room)  
Food waste decomposer / green wall

#### **1.2.7 ASSESSMENT COVERAGE**

The scope of BEAM Plus Interiors is typically confined to the factors over which the Applicant has direct control. For the most part this is defined by the footprint or boundary of the project space defined in the

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<sup>1</sup> Where used in this manual Partition or Partitions shall use the definition in the Appendix

- lease, plus key related interface areas and surroundings, including:
- i. overall sustainability attributes of the host building, its location, etc. under the Green Building Attributes category;
  - ii. control of nuisance (dust, noise, etc.) impacting building users and adjacent premises during the renovation works, under the Management category;
  - iii. building envelope, and types of Building Services installation (unless the space is served solely by its own system) for the host building, under the Energy Use category;
  - iv. potable water quality, water fittings, appliances, water tank configuration, water tank maintenance, (unless the space is served solely by its own system) for the host building, under in the Water Use category;
  - v. thermal comfort, visual comfort, aural comfort and indoor air quality aspects influenced by the host buildings' centralised systems in the Indoor Environmental Quality category.

Other than these, other aspects including the important category of Materials Aspects are generally confined to the footprint or boundary of the lease. The overall coverage of the BEAM Plus Interiors performance categories are presented in [Section 1.7 Summary of Credits](#) of this Manual.

### **1.3 CERTIFICATION FRAMEWORK**

Assessment shall be conducted by the BSL and certification granted by the HKGBC.

In view of the short duration leases in Hong Kong, often only three (3) years, certification is designed to be a one-stage process, taking place after completion of fit-out works with minimal need for longer-term follow-up.

The BSL aims for certification to be granted as soon as possible so that Applicants are able to publicize their achievements at the earliest opportunity. However, it remains the sole responsibility of the Applicant to provide comprehensive submission materials in the first instance. Inadequate submissions cause additional administration, and delay the assessment process.

For further details refer to the BEAM society website  
[\[www.beamsociety.org.hk\]](http://www.beamsociety.org.hk)

#### **1.3.1 CERTIFICATION TIMING**

BEAM Plus Interiors covers the planning, design and construction of fit-out projects, in addition to the "as-built" condition of the completed project space. As such, submissions should be initiated as soon as practicable, it is anticipated that Applicants would normally submit no later than 10-12 weeks after occupation.

Projects cannot be certified before their completion (i.e. for the "design intent"), since stakeholders and BEAM Plus Interiors emphasises the importance of "as-built" performance in addition to good design and construction practices.

Equally certification is also unlikely to be beneficial if submissions commence long after completion, unless the Applicant can furnish the necessary documentation to demonstrate that all the planning, design, construction, material specification, and "as built" information requirements were fulfilled.

It should be noted that whilst certification does not take place until the completion of works, the Applicant's preparations must start very much earlier, during the concept stage ideally. This includes the engagement of an accredited BEAM Professional, by the Applicant, to advise on the

integration of BEAM Plus sustainability measures as the project evolves, and submit the necessary documentation for assessment.

**1.3.2 CERTIFICATION PROCESS**

Certification under BEAM Plus Interiors comprises the following steps:

- i. Applicant applies for registration of the project via the HKGBC website, submitting a registration form that is used to check the project's eligibility for certification under BEAM Plus Interiors;
- ii. if eligible, the project will be added to the database of registered projects with details including client, location, size (floor area) and anticipated completion date;
- iii. BSL will assign a coordinator for the project to liaise between the Applicant and the Assessor;
- iv. Applicants shall engage at least one accredited BEAM Professional (with BI accreditation) in the project team to provide guidance on compliance throughout project planning, design, construction, completion and preparation of materials submitted;
- v. Applicants (usually via the BEAM Pro) are able to make CIR, subject to payment of published charges, where necessary to clarify technical queries relating to the project;
- vi. upon completion of the fit-out and associated commissioning and testing works, the Applicant (usually via the BEAM Pro) submits the completed templates and supporting information to the BSL;
- vii. BSL will engage an independent BAS who shall remain anonymous to the Applicant and project team;
- viii. all submission materials shall be logically presented, clearly cross referenced to related documents, and numbered approximately.
- ix. **IMPORTANT NOTE:** If the submission material (for example a product catalogue or data sheet) covers more than one material/product, then the pages/data in the document shall be clearly identified, highlighted and cross-referenced to the related summary table, drawings, record photographs and the like. The BAS shall only review and assessed the submitted materials. Should any clarification be required, the Applicant may submit CIR, subject to payment of the relevant charge published on the BSL website;
- x. day-to-day enquiries regarding assessment status, etc. are maintained between the Applicant and the BSL, there shall be no contact between Applicant and the assessor (BAS);
- xi. when required, the BAS may request technical clarifications from the BSL TRC;
- xii. BSL TRC shall review the project and, if satisfied, provide the award achieved to the Applicant;
- xiii. Where the Applicant accepts the result, HKGBC shall issue the BEAM Plus Interiors certificate;

Further guidance material is made available on the HKGBC/BSL website.

**1.3.3 SITE AUDIT**

BEAM Society Limited (BSL) reserves the right to conduct on-site inspection(s) at any time without advance notice to verify and validate Applicants' submission. The outcome of this audit shall be used for assessment purposes.

In the event that this audit is delayed or prevented for any reason, the project may not be certified, and no fees paid shall be refunded.

**1.3.4 APPLICANT PREPARATIONS PRIOR TO CERTIFICATION**

Whilst BEAM Plus Interiors certification is not finalised until commissioning and completion of the works, it is important for Applicants to make the necessary preparations well beforehand.

The BEAM Plus Interiors rating tool can be used as a form of design guide, helping to identify sustainability measures that can be implemented into a project during its planning, design, sourcing, construction, and commissioning.

The greatest benefit is derived where the Applicant engages sustainability expertise, at the outset of the project. Sustainability measures can then be integrated into the project from the earliest stage, and compliance with the BEAM Plus Interiors best practice criteria monitored as the project progresses.

Applicants may also refer to CIR from previous assessments, published on the BSL website, to gain further insight on the application of BEAM Plus Interiors to their own project.

**1.3.5 CERTIFICATE VALIDITY**

BEAM Plus Interiors certificate is valid for five (5) years from the date of issue, which covers the duration of most lease periods in Hong Kong (typically 3 years). Certified projects are listed in a website database to indicate their client, location, size, grading and validity period. The certificate shall automatically expire when the occupant/tenant moves out from the certified premises.

Upon certificate expiry, the BEAM Plus certificate is no longer effective, and not recognised by the BSL or HKGBC. Applicants are encouraged to commission, and submit a new application for every subsequent fit-out/ renovation work as they occur.

**1.3.6 CERTIFICATION FEES**

Fees for BEAM Plus Interiors certification depend on the size (floor area, number of floors, and complexity of the project) as determined by the HKGBC and BSL. Information on fees and charges for BEAM Plus Interiors can be obtained from the BSL website.

CIR's, Appeals, and other services are subject to separate published charges.

**1.3.7 CREDIT INTERPRETATION REQUEST (CIR)**

Credit Interpretation Request (CIR) is the process whereby Applicants may seek technical and administrative guidance from the BSL TRC for the application of BEAM Plus requirements or criteria, examples include:

- i. alternative compliance approaches that equally fulfil the sustainability objective;
- ii. technical clarifications for special unusual circumstances;
- iii. petitioning for higher credit allocation (performance enhancement);
- iv. petitioning for up to 20 sqm exempt area;

Each CIR application shall comprise a method statement identifying the objective, a description of the proposed approach and where appropriate, the proposed method for assessment.

Each CIR Application is subject to the payment of the published charge, and shall address only one credit.

It is the sole responsibility of the Applicant to provide a comprehensive application in the first instance, inadequate detail increase administration costs, and delay the review process.

The Applicant may apply for CIR between project registration and

submission for assessment. CIR applications after submission (or partial submission) will not be entertained.

CIRs and their associated rulings are deliberated and determined by the BSL TRC. They shall be listed on the BSL website and provide a valuable resource when studying for the BEAM Professional examination, researching products, and evaluating the likelihood of achieving BEAM Plus certification. More details can be found in HKGBC and BSL website [2].

**1.3.8 APPEAL**

After Assessment, the result is announced to the Applicant, when the Applicant is dissatisfied with a specific ruling, upon payment of the appropriate published charge on the BSL website, the Applicant may lodge an Appeal.

The Appeal procedure for BEAM Plus Interiors is the same as other BEAM rating tools.

Up to a maximum of five (5) credits can be appealed for each project. Where the Applicant is dissatisfied with the result from the First Appeal, upon payment of the appropriate charge published on the BSL website, the Applicant has the option to apply for a Final Appeal.

The First Appeal will be reviewed and adjudicated by BSL TRC or BSL TRC's nominated expert panel. The Final Appeal will be reviewed and adjudicated by HKGBC or HKGBC's nominated expert panel.

**1.3.9 BEAM  
PROFESSIONALS  
(BEAM PRO)**

Accredited BEAM Professionals are professionals with expertise and experience relating to green buildings that have been trained and passed an examination provided by the BSL. Upon passing their examination, the individual shall be certified by HKGBC and act as ambassadors promoting green and sustainable building.

BEAM Professionals would be engaged by the Applicant to help provide advice and expertise as it relates to green building including design, construction and management in accordance with the BEAM Plus rating systems.

The register of accredited BEAM Professionals is provided on the HKGBC website [<http://www.hkgbc.org.hk>]

**1.3.10 BEAM ASSESSORS  
(BAS)**

BEAM Plus Interiors certification assessments are undertaken an Assessor (BAS) assigned by BSL. BAS undergo a rigorous selection process based upon their green building assessment related qualifications and experience, receive training assessment processes, and are accredited by the HKGBC.

BAS are engaged directly by the BSL and are completely independent and anonymous to the Applicant. Liaison between the Applicant and the BAS is conducted via BSL.

**1.4 CATEGORIES**

Different rating systems in use worldwide assign the list of requirements into different categories according to the preferences of the tool developer. In BEAM Plus Interiors, credits are grouped within the following categories:

- i. [Green Building Attributes \(GBA\)](#);
- ii. [Management \(MAN\)](#);
- iii. [Materials Aspects \(MA\)](#);

- iv. [Energy Use \(EU\)](#);
- v. [Water Use \(WU\)](#);
- vi. [Indoor Environmental Quality \(IEQ\)](#);
- vii. [Innovations \(IV\)](#).

Whilst BEAM Plus Interiors adopts similar categories as other versions of BEAM Plus (for new and existing buildings), the number and nature of credits within each category is specific to the context of Hong Kong fit-out projects.

<b>1.4.1 GREEN BUILDING ATTRIBUTES (GBA)</b>	Encourages the selection of a “host building” that has been certified using BEAM Plus, a similar recognised framework, or alternatively has integrated best practice environmental sustainability measures into its design and day-to-day management: <ul style="list-style-type: none"><li>i. selection of a host building with green building attributes.</li></ul> It should be noted that BEAM Plus Interiors requirements do not address host building emissions, site greening, site water management, or local microclimate since the Applicant is usually unable to influence these.
<b>1.4.2 MANAGEMENT (MAN)</b>	Encourages responsible management practices during the fit-out works process, and provisions to encourage sustainable management of the occupied areas during its occupancy: <ul style="list-style-type: none"><li>i. engagement of an accredited BEAM Professional for the project;</li><li>ii. construction management practices (IAQ, noise, waste, safety);</li><li>iii. provision for sustainable operational management (user guidance, user facilities, and green cleaning).</li></ul> Management aspects remain similar in principle no matter what type of interiors, premises or usage they are applied to.
<b>1.4.3 MATERIALS ASPECTS (MA)</b>	The majority of materials used in fit-out projects are sourced outside Hong Kong, therefore any effort to reduce imported material contributes to lower environmental impacts. This category encourages the adoption of low-waste and materials with lower environmental impacts, works practices and occupant facilities: <ul style="list-style-type: none"><li>i. No ozone-depleting substances in refrigerants and thermal insulation materials installed during the project (pre-requisite);</li><li>ii. provide facilities and effective recycling programmes during occupancy (pre-requisite credit) with additional programme options available;</li><li>iii. selection of more eco-friendly materials (recycled, rapidly renewable, regional, sustainable and vinyl chloride free);</li><li>iv. reduce use of non-environmentally friendly material such as CFC, PVC etc;</li><li>v. reduced waste through modular design and reuse of materials, furniture and finishing.</li></ul> Materials aspects will remain similar in principle no matter what type of interiors premises or usage is being assessed. Materials aspects relating to indoor air quality are covered in the IEQ category. The terms <a href="#"><u>Partitions</u></a> and <a href="#"><u>Walls</u></a> are sometimes used interchangeably, or combined, in this Manual, each has a separate and specific meaning.
<b>1.4.4 ENERGY USE (EU)</b>	Encourages the adoption of low-energy design, selection of efficient systems, and energy management provisions, by host building selection,

and efficient Building Services Installations:

- i. meet a minimum energy performance level for the installed systems (as a pre-requisite), plus progressive performance improvements;
- ii. undertake thorough testing and commissioning;
- iii. provision for continuously monitoring and recording energy consumption;
- iv. select energy efficient appliances;
- v. provide operation & maintenance manual, energy manual and training for occupants;

Assessment of Energy Use depends on the engineering services provided by the tenant in addition to the Building Services in the host building.

For example, an office fit-out may only include lighting, basic plumbing and water heating equipment, etc., whilst a restaurant might require additional HVAC&R systems with externally located plant. BEAM Plus Interiors provides alternative routes for the system employed.

BEAM Plus Interiors also provides Applicants with the option to use either a computational approach (computer modelling) or prescriptive approach (based on the efficiency of installed systems) to benchmark energy usage in the project space.

**1.4.5 WATER USE (WU)** Encourages good quality potable water, and features that improve utilisation and reduce effluent:

- i. ensure satisfactory potable water quality for occupants;
- ii. conservation measures to reduce annual water usage;
- iii. reduction of effluent discharges;
- iv. discourage the use of bottle-water dispensers;

Water Use aspects remain similar in principle no matter what type of interiors, premises, or usage is being assessed.

**1.4.6 INDOOR ENVIRONMENTAL QUALITY (IEQ)** IEQ aspects in BEAM Plus Interiors are those aspects of performance that impact the health, comfort, or well-being of the occupants and improve productivity and functionality:

- i. indoor air quality including pre-occupancy flush-out, and separate ventilation of printing / copier rooms;
- ii. adoption of low-polluting adhesives, paints, finishes and furnishings;
- iii. provision of indoor planting;
- iv. measured ventilation performance;
- v. enhancing thermal comfort, acoustics and noise;
- vi. maximising natural lighting and views;

IEQ aspects remain similar in principle no matter what type of interiors, premises or usage is being assessed.

Not included are the technical performance aspects of specialist premises, such as acoustic qualities of concert venues, stage lighting, or air quality in clean rooms.

**1.4.7 INNOVATION (IV)** BEAM Plus Interiors does not presume to be comprehensive in its coverage. Applicants are encouraged to submit proposals to earn extra points under the Innovation category where the project:

- i. introduces innovative designs, construction or operational provisions that enhance environmental performance and are not hitherto found in Hong Kong; or
- ii. achieves superior performance (performance enhancements) greatly exceed the prevailing requirements in BEAM Plus Interiors.

In such cases, the Applicant can submit proposals that:

- i. detail the proposed technology, and practice;
- ii. demonstrate how the technology / practice is implemented and achieves the benefits that are claimed;
- iii. quantified data, using a life-cycle analysis or equal for the anticipated performance gains;
- iv. provide actual performance data;
- v. justify the proposed method statement/assessment criteria;

**IMPORTANT NOTE:** The onus is on the Applicant to present quantitative evidence of the performance compared to existing requirements. Generic narratives that do not demonstrate performance gains cannot be entertained. Incomplete or inadequate submissions will increase administration and delay the assessment process.

The BAS shall refer every IV proposal to the BSL TRC, which will consider each proposal on its merits and award points accordingly.

Any points gained under the Innovation category shall be regarded as 'Innovation' counting towards the total number of points obtained but not towards the total points obtainable.

BSL maintains a database of successful Innovation submissions for reference.

#### **1.4.8 ALTERNATIVE ASSESSMENT METHODS**

BEAM Plus Interiors does not seek to be overly prescriptive in setting requirements and compliance methods. As such, it is possible that some projects may not be fully embraced by the current criteria due to their unusual nature, or design. In such cases Applicants can consider an alternative approach for the same objective, and submit a Credit Interpretation Request (CIR) that details:

- i. the BEAM Plus Interiors objective (clause number) for which recognition is being sought;
- ii. proposed alternative criteria;
- iii. proposed method for assessment;

The CIR detailing the proposal should be made at the earliest opportunity. The CIR result, a ruling, shall be provided to accept, accept with defined modifications, or reject the proposal, and all shall be binding on the project assessment.

#### **1.5 GRADING METHODOLOGY**

BEAM Plus provides authoritative guidance to all stakeholders in the building construction and real estate sectors on practices that reduce the adverse effects of buildings and fit-out project impacts on the environment, whilst providing quality indoor environments for occupants.

#### **1.5.1 PRE-REQUISITE CREDITS**

Green building certification encourages the entire industry to set higher standards than the minimum code or regulatory requirements. Compliance with codes, legal, regulatory and statutory requirements is a condition of project approval by the authority having jurisdiction, and as such shall not be assessed under BEAM Plus.

However, BEAM Plus Interiors has pre-requisites for several key

performance aspects that must be satisfied in order to commence the assessment process and obtain overall certification:

- i. [implementation of construction safety plan \(MAN P1\);](#)
- ii. [avoiding chlorofluorocarbon \(CFC\)-based refrigerants in any HVAC&R equipment installed for the space during the fit-out \(MA P1\);](#)
- iii. [providing basic facilities for effective recycling of paper, plastic and metal wastes during occupancy \(MA P2\);](#)
- iv. [encouraging the use of sustainable timber resources during fit-out works \(MA P3\).](#)

For the avoidance of doubt, if during the process a BEAM requirement in transitions to a minimum code requirement, regulatory or legislative requirement, it cannot be assessed, and will not be counted towards the award or grading. In due course, an addendum will be released and future versions of the Manual should exclude that requirement.

#### **1.5.2 BEAM PLUS INTERIORS GRADING**

The final grading for all projects rated with BEAM Plus Interiors is conditional upon the following:

- i. meeting all specified pre-requisites;
- ii. meeting specified overall points score;
- iii. obtaining the minimum number of points for Materials, Energy Use, and Indoor Environmental Quality aspects;

The score requirement is set out in the following table:

	<u>Overall</u>	<u>MA</u>	<u>EU</u>	<u>IEQ</u>	
Platinum	75	15	18	17	(Excellent)
Gold	65	13	16	15	(Very Good)
Silver	55	11	12	12	(Good)
Bronze	40	9	10	10	(Above average)

#### **1.6 FRAMEWORK**

##### **1.6.1 BEAM PLUS FRAMEWORK**

BEAM Plus defines requirements for exemplary performance for a range of sustainability issues relating to the planning, design, construction, commissioning, management, operation and maintenance, and use of buildings and interior spaces.

Credits are achieved if the defined performance criteria are satisfied, with overall performance independently verified by the BSL and acknowledged through certification by the HKGBC.

At the time of writing, the suite of BEAM green building rating tools comprises:

- i. New Buildings [1] – the planning, design, construction and commissioning of new buildings and major refurbishments;
- ii. Existing Buildings [2] – the operation, maintenance and management of existing premises;
- iii. Interiors [3] – the planning, design, construction and commissioning of interiors projects (fit-out, renovation and refurbishment);

#### **A More Sustainable Building Stock**

BEAM contributes to the development and use of the building stock that

1 BEAM Society Ltd. BEAM Plus New Buildings. 2012.

2 BEAM Society Ltd. BEAM Plus Existing Buildings. 2012.

3 BEAM Society Ltd. BEAM Plus Interiors. 2013.

is more sustainable with reduced impacts on the environment by:

- i. enhancing safety, hygiene and the quality of indoor environments, and hence the health, comfort and well-being of occupants;
- ii. minimising pollution loadings on external environments;
- iii. promoting and encouraging energy efficient buildings, systems and equipment, including the use of renewable energy;
- iv. reducing the unsustainable consumption and depletion of increasingly scarce resources such as water and tropical timber;
- v. improving waste management and encouraging recycling and reuse of materials
- vi. influencing the market for the supply of environmentally friendly materials, fittings, furnishings, products and equipment.

### **Specifications for Sustainable Buildings**

The BEAM Plus Manuals provide a comprehensive and fair assessment of the overall performance of a building, or premises therein, in a range of key areas, at either the completion stage or during its life. BEAM Plus:

- i. embraces many areas of sustainability, including social and economic dimensions;
- ii. recognises best practices;
- iii. provides for a comprehensive method of quantifying overall performance;
- iv. demonstrates performance qualities to end users;
- v. provides economic benefits to stakeholders.

#### **1.6.2 BEAM PLUS BENEFITS**

BEAM Plus defines criteria for exemplary buildings performance that is independently verified and recognised through a third-party certificate. Voluntary BEAM Plus assessment provides independently certified building performance rating in clearly defined terms.

### **Commitment to Sustainable Development**

Increasingly investors, corporations and public sector organisations are demonstrating their commitment and contribution to sustainable development, through:

- i. the maintenance of sustainable levels of economic growth;
- ii. development progress that recognises the needs of the community;
- iii. efficient use of non-renewable natural resources;
- iv. enhanced protection of the global, regional and local environments.

BEAM Plus provides a means for investors, developers, owners, tenants, occupiers and other stakeholders to demonstrate commitment through investment, ownership, and tenancies in certified 'green buildings'.

### **Market Recognition**

The BEAM Plus rating systems:

- i. set targets, which are independently assessed, to minimise green washing, false claims and distortions;
- ii. provide recognition for buildings and premises where environmental impacts are reduced;

- iii. enables developers, building owners and occupiers to respond to end user demands for better quality buildings and interiors spaces that have less impact on the environment;

### **Applicants Decide**

The BEAM Plus label signifies levels of quality in respect of safety, health and comfort, which are important considerations for building users, and levels of performance in respect of environmental and social dimensions, which are of importance to society as a whole. The Applicant ultimately decides whether obtaining a BEAM Plus certificate is a worthwhile endeavour, but completion of a BEAM Plus assessment provides assurances as to the qualities of a building, not as a subjective promise, but as a measured reality.

#### **1.6.3 BEAM ACHIEVEMENTS**

Since its introduction in 1996, BEAM (formerly HK-BEAM) has undertaken the leading role raising awareness in Hong Kong on the contribution of better buildings to sustainable development.

BEAM has also helped encourage the integration of environmental measures into the planning, design, construction and management of buildings of all types, both in Hong Kong and mainland China.

Indeed, on per capita basis, BEAM is one of the most widely used voluntary green building labelling schemes of its kind in the world.

### **Building Types Certified**

The take up of assessments under BEAM has historically comprised the planning, design, construction, operation, maintenance and management of high-rise developments, including:

- i. commercial office towers, corporate HQ buildings, data centres, technology complexes, transport and logistics facilities;
- ii. private and public residential estates, university hostels and Government quarters;
- iii. shopping malls, hotels, tourism, sports, leisure and recreational facilities;
- iv. municipal buildings, Government offices, uniformed services, hospital, health and rehabilitation facilities;
- v. secondary school, international school, university and community college buildings.

### **Adoption by Government and Industry**

Different versions of the BEAM Plus rating system and its predecessors have long been used as a reference for Applicants, both in the private and public sectors, during the design, construction and management of their buildings. Most notably, BEAM requirements have been incorporated into Applicant briefs, specifications, and design requirements, in addition to procedures for building operation, maintenance and management.

Numerous large-scale Applicants commit to obtaining certification of their new buildings and progressively introducing certification to their existing property portfolios.

More recently, BEAM Plus was endorsed by the HKGBC as Hong Kong's green building rating system and, since April 2011, has been adopted as a pre-requisite by Hong Kong Government for granting a gross floor area concession for green and amenity features in certain new building developments.

#### **1.6.4 BASIS OF CREDITS**

The terms sustainable and green when applied to buildings are often used interchangeably, although sustainability suggests a much broader

**AND CRITERIA**

concept [4].

ASTM [5] defines a green building as, “a building that provides the specified building performance requirements while minimizing disturbance to and improving the functioning of local, regional, and global ecosystems both during and after its construction and specified service life”.

Furthermore “a green building optimises efficiencies in resource management and operational performance and minimises risks to human health and the environment”.

To this can be added considerations for community, social equity and economic viability [6].

In the context of Hong Kong’s sub-tropical climate and dense urban high-rise development BEAM regards a sustainable building as one that is safe, healthy, comfortable, functional, and efficient in the use of resources.

**Environmental Aspects**

An environmental aspect is defined in ISO 14004 [7] as an element of an organisation’s activity, products or services that can interact with the environment. ISO defines ‘environment’ as the surroundings in which an organisation operates, including air, water, land, natural resources, flora, fauna, humans, and their interrelation.

Surroundings in this context extend from within the organisation to the global system. An environmental impact is any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation’s activities, products, or services.

In the context of BEAM, and green building, the requirements herein challenge Applicants to lower and reduce these impacts, the ultimate long term goal being elimination of adverse impacts.

**Social Aspects**

BEAM Plus is equally concerned with the interaction between the premises, and their neighbours, neighbouring properties, and the neighbourhood in general. This methodology encourages Applicants to reduce negative impacts and rewards efforts that are aimed to improve the quality of the immediate surroundings to the benefit of the neighbourhood.

Post-SARs, hygiene has become a major issue in both design and management of buildings, and the premises within. Indoor air quality as long been a matter of concern, and together with thermal conditions, lighting quality and noise is also a comfort issue. Maintaining good indoor environmental quality (IEQ) depends on design, management, operation and user understanding of the many factors involved.

Poor IEQ impacts productivity in the workplace. The quality of other services, such as vertical transportation, can also impact on user satisfaction and workplace efficiency. However, the needs of users and the efficiency of buildings need to be balanced against the consumption of non-renewable natural resources and environmental loading to our

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- 4 International Organization for Standardization ISO/TS 21929-1 Sustainability in building construction - Sustainability indicators - Part 1: Framework for the development of indicators for buildings. 2006.
- 5 ASTM International E2114-01 Standard Terminology for Sustainability Relative to the Performance of Buildings. 2001.
- 6 International Organization for Standardization. ISO/TS 21931-1 Sustainability in building construction - Framework for methods of assessment for environmental performance of constructed works - Part 1: Buildings. 2006.
- 7 International Organization for Standardization. ISO14004: Environmental management systems – General guidelines on principles, systems and supporting techniques.

air, land and water.

### **Performance Benchmarks**

BEAM Plus uses local performance standards, codes and guides where these are available. Where these are not available, international or national standards, codes and guides are referenced. Where there are differences in the performance criteria set by the various authorities BEAM Plus will avoid specifying the performance criteria, allowing the Applicant to specify what they consider to be appropriate for their premises.

The BEAM rating process seeks confirmation that the performance levels have been achieved. Where performance standards are not well defined BEAM establishes its own performance benchmarks based on available data and stakeholder consensus. More points are awarded for higher levels of performance achieved.

### **Raising Building Performance Standards**

Responding to environmental priorities and to social and economic issues, BEAM strives to improve the overall performance of buildings. BEAM encourages progressively higher standards of performance and innovations that contribute to such performance.

### **Absolute versus Relative Performance**

Through opinion surveys of BEAM Society members it is apparent that there should be a balance between assessment of performance issues over which the Applicant may have little or no control and performance issues that can be influenced by the Applicant.

In addition, BEAM's position is that assessment of some aspects of performance should not be penalised because of externalities that are not under the control of the Applicant. For example, the efficiency of the utility supplying electricity to a building. In this case only consumption is quantified (e.g. kWh) and rated, and not the environmental loading (e.g. CO<sub>2</sub>) unless the mix of energy sources (gas, oil, electricity) is significant. The rational is that in the case of an inefficient supply, demand side management can make a significant contribution to reducing environmental load.

### **Regionally Responsive Criteria**

Assessment criteria need to be relevant to the building and interior types and setting, and environmental, social and economic priorities. Consequently, some of the performance criteria in BEAM Plus reflect Hong Kong's humid sub-tropical climate and dense urban living environment.

### **Scientific Rigour**

Whilst BEAM Plus endeavours to provide for a comprehensive and fair assessment it recognises that assessment criteria, assessment methods and allocation of points are not comprehensive.

BEAM Plus addresses items only where the associated environmental impacts have been proven, and for which reasonably objective performance criteria can be defined. Certain performance aspects attributable to buildings and interior spaces and their use have yet to be included, either because the environmental impacts are not well defined, or because performance criteria have not been established. They may be included in future updates, when information becomes available to permit a reasonably objective assessment.

In the meantime, it is argued that the real value of BEAM Plus lies not in scientific rigour but in the actual improvements to built quality and the levels of awareness amongst stakeholders resulting from its increasingly

wider application.

### **Market Acceptance**

For a voluntary scheme the extent to which performance can be enhanced is determined by market acceptance of the assessment criteria, BEAM's track record, and the cost of undertaking assessment.

Judging from the number of projects certified the performance criteria included in the various versions of BEAM have been both realistic and attainable in practice.

## **1.6.5 ASSESSMENT PRINCIPLES**

According to international consensus [4, 6] building assessments should be performance based as far as possible. Assessment needs to take a holistic view of performance with the emphasis on life-cycle impacts.

Assessment purely on prescriptive features would preclude areas without those features from obtaining a good result regardless of their actual performance. Furthermore, assessments based on features would only encourage feature-based design, construction and operating practices.

### **Transparency**

BEAM Plus recognises that assessment criteria and methods to achieve compliance need to be transparent, providing details of the benchmarks (baselines), data, assumptions and issues taken into account in the assessments and the rating.

BEAM Plus Interiors, a first for BEAM, conducted an open, three month consultation period (April-July 2013) when stakeholders, members of the public, and professionals submitted comments.

### **Flexible and Objective**

BEAM Plus embraces a wide range of projects, variable in terms of scale, location and mix of uses (types of premises). The assessment criteria and methods of assessment need to be flexible, and have alternative means of compliance, yet are reasonably objective to enable the Assessor to draw conclusions without undue delay or controversy.

### **Updates to Assessment Criteria**

The BEAM Plus rating schemes are revised and updated from time to time to reflect changes in industry standards and practices, findings from Credit Interpretation Request, Circular Letters and other related developments. Updates are issued as addenda to the rating system in circulation at the time and incorporated into future revisions.

Where the criteria is revised or modified after the project has been registered, the framework and credits that were current at the time of registration shall prevail unless the Applicant wishes to embrace the revisions and updates.

### **Special Cases**

It is possible that some projects may not be fully embraced by the criteria currently presented in this Manual, whether due to their unusual nature or variety of forms and system designs, etc. In such circumstances certain assessment criteria or the method of demonstrating compliance may need to be modified. This requires advance agreement between the Applicant and the BSL TRC.

### **Certification Upon Completion**

A key principle of BEAM Plus rating tool, and its predecessors has always been that certification is issued only upon completion of the project, this helps to ensure that committed design features are actually installed, that construction practices have met the required standards,

and that testing and commissioning has verified the performance after completion.

#### **1.6.6 DEVELOPMENT HISTORY**

BEAM was initiated in 1996 with initial funding provided by The Real Estate Developers Association of Hong Kong (REDA), research by Hong Kong Polytechnic University, and assessments conducted by the Centre for Environmental Technology Limited (CET) [8].

After more than a decade of implementation, the continued development of BEAM is now funded from certification, training and accreditation fees and industry sponsorship, with the voluntary efforts of BSL members and associates.

**1996 Editions:** Established in 1996 as "HK-BEAM" with the launch of two assessment methods, one for 'new office buildings' [9] and one for 'existing office premises' [10]. Environmental issues in the first versions of BEAM were categorised as 'global', 'local' and 'indoor' impacts.

**1999 Editions:** In 1999 the 'office' versions were re-issued with minor revisions and updated references [11,12], together with an entirely new assessment method for high-rise residential buildings [13]. BEAM for New Residential Buildings was the first such method for high-rise, high-density residential developments in a sub-tropical environment.

**2004 Editions:** Version 4/04 'New Buildings' and Version 5/04 'Existing Buildings' were significant upgrades, developed from pilot versions 4/03 and 5/03 published in June 2003. Besides expanding the range of building developments that can be assessed, these versions widened the coverage to include additional issues that are regarded as further defining quality and sustainability of buildings.

**BEAM Plus (2010):** BEAM Plus for New Buildings and for Existing Buildings were introduced in 2010 with research by the Chinese University of Hong Kong to coincide with the establishment of the HKGBC. BEAM Plus is endorsed by HKGBC as Hong Kong green building rating system and since April 2010 has been adopted as a prerequisite by Hong Kong Government for the granting of gross floor area concessions for green and amenity features in new building developments.

**BEAM Plus V1.2 (2012):** BEAM Plus Version 1.2 for New Buildings and Existing Buildings were released after further stakeholder engagement to integrate a holistic component of Passive Design for residential developments as an alternative method of assessment. BEAM Plus version 1.2 also contains minor amendments from the original guidelines in order to add clarity to the assessment.

**BEAM Plus Interiors (2013):** BEAM Plus Interiors has been introduced in response to calls from the marketplace for a localised benchmark for the fit-out, renovation and refurbishment of occupied interior spaces. This latest version continues the evolution of BEAM Plus through more comprehensive coverage and higher performance expectations.

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8 An independent and non-profit environmental information and services centre established by the private sector, later to become the Business Environment Council  
9 CET. BEAM 1/96. An Environmental Assessment Method for New Air-conditioned Office Premises. 1996.  
10 CET. BEAM 2/96. An Environmental Assessment Method for Existing Air-conditioned Office Premises. 1996.  
11 CET. BEAM 1/96R. An Environmental Assessment Method for New Air-conditioned Office Premises. 1999.  
12 CET. BEAM 2/96R. An Environmental Assessment Method for Existing Air-conditioned Office Premises. 1999.  
13 CET. BEAM 3/99. An Environmental Assessment Method for New Residential Buildings. 1999.

**1.6.7 CONTINUOUS  
IMPROVEMENT**

Since our collective knowledge as to what constitutes a sustainable fit-out, or sustainable workplace continues to develop BEAM systems will need to respond, requiring a dynamic system able to incorporate periodic changes and updates.

With wider implementation it is also expected that the BEAM system will be subject to scrutiny by, and feedback from, an increasing number of stakeholders. In recognition of this, stakeholders are invited to share their comments, opinions and expertise via the [BEAM Plus Interiors Feedback Form](#) in this Manual.

**1.7 SUMMARY OF CREDITS**

Section	Credit Requirement	Credit
<b>2 GREEN BUILDING ATTRIBUTES (GBA)</b>		<b>8</b>
<b>GBA 1 GREEN BUILDING ATTRIBUTES</b>	5 credits where the building has been certified with Platinum grade; 4 credits where the building has been certified with Gold grade; 3 credits where the building has been certified with Silver grade; or 2 credits for Bronze grade.	<b>5</b>
	<b>Alternative:</b> Up to 4 credits for an uncertified building that meets the listed performance characteristics	
<b>GBA 2 LONG-TERM LEASE</b>	2 credits where the fixed lease period between the landlord and the tenant is at least 4 years. 3 credits where the fixed lease period between the landlord and the tenant is at least 6 years.	<b>3</b>
Section	Credit Requirement	Credit
<b>3 MANAGEMENT (MAN)</b>		<b>10</b>
<b>MAN P1 CONSTRUCTION SAFETY</b>	A Safety Management Plan has been implemented and updated during construction and fit-out activities.	<b>Required</b>
<b>MAN 1 BEAM PROFESSIONAL</b>	1 credit for at least one (1) key member of the Project Team being a certified BEAM Professional with BI accreditation.	<b>1</b>
<b>MAN 2 CONSTRUCTION IAQ MANAGEMENT</b>	1 credit for implementing of adequate mitigation measures to reduce potential IAQ problems arising from demolition and fit-out activities in accordance with Construction Indoor Air Quality (IAQ) Management Plan.	<b>1</b>
<b>MAN 3 CONSTRUCTION NOISE</b>	1 credit for implementing measures to reduce noise from construction and fit-out activities.	<b>1</b>
<b>MAN 4 GREEN CLEANING</b>	2 credits for implementing green cleaning	<b>2</b>
	2 credits for providing one of the listed provisions:  i. Nursery provision (e.g. child care corner); ii. Baby-care room; iii. Supervised play area; iv. Recreation facility within space for staff (e.g. sleeping/rest room, fitness room); v. At least 2 enhanced provisions as stipulated in the "Recommended Design Requirements" of Barrier Free Access 2008 within tenant areas; vi. Bicycle parking, showering, and locker facilities;	
<b>MAN 5 CORPORATE SOCIAL RESPONSIBILITY FACILITIES</b>	1 credit for providing a space user's guide for office space or a notice board for public or retail area to encourage and promote environmentally friendly space use, including but not limited to the following: local transport, hygiene and environmental issues, material, energy, indoor environmental quality, water conservation, waste sorting, etc.	<b>2</b>
<b>MAN 6 USER GUIDANCE</b>	1 credit for scoring at least 50% of the applicable occupational health and safety measures and facilities for the project space.	<b>1</b>
<b>MAN 7 OCCUPATIONAL HEALTH AND SAFETY</b>	2 credits for scoring at least 70% of the applicable occupational health and safety measures and facilities for the project space.	<b>2</b>

Section	Credit Requirement	Credit
<b>4 MATERIALS ASPECTS (MA)</b>		<b>26</b>
<b>MAP1 USE OF NON-CFC BASED REFRIGERANTS</b>	Using no chlorofluorocarbon (CFC)-based refrigerants in HVAC&R or other equipment which is installed by the Applicant.	<b>Required</b>
<b>MAP2 MINIMUM WASTE RECYCLING FACILITIES</b>	Provide storage facilities at prominent location for the collection and recycling of paper, plastic and metal waste.	<b>Required</b>
<b>MAP3 TIMBER USED FOR TEMPORARY WORKS</b>	All timber used for <a href="#">temporary works</a> shall originate from sustainable sources or re-used from other sites.	<b>Required</b>
<b>MA 1 WASTE RECYCLING FACILITIES</b>	1 credit for providing storage and collection for any one (1) or 2 credits for providing storage and collection for any two (2) of the following: i. Recycling of glass; ii. Recycling of used small electrical appliance; iii. Recycling of food waste;	<b>2</b>
<b>MA 2 INTERIOR COMPONENTS REUSE</b>	1 credit for reusing at least 30% of prior condition walls, glazing, doors, ceiling and flooring. 2 credits for reusing at least 50% of prior condition walls, glazing, doors, ceiling and flooring. 3 credits for reusing at least 70% of prior condition walls, glazing, doors, ceiling and flooring.	<b>3</b>
	The terms <a href="#">Partitions</a> and <a href="#">Walls</a> are sometimes used interchangeably, or combined together. However, in this Manual, each term has a separate and specific meaning.	
<b>MA 3 FURNITURE AND PARTITIONS</b>	1 credit for at least 30% of the total furniture and partitions were reused from salvaged furniture and partitions. 2 credits for at least 50% of the total furniture and partitions were reused from salvaged furniture and partitions. 3 credits for at least 70% of the total furniture and partitions were reused from salvaged furniture and partitions.	<b>3</b>
	The terms <a href="#">Partitions</a> and <a href="#">Walls</a> are sometimes used interchangeably, or combined together. In this Manual each has a separate and specific meaning.	
<b>MA 4 MODULAR DESIGN MATERIALS</b>	1 credit for modular elements which contributed at least 50% of the newly installed elements in the project.	<b>1</b>
<b>MA 5 DESIGNED FOR DISASSEMBLY</b>	1 credit for easy to disassemble elements which contributed at least 50% of the newly installed elements in the project.	<b>1</b>

Section	Credit Requirement	Credit
<b>4</b>	<b>MATERIALS ASPECTS (MA)</b>	<b>26</b>
<b>MA 6</b>  <b>SUSTAINABLE FLOORING PRODUCTS</b>	<ul style="list-style-type: none"> <li>a) Rapidly Renewable Materials / Recycled Materials / Sustainable Timber 1 credit for at least 50% of all newly installed flooring materials were made from either rapidly renewable materials, recycled materials and sustainable timber, or combination of all three;  2 credits for demonstrating the 100% achievement;</li> <li>b) Regionally Manufactured Materials 1 credit for flooring material manufactured locally (within 800km radius) from the project space, which has contributed at least 50% of the newly installed flooring materials.</li> <li>c) Environmentally Manufactured Materials 1 credit for flooring materials from ALL manufacturers which implemented an EMS and contributed at least 50% of the newly installed flooring materials.</li> </ul> <p><b>Alternative:</b> 3 credits if the Applicant obviates the material and transportation through design, such that no new material was installed.</p>	<b>4</b>
<b>MA 7</b>  <b>SUSTAINABLE CEILING PRODUCTS</b>	<ul style="list-style-type: none"> <li>a) Rapidly Renewable Materials / Recycled Materials / Sustainable Timber 1 credit for installing at least 50% of all newly installed ceiling materials using either rapidly renewable materials, recycled materials, sustainable timber, or a combination of all three;  2 credits for demonstrating 100% achievement;</li> <li>b) Regionally Manufactured Materials 1 credit for providing ceiling materials manufactured locally within 800km radius from the project space, which contributed at least 50% of the newly installed ceiling materials.</li> <li>c) Environmentally Manufactured Materials 1 credit for provided ceiling materials from ALL manufacturers which implemented an EMS and contributed at least 50% of the newly installed ceiling materials.</li> </ul> <p><b>Alternative:</b> 3 credits where the Applicant obviates the material and transportation, through design, such that no new materials are installed.</p>	<b>4</b>

Section	Credit Requirement	Credit																		
<b>4</b>	<b>MATERIALS ASPECTS (MA)</b>	<b>26</b>																		
<b>MA 8</b>  <b>SUSTAINABLE WALL AND DOOR PRODUCTS</b>	<p>a) Rapidly Renewable Materials / Recycled Materials / Sustainable Timber            1 credit for where at least 50% of all newly installed wall and door materials were made from either of rapidly renewable materials, recycled materials, sustainable timber, or a combination of all three;            2 credits for demonstrating 100% achievement;</p> <p>b) Regionally Manufactured Materials            1 credit for wall and door materials manufactured locally (within 800km radius) from the project space, which contributed at least 50% of the newly installed wall and door materials.</p> <p>c) Environmentally Manufactured Materials            1 credit for wall and door materials from ALL manufacturers which implemented an EMS and contributed at least 50% of the newly installed wall and door materials used in the project.</p>	<b>4</b>																		
	<b>Alternative:</b> 3 credits where the Applicant obviates the material and transportation, through design, such that no new materials are installed.																			
<b>MA 9</b>	<b>ZERO PVC</b> 1 credit for using alternative products and materials with zero PVC content for the project.	<b>1</b>																		
<b>MA 10</b>	<b>OZONE DEPLETING SUBSTANCES</b> 1 credit for providing products that avoid using ozone depleting substances (CFC & HCFC) in both the manufacturing process and composition.	<b>1</b>																		
<b>MA 11</b>	<b>DEMOLITION AND CONSTRUCTION WASTE REDUCTION</b> 1 credit for demonstrating that at least 30% of demolition and construction waste was recycled. 2 credits for demonstrating that at least 60% of demolition and construction waste was recycled.	<b>2</b>																		
Section	Credit Requirement	Credit																		
<b>5</b>	<b>ENERGY USE (EU)</b>	<b>26</b>																		
	<b>Performance-based Approach</b>																			
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Credit(s)	1	2	3	4	5	6														
HVAC&R	3%	5%	10%	15%	20%	25%														
	Plus																			
<b>EU 1</b>	<b>ENERGY PERFORMANCE</b>	<b>14</b>																		
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Credit(s)	1	2	3	4	5	6	7	8												
Lighting	10%	15%	20%	25%	30%	35%	40%	45%												
	<b>Prescriptive-based Approach</b>																			
	Up to a maximum of 14 credits for using energy efficient systems and controls that reduce the energy consumption systems include HVAC&R and lighting.																			
<b>EU 2</b>	<b>ENERGY EFFICIENT APPLIANCES</b>	<b>3</b>																		
	1 credit when 70% of total quantities of each type of electrical appliances are certified energy efficient products. 2 credits when 90% of total quantities of each type of electrical appliances are certified energy efficient products. 3 credits when 100% of total quantities of each type of electrical appliances are certified energy efficient products.																			

<b>Section</b>	<b>Credit Requirement</b>	<b>Credit</b>
<b>5 ENERGY USE (EU)</b>		<b>26</b>
	a) Commissioning planning 2 credits for:	
	i. Commissioning plans that detailed all specified commissioning work for HVAC&R, lighting and where applicable other systems that impact on energy use and indoor environmental quality;	
	ii. The commissioning plan shall be endorsed by an independent Commissioning Authority ( <a href="#">iCXA</a> );	
<b>EU 3 COMMISSIONING</b>	b) Commissioning reports 2 credits for:	<b>4</b>
	i. Commissioning reports for HVAC&R, lighting and where applicable other systems that impact on energy use and indoor environmental quality;	
	ii. commissioning reports shall be endorsed by an independent Commissioning Authority iCXA;	
<b>EU 4 OPERATIONS &amp; MAINTENANCE</b>	1 credit for providing digital operations and maintenance (O&M) manual and energy management manual or an energy management section in O&M manual which encourages effective communication.	<b>1</b>
	3 credits for provided sub-metering that separately records and monitors of electricity use by the following equipment installed by the Applicant and serving the project space (at the minimum):	
	i. HVAC&R systems (including supplementary air conditioning, if any);	
	ii. Lighting systems;	
	iii. Small power (plug loads);	
	iv. Lifts and escalators (if any);	
	v. Hot water systems (if any);	
	vi. Pools, Spa, whirlpools (if any);	
	vii. Loads associated with server room (if any);	
	viii. High electrical power equipment (>25kVA, if any).	
	1 credit for providing thermal energy metering and monitoring of the chilled water consumption.	
<b>Section</b>	<b>Credit Requirement</b>	<b>Credit</b>
<b>6 WATER USE (WU)</b>		<b>6</b>
<b>WU 1 WATER QUALITY SURVEY</b>	1 credit for providing quality of potable water that meets the drinking water quality standards at all points of use.	<b>1</b>
	1 credit for demonstrating that the use of water efficient devices leads to an estimated aggregate annual water saving of 30% when compared with BEAM Plus baseline data herein.	
<b>WU 2 ANNUAL WATER USE</b>	2 credits for demonstrating an estimated annual water saving of 40% when compared with BEAM Plus baseline data herein	<b>2</b>
	<b>Alternative:</b>	
	1 credit for sensor type water taps were installed in the common area.	
	1 additional credit for Applicant can demonstrate that the water taps mixer taps, and shower heads (where provided) in the host building are Voluntary Water Efficiency Labelling Scheme (WELS) Grade 1 labelled or having the equivalent or lower flow rate.	
	1 credit for provided water efficient technology in the flushing system.	
<b>WU 3 EFFLUENT DISCHARGE TO FOUL SEWERS</b>	<b>Alternative:</b>	<b>1</b>
	1 credit for at least one water efficient flushing system is installed in the <a href="#">host building</a> .	
<b>WU 4 NO BOTTLED WATER</b>	2 credits for replacing bottled water services with drinking water fountains or equal;	<b>2</b>

Section	Credit Requirement	Credit
<b>7</b>	<b>INDOOR ENVIRONMENTAL QUALITY (IEQ)</b>	<b>24</b>
<b>IEQ 1</b>	<p><b>INDOOR AIR QUALITY</b></p> <p>A. Specifications For each of the materials categories (A1 to A5), one credit is achieved when compliance is demonstrated through submission of the requisite documentation.</p> <p><b>Alternative:</b></p> <p>B. Measurement For each of the categories of contaminants (B1 to B5) one credit is achieved if measured concentrations obtained through appropriate measurements comply with the Good Class requirements in the IAQ Certification Scheme.</p>	<b>5</b>
<b>IEQ 2</b>	<p><b>INDOOR PLANTING</b></p> <p>1 credit for fulfilling at least two (2) items as shown below. 2 credits for fulfilling at least four (4) items as shown below.</p> <ul style="list-style-type: none"> <li>i. The minimum density is one large plant (300mm pot) or two small plants (200mm pot) per two workstations;</li> <li>ii. Green wall of at least 5m<sup>2</sup> is provided;</li> <li>iii. The plant species are carefully selected and suitable to be planted in indoor environment;</li> <li>iv. A "Horticultural Maintenance Plan" shall be in place to ensure the health of the plants are maintained;</li> <li>v. No electricity is required to maintain and for the growth of the plants.</li> </ul>	<b>2</b>
<b>IEQ 3</b>	<p><b>MINIMUM VENTILATION PERFORMANCE</b></p> <p>1 credit for demonstrating that the project is in compliance with the minimum requirements of ANSI/ASHRAE 62.1-2010 in respect of Outdoor Air Quality and Minimum Ventilation Rate.</p> <p><b>Alternative:</b></p> <p>1 credit for demonstrating that carbon dioxide level within the project space can comply with Good Class requirement as stipulated in IAQ Certification Scheme.</p>	<b>1</b>
<b>IEQ 4</b>	<p><b>PRE-OCCUPANCY FLUSH OUT</b></p> <p>1 credit for flushing out of normally occupied project spaces prior to occupancy.</p>	<b>1</b>
<b>IEQ 5</b>	<p><b>TENANT EXHAUST</b></p> <p>1 credit for providing independent exhaust system for all photocopy / printing rooms and other locations where significant indoor pollution sources are generated.</p>	<b>1</b>
<b>IEQ 6</b>	<p><b>UNCONTROLLED VENTILATION</b></p> <p>1 credit for undertaking tests in the premises using a non-balanced test method to demonstrate that the air tightness is within recognised limits.</p> <p>a) Temperature 1 credit for demonstrating the air temperature within the project space is ±1.5 DegC of the set point temperature when the air side system is operating at steady state under normal occupied periods.</p>	<b>1</b>
<b>IEQ 7</b>	<p><b>THERMAL COMFORT</b></p> <p>b) Relative humidity 1 credit for demonstrating the relatively humidity within the project space is less than 70%.</p> <p>c) Air movement 1 credit for demonstrating the air movement within the project space is less than 0.3m/s.</p>	<b>3</b>
<b>IEQ 8</b>	<p><b>INTERIOR LIGHTING QUALITY</b></p> <p>3 credits where the uniformity, glare index and colour rendering index (1 credit for each parameter) at all workstations can comply with CIBSE requirements.</p>	<b>3</b>
<b>IEQ 9</b>	<p><b>NATURAL LIGHTING</b></p> <p>1 credit where 75% of workstations or seating are located in an area of floor with natural light illuminance level of 100 lux. 2 credits where 85% of workstations or seating is located in an area of floor with natural light illuminance level of 100 lux.</p>	<b>2</b>

Section	Credit Requirement	Credit
<b>7</b>	<b>INDOOR ENVIRONMENTAL QUALITY (IEQ)</b>	<b>24</b>
<b>IEQ 10</b>	<b>VIEWS TO OUTSIDE</b>  1 credit for at least 60% of all workstations or seating have a direct line of sight to external vision glazing or naturally lit internal courtyard or atrium.  2 credits for at least 80% of all workstations or seating have a direct line of sight to external vision glazing or naturally lit internal courtyard or atrium.	<b>2</b>
<b>IEQ 11</b>	<b>ACOUSTICS</b>  1 credit for provided background noise levels within the prescribed criteria.  1 credit for demonstrating that the reverberation time in applicable areas meets the prescribed criteria for given types of premises.  1 credit for demonstrating airborne noise isolation between rooms, spaces and premises meets the prescribed criteria.	<b>3</b>
<b>8</b>	<b>INNOVATIONS (IV)</b>	<b>10</b>
<b>IV 1</b>	<b>INNOVATIVE TECHNIQUES</b>	
<b>IV 2</b>	<b>PERFORMANCE ENHANCEMENTS</b>  Upto a maximum 10 points	<b>10</b>

## 2 GREEN BUILDING ATTRIBUTES

### GBA 1 GREEN BUILDING ATTRIBUTES

<b>EXCLUSION</b>	None.
<b>OBJECTIVE</b>	Encourage selection of BEAM certified <a href="#">host building</a> or that employs best practice in operation.
<b>CREDIT ATTAINABLE</b>	Up to 5 credits
<b>CREDIT REQUIREMENT</b>	5 credits where the host building is certified BEAM Platinum grade; 4 credits where the host building is certified BEAM Gold grade; 3 credits where the host building is certified BEAM Silver grade; 2 credits where the host building is certified BEAM Bronze grade; <i>Alternative:</i> Up to 4 credits when host building provided the performance characteristics listed in this Manual;
<b>ASSESSMENT</b>	<u>Criteria</u> The selected host building hold BEAM certification or other internationally recognised green building labelling system. The prescribed number of credits shall be achieved in accordance with the equivalence to BEAM grades. Grades such as 'Excellent' shall be deemed equivalent to 'Platinum', and so on, for lower grades. A green building certificate older than five (5) calendar years, irrespective of any published validity, does not meet the requirement of this credit. <u>Documentation</u> For BEAM certified buildings, the credits shall be achieved automatically based on the records held by BSL. Where the host building holds more than one independently assessed Green Building certification, points are only awarded for the BEAM certificate, no double counting is permitted. Where the certificates have different ratings, this credit shall be based only on the BEAM certificate. For other rating systems, the Applicant shall provide evidence confirming the <a href="#">host building</a> has a valid certificate (at the time of Assessment).
<b>ALTERNATIVE</b>	<u>Criteria</u>
<b>APPROACH</b>	For a host building without certificate one (1) credit is achieved for each of the following listed characteristics of the building, up to a maximum of 4 credits. The first six (6) listed characteristics or features are referenced from Site Aspects of the latest version of BEAM Plus for New Buildings. <ol style="list-style-type: none"><li>i. No car parking provision: No car parking is provided other than provisions intended for use by disabled persons and/or any shuttle service vehicles.</li><li>ii. Local transport: The mass transit station or other public transport facilities must be within 500m walking distance (not 500m radius) of the host building, and the scheduled operating frequency Monday to Friday between the hours of</li></ol>

- 07.00 -19.00 hours, shall be 10 minutes or less.
- iii. Neighbourhood basic services: At least 10 different basic services are located within 500m walking distance (not 500m radius) from the main entrance of the host building and pedestrian access to the services is available for the Site. Basic services shall include: (1) Restaurants; (2) Banks (including Automated Teller Machine); (3) Medical Facility; (4) Dental Clinic; (5) Pharmacy; (6) Supermarket; (7) Convenience Stores; (8) School; (9) Kindergarten or Day Care Centre; (10) Library; (11) Post Box; (12) Laundry or Dry Cleaner; (13) Hairdresser; (14) Retail shops; (15) Place of Worship; (16) Community Centre. Among these 16 items, only one of them can be counted twice in calculating the total number of neighbourhood basic services.
  - iv. Neighbourhood recreational facilities: At least 2 different recreational facilities are located within 500m walking distance from the main entrance of the host building and pedestrian access to the facilities is available for the site. Recreational facilities shall include: (1) Shaded/covered sitting out areas/garden/park with seating facilities; (2) Waterfront Promenade; (3) Public Swimming pool; (4) Public Indoor Sports Hall; (5) Public Outdoor Sports Facility such as football field, basketball court, tennis court, etc. (6) Bicycle Tracks. Among these 6 items, only one of them can be counted twice in calculating the total number of neighbourhood recreational facilities.
  - v. Light pollution: The obtrusive light from exterior lighting (installed / owned by the Applicant) meets the specified performance for the environmental zone in which the building is located.
  - vi. Water efficient design: The host building employs operating rainwater harvesting or greywater reclamation system.
  - vii. On-site renewable energy: The host building has installed monitored renewable applications that supply energy for building usage (no specific percentage is required for achieving this approach).
  - viii. Corporate Social Responsibility (CSR) Facilities: The host building has provided at least 2 CSR facilities. These include: (1) Nursery provisions; (2) Baby-care rooms; (3) Recreational facilities; (4) Bicycle parking; (5) Electrical vehicle charging facilities; (6) Barrier free access facilities (7) Carpool.
- The above list of features is not meant to be exhaustive, the Applicant is encouraged to submit CIR to claim alternative green feature(s) for review and approval by BSL TRC. In the event a CIR is not approved, the point will not be granted.

#### Documentation

For each listed characteristic or feature above, credit(s) shall be achieved when the Applicant provides the documentation stated below, to demonstrate criteria compliance:

- i. No car parking provision: Record photographs showing no private carparking space is provided within the host building.
- ii. Local transport: A scaled map showing the transport facilities and the walking distance (not 500m radius) from the main entrance of the host building, and extracts of timetable for each route showing the service frequency during the

prescribed hours.

- iii. Neighbourhood basic services: A scaled map showing the neighbourhood basic services and the walking distance (not 500m radius) from the main entrance of the host building.
- iv. Neighbourhood recreational facilities: A scaled map showing the neighbourhood recreational facilities and the walking distance (not 500m radius) from the main entrance of the host building.
- v. Light pollution: A lighting simulation report including methodology justification and result analysis to confirm the compliance of the prescribed light pollution criteria.
- vi. Water efficient design: Record photographs showing the operating system for greywater reclamation or rainwater harvesting.
- vii. On-site renewable energy: Record photographs showing the renewable energy system and screenshot of the energy monitoring system.
- viii. Corporate Social Responsibility facilities: Floor plans or record photographs showing the provisions of these facilities within the host building.

#### **BACKGROUND**

Certification of the host building with BEAM green building rating tool clearly signifies to the Applicant that the building owner has already taken significant steps to protect eco-systems, bio-diversity, conserve valuable resources, and provide healthy indoor environment for building occupants. BEAM certified buildings also deliver many economic benefits to tenants, such as reduced operating costs and improved productivity of building occupants.

The Applicant's representative responsible for sourcing and selecting premises have the opportunity to demonstrate commitment to sustainability by selecting a host building that has been BEAM certificate, or has already employed green strategies.

**GBA 2 LONG-TERM LEASE**

<b>EXCLUSION</b>	None.
<b>OBJECTIVE</b>	Conserve the natural resources, reduce the waste and associated environmental impacts by remaining in the same location.
<b>CREDIT ATTAINABLE</b>	Up to 3 credits
<b>CREDIT REQUIREMENT</b>	2 credits where the fixed lease period was at least 4 years. 3 credits where the fixed lease period was at least 6 years.
<b>ASSESSMENT</b>	<p><u>Criteria</u></p> <p>The Applicant shall provide a certified true copy of the lease agreement for the prescribed duration.</p> <p>Note: Lease period shall mean the fixed term period of the lease. For example, a 2+2 lease, with a two (2) year fixed period, and a two (2) year optional does NOT fulfil the requirement.</p> <p><u>Documentation</u></p> <p>Credits shall be achieved when the Applicant provides the documentation stated below, to demonstrate compliance:</p> <ul style="list-style-type: none"><li>i. The certified true copy of the lease agreement for the prescribed duration;</li><li>ii. Where the Applicant is also the building owner, the landlord or a related company [1], a letter signed by a director from the building owner shall be submitted clearly stating the occupation commitment for the prescribed duration.</li></ul>
<b>BACKGROUND</b>	<p>A long-term lease can minimise the frequency of relocation and associated demolition, and renovation activities. It helps reduce the waste generated, energy consumption during transportation, saves the virgin resources, and will minimise the disturbance to adjacent occupants and building users.</p> <p>Another benefit for longer occupancy periods is that the occupant has a greater incentive to make longer-payback upgrades for energy and water upgrading works. Longer leasing periods also help tenants reduce moving expenses over time, reduce construction expenses for fitting-out new spaces, prevents the disruption of employee productivity that is often associated with relocation, and shelter the occupant from rent increases and inflation.</p>

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1 In this context "Related Company" shall mean any individual, organisation, firm or company where the Applicant has beneficial control, or holds more than 10% of its shares.

### **3 MANAGEMENT**

#### **MAN P1 CONSTRUCTION SAFETY**

<b>EXCLUSION</b>	None.
<b>OBJECTIVE</b>	Encourage development of systematic safety management plan that embraces the safety and health of the workers and neighbours.
<b>REQUIREMENT</b>	A Safety Management Plan has been implemented and updated where necessary during construction and fit-out activities.
<b>ASSESSMENT</b>	<u>Criteria</u> The Applicant shall submit a Safety Management Plan detailing the following at a minimum shall be provided: <ul style="list-style-type: none"><li>i. Person-in-charge and emergency contact;</li><li>ii. Hazard / risk identification;</li><li>iii. Public protection controls (e.g. prevent unauthorised access, falling debris);</li><li>iv. Control methods;</li><li>v. Site inspection frequency;</li><li>vi. Common plant and equipment used;</li><li>vii. Promotion &amp; training;</li><li>viii. Personal protection equipment used, etc.</li></ul> <u>Documentation</u> Pre-requisite shall be fulfilled when the Applicant provides the documentation stated below, to demonstrate compliance: <ul style="list-style-type: none"><li>i. Safety Management Plan</li><li>ii. Records, a logbook, site diary, or similar daily monitoring record, to demonstrate that the Safety Management Plan was properly implemented.</li></ul> <b>BACKGROUND</b> In many instances Interior fit-out projects are carried out by small and medium-sized firms which may not have sufficient resources to develop a comprehensive Safety Management Plan for every specific project. BEAM seeks to reduce the injuries from construction activities associated with fit-out work by encouraging renovation firms to develop and implement a safely culture through implementing a Safety Management Plan using the resources available from the public domain. Various resources quoted from the Authorities are extracted [1,2,3,4,5,6].

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- 1 Occupational Safety and Health Management in Renovation and Maintenance Works for the Property Management Industry – Labour Department  
<http://www.oshc.org.hk/others/bookshelf/BB110069E.pdf>
  - 2 Safety Hints for Renovation Workers – Occupational Safety & Health Council (Chinese version only)  
<http://www.oshc.org.hk/others/bookshelf/CB945C.pdf>
  - 3 Guidance Notes to Renovation Safety – Labour Department  
<http://www.oshc.org.hk/others/bookshelf/BB258E.pdf>
  - 4 Guidance Notes to Renovation Safety – Labour Department  
<http://www.oshc.org.hk/others/bookshelf/BB258E.pdf>
  - 5 Safety Hints for Renovation Workers in Using Chemicals – Occupational Safety & Health Council (Chinese version only)  
<http://www.oshc.org.hk/others/bookshelf/CB148C.pdf>
  - 6 OSH for Building Services Work – Occupational Safety & Health Council (Chinese version only)  
<http://www.oshc.org.hk/others/bookshelf/CB098C.pdf>

**MAN 1 BEAM PROFESSIONAL**

<b>EXCLUSION</b>	None.
<b>OBJECTIVE</b>	To facilitate the application for the BEAM certification process and to ensure the design of the project following the requirement of the BEAM Plus Manual.
<b>CREDIT ATTAINABLE</b>	1
<b>CREDIT REQUIREMENT</b>	1 credit for at least one (1) key member of the project consultants being a certified BEAM Professional with BI accreditation.
<b>ASSESSMENT</b>	<p><u>Criteria</u></p> <p>The Applicant shall provide evidence of engagement of the BEAM Professional as the key project team member, and shall have BEAM Plus Interiors credential to submit BEAM Plus Interiors project.</p> <p>The BEAM Professional shall meet all of the following requirements:</p> <ul style="list-style-type: none"><li>i. The BEAM Professional was accredited before the beginning of construction;</li><li>ii. An employee of a design firm, project manager, contractor, or consultant engaged on the project;</li><li>iii. Conducted at least one design charrette meeting at concept stage;</li><li>iv. Participated in meetings;</li><li>v. Provide guidance to the project team regarding BEAM Plus principles, structure, timing and certification process from design through to practical completion of the project;</li><li>vi. Supervised and submitted all documentation and materials in accordance with this Manual;</li></ul>
	<p><u>Documentation</u></p> <p>Credit shall be achieved when the Applicant provides the documentation stated below, to demonstrate criteria compliance:</p> <ul style="list-style-type: none"><li>i. nominated BEAM Pro's accreditation certificate; or a printout of the relevant page of the online directory, found on the HKGBC website, signed and dated by the BEAM Pro, with his/her name underlined;</li><li>ii. letter of appointment endorsed/signed by the project manager or the space owner, and identifying the scope of work.</li><li>iii. records for meetings, design stage charrette, and written work products for design team;</li></ul>

## **MAN 2 CONSTRUCTION IAQ MANAGEMENT**

<b>EXCLUSION</b>	None.
<b>OBJECTIVE</b>	Reduce the potential for indoor air quality problems resulting from construction and where applicable demolition, to the benefit of workers, and adjacent neighbours.
<b>CREDIT ATTAINABLE</b>	1
<b>CREDIT REQUIREMENT</b>	1 credit for implemented, adequate mitigation measures that reduced IAQ impacts arising from demolition and fit-out activities.
<b>ASSESSMENT</b>	<u>Criteria</u> The Construction IAQ Management Plan which included procedures meeting the following minimum requirements: <ul style="list-style-type: none"><li>i. measures to protect the Building Services Installation, its ventilation system components, and air pathways against contamination during construction;</li><li>ii. measures to protect the building components against contamination during construction;</li><li>iii. control measures for HVAC&amp;R system and component protection.</li><li>iv. in the event that HVAC&amp;R system, building components or air pathways were not adequately protected, cleaning procedures to be employed prior to the premises being occupied;</li><li>v. contaminant source control;</li><li>vi. interruption of moisture/pollutant pathways;</li></ul> Events shall be scheduled to protect indoor air quality by: <ul style="list-style-type: none"><li>i. permitting adequate airing-out of new materials;</li><li>ii. sequencing the installation of finish materials;</li><li>iii. proper curing of concrete and wet finishes before covering;</li></ul> The plan should specify the location, type, amount, sequence and timing of the various control measures, including emergency procedures, and the labour, materials and time required to implement them. The project construction documents should address the following: <ul style="list-style-type: none"><li>i. an overview of tasks to be executed;</li><li>ii. a list of reference documents, including specifications, drawing list, and submittal drawings;</li><li>iii. a list of participants in the process and their responsibilities;</li><li>iv. a plan for management, communication and documentation;</li><li>v. an outline of the scope of the IAQ Management Plan, including submittal review, inspection, and enforcement;</li><li>vi. the expected written work products, including logbook, checklists and worksheets;</li><li>vii. a schedule of activities;</li></ul>

The project construction documents should require the contractor to:

- i. designate a representative with daily responsibility for IAQ issues;
- ii. include procedures related to the IAQ Management Plan on the agenda during regularly scheduled meetings;
- iii. store building materials in a weather tight, clean area protected from dust, debris and moisture damage;
- iv. keep the premises free from accumulating of waste materials, rubbish and other debris resulting from the work. Identify the storage, disposal and good housekeeping practices to be applied to building supplies and waste materials to protect HVAC&R systems from contamination;
- v. submit a construction schedule to prevent materials from acting as sinks for storage and subsequent release of contaminants emitted from finishes which have the potential for short-term off-gassing. In the schedule, the contractor should include appropriate allowances for drying or curing times before installation of materials that have a fibrous or porous nature that tend to adsorb contaminants;
- vi. provide adequate outside air continuously during installation of materials and finishes;
- vii. replace all construction-related filtration media used on permanent HVAC&R equipment at substantial completion of the work;
- viii. confirm that all air handling equipment including but not limited to filters, casing, coils, fans and ducts are clean, before air quality testing;
- ix. ensure air ducts clean by coordinating duct testing and cleaning procedures with the commissioning requirements.

A Construction IAQ Management report detailing how fit-out construction activities, and where applicable demolition and hauling activities, were executed for the project. The report shall detail:

- i. design approaches, specifications and contract requirements on actions to be taken by contractors to control dust, odour and other emissions, moisture damage, etc. generated during work activities;
- ii. roles and responsibilities for monitoring and reporting on the execution of the control instructions;
- iii. measures taken to schedule delivery, store, protect and install absorptive materials in order to minimise exposure to moisture and airborne contaminants;
- iv. protection measures for fixed HVAC&R systems and equipment;
- v. protection for all Building Services equipment, including but not limited to plumbing, tanks, vessels, drainage, piping, FSI, hose reels, electrical and FSI conduits, etc should be sealed with temporary plugs during construction;
- vi. source control of pollutants from materials such as sealants and paints;
- vii. isolation of areas of work to prevent contamination of adjacent clean or occupied spaces;
- viii. exhausting of contaminants to outside air where appropriate;

**BEAM PLUS INTERIORS****COMMERCIAL, RETAIL AND INSTITUTIONAL****MANAGEMENT (MAN)****MAN 2 CONSTRUCTION IAQ MANAGEMENT**

- ix. negative pressurisation where appropriate;
- x. cleaning activities during construction;
- xi. replacement of appropriate filter media upon completion;
- xii. details of any monitoring or measurement of pollutants during construction;
- xiii. implementation of pre-occupancy flush-out ([refer to IEQ 4](#))

The above requirements shall apply irrespective of whether the premises is located in a new or refurbished building, if adjacent tenant areas are occupied/ unoccupied, or where the project is a renovation of space in an occupied building. Where demolition works are required, it shall be included in the Assessment.

Where there is minimal construction activity associated with a project the credit remains applicable, but the submitted report shall detail the project's interior (design and layout of spaces) prior to acquisition, and when completed for the new occupancy.

**Documentation**

Credit shall be achieved when the Applicant provides the documentation stated below, to demonstrate compliance:

- i. list responsible person;
- ii. construction IAQ Management system;
- iii. drawings, floor layout plan;
- iv. drawings, engineering plans;
- v. records, logbook;
- vi. record photographs;

**GUIDANCE**

Dust and odours generated by various construction activities cause significant air pollution. High levels of dust, combined with other pollutants, can cause respiratory problems, inhaled particles may aggravate asthma, bronchitis, and very small particles may cause cancer. Dust also reduces visibility, dirties clothing and buildings, and increases the rate of corrosion.

Best practice can prevent air pollution resulting from construction activities. A management plan, covering IAQ related construction procedures should be developed before construction begins with contractors and be a regular agenda item for progress meetings.

An important part of the management plan is the sequence in which materials, fixtures and fittings are installed during the phases of construction. For example, products that emit VOC's over a relatively short timeframe should be installed before installing absorbent materials.

Practical guidance on the control of air pollution during construction is available from SMACNA [1], US EPA [2] and Hong Kong EPD website [3]. Though the guidance focuses on activities in occupied buildings, they are also appropriate to manage construction activities in new buildings. The guide recommends measures in respect of

1 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA). IAQ Guidelines for Occupied Buildings Under Construction. 2nd. Ed., 2007.

2 The US Government. Environmental Protection Agency. IAQ Design Tools for Schools during Construction. <http://www.epa.gov/iaq/schooldesign/construction.html#Construction%20Practices>

3 Hong Kong Environmental Protection Department – Indoor Air Quality Information Centre. Improve the Indoor Air Quality in Your Building. [http://www.iaq.gov.hk/pamphlets/200911/booklet\\_building.pdf](http://www.iaq.gov.hk/pamphlets/200911/booklet_building.pdf)

scheduling activities, source control, pathway interruption, protecting installed HVAC&R systems and equipment, and good housekeeping.

**SCHEDULING ACTIVITIES**

Construction work in occupied buildings that will generate emissions and nuisance should be undertaken outside normal working hours or in accordance with the host building fit-out requirements.

**SOURCE CONTROL MEASURES**

Source control means specifying finish materials, composite wood products, sealants, etc. with low toxicity and off-gassing, as covered in the IEQ section. Contractors will require instructions and close monitoring to ensure that inferior products are not used in place of specified materials.

**PATHWAY INTERRUPTION**

All occupied areas, or areas that will become occupied, particularly those adjacent to the project, should be isolated as far as practicable. Measures such as erecting temporary hoarding, doors and screens to inhibit dust and air movement, sealing of construction areas, depressurising work areas to provide a pressure differential to adjacent areas, and exhausting directly to the outside are recommended.

**HVAC&R EQUIPMENT AND OTHER BUILDING SERVICES**

Installed HVAC&R equipment shall be protected from ingress of dust and other contaminants. Ducts and openings shall be sealed and subsequently cleaned.

**INSTALLATION PROTECTION**

Where HVAC&R systems are required to operate during project work activities it is important to protect the return air side of the ventilation system. Temporary filters, to MERV 8 or better, shall be installed over all openings. Care should be taken not to store material and other products in ductwork or air-handler plant rooms. Upon completion of the work, but in co-ordination with pre-occupancy flush out activities, all filtration media should be replaced.

**HOUSEKEEPING MEASURES**

Cleaning activities shall be arranged to control contaminants in spaces under construction and prior to occupancy. Possible strategies include high-efficiency filters, or using suitable wetting agents to manage fine dust. Cleaning materials used should not themselves be a source of toxic chemicals, pollutants, and should be applied under appropriate guidelines.

**MERV RATING**

Filtration efficiency defines how well the filter cleans indoor air by removing airborne particles. Low-efficiency filters, around 25% efficiency for 3-10 micron particles, are typically used to keep lint and dust from clogging HVAC&R system components. Medium- and high-efficiency filters, up to 95% efficiency for 3-10 micron particles, are typically used to remove mould, pollen, and fine particulate. High Efficiency Particulate Air (HEPA) filters are used when 99.97% efficiency and above (for 0.3 micron particles) is required.

ANSI/ASHRAE Standard 52.2 [ 4 ] measures the particle size efficiency (PSE) of a filter. This indicates the ability to remove particles of differing sizes between 0.3 and 10 micrometres in diameter. A Minimum Efficiency Reporting Value (MERV), is assigned to a filter based on a minimum PSE. A MERV 1 is least efficient, while a MERV 16 is most efficient. HEPA and Ultra Low Penetration Air (ULPA) filters have filtration efficiency that is higher than MERV 16 and are not measured by the ANSI/ASHRAE 52.2 test standard.

### **MAN 3 CONSTRUCTION NOISE**

<b>EXCLUSION</b>	None.
<b>OBJECTIVE</b>	Minimise nuisance to the immediate neighbourhood caused by noise during construction and fit-out activities.
<b>CREDIT ATTAINABLE</b>	1
<b>CREDIT REQUIREMENT</b>	1 credit for implementing measures to mitigate noise level arising from demolition, construction, transportation, and fit-out activities.
<b>ASSESSMENT</b>	<p><b><u>Criteria</u></b></p> <p>The Applicant shall submit documentation to prove that noise from the work activities was minimised and/or rescheduled to avoid nuisance to host building users and neighbouring occupants.</p>
	<p><b><u>Documentation</u></b></p> <p>Credit shall be achieved when the Applicant provides the documentation stated below, to demonstrate criteria compliance:</p> <ul style="list-style-type: none"><li>i. List Responsible person</li><li>ii. Overall plan listing all nuisance Measures to minimise the noise nuisance to the immediate neighbourhood during construction and fit-out activities;</li><li>iii. Building Management Office (BMO) declaration letter No written compliant received;</li></ul>
<b>BACKGROUND</b>	<p>In many instances the interior fit-out works will take place when other areas of the <a href="#">host building</a>, or the premises, are occupied. BEAM seeks to reduce the nuisance from construction activities associated with fit-out, particularly noise and vibration that can affect neighbours and other building users.</p> <p>Where the work takes place in circumstances when other parts of the building are normally occupied, noise and vibration transmitted via the building structure shall be avoided between 09.00 and 18.00 (or other hours indicated in the host building fitting out guide).</p> <p>Where the noise generated does not involve demolition, drilling, cutting chases, scrabbling, coring, or channelling but transmitted as airborne noise then steps shall be taken to mitigate those impacts.</p>

## **MAN 4 GREEN CLEANING**

<b>EXCLUSION</b>	None.
<b>OBJECTIVE</b>	Encourage environmentally friendly cleaning products and procedures
<b>CREDIT ATTAINABLE</b>	2
<b>CREDIT REQUIREMENT</b>	2 credits for implementing <a href="#">green cleaning</a> system
<b>ASSESSMENT</b>	<u>Criteria</u> The Applicant shall implement <a href="#">green cleaning</a> procedures, and present documentation detailing how in-house, or appointed cleaning service providers. Adoption of lower toxicity cleansing agents and procedures for cleaning each area of the premises.
<u>Documentation</u>	
Credits shall be achieved when the Applicant demonstrates that the Green Cleaning system manual including the following:	
i. Responsible person	
ii. Materials:	
i. product purchase records, delivery notes;	
ii. product catalogue/data sheet/material hazard data sheets (if applicable);	
iii. toxic/pesticide/herbicide (if applicable);	
iv. chemical handling safety (if applicable);	
v. record photographs for all cleaning products;	
iii. Procedures for:	
i. method statements for all routine cleaning including floors, carpet, <a href="#">walls</a> , doors, <a href="#">partitions</a> , windows, furniture, desks, chairs, telephones, air filters, AC units, electronic equipment, etc. in the project space;	
ii. method statements for purchase, preparation, dilution, mixing, decanting, handling, spillage, and disposal of waste;	
iii. record keeping	
iv. equipment operation and maintenance;	
v. training and communication;	
vi. record photographs of cleaning procedures conducted;	
iv. Cleansing Records	
i. Log book, records;	

**BACKGROUND**

Choosing less hazardous cleaning products (e.g. biodegradability, low toxicity, lower VOC content, reduced packaging, etc.) will minimise harmful impacts to cleaning staff and occupants, and help maintain the good indoor air quality.

Furthermore, driving choice of cleaning materials and products based on the environmental issues first and foremost will reduce related water, waste, and ambient air pollution.

Green Seal [1] establishes requirements for cleaning service providers, including in-house and external cleaning services, to create a green cleaning system that protects human health and the environment.

There are many resources providing environmentally friendly cleaning products including: Green Seal, EPD [2] (publishes green specifications of cleansing products requirements), Kadoorie Farm and Botanic Garden (KFBG) Corporation [3], Consumer Specialty Products Association [4], US EPA [5], etc.

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- 1 Green Seal  
<http://www.greenseal.org/>
  - 2 EPD – List of products with recommended green specifications  
[http://www.epd.gov.hk/epd/english/how\\_help/green\\_procure/files/Green\\_Specifications.pdf](http://www.epd.gov.hk/epd/english/how_help/green_procure/files/Green_Specifications.pdf)
  - 3 Kadoorie Farm and Botanic Garden (KFBG) Corporation – Green Cleaning Products  
<http://www.climatechange.hk/cht/green-cleanse-product-highlights.aspx>
  - 4 Consumer Specialty Products Association – Household Cleaning Products and Green Cleaning Products  
<http://www.aboutcleaningproducts.com/>
  - 5 The United States Government Environmental Protection Agency – Environmentally Preferable Purchasing (EPP)  
<http://www.epa.gov/epp/index.htm>

**MAN 5 CORPORATE SOCIAL RESPONSIBILITY FACILITIES**

<b>EXCLUSION</b>	None.
<b>OBJECTIVE</b>	Encourage space development that is an asset to the society and promotes the organisation's Corporate Social Responsibility (CSR).
<b>CREDIT ATTAINABLE</b>	2
<b>CREDIT REQUIREMENT</b>	2 credits for one of the listed facilities: <ol style="list-style-type: none"><li>i. Nursery provision (e.g. child care corner);</li><li>ii. Baby-care room;</li><li>iii. Supervised play area;</li><li>iv. Recreation facility within space for staff (e.g. sleeping/rest room, fitness room);</li><li>v. At least 2 enhanced provisions stipulated in the "Recommended Design Requirements" of Barrier Free Access - 2008, within occupied area;</li><li>vi. Bicycle parking, showering, and locker facilities;</li></ol>
<b>ASSESSMENT</b>	<p><b>Criteria</b></p> <p>The Applicant shall submit a floor plan showing the provided facility and contents (e.g. the type of furniture provided within the baby-care room).</p> <p>The Applicant may locate this facility in different area of the same <a href="#">host building</a>, provided that, it is under the management of the Applicant, and is accessible for other occupants.</p> <p>Each facility shall be supported with a management plan, the plan can be one page in-length listing person-in-charge, operating schedule, access, usage rules for the space, etc. and it shall be endorsed by the Applicant or the property manager.</p> <p>The listed provisions as shown above are not meant to be exhaustive, the Applicant is encouraged to submit CIR for alternative CSR facilities for review and approval by BSL TRC.</p>
	<p><b>Documentation</b></p> <p>Credits shall be achieved when the Applicant provides the documentation stated below, to demonstrate compliance:</p> <ol style="list-style-type: none"><li>i. management plan narrative (endorsed by the Applicant or the host building property manager)</li><li>ii. list responsible person;</li><li>iii. drawings, floor layout plan, furniture plan, and Building Services layouts;</li><li>iv. lease</li><li>v. location plan if located elsewhere in <a href="#">host building</a>;</li><li>vi. record photographs with facility and finishes;</li></ol>
<b>BACKGROUND</b>	The provision of CSR facilities such as, child care corner, baby-care room, recreation facilities for staff, etc. within the project space does not only provide convenience to the Applicant's staff, but also for the community and society. It is one of the many opportunities an organisation's commitment toward CSR is demonstrated.

CSR facilities are essential to the mental and physical well-being of the individual and the community as a whole. It contributes to the quality of life for occupants, and therefore sustainable. The design and layout of the facilities should be of a high quality (not an unfurnished room) which meets the needs of the users.

## **MAN 6 USER GUIDANCE**

<b>EXCLUSION</b>	None.
<b>OBJECTIVE</b>	Inform and educate occupiers regarding environmental, comfort and health impacts of their activities, and encourage actions that reduce adverse impacts.
<b>CREDIT ATTAINABLE</b>	1
<b>CREDIT REQUIREMENT</b>	1 credit for providing user's guide for office space, or a notice board for public or retail area, to encourage and promote environmentally friendly activities, including but not limited to: local transport, hygiene and environmental issues, material, energy, indoor environmental quality, water conservation, waste sorting, etc.
<b>ASSESSMENT</b>	<p><b><u>Criteria</u></b></p> <p>The Applicant shall submit user guide for office space, or notice board (electronic dashboard) for other areas, that were designed specifically for the occupants/users. The user guide or notice board, etc. shall use easy-to-understand language and address at least five (5) of the following aspects:</p> <ul style="list-style-type: none"><li>i. Local public transport and cycling provision (e.g. information, maps and timetables);</li><li>ii. Information on alternative methods of transport (e.g. car sharing schemes; shuttle bus services; electric car rental and charging location, where available);</li><li>iii. Hygiene and environmental issues (e.g. green cleaning);</li><li>iv. Materials selection for fit-out (e.g. low VOC products, sustainable timber, reuse of materials);</li><li>v. Energy issues (e.g. energy efficient operation of air conditioning, lighting and/or hot water system(s), selection of energy efficient appliances);</li><li>vi. Water conservation (e.g. adoption of low flow tap);</li><li>vii. Waste sorting facilities or practices (e.g. details of recyclable waste, location of recycling bins) and</li><li>viii. Indoor environmental quality (e.g. IAQ certification), etc.</li></ul> <p><b><u>Documentation</u></b></p> <p>Credit shall be achieved when the Applicant provides the documentation stated below, to demonstrate compliance:</p> <ul style="list-style-type: none"><li>i. List Responsible Person;</li><li>ii. Updating frequency for the user guide;</li><li>iii. effective communication with explanation of the features used on the notice board, or electronic board;</li><li>iv. record photographs;</li><li>v. other records (for example, historical records show change of focus, etc.);</li></ul>
<b>BACKGROUND</b>	Environmental impacts can be reduced with the co-operation of the occupants/users, but often they are not aware of the key environmental issues. Best practice dictates that effective communication shall be periodically updated.

### **MAN 7 OCCUPATIONAL HEALTH AND SAFETY**

<b>EXCLUSION</b>	None.				
<b>OBJECTIVE</b>	Interior layout provisions that embrace health and safety.				
<b>CREDIT ATTAINABLE</b>	2				
<b>CREDIT REQUIREMENT</b>	1 credit for scoring at least 50% of the applicable occupational health and safety measures and facilities for the project space. 2 credits for scoring at least 70% of the applicable occupational health and safety measures and facilities for the project space.				
<b>ASSESSMENT</b>	<b>Criteria</b> The Applicant shall submit documentation illustrating the health and safety measures and/or facilities in accordance with the checklist provided below. Where 50% or 70% compliance is demonstrated, 1 or 2 credit(s) respectively can be achieved.				
<b>Assessment Grid</b>					
Ergonomics	Pt	Indoor Environmental Quality	Pt	Storage	Pt
Provided adjustable & movable office chairs.	1	Wall / sound barrier between occupant and noisy equipment or locations (e.g. photocopies, kitchen etc).	1	Closed lid bins for organic waste (e.g. food waste).	1
Armrests on office chair (if provided) shall be adjustable in height.	1	Draught: Air from air diffuser is not directly blown to seating occupant.	1	1.2 metres of space in front of storage to provide sufficient space for safe movement.	1
Standing-height-benches can be adjustable in height (if provided).	1	Glare: No monitors (computer, TV) are facing window.	1	Safe means of climbing up to storage that is more than 2 metres.	1
Desks or tables are rounded corners with no sharp edges.	1	Sound absorbing panel between walkway and workstation.	1	<b>Interior layout</b>	Pt
Knee clearance dimensions for desk is from 610mm to 760mm for height and >800 mm for width.	1	Others (by Applicant):	1	Walkways / aisles are at least 1 metre clear width.	1
Anti-fatigue matting for standing workers (e.g. retail staff, counter staff)	1	Others specify (by Applicant):	1	No electrical extension cords crossing walkway/corridor.	1
Others specify (by Applicant):	1	Others specify (by Applicant):	1	Others specify (by Applicant):	1
Total Applicable Points		Points Achieved:		Percentage Achieved:	

#### Documentation

Credit(s) shall be achieved when the Applicant provides the documentation stated below, to demonstrate compliance:

- i. list responsible person
- ii. summary table, justification for each checked item,
- iii. drawings, floor layout with key data clearly highlighted;
- iv. manufacturer manuals/catalogues;
- v. record photographs;

**BACKGROUND**

Protecting the health and safety of people in the workplace is an important aspect for a sustainable workplace, where the potential exists to cause injury or illness. Incidents can have a dramatic impact on people's lives and significant impact for an organisation through loss of skilled staff and lost production.

A safe and healthy workplace requires thoughtful planning to eliminate hazards and risks during design stage.

This section only includes some of the common measures that should be used to control OHS hazards and risks. There are many resources that can provide further information and design guidelines in OHS, such as the Occupational Safety & Health Council [1], the United States Department of Labour, Occupational Safety & Health Administration [2], Australia WorkSafe Victoria [3], etc.

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1 Occupational Safety & Health Council  
<http://www.oshc.org.hk/>

2 The United States Department of Labour. Occupational Safety & Health Administration. Ergonomics  
<http://www.osha.gov/SLTC/ergonomics/>

3 Australia WorkSafe Victoria  
<http://www.worksafe.vic.gov.au/>

## 4 MATERIALS ASPECTS

### MA P1 USE OF NON-CFC BASED REFRIGERANTS

<b>EXCLUSION</b>	None.
<b>OBJECTIVE</b>	Prevent the release of chlorofluorocarbon (CFC) into the atmosphere.
<b>REQUIREMENT</b>	No CFC-based refrigerants in HVAC&R systems installed by the Applicant.
<b>ASSESSMENT</b>	<p><u>Criteria</u></p> <p>The Applicant shall not specify or use CFC-based refrigerants in HVAC&amp;R systems.</p> <p><u>Documentation</u></p> <p>The pre-requisite shall be fulfilled when the Applicant provides the following documentation to demonstrate the compliance:</p> <ul style="list-style-type: none"><li>i. summary table with equipment, type, model number, refrigerant type</li><li>ii. HVAC&amp;R equipment schedules;</li><li>iii. catalogues/data sheets;</li><li>iv. record photographs with equipment, nameplates;</li></ul> <p>Where the HVAC&amp;R systems were not installed by the Applicant, or under the Applicants control, the following documents are required in the submission.</p> <ul style="list-style-type: none"><li>i. Lease/Contractual document to indicate that no supplementary HVAC&amp;R systems were installed by the Applicant.</li></ul>
<b>BACKGROUND</b>	In Hong Kong, Ozone Layer Protection Ordinance (Cap. 403) 1989 gives effect to Hong Kong's international obligations to control the manufacture, import and export of ozone depleting substances [1]. Ozone Layer Protection (Controlled Refrigerants) Regulation 1994 requires the conservation of controlled refrigerants used in large scale installations and motor vehicles [2]. Ozone Layer Protection (Products Containing Scheduled Substances) (Import Banning) Regulation 1993 prohibits the import of portable fire extinguishers containing halons and other controlled products from a country or place not a party to the Montreal Protocol unless the Authority considers that it complies with the requirements of the Protocol.  More information on ozone layer protection can be found in EPD website [3].

1 Environmental Protection Department. A Concise Guide to the Ozone Layer Protection Ordinance.  
[http://www.epd.gov.hk/epd/english/laws\\_regulations/comp\\_guides/files/cgto\\_olpo\\_eng.pdf](http://www.epd.gov.hk/epd/english/laws_regulations/comp_guides/files/cgto_olpo_eng.pdf)

2 Environmental Protection Department. A Concise Guide to the Ozone Layer Protection (Controlled Refrigerants) Regulation.  
[http://www.epd.gov.hk/epd/english/laws\\_regulations/comp\\_guides/files/cqto\\_olp\\_cr\\_eng.pdf](http://www.epd.gov.hk/epd/english/laws_regulations/comp_guides/files/cqto_olp_cr_eng.pdf)

3 Environmental Protection Department. Ozone Layer Protection.  
[http://www.epd.gov.hk/epd/english/environmenthk/air/ozone\\_layer\\_protection/wn6\\_info.html](http://www.epd.gov.hk/epd/english/environmenthk/air/ozone_layer_protection/wn6_info.html)

**MA P2 MINIMUM WASTE RECYCLING FACILITIES**

<b>EXCLUSION</b>	None.
<b>OBJECTIVE</b>	Reduce pressure on landfill sites and help to preserve non-renewable resources by promoting the recycling of waste materials.
<b>REQUIREMENT</b>	Provide storage facilities at prominent location for the collection of paper, plastic and metal waste.
<b>ASSESSMENT</b>	<p><u>Criteria</u></p> <p>The Applicant shall provide at least one (1) storage facility with the capacity for paper, plastic and metal materials. The facility shall be placed in prominent location (i.e. cannot be located in a car park or other non-occupied areas), but not necessary within the project space. The storage facility size, and collection frequency are not regulated.</p> <p>A waste collection firm employed by either Applicant or property management company shall collect all materials. Where the host building provides such a facility at prominent location, the Applicant is not required to duplicate it, if the <u>host building</u> management provides the required information for Assessment.</p>
<b>BACKGROUND</b>	<p><u>Documentation</u></p> <p>The pre-requisite shall be fulfilled when the Applicant provides the following documentation to demonstrate the compliance:</p> <ul style="list-style-type: none"><li>i. responsible person</li><li>ii. drawings, floor plan, sections, elevations</li><li>iii. drawings, location plan in host building</li><li>iv. record photographs for facility and procedures;</li><li>v. recycling company information including:<ul style="list-style-type: none"><li>a.) company name, address, and contact information;</li><li>b.) target material list;</li><li>c.) collection frequency;</li><li>d.) Collection Agreement signed by the Recycling firm and Applicant. Where the Applicant adopts the host building facility, the host building Collection Agreement (or an equivalent letter by the Property Managers organisation);</li></ul></li></ul> <p>Encouraging wider recycling will reduce waste dumped into landfill sites, therefore well managed facilities, and host buildings must provide good solid waste collection, handling and storage facilities. Locating the facility in prominent location, with good directional signage, invites and encourages occupants to separate waste, support recycling and contribute to Hong Kong's environmental movement.</p>

### **MA P3 TIMBER USED FOR TEMPORARY WORKS**

<b>EXCLUSION</b>	None.
<b>OBJECTIVE</b>	Encourage the use of well-managed timber.
<b>REQUIREMENT</b>	All timber used for all <u>temporary works</u> shall originate from sustainable forestry or existing material was re-used.
<b>ASSESSMENT</b>	<p><u>Criteria</u></p> <p>The Applicant shall provide documentation and photographic evidence demonstrating that all timber used for ALL <u>temporary works</u> originated from either a sustainable forestry source, or was re-used material from another construction site.</p> <p>Refer to the appendix for the '<a href="#">Temporary Works</a>' definition used in this Manual.</p> <p>Also, when a combination totalling 100%, consisting of sustainable timber, and recycled material was used, the pre-requisite is fulfilled.</p> <p><u>Documentation</u></p> <p>The pre-requisite shall be fulfilled when the Applicant provides the following documentation to demonstrate compliance:</p> <ul style="list-style-type: none"><li>i. summary table including type, certificate, manufacturer, country of origin, quantity, etc.</li><li>ii. drawings, floor plan, sections, elevations, as required;</li><li>iii. certificate indicating sustainable forest management, manufacturer, date, vendor, etc.</li><li>iv. purchase orders/delivery notes from vendors and manufacturers for both sustainable, normal timber, and composite timber products are required;</li></ul> <p>Acceptable forestry certification systems include:</p> <ul style="list-style-type: none"><li>i. Forest Stewardship Council (FSC);</li><li>ii. Programme for the Endorsement of Forest Certifications Scheme (PEFC);</li><li>iii. Canadian Standards Association (CSA);</li><li>iv. Cerflor (Brazil);</li><li>v. Malaysian Timber Certification Council (MTCC).</li></ul>
<b>BACKGROUND</b>	<p>Timber is the most ecologically benign of construction materials. However, there are hardwoods which are being extracted from virgin forests in an unsustainable manner, destroying valuable forests and ecosystems. Similarly, some softwoods such as redwood and cedar are being depleted. Where forests are being harvested in an unsustainable manner, the result is the extinction of indigenous species and the clearance of vegetation that would otherwise help regulating the amount of CO<sub>2</sub> in the atmosphere. Improved forestry practices can be encouraged by seeking timber from sources where the forests are well-managed.</p> <p>Hong Kong uses only imported timber and is one of the largest importers of tropical hardwoods. The construction sector in Hong Kong is a major consumer of hardwoods from tropical rainforests, with a large proportion used wastefully, and ending up at landfill sites. Timber should originate only from well-managed and documented sources, and be reused whenever possible.</p>

## **MA 1 WASTE RECYCLING FACILITIES**

<b>EXCLUSION</b>	None.
<b>OBJECTIVE</b>	Reduce pressure on landfill sites and help to preserve non-renewable resources by promoting the recycling of waste materials.
<b>CREDIT ATTAINABLE</b>	2
<b>CREDIT REQUIREMENT</b>	1 credit for storage for anyone of the following items: 2 credits for storage for any two of the following items: i. Recycling of glass; ii. Recycling of used small electrical appliance; iii. Recycling of food waste;
<b>ASSESSMENT</b>	<p><u>Criteria</u></p> <p>The Applicant provided at least one (1) storage facility for recycling glass, small electrical appliances, or food waste.</p> <p>The location (not necessary within the project space) size, and collection frequency are not regulated.</p> <p>The collection/recycler organisation shall be employed by either Applicant or property management company to collect the materials.</p> <p>Where the Applicant adopts to use a prescribed facility within the <a href="#">host building</a> (it shall be the same building, not a different tower in the same development) the Property Manager company shall furnish the facilities information for assessment purpose.</p> <p>In this Manual, small electrical appliance(s) shall mean computers, monitors, rechargeable batteries, printers or lamps.</p> <p><u>Documentation</u></p> <p>Credit(s) shall be achieved when the Applicant provides the documentation stated below, to demonstrate compliance:</p> <ul style="list-style-type: none"><li>i. list responsible person;</li><li>ii. drawing, floor plan, sections, elevations;</li><li>iii. record photographs for recycling facilities;</li><li>iv. recycler/collection organisation information, including:<ul style="list-style-type: none"><li>a.) company name, address, contact number;</li><li>b.) list of target material;</li><li>c.) collection frequency;</li><li>d.) Collection Agreement, signed by Applicant or Property manager;</li></ul></li></ul>
<b>BACKGROUND</b>	<p><u>Glass</u></p> <p>Close to 100,000 tonnes of glass are disposed into our landfills every year. Glass makes up a large component of waste due to its weight and density. Whilst considered inert that will not release harmful compounds into the environment on disposal glass does not decompose.</p> <p>Continued disposal into landfill will exhaust our dwindling landfill space. Glass can be readily recycled, it can be crushed (known as cullet) a key component for manufacturing new glass products, saving energy, and material resources.</p>

The Government has been encouraging the community to participate in source separation of waste to minimise waste disposal and promote resources recovery. To promote local glass recycling, the Environmental Protection Department (EPD) has liaised with the sectors concerned (e.g. hotels, catering and property management sectors, etc.) and non-profit making organisations and provided support to them in implementing various voluntary glass bottle recycling programmes in specific trade and at local districts.

#### **Small Electrical Appliance**

Each year, Hong Kong households and corporations dispose of more than 70,000 tonnes of computers, electrical and electronic equipment.

Some of these items are still in good working condition and could be put to second-hand use. All of them contain components and materials that could be recovered for reuse and recycling, such as metals and plastics.

To reduce the quantity of waste computers and waste electrical and electronic equipment disposed of at landfills, the Environmental Protection Department launched a Territory-Wide Trial Recovery Programme in January 2003. The programme has been well received by the public and more than 40,000 waste computers and electrical and electronic units are being recovered and processed each year.

#### **Food Waste**

There is approximately 3,584 tonnes food waste produced in Hong Kong every day. One third originates from commercial and industry (C&I) sector, and the remaining comes from households, representing 12% and 28% respectively of the municipal solid waste generated in Hong Kong. In recent years, the amount of disposal food waste from C&I sectors has been increasing, from 400 tonnes in 2002 to 1,056 tonnes in 2011.

The disposal of food waste, an organic waste which decomposes easily, to landfills is not sustainable as it leads to rapid depletion of the limited landfill space and formation of greenhouse gases such as methane imposing severe burden on our environment.

The EPD plans to develop the Organic Waste Treatment Facilities (OWTF) in phase. The OWTF will adopt biological technologies composting and anaerobic digestion to stabilise the organic waste and turn it into compost and biogas for recovery. The first phase of the OWTF will be constructed at Siu Ho Wan with a daily treatment capacity of 200 tonnes of source separated organic waste.

## **MA 2 INTERIOR COMPONENTS REUSE**

<b>EXCLUSION</b>	None.						
<b>OBJECTIVE</b>	Extend the life cycle of the existing wall, doors, and glazing in the premises to conserve resources, reduce waste, and lower the environmental impact.						
<b>CREDIT ATTAINABLE</b>	3						
<b>CREDIT REQUIREMENT</b>	<p>1 credit for reusing at least 30% of prior condition walls, glazing, doors, ceilings, and flooring.</p> <p>2 credits for reusing at least 50% of prior condition walls, glazing, doors, ceilings, and flooring.</p> <p>3 credits for reusing at least 70% of prior condition walls, glazing, doors, ceilings, and flooring.</p>						
<b>ASSESSMENT</b>	<p><b>Criteria</b></p> <p>The Applicant shall schedule and quantify the existing and reused elements, based on the total surface area.</p> <p>To determine the total reused portion, divide the total area of reused elements by the total area of elements at prior condition.</p> <p><b>Important Note:</b> in this Manual, the terms '<a href="#">partition</a>' and '<a href="#">wall</a>' have individual meaning and are defined separately.</p> <p>(The boundary wall of the premises including the building envelope of the host building, and the shared/party wall with the host building common area and the shared/party wall with adjacent units are not included).</p> <p><b>Documentation</b></p> <p>Credit(s) shall be achieved when the Applicant provides the documentation stated below, to demonstrate compliance:</p> <ul style="list-style-type: none"> <li>i. summary table, with each construction element, description, total area, reused area, reused percentage calculation, descriptions of the methodologies and steps adopted to retain the reused items;</li> <li>ii. drawings, floor /ceiling plans, elevations, sections, details, quantifying the total and reused areas;</li> <li>iii. record photographs including pre-construction and post-construction to demonstrate the elements that were retained;</li> </ul>						
<b>CHECK-LIST AND EQUATION</b>	<p>The following items* shall be included under this assessment:</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">a.) Walls</td> <td style="width: 50%;">d.) Doors</td> </tr> <tr> <td>b.) Glazing</td> <td>e.) Flooring</td> </tr> <tr> <td>c.) Ceilings</td> <td>f.) Existing wall coverings</td> </tr> </table> <p>* Only single side area shall be counted.</p> <p>The building envelope, structural elements, building envelope fenestration, shared/party walls, <a href="#">partitions</a>, furniture, mechanical and electrical installations and any other elements which are not listed above are excluded under this assessment.</p>	a.) Walls	d.) Doors	b.) Glazing	e.) Flooring	c.) Ceilings	f.) Existing wall coverings
a.) Walls	d.) Doors						
b.) Glazing	e.) Flooring						
c.) Ceilings	f.) Existing wall coverings						

Total quantity of reused interior elements can be determined by the

$$\frac{\text{Interior Elements Reuse (\%)} \quad = \quad \sum \text{Reused Elements (m}^2\text{)}}{\sum \text{Elements in Prior Condition (m}^2\text{)}} \times 100\%$$

following equation (1).

#### **BACKGROUND**

Some lease agreements require that the occupier, at the end of the lease return the premise in [bare shell condition](#) requiring the demolition, and disposal of serviceable construction materials to landfill. Extending the life of the existing fit-out components provides several benefits for our environment. It reduces the impact on the environment through lower demand for virgin materials, processing and transportation impacts, and waste otherwise destined for landfill is averted.

### **MA 3 FURNITURE AND PARTITIONS**

<b>EXCLUSION</b>	None.						
<b>OBJECTIVE</b>	Extend the life cycle of existing furniture and <u>partitions</u> to conserve resources, reduce waste and lower environmental impact.						
<b>CREDIT ATTAINABLE</b>	3						
<b>CREDIT REQUIREMENT</b>	<p>1 credit for at least 30% of the total furniture and partitions were reused from salvaged furniture and partitions.</p> <p>2 credits for at least 50% of the total furniture and partitions were reused from salvaged furniture and partitions.</p> <p>3 credits for at least 70% of the total furniture and partitions were reused from salvaged furniture and partitions.</p>						
<b>ASSESSMENT</b>	<p><u>Criteria</u></p> <p>The Applicant shall quantify reused / salvaged furniture and partitions, by Mass. Note: In this Manual, 'partitions' and 'walls' are defined separately</p> <p>To determine the total reused percentage, divide the total mass of the reused / salvaged furniture and/or partitions by the total mass of the furniture and partitions used in the project space (both reused and newly installed).</p> <p>Desks and chairs are also included in the assessment and qualified as 100% recyclable when 1) they are purchased from second-hand shop, and/or 2) reused from either prior condition, or other existing premises.</p> <p><u>Documentation</u></p> <p>Credit(s) shall be achieved when the Applicant provides the documentation stated below, to demonstrate compliance:</p> <ul style="list-style-type: none"> <li>i. summary table to show the prior condition's elements (items, mass), reused elements (items, mass) and calculation of reused percentage;</li> <li>ii. drawings, indicating location and quantity;</li> <li>iii. record photographs, post-construction of prescribe items;</li> <li>iv. Desks and chairs only: <ul style="list-style-type: none"> <li>i. Purchase orders, delivery notes, chain of custody and sourced from second-hand market and/or reuse.</li> <li>ii. Record photographs;</li> </ul> </li> </ul> <p><b>CHECK-LIST AND EQUATION</b></p> <p>The following items shall be included under this assessment:</p> <table border="0"> <tr> <td>a.) Fixed Furniture</td> <td>d.) <u>Partitions</u></td> </tr> <tr> <td>b.) Cabinets</td> <td>e.) Desks</td> </tr> <tr> <td>c.) Chairs</td> <td></td> </tr> </table> <p>Structural elements, fenestration, mechanical and electrical installations and any other elements which are not listed above are excluded from this assessment.</p> <p><u>In this manual, wall and partition have separate meaning, for the definition of 'partitions' refer to the appendix.</u></p>	a.) Fixed Furniture	d.) <u>Partitions</u>	b.) Cabinets	e.) Desks	c.) Chairs	
a.) Fixed Furniture	d.) <u>Partitions</u>						
b.) Cabinets	e.) Desks						
c.) Chairs							

Total quantity of reused furniture and partitions can be determined by following equation (1).

$$\text{Reuse Furniture and Partitions (\%)} = \frac{\sum \text{Reused Furniture and Partitions (kg)}}{\sum \text{All Furniture and Partitions used in Project Space (kg)}} \times 100\%$$

#### **BACKGROUND**

There is a great potential to lower project costs and significantly reduce the total environmental impacts by re-using furniture and partitions. By doing so, the environmental impacts associated with the extraction, processing and transportation of virgin materials can be reduced. Furthermore, material otherwise destined for landfill is used productivity.

#### **MA 4 MODULAR DESIGN MATERIALS**

<b>EXCLUSION</b>	None.						
<b>OBJECTIVE</b>	Encourage to increase the use of modular design elements for project in order to enhance buildability and reduce waste.						
<b>CREDIT ATTAINABLE</b>	1						
<b>CREDIT REQUIREMENT</b>	1 credit for designing modular elements which contributed at least 50% of the newly installed elements in the project.						
<b>ASSESSMENT</b>	<p><b>Criteria</b></p> <p>The Applicant shall quantify the modular elements based on total surface area. Only the newly installed elements are included in this assessment. Each item (see below checklist and equation section) shall be designed with modular elements and it shall be assessed individually.</p> <p>Elements shall be manufactured with standardise dimensions which can be arranged or fitted together in various scenarios of design.</p>						
	<p><b>Documentation</b></p> <p>Credit shall be achieved when the Applicant provides the documentation stated below, to demonstrate compliance:</p> <ul style="list-style-type: none"> <li>i. summary table with product types, materials, manufacturer, quantities, percentage of modular component, reference sources;</li> <li>ii. drawings, floor plans, ceiling plans, sections, details, elevations, fixing details, etc.;</li> <li>iii. product catalogues, data technical sheets;</li> <li>iv. record photographs, modular components adopted.</li> </ul>						
<b>CHECK-LIST AND EQUATION</b>	<p>The following items shall be included for assessment:</p> <table border="0"> <tr> <td>a.) <a href="#">Partitions</a></td> <td>d.) Doors</td> </tr> <tr> <td>b.) <a href="#">Walls</a></td> <td>e.) Raised floor</td> </tr> <tr> <td>c.) Ceilings</td> <td></td> </tr> </table> <p>Structural elements, fenestration, furniture, mechanical and electrical installations and any other elements not listed above are excluded from the assessment.</p> <p>Total quantity of modular design (%) for each item as shown above can be determined by below equation (1).</p> $\text{Modular Design}^* \quad = \quad \frac{\sum \text{Modular Elements } (m^2)}{\sum \text{Newly Installed Items } (m^2)} \times 100\%$ <p>* Only single side area shall be counted.</p> <p><a href="#">'Partitions' used in this manual are defined in the Appendix</a></p>	a.) <a href="#">Partitions</a>	d.) Doors	b.) <a href="#">Walls</a>	e.) Raised floor	c.) Ceilings	
a.) <a href="#">Partitions</a>	d.) Doors						
b.) <a href="#">Walls</a>	e.) Raised floor						
c.) Ceilings							
<b>BACKGROUND</b>	<p>Planning, to embrace modular design and standardisation of detailing goes hand in hand with optimising the built quality, use of materials, and therefore benefits the environment. Repeated construction elements could simplifies the design, procurement, fit-out works, supervision, and site operations.</p> <p>Building elements produced in standard ranges of sizes can also be</p>						

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INSTITUTIONAL**

interchanged, therefore materials should be considered and dimensioned carefully to use standard-sized modules to the greatest extent to minimise construction off-cutting waste, and waste diverted to landfill.

### **MA 5 DESIGNED FOR DISASSEMBLY**

<b>EXCLUSION</b>	None.						
<b>OBJECTIVE</b>	Encourage forward looking planning, design, and installation to permit easy dismantling, separation and collection of the construction elements						
<b>CREDIT ATTAINABLE</b>	1						
<b>CREDIT REQUIREMENT</b>	1 credit for installed construction elements and fixings that are easy to dismantle, and disassemble at the end of serviceable life, and contributed at least 50% by area of the newly installed elements.						
<b>ASSESSMENT</b>	<p><b>Criteria</b></p> <p>The Applicant shall quantify each element based on total surface area of only newly installed elements for compliance.</p> <p>Each item in the checklist below, including all supports and fixings, shall be easily dismantled, disassembled and removed from the premises without any specialist tools for future reuse, recycling or reprocessing.</p> <p><b>Documentation</b></p> <p>Credit shall be achieved when the Applicant provides the documentation stated below, to demonstrate compliance:</p> <ul style="list-style-type: none"> <li>i. summary table, with each type, manufacturer, material, dimensions, fixings, quantities, percentage of disassembly design, reference sources;</li> <li>ii. drawings, with layouts, sections, elevations, detail sheets including fixings;</li> <li>iii. product catalogues, technical data sheets;</li> <li>iv. record photographs;</li> </ul> <p><b>CHECK-LIST AND EQUATION</b></p> <p>The following items shall be included for assessment:</p> <table border="0"> <tr> <td>a.) Walls;</td> <td>c.) Doors;</td> </tr> <tr> <td>b.) Ceilings;</td> <td>d.) Raised floor;</td> </tr> <tr> <td></td> <td>e.) Supports and fixings;</td> </tr> </table> <p>Structural elements, building envelope fenestration, furniture, partitions, mechanical and electrical installations and any other elements not listed above shall be excluded from assessment.</p> <p>The percentage of area for each item as shown above can be determined by below equation (1).</p> $\text{Disassembly Design (\%)} = \frac{\sum \text{Disassembly Designed Elements (m}^2\text{)}}{\sum \text{Newly Installed Items* (m}^2\text{)}} \times 100\%$ <p>* Only single side area shall be counted.</p>	a.) Walls;	c.) Doors;	b.) Ceilings;	d.) Raised floor;		e.) Supports and fixings;
a.) Walls;	c.) Doors;						
b.) Ceilings;	d.) Raised floor;						
	e.) Supports and fixings;						
<b>BACKGROUND</b>	There is a great potential to lower project costs and significantly reduce the total environmental impacts by re-using the ceiling, partitions, walls, doors and/or raised flooring systems. By doing so, the environmental impacts associated with the extraction, processing and transportation of virgin material is reduced. Furthermore, planning and designing for disassembly in the future can also minimise the noise and vibration during future renovation projects.						

## **MA 6 SUSTAINABLE FLOORING PRODUCTS**

<b>EXCLUSION</b>	None.
<b>OBJECTIVE</b>	Promote the use of environmentally friendly materials, manufacturing processing, and minimise impacts arising from material transportation.
<b>CREDIT ATTAINABLE</b>	4
<b>CREDIT REQUIREMENT</b>	<p><b>a) Rapidly Renewable Materials / Recycled Materials / Sustainable Timber</b></p> <p>1 credit for flooring comprising rapidly renewable material, recycled material, sustainable timber flooring, or a combination of those prescribed materials that contributed at least 50% of all newly installed flooring.</p> <p>2 credits for demonstrating 100% achievement;</p> <p><b>b) Regionally Manufactured Materials</b></p> <p>1 credit for flooring materials manufactured locally within 800km radius from the project space, and contributed to at least 50% of the newly installed flooring material.</p> <p><b>c) Environmentally Manufactured Materials</b></p> <p>1 credit for flooring material (or composite material) manufactured by organisations which ALL have implemented an Environmental Management System (EMS) and contributed to at least 50% of the newly installed flooring materials.</p>
<b>ASSESSMENT</b>	<p><u>Criteria</u></p> <p><b>a) Rapidly Renewable Materials / Recycled Materials / Sustainable Timber</b></p> <p>The Applicant shall quantify the flooring products, rapidly renewable material, recycled materials, sustainable timber, or a combination of those prescribed materials, based on the floor total surface area.</p> <p>Composite products comprising rapidly renewable material, recycled material, or sustainable timber, that exceeds 50% by Mass shall qualify.</p> <p>Use equation 1 to determine compliance.</p> <p><b>b) Regionally Manufactured Materials</b></p> <p>The Applicant shall quantify the flooring products which are manufactured within 800km radius, based on the total surface area of floor. For salvaged material, the location of material source shall be treated as the point of manufacture.</p> <p>For composite products, only the portion, by Mass, manufactured or sourced within 800 km radius shall qualify as regionally manufactured material.</p> <p>Use the equation 2 to determine compliance.</p> <p><b>c) Environmentally Manufactured Materials</b></p> <p>The Applicant shall quantify all flooring products based on the total surface area of floor, sourced ALL organisation(s) with manufacturing facilities or factories having already implemented an Environmental Management System (EMS).</p>

The EMS shall fully cover the following:

- |                                |                                |
|--------------------------------|--------------------------------|
| a.) Environmental policy       | e.) Objective & Target         |
| b.) Impact identification      | f.) Environmental training     |
| c.) System of EMS review       | g.) Assigned responsible       |
| d.) Environmental audit system | staff for environmental aspect |

Flooring materials, and composite materials produced, manufactured, assembled, or processed in several different manufacturing facilities shall ALL be included under this assessment.

Use the equation 3 to determine compliance.

#### **For All Sections**

Only the new construction works are assessed.

#### ***Alternatively:***

3 credits shall be achieved where the Applicant obviates the need for materials through design, such that no new materials are installed.

#### Documentation

Credit(s) shall be achieved when the Applicant provides the documentation stated below, to demonstrate compliance:

##### **a) Rapidly Renewable Materials / Recycled Materials / Sustainable Timber**

- i. summary table, with product details, manufacturer, quantities, percentage of rapidly renewable / recycled / sustainable timber content, supports, under floor, fixings, reference sources;
- ii. drawings, floor layout plans, details including underfloor, supports, framing materials,
- iii. product catalogues or technical data sheets;
- iv. record photographs for existing, newly installed flooring products;

##### **b) Regionally Manufactured Materials**

- i. summary table showing the types, manufacturer, manufacture locations, quantities, percentage of regionally manufactured products, supports, under floor, fixings, reference sources;
- ii. purchase orders, delivery notes with manufacturer's location, quantity, etc.

##### **c) Environmentally Manufactured Materials**

- i. summary table, types, manufacturer, quantities;
- ii. EMS Manual, or EMS certificate(s)

#### **CHECKLIST**

#### **Check-List**

The following items shall be included under this assessment :

- |              |               |
|--------------|---------------|
| a.) Flooring | d.) Trimming  |
| b.) Supports | e.) Bracing   |
| c.) Framing  | f.) Skirting  |
|              | g.) Levelling |

Structural elements, building envelope, fenestration, furniture, partitions, walls, mechanical and electrical installations and any other elements which are not listed above are excluded from this assessment.

**EQUATION**

**Equation 1 – Determining the total quantity of renewable materials / recycled materials / sustainable timber.**

$$\text{Qualified Content (\%)*} = \frac{\sum (\text{Rapidly Renewable Materials + Recycled Materials + Sustainable Timber}) (m^2)}{\sum \text{Newly Installed Flooring Materials} (m^2)} \times 100\%$$

**Equation 2 – Determining the total quantity of regionally manufactured materials.**

$$\text{Total Regionally Manufactured Materials (\%)*} = \frac{\sum \text{Regionally Manufactured Materials} (m^2)}{\sum \text{Newly Installed Flooring Materials} (m^2)} \times 100\%$$

**Equation 3 – Determining the total quantity of environmentally manufactured materials.**

$$\text{Total Environmentally Manufactured Materials (\%)*} = \frac{\sum \text{Environmentally Manufactured Materials} (m^2)}{\sum \text{Newly Installed Flooring Materials} (m^2)} \times 100\%$$

\* Only single side area shall be counted.

**BACKGROUND**

**Rapidly Renewable Materials**

Most building materials necessitate the consumption of large amounts of natural resources. Rapidly renewable materials [1] are represent a materials alternative to mainstream buildings materials that are composed from either finite raw materials or long-cycle renewable materials (i.e., natural resources which are planted and harvested in less than a 10-year cycle are defined as rapidly renewable materials) and do not result in significant biodiversity loss, increased erosion, or air quality impacts. Rapidly renewable materials include, but are not limited to, bamboo, linoleum, cork, fast-growing poplar, pine and products such as wheat straw cabinetry. Materials such a bamboo, wool, natural linoleum, etc. require fewer inputs, have reduced environmental impacts, and can provide economic benefits.

Designers should establish objectives for the use of rapidly renewable materials and identify where such materials can be applied as substitutes for more commonly used resource intensive materials. The use of materials such as bamboo flooring, strawboard, cotton insulation, natural linoleum flooring, etc. should be considered as a minimum. Installation method shall be carefully considered, and detailed in the submission.

**Recycled Materials**

Waste materials and industrial by-products can be used in building construction in an unprocessed form. This reduces the extraction of virgin materials. The basic properties required for technical acceptance are that they can perform their intended functions throughout the design life without being deleterious on the environment.

**Sustainable Timber**

Timber is the most ecologically benign of construction materials. However, there are hardwoods which are being extracted from virgin forests in an unsustainable manner, destroying valuable forests and ecosystems. Similarly, some softwoods, such as redwood and cedar are being depleted. Where forests are being harvested in an

1 Preshani Maistry. Rapidly Renewable Materials.  
[http://greenalberta.ca/downloads/Rapidly\\_Renewable\\_Materials.pdf](http://greenalberta.ca/downloads/Rapidly_Renewable_Materials.pdf)

unsustainable manner, the result is the extinction of indigenous species and the clearance of vegetation that would otherwise help regulate the amount of CO<sub>2</sub> in the atmosphere. Improved forestry practices can be encouraged by seeking timber from sources where the forests are well managed.

Hong Kong uses only imported timber, and is one of the largest importers of tropical hardwoods. The construction sector in Hong Kong is a major consumer of hardwoods from tropical rainforests, with a large proportion used wastefully, and ending up at landfill sites. Timber should originate only from well-managed sources and should be reused whenever possible. Guidelines, templates and implementation measures to help organisations develop purchasing policies and practices that help conserve forest resources are available [2]. PNAP No. ADV-5 [3] gives guidance for alternatives to the use of hardwoods in order to reduce the amount of tropical hardwood timber used in projects.

Sustainable timber is defined as a wood-based material originally sourced from forestlands participating in an acceptable system or program which certifies sustainable forest management. Acceptable systems or programs must include adherence to management practices which conserve biological diversity and maintain productive capacity of forest ecosystems, and be independently audited and monitored.

Forest Stewardship Council (FSC) [4] and Programme for the Endorsement of Forest Certification (PEFC) [5] are independent, non-profit organisation established to promote the responsible management of the world's forest.

### **Regionally Manufactured Materials**

By using regional materials, environmental impacts and material costs are reduced, and the local economy is supported. Pollution associated with transportation, including air and noise, has become a serious obstruction to the quality of life, and even the health of citizen. Further, energy consumption by transportation, as well as the demand of petroleum, has dramatically increased. The use of regional materials reduces the transportation activities and the accompanying pollution associated. It can relieve air pollution generated by trucks, trains and other vehicle deplete non-renewable fossil fuels in the long transportation. By purchasing the regional materials, transportation problems are further reduced.

Due to the reduced transportation costs, the regional materials are more cost effective. Also, the support of local manufacturing and labour forces contributes to a healthier local economy.

### **Environmentally Manufactured Materials**

For an organisation to be successful in addressing environmental issues, it must set clear objectives at the highest level with an appropriate programme for their management, checking and review.

- 
- 2 World Wildlife Fund.  
[http://assets.wwf.org.uk/downloads/responsible\\_purchasing.pdf](http://assets.wwf.org.uk/downloads/responsible_purchasing.pdf)
- 3 Buildings Department, Practice Note for Authorized Persons and Registered Structural Engineers PNAP No. ADV-5, Tropical Hardwood Timber.  
<http://www.bd.gov.hk/english/documents/pnap/ADV/ADV005.pdf>
- 4 Forest Stewardship Council.  
<http://www.fsc.org/>
- 5 Programme for the Endorsement of Forest Certification.  
<http://www.pefc.org/>

An environmental policy, endorsed by directorate level management, is a key element of such a programme. ISO 14004 [6] sets out guidelines for establishing an environmental management system (EMS) and specifies the key features of an effective environmental policy as:

- i. Being appropriate to the nature, scale and environmental impacts of the organisation's activities, products and services;
- ii. A commitment to comply with relevant environmental legislation;
- iii. A commitment to continual improvement and pollution prevention;
- iv. Providing a framework for setting and reviewing environmental objectives and targets;
- v. Being documented and communicated to all employees, suppliers, and customers.

**MA 7 SUSTAINABLE CEILING PRODUCTS**

<b>EXCLUSION</b>	None.
<b>OBJECTIVE</b>	Promote the use of environmentally friendly materials, manufacturing processes, and reduced impacts arising from transportation.
<b>CREDIT ATTAINABLE</b>	4
<b>CREDIT REQUIREMENT</b>	<p><b>a) Rapidly Renewable Materials / Recycled Materials / Sustainable Timber</b></p> <p>1 credit for ceiling materials either rapidly renewable materials, recycled materials and sustainable timber (or a combination) which contribute at least 50% of all newly installed ceiling.</p> <p>2 credits for demonstrating 100% achievement;</p> <p><b>b) Regionally Manufactured Materials</b></p> <p>1 credit for ceiling materials manufactured locally within 800 km radius from the project space, which contributed to at least 50% of the newly installed ceiling materials.</p> <p><b>c) Environmentally Manufactured Materials</b></p> <p>1 credit for ceiling materials from ALL organisations with manufacturing facilities which implemented an Environmental Management System (EMS) and contributed at least 50% of the newly installed ceiling materials.</p>
<b>ASSESSMENT</b>	<p><u>Criteria</u></p> <p><b>a) Rapidly Renewable Materials / Recycled Materials / Sustainable Timber</b></p> <p>The Applicant shall quantify the ceiling products with the content of either (or a combination) rapidly renewable materials, recycled materials and sustainable timber based on the total surface area.</p> <p>Composite products with rapidly renewable material, recycled material, sustainable timber, or combination that exceed 50% by Mass shall qualify under this assessment.</p> <p>Use the equation 1 to determine compliance.</p> <p><b>b) Regionally Manufactured Materials</b></p> <p>The Applicant shall quantify the ceiling products which are regionally manufactured within 800km radius, based on the total surface area of ceilings. For salvaged material, the location of the factory from where they were salvaged shall be classified as the point of manufacture.</p> <p>For composite products, only the portion by mass, manufactured within 800km radius shall qualify as regionally manufactured material.</p> <p>Use the equation 2 to determine compliance.</p> <p><b>c) Environmentally Manufactured Materials</b></p> <p>The Applicant shall quantify the ceiling products manufactured by organisations ALL having implemented an EMS, based on the total surface area.</p>

The EMS shall fully cover the following:

- |                                |                                |
|--------------------------------|--------------------------------|
| a.) Environmental policy       | e.) Objective & Target         |
| b.) Impact identification      | f.) Environmental training     |
| c.) System of EMS review       | g.) Assigned responsible       |
| d.) Environmental audit system | staff for environmental aspect |

For products which are manufactured in different manufacturing facilities or factories, ALL shall be including in this Assessment.

Use the equation 3 to determine compliance.

#### **For All Sections**

Only the new construction work is assessed.

#### ***Alternatively:***

3 credits shall be achieved where the Applicant obviates the material and transportation, through design, such that no new construction materials were installed.

#### Documentation

Credit(s) shall be achieved when the Applicant provides the documentation stated below, to demonstrate criteria compliance:

- a) Rapidly Renewable Materials / Recycled Materials / Sustainable Timber**
  - i. summary table with items, manufacturer, quantities, percentage of rapidly renewable / recycled / sustainable timber content, reference sources;
  - ii. Drawings, ceiling layout plan, section, elevations, details for ceiling;
  - iii. Product catalogues or technical sheets;
  - iv. Record photographs for existing or newly installed ceiling;
- b) Regionally Manufactured Materials**
  - i. A summary table showing the product types, manufacturer, manufacturing locations, quantities, percentage of locally manufactured products and reference sources;
  - ii. Delivery Notes, with manufacturer's location, quantity, etc.
- c) Environmentally Manufactured Materials**
  - i. A summary table to show the product types, manufacturers, quantities;
  - ii. EMS Manual or EMS certificate(s) for ALL organizations;

#### **CHECKLIST**

#### **Check-List**

The following items shall be included under this assessment :

- |                   |                       |
|-------------------|-----------------------|
| a.) Ceiling Tiles | f.) Bracing           |
| b.) Hangers       | g.) Ceiling Support   |
| c.) Trimming      | h.) Secondary Grid    |
| d.) Levelling     | i.) Bulkhead          |
| e.) Framing       | j.) Shadow Gap Infill |
|                   | k.) Access panels     |

Structural elements, fenestration, walls, partitions, doors, furniture, mechanical and electrical installations and any other elements which are not listed above are excluded under this assessment.

**EQUATION**

**Equation 1** – Determining the total quantity of renewable materials / recycled materials / sustainable timber.

$$\text{Qualified Content (\%)*} = \frac{\sum (\text{Rapidly Renewable Materials + Recycled Materials + Sustainable Timber}) (m^2)}{\sum \text{Newly Installed Ceiling Materials (m}^2\text{)}} \times 100\%$$

**Equation 2** – Determining the total quantity of regionally manufactured materials.

$$\text{Total Regionally Manufactured Materials (\%)*} = \frac{\sum \text{Regionally Manufactured Materials (m}^2\text{)}}{\sum \text{Newly Installed Ceiling Materials (m}^2\text{)}} \times 100\%$$

**Equation 3** – Determining the total quantity of environmentally manufactured materials.

$$\text{Total Environmentally Manufactured Materials (\%)*} = \frac{\sum \text{Environmentally Manufactured Materials (m}^2\text{)}}{\sum \text{Newly Installed Ceiling Materials (m}^2\text{)}} \times 100\%$$

\* Only single side area shall be counted.

**BACKGROUND**

See MA 6.

## MA 8 SUSTAINABLE WALL AND DOOR PRODUCTS

- |                                |                                |
|--------------------------------|--------------------------------|
| b.) Impact identification      | f.) Environmental training     |
| c.) System of EMS review       | g.) Assigned responsible       |
| d.) Environmental audit system | staff for environmental aspect |

For products which are manufactured or assembled in different manufacturing facilities or factories, all facilities shall be included in this Assessment.

#### **For All Sections**

Only newly installed walls and door products shall be assessed.

Alternatively, 3 credits shall be achieved where the Applicant obviates the material requirement, through design, such that no new construction materials were installed.

#### Documentation

Credit(s) shall be achieved when the Applicant provides the documentation stated below, to demonstrate criteria compliance:

**a) Rapidly Renewable Materials/ Recycled Materials / Sustainable Timber**

- i. A summary table to show the product items, manufacturers, quantities, percentage of rapidly renewable / recycled / sustainable timber content and reference sources;
- ii. Drawings, layout, sections, and elevations for the walls and doors;
- iii. Product catalogues or technical sheets with description to substantiate the content;
- iv. Record Photographs for existing or newly installed walls and doors;

**b) Regionally Manufactured Materials**

- i. A summary table showing the product types, manufacturers, manufacture locations, quantities, percentage of locally manufactured products and reference sources;
- ii. Delivery Notes, manufacturer's location, quantity, etc.

**c) Environmentally Manufactured Materials**

- i. A summary table to show the product types, manufacturers, quantities;
- ii. EMS Manual or certificate of the manufacturer.

**ORIGINATE FROM  
DIFFERENT LOCATIONS,  
CHECK-LIST AND  
EQUATION**

#### **Check-List**

The following items shall be included under this assessment:

- |  |               |
|--|---------------|
| a.) Wall and its covering                  | d.) Trimming  |
| b.) External/Structural Wall covering only | e.) Levelling |
| c.) Doors                                  | f.) Bracing   |
|  | g.) Framing   |

\* Only single side area shall be counted.

Structural elements, fenestration, furniture, mechanical and electrical installations and any other elements which are not listed above are excluded from this assessment.

**Equation 1 – Determining the total quantity of renewable materials / recycled materials / sustainable timber.**

$$\text{Qualified Content (\%)} = \frac{\sum (\text{Rapidly Renewable Materials} + \text{Recycled Materials} + \text{Sustainable Timber}) (m^2)}{\sum \text{Newly Installed Wall and Door Materials} (m^2)} \times 100\%$$

**Equation 2 – Determining the total quantity of regionally manufactured materials.**

$$\text{Total Regionally Manufactured Materials (\%)} = \frac{\sum \text{Regionally Manufactured Materials} (m^2)}{\sum \text{Newly Installed Wall and Door Materials} (m^2)} \times 100\%$$

**Equation 3 – Determining the total quantity of environmentally manufactured materials.**

$$\text{Total Environmentally Manufactured Materials (\%)} = \frac{\sum \text{Environmentally Manufactured Materials} (m^2)}{\sum \text{Newly Installed Wall and Door Materials} (m^2)} \times 100\%$$

Note: Only the newly installed walls and doors shall be assessed. Existing party walls (shared with adjacent unit), and structural core walls are excluded from this assessment.

#### BACKGROUND

See MA 6.

## **MA 9 ZERO PVC**

<b>EXCLUSION</b>	None.										
<b>OBJECTIVE</b>	Avoid the use of Poly Vinyl Chloride (PVC) products.										
<b>CREDIT ATTAINABLE</b>	1										
<b>CREDIT REQUIREMENT</b>	1 credit for using alternative products and materials with zero PVC content for the project.										
<b>ASSESSMENT</b>	<p><b><u>Criteria</u></b></p> <p>The Applicant shall use alternative products with no PVC content.</p> <p>Note: PVC materials within the project space that are provided by the host building or is not installed by the Applicant shall be excluded from this assessment. For example telephone cable, internet cabling, fibre optic cabling, etc. installed by the telecom utility is excluded from this assessment. However, the conduit for the utility provided by the Applicant shall be assessed.</p> <p>In this context 'Telephone cable' shall mean the cable from the central MDF to Applicants PABX or digital equivalent. Telecom utility shall mean telephone service or internet service provider who provides cabling within the host building from the MDF room to the telecom/internet equipment installed within the Applicants area.</p> <p><b><u>Documentation</u></b></p> <p>Credit shall be achieved when the Applicant provides the documentation stated below, to demonstrate criteria compliance:</p> <ul style="list-style-type: none"><li>i. summary table with product types, quantities, determination of PVC content, reference sources;</li><li>ii. drawings, floor ceiling layout plans, elevations, etc.</li><li>iii. Product catalogues (to show the materials) or technical sheets to confirm that the installed products are non-PVC type material.</li><li>iv. Record photographs;</li></ul>										
<b>CHECK-LIST</b>	<p>The following items shall be included for assessment:</p> <table><tbody><tr><td>a.) Edge Protection Strip</td><td>f.) Phone Cables</td></tr><tr><td>b.) Cable Conduit</td><td>g.) Pipework</td></tr><tr><td>c.) Electrical Cables</td><td>h.) Data Cables</td></tr><tr><td>d.) Furniture</td><td></td></tr><tr><td>e.) chairs;</td><td></td></tr></tbody></table> <p>Items which are not listed in the above checklist are excluded from the assessment.</p>	a.) Edge Protection Strip	f.) Phone Cables	b.) Cable Conduit	g.) Pipework	c.) Electrical Cables	h.) Data Cables	d.) Furniture		e.) chairs;	
a.) Edge Protection Strip	f.) Phone Cables										
b.) Cable Conduit	g.) Pipework										
c.) Electrical Cables	h.) Data Cables										
d.) Furniture											
e.) chairs;											
<b>BACKGROUND</b>	PVC is a persistent bioaccumulative toxic chemical (PBT). These chemical toxins persist in the environment, accumulate in the food chain, and pose risks to human health and ecosystems. Remediation is difficult and often very expensive, preventing it's entering the environment in the first place is the obvious and preferred strategy. To avoid the release of PBT chemicals into the environment, the specification, installation of PBT's in building materials and choose										

materials that are manufactured without added PVC is required.

Greenpeace [1] has provided the evaluation for PVC. The PVC products may usually be found in building furnishings including electrical cable, furniture elements, floor covering, blinds, finishes etc. However the production of PVC may release a toxic chemical, dioxin, to air, water and land. Meanwhile, additional chemicals such as phthalates are added to make it more soft and flexible. When PVC reaches its end of useful life and is disposed at landfill, it again leaks dioxin and heavy metal. The Australia Green Star rating tools [2] has provided the reference of alternative materials for reducing the use of PVC.

- 
- 1 Greenpeace, PVC Free Solution.  
<http://www.greenpeace.org/international/en/campaigns/toxics/polyvinyl-chloride/pvc-free-solutions/?accept=8c09563de2f21958e588a899afb444b0>
  - 2 Green Building Council of Australia, Green Star rating tools for Office Interior v1, Technical Manual, section Mat-10 PVC Minimisation.

## **MA 10 OZONE DEPLETING SUBSTANCES**

<b>EXCLUSION</b>	None.
<b>OBJECTIVE</b>	Prevent the use and release of chlorofluorocarbons and hydrochlorofluorocarbons into the atmosphere.
<b>CREDIT ATTAINABLE</b>	1
<b>CREDIT REQUIREMENT</b>	1 credit for products in the <u>project space</u> without ozone depleting substances (CFC & HCFC) in either the manufacturing process or composition.
<b>ASSESSMENT</b>	<p><u>Criteria</u></p> <p>The Applicant shall not use products that use ozone depleting substances in the manufacturing process, composition of thermal insulation, fire retardant materials used for all <u>partitions</u>, <u>walls</u>, chilled water pipes, refrigerant pipes and ductwork.</p> <p>Note: Ozone depleting substances within the project space that are provided in the host building, and are not installed or replaced by the Applicant, shall be excluded from this assessment.</p>
	<p><u>Documentation</u></p> <p>Credit shall be achieved when the Applicant provides the documentation stated below, to demonstrate compliance:</p> <ol style="list-style-type: none"><li>i. summary table with materials, products, manufacturer, reference sources (e.g. catalogue or manufacturer compliance letter; vendor's letter is not accepted);</li><li>ii. drawings, architectural, floor plans, sections, elevations;</li><li>iii. drawings, engineering, plans, sections, details;</li><li>iv. Product catalogue and/or compliance letter signed by the manufacturer to show the avoidance of using ozone depleting substances in all newly installed materials and products.</li><li>v. Record photographs of alternatives;</li></ol>
<b>BACKGROUND</b>	The US Environmental Protection Agency provides information on suitable substitutes for ozone depleting substances [1], including fire suppression [2], blowing agents [3], solvents, etc. CIBSE GN01 [4] provides design guidance for refrigeration systems, thermal insulation and fire protection systems.

- 
- 1 US Environmental Protection Agency.  
<http://www.epa.gov/docs/ozone/snap/lists/index.html>
- 2 US Environmental Protection Agency.  
<http://www.epa.gov/ozone/snap/fire/index.html>
- 3 US Environmental Protection Agency.  
<http://www.epa.gov/docs/ozone/snap/foams/lists/index.html>
- 4 Chartered Institution of Building Services Engineers. CFC's, HCFC's, HFC's and halons. 2000. ISBN 0900953993.

**MA 11 DEMOLITION AND CONSTRUCTION WASTE REDUCTION**

<b>EXCLUSION</b>	None.								
<b>OBJECTIVE</b>	Encourage best practice for the management of waste, including sorting, recycling and disposal of demolition and construction waste.								
<b>CREDIT ATTAINABLE</b>	2								
<b>CREDIT REQUIREMENT</b>	1 credit for demonstrating that at least 30% of demolition and construction waste was recycled. 2 credits for demonstrating that at least 60% of demolition and construction waste was recycled.								
<b>ASSESSMENT</b>	<p><b>Criteria</b></p> <p>The Applicant shall quantify the overall demolition and construction waste and list the disposal, recycle method, based on Mass.</p> <p>The disposal of inert material to public fill does not fulfil this requirement.</p> <p>Note: Waste from demolition works is excluded from this calculation when the work is not required or not under the Applicant's control.</p>								
	<p><b>Documentation</b></p> <p>Credit(s) shall be achieved when the Applicant provides the documentation stated below, to demonstrate criteria compliance:</p> <ol style="list-style-type: none"><li>i. List responsible person;</li><li>ii. summary table with waste flow, type, disposal method, quantities, reference sources;</li><li>iii. trip tickets, waste records and recycler receipts to substantiate the waste reduction calculation;</li><li>iv. logbook/records waste monitoring with execution of waste, recycling, and sorting on monthly basis;</li><li>v. Record photographs, waste sorting and storage by contractors, and collection by recyclers.</li></ol>								
<b>CHECK-LIST AND EQUATION</b>	<p>The following items shall be included in the assessment:</p> <table><tr><td>a.) Demolished materials (if any)</td><td>d.) Metals</td></tr><tr><td>b.) Plastics</td><td>e.) Timber</td></tr><tr><td>c.) Paper/cardboard</td><td>f.) General refuse</td></tr><tr><td>d.) packaging materials</td><td></td></tr></table> <p>Items which are not listed above are excluded from assessment.</p> <p>Total quantity of recycled waste can be determined by equation (1).</p> $\text{Total C\&D Waste Recycle (\%)} = \frac{\sum \text{Quantity of Recycled C\&D Waste (kg)}}{\sum \text{Quantity of C\&D Waste (kg)}} \times 100\%$	a.) Demolished materials (if any)	d.) Metals	b.) Plastics	e.) Timber	c.) Paper/cardboard	f.) General refuse	d.) packaging materials	
a.) Demolished materials (if any)	d.) Metals								
b.) Plastics	e.) Timber								
c.) Paper/cardboard	f.) General refuse								
d.) packaging materials									
<b>BACKGROUND</b>	Building Department PNAP ADV-19 [1] and ETWB TWC 19/2005 [2] provide guidance for waste management during construction.								

1 <http://www.bd.gov.hk/english/documents/pnap/ADV/ADV019.pdf>

2 <http://www.devb.gov.hk/filemanager/technicalcirculars/en/upload/19/1/C-2005-19-0-1.pdf>

## 5 ENERGY USE

### EU 1 ENERGY PERFORMANCE – PERFORMANCE-BASED APPROACH

<b>EXCLUSION</b>	None.																		
<b>OBJECTIVE</b>	Reduce the consumption of energy, resources and consequentially harmful emissions of carbon dioxide (CO <sub>2</sub> ) to the atmosphere.																		
<b>CREDIT ATTAINABLE</b>	14																		
<b>CREDIT REQUIREMENT</b>	Credit(s) shall be achieved based on the reduction of annual HVAC&R and lighting energy consumption by: <table border="1"><tr><td>Credit(s)</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr><tr><td>HVAC&amp;R</td><td>3%</td><td>5%</td><td>10%</td><td>15%</td><td>20%</td><td>25%</td></tr></table>	Credit(s)	1	2	3	4	5	6	HVAC&R	3%	5%	10%	15%	20%	25%				
Credit(s)	1	2	3	4	5	6													
HVAC&R	3%	5%	10%	15%	20%	25%													
<b>ASSESSMENT</b>	<p>Plus <table border="1"><tr><td>Credit(s)</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td></tr><tr><td>Lighting</td><td>10%</td><td>15%</td><td>20%</td><td>25%</td><td>30%</td><td>35%</td><td>40%</td><td>45%</td></tr></table></p> <p>Applicants must choose either the Performance-Based Approach or Prescriptive-Based Approach, to avoid double counting environmental impacts.</p> <p><b>Criteria</b> The number of credits to be achieved shall be determined by reference to the percentage reduction in the annual energy use of the <u>project space</u> relative to the respective benchmark (zero-credit) criteria evaluated from the Baseline model.</p> <p>The methodology of the energy simulation shall make reference to the latest Building Energy Code (BEC) or Appendix G of ANSI/ASHRAE/IES 90.1-2010 or equivalent. (Note: For interim measure before Hong Kong equivalent of Appendix G of ANSI/ASHRAE/IES 90.1-2010 is available, lighting power density (LPD) in ANSI/ASHRAE/IES calculation shall use those parameters in Code of Practice for Energy Efficiency of Building Services Installation – 2012 Edition). <u>Appendix 9.1</u> herein includes the default values or assumptions for design parameters for Performance-based approach when conducting energy simulation.</p> <p>The submission for compliance and the computer software to be used shall make reference to the latest Building Energy Code (BEC) or ANSI/ASHRAE/IES Standard 90.1-2010.</p> <p>When the selected simulation program cannot adequately model a design (Note: For example: passive design with significant contribution on the reduction of CO<sub>2</sub> emissions), material, or device, the rating authority may approve an exceptional calculation method to demonstrate above-standard performance. The exceptional calculation shall make reference to Section A3.4 of Code of Practice for Energy Efficiency of Building Services Installation - 2012 Edition [1] and/or Appendix G2.5 of ANSI/ASHRAE/IES 90.1-2010[2] and/or Appendix D of the Advanced Energy Modelling for LEED – Technical Manual v2.0 (September 2011 Edition) [3].</p>	Credit(s)	1	2	3	4	5	6	7	8	Lighting	10%	15%	20%	25%	30%	35%	40%	45%
Credit(s)	1	2	3	4	5	6	7	8											
Lighting	10%	15%	20%	25%	30%	35%	40%	45%											

1 EMSD - Code of Practice for Energy Efficiency of Building Services Installation - Section A3.4 2012  
2 ANSI/ASHRAE/IES Standard 90.1-2010 – Energy Standard for Buildings Except Low Rise Residential Buildings  
3 USGBC - Advanced Energy Modeling for LEED – Technical Manual v2.0 (September 2011 Edition).  
[http://www.gbci.org/files/leedonline/Advanced\\_Energy\\_Modeling\\_for\\_LEED\\_V2\\_1c.pdf](http://www.gbci.org/files/leedonline/Advanced_Energy_Modeling_for_LEED_V2_1c.pdf)

Estimated annual energy consumption:

### HVAC&R system

Where a significant portion (>80%) of a project space in a new or an existing commercial building (an office, retail shop, restaurant etc.), is served by an independent central plant equipment (e.g. chiller plant controlled by the landlord and not by the Applicant), the simulation model will need to cover only the air-side air-conditioning system serving the project space, and the building envelop characteristics will be as described in [Appendix 9.1](#).

If the project space is served by a unitary air-conditioning system (e.g. VRF system or split type air conditioning unit controlled by the Applicant), the simulation model will need to cover the entire air-conditioning installation, and the building envelop characteristics will be as described in [Appendix 9.1](#).

### Lighting system

The lighting power densities and lighting controls will be ascertained from the lighting installation designs.

### Documentation

Credit(s) shall be achieved when the Applicant provides the documentation stated below, to demonstrate criteria compliance:

- i. Energy simulation report clearly indicates the savings associated with HVAC&R and lighting systems;
- ii. All input and output files used for the energy simulation;
- iii. Specification describing HVAC&R and lighting systems;
- iv. drawings, As-built for all systems installed;
- v. Manufacturer specification, catalogue, technical data used in the energy simulation;
- vi. Other calculations or supporting that are used as substantiation to the energy simulation;
- vii. All submissions shall be signed by a Registered Energy Assessor (REA)

**EU 1 ENERGY PERFORMANCE – PRESCRIPTIVE-BASED APPROACH**

<b>EXCLUSION</b>	None.
<b>OBJECTIVE</b>	Reduce the consumption of energy resources and the consequentially harmful emissions of carbon dioxide (CO <sub>2</sub> ) to the atmosphere.
<b>CREDIT ATTAINABLE</b>	14
<b>CREDIT REQUIREMENT</b>	Up to a maximum of 14 credits for using energy efficient systems and controls that will reduce the energy consumption of the project space. Building systems include HVAC&R and lighting. Applicants may choose either, the Performance-based or the Prescriptive-based approach avoiding double counting environmental impacts.
<b>ASSESSMENT</b>	<u>Criteria</u> Completed documentation shall be submitted for each feature installed for the project space. The documentation shall detail the essential information of the installed system. Credit(s) may not be achieved if the installed feature is not going to operate as intent. For example, occupancy sensor is unlikely to turn off lighting in shopping area of a 24/7 convenience store. Credit(s) shall be achieved where one or more of the following features are installed, providing the energy efficient features meet all of the following conditions: <ul style="list-style-type: none"><li>i. Installed by the Applicant;</li><li>ii. Serve the project space;</li><li>iii. Meet the minimum system requirements outlined in <a href="#">Appendix 9.1</a> for respective features.</li></ul>
<b>HVAC&amp;R Systems</b>	
<ul style="list-style-type: none"><li>i. 1 credit for appropriate zoning and thermostat distribution;</li><li>ii. 1 credit for occupancy sensors and/or programmable timers controlling HVACR operation;</li><li>iii. 1 credit for automatic blinds controlled by daylight sensor reducing air conditioning demand;</li><li>iv. 1 credit for ceiling or wall mounted fans increasing air circulation hence reducing air conditioning demand;</li><li>v. 1 credit for variable speed drive fan coil units or high efficiency motors;</li><li>vi. 1 credit for high efficiency air conditioning units;</li><li>vii. 1 credit for heat recovery system;</li><li>viii. 1 credit for CO<sub>2</sub> sensors controlling fresh air rate (irrespective of ownership);</li><li>ix. 1 credit for complying with the installation positions for air-conditioning units;</li><li>x. 1 credit for HVACR system operating with free cooling under enthalpy control (irrespective of ownership);</li><li>xi. 1 credit for openable windows for mixed mode/natural ventilation;</li></ul>	

***Lighting System***

- i. 1 to 6 credits for a reduction of Lighting Power Density (LPD) by: 10%, 15%, 20%, 25%, 30% and 35% respectively;
- ii. 1 credit for appropriate zoning and manual control distribution;
- iii. 1 credit for daylight dimming controls;
- iv. 1 credit for occupancy sensor controls;
- v. 1 credit for task light for every workstation;
- vi. 1 credit for master switch (main switch) at the staff entrance of the premises so that the person can switch off all the lighting systems and non essential power when leaving the premises;
- vii. 1 credit for compliance with voluntary lighting code to switch off retail signboards and non-essential lighting after operating hours, or no later than 23:00 hours

**Documentation**

Credit(s) shall be achieved when the Applicant provides the documentation stated below, to demonstrate criteria compliance:

- i. Summary table, with specification describing the installation requirements for the features;
- ii. drawings, as-built drawings showing systems;
- iii. manufacturer specification, catalogue, and data sheets;
- iv. Records, testing and commissioning records, Completely filled EMSD Technical Form for Lighting Installation showing the percentage of reduction in lowering the Lighting Power Density (if adopted);
- v. EU submission shall be signed by a Registered Energy Assessor (REA);

**OTHER ENERGY  
EFFICIENT FEATURES**

For energy efficient features not listed above, the Applicant can submit the proposed features for BSL TRC consideration.

The Applicant shall also submit calculation showing the estimated energy saving achieved by the adoption of each or all the proposed features. Number of credit(s) to be achieved is subject to BSL TRC's final approval based on the estimated energy reduction and/or the innovation of the proposed features.

Note: Energy saving measures that rely on occupant's behaviour or manual control (such as, turning up the set temperature manually for air conditioning; turning off lighting by hand in accordance to staff energy management manual) will not be considered energy saving features in this section.

## EU 2 ENERGY EFFICIENT APPLIANCES

<b>EXCLUSION</b>	None.
<b>OBJECTIVE</b>	Encourage the procurement of labelled energy efficient equipment and appliances.
<b>CREDIT ATTAINABLE</b>	3
<b>CREDIT REQUIREMENT</b>	<p>1 credit when 70% of the total quantity, for each type of electrical appliance is certified energy efficient.</p> <p>2 credits when 90% of the total quantity, for each type of electrical appliance is certified energy efficient.</p> <p>3 credits when 100% of the total quantity, for each type of electrical appliance is certified energy efficient.</p>
<b>ASSESSMENT</b>	<p><b>Criteria</b></p> <p>Only eligible equipment and appliances meeting the following criteria shall be included in this assessment:</p> <ul style="list-style-type: none"><li>i. installed by the Applicant at the time of occupancy and serving the project space;</li><li>ii. equipment and appliance are governed by the EMSD's Energy Efficiency Labelling Scheme for both mandatory and voluntary schemes [1,2] and the US EPA's ENERGY STAR Program [3].</li><li>iii. HVAC&amp;R, lighting (including ballast), fixed task lighting and building envelope products are excluded in this section to prevent double counting, as energy performance of these building services systems are assessed in EU 1.</li><li>iv. For those electrical appliances re-used from other offices or locations they shall not be included in the calculation.</li></ul> <p>Certified energy efficient products are qualified by the EMSD Energy Efficiency Labelling Scheme with Grade 1 labels, EMSD's Voluntary Energy Efficiency Labelling Scheme with Recognition type label, or US's EPA ENERGY STAR Program with ENERGY STAR label in this assessment.</p> <p><b>Documentation</b></p> <p>Credit(s) shall be achieved when the Applicant provides the documentation stated below, to demonstrate compliance:</p> <ul style="list-style-type: none"><li>i. summary table with appliance type, model number, reference, quantity, efficiency ratings, labelling type;</li><li>ii. drawings, floor plan;</li><li>iii. catalogue, manufacturer specification, technical data sheets;</li><li>iv. Record photographs;</li></ul>

1 Electrical and Mechanical Services Department. Voluntary Energy Efficiency Labelling Scheme.  
[http://www.emsd.gov.hk/emsd/eng/pee/eels\\_pub.shtml](http://www.emsd.gov.hk/emsd/eng/pee/eels_pub.shtml)

2 Electrical and Mechanical Services Department. Mandatory Energy Efficiency Labelling Scheme.  
[http://www.emsd.gov.hk/emsd/eng/pee/eels\\_mpub.shtml](http://www.emsd.gov.hk/emsd/eng/pee/eels_mpub.shtml)

3 US Environmental Protection Agency. Energy Star Qualified Products.  
[http://www.energystar.gov/index.cfm?fuseaction=find\\_a\\_product](http://www.energystar.gov/index.cfm?fuseaction=find_a_product)

**BACKGROUND**

To make it easier to choose energy efficient products, EMSD operates Mandatory and Voluntary Energy Efficiency Labelling Schemes for appliances and equipment used both in the home and office. The scheme aims to save energy by informing potential customers of the product's level of energy consumption and efficiency rating, so that buyers can take these factors into consideration when making their purchasing decision.

At the time of writing, the EMSD scheme now covers twenty types of household appliances and office equipment. Twelve types are electrical appliances including refrigerators, washing machines, non-integrated type compact fluorescent lamps, dehumidifiers, electric clothes dryers, room coolers, electric storage water heaters, television sets, electric rice-cookers, electronic ballasts, LED lamps and induction cookers.

There are seven types of office equipment include photocopiers, fax machines, multifunction devices, laser printers, LCD monitors, computers, and bottled water dispensers. There is also one type of gas appliance for domestic gas instantaneous water heaters.

It is anticipated that this scheme will be extended to cover other appliances in the future.

To further facilitate the public in choosing energy efficient appliances and raise public awareness on energy saving, the Government has introduced a Mandatory Energy Efficiency Labelling Scheme (MEELS) through the Energy Efficiency Labelling (Labelling of Products) Ordinance, Cap. 598. The MEELS covers 5 types of products, namely room air conditioners, refrigerating appliances, compact fluorescent lamps, washing machines and dehumidifiers. The Voluntary Energy Efficiency Labelling Scheme for room coolers, household refrigeration appliances, washing machines and dehumidifiers shall cover only the type of products not regulated under the Ordinance.

Products in more than 40 categories are eligible for the Energy Star. They use less energy, save money, and help protect the environment.

### **EU 3 COMMISSIONING**

<b>EXCLUSION</b>	None.
<b>OBJECTIVE</b>	Commissioning the Building Services installation is the first and vital step for energy efficient operation, and validate that the systems operate as intended.
<b>CREDIT ATTAINABLE</b>	4
<b>CREDIT REQUIREMENT</b>	a) Commissioning plans 2 credits for provision of: i. Commissioning plan detailing all specified commissioning work for HVAC&R, lighting and other Building Services systems that impact on energy use and indoor environmental quality; ii. The commissioning plan shall be endorsed by an Independent Commissioning Authority (iCXA). b) Commissioning reports 2 credits for provision of: i. commissioning reports for HVAC&R, lighting and other Building Services systems that impact on energy use and indoor environmental quality; ii. commissioning reports shall be endorsed by an iCXA.
<b>ASSESSMENT</b>	Where no alterations to building services* in the host building are undertaken and no supplementary building services are installed, 4 credits in EU 3a) and 3b) are achieved when the Applicant provides the documentation stated below, to demonstrate compliance: i. Contractual document from the space owner that confirms that no alterations to the building services provided by the host building were undertaken and no supplementary building services were installed. For project where alterations to host building services* are undertaken or supplementary building services are installed, the following criteria apply. a) Commissioning plan <u>Criteria</u> The commissioning plan shall fulfil the requirements detailed in <a href="#">Appendix 9.2.1</a> as a minimum and it shall be endorsed by the iCXA. The iCXA shall meet all of the following requirements based on the project area: i. For project area less than 1,000m <sup>2</sup> , the iCXA shall be an independent person who is not involved in the design and general installation works and with commissioning experience in at least two (2) fit-out projects. ii. For project area larger than 1,000m <sup>2</sup> , the iCXA shall be an independent person who is not involved in the design and general installation works and meet the following requirements: a.) Registered Professional Engineer (R.P.E.) registered with the Engineers Registration Board (ERB) in Building Services, Electrical,

Mechanical or Environmental discipline and/or Member of the Hong Kong Institution of Engineers (MHKIE) in Building Services, Electrical, Mechanical or Environmental discipline;

- b.) Relevant commissioning experience in at least 2 buildings or fit out projects;
- c.) Must not be an employee of, or contracted through, a contractor or construction manager dealing with construction contracts.

The commissioning plans shall cover the following energy and IEQ related systems:

- i. Heating, ventilating, air conditioning and refrigeration (HVAC&R) systems and associated controls;
- ii. Lighting systems and associated controls;
- iii. Energy monitoring systems (if any);
- iv. Renewable energy systems (if any);
- v. Domestic hot water systems (if any)
- vi. Other systems where installed by the Applicant in the [project space](#) (for example dumb waiter, lift, escalator, etc.)

In brief, the criteria can be summarised in the matrix as shown:

<b>Alter the base BS* or install supplementary BS?</b>	<b>Area (m<sup>2</sup>)</b>	<b>Requirements in brief</b>
No	All size	Credits are deemed to be achieved.
Yes	All size	iCXA

- b) Commissioning Report

#### Criteria

The records of functional testing of systems and equipment shall be performed as documented in the commissioning plan and endorsed by iCXA.

The commissioning report shall cover as a minimum the items given in [Appendix 9.2.2](#), after all commissioning tasks, except seasonally deferred testing, have been completed.

Commissioning reports shall be verified and signed-off by the iCXA. The commissioning records and reports shall cover the following systems, where installed:

- i. Heating, ventilating, air conditioning and refrigeration (HVAC&R) systems and associated controls;
- ii. Lighting systems and associated controls;
- iii. Energy monitoring systems;
- iv. Renewable energy systems;
- v. Domestic hot water systems;
- vi. Plumbing and Drainage systems;
- vii. Lifts and Escalators;

Only systems installed by the Applicant serving the [project space](#) shall be assessed.

Documentation

Credit(s) shall be achieved when the Applicant provides the documentation stated below, to demonstrate criteria compliance:

- i. iCXA Resume;
- ii. commissioning plan , records, reports all endorsed by iCXA
- iii. record photographs;
- iv. engagement letter for iCxA stating ICXA is responsible for reporting of all conditions, and findings directly to the owner;

**Note:** Minor adjustment/relocation (within 1 metre) of existing host building air conditioning and lighting systems shall be considered as "no alteration to host building system" under this Assessment.

**BACKGROUND**

Commissioning is a quality assurance process for systems from concept to completion, and operation.

It involves verifying, and documenting the performance of each system to meet the operational need within the capabilities of the documented design and equipment capacities, according to the owner's functional criteria.

In this context, commissioning shall also include preparing project operational and maintenance documentation, and training for operation and maintenance personnel. The result should be fully functional systems that can be properly operated and maintained throughout the life of the project space.

CIBSE [1,2,3], BSRIA [4] and ASHRAE [5] publications provide guidance on commissioning requirements and procedures, such as management, design for commissioning, access, testing, measurements and tolerances, installed transducers, specification for portable measuring equipment, etc. Architectural Services Department publishes commissioning procedures for Government buildings [6].

Effective commissioning and proper instruction for operation and maintenance procedures have been shown to improve the operating efficiency and environmental performance of systems over their life cycle. The commissioning requirements shall cover all HVAC&R, lighting and other Building Services systems including but not limited to, the renewable systems (if any), energy monitoring systems (if any) and domestic hot water systems (if any).

The iCXA must oversee the implementation of the Commissioning Plan, this work should compliment and not cross over the responsibility of the building services designers who may also have commissioning responsibility.

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1 The Chartered Institution of Building Services Engineers. Air distribution systems. CIBSE Commissioning Code A  
2 The Chartered Institution of Building Services Engineers. Water distribution systems. CIBSE Commissioning Code W  
3 The Chartered Institution of Building Services Engineers. Automatic controls. CIBSE Commissioning Code C  
4 Building Services Research and Information Association. Commissioning air systems. Application procedures for buildings.  
<http://www.bsria.co.uk/>

5 ASHRAE. New Building Commissioning.  
<http://www.ashrae.org/>

6 Architectural Services Department, Building Services Branch. Testing and Commissioning Procedure No.1 for Air-conditioning, Refrigeration, Ventilation and Control System in Government Buildings.  
<http://www.archsd.gov.hk/en/publications.aspx>

## **EU 4 OPERATIONS & MAINTENANCE**

<b>EXCLUSION</b>	None.
<b>OBJECTIVE</b>	Enable building operators to operate the HVAC&R, lighting and other Building Services Installation and systems in an energy efficient manner according to the design intent, able to monitor the performance of the building, and maintain the performance.
<b>CREDIT ATTAINABLE</b>	1
<b>CREDIT REQUIREMENT</b>	1 credit for provision of digital or online operations and maintenance (O&M) manual and energy management manual or an energy management section in O&M manual
<b>ASSESSMENT</b>	<p>Where the host building operator provides maintenance service for the entire Building Services installation (excluding Fire Services), the Applicant shall submit the information including the contract, scope of work, programme, schedule, and maintenance method statements to achieve this credit.</p> <p>For project where alterations to host building services are undertaken or supplementary building services were installed, the following shall apply:</p> <p><b>Criteria</b></p> <p>The digital operations and maintenance manual(s) and the energy management manual(s) shall include the details given in <a href="#">Appendices 9.2.3 and 9.2.4</a> respectively as a minimum and cover the following systems at a minimum:</p> <ul style="list-style-type: none"><li>i. Heating, ventilating, air conditioning and refrigeration (HVAC&amp;R) systems and associated controls;</li><li>ii. Lighting systems and associated controls;</li><li>iii. Energy monitoring systems (if any);</li><li>iv. Renewable energy systems (if any);</li><li>v. Domestic hot water systems (if any).</li></ul> <p>Only systems installed by the Applicant and serving the project space are assessed.</p> <p><b>Documentation</b></p> <p>Credit shall be achieved when the Applicant provides the documentation stated below, to demonstrate compliance:</p> <ul style="list-style-type: none"><li>i. List person responsible;</li><li>ii. List all systems;</li><li>iii. digital O&amp;M manual and energy management manual for all systems and equipment. It can be in PDF format with table of content linked to respective sections for easy navigation, scanned pdf images not accepted.</li></ul>
<b>BACKGROUND</b>	Facilities to carry out basic maintenance and equipment for monitoring consumption can help improve operating efficiency and environmental performance of a building. ASHRAE [1] and BSRIA [2]

1 American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. Preparation of Operating and Maintenance Documentation for Building Systems. ASHRAE Guideline 4. Atlanta.

2 J H Armstrong. Building Services Research and Information Association. Operating and Maintenance Manuals for Building Services Installations. Application Guide 1/87. Dec. 1990.

provide advice on the preparations for operation and maintenance to ensure the safe and efficient operation of each system and major item of plant, including a description of the operating modes, a recommended strategy for operation and control, control data and set points, interlocks between plant items, etc.

## **EU 5 METERING AND MONITORING**

<b>EXCLUSION</b>	None.
<b>OBJECTIVE</b>	real time monitoring, measurement, and historical record keeping, to enable managing and improving energy performance.
<b>CREDIT ATTAINABLE</b>	4
<b>CREDIT REQUIREMENT</b>	<p>a) Electrical meters</p> <p>3 credits for monitoring system and appliance electricity consumption, the Applicant shall install electricity sub-metering to record electricity consumption of the following equipment serving the project space irrespective of ownership (at the minimum):</p> <ul style="list-style-type: none"><li>i. HVAC&amp;R systems (including supplementary air conditioning, if any);</li><li>ii. Lighting Systems;</li><li>iii. Small power (plug loads);</li><li>iv. Lifts and escalators (if any);</li><li>v. Domestic hot water systems (if any);</li><li>vi. Pools, Spa, and whirlpools (if any);</li><li>vii. Loads associated with server/equipment room (if any);</li><li>viii. High electrical power equipment (&gt;25kVA, if any).</li></ul> <p>b) Thermal energy meters for chilled water</p> <p>1 credit for installation of thermal energy meters for monitoring chilled water consumption.</p>
<b>ASSESSMENT</b>	<p>a) Electrical meters</p> <p><u>Criteria</u></p> <p>The assessment focuses on the largest categories of energy consumption, which for interiors would be HVAC&amp;R systems (including supplementary air conditioning, if any); lighting systems; small power (plug loads); domestic hot water systems (if any); loads associated with server room (if any) and high electrical power equipment (&gt;25kVA, if any) installed by the Applicant and serving the project space.</p> <p>Meters shall record every minute, hourly, daily, weekly, and monthly and data shall be saved with either:</p> <ul style="list-style-type: none"><li>i. 'Smart' meters or meter with data-recording ability; or</li><li>ii. building automation/energy management system.</li></ul> <p>Electricity metering (for input power, energy and maximum demand), together with associated measuring transducers/transformers for indicating power and energy, shall comply with an appropriate standard such as BS EN [1] and to at least accuracy class 1.</p> <p><u>Documentation</u></p> <p>Credits shall be achieved when the Applicant provides the documentation stated below, to demonstrate compliance:</p> <ul style="list-style-type: none"><li>i. List responsible person;</li></ul>

1 British Standard BS EN 62053-11:2003, Electricity metering equipment (AC), Particular requirements. Electromechanical meters for active energy (classes 0,5, 1 and 2)

- ii. consumption records, meter readings, logbook or print output;
- iii. drawings, as-built electrical schematic, location layouts;
- iv. manufacturer's technical specification, technical data sheets;
- v. O&M manuals;
- vi. testing and Commissioning records;
- vii. record Photographs;

**b) Thermal energy meters for chilled water sub-metering****Criteria**

Thermal energy meters for chilled water sub-metering shall provide data every minute, hour, day, week and monthly of chilled water energy consumption for the project area.

The metering and associated measuring transducers/transformers for indicating flow rate, supply and return temperature of chilled water and energy, shall comply with an appropriate standard such as EN [2] and to at least accuracy class 2.

**Documentation**

Credit shall be achieved when the Applicant provides the documentation stated below, to demonstrate criteria compliance:

- i. list responsible person,
- ii. consumption records, meter readings, logbook or print output;
- iii. drawings, as-built chilled water schematic, layout drawing;
- iv. manufacturer technical specification, technical data sheets for meter, transducers, and sensors;
- v. testing and Commissioning records;
- vi. record photographs;

**BACKGROUND**

Surveys of a large number of premises in Hong Kong [3] revealed that buildings are in general insufficiently equipped with measuring devices for measurement of energy performance. Furthermore, other than basic metering for billing purposes, interiors projects rarely provide sub-metering so occupiers remain ignorant of when and where energy is consumed.

Whilst sub-metering in itself does not save energy, meters that are installed correctly encourage and provide the information for the monitoring and targeting conservation.

Opportunities for reducing energy consumption can be identified only if it is possible to monitor performance of the systems. Good monitoring systems provide record for part load performance, not only improving efficiency, but also improving the control of the building's thermal comfort conditions. Plant control can be altered and the results monitored to show how energy consumption changes. Unseen plant faults, which are not evident during routine maintenance, but which can be identified from analysis of performance trend data. Control problems can be detected and control strategies improved to match the building demand.

Opportunities for reducing energy consumption can be identified only if it is possible to monitor performance of the installed systems and

2 British Standard BS EN 1434-5:2007. Heat meters. Initial verification tests

3 Yik F W H, Chiu T W. Measuring instruments in chiller plants and uncertainties in performance evaluation, Transactions, The Hong Kong Institution of Engineers, 5(3) 95-99.

equipment. Equipment use and control can be altered and the results monitored to show how energy consumption changes.

The cost of instrumentation is not significant when compared to overall construction costs and the accuracy should be such as to provide meaningful readings. The payback from improved energy performance can be high taking into account the reduction in electricity consumption and demand charges resulting from more efficient equipment operation.

For most projects monitoring should include separate meters for lighting and small power (plug loads and fixed equipment such as an instantaneous water heater), with additional provisions to monitor air-conditioning energy use. Where the project includes HVAC&R plant additional to the core and shell provisions, metering can be more extensive. For example, a monitoring system should provide the overall performance of the plant to be determined for all operating modes and range of operating conditions [4].

Given the interest in carbon foot-printing and carbon trading, energy monitoring and targeting is receiving greater attention than hitherto [5].

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4 K Calder. The Building Services Research and Information Association. Practical Chiller System Monitoring. Technical Note TN 7/94. 1994.  
5 Carbon Trust. In-depth management guide CTG008. Monitoring and targeting.

## 6 WATER USE

### WU1 WATER QUALITY SURVEY

<b>EXCLUSION</b>	None
<b>OBJECTIVE</b>	Ensure that the quality of potable water is satisfactory.
<b>CREDIT ATTAINABLE</b>	1
<b>CREDIT REQUIREMENT</b>	1 credit for demonstrating that the quality of potable water meets the referenced drinking water quality standards at all points of use.
<b>ASSESSMENT</b>	<u>Criteria</u>  Potable water sampling should be systematic, such as described in ISO 5667 [1]. Sample(s) shall be taken at the farthest point(s) of use in the distribution system within the project space from the storage tank of the host building. If water sample(s) can comply with the seven (7) parameters including pH, colour, turbidity, conductivity, iron, E.Coli and total coliform as stipulated in the Quality Water Recognition Scheme for Buildings [2] administered by the Water Supplies Department, the credit can be achieved.

#### ***Alternative:***

Where the water service installation is not provided in the project space, the credit can still be attained provided that the Applicant can demonstrate:

- i. host building is already awarded with at least Blue Certificate under the Quality Water Recognition Scheme issued by Water Supplies Department for potable and flushing water or
- ii. twin-tank system is installed in the host building for potable water;

#### Documentation

Credit shall be achieved when the Applicant provides the documentation stated below, to demonstrate compliance:

- i. summary table;
- ii. drawings, with plumbing schematic, layout drawings;
- iii. Laboratory test report(s) including details of the analysis of sample(s) taken from potable water outlets used to supply for human consumption.

#### Alternative I:

- i. Certificate(s) for host building;
- ii. Record photographs;

#### Alternative II:

- i. drawings, schematic for twin tank system;

1 ISO 5667-5:2006 Water quality -- Sampling -- Part 5: Guidance on sampling of drinking water from treatment works and piped distribution systems

2 Water Supplies Department. Quality Water Recognition Scheme for Buildings  
[http://www.wsd.gov.hk/en/customer\\_services\\_and\\_water\\_bills/application\\_for\\_licence\\_certificate/quality\\_water\\_recognition\\_scheme\\_for\\_buildings/index.html](http://www.wsd.gov.hk/en/customer_services_and_water_bills/application_for_licence_certificate/quality_water_recognition_scheme_for_buildings/index.html)

- ii. record photographs, twin-tank system;

**BACKGROUND**

According to WSD [3] Hong Kong's water is of the safest quality and among the best in the world. However, it is affected in some instances by the inadequate maintenance of internal plumbing systems before it reaches customers' taps and this can cause discolouration of the water.

To encourage the building owners to maintain their plumbing systems properly and with the endorsement of the Advisory Committee on the Quality of Water Supplies (ACQWS), the Water Supplies Department launched the Fresh Water Plumbing Quality Maintenance Recognition Scheme [4] in 2002. Since 1 January 2008, the Scheme has been renamed as Quality Water Recognition Scheme for Buildings. The successful applicants will be awarded a Certificate to recognise proper maintenance of the plumbing systems inside a building for keeping the good quality of government supplied water throughout the inside service up to the consumers' taps.

The twin-tank system can bring few benefits. These include:-

- i. Un-interrupted water supply to consumers;
- ii. Water saving;
- iii. Facilitating cleansing operation.

More details can be found in WSD website [5].

**SAMPLING**

ISO 5667 establishes detailed principles to be applied to the design of sampling programmes, to sampling techniques and to the handling and preservation of samples of drinking water and water used for food and beverage processing (drinking water). It is important that the sampling purpose be defined as accurately as possible and that the measurements provide the required information in the most efficient and statistically representative manner.

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- 3 Water Supplies Department. Annual Report.  
[http://www.wsd.gov.hk/filemanager/en/share/annual\\_reports/rpt0203/pdf/08\\_water\\_quality.pdf](http://www.wsd.gov.hk/filemanager/en/share/annual_reports/rpt0203/pdf/08_water_quality.pdf)
- 4 Water Supplies Department. Fresh Water Plumbing Maintenance Guide.  
<http://www.wsd.gov.hk/filemanager/en/share/pdf/FWPMGe.pdf>
- 5 Water Supplies Department. Twin-tank System  
[http://www.wsd.gov.hk/en/plumbing\\_and\\_engineering/tts/index.html](http://www.wsd.gov.hk/en/plumbing_and_engineering/tts/index.html)

## **WU 2 ANNUAL WATER USE**

<b>EXCLUSION</b>	None.
<b>OBJECTIVE</b>	Reduce the consumption of fresh (potable) water through the application of water saving devices that have proven performance and reliability.
<b>CREDIT ATTAINABLE</b>	2
<b>CREDIT REQUIREMENT</b>	1 credit for demonstrating that the use of water efficient devices leads to an estimated aggregate annual water saving of 30% when compared with BEAM Plus baseline. 2 credits for demonstrating an estimated annual water saving of 40% when compared with BEAM Plus baseline.
<b>ASSESSMENT</b>	<p><u>Criteria</u></p> <p>Calculation shall be provided to determine the reduction of water consumption in the project space compared with a similarly occupied space whose water fittings and appliances conform to a baseline performance. The calculation should take into account the number of employees, and the number of operational days per annum. This information must be supplied by the Applicant and may be stated in the design brief or OPR.</p> <p>Water use is based either on a 'per operation' basis or as the product of flow rate and operation time. The default assumptions are given in <a href="#">Appendix 9.3</a>. Number of water devices installed and frequency of use must be the same for both the baseline and project case.</p> <p><b>Alternative:</b></p> <p>If water taps and shower heads are not provided within the <a href="#">project space</a> but located in the shared common area (e.g. toilets/bathroom shared with other tenants (or in retail premises located within shopping centres etc) within the host building that is available to the user of the project space:</p> <ul style="list-style-type: none"><li>1 credit can be achieved if, on same floor as the project space, sensor type water taps are installed in the shared/common area.</li><li>1 additional credit can be achieved where the Applicant demonstrates that all water taps, mixer taps, and shower heads (where installed) on that floor of the host building comply with voluntary Water Efficiency Labelling Scheme (WELS) [1] Grade 1 labelled or have an equivalent or lower flow rate.</li></ul> <p>This alternative approach encourages conservation and raises awareness, ultimately market forces motivating the building owner to select or retrofit with water efficient fixtures.</p> <p><u>Documentation</u></p> <p>Credit(s) shall be achieved when the Applicant provides the documentation stated below, to demonstrate compliance:</p> <ul style="list-style-type: none"><li>i. Water saving calculation, example given in <a href="#">Appendix 9.3</a>.</li><li>ii. Drawings, architectural, floor layout plan;</li></ul>

1 Water Supplies Department. Voluntary Water Efficiency Labelling Scheme.  
[http://www.wsd.gov.hk/en/plumbing\\_and\\_engineering/wels/index.html](http://www.wsd.gov.hk/en/plumbing_and_engineering/wels/index.html)

- iii. manufacturer specifications, technical data sheets with flow rate information;

- iv. record photographs, "As-built" installation

Alternative:

- i. documentation, sensor type water taps installed in the common area within the host building;
- ii. manufacturer specification/catalogue;
- iii. WSD WELS grade documentation, for all water tap, mixer tap, and shower head (where installed);
- iv. record photographs, "As-built" installation

**BACKGROUND**

Hong Kong differs from most other places in the world in that the majority of buildings have saltwater for flushing rather than using potable water. Therefore the scope for potable water reductions may be more limited here than elsewhere. Neither the quantification of water use nor the potential for savings has been addressed in local research literature. Nevertheless, evidence from other countries suggests that reductions in water use may be achieved through the use of water efficient devices and automatic controls.

For the majority of interior premises a limited amount of hand washing and perhaps some manual dish washing will take place in the pantry. It is not the intention to include water used for washing food or produce (required for hygiene), nor water used for coffee making machines, etc.

There is an increasing availability of devices and plumbing fixtures which have demonstrated an ability to save water over the lifetime of the system if installed and maintained properly. Flow rates can be controlled to reduce excessive discharge at taps, faucets and showers without detriment to the quality of water delivery. Substantial evidence shows that the use of water-efficient plumbing fixtures conserves water [1]. A number of studies in the US have measured the impact of installing water-efficient plumbing fixtures through sophisticated sensors, before and after comparisons of water bills, or other means. Although the results varied, the studies concluded that low-flow fixtures are effective in saving water.

High efficiency devices include low flow rate faucets or faucets with aerated flows. The provision of automatic shut-off devices, particular in public use areas, can save significant quantities of water. Examples of automatic shut-off devices are spring-loaded (or push-once) taps, electronic proximity sensors, etc., but excluding timed shut-off devices.

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1 United States General Accounting Office. Report to Congressional Requesters. Water Infrastructure. Water-Efficient Plumbing Fixtures Reduce Water Consumption and Wastewater Flows. GA RCED-00-23. August 2000.

**WU 3 EFFLUENT DISCHARGE TO FOUL SEWERS**

<b>EXCLUSION</b>	None.
<b>OBJECTIVE</b>	Encourage reducing sewage volume discharge thereby reducing the burden on municipal sewage, and water treatment facilities.
<b>CREDIT ATTAINABLE</b>	1
<b>CREDIT REQUIREMENT</b>	1 credit for the application of water efficient flushing water installation technology;
<b>ASSESSMENT</b>	<p><b>Criteria</b></p> <p>The Applicant demonstrates that the flushing systems installed within the <a href="#">project space</a> are water efficient lowering sewerage volume. Water efficient flushing systems include but not limited to:</p> <ul style="list-style-type: none"><li>i. sensor type urinal;</li><li>ii. waterless urinal;</li><li>iii. flushing system certified by WELS Grade 1;</li><li>iv. dual flush water closet;</li></ul>
	<p><b>Alternative</b></p> <p>If the toilet areas are located in shared/common area of the host building, one (1) credit is available where at least two (2) of the prescribed water efficient flushing appliances above are installed within the host building available to the occupants of the project space.</p> <p>The alternative approach encourages the occupier to examine the host building before leasing, and motivates the building owner to select or retrofit with water efficient flushing water installations.</p> <p>If the occupants of the <a href="#">project space</a> have access to toilet facilities in both the common area and project space, only the sewerage system(s) within the project space shall be counted. Where the host building has shared common area toilet facilities fitted water efficient appliances in (on the same floor) each Applicant on the same floor achieve credit.</p>
	<p><b>Documentation</b></p> <p>Credit shall be achieved when the Applicant provides the documentation stated below, to demonstrate compliance:</p> <ul style="list-style-type: none"><li>i. calculation, sewerage volume;</li><li>ii. manufacturer specifications/catalogue with flow rate data;</li><li>iii. record photographs, for the flushing water installation;</li></ul>
	<p><b>Alternative (host building):</b></p> <ul style="list-style-type: none"><li>i. Lease, or other document indicating occupant use of shared/common area washroom facility;</li><li>ii. Drawings, architectural, location plan for the facility</li><li>iii. manufacturer's information, technical data sheets with flow rate data;</li><li>iv. record photographs for the installation provided in host building;</li></ul>

**BACKGROUND**

Demand for flushing and potable water should be assessed with regard to Building (Standards of Sanitary Fitments, Plumbing, Drainage Works and Latrines) Regulation 10A(4). "Potable water" refers to a supply of water for the purposes of Regulation 10A(2)[1]. The quantity of flushing water required is given in PNAP 17 [2].

Regulation 19 of the Building (Standards of Sanitary Fitments, Plumbing, Drainage Works and Latrines) Regulations (Drainage Regulations) requires flushing cisterns of water closet fitments to have a discharge between 9 and 14 litres. Under the current Waterworks Regulations, flushing cisterns shall be of the valveless syphonic type and the flushing volume shall be within the range of 7.5 and 15 litres [3].

With the application of modern technology in the design of water closet flushing system, the effectiveness of flushing can be maintained with a reduced discharge. Therefore, to conserve our valuable water resources, both the Building Authority (BA) and Water Authority would have no objection to relaxing the use of syphonic flushing cisterns with lower discharge than that required by the current regulations provided that the associated toilet bowls are compatible with the cisterns and the syphonic action is sufficient for the waste in the toilet bowls to be cleared effectively by a single flush. WSD has relaxed the requirements in respect of the flushing mechanism and minimum flushing volume as follows:

- i. the use of valve type flushing devices (mechanical or sensor type with single flush or dual flush) in addition to valveless syphonic type flushing apparatus;
- ii. the use of flushing devices which are capable to give a single flushing volume of less than 7.5 litres.

The capacity of the flushing cistern in the case of trough water-closets and urinals shall be approved by the Water Authority subject to the discharge in the case of trough water-closets being not less than 9 litres of water for every metre of the channel and the discharge in the case of urinals being not less than 4.5 litres of water for every urinal stall, or in the case of a trough urinal, every metre thereof.

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1 Department of Justice, CAP 123I building (Standards of Sanitary Fitments, Plumbing, Drainage Works and Latrines) Regulations  
[http://www.legislation.gov.hk/blis\\_pdf.nsf/6799165D2FEE3FA94825755E0033E532/182338FA79710018482575EE03F2DBE/\\$FILE/CAP\\_123I\\_e\\_b5.pdf](http://www.legislation.gov.hk/blis_pdf.nsf/6799165D2FEE3FA94825755E0033E532/182338FA79710018482575EE03F2DBE/$FILE/CAP_123I_e_b5.pdf)

2 Buildings Department. Practice Note for Authorized Persons, Registered Structural Engineers and Registered Geotechnical Engineers. PNAP No. APP-4 Water Supply and Wells.  
<http://www.bd.gov.hk/english/documents/pnap/APP/APP004.pdf>

3 Buildings Department. Practice Note for Authorized Persons, Registered Structural Engineers and Registered Geotechnical Engineers. PNAP No. APP-99Flushing Volume for Flushing Cisterns.  
<http://www.bd.gov.hk/english/documents/pnap/APP/APP099.pdf>

**WU 4 No BOTTLED WATER**

<b>EXCLUSION</b>	None.
<b>OBJECTIVE</b>	Reduce the environmental impact during the production and transportation of plastic water bottles.
<b>CREDIT ATTAINABLE</b>	2
<b>CREDIT REQUIREMENT</b>	2 credits for demonstrating replacements for plastic bottled water services have been provided (such as drinking water fountains, etc.)
<b>ASSESSMENT</b>	<p><u>Criteria</u></p> <p>Provide alternatives for the plastic bottled water type water delivery and dispenser(s) for <a href="#">project space</a>.</p>
	<p><u>Documentation</u></p> <p>Credits shall be achieved when the Applicant provides the documentation stated below, to demonstrate compliance:</p> <ul style="list-style-type: none"><li>i. list alternatives provided;</li><li>ii. drawings, floor plan layout;</li><li>iii. catalogue information;</li><li>iv. record photographs;</li></ul>
<b>BACKGROUND</b>	A study commissioned by the World Wildlife Fund (WWF) [1] found that bottled water was the largest growing drinks industry driven by peoples' perception of deteriorating drinking water quality. The study said that in some cases, bottled waters only differed from tap water in their method of delivery. The environmental consequences of drinking bottled water are immense. The study found that 1.5 million tons per annum of plastic are used to bottle water. Toxic chemicals can be released into the environment during the manufacture and in the ultimate disposal of the bottles, a significant proportion of which end up in landfills. A quarter of the 89 billion litres of water bottled worldwide annually are consumed outside their country of origin resulting in additional carbon dioxide emissions.

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1 Ferrier, C, Bottled water: Understanding a social phenomenon, April, 2001,  
[http://assets.panda.org/downloads/bottled\\_water.pdf](http://assets.panda.org/downloads/bottled_water.pdf)

## **7 INDOOR ENVIRONMENTAL QUALITY**

### **IEQ 1 INDOOR AIR QUALITY**

<b>EXCLUSION</b>	None.
<b>OBJECTIVE</b>	Demonstrate that airborne contaminants do not give rise to unacceptable levels of indoor air pollution in normally occupied spaces.
<b>CREDIT ATTAINABLE</b>	5
<b>CREDIT REQUIREMENT</b>	A. Specifications  For each of the materials categories (A1 to A5), one credit is achieved when compliance is demonstrated through submission of the requisite documentation.  Alternative:  B. Measurement  For each of the categories of contaminants (B1 to B5) one credit is achieved if measured concentrations obtained through appropriate measurements comply with the Good Class requirements in the IAQ Certification Scheme [1].
<b>ASSESSMENT</b>	<u>Criteria</u>  Two alternative methods are available to demonstrate compliance: A. by design, whereby indoor contaminant sources are reduced through selection of materials, or B. through measurement of contaminants upon completion of the project.  A. Design Approach  A1. Adhesives and Sealants  Where adhesives, sealants and sealant primers are used in the project interiors, the VOC content limits should less than the maximum limit given in Annex 6 of "A Guide to the Air Pollution Control (Volatile Organic Compounds) Regulation" issued by Environmental Protection Department [2].  A2. Paints, Coatings and Finishes  Where paints, coatings and finishes are used in the project interiors, the VOC content limits should less than 50g per litre.  A3. Wood and Laminates <ol style="list-style-type: none"><li>i. Composite wood and fibre products shall not contain any added urea - formaldehyde resins;</li><li>ii. Adhesives used to fabricate assemblies shall not contain any added urea - formaldehyde.</li></ol>

1 Indoor Air Quality Management Group. A Guide on Indoor Air Quality Certification Scheme for Offices and Public Places.  
<http://www.iaq.gov.hk/cert/doc/CertGuide-eng.pdf>

2 A Guide to the Air Pollution Control (Volatile Organic Compounds) Regulation  
[http://www.epd.gov.hk/epd/english/environmenthk/air/prob\\_solutions/files/voc\\_reg\\_guide.pdf](http://www.epd.gov.hk/epd/english/environmenthk/air/prob_solutions/files/voc_reg_guide.pdf)

The list of all products and laminate adhesives used shall be accompanied by a statement that they contain no added urea-formaldehyde.

#### A4. Flooring materials and Carpets

For flooring materials:

- i. The total emission and emission rate of VOC should not exceed 2g/m<sup>2</sup> and 500µg/m<sup>2</sup>/hr;
- ii. The emission of formaldehyde should not exceed 0.13mg/m<sup>3</sup> air for wood-based flooring;
- iii. The product should not contain chlorinated / brominated paraffin's, organic tin compounds, phthalates or PBDEs content;
- iv. The product should not contain any heavy metals or their compounds as list below:
  - a.) Cadmium;
  - b.) Mercury;
  - c.) Hexavalent chromium;
  - d.) Lead;
  - e.) Arsenic;
  - f.) Antimony.

For carpets:

- i. The emissions of Total Volatile Organic Compounds (TVOCs) should not exceed 0.5 mg/m<sup>2</sup> per hour.

Water-based adhesive or adhesive free should be used.

#### A5. Furniture

For metal furniture:

- i. The colour coating of the furniture should not contain:
  - a.) Formaldehyde or halogen solvent;
  - b.) Any heavy metallic substances such as lead, cadmium, chromium and their compounds.
- ii. If the product contains plastic parts, the plastic parts should not contain the following substances:
  - a.) Lead;
  - b.) Chromium;
  - c.) Cadmium;
  - d.) Mercury;
  - e.) Phthalates;
  - f.) Halogenated organic substances.

For non-metal furniture:

- i. All wooden board used shall be of Class E1 in respect of formaldehyde emission requirements as follows:
  - a.) MDF Board  $\leq$  8mg/100g as per EN120 test requirement;
  - b.) Plywood: release  $\leq$  0.124mg/m<sup>3</sup> air as per EN717-1

requirement.

Salvaged and used furniture shall be excluded from the assessment.

A list of all furniture and fittings shall be provided identifying either age (reused) or product details (description, manufacturer, product range/model) and copies of test reports.

Alternative:

**B. Measurement Approach**

The objective of sampling is to ensure that the interior spaces will not suffer undue contamination from indoor sources or infiltration from outdoor sources. Where it can be demonstrated that identified pollutants (B1 to B5 as stated below) are complied with the Good Class requirement prescribed in the IAQ Certification Scheme, credit(s) shall be achieved.

B1. Total Volatile Organic Compounds (TVOCs)

B2. Formaldehyde (HCHO)

B3. Products of Combustion:

i) Carbon Monoxide (CO)

ii) Nitrogen Dioxide (NO<sub>2</sub>)

B4. Respirable Suspended Particulate (RSP, PM<sub>10</sub>)

B5. Ozone

Measurements shall take place during normally occupied period.

**Documentation**

Credit(s) shall be achieved when the Applicant provides the documentation stated below, to demonstrate compliance:

**A. Design Approach**

- i. summary table listing the materials used, identifying the emissions rates for materials in classes A2 and A4, the permitted emissions limit for each of the materials as specified in referenced documents, and details of the source data (e.g. manufacturer data sheets);
- ii. Specifications for the materials/components as they appear in construction documents;
- iii. Confirmation of compliance with the relevant standard/emissions criteria.

**B. Measurement Approach**

- i. The method statement of IAQ measurement;
- ii. Measurement report issued by an HKAS accredited IAQ Certificate Issuing Body with measurement methodology, number of sampling points required under IAQ Certification Scheme, measuring date, time and conditions of the interiors space, the measurement results and the calibration certificates of the measuring equipment; or
- iii. Alternatively, IAQ Certificate issued by Environmental Protection Department for demonstrating compliance.

**COMMON IAQ POLLUTANTS**

All materials that emit contaminants that can enter the indoor air in interior spaces are considered as indoor contaminants. Surfaces and materials that can emit contaminants into the indoor air include flooring, ceilings and ceiling systems, walls, fittings, finishes,

ventilation system surfaces and components, and materials in cavities and chases, including caulking materials for insulation and sealing purposes.

The Indoor Air Quality Information Centre website indicates the major emission sources, health effect and the mitigation measures of different IAQ pollutants [3].

**IAQ CERTIFICATION  
SCHEME**

EPD has launched the IAQ Certification Scheme in 2003 in order to improve the indoor air quality and promote public awareness of the importance of IAQ. There are two objectives of the Certification Scheme: a.) to recognise good IAQ management practice and b.) to provide incentives for owners of premises / buildings or property management companies to pursue the best level of IAQ.

More details can be found in EPD website [4].

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- 3 Indoor Air Quality Information Centre Website  
<http://www.iaq.gov.hk/second.asp?page=iaq&sub=pollutant>
- 4 Indoor Air Quality Information Centre Website  
<http://www.iaq.gov.hk/second.asp?page=scheme&sub=background>

## **IEQ 2 INDOOR PLANTING**

<b>EXCLUSION</b>	None.
<b>OBJECTIVE</b>	Improve the indoor air quality and enhance the productivity.
<b>CREDIT ATTAINABLE</b>	2
<b>CREDIT REQUIREMENT</b>	1 credit for fulfilled at least 2 of prescribed features; 2 credits for fulfilled at least 4 of prescribed features;
<b>ASSESSMENT</b>	Plant species shall be carefully selected, and suited for indoor environment  <u>Criteria</u> <ul style="list-style-type: none"><li>i. The minimum density is one large plant (300mm pot) or two small plants (200mm pot) per two workstations;</li><li>ii. Green wall of at least 5m<sup>2</sup> is provided;</li><li>iii. Horticultural Maintenance Plan shall be in place for effective communication and ensure the health of the plants is maintained;</li><li>iv. No herbicides and pesticides are applied to the plants;</li><li>v. No electricity, from fossil fuelled generation, is used to maintain and for the growth of the plants.</li></ul>
<b>Documentation:</b>	Credit(s) shall be achieved when the Applicant provides the documentation stated below, to demonstrate criteria compliance: <ul style="list-style-type: none"><li>i. summary table that includes the total number of the plants and species;</li><li>ii. drawing, layout plans for the plants or green walls;</li><li>iii. calculation showing the density of the plant is adequate;</li><li>iv. A statement from plant supplier that the plants selected are suitable to be planted in indoor environment;</li><li>v. A Horticultural Maintenance Plan in one A-4 page which addresses, in minimum, the location of the plants, the watering and cleaning requirements, identification of plant disease and plant replacement regime etc.;</li><li>vi. A statement from the Applicant to substantiate that no herbicides and pesticides are applied to the plants;</li><li>vii. A statement from the Applicant or photos to substantiate that no electricity from fossil fuelled generation is used to maintain and for the growth of the plants.</li></ul>
<b>BACKGROUND</b>	<p>There are many benefits for indoor planting, plants not only bring a feeling of refreshment to the occupants, but also absorb indoor pollutants such as carbon dioxide. In return they emit oxygen in the surroundings and help in cleansing the indoor air.</p> <p>According to some research studies, offices with indoor planting can reduce the rate of absenteeism and enhance in the creativity and productive of the employees.</p>

**IEQ 3 MINIMUM VENTILATION PERFORMANCE**

<b>EXCLUSION</b>	None.
<b>OBJECTIVE</b>	Ensure that a minimum quality and quantity of outdoor air is supplied to spaces in the project in order to support the well-being and comfort of occupants.
<b>CREDIT ATTAINABLE</b>	1
<b>CREDIT REQUIREMENT</b>	1 credit for demonstrating that the project is in compliance with the minimum requirements of ANSI/ASHRAE 62.1-2010 [1] in respect of Outdoor Air Quality and Minimum Ventilation Rate.  Alternative  1 credit for demonstrating that carbon dioxide level within the project space can comply with Good Class requirement as stipulated in IAQ Certification Scheme.
<b>ASSESSMENT</b>	<p><u>Criteria</u></p> <ul style="list-style-type: none"><li>i. The Applicant shall conduct the air measurement at the intake location to check whether the outdoor air pollutants including Carbon Monoxide (CO), Nitrogen Dioxide (NO<sub>2</sub>), Ozone (O<sub>3</sub>) and Respirable Suspended Particulates (RSP) conform to IAQ Certification Scheme Good Air Quality level.</li><li>ii. The Applicant shall demonstrate that the ventilation rate complies with ASHRAE 62.1-2010's requirement.</li></ul> <p><u>Documentation</u></p> <p>Credit shall be achieved when the Applicant provides the documentation stated below, to demonstrate compliance:</p> <ul style="list-style-type: none"><li>i. Report CO, NO<sub>2</sub>, O<sub>3</sub> and RSP at each outdoor air intake;</li><li>ii. Completion Table H-3 ASHRAE 62.1-2010 demonstrating compliance with the minimum ventilation rate(s).</li></ul> <p>Alternative:</p> <ul style="list-style-type: none"><li>i. IAQ Certificate Good Class issued by Environmental Protection Department.</li></ul>
<b>BACKGROUND</b>	The purpose of this credit is to provide the minimum outdoor air ventilation to provide for the control of odours, that is, the supply, distribution and control of ventilation to maintain the carbon dioxide (CO <sub>2</sub> ) levels within design targets in normally occupied spaces, and the control of indoor pollutants such as TVOCs, formaldehyde, etc.

1 ANSI/ASHRAE 62.1-2010. Ventilation for Acceptable Indoor Air Quality. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.

#### **IEQ 4 PRE-OCCUPANCY FLUSH OUT**

<b>EXCLUSION</b>	None.
<b>OBJECTIVE</b>	Reduce the potential for indoor air quality problems resulting from the construction or renovation process.
<b>CREDIT ATTAINABLE</b>	1
<b>CREDIT REQUIREMENT</b>	1 credit for undertaking flush-out of normally occupied project spaces <u>prior to occupancy</u> .
<b>ASSESSMENT</b>	<p><b>Criteria</b></p> <p>Following completion of construction and all interior finishes and after the installation of all fixed furniture and furnishings, the occupied spaces should be flushed out to remove the contaminants.</p> <p>The flushing duration can be determined by the Applicant and subject to calculation of fresh air required to achieve the IAQ Certification Good Class requirements. During the flushing period, there should be no construction or renovation activities in the vicinity of the space being flushed.</p>
<b>Documentation</b>	Credit shall be achieved when the Applicant provides the documentation stated below, to demonstrate compliance:
	<ul style="list-style-type: none"><li>i. calculation showing the fresh air required for flushing can comply with IAQ Good Class requirements;</li><li>ii. method statement, with details of the flush out procedures;</li><li>iii. record photographs, taken during flush-out period;</li><li>iv. logbook with date, outdoor delivery rates, flushing duration, internal temperature, humidity shall be indicated;</li></ul>
<b>BACKGROUND</b>	<p>This compliance path uses the building HVAC&amp;R system to evacuate airborne contaminants. The flush-out may begin only after all construction works and finishes are completed; all cleaning finalised and all fixed furniture installed. Final test and balancing should be completed and HVAC&amp;R control should be functional, particularly if the occupants will be moving in during the second phase of flush-out.</p> <p>The flush-out procedure assumes the use of the building's HVAC&amp;R system, but alternatives are acceptable providing they meet the air quantity, temperature and humidity requirements.</p> <p>One approach uses temporary supply and exhaust systems placed into windows or window openings. EPA's indoor air quality for schools website [1] provides information on exhaust and spot ventilation during construction activities that can be helpful for design teams who are considering using this approach.</p> <p>Care must be taken to ensure the airflow is not short circuited, potentially leaving remote corners within the project spaces with less than adequate circulation, or other parts of the building with unanticipated increases, such as a stack effect up elevator shafts.</p> <p>If the interior's HVAC&amp;R system is used, any temporary filters and</p>

1 EPA IAQ Design Tools for Schools, Controlling Pollutants and Sources Section 5 Ventilation Techniques.  
<http://www.epa.gov/iaq/schooldesign/controlling.html#Ventilation Techniques>

duct coverings installed shall be removed. The filtration media shall be replaced with new media unless the system is configured such that filters filter only the outside air. The new filters installed prior to the start of flush-out must be MERV 13 or better.

Depending upon the season, outside air can be cold or humid. Appropriate internal temperature and relative humidity shall be maintained during flush-out procedure.

### **IEQ 5 TENANT EXHAUST**

<b>EXCLUSION</b>	None.
<b>OBJECTIVE</b>	Prevent exposure of occupants to concentrated indoor sources of pollutants.
<b>CREDIT ATTAINABLE</b>	1
<b>CREDIT REQUIREMENT</b>	1 credit for the provision of independent exhaust system for all photocopy / printing rooms and locations where significant indoor pollution sources are generated.
<b>ASSESSMENT</b>	<p><u>Criteria</u></p> <p>The Applicant shall provide independent exhaust to all photocopy / printing rooms and locations with significant indoor pollution sources with sufficient exhaust rate. On the other hand, the Applicant shall ensure the discharge of the exhaust louvres shall not face or at a minimum distance of 7m to other intake location points or louvres.</p> <p><u>Documentation</u></p> <p>Credit shall be achieved when the Applicant provides the documentation stated below, to demonstrate criteria compliance:</p> <ul style="list-style-type: none"><li>i. drawings, with location layout, sections, elevations for each rooms, including E&amp;M layout drawings, and associated ductwork layouts;</li><li>ii. fan schedules;</li><li>iii. calculation that exhaust rate of 2.5 litres per second/sqm is achieved;</li><li>iv. commissioning records;</li><li>v. record photographs;</li></ul> <p>NOTE: Record photographs shall be required during the progress of the works for installations and systems that will be subsequently covered up or concealed;</p> <p><b>BACKGROUND</b></p> <p>Concentrated airborne contaminants are best removed close to their sources. The provision of independent exhaust, segregated from general ventilation, is an appropriate strategy.</p> <p>Photocopiers and printers emit contaminants such as ozone and particulates and should be housed in dedicated rooms that are not normally occupied.</p> <p>ANSI/ASHRAE 62.1-2010 [1] designates the air quality in copy and print rooms as air class 2 and it is therefore inappropriate to re-circulate with occupied areas of the building. ANSI/ASHRAE 62.1-2010 recommends an exhaust flow rate of 2.5 l/s/m<sup>2</sup>.</p>

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1 ANSI/ASHRAE 62.1-2010. Ventilation for Acceptable Indoor Air Quality. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.

## **IEQ 6 UNCONTROLLED VENTILATION**

<b>EXCLUSION</b>	None.
<b>OBJECTIVE</b>	Reduce uncontrolled air movement in or out of premises, thereby provide better control over background ventilation through purposely provided openings and reduce infiltration of contaminated air.
<b>CREDIT ATTAINABLE</b>	1
<b>CREDIT REQUIREMENT</b>	1 credit for testing project space using a non-balanced test method to demonstrate air leakage;
<b>ASSESSMENT</b>	<p><u>Criteria</u></p> <p>The Applicant shall conduct on-site testing in accordance with ASTM E779 [1] and demonstrate the testing result can comply with air leakage rates as stipulated in CIBSE TM23:2000 [2].</p> <p>For all test methods, the arithmetic mean of the air leakage rates measured under pressurisation and depressurisation at 50 Pa should be normalised to the external surface area of the whole building or unit to give the air leakage rate in <math>\text{m}^3 \text{ m}^{-2} \text{ h}^{-1}</math> of external envelope.</p>
<b>BACKGROUND</b>	<p><u>Documentation</u></p> <p>Credit shall be achieved when the Applicant provides the documentation stated below, to demonstrate compliance:</p> <ul style="list-style-type: none"><li>i. method statement;</li><li>ii. drawings, floor plan;</li><li>iii. testing report, details of the fan and results;</li><li>iv. record photographs;</li></ul> <p>Air movement between indoors and outdoors occurs as a result of differentials between indoor and outdoor air pressure caused by winds and stack effect. Poor building detailing, services penetrations and gaps around windows in a building envelope will result in air leakage, either infiltration or exfiltration. This results in a loss of conditioned air or an unwanted gain of unconditioned air, and resultant heat losses or heat gains in occupied rooms. These losses reduce the user's control over ventilation through purposely provided ventilators. Infiltration can increase the levels of outdoor pollutants that enter indoors. Infiltration can be reduced through good detail design, sealing of services penetrations and properly installed high-quality window systems with effective sealing of cracks and joints.</p> <p>The air tightness of the building envelope can be investigated using a fan (or fans) mounted in a suitable aperture such as a door or window to create an induced pressure difference across the envelope. The test should be carried out under low wind and stack conditions so that the induced pressure difference is uniformly distributed over the building envelope.</p> <p>ASHRAE RP 935 details several methods for testing tall buildings. A modification to one test method (floor by floor method) is to simultaneously pressurise the floors above and below the test floor, i.e. simultaneously pressurise 3 adjacent floors. If the flow rates are</p>

1 ASTM E779. Standard Test Method for Determining Air Leakage Rate by Fan Pressurization. 1999.  
2 CIBSE TM23:2000. Testing Buildings for Air Leakage, London. 2000.

adjusted so that there is no differential pressure between the middle and the upper and lower floors there will be no cross leakage from the middle floor. The measured air leakage rate will therefore be the envelope leakage for that floor.

Some example good practice target values (at 50 Pa) are [3]:

Air-conditioned offices	$5 \text{ m}^3 \text{ m}^{-2} \text{ h}^{-1}$
Naturally Ventilated offices	$10 \text{ m}^3 \text{ m}^{-2} \text{ h}^{-1}$
Superstores	$5 \text{ m}^3 \text{ m}^{-2} \text{ h}^{-1}$

The measured values quoted are the arithmetic mean of the air leakage rates measured for pressurisation and depressurisation tests. It follows that the air leakage rate measured under unbalanced conditions will be an over estimate of the air leakage through the envelope by an amount depending on the degree of leakage to neighbouring units.

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3 Bahnfleth W P, Yuill G K, Lee B W. Protocol for Field Testing of Tall Buildings to Determine Air Leakage Rate. ASHRAE Transactions. 1999. pp27-38.

### **IEQ 7 THERMAL COMFORT**

<b>EXCLUSION</b>	None.
<b>OBJECTIVE</b>	Ensure the thermal comfort of the occupants.
<b>CREDIT ATTAINABLE</b>	3
<b>CREDIT REQUIREMENT</b>	<p>a) Temperature 1 credit for demonstrating the air temperature within the project space is <math>\pm 1.5^{\circ}\text{C}</math> of the set temperature when the air side system is operating at steady state under normal occupied periods.</p> <p>b) Relative Humidity 1 credit for demonstrating the relatively humidity within the project space is less than 70%.</p> <p>c) Air Movement 1 credit for demonstrating the air movement within the project space is less than 0.3m/s.</p>
<b>ASSESSMENT</b>	<p><b>Criteria</b> The measurement report shall be prepared and endorsed by Indoor Air Quality Certificate Issuing Bodies (CIB). The measurement protocols such as the equipment used, measurement methodologies, number of points required and the contents of the report shall in accordance with the Guidance Notes for the Management of Indoor Air Quality in Offices and Public Places issued by The Government of the Hong Kong Special Administrative Region [1].</p> <p><b>Alternative:</b> The Applicant can present a valid IAQ Certificate for the project space issued by EPD to demonstrate compliance</p> <p><b>Documentation</b> Credit(s) shall be achieved when the Applicant provides the documentation stated below, to demonstrate criteria compliance:</p> <ul style="list-style-type: none"><li>i. summary table, measurements and locations;</li><li>ii. drawings, floor plan layout, sections, elevations indicating test points;</li><li>iii. site measurement report endorsed by a CIB;</li></ul> <p>Alternative:</p> <ul style="list-style-type: none"><li>i. IAQ Certificate issued by Environmental Protection Department for demonstrating compliance;</li></ul>
<b>BACKGROUND</b>	Air temperature has the most direct effect on thermal comfort. The air temperature of the indoor environment is influenced by factors such as the temperature control of the air-conditioning, solar heat gain, other heat sources such as lighting, electrical equipment, computers and water heaters, and humidity. Consideration should also be given to variations in temperature within

1 Guidance Notes for the Management of Indoor Air Quality in Offices and Public Places, Indoor Air Quality Management Group, The Government of the Hong Kong Special Administrative Region.  
<http://www.iaq.gov.hk/cert/doc/GN-eng.pdf>

rooms served by a single thermostat. Temperature between rooms or locations within a room may vary due to large window areas, or large vertical surfaces (which may create convection currents resulting in cold air at floor level), causing discomfort for some occupants. The temperature level at which people feel comfortable will depend on activity levels, clothing, age and natural body temperature which will vary from individual to individual, and seasonal conditions.

Humidity influences thermal comfort by affecting the human body's ability to lose body heat through perspiration. In humid conditions it is more difficult to lose heat, the effect is therefore the same as raising the temperature and people feel "sticky". High humidity also encourages the growth of mildew and other fungi on building fabric and furnishings. Furthermore if the humidity is too low it can cause eyes, nose or throat to dry which may lead to discomfort, irritation and increased susceptibility to infection. Extremely low humidity can cause static electricity which is uncomfortable for occupants and can affect the operation of computers.

A certain amount of air movement round the human body is essential for thermal comfort. It is also important in dispersing air pollutants. The required level of airflow depends on the air temperature and humidity. In the hot and humid summer months, for example, greater air movement can help produce a more comfortable environment.

Airflow is determined by ventilation and convection currents (created by hot air rising and cool air falling) in a room. Blocked or unbalanced ventilation systems, or too low pressure levels in ventilation ducts may restrict air movement, producing a "stuffy" atmosphere which makes occupants feel uncomfortable.

Airflow is also sensitive to changes in room occupancy; installation or removal of partitions, walls, the size, quantity, arrangement of office equipment and furniture, and building use. Too much air movement results in draughts and excessive cold.

### **IEQ 8 INTERIOR LIGHTING QUALITY**

<b>EXCLUSION</b>	None.
<b>OBJECTIVE</b>	Ensure the adequacy and maintenance of visual comfort conditions achieved by the electric lighting provisions in the occupied space.
<b>CREDIT ATTAINABLE</b>	3
<b>CREDIT REQUIREMENT</b>	3 credits where the uniformity, glare index and colour rendering index (1 credit for each parameter) at all workstations or working zone can comply with CIBSE requirements [1].
<b>ASSESSMENT</b>	<u>Criteria</u>  Compliance with the assessment criteria shall be demonstrated either by measurements using a standardised measurement protocol appropriate to the parameter being assessed, and/or by modelling (calculation), providing the calculation method or software used is based on a standardised method, and uses data/assumptions appropriate to the circumstances.
	<u>Documentation</u>  The Applicant shall provide the following documentation to demonstrate compliance: <ol style="list-style-type: none"><li>i. summary table with uniformity, glare index and colour rendering index (by measurements or simulations) for each location;</li><li>ii. drawings, layout plan showing all workstations, working zone;</li><li>iii. site measurements;</li><li>iv. Catalogues or other supporting documents showing that the colour rendering index of the lighting system.</li></ol>
<b>MEASURED PERFORMANCE</b>	For lighting installations that are already installed, horizontal and vertical illuminance and luminance can be measured using a lux meter and a luminance meter.  The colour quality of lamps can be judged from the lamp specifications. Colour appearance (correlated colour temperature) can be checked from the specification provided by the suppliers.
<b>COMPUTATION</b>	The illuminance variation consists of 'uniformity' which is concerned with illuminance conditions on the task and immediate surroundings, and 'diversity' which expresses changes in illuminance across a larger space.  The uniformity can be calculated according to that described in Section 4.5.4 of the Code. The calculated uniformity (minimum to average illuminance) over any task area and immediate surround should not be less than 0.8.  The glare index can be calculated according to either of the two methods described by CIE [2], or the CIBSE Technical Memoranda

1 The Chartered Institution of Building Services Engineers. Code for Interior Lighting. London. CIBSE.

[3]. These methods are also summarised in Section 4.5.6 of the CIBSE Code.

The calculated glare index shall be checked for compliance with the recommendations given in Section 2.6.4 of the Code or Chapter 5 of the Lighting Guide.

For assessment using the IESNA Lighting Criteria, the calculation methods described in Chapter 9 of the IESNA Lighting Handbook can be used for the calculation of the following parameters:

- i. horizontal and vertical illuminance;
- ii. glare: VCP or UGR;
- iii. luminance;

A validated computer programme such as Radiance, Lightscape etc. can be used for the calculation. The calculated results will then be checked for compliance.

#### **BACKGROUND**

Lighting quality is a complicated subject and is an integration of task performance, visual comfort, social communication, mood, health, safety and well-being and aesthetic judgement. It is also related to economics and the environment in respect of the installation, maintenance and operation of the lighting system.

The uniformity of illuminance distribution on the task area and its surrounding area have a great impact on how quickly, safely and comfortably a person perceives and carries out a visual task. A task area is not usually the entire area of a workstation. On an office desk, for example, the task area may only be about the size of a desk blotter, but in interiors such as drawing offices the visual task may cover the whole area of a drawing board. Where task areas may be located anywhere over an area of a room, the recommendation applies to all potential task areas within that area.

Glare is another important factor which affects lighting quality. It describes the sensation produced by bright areas in the field of view, and may be experienced either as discomfort glare or as disability glare. In any proposed lighting installation, the likelihood of discomfort glare being experienced can be estimated by calculating the unified glare rating (UGR).

It is also important for visual performance and the feeling of comfort when objects and human skin are rendered naturally and correctly. To provide an objective indication of the colour rendering properties of a light source, the general colour-rendering index, Ra, has been introduced. The maximum value of Ra is 100, which stands for the quality of natural light, and this figure decreases with decreasing colour-rendering quality.

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2 Commission Internationale de l'Eclairage (CIE). Maintenance of indoor electric lighting systems. CIE Technical Report - Publication No. 97. Vienna. The Chartered Institution of Building Services Engineers. Code for interior lighting. London.  
3 The Chartered Institution of Building Services Engineers. Technical Memoranda TM10. Calculation of glare indices. London, CIBSE, 1985.

### **IEQ 9 NATURAL LIGHTING**

<b>EXCLUSION</b>	None.
<b>OBJECTIVE</b>	Encourage a holistic examination of interior layout, building design, and fenestration design, such as to maximise access to daylight for the purposes of improved health and comfort.
<b>CREDIT ATTAINABLE</b>	2
<b>CREDIT REQUIREMENT</b>	1 credit where 75% of workstations or seating are located in an area of floor plate that has a natural light illuminance level of 100 lux. 2 credits where 85% of workstations or seating is located in an area of floor plate that has a natural light illuminance level of 100 lux.
<b>ASSESSMENT</b>	<p><u>Criteria</u></p> <p>The credit(s) can be achieved by either measurement or computer modelling.</p> <p>The Applicant can simply use a lux meter to measure the illuminance levels at all workstations when all artificial lighting is switched off at noon time and under sunny day condition.</p> <p><u>Alternative</u></p> <p>The Applicant can use computer software such as Radiance to simulate the illuminance level under overcast sky condition. The report submitted shall identify the key parameters used in the computations/modelling, especially with regard to glazing transmittance, and the reflectance's of external and internal surfaces. The values of the parameters shall reflect the nature and type of surfaces on the external vertical obstructions and horizontal surfaces, and likely internal finishes. In addition, to ensure a realistic result that reflects the urban density of Hong Kong, surrounding buildings shall be included in the model.</p> <p><u>Documentation</u></p> <p>Credit(s) shall be achieved when the Applicant provides the documentation stated below, to demonstrate criteria compliance:</p> <ul style="list-style-type: none"><li>i. summary table showing the measurement, date, time, sky conditions, percentage of compliance;</li><li>ii. drawings, interior layout plan;</li><li>iii. site measurement with calibrated device;</li><li>iv. record photographs;</li></ul> <p>Alternative:</p> <ul style="list-style-type: none"><li>i. Computer modelling report;</li><li>ii. Information showing the transmittance of the glazing;</li><li>iii. Schedule of internal finishes used in the modelling;</li><li>iv. Summary table showing the percentage of compliance.</li></ul>

**BACKGROUND**

Access to daylight is an important aspect of comfort and health. Critical to providing sufficient daylight is the provision of a view of the sky. The amount of daylight available for specific rooms is related to:

- i. window and room geometry and room surface finishes;
- ii. sky obstruction due to the form of the building and its overshadowing from neighbouring buildings;
- iii. glazing transmittance;

In Hong Kong's congested built form rooms on lower floors of buildings may be considerably overshadowed by adjacent structures. This can significantly reduce natural light, incur electricity consumption for artificial lighting, and degrade internal comfort and health conditions. It is possible to take into account the overshadowing by adjacent buildings using appropriate design tools.

### **IEQ 10 VIEWS TO OUTSIDE**

<b>EXCLUSION</b>	None.
<b>OBJECTIVE</b>	Provide occupants in normally occupied spaces with a connection to the outdoors.
<b>CREDIT ATTAINABLE</b>	2
<b>CREDIT REQUIREMENT</b>	1 credit for at least 60% of all workstations or seating have a direct line of sight to external vision glazing or naturally lit internal courtyard or atrium. 2 credits for at least 80% of all workstations or seating have a direct line of sight to external vision glazing or naturally lit internal courtyard or atrium.
<b>ASSESSMENT</b>	<p><b><u>Criteria</u></b></p> <p>The assessment is focused toward workplaces such as offices, schools, and retail etc., where connection to the outside is regarded as important for comfort and productivity. Interior spaces that need not be considered include public corridors, lift lobbies, conference rooms, storage areas, printing rooms, plant rooms, and server rooms.</p> <p>On the plan view sight lines shall be drawn from each workstation or seating location to the exterior vision glazing. In section view, direct sight lines shall be drawn for each workstation or seating from a point 1.2m above the floor (Fig. 1).</p> <p>The project workstations or seating shall be within 8m of the nearest vision glazing and have a direct line of sight at seated eye level of 1.2m of the vision glazing. The view shall be either through an external window providing a view of landscape, streetscape or buildings, or atrium (atrium shall mean a naturally lit atrium, or internal courtyard, not less than eight (8) metres wide).</p> <p>The view can be an internal view across a space providing the Applicant can provide photos that the interior layout shall be such that views will not be impaired once all <u>walls</u>, <u>partitions</u> and furniture has been installed.</p> <p><b>IMPORTANT NOTE:</b> All submissions comprising several type of data, for example, table, layout drawings, elevations, photographs and other data, shall be clearly labelled and cross-referenced.</p> <p><b><u>Documentation</u></b></p> <p>Credit(s) shall be achieved when the Applicant provides the documentation stated below, to demonstrate criteria compliance:</p> <ol style="list-style-type: none"><li>i. summary table with location, distances;</li><li>ii. drawings, floor layout plan, elevations</li><li>iii. workstations or seating clearly indicated;</li><li>iv. record photographs;</li></ol>
<b>BACKGROUND</b>	A very important psycho-emotional factor for building occupants who remain indoors for long periods is the visual contact with the exterior. The ability to focus the eyes on a distant view provides for relaxation.

An investigation [1] into the potential contributions of windows and daylight to improved performance by office workers found that having a better view out of a window was consistently associated with better worker performance. Office workers were found to perform 10% to 25% better on tests of mental function and memory recall when they had the best possible view versus those with no view. Furthermore, office worker self reports of better health conditions were strongly associated with better views. Reports of increased fatigue were most strongly associated with a lack of view.

For students, findings [2] clearly support the theory that interesting views to outside enhance, rather than detract, from student learning.

An appropriate approach to interior fit-out is to arrange high height panels and similar obstructions perpendicular to vision glazing, with low height or suitably glazed (clear) panels arranged parallel with the vision glazing in order to maintain views to the outside for workstations located away from exterior walls.

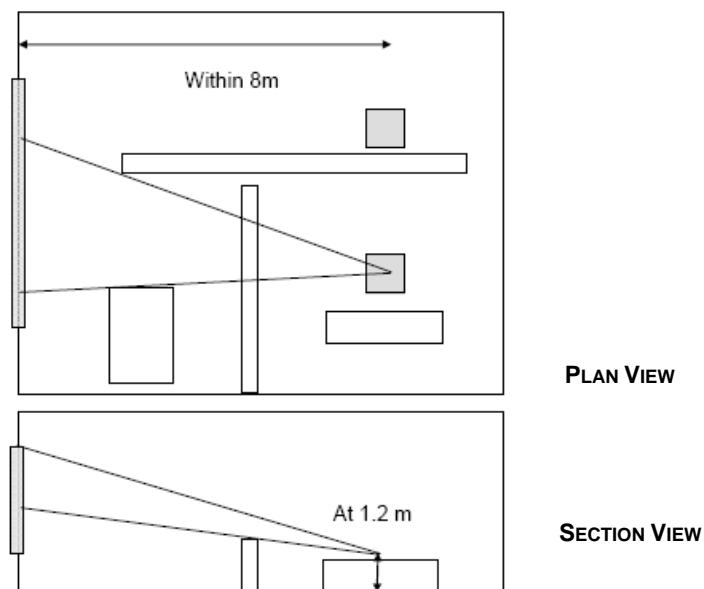


Fig. 1. Determination of viewable vision glazing for each workstation

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- 1 California Energy Commission. Windows and Offices: a Study of Office Worker Performance and the Indoor Environment. 2003.
  - 2 California Energy Commission. Windows and Classrooms: A Study of Student Performance and the Indoor Environment, 2003.

### **IEQ 11 ACOUSTICS**

<b>EXCLUSION</b>	None.
<b>OBJECTIVE</b>	Encourage comfortable acoustic environment for occupants.
<b>CREDIT ATTAINABLE</b>	3
<b>CREDIT REQUIREMENT</b>	<p>1 credit for demonstrating background noise levels are within the prescribed criteria to ensure the well-being of the occupant.</p> <p>1 credit for demonstrating that the reverberation time in applicable areas meets the prescribed criteria for given types of premises to ensure the speech clarity.</p> <p>1 credit for demonstrating airborne noise isolation between rooms, spaces and premises meets the prescribed criteria to ensure the speech privacy.</p>
<b>ASSESSMENT</b>	<p><u>Criteria</u></p> <p>A. Internal Noise level:</p> <ul style="list-style-type: none"><li>i. Classrooms - NC 35</li><li>ii. Conference rooms - NC 35</li><li>iii. Offices - NC 40</li><li>iv. Retail shops and restaurants - NC 45</li><li>v. Hotel rooms and serviced apartments - NC 35</li><li>vi. Function, multi-function, and activity rooms - NC 45</li></ul> <p>Note: If on-site measurement is adopted, the measurement should be based on an equivalent continuous sound level of 5 minutes [L<sub>eq</sub> (5mins)] with the HVAC&amp;R system operating under normal condition.</p> <p>B. Reverberation time:</p> <p>The average reverberation time for mid frequencies (500Hz, 1kHz and 2kHz), shall not exceed:</p> <ul style="list-style-type: none"><li>i. Classrooms - 0.6s</li><li>ii. Conference rooms - 0.6s</li><li>iii. Offices - 0.6s</li><li>iv. Retail shops, and restaurants - 1s</li><li>v. Hotel rooms and service apartments - 0.4 to 0.6s</li><li>vi. Function, multi-function and Activity rooms - 0.6s</li></ul> <p>C. Air-borne noise isolation:</p> <ul style="list-style-type: none"><li>i. Between 2 classrooms - STC 37</li><li>ii. Between 2 conference rooms and office/conference - STC 48</li><li>iii. Between 2 offices – STC 48</li><li>iv. Between 2 retail shops - STC 48</li><li>v. Between 2 hotel rooms or serviced apartments - STC 52</li><li>vi. Between 2 function or activity rooms - STC 52</li></ul>

When the most appropriate criteria for room type is not stated in the Manual, the Applicant shall select appropriate criteria, and provide supporting documentation to justify same.

Compliance shall be demonstrated by detailed calculation, or measurement, or both, depending on the Applicant's preference.

#### Reverberation Time

The reverberation time shall be assessed using Sabine's formula [1] or similar alternative taking into account the room details and appropriate assumptions about the materials in the space.

Measurements during commissioning shall use the method given in ISO 3382 [2] or equal equivalent. The submission shall include at least one sample of each type of occupied space

#### Airborne Isolation

The Applicant shall submit a schedule of the rooms in the project space, the noise isolation criteria adopted, relevant construction details as they impact on noise isolation, the rooms/premises subject to field tests or for which detailed calculations/simulations have been made, underlying assumptions, and the results of tests or calculations/simulations demonstrating compliance with the criteria

#### Internal Noise level

The Applicant shall submit calculations or site measurements should include at least one sample of each type of occupied space, taking account the worst case condition of exposure to noise source external to the space, and undertaken during periods appropriate to the usage pattern for the space. Measuring equipment shall conform to the accuracy requirements given in IEC 60804 to type 2 or better, or equal equivalent standard.

Only the noise from and related to, the Building Services equipment shall be assessed.

#### Documentation

Credit(s) shall be achieved when the Applicant provides the documentation stated below, to demonstrate compliance:

- i. drawing, floor plan layouts highlighting measurement locations;
- ii. measurement, reverberation time
- iii. measurement, NC level measurement;
- iv. calibration certificate for all sound level meters;
- v. calculations, reverberation time, absorption coefficients;
- vi. calculations, NC level;
- vii. calculations, airborne isolation, construction details for the walls;
- viii. technical data sheets;

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1 I.Sharland. Woods practical guide to noise control. Colchester, England.

2 International Standard Organization. ISO 3382. Acoustics - Measurement of the reverberation time of rooms with reference to other acoustical parameters.

## **BACKGROUND**

The internal noise levels in occupied spaces are important to the well-being of a person. It can have major impacts on the concentration and productivity of the occupants. Higher noise levels may lead to hearing impairment and health hazard. An important first step in architectural acoustic design is to identify appropriate values of reverberation time for the intended use of a room and then to specify materials to be used in the construction which will achieve the desired value of the reverberation time for a given space and use. The focus for BEAM is on the acoustic qualities in workplaces such as offices and classrooms, libraries, and retail, etc.

Room acoustics is complex, and defining performance with a single metric is problematic, an important acoustic measurement is the reverberation time.

It is used to determine how quickly sound decays in a room, and offers a relatively simple assessment of acoustical design.

Another problem is noise transmitted between spaces, through walls and through floors, which are not addressed under the local Building Regulations, but have been a matter for legislation elsewhere. The extent to which walls and floor can attenuate unwanted noise from neighbours and neighbouring spaces is an important aspect of controlling noise levels in interior spaces.

As far as airborne noise transmission is concerned the weakest link in the chain occurs around gaps, openings and penetrations through the envelope, typically including ventilation system, conduits, recessed conduit boxes installed back to back, access panels, and doors.

Further guidance on the design of walls and floors, and guidelines for assessing performance is available in the literature [3].

<b>8 INNOVATION</b>	<b>IV 1 Innovative Techniques</b> <b>IV 2 Performance Enhancements</b>
<b>INTRODUCTION</b>	<p>This Innovation category provides two options for this special award, these are called Innovative Technique or Performance Enhancement.</p> <p>The Applicant shall be solely responsible to submit quantitative evidence for BSL TRC review and approval.</p> <p>Generally the submission materials shall comprehensively detail the benefits, environmental impact averted, or exemplary performance achieved compared to existing criteria.</p> <p>Important Note: The Applicant shall expressly state the full extent, scope, and coverage of the intended Innovation submission.</p>
<b>POINTS</b>	Maximum 10 Innovation points in this section.
<b>IV 1 INNOVATIVE TECHNIQUES</b>	<p>Innovation means advanced practices and new technologies that have not hitherto found application in Hong Kong. Points gained under this heading shall be regarded as 'Innovations', counting towards the total obtained, but not towards the total points available, a maximum of ten (10) points are possible.</p> <p>Innovation also covers innovative and/or unconventional designs, construction techniques, or provisions for operation that will improve the environmental performance of the premises during any part of its life cycle.</p> <p>Submissions that do not provide detailed and comprehensive information, method statements, "quantified" emission reductions and or avoided impacts, no matter how obvious, cannot be assessed.</p>
<b>OBJECTIVE</b>	Actively encourage design, and adoption of practices, new technologies and techniques that have yet to find application in Hong Kong.
<b>ASSESSMENT</b>	<p>The onus will be on the Applicant to present the evidence of the application of new practices, technologies and techniques and the associated benefits. The benefits related to sustainable living, sustainable workspace, lower energy use, materials use, improved comfort, lower water consumption, reduced pollution are all encouraged.</p> <p>The Applicant's submission shall identifies the intent of the proposed innovative technique, the proposed criteria for assessing compliance, and the assessment criteria. The Assessor shall refer the proposal to BSL TRC who will consider each application on its merit.</p> <p>Innovations shall be granted at the sole discretion of BSL TRC.</p>
<b>FEATURES CONSIDERED AS INNOVATIONS</b>	<p><a href="#">Appendix 9.4</a> in this Manual provides a list of features that would be favourably considered as an Innovation.</p>
<b>IV 2 PERFORMANCE ENHANCEMENTS</b>	<p>A second option to achieve recognition is providing systems with exemplary performance, i.e. strategies and techniques that at least exceed 50% of the requirement stipulated in this Manual.</p> <p>For example, equipment or features that result in significantly higher levels of service, energy, water or materials savings. Any points gained under this heading shall be regarded as 'Innovation', counting towards the total points obtained, but not towards the total credits obtainable.</p>
<b>OBJECTIVE</b>	Encourage adoption of practices, technologies and techniques that

provide for exemplary performance, over and above the criteria identified in the BEAM Plus Interiors manual.

**ASSESSMENT**

The Applicant shall provide a submission for each point which shall identifies the application, level of performance, and records to substantiate the achievement. The onus is on the Applicant to present evidence of the performance compared to the existing criteria.

The Assessor will refer the proposal to the BSL TRC who will consider each application on its merits.

Submissions that do not provide detailed and comprehensive information, method statements, "quantified" emission reductions or avoided impacts, no matter how obvious, cannot be assessed.

**9 APPENDICES**

- 9.1 Assessment Framework of Energy Performance**
- 9.2 Provisions for Energy Management**
- 9.3 Assumptions and Baselines for Water Consumption**
- 9.4 Features Considered as Innovations**
- 9.5 Abbreviation**
- 9.6 Glossary**
- 9.7 Feedback Form**
- 9.8 Submission Templates**

<b>9.1 ASSESSMENT FRAMEWORK OF ENERGY PERFORMANCE</b>	<b>9.1.1 Energy Assessment Framework</b> <b>9.1.2 Energy Assessment Approaches</b> <b>9.1.3 Performance-based Approach</b> <b>9.1.4 Prescriptive-based Approach</b>
<b>9.1.1 ENERGY ASSESSMENT FRAMEWORK</b>	The assessment framework described herein applies to all space types: <ul style="list-style-type: none"><li>i. those that are air-conditioned throughout the year;</li><li>ii. premises that are air-conditioned, either by a central plant serving the entire project area or unitary equipment for individual spaces;</li><li>iii. premises that are air-conditioned by a central plant shared with other portions of the building;</li><li>iv. premises that adopted passive design;</li></ul>
<b>9.1.2 ENERGY ASSESSMENT APPROACHES</b>	To accommodate various types of projects and for flexibility to achieve the energy performance target for a project, the Applicant can freely choose one of the given approaches (i.e. Performance-based or Prescriptive-based Approaches) based on their project situation and resources for the assessment of energy performance.
<b>9.1.3 PERFORMANCE-BASED APPROACH</b>	<p>The Performance-based Approach is used for assessing the Annual Energy Use for HVAC&amp;R and lighting systems. The Annual Energy Use is estimated by computer simulation and is based primarily on the 'Energy Budget' approach, supplemented by a range of basic requirements.</p> <p>The Code of Practice for Energy Efficiency of Building Services Installations (BEC) [1] provides a framework for demonstrating compliance in which the proposed design has annual energy consumption no greater than that of a reference case that satisfies the prescriptive requirements.</p> <p>The Performance-based Approach described in Section 9 of the Code of Practice for Energy Efficiency of Building Services Installations is primarily geared towards demonstrating compliance to performance requirements in section 5 to 8 of the BEC. A number of important modifications are listed here for extending the BEC's Performance-based Approach for the purpose of quantifying energy reduction as a result of efficient design.</p>

#### **Energy Reduction Measures Considered for this credit**

The major modifications concerns clause 9.5.4.1 in BEC, which states: In fulfilling clause 9.5.3 (the requirement that the design energy should not exceed the energy budget), the increase in design energy as a result of not satisfying the trade-off allowable requirements in clause 9.4.2 (performance requirements for lighting, air-conditioning, lift and escalators, electrical installations) of BEC, can be off-set with reduction in design energy as a result of –

- i. An improvement over the corresponding minimum allowable levels of performance in any one or more of the items listed with energy efficiency requirements in Sections 5 to 8 of the Code (lighting, A/C, vertical transport and electrical), [This clause effectively limits the baseline A/C system to be the

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1 Electrical and Mechanical Services Department - Code of Practice for Energy Efficiency of Building Services Installation 2012

same as the proposed system with the same components (albeit with minimum performance requirements). For example: both baseline and designed building will have VAV, though the designed building can have better fan efficiencies] And/or,

- ii. A better OTTV (Overall Thermal Transfer Value), on condition that the energy reduction (as a result of better OTTV) counted towards the reduction should be limited to not more than 5% of the energy budget, and/or
- iii. Having recovered energy or renewable energy captured or generated on site.

For the purpose of quantifying energy reduction for air conditioning and lighting as a result of efficient design towards demonstration of compliance to this credit, the reduction due to OTTV (e.g. apply Low-E window film if allowed by the building management of the host building) need not be limited to 5% of the energy budget, and the acceptable reduction measures are extended to:

- i. An improvement over the corresponding minimum allowable levels of performance in any one or more of the items listed with energy efficiency requirements in Sections 5 to 6 of BEC (lighting and A/C);
- ii. Reduce facade heat gain through improved OTTV;
- iii. Adoption of load reduction strategies, including but not limited to natural ventilation, free-cooling, natural daylight etc. When the selected simulation program cannot adequately model a design or a control strategy, exceptional calculation method can be used with reference to 8.1.6 - ASHRAE Approach (see below);
- iv. Addition of energy reduction components, such as (but not limited to) variable speed drives, heat recovery, energy efficient lamps and ballasts, light pipes and light tubes, sensors (daylight, CO<sub>2</sub>, occupancy), dimming devices, etc.;
- v. Reduction in energy use through the selection of a more efficient system, such as (but not limited to) A/C equipment with higher COP than BEC minimum requirements, LED lighting reducing the lighting power density etc.

### **Baseline Design**

For the purpose of assessment of this credit, the baseline case should also be developed based on design case but with the following important distinctions:

Modifications as described by clauses A3.3.2 and A3.3.4;

Energy saving devices and load reduction strategies need not be included in the baseline case. These are defined as components or operation strategies that reduce energy use while delivering the same level of environmental comfort to the interior space. Classification of energy saving devices and load reduction strategies is subject to the acceptance of the BAS.

### **Baseline Air-Conditioning System**

For the purpose of assessment of this credit, the baseline air-conditioning should have identical zoning to the designed-case, and should be modelled with a system and equipment identical to the designed-case as stated in A3.3.5 of BEC, concerning air-conditioning

system:

"The air-conditioning systems, zoning and equipment types of the base-case should be identical to the designed-case and the system and equipment of the reference space should exactly meet the relevant requirements in Section 6 of the BEC."

### Baseline Envelope Design

For the purpose of the assessment of this credit, in the case of difficulty in extracting the construction details of external walls, roofs and windows of the assessed space, the baseline building envelope should be modelled with the dimension of external walls, roofs and windows measured on site and the default construction characteristics as given below.

#### DEFAULT CONSTRUCTION CHARACTERISTICS FOR THE BUILDING ENVELOPE

External walls	Thickness (m)	Material	k (W/mK)	density (kg/m <sup>3</sup> )	Cp (J/kgK)	alpha (-)
Layer 1	0.005	Mosaic Tiles	1.5	2500	840	0.58
Layer 2	0.01	Cement/Sand Plastering	0.72	1860	840	
Layer 3	0.1	Heavy Concrete	2.16	2400	840	
Layer 4	0.01	Gypsum Plastering	0.38	1120	840	0.65
<b>Roofs</b>						
Layer 1	0.025	Concrete Tiles	1.1	2100	920	0.65
Layer 2	0.02	Asphalt	1.15	2350	1200	
Layer 3	0.05	Cement/Sand Screed	0.72	1860	840	
Layer 4	0.05	Expanded Polystyrene	0.034	25	1380	
Layer 5	0.15	Heavy Concrete	2.16	2400	840	
Layer 6	0.01	Gypsum Plastering	0.38	1120	840	0.65
<b>Windows</b>						
Layer 1	0.006	Tinted Glass	1.05 SC = 0.65	2500	840	0.65
<b>Window to wall area ratio</b> As measured on site						
<b>Adjacent spaces not assessed but air conditioned</b> Assume no heat transfer						
<b>Adjacent spaces not assessed and not air conditioned</b> Assume having the same construction characteristics as external wall						

**Symbols:**

- k Thermal conductivity
- density Material Density
- Cp Specific Heat Capacity
- alpha Solar absorptivity of exposed surface
- SC Shading coefficient of glazing

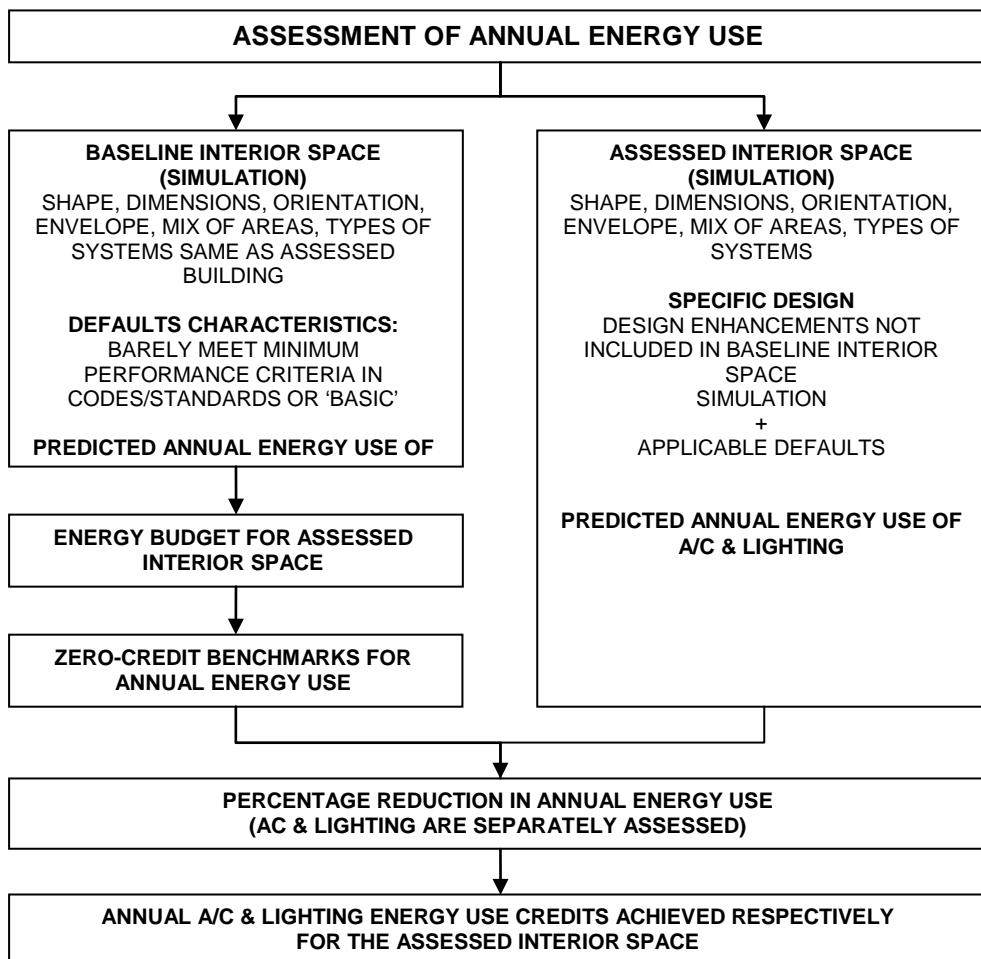


Figure 9.1 Energy performance assessment

#### KEY FEATURES

The key features of the Performance-based Approach are listed as follows.

- i. the 'Energy Budget' for an ASSESSED PROJECT SPACE is the predicted Annual Energy Use for a BASELINE INTERIOR SPACE (zero-credit benchmark);
- ii. the BASELINE INTERIOR SPACE model has the same shape and dimensions, comprises the same mix of areas and types of accommodation as the ASSESSED PROJECT SPACE;
- iii. the BASELINE INTERIOR SPACE model will incorporate a range of standard (default) characteristics such that the model represents an area whose energy performance barely meets the relevant regulatory requirements or meets only 'basic' design quality;
- iv. as far as possible the predicted Annual Energy Use of the ASSESSED PROJECT SPACE will be based on its specific design characteristics;
- v. the number of credits achievement is determined by the percentage reduction in the predicted Annual Energy Use of the ASSESSED PROJECT SPACE relative to the BASELINE INTERIOR SPACE where HVAC&R and lighting are

separately assessed;

<b>APPLICABLE SOFTWARE</b>	<p>In principle, BEAM would accept the use of most of the energy analysis simulation software listed in the latest edition of EMSD Performance-Based Building Energy Code.</p> <p>However, the BSL TRC might review the acceptance of any other software that are not in the list but embrace those simulation general requirements as highlighted in latest edition of ANSI/ASHRAE/IES Standard 90.1. The Applicant shall submit a report to justify its suitability.</p>
<b>ASHRAE APPROACH</b>	<p>ANSI/ASHRAE/IES Standard 90.1-2010 Energy Standard for Buildings Except Low-Rise Residential Buildings is to provide minimum requirements for the energy-efficient design of buildings except low-rise residential buildings. Appendix G of ANSI/ASHRAE/IES 90.1-2010 provides the alternative approach, which is intended for use in rating the energy efficiency of building designs that exceed the requirement of Section 11 of the ANSI/ASHRAE/IES standard 90.1-2010.</p> <p>It may be useful for evaluating the performance of all proposed designs, including alterations and additions to existing buildings, except designs with no mechanical systems. The detailed requirement, assumption and modelling methodology for calculating the proposed and baseline building performance shall be made reference to the ANSI/ASHRAE/IES Standard.</p>
<b>EXCEPTIONAL CALCULATION METHOD</b>	<p>Where simulation programmes cannot adequately model the design strategy (for example passive design contributing to reduced CO<sub>2</sub> emissions), material, or device the BSL TRC may approve an exceptional calculation method to demonstrate above-standard performance.</p> <p>The exceptional calculation shall make reference to Section A3.4 of Code of Practice for Energy Efficiency of Building Services Installation 2012 Edition [3], Appendix G2.5 of ANSI/ASHRAE/IES 90.1 2010 [4], and Appendix D of the Advanced Energy Modelling for LEED Technical Manual v1.0 (September 2011 Edition)[5].</p>
<b>9.1.4 PRESCRIPTIVE-BASED APPROACH</b>	<p>Whilst computer simulation is the generic and preferred approach for predicting annual energy use, the implementation of prescriptive strategies for reducing the annual energy consumption in the <u>project space</u> can be used as an alternative to the simulation method.</p> <p>The prescriptive strategies listed herein, may include the use of high efficiency equipment, the implementation of energy saving measures, and the provision of appropriate zoning and controls. Further details of the rewarded strategies are provided in this Manual.</p> <p>The Applicant shall submit clearly cross-reference materials including tables, drawings, technical data sheets, measurements, and the like to justify compliance.</p>
<b>MINIMUM SYSTEM REQUIREMENTS FOR PRESCRIPTIVE HVAC&amp;R STRATEGIES</b>	<p><b>Appropriate Zoning and Thermostat Distribution</b></p> <p>Credit shall be achieved where the following were provided:</p> <ul style="list-style-type: none"><li>i. every solar exposure has a separate control zone;</li><li>ii. interior spaces are separately zoned to enable independent control of space conditions;</li><li>iii. testing and commissioning records;</li></ul> <p><b>Occupancy Sensors and/or Programmable Timers</b></p>

Credit shall be achieved where the following were provided:

- i. Normally occupied areas during business hours (open plan offices, retail areas, etc.) are provided with programmable timer controls capable of modulating HVAC&R system (either setting higher temperature and/or turning off air-conditioning) in response to lower / no air conditioning demand after business hours;
- ii. Private offices and specialty occupancies (conference rooms, multi-purpose rooms, kitchen, pantry, plant room, store rooms, etc.) are provided with occupancy sensor controls capable of sensing space use and modulating HVAC&R system (either controlling the set temperature and/or on/off of air-conditioning) in response to space demand;

#### **Automatic Blinds Controlled by Daylight Sensor**

Credit shall be achieved where the following were provided:

- i. every window/glazing section with solar exposure a separate control (i.e. one control zone for one orientation of façade at the minimum);
- ii. switches are installed for occupants to overwrite the control;
- iii. automatic blinds must be able to adjust the access of daylight in response to the lighting level in space;
- iv. testing and commissioning records must indicate at what levels of daylight the blinds are automatically closed and half closed, and the installation location of the sensors selected allows proper sensing of daylight level of the [project space](#);

#### **Ceiling or Wall Mounted Fans**

Credit shall be achieved where the following were provided:

- i. ceiling and/or wall mounted fans serving at least 50% of the occupied area. Non-occupied spaces, for example copying rooms, print rooms, equipment rooms, and plant rooms are excluded from assessment;
- ii. testing and Commissioning records;

#### **Variable Speed Drive Fan Coil Units**

Credit shall be achieved where the following was provided:

- i. all fan coil units installed by the Applicant and serving the [project space](#) must be fitted with variable speed drive, or with high efficiency fan motor that is at least 80% efficiency at full load;
- ii. testing and commissioning records;

#### **High Efficiency Air Conditioning Units**

Credit shall be achieved where the following was provided:

- i. all air conditioning units installed by the Applicant and serving the project space must be at least 15% better than the minimum requirements as stated in the latest Building Energy Codes in terms of Coefficient of Performance (COP) at full load;

#### **Heat Recovery System**

Credit shall be achieved where the following was provided:

- i. conditioning or pre-conditioning the outdoor air by utilising the cooling/heating energy from the exhaust air;
- ii. heat recovery rate shall be at least 60%;

- iii. testing and commissioning records;

#### **CO<sub>2</sub> Sensors Controlling Fresh Air Rate**

Credit shall be achieved where the following was provided:

- i. All air handling units and primary air handling units installed by the Applicant and supplying outdoor air to the project space shall be variable speed, and controlled by CO<sub>2</sub> sensors capable of sensing and modulating outdoor air rate in response to demand;
- ii. testing and commissioning records shall also indicate the CO<sub>2</sub> set point for maximum and minimum outdoor air;

#### **Enthalpy Controlled Free Cooling by Host building**

Credit shall be achieved where the following was provided:

- i. All air handling units, and primary air handling units installed have the capacity to deliver 100% outdoor air to the project space;
- ii. Enthalpy sensors shall control the delivery of outdoor air into the [project space](#) dependant on the Enthalpy set points;
- iii. testing and commissioning records shall state set points;

#### **Recommended Installation Positions For Air Conditioning Units**

Credit shall be achieved where the following was provided:

- i. all air conditioning units (including indoor and outdoor units of for split-type, VRV, VRF air-conditioning units, and window type air conditioning units) installed by the Applicant and serving the project space shall comply with the recommended installation dimensions given in manufacturers installation specification;
- ii. drawings, dimensioned 1:50 scale installation drawings demonstrating the installation position of the air-conditioning units installed;
- iii. Letter from the manufacturer or supplier stating that the installation position of air-conditioning units complies with the recommended installation dimensions;

#### **Provision of Openable Windows**

Credit shall be achieved where the following was provided:

- i. openable windows, within the project space, have a total area not less than 1/16 of the internal floor area.

#### **MINIMUM SYSTEM REQUIREMENTS FOR PRESCRIPTIVE LIGHTING STRATEGIES**

#### **Reduction of Lighting Power Density (LPD)**

Credit shall be achieved where the following was provided:

- i. calculation, the method for Lighting Power Density (LPD) shall reference latest version of BEC. Baseline values shall also reference the latest version of BEC;
- ii. technical data sheets for equipment;
- iii. record photographs;

#### **Appropriate Zoning and Manual Control Distribution**

Credit shall be achieved where the following were provided:

- i. Every solar exposure (east, west and south) has a separate control zone allowing occupants to switch on/off (or adjust lighting level) of a lighting zone according to their need;
- ii. open plan spaces are separately zoned (1 control for every 15 m<sup>2</sup>) for independent control of each lighting zones;
- iii. the manual control must have indication / illustration (e.g. electronic touch-screen control, simple illustration next to switches) allowing occupants to easily identify the lighting arrangement;

### **Daylight Dimming Controls**

Credit shall be achieved where the following were provided:

- i. all lighting fittings located in areas with access to daylight (up to 5m from the perimeter) are controlled by daylight dimming controls;
- ii. testing and commissioning records must indicate the set points and thresholds set for automatically adjusting the lighting, the power consumption, and the installation location of the sensors;

### **Occupancy Sensor Controls**

Credit shall be achieved where the following was provided:

- i. Normally occupied areas during business hours (e.g. open plan offices) are provided with programmable timer integrated with occupancy sensors controls capable of modulating lighting system (either controlling the lighting level and/or on/off of lighting) in response to lower / no lighting demand after business hours;
- ii. Private offices and specialty occupancies (conference rooms, multi-purpose rooms, kitchen, pantry, store rooms, etc.) are provided with occupancy sensor controls capable of sensing occupancy and modulating lighting system (either controlling the lighting level and/or on/off of lighting) in response to space demand;
- iii. open plan spaces are separately zoned (1 occupancy control for every 15m<sup>2</sup>) for independent control of the lighting zones;
- iv. Switching installed for occupants to override the control.

### **Task Light for Every Workstation**

Credit shall be achieved when the following were provide:

- i. the lighting level of overhead lighting can be lower during business hours;
- ii. task light can provide at least 300 lux measured on the desk level;

### **Main Switch (at the staff entrance)**

Credit shall be achieved where the following was provided:

- i. a master main switch located adjacent to the main staff entry/egress for the premises (not necessarily the main entrance) so that the last person can switch off all the lighting systems when leaving the premises;

### **External Lighting Control**

Credit shall be achieved where the following was provided:

- i. lighting time control to curb light pollution, switch off, no later

than 11pm, all external signboards, signage, window displays, and other non-essential lighting;

<b>9.2 PROVISIONS FOR ENERGY MANAGEMENT</b>	<b>9.2.1 Commissioning Plan</b>
	<b>9.2.2 Commissioning Reports</b>
	<b>9.2.3 Operations and Maintenance Manual</b>
	<b>9.2.4 Energy Management Manual</b>
<b>9.2.1 COMMISSIONING PLAN</b>	To execute commissioning in a comprehensive and orderly manner a commissioning plan, covering every system, equipment, and component shall be prepared. The plan shall include: <ul style="list-style-type: none"><li>i. start-up and inspection checklists and procedures;</li><li>ii. functional performance testing procedures and checklists;</li><li>iii. testing, adjusting, and balancing;</li><li>iv. development of an operations and maintenance manual and energy management manual;</li><li>v. completion of the commissioning report;</li></ul> For each system commissioned the plan shall provide: <ul style="list-style-type: none"><li>i. an overview of the tasks to be executed during commissioning;</li><li>ii. a list of all features to be commissioned;</li><li>iii. a list of reference documents related to commissioning, including specification references, drawing list, and submittal drawings;</li><li>iv. a list of primary participants in the commissioning process and their responsibilities;</li><li>v. a plan for management, communication and documentation;</li><li>vi. description of checklists and tests to be performed, with reference to specification;</li><li>vii. pre-start and start-up checklists;</li><li>viii. list of the functional performance tests to be performed;</li><li>ix. description of the training to be provided to the operations and maintenance personnel</li></ul>
<b>9.2.2 COMMISSIONING REPORT</b>	The commissioning report shall document the commissioning process, and results, it shall comprise: <ul style="list-style-type: none"><li>i. executive summary;</li><li>ii. list of participants and their respective roles;</li><li>iii. brief project space description;</li><li>iv. an overview of the scope of testing and commissioning;</li><li>v. general description of testing and verification methods;</li><li>vi. list of each feature component, and system commissioned;</li><li>vii. for each piece of commissioned equipment, the determination of the iCxA regarding the adequacy of the equipment, documentation and training.</li></ul> The commissioning report shall address the following areas: <ul style="list-style-type: none"><li>i. adequacy of equipment with respect to construction documents and design intent;</li><li>ii. equipment installation;</li></ul>

- iii. functional performance and efficiency;
- iv. equipment documentation;
- v. operations and maintenance review and recommendations;
- vi. operator training;

The functional performance and efficiency section for each piece of equipment shall identify the verification method used observations and conclusions from the commissioning process. The report shall include a list of outstanding commissioning issues, and any deferred or seasonal testing that should be scheduled.

All outstanding deficiencies identified during or as a result of commissioning activities shall have been corrected or must be separately listed and highlighted in the commissioning report.

Each non-compliance issue must be referenced to where the deficiency is documented.

Verification and documentation of installation of systems, equipment and components shall ensure:

- i. that they are installed according to construction documents and manufacturers instructions;
- ii. any differences between the final installation and the original construction documents shall be documented;
- iii. that other building systems or components are not compromising the efficiency of the systems or features being commissioned;
- iv. the start-up and inspection checklists were completed and performed as required;
- v. that functional performance tests were completed;
- vi. that HVAC&R piping testing and duct testing was completed and documentation is included in operation and maintenance manual;
- vii. functional testing of all control systems was completed;
- viii. record of any deficiencies and corrective actions;
- ix. final testing outcomes are included in the commissioning report and in the operation and maintenance manual;
- x. documentation of any seasonally deferred testing and corrections of any deficiencies;
- xi. the operations and maintenance manual and energy management manual are complete for all components, equipment, subsystems, and systems that have been commissioned;
- xii. adequacy of training provided for the Owner's management, operation and maintenance personnel

If components, equipment, subsystems, or controls, or sequences of operations as-built are differing from the original construction documents, the report shall detail these differences.

When any deferred or seasonally deferred commissioning is completed the iCxA shall issue an addendum, arranged in the same manner as in the initial commissioning report.

**9.2.3 OPERATIONS AND MAINTENANCE MANUAL** The parties responsible for the design of each system to be commissioned shall provide in writing:

- i. the design intent;
- ii. the basis of design;
- iii. full sequences of operation for all equipment and systems, all of which must meet the legal requirements and industry wide standards;

The description of the design intent should include as a minimum:

- i. space temperature and humidity criteria (refer also to the section on IEQ);
- ii. levels operator and/or occupant control over HVAC&R systems;
- iii. ventilation requirements and related indoor air quality criteria (refer also to the section on IAQ);
- iv. performance criteria related to energy efficiency;
- v. environmental responsiveness of the facility;
- vi. commissioning criteria;

The basis of design shall include at a minimum:

- i. details of occupancy;
- ii. space activity and any process requirements;
- iii. applicable regulations, codes, and standards;
- iv. design assumptions;
- v. performance standards and benchmarks;
- vi. control system appropriate for the skill of the operations and maintenance staff.

The operations and maintenance manual must include for each piece of equipment and each system:

- i. the name and contact information of the manufacturer or vendor and installing contractor;
- ii. submittal data;
- iii. operations and maintenance instructions with the models and features for the subject site clearly marked;

The manual shall include only data for equipment that is actually installed, and include the following:

- i. instructions for installation, maintenance, replacement, start-up;
- ii. special maintenance requirements and sources for replacement parts/equipment;
- iii. parts list and details of and special tooling requirements; performance data;
- iv. warranty information;

The manual shall include an as-built documentation package for controls covering the following:

- i. control drawings and schematics;
- ii. normal operation;
- iii. shutdown;
- iv. unoccupied operation;
- v. seasonal changeover;
- vi. manual operation;
- vii. controls set-up and programming;
- viii. troubleshooting;
- ix. alarms;
- x. final sequences of operation.

**9.2.4 ENERGY MANAGEMENT MANUAL** The details shall include:

- i. guidelines for establishing and tracking benchmarks for space energy use and primary plant equipment efficiencies;
- ii. descriptions of the final design intent and basis of design, including brief descriptions of each system;
- iii. final sequences of operations for all equipment;
- iv. procedures for seasonal start-up and shutdown, manual and restart operation;
- v. as-built control drawings;
- vi. for all energy-saving features and strategies, rationale description, operating instructions, and caveats about their function and maintenance relative to energy use;
- vii. specifications for re-calibration frequency of sensors and actuators by type and use;
- viii. recommendations for continuous commissioning or recommended frequency for re-commissioning by equipment type, with reference to tests conducted during initial commissioning;
- ix. recommendations regarding seasonal operational issues affecting energy use;
- x. list of all user-adjustable set points and reset schedules, with a discussion of the purpose of each and the range of reasonable adjustments with energy implications;
- xi. schedules of inspection frequency for reviewing the various set points and reset schedules to ensure they still are near optimum;
- xii. list of time-of-day schedules and a frequency to review them for relevance and efficiency;
- xiii. guidelines for ensuring that future renovations and equipment upgrades will not result in decreased energy efficiency and will maintain the design intent;

<b>9.3 ASSUMPTIONS AND BASELINES FOR WATER CONSUMPTION</b>	The following details the default assumptions for the calculation of the reduction in water use of the project building when compared with an equivalent baseline space.
<b>NUMBER OF WORKING OR OPERATIONAL DAYS</b>	<p>The number of operational days per annum (Nop) should be obtained from the OPR.</p> <p>The number of non-operational days is equal to 365 - Nop. The same value for operational and non-operational days shall be used for both the baseline space and project space.</p>
<b>OCCUPANCY CONSIDERATIONS</b>	<p>The number of occupants shall be taken from the OPR. If the data is not obtainable then, in the absence of any other data, the occupant space allowance should be taken as 9m<sup>2</sup>/person. [1]</p> <p>The male to female ratio should be also determined from the OPR. If the data is not available then the default assumptions shall refer to the latest version of PNAP ADV-28 [2].</p> <p>The same occupancy load shall be applied to the baseline case and as-built case.</p>
<b>WATER FLOW RATE CONSIDERATIONS</b>	<p>Where installed, water conservation fixtures and appliances shall deliver no more than declared water flow rate, irrespective of the working pressure.</p> <p>For example, where the submission material indicates the as-built case for shower, providing 8 litres/min @ 100 Kpa, the Applicant shall demonstrate that the working pressure by calculation does not exceed 100 Kpa. In this case, if the actual working pressure was 150 Kpa then the flow rate would exceed the declared flow rate.</p>
<b>HAND WASHING IN REST ROOMS</b>	<ul style="list-style-type: none"> <li>i. operations per occupant per day shall be five (5);</li> <li>ii. duration of use shall be ten (10) seconds;</li> <li>iii. baseline flow rate is indicated in the table;</li> <li>iv. to obtain significant savings, automatic control, such as proximity sensors, would reduce the tap operation time to less than the default ten (10) seconds per operation;</li> </ul>
<b>WATER USE IN PANTRIES / KITCHEN</b>	<ul style="list-style-type: none"> <li>i. pantry tap operations per occupant per day shall be 1.</li> <li>ii. Utensil washing operation carried out by hand shall be 6 litres of water per operation;</li> <li>iii. duration of use shall be fifteen (15) seconds</li> <li>iv. baseline flow rate is indicated in the table;</li> </ul>
<b>SHOWERS</b>	<ul style="list-style-type: none"> <li>i. operations per occupant per day shall be 0.1</li> <li>ii. duration of use shall be 6 minutes (360 seconds);</li> <li>iii. baseline flow rate is indicated in the table;</li> </ul>
<b>OTHER APPLIANCES/ EQUIPMENT</b>	If the baseline for other fixtures and equipment is not listed in this Manual the Applicant shall base it upon reference to regulations, standards, guides and other publication published by relevant authorities, and justification for each instance provided.

1 Buildings Department (2011), Code of Practice for Fire Safety in Buildings.  
 2 Buildings Department. Practice Note for Authorized Persons, Registered Structural Engineers and Registered Geotechnical Engineers. PNAP No. ADV-28 Provision of Sanitary Fitments in Offices, Shopping Arcades, Department Stores, Places of Public Entertainment, Cinemas and Other Public Places.

The calculation shall list each type of water using device all data used shall reference the source. It shall include water taps for basin, pantry, kitchen, bath and shower heads but exclude water closet, urinal, water features, appliance and irrigation. There should be separate entries for water use in male and female facilities. The water saving calculation format shall be as follows:

Device (Reference catalogue <sup>(A)</sup> )	Duration of each operation (seconds)	Daily number of uses per occupant	Rated flow rate (litres/minute)		Estimated daily consumption per occupant (litres)	
			Baseline (c)	As-built	Baseline (c)	As-built
Tap Toilet (Model 123)	10	5	6	4	5	3.3
Tap Pantry (Model 456)	15	1	8	4.5	2	1.1
Estimated total daily consumption per occupant (litres)			7	4.4		
Number of occupants <sup>(B)</sup>				30		
Number of day				365		
Estimated total annual consumption (litres)			76,650	48,180		
% of water saving:				37.1%		

**Notes:**

- (A) Reference catalogues or manufacturer specification should show device type, model number, flow rate and WELS label (if provided) as substantiation to the information filled in the calculation, where important information in the reference catalogues or manufacturer specification shall be highlighted or circled for easy identification.
- (B) The number of occupants shall be taken from the design brief or OPR. If this data is not obtainable then, in the absence of any other data, the occupant space allowance should be reference to the Occupancy Considerations as shown above.
- (C) The baseline data shall utilize the appropriate flow rate data listed in the table below.

The baseline water flow rate data used in calculations shall use the following data:

description	size (mm)	flow rate	unit
shower head		9.5	l/min
kitchen sink pillar tap (pantry)	22	6	l/min
kitchen sink mixer tap (pantry)	22	6	l/min
pillar tap	15	6	l/min
mixer tap	15	9	l/min
bath pillar tap	22	15	l/min
bath mixer tap	22	15	l/min
bidet	15	5	l/min
Pre-rinse spray valves kitchen	15	7	l/min
WC		7	L/flush
WC hose spray	15	5	l/min
Urinal	15	4.5	L/flush
Washing machine (horz)	15	12.6	L/kg/cycle
Washing machine (vert)	15	22	L/kg/cycle

<b>9.4 FEATURES CONSIDERED AS INNOVATIONS</b>	<p>The section provides features that will be favourably considered as innovative techniques and performance enhancements for, which innovation points may be achieved upon Assessment. Innovation points are awarded at the sole discretion of BSL TRC based on the features implemented and supporting information.</p> <p>The list below will be updated from time to time in order to reflect the latest trend of building technology development and construction practices that should be encouraged.</p>
<b>REAL TIME ENERGY MONITORING DISPLAY</b>	1 innovation point will be considered for real time energy monitoring display installed at entrance (or at high pedestrian flow path) for staff or space user to monitor their energy usage.
<b>IAQ EXCELLENT CLASS</b>	1 innovation point will be considered for achieving Excellent Class in indoor air quality of the project space. Valid IAQ certificate or IAQ measurement report conducted by HOKLAS certified service provider should be provided.
<b>OUTSTANDING ENERGY PERFORMANCE</b>	1 innovation point will be considered for achieving 2 or more credits in addition to the 14 credits achieved in EU 1 using the Prescriptive-based Approach. Please note: the maximum credits achievable in EU 1 are still 14 credits.
<b>RENEWABLE ENERGY SYSTEMS</b>	1 innovation point will be considered for renewable energy system(s) that generate energy for space usage. (e.g. electricity by PV panel, hot water by solar hot water system)
<b>EFFICIENT HOT WATER HEATING</b>	1 innovation point will be considered for heat pump water heater (or other forms of water heating technology) that can save 50% or more energy compared to fossil fuel or resistance type electric water heater.
<b>MIXED MODE VENTILATION SYSTEMS</b>	1 innovation point will be considered for project space utilises natural ventilation when outdoor condition is suitable or project located in building that can provide mixed mode ventilation to the project space.
<b>AIR-CONDITIONING CONDENSATE REUSE</b>	1 innovation point will be considered for air-conditioning condensate reuse system installed by the Applicant or provided by the host building, and serving the project space.
<b>TEMPORARY PROTECTION MADE FROM RECYCLED MATERIALS</b>	1 innovation point will be considered where recycled materials were provided for all temporary protection during the construction works.
<b>WASTE RECYCLE FACILITIES FOR BUSINESS SPECIFIC MATERIALS</b>	1 innovation point will be considered for providing a collection/storage facility with signed collection Agreement for at least one type of recyclable material, not addressed under credit MA 1.  The recycled material shall be one of the major waste streams from the business operation within the project space.
<b>CERTIFICATION</b>	1 innovation point will be considered where the Applicant's organisation operated an Energy Management System (EnMS) in accordance with ISO 50001 or BS EN 16001
<b>ENERGY/CARBON AUDIT</b>	1 innovation point will be considered where an energy/carbon audit is provided for occupied premise operating for more than twelve (12) months.
<b>PARTITION SYSTEM</b>	1 innovation point will be considered where the project space has adopted system partitions for all cellular offices, meeting rooms, function rooms, and conference rooms.

## **9.5 INTERPRETATIONS AND ABBREVIATION**

In the this manual the meaning of the following Abbreviations, phrases, and terminology shall be:

<b>ACQWS</b>	Advisory Committee on the Quality of Water Supplies
<b>ARCHSD</b>	Architectural Services Department
<b>ASHRAE</b>	American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.
<b>BAS</b>	BEAM Assessor
<b>BD</b>	Buildings Department
<b>BEAM PRO</b>	BEAM Professionals
<b>BEC</b>	Building Energy Code
<b>BEEO</b>	Buildings Energy Efficiency Ordinance
<b>BS EN</b>	British Standard
<b>BSRIA</b>	Building Services Research and Information Association
<b>CFC</b>	Chlorofluorocarbons
<b>CIBSE</b>	The Chartered Institution of Building Services Engineers (UK)
<b>CSR</b>	Corporate Social Responsibility
<b>EMS</b>	Environmental Management System
<b>EMSD</b>	Electrical and Mechanical Services Department
<b>EPD</b>	Environmental Protection Department
<b>FSC</b>	Forest Stewardship Council
<b>GWP</b>	Global Warming Potential
<b>HCFC</b>	Hydrochlorofluorocarbon
<b>HFC</b>	Hydrofluorocarbon
<b>HKAS</b>	Hong Kong Accreditation Services
<b>HKIE</b>	Hong Kong Institution of Engineers
<b>HKSAR</b>	Hong Kong Special Administrative Region
<b>HVAC&amp;R</b>	Heating, Ventilating, Air Conditioning and Refrigeration
<b>IAQ</b>	Indoor Air Quality
<b>ICXA</b>	Independent Commissioning Authority
<b>IEQ</b>	Indoor Environmental Quality
<b>LPD</b>	Lighting Power Density

<b>MERV</b>	Minimum Efficiency Reporting Value
<b>ODP</b>	Ozone Depleting Potential
<b>OHS</b>	Occupational Health & Safety
<b>REA</b>	EMSD Registered Energy Assessor
<b>RPE</b>	Registered Professional Engineer
<b>SMACNA</b>	Sheet Metal and Air Conditioning Contractors' National Association
<b>US EPA</b>	The United States Environmental Protection Agency
<b>VRF</b>	Variable Refrigerant Flow
<b>VSD</b>	Variable Speed Drive
<b>WACS</b>	Water-cooled Air-Conditioning Systems
<b>WELS</b>	Water Efficiency Labelling Scheme by Water Supplies Department
<b>WHO</b>	World Health Organization
<b>WSD</b>	Water Supplies Department
<b>WWF</b>	World Wildlife Fund
<b>ALTERNATIVE ASSESSMENT METHOD</b>	means the proposed assessment method submitted by the Applicant for approval by BSL TRC, offering an alternative means for compliance, or a new methodology.
<b>AS-BUILT</b>	in the context of drawings, as-built means architectural, engineering and other types of drawings recording the actual completed installation (as known as Record Drawings).
<b>ASSESSMENT</b>	means the systematic and methodical review and examination of an Applicants submission to determine compliance or otherwise with the requirements provided in this Manual.
<b>APPEAL</b>	means the process, upon payment of the published charge, whereby the Applicant can request a technical ruling review.  A two level appeal process is provided, known as the First Appeal, and then the Final Appeal.  For the First Appeal, the application shall be reviewed and adjudicated by the BSL TRC. If the Applicant is still dissatisfied with the ruling, the next option is the Final Appeal which shall be reviewed and adjudicated by HKGBC.
<b>APPLICANT</b>	means the authorised party seeking BEAM Plus Interiors certification for the <a href="#">project space</a> . Typically the client, occupier, tenant or their representative) with a contractual relationship with HKGBC and BSL.
<b>BARE SHELL CONDITION</b>	means, in the context of leasing conditions, the requirement in a lease for the occupier/tenant to demolish and remove all the interior features, and coverings, handing back a bare shell at the end of the lease.
<b>BASELINE</b>	Refer to <a href="#">Zero Credit benchmark</a>
<b>BEAM ASSESSOR</b>	means a person or persons who conduct an Assessment before final approval by BSL TRC (also abbreviated BAS).

<b>BEAM CONSULTANT</b>	means a firm or individual engaged by the Applicant to advise the project team in matters related to BEAM certification.
<b>BEAM PLUS CATEGORY</b>	means the sections of the BEAM Plus Interiors rating tool including: GBA - Green Building Attributes MAN - Management MA - Material Aspects EU - Energy Use WU - Water Use IEQ - Indoor Air Quality IV - Innovation
<b>BEAM PLUS FRAMEWORK</b>	means the rating system, criterion, assessment standard and processes applied under BEAM Plus for New Buildings, Existing Buildings and Interiors.
<b>BEAM PLUS GRADING</b>	means the outcome of BEAM assessment for an Interiors project expressed as a performance level of Bronze (above average), Silver (good), Gold (very good) or Platinum (excellent).
<b>BEAM PROFESSIONAL</b>	means an accredited individual engaged by the Applicant to help integrate sustainability measures into the project, who shall facilitate submissions for Assessment (also abbreviated BEAM Pro).  To be eligible to submit any project for BEAM Plus Interior assessment the BEAM Professional must be BI accredited.
<b>BEAM SOCIETY LIMITED</b>	means the independent, not-for-profit, member-based organisation that owns and operates BEAM and BEAM Plus rating systems, provides assessments, training, and examinations (also abbreviated BSL).
<b>BSL COORDINATOR</b>	means the BSL officer or officers that maintain day-to-day liaison between the Applicant's representative and the assessor conducting the project assessment.
<b>BUILDING MANAGEMENT SYSTEM</b>	means a central computer-based monitoring and control system to coordinate, organise, and optimise automatic control systems. Often used for Building Services installations including HVAC&R, electrical, lighting, equipment scheduling, logging, and alarm reporting (also abbreviated BMS).
<b>CENTRAL BUILDING SERVICES</b>	means the centrally installed plant and equipment for example the central chillers, chilled water pumps, air-conditioning installation, ventilation, lighting, electrical installation, water tanks, lifts and escalators provided in the host building and controlled by the building owner, not by the Applicant.
<b>CENTRALISED AIR CONDITIONING SYSTEM</b>	means the central air conditioning systems providing chilled water serving multiple units within the host building. The systems typically use chilled water as the cooling medium and extensive ductwork for air distribution.
<b>CERTIFICATE VALIDITY</b>	means the duration where a BEAM or BEAM Plus green building certificate is effective and recognised by the BSL.
<b>CERTIFICATION SCOPE</b>	means the internal floor area of the project space, defined by the footprint or the boundary of the leased area (also refer to <a href="#">project space</a> ) and the associated facilities.

<b>CHLOROFLUOROCARBON</b>	means chemical compounds comprising Chlorofluorocarbons (also abbreviated as CFC) that cause damage the earth's ozone layer if released into the atmosphere.
<b>COMMISSIONING</b>	means the process of putting systems, usually Building Services installations, into active service, including testing, adjusting and balancing HVAC&R, electrical, plumbing and other systems to assure efficient performance, and compliance with the OPR, design criteria and design intent.
<b>INDEPENDENT COMMISSIONING AUTHORITY</b>	means an independent firm, or individual engaged by the Applicant to supervise and oversee the entire commissioning process, from initial planning through to completion.  The iCxA shall NOT be an employee of a firm, or related firm, designer, consultants, or contractors involved with the project.
	The iCXA shall facilitate and communicate between the all parties including the owner, design team, contractors, and sub-contractors and report that all systems are commissioned before occupancy (also abbreviated iCXA).
<b>COMPLIANCE</b>	means demonstrating fulfilment of the requirement specified in this manual through furnishing documentation and supplementary information detailed in relevant credit criteria and submission template.
<b>CONDITIONED SPACE</b>	means the part of a premises or building, that is cooled or heated, or both, with mechanical plant, for the comfort of occupants.
<b>CREDIT</b>	means the requirements and criteria used In BEAM Plus Interiors similar credits are allocated into categories;
<b>CREDIT INTERPRETATION REQUEST</b>	The process whereby Applicants, upon payment of specified charges, apply to BSL to seek technical and administrative guidance from BSL TRC on the application of BEAM Plus criteria to their projects (also abbreviated CIR).
<b>DECENTRALISED AIR CONDITIONING SYSTEM</b>	means DX air conditioning equipment/system serving one room or a number of rooms from a location within or adjacent to the room. Equipment used includes window type air conditioners, and split type air conditioning systems.  DX air conditioning equipment/systems piped to remote fan coil units, on different floors of a building, for example VRV, is excluded from this definition.
<b>DECONSTRUCTION AND CONSTRUCTION WASTE</b>	means waste (including recyclable waste) generated from demolition, renovation, or construction work are considered to be demolition and construction waste.  Tools that can maybe reused for other construction projects (such as, metal platform, bamboo scaffolding, temporary timber formwork, etc.) are not classified as waste or recyclable material and hence are excluded.
<b>DESIGN CONDITION</b>	means a selected criteria used for design, and plant capacity estimating purposes;

<b>DESIGN TEAM</b>	means the team of professionals engaged for the design and contract administration of a fit-out interiors project. The team may comprise an architect, interior designers, engineers (structural, civil, building services, mechanical, electrical, fire), project manager, quantity surveyor, environmental consultant, acoustic consultant, lighting consultant, and BEAM consultant.
<b>DESIGNED FOR DISASSEMBLY</b>	means construction material, or components which were specifically designed to be dismantled and disassembled using non-specialist tools for future reuse, recycling, or reprocessing.
<b>DEMOLITION</b>	means destruction, dismantling of construction elements, components, and materials, and removal from the <a href="#">project space</a> .
<b>DIRECT EXPANSION</b>	means a type of refrigeration equipment where the medium, usually air, is cooled with direct contact with heat exchanger containing a refrigerant (also abbreviated DX).
<b>EMBODIED ENERGY</b>	The energy used during the entire life cycle of a product, including its manufacture, transportation, and disposal, as well as the inherent energy captured within the product itself.
<b>ENERGY SIMULATION</b>	means a computer-generated models designed to represent the anticipated energy consumption and trends in buildings or the project space, providing a software platform to review and examine the energy performance of different design and equipment scenarios.
<b>ENVIRONMENTALLY MANUFACTURED MATERIALS</b>	Materials that are produced by manufacturer with a recognised Environmental Management System (EMS) in place (such as ISO 14001:2004). The EMS shall help the manufacturer minimise how their operations (processes etc.) negatively affect the environment (i.e. cause adverse changes to air, water, or land), comply with applicable laws, regulations, and other environmentally oriented requirements, and continually improve in the above.
<b>EXEMPT AREA</b>	means an area, not exceeding 20m <sup>2</sup> within the project space that maybe excluded from assessment. The Applicant, upon payment of the prescribed CIR charges, must apply to gain this concession from BLS TRC.
<b>EXFILTRATION</b>	means air leakage from the project space through cracks, interstices, ceilings, floors, walls, and the building envelope (irrespective of ownership)
<b>EXHAUST AIR</b>	means vitiated air removed from the project space or building, then discharged outside the building with mechanical systems.
<b>FSC CERTIFICATION</b>	means the independent certification system for timber products which label timber that was harvested in a sustainable manner.
<b>GLOBAL WARMING POTENTIAL</b>	means the comparative rating system for chemical compounds to indicate the potential damage that a chemical compound has related to one unit of carbon dioxide (a primary greenhouse gas).
<b>GREEN CLEANING</b>	means a environmentally friendly cleansing system using lower toxicity cleaning products and best practice to lower the environmental impacts of cleansing activities. It also includes handling, and disposal of waste resulting from cleansing activities;
<b>HONG KONG GREEN BUILDING COUNCIL LIMITED</b>	means the industry body established in 2009 to coordinate efforts towards green building in Hong Kong. HKGBC certifies BEAM Plus projects, and accredits BEAM Professionals

<b>HOST BUILDING</b>	means the building or tower in a building which houses the <a href="#">project space</a> .
<b>HOST BUILDING PROVISIONS</b>	means those Building Services and systems provided by the building owner / landlord for use by the Applicant in the occupied space being assessed (typically including central air conditioning, fan coil units / VAV terminals, lighting fixtures and controls, etc.).
<b>HYDRO-CHLOROFLUOROCARBONS</b>	means chemical compounds (also known as HCFC) that cause ozone depletion when released into the atmosphere.
<b>HYDRO-FLUOROCARBONS</b>	HFCs are commonly used to replace HCFC refrigerants to reduce the OPD, however HFCs refrigerants have a high GWP.
<b>INDEPENDENT COMMISSIONING AUTHORITY (iCxA)</b>	means the independent individual designated to review, oversee, and inspect the entire commissioning process from initial planning to completion. The iCxA should facilitate communication amongst the owner, designer, and contractor to ensure that the systems are installed and function in accordance with the design intent and owner's requirements.
<b>INFILTRATION</b>	means the uncontrolled air leakage into conditioned spaces through unintentional openings in ceilings, floors, walls, building envelope, or other openings.
<b>INNOVATION POINTS</b>	Innovations points may be awarded in the Innovation category (not in any of the other BEAM Plus Interior categories) where the BSL TRC has approved the Applicant's submission Innovation points will count towards the total credits obtained, but not towards the total credits obtainable.
<b>INTERIORS PROJECT</b>	means a project that involves the planning, design, construction and commissioning of the fit-out, renovation and refurbishment of internal occupied spaces within a host building.
<b>MERV</b>	means the Minimum Efficiency Reporting Value (also known as MERV). It is rating scale describing the effectiveness of air filters, designed by the American Society of Heating, Refrigerating and Air-conditioning Engineers, Inc. (ASHRAE).
<b>MODULAR COMPONENT</b>	means materials which are manufactured with standardised dimensions, and can be arranged or fitted together in various design scenarios.
<b>OWNER'S PROJECT REQUIREMENTS</b>	means the document outlining the goals, expectations for a project. It may include performance criteria for the design team, contractors, or maintenance personnel, and often includes specific requirements regarding the aspiration for BEAM certification (also abbreviated OPR).
<b>OZONE DEPLETING POTENTIAL</b>	means the comparative rating given to chemical compounds related to ozone layer degradation it may cause where released into the atmosphere.

<b>PARTITION</b>	means variable height movable modular self-supporting vertical units providing privacy to work stations in an open office or cellular system furniture for modular office, and are created from modular components with high rate of re-use. Partitions can be readily installed, relocated and dismantled normally without affecting the surrounding finishes (sometimes known as privacy screens).  Folding screens, and doors that employ tracks embedded in either the floor and/or ceiling are excluded from this definition.  Partitions and Walls are terms that are often used interchangeably, in this Manual, they have different and separate definitions.
<b>PERFORMANCE CATEGORIES</b>	means the section into which BEAM Plus criteria are divided based on their influence on the sustainability performance of a project including green building attributes, management, material aspects, energy use, water use, indoor environmental quality, and Innovation.
<b>POTABLE WATER</b>	means water that is safe enough to be consumed by humans, or used with low risk of immediate or long-term harm. Although the quality of water supplied to buildings in Hong Kong is strictly controlled, the quality of water drawn from consumers' taps may sometimes be affected by the condition of the host building plumbing such as discolouration from rusty pipes. Consumers are responsible for proper maintenance of internal plumbing and are required to engage a licensed plumber if the water quality is found to be affected due to defects.
<b>PREREQUISITE</b>	means special BEAM criterion that must be satisfied. Projects that do not meet these basis requirements cannot be assessed.
<b>PRIOR CONDITION</b>	means (1) condition when previous tenant moved out, or (2) property management company provided condition of project space for Applicant, or (3) prior to renovation where the project space is controlled by Applicant.
<b>PROJECT SPACE</b>	means the normally occupied area of the accommodation, typically delineated and bounded by the area(s) indicated in the Lease, and typically excludes all common areas, plant rooms, shared common areas in the <a href="#">host building</a>
<b>PRIVACY SCREENS</b>	<a href="#">Refer to Partition</a>
<b>RAPIDLY RENEWABLE MATERIAL</b>	means materials derived from sustainable crop, planted and harvested with a regeneration cycle of less than a 10-years that causes no biodiversity loss, no increased soil erosion, and no air quality impacts.
<b>RECORD PHOTOGRAPHS</b>	means photographs with time and date stamp documenting progress, an existing condition, feature, material delivery, site practices, installation details, concealed work that will be subsequently covered up, or finished works.
<b>RECYCLE CONTENT</b>	means the proportion, by mass, of the recycled material in a product (refer to ISO 14021)
<b>REGIONALLY MANUFACTURED MATERIALS</b>	means components or materials that were manufactured and/or assembled within a radius less than 800 km from the project space. For composite materials, only the portion by mass, manufactured with 800 km radius shall qualify.

<b>REGISTRATION</b>	The first step in seeking BEAM Plus certification, upon application and payment of the published fee, Applicants can apply to register their project online using the HKGBC website <a href="http://www.hkgbc.org.hk">http://www.hkgbc.org.hk</a>
<b>REGISTERED PROJECT</b>	means a project that has been registered and listed in the HKGBC project database for public information.
<b>REUSE</b>	means material(s) that can be used again, with the same function as the original usage.
<b>SUBMISSIONS DOCUMENTS</b>	means documentation provided for assessment, including but not limited to, submission templates, drawings, sketches, specifications, data sheets, catalogues, certificates, <a href="#">record photographs</a> , reports, logbooks, or contracts, as detail in this manual and any supplementary information as requested.
<b>SUSTAINABLE FORESTRY PRODUCT</b>	means timber or timber product sourced from sustainable forestry land participating in an independently assessed sustainable forest management programme.
<b>TECHNICAL REVIEW COMMITTEE</b>	means the BEAM Technical Review Committee (also known as BSL TRC) or other nominated BEAM committee who shall be responsible to review, adjudicate, and approve BEAM Plus Interiors projects, with certification undertaken by HKGBC.  The BSL TRC also oversees the implementation and progress monitoring of BEAM Plus assessments, resolves technical issues, and responds to Credit Interpretation Request (CIR).
<b>TEMPORARY WORK</b>	means all temporary work, including but not limited to, enabling works, temporary protection works, temporary protection erected between different phases of the works or other occupants, temporary protection erected for walls, doors, finishes, cabinets, partitions, equipment, lifts, escalators, and the like, temporary protection applied for floors, flooring, and carpets, temporary hoardings, and including all temporary doors, supports, bracing, cross bracing, fixings, trimming, hangers, and the like, whether located inside or outside the project space.
<b>UNITARY AIR CONDITIONING UNIT</b>	Refer to decentralised air conditioning system
<b>VARIABLE REFRIGERANT FLOW</b>	means unitary air-conditioner with a variable refrigerant volume flow feature, where modulating refrigerant flow adjusts the cooling capacity serving the conditioned space.
<b>VARIABLE SPEED DRIVE</b>	means an electronic motor control device (also known as VSD) that is used to start and control the speed of an electric motor.
<b>WALL</b>	means a full height structure normally extending from the structural floor to soffit and erected using masonry, including stone, concrete blocks, or brickwork although other materials are sometimes employed. Normally treated as builder's work involving wet trades and erected before commencement of finishing work.  There is potentially a high rate of reuse for the individual masonry units forming such an assembly.  Similar walls are also cast out using reinforced concrete, and normally form the separation between individual units or between individual unit and host building.  <a href="#">Partitions</a> and Walls are terms that are often used interchangeably, in this Manual, each is separately defined.

**ZERO-CREDIT  
BENCHMARK**

means, in the context of green building rating tools, a theoretical or design situation, where zero points can be awarded. Also known as baseline or baseline case. Used for quantify performance compared with the installed features.

**9.7 FEEDBACK FORM**

<b>BEAM PLUS INTERIORS – FEEDBACK FORM</b>			
The BEAM Society Limited values your opinions and expertise in improving the <i>BEAM Plus Interiors</i> standard. Should you have any comments and suggestions, feel free to complete this feedback form template and scan and return it to the BEAM Society Limited Secretariat at <a href="mailto:enquiry@beamssociety.org.hk">enquiry@beamssociety.org.hk</a> .			
<b>Your Name:</b>		<b>Position:</b>	
<b>Organisation:</b>			
<b>Contact Number:</b>		<b>Email Address:</b>	
<b>Project Title:</b>			
<b>BEAM Plus Reference (if applicable):</b>		<b>Date:</b>	
<b>Your Role (please tick):</b>		<b>Nature of feedback (please tick):</b>	
client / owner	( <input type="checkbox"/> )	overall framework	( <input type="checkbox"/> )
occupant / tenant	( <input type="checkbox"/> )	credit criteria	( <input type="checkbox"/> )
designer	( <input type="checkbox"/> )	assessment method	( <input type="checkbox"/> )
contractor	( <input type="checkbox"/> )	submission templates	( <input type="checkbox"/> )
BEAM Professional	( <input type="checkbox"/> )	certification process	( <input type="checkbox"/> )
other	( <input type="checkbox"/> )	other	( <input type="checkbox"/> )
<b>Your feedback:</b>			
<b>Declaration:</b>			
I hereby grant the BEAM Society Limited or its agent the non-exclusive royalty rights, including non-exclusive rights in copyright, for my proposals. I understand that I acquire no rights in publication of the standard in which my proposals in this or other analogous form is used. I hereby attest that I have the authority and am empowered to grant this copyright release.			
<b>BEAM Society Limited   <a href="mailto:enquiry@beamssociety.org.hk">enquiry@beamssociety.org.hk</a>   Tel: (852) 3610 5700   Fax: (852) 3996 9108 Address   1/F Jockey Club Environmental Building, 77 Tat Chee Avenue, Kowloon Tong, Hong Kong</b>			

## Appendices

### Submission Templates



# BEAM Plus Interiors Submission Summary Sheet

**Project Name:**

**Floor Area (IFA) sqm:**

**Total Number of Pages:**

Please complete this credit summary sheet by checking  for all credits you submitted for this project.

## Credit Summary

<b>Green Building Attributes (GBA)</b>	<b>Energy Use Category (EU)</b>
<input type="checkbox"/> GBA 1 – Green Building Attributes	<input type="checkbox"/> EU 1 – Energy Performance
<input type="checkbox"/> GBA 2 – Long-term Lease	<input type="checkbox"/> EU 2 – Energy Efficient Appliances
<b>Management (MAN)</b>	<b>EU 3 – Commissioning</b>
<input type="checkbox"/> MAN P1 – Construction Safety	<input type="checkbox"/> EU 4 – Operations and Maintenance
<input type="checkbox"/> MAN 1 – BEAM Professional	<input type="checkbox"/> EU 5 – Metering and Monitoring
<input type="checkbox"/> MAN 2 – Construction IAQ Management	<b>Water Use Category (WU)</b>
<input type="checkbox"/> MAN 3 – Construction Noise	<input type="checkbox"/> WU 1 – Water Quality Survey
<input type="checkbox"/> MAN 4 – Green Cleaning	<input type="checkbox"/> WU 2 – Annual Water Use
<input type="checkbox"/> MAN 5 – CSR Facilities	<input type="checkbox"/> WU 3 – Effluent Discharge to Foul Sewers
<input type="checkbox"/> MAN 6 – User Guidance	<input type="checkbox"/> WU 4 – No Bottled Water
<input type="checkbox"/> MAN 7 – Occupational Health and Safety	<b>Indoor Environmental Quality (IEQ)</b>
<b>Materials Aspects (MA)</b>	<input type="checkbox"/> IEQ 1 – Indoor Air Quality
<input type="checkbox"/> MA P1 – Use of Non-CFC-based Refrigerants	<input type="checkbox"/> IEQ 2 – Indoor Planting
<input type="checkbox"/> MA P2 – Minimum Waste Recycling Facilities	<input type="checkbox"/> IEQ 3 – Minimum Ventilation Performance
<input type="checkbox"/> MA P3 – Timber Used for Temporary Works	<input type="checkbox"/> IEQ 4 – Pre-Occupancy Flush Out
<input type="checkbox"/> MA 1 – Waste Recycling Facilities	<input type="checkbox"/> IEQ 5 – Tenant Exhaust
<input type="checkbox"/> MA 2 – Interior Component Reuse	<input type="checkbox"/> IEQ 6 – Uncontrolled Ventilation
<input type="checkbox"/> MA 3 – Furniture and Partitions	<input type="checkbox"/> IEQ 7 – Thermal Comfort
<input type="checkbox"/> MA 4 – Modular Design Materials	<input type="checkbox"/> IEQ 8 – Interior Lighting Quality
<input type="checkbox"/> MA 5 – Designed for Disassembly	<input type="checkbox"/> IEQ 9 – Natural Lighting
<input type="checkbox"/> MA 6 – Sustainable Flooring Products	<input type="checkbox"/> IEQ 10 – Views to Outside
<input type="checkbox"/> MA 7 – Sustainable Ceiling Products	<input type="checkbox"/> IEQ 11 – Acoustics
<input type="checkbox"/> MA 8 – Sustainable Wall and Door Products	<b>Innovations (IV)</b>
<input type="checkbox"/> MA 9 – Zero PVC	<input type="checkbox"/> IA 1 – Innovative Techniques
<input type="checkbox"/> MA 10 – Ozone Depleting Substances	<input type="checkbox"/> IA 2 – Performance Enhancement
<input type="checkbox"/> MA 11 - C&D Waste Reduction	



## **BEAM Plus Interiors Submission Summary Sheet**

***Room Schedule (to be completed by Applicant):***



## BEAM Plus Interiors Submission Summary Sheet

**Declaration:**

I, the undersigned, declare this submission, including all supporting documentation, is true, and complies fully and irrevocably, with requirements of BEAM Plus Interiors Manual

BEAM Pro Name

---

BEAM Pro Number

---

Signature

---

Date

---

**IMPORTANT NOTES:**

1. The Applicant shall complete the master template, with the overall credit summary, the room schedule, and required project information, can only be shall be signed by a BEAM Professional, with BI accreditation.
2. The Applicant shall submit one template for every prerequisite and individual credit. Submissions without prerequisites will not be assessed.
3. The Applicant shall provide ALL listed documentation on the template to support their application. Partial/split submissions shall NOT be permitted.
4. In the event that list on the template not sufficient for your project, provide supplementary page, clearly labelled and identified.
5. Submission materials for each template may comprise tables, report(s), drawing(s), calculation(s), catalogue data, commissioning records, record photographs, etc. ALL signed, and dated, by the relevant authority. For example all submission under Commissioning shall be dated and signed by the project ICxA.
6. Submissions with different types of material, for example summary table, drawings and photograph, SHALL be clearly identified and cross-referenced.
7. Where multiple page documents, for example a product catalogue or other material, is submitted containing pages with different model, or types, it shall be the Applicant's responsibility to clearly identify and highlight the item(s) used in the project, and its technical data.
8. All Innovation (IV) submissions shall stipulate coverage, scope, quantitative environmental benefits, and references to be reviewed.



**BEAM Plus Interiors**  
**Commercial, Retail and Institutional**  
**Submission Template for GBA 1**  
**Green Building Attributes**

**Credit Requirements:** **Leasing/Occupying a Green Building with Platinum, Gold, Silver, or Bronze certificate achieves 5, 4, 3, or 2 points respectively.**

**Alternatively, up to 4 points for Leasing/Occupying an uncertified building that meets the prescribed performance characteristics**

Credit Attainable:	<b>5</b>
Credit(s) anticipated for this submission:	

**Enclosure**

Certificate, valid less than 5 years old certificate for BEAM certificate grade, or other system

**Alternative**

**No Carparking**

Drawings, with host building General Building Plan

Record Photographs with no private carparking space in the host building

**Local Transportation**

Map, scaled walking distances from the main entrance of the host building.

Timetable, for each route, service frequency during the prescribed hours.

**Neighbourhood Basic Services**

Summary table with neighbourhood basic services, type, distance, map location

Map, scaled 500m walking distance from the host building main entrance

**Neighbourhood Recreational Facilities**

Summary table with neighbourhood recreational facilities, type, distance, map location

Map, scaled 500m walking distance from the host building main entrance

**Light Pollution**

Lighting simulation report

Record Photographs, "as built" lighting installation, night view;

**Water Efficient Design (greywater reclamation or rainwater harvesting system)**

Drawings, schematic drawing, location plans within host building;

Control system, dashboard screenshot



**BEAM Plus Interiors**  
**Commercial, Retail and Institutional**  
**Submission Template for GBA 1**  
**Green Building Attributes**

- Record Photographs, water systems in operation
  
- Renewable Energy System**
- Energy monitoring dashboard screenshot
- Drawings, engineering, schematic and layout
- Record Photographs with system equipment, operating, controls/dashboard
  
- Corporate Social Responsibility Facilities**
- Responsible person
- Drawings, architectural, layout plans, sections, elevations, drawings, engineering
- Drawings, engineering, sections, elevations layouts;
- Record photographs, "As built" installation, layout, location, signage, opening hours;



**BEAM Plus Interiors  
Commercial, Retail and Institutional  
Submission Template for GBA 2  
Long-term Lease**

**Credit Requirements:**    **2 credits for fixed lease where duration is at least 4 years;**  
                                 **3 credits for fixed lease where duration is at least 6 years;**

Credit Attainable:	<b>3</b>
Credit(s) anticipated for this submission:	

**Enclosure**

Lease with certified true copy of lease, with clearly highlighted FIXED lease period;

**Alternate**

Undertaking by building owner director signed with commitment for prescribed period clearly highlighted;



**BEAM Plus Interiors  
Commercial, Retail and Institutional  
Submission Template for MAN P1  
Construction Safety**

**Credit Requirements:** **Construction safety management was implemented during construction/fit-out activities;**

Credit Attainable:	Prerequisite
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**Enclosure**

- List Responsible Person
- Safety Management documentation with safety plan, schedules, personnel, procedures, method statements;
- Records, logbook, site diary, green card, staff on site, accident record, daily monitoring record;
- Record photographs with safety board, safety measures; data sheets, notices;



**BEAM Plus Interiors  
Commercial, Retail and Institutional  
Submission Template for MAN 1  
BEAM Professional**

**Credit Requirements:** **1 credit for at least one (1) key member project consultants holds BEAM Professional with BI accreditation**

Credit Attainable:	<b>1</b>
Credit anticipated for this submission:	

**Enclosure**

- BEAM Professional, name, number, BP accreditation date, register printout, BI accreditation;
- BEAM Professional appointment letter, employee of one project consultant;
- Summary table with prescribed data, design charrette concept stage, meetings participation, etc.



**BEAM Plus Interiors  
Commercial, Retail and Institutional  
Submission Template for MAN 2  
Construction IAQ Management**

**Credit Requirements:** **1 credit for implementing mitigation measures to reduce potential IAQ problems arising from demolition, dismantling, and removal of materials , etc. during fit-out activities;**

Credit Attainable:	<b>1</b>
Credit anticipated for this submission:	

**Enclosure**

- List Responsible Person
- Construction IAQ Management documentation with plan, threat, method statements, solutions;
- Records with logbook/records during construction programme;
- Drawings with floor layout plans, sections, elevations, with measures highlighted
- Drawings, engineering with floor plans, sections, details, with measures highlighted
- Record photographs with site progress, “as built” works



**BEAM Plus Interiors  
Commercial, Retail and Institutional  
Submission Template for MAN 3  
Construction Noise**

**Credit Requirements:** **1 credit for implementing measures to mitigate noise arising from demolition, dismantling, handling, construction, transportation for all fit-out activities;**

Credit Attainable:	1
Credit anticipated for this submission:	

**Enclosure**

- List Responsible Person;
- Documentation, with planning, method statements, identified sources, mitigation measures, references
- Records with logbook, daily records, etc;
- Letter, BMO declaration No written compliant received;
- Record Photographs, with progress and “as built” mitigation measures taken;



**BEAM Plus Interiors  
Commercial, Retail and Institutional  
Submission Template for MAN 4  
Green Cleaning**

**Credit Requirements:** **2 credits for implementing green cleaning system**

Credit Attainable:	<b>2</b>
Credit(s) anticipated for this submission:	

**Enclosure**

- List Responsible person
- Green Cleaning System Manual
- Manufacturer's data, data sheets with product purchase notes, delivery notes, hazard data sheets;
- Manufacturer's data, data sheets with product toxic, pesticides, herbicides, chemical handling safety;
- Procedures for routine cleaning, mixing, decanting, dilution, spillage, waste handling
- Procedures for keeping records, with method statements, logbook
- Procedures for staff training and communication;
- Procedures for equipment operation and maintenance highlighted
- Records with logbook with monitoring records, maintenance records, etc.
- Record photographs for all products, cleaning activities, handling procedures, waste handling highlighted



**BEAM Plus Interiors  
Commercial, Retail and Institutional  
Submission Template for MAN 5  
Corporate Social Responsibility Facilities**

**Credit Requirements:** **2 credits for providing prescribed CSR facility**

Credit Attainable:	<b>2</b>
Credit(s) anticipated for this submission:	

**Facility Type:**

- Nursery Area       Baby care room       Recreation Facility  
 Bicycle park & changing       Supervised Play Area       BFA  
 Other,, please specify:

**Enclosure**

- List Responsible Person  
 Documentation, with management plan, narrative, operating hours, operation plan;  
 Drawings, architectural, with layout floor, ceiling plan, sections, elevations, details;  
 Drawings, architectural with location plan in the same host building highlighted  
 Drawings, engineering services with BSI layout plans, sections, etc.  
 Lease for CSR area/facility within host building  
 Record Photographs with site progress, "As built" facility, furniture;



**BEAM Plus Interiors  
Commercial, Retail and Institutional  
Submission Template for MAN 6  
User Guidance**

**Credit Requirements:** **1 credit for Occupant related guidance targeted to education for environmental issues**

Credit Attainable:	<b>1</b>
Credit anticipated for this submission:	

**Enclosure**

- List Responsible person
- Documentation, with items, coverage, updating procedure, updating frequency
- Records with historical records, changes to notice board, changed focus
- Record Photographs with Notice board, poster, or electronic board Information

**Guidance Scope may include:**

- Public transport (e.g. maps and timetables)
- Alternative transport (e.g. bicycle, car sharing, shuttle bus, etc.)
- Hygiene (e.g. green cleaning)
- Material used (e.g. sustainable timber, reused materials)
- Energy Issues (e.g. energy efficient operation, energy efficient appliances, etc.).
- Water Conservation (e.g. adoption of low flow tap, flow rate data).
- Recycling (e.g. details of recyclable waste, location of recycling bins, benefits).
- Indoor Air Quality (e.g. measures taken, IAQ certification).



**BEAM Plus Interiors  
Commercial, Retail and Institutional  
Submission Template for MAN 7  
Occupational Health and Safety**

**Credit Requirement:** **1 credit for scoring at least 50% of the applicable occupational health and safety facilities;**  
**2 credits for scoring at least 70% of the applicable occupational health and safety facilities;**

Credit Attainable:	<b>2</b>
Credit(s) anticipated for this submission:	

**Enclosure**

- List Responsible Person
- Summary Table, with justification for each item, referenced to drawings, photographs, etc.
- Drawings, architectural with floor layout, elevation, section, detailed dimensioned, features highlighted
- Drawings, engineering with BSI, schematic, layout, details
- Manufacturer's catalogue, technical data sheets, operating/maintenance instructions, etc.
- Procurement with purchase notes, deliver notes,
- Record Photographs to show delivery, installation works, "As built" features



**BEAM Plus Interiors  
Commercial, Retail and Institutional  
Submission Template for MA P1  
Use of Non-CFC Based Refrigerants**

**Credit Requirements:** **Use Non chlorofluorocarbon (CFC)-based refrigerant for HVAC&R systems installed by the Applicant;**

<b>Credit Attainable:</b>	<b>Prerequisite</b>
---------------------------	---------------------

**Enclosure**

- Summary table, HVAC&R equipment, refrigerant type, quantity, model no.
- HVAC&R equipment schedule;
- Manufacturer's catalogue, technical data sheets for equipment refrigerant highlighted
- Record Photographs with equipment, refrigerant, nameplate information highlighted

**Alternative - HVAC&R not by the Applicant**

- Undertaking Letter, by BMO that no supplementary HVAC&R installed by Applicant



**BEAM Plus Interiors  
Commercial, Retail and Institutional  
Submission Template for MA P2  
Minimum Waste Recycling Facilities**

**Credit Requirements:** **Provide storage facilities, at prominent location, for the collection and recycling for paper, plastic, and metal waste.**

<b>Credit Attainable:</b>	<b>Prerequisite</b>
---------------------------	---------------------

**Enclosure**

- List Responsible Person:
- Collection Agreement, by Applicant
- Drawing, architectural floor layout plan, sections, elevations, etc.
- Record Photographs with "As-built" facility
- Recycler's company name
- Recycler's company contact number
- Recycler's company address
- List Target materials
- Collection Frequency

**Alternative**

- List Responsible Person:
- Collection Agreement, by BMO, or undertaking letter by BMO
- Drawing, architectural location plan in same host building
- Record Photographs with "As-built" facility
- Recycler's company name
- Recycler's company contact number
- Recycler's company address
- List Target materials
- Collection Frequency



**BEAM Plus Interiors  
Commercial, Retail and Institutional  
Submission Template for MA P3  
Timber Used for Temporary Works**

**Credit Requirements:** All timber for temporary work originated from a sustainable forestry source, re-used timber material, or combination of both types;

Credit Attainable:	Prerequisite
--------------------	--------------

- Sustainable timber used       Reused timber used       Combination used

**Enclosure**

- Summary table, timber type, source, manufacturer, origin, certification, quantities, usage;
- Drawings, architectural with floor plan(s), sections, elevations;
- Certificate, source for sustainable timber, by prescribed organisation;
- Certificate/undertaking source of re-used timber;
- Procurement, sustainable timber purchase orders, delivery notes, records;
- Procurement, regular timber purchase orders, delivery notes, records;
- Procurement, composite timber purchase orders, delivery notes, records;
- Record Photographs for materials, installation, and demolition of all temporary works



**BEAM Plus Interiors  
Commercial, Retail and Institutional  
Submission Template for MA 1  
Waste Recycling Facilities**

**Credit Requirements:** **1 credit for storage for any one prescribed item;**

**2 credits for storage for any two prescribed items;**

- i. **Recycling of glass;**
- ii. **Recycling of used small electrical appliance;**
- iii. **Recycling of food waste.**

Credit Attainable:	<b>2</b>
Credit(s) anticipated for this submission:	

Target Material	Glass	Electrical Appliance	Food Waste
<b>Enclosure</b>			
List Responsible Person	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Recycler's company name	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Recycler's company contact number	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Recycler's company address	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Collection Frequency	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Collection Agreement by Applicant	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Drawing, architectural floor plan(s)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Record photographs "As built" facility	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Alternative</b>			
List Responsible Person	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Recycler's company name	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Recycler's company contact number	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Recycler's company address	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Collection Frequency	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Collection Agreement, undertaking by BMO	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Drawing, architectural location in host building	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Record photographs "As built" facility	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



**BEAM Plus Interiors  
Commercial, Retail and Institutional  
Submission Template for MA 2  
Interior Components Reuse**

- Credit Requirements:**
- 1 credit for reusing at least 30% of prior condition's walls, glazing, doors, ceilings and flooring.**
  - 2 credits for reusing at least 50% of prior condition's walls, glazing, doors, ceilings and flooring.**
  - 3 credits for reusing at least 70% of prior condition's walls, glazing, doors, ceilings and flooring.**

Credit Attainable:	<b>3</b>
Credit(s) anticipated for this submission:	

**Enclosure**

- Summary table (refer sample below)
- Narrative with areas, methodologies adopted to maintain existing, sketches, etc.
- Drawings with floor layout, elevations, sections, for areas covered
- Record Photographs with pre- and post-construction of areas highlighted

Item	Reused Elements (sqm)	Prior Condition (sqm)	Comment
a) walls			
b) glazing			
c) Ceilings			
d) Internal doors			
e) Flooring			
f) Structural wall's coverings			
g)			
<b>Total (sqm)</b>			
	<b>Elements Reused (%)</b>		



**BEAM Plus Interiors**  
**Commercial, Retail and Institutional**  
**Submission Template for MA 3**  
**Furniture and Partitions**

- Credit Requirement**
- 1 credit for at least 30% by mass of the total furniture and partitions were reused**
  - 2 credits for at least 50% by mass of the total furniture and partitions were reused**
  - 3 credits for at least 70% by mass of the total furniture and partitions were reused**

Credit Attainable:	<b>3</b>
Credit(s) anticipated for this submission:	

**Enclosure**

- Summary table (refer sample below)
- Drawings architectural with floor plan layouts, sections, quantity reused indicated
- Procurement with purchase orders, deliver notes;
- Record Photographs, post-construction furniture / partition retained

**Desks and Chairs only**

- Summary table with desks/chairs, location, source, mass, quantity reused, total
- Drawings architectural with floor plan layouts
- Procurement with purchase orders, deliver notes, chain of custody for reused items
- Record Photographs for post-construction furniture / partition retained

Item	Total Reused Furniture and Partitions (kg)	Total Furniture and Partitions used in Project Space (kg)	Comment
a) Fixed furniture			
b) Cabinet			
c) Chairs			
d) Partitions			
e) Desks			
Total			
<b>Reused Furniture and Partitions (%)</b>			

**NOTE:** the terms 'walls' and 'partitions' are often used interchangeably. However in this context and BI Manual they are separately defined, refer to glossary.



**BEAM Plus Interiors**  
**Commercial, Retail and Institutional**  
**Submission Template for MA 4**  
**Modular Design Materials**

**Credit Requirements:** **1 credit for modular construction that contributed at least 50% by area of the newly installed elements;**

Credit Attainable:	<b>1</b>
Credit anticipated for this submission:	

**Enclosure**

- Summary table (refer to sample below)
- Drawings, architectural with floor plans, elevations, sections, detail sheets, fixing details, details highlighted;
- Product catalogues / technical data sheets for equipment, materials, systems, supports, fixings highlighted
- Record photographs with installation progress and “As built” installation

<b>Item</b>	<b>Modular Construction (sqm)</b>	<b>Total newly installed items (sqm)</b>	<b>Modular (%)</b>
<b>a) Partitions</b>			
<b>b) Walls</b>			
<b>c) Ceilings</b>			
<b>d) Doors</b>			
<b>e) Raised floor</b>			
<b>f)</b>			



**BEAM Plus Interiors**  
**Commercial, Retail and Institutional**  
**Submission Template for MA 5**  
**Designed for Disassembly**

**Credit Requirements:** **1 credit for installing easy to disassemble/dismantle elements that contributed to at least 50% by area of the newly installed elements;**

Credit Attainable:	<b>1</b>
Credit anticipated for this submission:	

**Enclosure**

- Summary table (refer to sample table below)
- Drawings, architectural with floor, elevations, sections, detail sheets, supports, fixing details highlighted
- Narrative, method statement for dismantling components;
- Product catalogues, technical data sheets with components, materials and fixing highlighted
- Record photographs with "As built" installation, site progress records, details, fixings

Item	Total Disassembly Designed Elements (sqm)	Total Newly Installed items (sqm)	Disassemble Design (%)
a) Partitions			
b) Walls			
c) Ceilings			
d) Doors			
e) Raised floor			



**BEAM Plus Interiors  
Commercial, Retail and Institutional  
Submission Template for MA 6  
Sustainable Flooring Products**

- Credit Requirements:**
- A. Rapidly Renewable Materials / Recycled Materials / Sustainable Timber / Combination - 1 credit for prescribed flooring materials that contributed at least 50% by area of flooring. 2 credits for 100% coverage achievement;**
  - B. Regionally Manufactured Materials - 1 credit for flooring materials manufactured within 800km radius that contributed at least 50% by area of flooring material;**
  - C. Environmentally Manufactured Material - 1 credit for flooring sourced from organisations with EMS and contributed to at least 50% of flooring material;**

Credit Attainable:	<b>4</b>
Credit(s) anticipated for this submission:	

- Rapidly Renewable Material, Recycled Material, Sustainable Timber or Combination**
  - Summary table (refer to sample)
  - Drawings, architectural, with floor layout plans, sections, details, fixings highlighted
  - Product catalogues, technical sheets, certificates for all materials, material content highlighted
  - Record Photographs, installation progress, completed work, "As-built" installation
- ALTERNATIVE 1 - No Construction Materials**
  - Record Photographs
- Regionally Manufactured Materials**
  - Summary Table (refer to sample table)
  - Product Catalogues, technical sheets substantiating materials, material content highlighted
  - Map indicating each location is < 800km radius highlighted
  - Procurement with purchase orders, delivery notes, factory location, quantity
- Environmentally Manufactured Materials**
  - Summary table (refer to sample table)
  - Certificate for EMS or EMS Manual for ALL manufacturer/factories;



**BEAM Plus Interiors**  
**Commercial, Retail and Institutional**  
**Submission Template for MA 6**  
**Sustainable Flooring Products**

Item	Prescribed Material (sqm)	Total Newly Installed Material (sqm)	Comments
a) Flooring			
b) Supports, Fixing, Framing, Trimming, Bracing, Levelling			
c) Skirting			
Total			
Qualified Content (%)			

Item	Total Regionally Manufactured Materials (sqm)	Total Newly Installed Flooring Materials (sqm)	Comments
a.) Flooring			
b.) Fixing, Framing, Trimming, Bracing, Levelling			
c.) Skirting			
Total			
Total Regionally Manufactured Materials (%)			

Item	Total Environmentally Manufactured Materials (sqm)	Total Newly Installed Flooring Materials (sqm)	Comments
a.) Flooring			
b.) Fixing, Framing, Trimming, Bracing, Levelling			
c.) Skirting			
Total			
Total Environmentally Manufactured Materials (%)			



**BEAM Plus Interiors  
Commercial, Retail and Institutional  
Submission Template for MA 7  
Sustainable Ceiling Products**

**Credit Requirements:**

A) **Rapidly Renewable Materials, Recycled Materials, Sustainable Timber , or combination** 1 credit for ceiling materials either rapidly renewable materials, recycled materials, sustainable timber, or combination that contributed at least 50% of ceiling area. 2 credits for 100% coverage achievement;

B) **Regionally Manufactured Materials** 1 credit for ceiling materials manufactured locally within 800km radius from the project space, which contributed to at least 50% of the ceiling materials;

C) **Environmentally Manufactured Materials** 1 credit for sourcing ceiling materials from all manufacturers / factory which implemented EMS and contributed at least 50% of the ceiling materials

Credit Attainable:	<b>4</b>
Credit(s) anticipated for this submission:	

- Rapidly Renewable Material, Recycled Material, Sustainable Timber or Combination**
- Summary table (refer to sample)
- Drawings, ceiling layout plans, fixing details, sub grid, hangers, highlighted
- Product catalogues, technical sheets, certificates for all materials, material content highlighted
- Record Photographs, installation progress work, completed work, “As-built” installation
  
- ALTERNATIVE 1 - No Construction Materials**
- Record Photographs
  
- Regionally Manufactured Materials**
- Summary Table (refer to sample table)
- Product Catalogues, technical sheets substantiating materials, material content,highlighted
- Map indicating each location is < 800km radius highlighted
- Procurement with purchase orders, delivery notes, factory location, quantity
  
- Environmentally Manufactured Materials**
- Summary table (refer to sample table)
- Certificate for EMS or EMS Manual for ALL manufacturer/factories;



**BEAM Plus Interiors**  
**Commercial, Retail and Institutional**  
**Submission Template for MA 7**  
**Sustainable Ceiling Products**

Item	Prescribed Material (sqm)	Total Newly Installed Material (sqm)	Comments
a) Ceiling			
b) Supports, Fixing, Framing, Trimming, Bracing, Levelling			
c) Sub/Secondary grid			
Total			
Qualified Content (%)			

Item	Total Regionally Manufactured Materials (sqm)	Total Newly Installed Materials (sqm)	Comments
a.) Ceiling			
b.) Fixing, Framing, Trimming, Bracing, Levelling			
c.) Sub/Secondary grid			
Total			
Total Regionally Manufactured Materials (%)			

Item	Total Environmentally Manufactured Materials (sqm)	Total Newly Installed Materials (sqm)	Comments
a.) Ceiling			
b.) Fixing, Framing, Trimming, Bracing, Levelling			
c.) Sub/Secondary grid			
Total			
Total Environmentally Manufactured Materials (%)			



**BEAM Plus Interiors  
Commercial, Retail and Institutional  
Submission Template for MA 8  
Sustainable Wall and Door Products**

- Credit Requirements:**
- A. **Rapidly Renewable Materials, Recycled Materials, Sustainable Timber or Combination** - 1 credit for prescribed wall/door materials that contributed at least 50% by area. 2 credits for 100% achievement;
  - B. **Regionally Manufactured Materials** - 1 credit for wall/door materials manufactured within 800km radius that contributed at least 50% by area;
  - C. **Environmentally Manufactured Material** - 1 credit for wall/door sourced from organisations with EMS and contributed to at least 50% by area;

Credit Attainable:	4
Credit(s) anticipated for this submission:	

- Rapidly Renewable Material, Recycled Material, Sustainable Timber or Combination**
  - Summary table (refer to sample table)
  - Drawings, floor layout plans, elevations, door schedules, sections, details highlighted
  - Product catalogues, technical sheets, certificates for all materials, material content highlighted
  - Record Photographs, installation work, completed work, "As-built" installation
- ALTERNATIVE 1 - No Construction Materials**
  - Record Photographs
- Regionally Manufactured Materials**
  - Summary Table (refer to sample table)
  - Product Catalogues, technical sheets, door schedules, substantiating materials, material content highlighted
  - Map indicating each location is < 800km radius
  - Procurement with purchase orders, delivery notes, factory location, quantity
- Environmentally Manufactured Materials**
  - Summary table (refer to sample table)
  - Certificate for EMS or EMS Manual for ALL manufacturer/factories;



**BEAM Plus Interiors  
Commercial, Retail and Institutional  
Submission Template for MA 8  
Sustainable Wall and Door Products**

Item	Prescribed Material (sqm)	Total Newly Installed Material (sqm)	Comments
a) Walls			
b) doors			
c)			
Total			
Qualified Content (%)			

Item	Total Regionally Manufactured Materials (sqm)	Total Newly Installed Materials (sqm)	Comments
d) Walls			
e) doors			
f)			
Total			
Total Regionally Manufactured Materials (%)			

Item	Total Environmentally Manufactured Materials (sqm)	Total Newly Installed Materials (sqm)	Comments
g) Walls			
h) doors			
i)			
Total			
Total Environmentally Manufactured Materials (%)			



**BEAM Plus Interiors**  
**Commercial, Retail and Institutional**  
**Submission Template for MA 9**  
**Zero PVC**

**Credit Requirements:**     **1 credit for choosing alternative products to eliminate PVC**

Credit Attainable:	<b>1</b>
Credit anticipated for this submission:	

**Enclosure**

- Summary table (refer sample below)
- Product catalogues, technical data sheets with materials, products, fixings highlighted
- Drawings, engineering with floor layouts, sections, and detail sheets;
- Record photographs, installed products highlighted

Element	Zero PVC Replacement Product	quantity	Drawing no.	Material data sheet
a.) Edge protection strip				
i) Cable conduit				
ii) Electrical cables				
• Furniture				
b.) Phone cables				
c.) Pipework				
• Data cables				
d.)				



**BEAM Plus Interiors  
Commercial, Retail and Institutional  
Submission Template for MA 10  
Ozone Depleting Substances**

**Credit Requirements:** **1 credit for installing products without ozone depleting substances (CFC & HCFC) in the material processing, manufacturing, and composition;**

Credit Attainable:	<b>1</b>
Credit anticipated for this submission:	

**Enclosure**

- Summary table (refer to sample below)
- Product catalogue, technical data sheets with no CFC/HCFC highlighted
- Letter, manufacturer's declaration no ozone depleting substances
- Drawings, architectural with floor layout, sections, or elevations;
- Drawings, engineering with BSI schematics, layouts, details sheets
- Record photographs with equipment, nameplates

Prescribed Element	Alternative Material Used	Material Data Sheet	Drawing Number	Photo Number
a.) Partitions				
b.) Walls				
c.) Chilled water pipes				
d.) Refrigerant pipes				
e.) Ductwork				
f.)				
g.)				
h.)				



**BEAM Plus Interiors  
Commercial, Retail and Institutional  
Submission Template for MA 11  
Demolition and Construction Waste Reduction**

**Credit Requirements:**    **1 credit for recycling at least 30% of demolition and construction waste by mass;**  
**2 credits for recycling at least 60% of demolition and construction waste by mass;**

Credit Attainable:	2
Credit(s) anticipated for this submission:	

**Enclosure**

- Summary Table (refer to sample below)
- Records with trip tickets, recycling firm receipts, substantiating the waste and waste reductions
- Site records with logbook (excel format) for waste stream, qty, type, sorting, storage, recycling, disposal;
- Record photographs with process, storage, waste sorting and storage by contractor, collection by recyclers

Prescribed Element	Recycled C&D Waste (kg)	Overall Quantity C&D Waste (kg)
a.) Demolished materials		
b.) Plastics		
c.) Paper and cardboard packaging		
d.) Metals		
e.) Timber		
f.) General refuse		
<b>Sub Total</b>		
<b>Percentage C&amp;D Waste Recycled (%)</b>		



**BEAM Plus Interiors**  
**Commercial, Retail and Institutional**  
**Submission Template for EU 1**  
**Energy Performance – Performance-based Approach**

**Credit Requirements:**

**Credit(s) shall be based on the reduction of annual HVAC&R consumption by:**

Credit(s)	1	2	3	4	5	6
HVAC&R	3%	5%	10%	15%	20%	25%

**And from lighting by:**

Credit(s)	1	2	3	4	5	6	7	8
Lighting	10%	15%	20%	25%	30%	35%	40%	45%

Credit Attainable:	<b>14</b>
Credit(s) anticipated for this submission:	

**Type of Space:**

- air-side air-conditioning system (Over 80% of area served by central plant, the simulation shall cover the project space. The building envelop characteristics will be as described in Appendix 9.1 of the Manual).
- unitary air-conditioning system (the simulation will cover the entire air-conditioning installation. The building envelope characteristics shall be as described in Appendix 9.1 of the Manual).

**Enclosure**

- Narrative, with describing in detail HVAC&R and lighting systems installed;
- Simulation, with Software name, version listed;
- Exceptional Calculation Method, where used
- Methodology, BEC 2012 Edition and Appendix 9.1 of the Manual
- Methodology, ASHRAE 90.1-2010, Appendix G, or equivalent
- Energy Simulation report, clearly indicating savings for HVAC&R and lighting systems;
- Energy Simulation report, with ALL input data, output file;
- Energy Simulation report, other documentation to substantiate simulation;
- Manufacturer's catalogue, technical data sheets used in the energy simulation
- Drawings, engineering with "As-built" for all systems;
- Signature, by HKSAR Registered Energy Assessor.



**BEAM Plus Interiors**  
**Commercial, Retail and Institutional**  
**Submission Template for EU 1**  
**Energy Performance – Prescriptive-based Approach**

**Credit Requirements:** **Up to a maximum of 14 credits for using energy efficient HVAC&R and lighting systems and controls that reduce energy consumption**

Credit Attainable:	<b>14</b>
Credit(s) anticipated for this submission:	

**Enclosure**

- Narrative, describing the engineering installation features;
- Drawings, engineering with “As-built” BSI floor plans, schematics, with features indicated;
- EMSD Lighting Form (showing the percentage LPD reduction);
- Manufacturer’s catalogue, technical data sheet (for feature/equipment installed)
- Records with all T&C records demonstrating the relevant systems, set points, criteria;
- Record Photographs with “as built” installations with features indicated;
- Signature by HKSAR Registered Energy Assessor (all documents)

**HVAC&R Features**

- 1 credit for appropriate zoning and thermostat distribution;
- 1 credit for occupancy sensors and/or programmable timer controlling HVAC operation;
- 1 credit for automatic blinds controlled by daylight sensor;
- 1 credit for ceiling, wall mounted circulation fans;
- 1 credit for fan coil units with variable speed drive, or high efficiency motors;
- 1 credit for high efficiency air conditioning units;
- 1 credit for heat recovery system;
- 1 credit for CO<sub>2</sub> sensors controlling fresh air rate;
- 1 credit for complying with the installation positions for air-conditioning units;
- 1 credit for HVACR system operating with free cooling under enthalpy control;
- 1 credit for openable windows for natural ventilation;

**Electrical Features**

- 1 credit for reducing LPD by 10%
- 2 credit for reducing LPD by 15%
- 3 credit for reducing LPD by 20%
- 4 credit for reducing LPD by 25%
- 5 credit for reducing LPD by 30%
- 6 credit for reducing LPD by 35%
- 1 credit for appropriate zoning and manual control;



**BEAM Plus Interiors  
Commercial, Retail and Institutional  
Submission Template for EU 1  
Energy Performance – Prescriptive-based Approach**

- 1 credit for daylight dimming controls;
- 1 credit for occupancy sensor controls;
- 1 credit for task light for every workstation;
- 1 credit for entrance master switch;
- 1 credit for compliance with voluntary lighting code;

Use CIR to submit additional options for BSL consideration;



**BEAM Plus Interiors  
Commercial, Retail and Institutional  
Submission Template for EU 2  
Energy Efficient Appliances**

**Credit Requirements:**

- 1 credit for 70% of all electrical appliances are certified energy efficient;**
- 2 credits for 90% of all electrical appliances are certified energy efficient;**
- 3 credits for 100% of electrical appliances are certified energy efficient;**

Credit Attainable:	<b>3</b>
Credit(s) anticipated for this submission:	

**Enclosure**

- Summary table (refer to sample below);
- Catalogue manufacturer's technical data sheet for all appliances;
- Drawings, architectural layout plan(s) with locations highlighted
- Record Photographs with all appliances in situ;

item	appliance	model number	dwg reference	catalogue reference	efficiency rating	photo reference	labelled qty	total qty
1								
2								
3								
4								
Sub total:								

**Note:** Equipment and appliances shall be new, installed by the Applicant at the time of occupancy, within the project space. Only appliances under the EMSD's mandatory, recognition, voluntary scheme, and US EPA's ENERGY STAR shall qualify. Other labelled appliances, including but not limited to, HVAC&R related, lighting related including ballast, fixed task lighting, hot water appliances, and building envelope products, shall be excluded to prevent double counting.



**BEAM Plus Interiors  
Commercial, Retail and Institutional  
Submission Template for EU 3  
Commissioning**

**Credit Requirements:** **2 credits for Commissioning planning detailing all specified commissioning work for HVAC&R, lighting and other BSI systems that impact on energy use and indoor environmental quality, and signed by iCx A**  
**2 credits for Commissioning records, drawings for HVAC&R, lighting and other BSI that impact on energy use and indoor environmental quality, and signed by iCx A.**

Credit Attainable:	<b>4</b>
Credit(s) anticipated for this submission:	

**Enclosure**

**iCx A**

- ICx A Information, Resume, Scope of work, Verify independent;

**Commissioning planning**

- Commissioning plans for all BSI, functional templates, programme, signed by iCx A;  
 Commissioning specifications all systems, signed by iCx A;

**Commissioning records**

- Records, commissioning reports, forms, measurement schedules, methods for all systems signed by iCx A  
 Records with scheduled /deferred commissioning, all systems, signed by iCx A  
 Drawings with "As built" for all systems reviewed by iCx A with ALL commissioning data highlighted;  
 Record Photographs, sample commissioning procedures, records, measuring;

**Alternative - No BSI Alteration**

- Contract/Lease, stating no BSI, and no supplementary BSI installed, signed by director of building owner;

iCx A - independent Commissioning Authority

BSI - Building Services Installation



**BEAM Plus Interiors  
Commercial, Retail and Institutional  
Submission Template for EU 4  
Operations & Maintenance**

**Credit Requirements:** **1 credit for digital/online O&M manual for all engineering systems including energy management section, or extra separate energy management manual;**

Credit Attainable:	<b>1</b>
Credit anticipated for this submission:	

**Enclosure**

- List Responsible Person
- Records with digital O&M manual, record photographs, screenshots, printout, populated lists, list set points
- Records with digital energy management manual or section indicated, table of contents;

**Alternate - Host Building Contractor\***

- Contract with BSI maintenance, scope of work
- Records with method statements for all systems, programme/frequency of inspection for all systems;

BSI - Building Services Installation

\*Contract(s) shall cover entire BSI (except FSI)

**Credit Requirements:**

- a) 3 credits for electricity sub-system monitoring with sub-meters (irrespective of ownership) of the prescribed engineering systems
- b) 1 credit for chilled water energy monitoring with thermal energy meter (irrespective of ownership) of the prescribed CHW system;

Credit Attainable:	<b>4</b>
Credit(s) anticipated for this submission:	

**Enclosure**

- Electricity Monitoring**
  - Responsible person
  - Records with consumption records, BMS screenshot (if used); , T&C reports for all meters and CT's
  - Manufacturer's catalogue, technical data sheets, O&M manuals, for all meters, safety, and CT's,
  - Drawings, engineering As-built electrical schematic, highlighting installed meter(s);
  - Record Photographs with "as built" installed meter(s) highlighted
- Chilled Water Monitoring**
  - Responsible person
  - Records with consumption records, BMS screenshot (if used), T&C reports for all meters and all sensors;
  - Manufacturers catalogue, technical data sheets, and O&M manuals for all meters and all sensors;
  - Drawings, engineering As-built schematic, layouts, highlighting installed meter(s);
  - Record Photographs with "as built" installed meter(s) highlighted

CT - Current Transformer



**BEAM Plus Interiors  
Commercial, Retail and Institutional  
Submission Template for WU 1  
Water Quality Survey**

**Credit Requirements:** **1 credit for providing quality potable water to referenced drinking water quality standards at all points of use;**

Credit Attainable:	<b>1</b>
Credit anticipated for this submission:	

**Enclosure**

- Summary table, with item, sample point, results for QWRS parameters
- Drawings, engineering, plumbing schematic, layout drawings, sampling points highlighted
- Records, laboratory test report for QWRS parameters for each sample point

**Alternative 1 - Common Area, QWRS certificate**

- Certificate, QWRS for Host building Potable Water (Blue or higher grade certificate)
- Certificate, QWRS for Host building Flushing Water Installation (Blue or higher grade certificate)

**Alternative 2 - Common Area, Twin tank Installation**

- Drawings, plumbing schematic, layout for potable twin-tank system
- Record Photographs, for twin-tank installation



**BEAM Plus Interiors  
Commercial, Retail and Institutional  
Submission Template for WU 2  
Annual Water Use**

**Credit Requirements:**    **1 credit for using water efficient devices with aggregate annual potable water saving of 30% compared with BEAM Plus baseline**  
**2 credits for using water efficient devices with aggregate annual potable water saving of 40% compared with BEAM Plus baseline**

Credit Attainable:	<b>2</b>
Credit(s) anticipated for this submission:	

**Enclosure**

- Calculation, with annual water usage, compared with baseline data
- Drawings, architectural, with floor plan with wc, washroom, pantry, etc. clearly indicated
- Drawings, engineering with plumbing schematic, and layout drawings
- Manufacturer's specification, technical data sheets with water flow rate information
- Record Photographs, fixtures and fitting installed

**Alternative**

- Summary table, with water fixture, flow rate, baseline flow rate, water saving
- Records, with Sensor type water taps installed in the host building common area
- Records, with WELS Grade 1 labelled water taps and shower heads installed in the host building common area
- Manufacturer's specifications, technical data sheets with flow rate information
- Drawings, with location plan in host building clearly highlighted
- Record Photographs, host building "As built" installation



**BEAM Plus Interiors  
Commercial, Retail and Institutional  
Submission Template for WU 3  
Effluent Discharge to Foul Sewers**

**Credit Requirements:** **1 credit for using water efficient flushing systems and/or technology in project space or host building**

Credit Attainable:	<b>1</b>
Credit anticipated for this submission:	

**Enclosure**

- Calculation, sewerage volume “As built” compared with baseline data
- Drawings, architectural, with floor layout plan(s) of facilities
- Manufacturer’s specification, technical data sheet for all appliances c/w flow rate
- Record Photographs, for “As-built” facility

**Alternative**

- Lease/other document for occupants access to shared facility;
- Drawings, architectural, with location plan in host building clearly indicated
- Manufacturer specifications, technical data sheet c/w flow rate information
- Record Photographs for “As-built” facility in host building



**BEAM Plus Interiors  
Commercial, Retail and Institutional  
Submission Template for WU 4  
No Bottled Water**

**Credit Requirements:** **2 credits for replacing plastic bottled potable water with sustainable alternative**

Credit Attainable:	<b>2</b>
Credit(s) anticipated for this submission:	

**Enclosure**

- Summary table with location, quantity, water dispenser type(s)
- Drawings, architectural, with floor layout plans, elevations, sections, with location of water dispenser(s)
- Catalogue, technical data sheet(s) for installed equipment
- Record photographs for “As-built” equipment/facility



**BEAM Plus Interiors**  
**Commercial, Retail and Institutional**  
**Submission Template for IEQ 1**  
**Indoor Air Quality**

**Credit Requirements:**

**A) Specifications Approach**

For each of the materials categories (A1 to A5), 1 credit is achieved when compliance is demonstrated through submission of the requisite documentation.

**A1. Adhesive and sealants; A2. Paints, coatings and finishes; A3. Wood and laminates; A4. Flooring materials and Carpets; and A5. Furniture.**

Alternatively,

**B) Measurement Approach**

For each of the categories of contaminants (B1 to B5), 1 credit is achieved if measured concentrations obtained through appropriate measurements comply with the GOOD class requirement of the Indoor Air Quality (IAQ) Certification Scheme

**B1. Total volatile organic compounds (TVOCs); B2. Formaldehyde (HCHO); B3. Products of combustion: carbon monoxide (CO), nitrogen dioxide (NO<sub>2</sub>); B4. Respirable Suspended Particulate (RSP, PM<sub>10</sub>); and B5. Ozone.**

Credit Attainable:	<b>5</b>
Credit(s) anticipated for this submission:	

**BEAM Plus criteria:**

- A) Design Approach**
- A1. The VOC content limits of the adhesives, sealants and sealant primers used in the project interiors should be less than the maximum limit given in Annex 6 of "A Guide to the Air Pollution Control (Volatile Organic Compounds) Regulation" issued by Environmental Protection Department.**
- A2. The VOC content limits of paint paints, coatings and finishes used in the project interiors should be less than 50g per litre.**
- A3.**
  - i. Composite wood and fibre products shall not contain any added urea - HCHO resins; and
  - ii. Adhesives used to fabricate assemblies shall not contain any added urea - HCHO.

The list of all products and laminate adhesives used shall be accompanied by a statement that they contain no added urea – HCHO.

**BEAM Plus criteria:**

- A4. For flooring materials
- i. The total emission and emission rate of VOC should not exceed 2g/m<sup>2</sup> and 500µg/m<sup>2</sup>/hr;
  - ii. The emission of HCHO should not exceed 0.13mg/m<sup>3</sup> air for wood-based flooring;
  - iii. The product should not contain chlorinated / brominated paraffins, organic tin compounds, phthalates or PBDEs content; and
  - iv. The product should not contain any heavy metals or their compounds as list below:  
Cadmium, mercury, hexavalent chromium, lead, arsenic, and antimony.

For carpets

- i. The emissions of TVOCs should not exceed 0.5 mg/m<sup>2</sup> per hour; and
- ii. Water-based adhesive or adhesive free should be used.

- A5. Furniture

For metal furniture:

- i. The colour coating of the furniture should not contained:
  - a) HCHO or halogen solvent; and
  - b) Any heavy metallic substances such as lead, cadmium, chromium and their compounds.
- ii. If the product contains plastic parts, the plastic parts should not contained the following substances:  
Lead, chromium, cadmium, mercury, phthalates, and halogenated organic substances.

For non-metal furniture:

- i. All wooden board used shall be of Class E1 in respect of formaldehyde emission requirements as follows:
  - a) MDF Board:  $\leq$  8mg/100g as per EN120 test requirement; and
  - b) Plywood: release  $\leq$  0.124mg/m<sup>3</sup> air as per EN717-1 requirement.

Salvaged and used furniture shall be excluded from the assessment.

A list of all furniture and fittings shall be provided identifying either age (reused) or product details (description, manufacturer, product range/model) and copies of test reports.

- Alternative,

B) Measurement Approach

- B1. The TVOCs level during normally occupied period complies with IAQ Good Class requirement of IAQ Certification Scheme.
- B2. The HCHO level during normally occupied period complies with IAQ Good Class requirement of IAQ Certification Scheme.
- B3. The CO and NO<sub>2</sub> level during normally occupied period complies with IAQ Good Class requirement of IAQ Certification Scheme.
- B4. The RSP (PM<sub>10</sub>) level during normally occupied period complies with IAQ Good Class requirement of IAQ Certification Scheme.



**BEAM Plus Interiors  
Commercial, Retail and Institutional  
Submission Template for IEQ 1  
Indoor Air Quality**

**BEAM Plus criteria:**

- B5. The ozone level during normally occupied period complies with IAQ Good Class requirement of IAQ Certification Scheme.

**Explanation to fulfill BEAM Plus criteria:**

**Enclosures:**

A) Design Approach

- Specifications for the materials/components as they appear in construction documents.
- A table listing the materials used, identifying the emissions rates for materials in classes A2 and A4, the permitted emissions limit for each of the materials as specified in referenced documents, and details of the source data (e.g. manufacturer's data sheets).
- Confirmation of compliance with the relevant standard/emissions criteria.

Alternative,

B) Measurement Approach

- The method statement of IAQ measurement.
- Measurement report issued by an HKAS accredited IAQ Certificate Issuing Body with measurement methodology, number of sampling points required under IAQ Certification Scheme, measuring date, time and conditions of the interiors space, the measurement results and the calibration certificates of the measuring equipment.
- Valid IAQ Certificate issued by Environmental Protection Department.
- Other supporting documents, please specify.



**BEAM Plus Interiors**  
**Commercial, Retail and Institutional**  
**Submission Template for IEQ 2**  
**Indoor Planting**

**Credit Requirements:**    **1 credit for fulfilling at least 2 items of prescribed criteria;**  
                                 **2 credits for fulfilling at least 4 items of prescribed criteria;**

Credit Attainable:	<b>2</b>
Credit(s) anticipated for this submission:	

**Enclosure**

- Drawings, architectural, with layout, elevations, sections showing the location of the plants/green wall
- Horticultural Maintenance Plan
- Schedule with number of plants and species provided;
- Calculation with show plant density
- Undertaking with species suitable for indoor environment
- Undertaking with no herbicides, pesticides, or fossil fuel powered electricity used;



**BEAM Plus Interiors  
Commercial, Retail and Institutional  
Submission Template for IEQ 3  
Minimum Ventilation Performance**

**Credit Requirements:** **1 credit for compliance with the minimum requirements of ASHRAE 62.1-2010 in respect of Outdoor Air Quality; and Minimum Ventilation Rate.**

**Alternatively 1 credit for carbon dioxide level within the space complies with Good Class requirement as stipulated in IAQ Certification Scheme**

Credit Attainable:	<b>1</b>
Credit anticipated for this submission:	

**Enclosure**

- Measurement report for CO, NO<sub>2</sub>, O<sub>3</sub>, RSP complies with EPD IAQ Certificate Good Class
- Completed Table H-3 of ANSI/ASHRAE 62.1-2010 compliance with the minimum ventilation rate

**Alternative**

- Certificate, valid EPD IAQ Certificate at least Good Class



**BEAM Plus Interiors  
Commercial, Retail and Institutional  
Submission Template for IEQ 4  
Pre-occupancy Flush Out**

**Credit Requirements:** **1 credit for flush-out of all normally occupied project spaces prior to occupancy;**

Credit Attainable:	<b>1</b>
Credit anticipated for this submission:	

**Enclosure**

- Documents, method statements with flush out procedure, date, flushing duration, fresh air provision:
- Occupancy date
- Record Photographs, showing equipment, fans, flush-out procedure
- Records, logbook, records, indicating the flush-out dates, outdoor delivery rates, flushing duration, temp, RH;
- Calculations, showing the outdoor air required for flushing



**BEAM Plus Interiors  
Commercial, Retail and Institutional  
Submission Template for IEQ 5  
Tenant Exhaust**

**Credit Requirements:** **1 credit for independent local exhaust system(s) for all photocopy / printing rooms and other areas\*\* indoor pollution is generated.**

Credit Attainable:	<b>1</b>
Credit anticipated for this submission:	

**Enclosure**

- Drawings, architectural, location, floor area, for pollutant sources (photocopy / printing rooms);
- Drawings, engineering schematic, sections, layout indicating ductwork/fan exhaust system(s);
- Drawings, engineering ductwork scale 1:50 indicating distance between exhaust and intake positions;
- Records, T&C records with exhaust fan schedule, and controls;
- Records, T&C record for exhaust rate of 2.5l/s/sqm, control panel, and power consumption;
- Manufacturer's catalogue, technical data sheet for exhaust fan(s);
- Record Photographs, for site work, ductwork, fan, wiring, exhaust discharge point, and completed installation

\*\* Commercial Kitchens are excluded



**BEAM Plus Interiors  
Commercial, Retail and Institutional  
Submission Template for IEQ 6  
Uncontrolled Ventilation**

**Credit Requirements:** **1 credit for air leakage test using a non-balanced method and report envelope air tightness;**

Credit Attainable:	<b>1</b>
Credit anticipated for this submission:	

**Enclosure**

- Method statement, ASTM E779 testing
- Drawings, architectural with floor plan, with location testing highlighted;
- Records with result air leakage rates, report compliance with CIBSE TM23:2000 or equipment, fan, etc. used
- Record Photographs with testing procedure, result taking



**BEAM Plus Interiors  
Commercial, Retail and Institutional  
Submission Template for IEQ 7  
Thermal Comfort**

**Credit Requirements:**

**A) Temperature**

**1 credit for demonstrating the air temperature within the project space is  $\pm 1.5$  °C of the set temperature when the air side system is operating at steady state under normal occupied periods.**

**B) Relative humidity**

**1 credit for demonstrating the relatively humidity within the project space is less than 70%.**

**C) Air movement**

**1 credit for demonstrating the air movement within the project space is less than 0.3m/s.**

Credit Attainable:	<b>3</b>
Credit(s) anticipated for this submission:	

**Enclosure**

- Report with Method Statements for measurement
- Records site measurements
- Record Photographs for site measurement

**Alternate IAQ Certificate**

- Certificate, valid Good Class IAQ certificate issued by EPD



**BEAM Plus Interiors  
Commercial, Retail and Institutional  
Submission Template for IEQ 8  
Interior Lighting Quality**

- Credit Requirements:**
- A) 1 credit for the uniformity at all workstations / working zone complies with CIBSE requirement**
  - B) 1 credit for glare index at all workstations / working zone complies with CIBSE requirement**
  - C) 1 credit for the colour rendering index at all workstations / working zone complies with CIBSE requirement**

Credit Attainable:	<b>3</b>
Credit(s) anticipated for this submission:	

**Enclosure**

- Summary table, indicating uniformity, glare index (by measurement or simulation), CRI
- Drawings, architectural, with floor plan showing all workstations / working zone highlighted
- Drawings, engineering, with layout plan, lighting installation highlighted
- Records, manufacturer's catalogue for lighting installed, and colour rendering index (CRI)



**BEAM Plus Interiors  
Commercial, Retail and Institutional  
Submission Template for IEQ 9  
Natural Lighting**

**Credit Requirements:** **1 credit where 75% of workstations / seating is located in an area with natural light illuminance level of 100 lux;**  
**2 credits where 85% of workstations /seating is located in an area with natural light illuminance level of 100 lux;**

Credit Attainable:	<b>2</b>
Credit(s) anticipated for this submission:	

**Enclosure**

- Summary table with measurement date, time, sky conditions, percentage compliance;
- Drawing, architectural, with floor plan(s) and section(s) with measurement locations highlighted;
- Records, with measurement results using calibrated device and its calibration certificate;

**Alternative**

- Report, with computer modelling software, version, input and output files;
- Report with data including glazing transmittance, internal finishes, reflectance used;
- Summary table with layout, percentage compliance;



**BEAM Plus Interiors  
Commercial, Retail and Institutional  
Submission Template for IEQ 10  
Views to Outside**

**Credit Requirements:** **1 credit for at least 60% of all workstations or seating having a direct line of sight to external vision glazing or naturally lit internal courtyard or atrium;**  
**2 credits for at least 80% of all workstations or seating having a direct line of sight to external vision glazing or naturally lit internal courtyard or atrium;**

Credit Attainable:	<b>2</b>
Credit(s) anticipated for this submission:	

**Enclosure**

- Drawings, architectural, with floor plan with windows, seating and view angle highlighted;
- Drawings, architectural, with sections with window, partitions, seating and view angle highlighted;
- Drawings, architectural, with atrium dimensions highlighted (where provided)
- Summary table with distance between glazing and seating plan view and section view
- Record Photographs illustrating the layout, external windows, view, atrium (if provided)



**BEAM Plus Interiors**  
**Commercial, Retail and Institutional**  
**Submission Template for IEQ 11**  
**Acoustics**

**Credit Requirements:**

A) **Background Noise** - 1 credit for demonstrating background noise levels are within the prescribed criteria;

B) **Reverberation Time** - 1 credit for demonstrating that the reverberation time in applicable areas meets the prescribed criteria;

C) **Air-borne Noise Isolation** - 1 credit for demonstrating airborne noise isolation between rooms meets the prescribed criteria;

Credit Attainable:	<b>3</b>
Credit(s) anticipated for this submission:	

**Enclosure**

**A. Background Noise**

- Summary table (refer to samples below) ;
- Drawings, architectural, with floor plan layout, measurement locations highlighted;
- Acoustic measurement report with valid calibration certificate of sound level meters or calculation;
- Certificate, calibration certificate for instrument;
- Record photographs, with testing in progress;

**B. Reverberation Time**

- Summary table (refer to samples below);
- Drawings, architectural, with floor plan layout, measurement locations highlighted;
- Site measurement with supporting documents, absorption coefficients, etc.
- Calculation at representative locations, with supporting documents, absorption coefficients;
- Record photographs, with testing in progress;

**C. Air-borne Noise Isolation**

- Summary table (refer to samples below);
- Drawings, architectural, with floor plan layout, construction details, measurement locations highlighted;
- Site measurement report Leq5 mins ,or computer simulation with construction used;
- Record photographs, with testing in progress;



**BEAM Plus Interiors**  
**Commercial, Retail and Institutional**  
**Submission Template for IEQ 11**  
**Acoustics**

### A. Background Noise

The average internal noise levels are:

Measurement       Calculation

Location	Noise Level	Criteria

### B. Reverberation Time

The average reverberation time for mid frequencies (500Hz, 1kHz and 2kHz) :

Measurement       Calculation

Location	Reverberation Time	Criteria

### C. Airborne Noise Isolation

The Airborne noise isolation:

Measurement       Calculation

Location	Noise Isolation	Criteria



**BEAM Plus Interiors  
Commercial, Retail and Institutional  
Submission Template for Innovation (IV)**

upto 10 maximum Innovation credits possible:

**IV 1 - Innovative techniques/ Features considered as innovations**

**IV 2 - Performance Enhancement**

Credit Attainable:	<b>1</b>
Credits anticipated for this submission:	

The Applicant shall submit a separate template, with submission material attached, for each Innovation or Performance Enhancement

**Innovation (IV-1)**

**Performance Enhancement (IV-2)**

**Enclosure**

Schedule of supporting documentation, please specify: