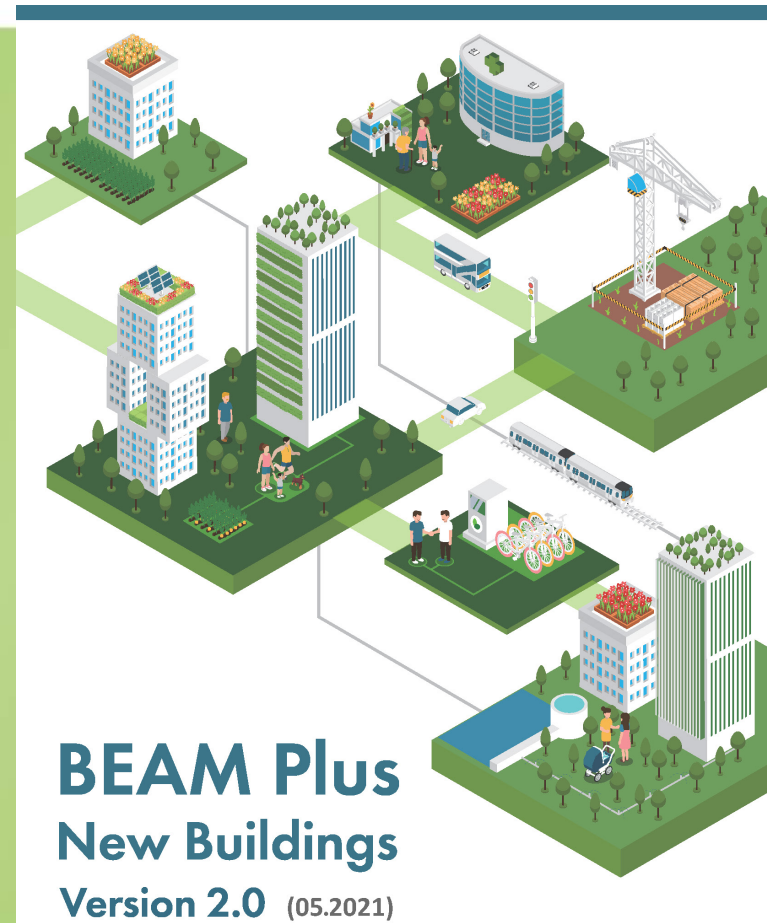


BEAM Society Limited

BEAM Plus New Buildings (NBv2.0)
Training and Examination
Health and Wellbeing (HWB)
for New Buildings

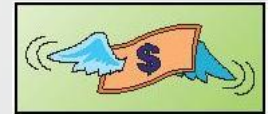
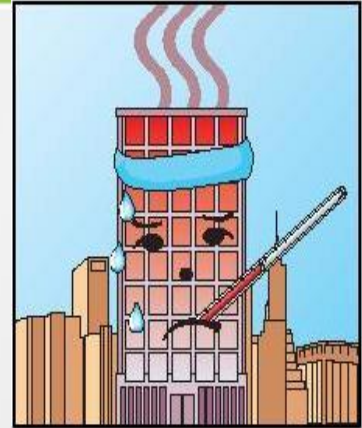


Overview - HWB

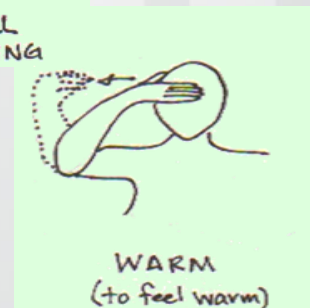
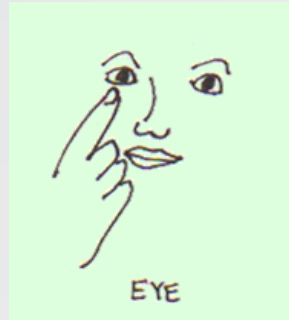
- This section of BEAM Plus considers the broader perspectives of sustainable buildings as well as the building occupants' health and wellbeing. The broader sustainable issues include provisions of hygiene and amenities maintenance provided in the building, which have impact on the quality of working and living environments. Indoor environmental quality (IEQ) includes indoor air quality and ventilation provisions that safeguard health. Considerations of these issues, as well as thermal comfort, lighting, acoustics and noise, impact on well-being, comfort and productivity.

Why IEQ is important?

- On average, adults spend more than 90% indoors;
- Better IEQ protect our health, contribute to our comfort, improve productivity, increase profitability and value of property, and attract & retain more tenants;
- Poor IEQ may lead to discomfort and illness, more sick leave and higher absenteeism, and weaken our competitiveness;



- 4 basic factors:
- Visual comfort
- Aural comfort
- Indoor Air Quality
- Thermal comfort



- Distinguish between discomfort vs. health hazard

	Discomfort (examples)	Health Hazard
Thermal	Warm / cool sensation	Heat stress, Cold stress
IAQ	Odour	Inhalation of toxic gases
Visual	Glare, Eye strains	Retina damages due to blue-light hazard: Excessive illumination with blue light or UV radiation
Aural	Noise annoyance	Hearing damages

- ▶ **Normally, IEQ problem in built environment would not lead to hazardous level, although sick symptoms may be reported.**

Overview

			19 + 10B
HWB P1	Minimum Ventilation Performance	P	
HWB 1	Healthy and Active Living		1B
HWB 2	<i>Biophilic Design</i>		1B + 1B add
HWB 3	Inclusive Design	1	1B
HWB 4	Enhanced Ventilation	3	1B add
HWB 5	Waste Odour Control	1	
HWB 6	Acoustics and Noise	4	1B
HWB 7	Indoor Vibration	1	
HWB 8	Indoor Air Quality	4	1B add
HWB 9	Thermal Comfort	2	1B add
HWB 10	Artificial Lighting	2	
HWB 11	Daylight		2B
HWB 12	Biological Contaminations	1	

General

Extend Of Application

Health and Wellbeing 7.3 Indoor Environmental Quality

HWB 8 Indoor Air Quality

Extent of Application All buildings for part (a)

All buildings with enclosed and/ or semi-enclosed car park of areas more than 10% of Construction Floor Area for part (b).



Submittal List

(b) Air Quality in Car Park

Supporting Documents		PA	FA
<i>Please provide softcopies with filename prefix as indicated on the leftmost column below.</i>			
HWB_8_00	BEAM Plus NB submission template for HWB 8b	✓	✓
HWB_8b_01	HWB-8-2_Form	✓	✓
HWB_8b_02	Estimation of the peak pollutant loading in car park	✓	✓
HWB_8b_03	Car park ventilation report (not applicable to naturally ventilated car park) with pollution calculation	✓	✓
HWB_8b_04	Car park floor plans highlighting location of CO sensors (not applicable to naturally ventilated car park)	✓	✓
HWB_8b_05	Control logic of car park ventilation (not applicable to naturally ventilated car park)	✓	✓
HWB_8b_06	On-site car park air quality measurement protocol (not applicable to mechanically ventilated car park)	✓	✓
HWB_8b_07	Endorsed test reports of air quality in car park (not applicable to mechanically ventilated car park)	-	✓

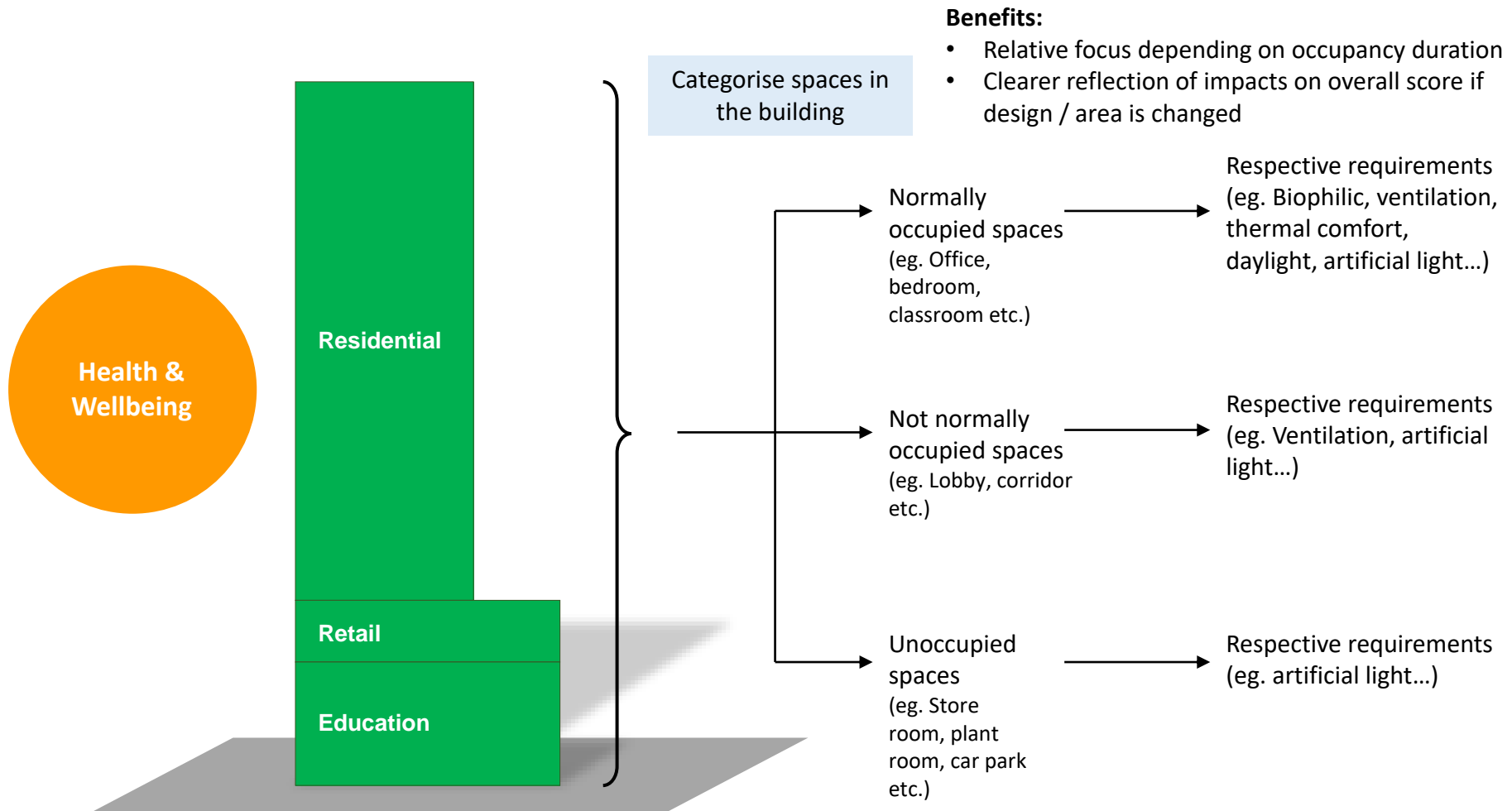
Template & Form

Guidance to compliance

Please fill in the below table and check the applicable boxes with for all normally occupied spaces present in the project.

Location	Space Usage	Area (m ²)	Ventilation Mode	Mechanical Ventilation (MV)		Natural Ventilation (NV)					
				All Buildings		Residential			Non-Residential		
						Prescriptive Route		Performance Route	In Compliance with ASHRAE		
				ASHRAE Requirement (L/s)	Design Outdoor Air (L/s)	Single sided (S) or Cross Ventilation (C)	Windows or Primary Openings (%)	Secondary Openings (%)	ACH	Y <input type="checkbox"/>	N <input type="checkbox"/>
			MV <input type="checkbox"/> NV <input type="checkbox"/>			S <input type="checkbox"/> C <input type="checkbox"/>					Y <input type="checkbox"/> N <input type="checkbox"/>
			MV <input type="checkbox"/> NV <input type="checkbox"/>			S <input type="checkbox"/> C <input type="checkbox"/>					Y <input type="checkbox"/> N <input type="checkbox"/>
			MV <input type="checkbox"/> NV <input type="checkbox"/>			S <input type="checkbox"/> C <input type="checkbox"/>					Y <input type="checkbox"/> N <input type="checkbox"/>
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			MV <input type="checkbox"/> NV <input type="checkbox"/>			S <input type="checkbox"/> C <input type="checkbox"/>					Y <input type="checkbox"/> N <input type="checkbox"/>

No Area Weighting



Credits & Requirement

HWB P1 MINIMUM VENTILATION PERFORMANCE

EXTENT OF APPLICATION

All buildings .

OBJECTIVE

- Assess the quality of on-site outdoor air and demonstrate that a minimum quantity of outdoor air is supplied to all normally occupied spaces in the project in order to safeguard the health and comfort of building users.

REQUIREMENT

- (a) Measure outdoor air pollutants on-site prior to building design to understand the site condition
- (b) Demonstrate the project is in compliance with the minimum ventilation quantity with respect to its designed ventilation mode.

HIGHLIGHTS

- New requirement to take OAQ measurement prior to design
- Expanded scope to cover ventilation performance (quantity) of NV spaces

Engage an IAQ certified issuing body [1] to measure the quality of outdoor air. Measurements should be taken for the following outdoor air pollutants:

- 1) Carbon monoxide (CO)
- 2) Nitrogen dioxide (NO₂)
- 3) Ozone (O₃); and
- 4) Respirable suspended particulates (PM₁₀)

Parameter	8-hour average acceptance limit [3]
Carbon monoxide (CO)	<7,000 µg/m ³ or <6.1 ppmv
Nitrogen dioxide (NO ₂)	<150 µg/m ³ or <80 ppbv Plus [1-hour] <200 µg/m ³ or <106 ppbv
Ozone (O ₃)	<120 µg/m ³ or <61 ppbv
Respirable suspended particulate (PM ₁₀)	<100 µg/m ³

Prescriptive path

For residential buildings:

For *normally occupied spaces*, the total area of the windows / primary openings provided in each space is not less than 7% of the floor area of the space. Refer to Cap. 123F Building (Planning) Regulations [5] for the requirements for windows or PNAP APP 130 [6] for the definition of primary openings.

If acoustic window is implemented, full window area could be accounted in the calculation.

If cross ventilation is provided as per PNAP APP 130, the aggregated size of the primary openings should not be less than 2.2% of the floor area of the room; the aggregated size of the secondary openings should not be less than 2.2% of the floor area of the room.

For non-residential buildings:

Provide a report demonstrating compliance with section 6.4 Natural Ventilation Procedure stipulated in ASHRAE Standard 62.1-2016 in all *normally occupied spaces*.

Performance path – for project cannot achieve through prescriptive method

For *normally occupied spaces*, the ventilation rate meets 1.7 ACH under one annual prevailing wind direction with the highest wind frequency. The annual wind rose (wind probability table) in Building (Planning) Regulation is used.

Wind data, such as wind frequency, wind rose, wind profile should be adopted from the appropriate and reliable sources, such as simulated *site* wind data based on appropriate mathematical models, such as RAMS from PlanD [7] or experimental *site* wind data from *wind tunnel* test.

Ventilation performance should be demonstrated using *wind tunnel* tests, computational fluid dynamics or approaches that range from simple single zone models to elaborate multi-zone models [8].

HWB 4 ENHANCED VENTILATION

IEQ 9,10,11,12

EXTENT OF APPLICATION

All buildings.

OBJECTIVE

- Maintain effective ventilation and prevent exposure to concentrated indoor pollutant sources to support occupants' health and wellbeing.

REQUIREMENT

- (a) Fresh air provision
- (i) Fresh air provision in normally occupied spaces
1 credit for demonstrating that all normally occupied spaces in the building are provided with increased ventilation **Credit: 1**
- (ii) Fresh air provision in not normally occupied spaces
1 credit for demonstrating that all not normally occupied spaces in the building are provided with adequate ventilation **Credit: 1**
- (iii) On-site measurements
1 additional BONUS credit for conducting on-site measurements to verify the ventilation performance for all normally occupied spaces **Credit: 1B add**
- (b) Exhaust air
1 credit for the provision of an effective ventilation system for spaces where significant indoor pollution sources are generated. **Credit: 1**

HIGHLIGHTS

- Grouped ventilation credits to facilitate assessment
- (a) Fresh air provision: 3-step incremental award
- 1) Normally occupied spaces – MV and NV (performance – ACH and prescriptive – window openings)
- 2) Not normally occupied spaces – MV and NV (ACH)
- 3) On-site measurements – Bonus for measurement
- (b) Exhaust air: No major changes
- Removed requirement for temporary adapted ventilation system from v1.2

1.1.2 Natural ventilation spaces

Select one of the following paths. The Applicant is not limited to adopting only one path for all the spaces.

a) Prescriptive path

1. For *residential buildings*:

For *normally occupied spaces*, the total area of the windows / primary openings provided in each space is not less than 9% of the floor area of the space. Refer to Cap. 123F Building (Planning) Regulations for the requirements for windows or PNAP APP 130 [2] for the definition of primary openings.

If cross ventilation is provided as per PNAP APP 130, the aggregate size of the primary openings should not be less than 2.5% of the floor area of the room; the aggregate size of the secondary openings should not be less than 2.5% of the floor area of the room.

2. For *non-residential buildings*:

For *normally occupied spaces*, the openable area should be not less than 5.2% (exceed 4%, as stipulated in ASHRAE 62.1 – 2016 Section 6.4.2, by 30%) of the net occupiable floor area.

b) Performance path

For *normally occupied spaces*, the ventilation rate meets 2.2 ACH under one annual prevailing wind direction with the highest wind frequency. The annual wind rose (wind probability table) at 400 – 600m of the *site* should be used.

Wind data, such as wind frequency, wind rose, wind profile should be adopted from the appropriate and reliable sources, such as simulated *site* wind data based on appropriate mathematical models, such as RAMS from PlanD [3] experimental *site* wind data from *wind tunnel* test.

Ventilation performance should be demonstrated using *wind tunnel* tests, computational fluid dynamics or approaches that range from simple single zone models to elaborate multi-zone models [4].

HWB 1 HEALTHY AND ACTIVE LIVING

NEW

EXTENT OF APPLICATION

Indoor / semi-outdoor communal areas of building development.

OBJECTIVE

- Encourage a building environment for healthy and active living by improving living and / or working experience of building users and integrating physical activities in the design for an active lifestyle.

REQUIREMENT

- 1 BONUS credit for scoring at least 3 items of all applicable design measures for healthy and active living.

HIGHLIGHTS

- Improving living and/or working experience of communal use
 - i) **Integration of public art**
- Integrating physical activities in the design for an active lifestyle
 - i) **Way-finding signage and info graphics** at point-of-decision to encourage stair use (at least one at the building main entrance and all core circulation lobbies with lift provisions).
 - ii) At least one (1) **circulation stair** in communal area meeting the prescribed requirements.
 - iii) At least one (1) provision for **physical activities in communal areas**, e.g. exercise stations, jogging tracks, cycling etc.
- Additional or alternative design features may be included, which will be taken as one of the total applicable design measures in **denominator calculation**.

Credit: **1B**

Health & Wellbeing

Healthy and Active Living



Fitness Equipment at Sky Garden, Aria, Ngau Chi Wan



An Integrated Teaching Building, CUHK [GBA2014 Merit Award]



Amenities at Sky Garden of Office Building, San Francisco



Ping Shek Estate, Kowloon [GBA2014 Finalist]

Health & Wellbeing

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Amenities at Sky Garden of Office Building, San Francisco



Ping Shek Estate, Kowloon [GBA2014 Finalist]



HWB 2 BIOPHILIC DESIGN

NEW

EXTENT OF APPLICATION

All buildings.

OBJECTIVE

- Encourage building occupants to have constant interaction with living things and natural surroundings to nurture the innate human-nature connection and to address human psychological need to be around life and life-like processes.

REQUIREMENT

- 1 BONUS credit for demonstrating visual connection with nature and/ or biophilic design features at an assessment space with Visual Quality Score of 2 or above.
- 1 additional BONUS credit for demonstrating visual connection with nature and/ or biophilic design features at an assessment space with Visual Quality Score of 3 or above.

Credit: **1B + 1B add**

HIGHLIGHTS

- The assessment space chosen shall be a **normally occupied space with highest occupancy** within the development.
- Due to practicality issues, the Applicant can provide evidence to justify the difficulty and propose the use of the normally occupied space of the **second highest** occupancy for the assessment.
- The Applicant shall produce images from the viewpoints using viewpoint in **3D model at PA stage and single lens camera at FA stage.**
- A minimum of **ONE viewpoint** shall be placed within the selected assessment space
- A series of frames from **3 different directions at 45° interval** should be taken using landscape orientation.

Weighting factor	Representation	Visual connection to nature and/ or <i>biophilic design</i> features
5	Outstanding	Natural terrain; waterfront; extensive outdoor greenery with deciduous trees, seasonal flowers and/or native plants providing local fauna, including birds and butterflies with appropriate food sources and habitats
4	Excellent	Outdoor planting; sky
3	Good	Indoor planting
2	Fair	Biomorphic forms & patterns; nature presented by digital medium, drawings or other visual means
1	insignificant	No visual connection to the above

The assessment space chosen shall be a **normally occupied space** with highest occupancy within the development.

7.1 Viewpoint in 3D Model at PA stage:

Option 1:

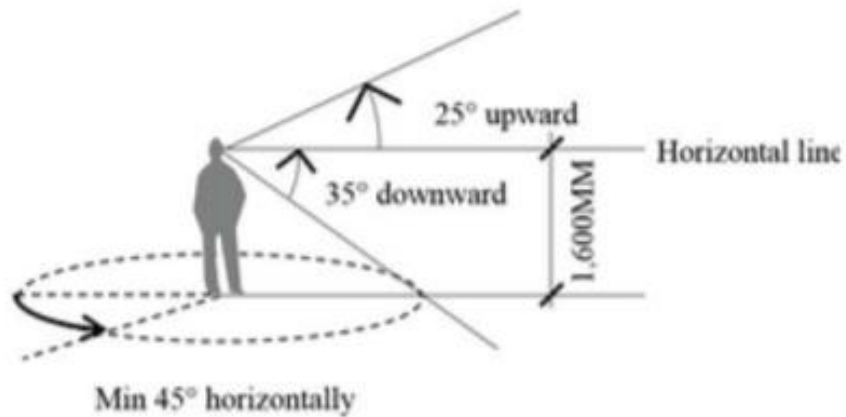
Vertical elevation of camera for viewpoints in 3D model	1,600mm above ground/ finished floor
Vertical upward angle	25°
Vertical downward angle	35°

Option 2:

Vertical elevation of camera for viewpoints in 3D model	1,600mm above ground/ finished floor
Equivalent lens focal length or focal length	27mm

7.2 Single Lens Camera at FA stage:

Vertical elevation of camera	1,600mm above ground/ finished floor
Equivalent lens focal length or focal length	27mm
Aspect Ratio	3:2



HWB 3 INCLUSIVE DESIGN

NEW

EXTENT OF APPLICATION

All buildings.

OBJECTIVE

- Encourage well integrated weather protection and user-friendliness in the building design for outdoor or semi-outdoor communal / private space design at various levels of a building.

REQUIREMENT

(a) Universal Accessibility

- 1 credit for providing at least ten (10) applicable enhanced provisions as stipulated in the “Recommended Design Requirements” of BFA 2008.

Credit: **1**

(b) Weather protection & Family Friendly Facilities

- 1 BONUS credit for providing prescribed weather protection and at least two (2) family friendly facilities features.

Credit: **1B**

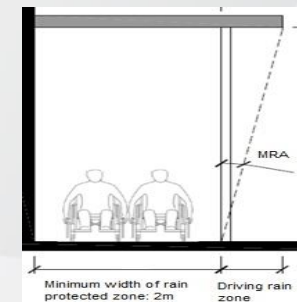
HIGHLIGHTS

- Minimum driving rain angles (MRA)** from edges of rain protection features shall be calculated based on the following equation:

$$\text{MRA} = \tan^{-1} (u / 4.5 I^{0.107})$$

where, u = Hourly mean wind speed affecting the rain (m/s)

I = Intensity of rainfall (mm/hr)



- Family Friendly Facilities:**
 - At least one shaded rest areas with seating for care-takers near play equipment for children.
 - At least one water closet for children or family in each male and female or stand-alone toilet with seat height in the range of 310 mm to 380 mm for communal use.
 - At least one baby-care facilities/ breast feeding room

Example

Recommended Design Requirements

Unisex Facilities

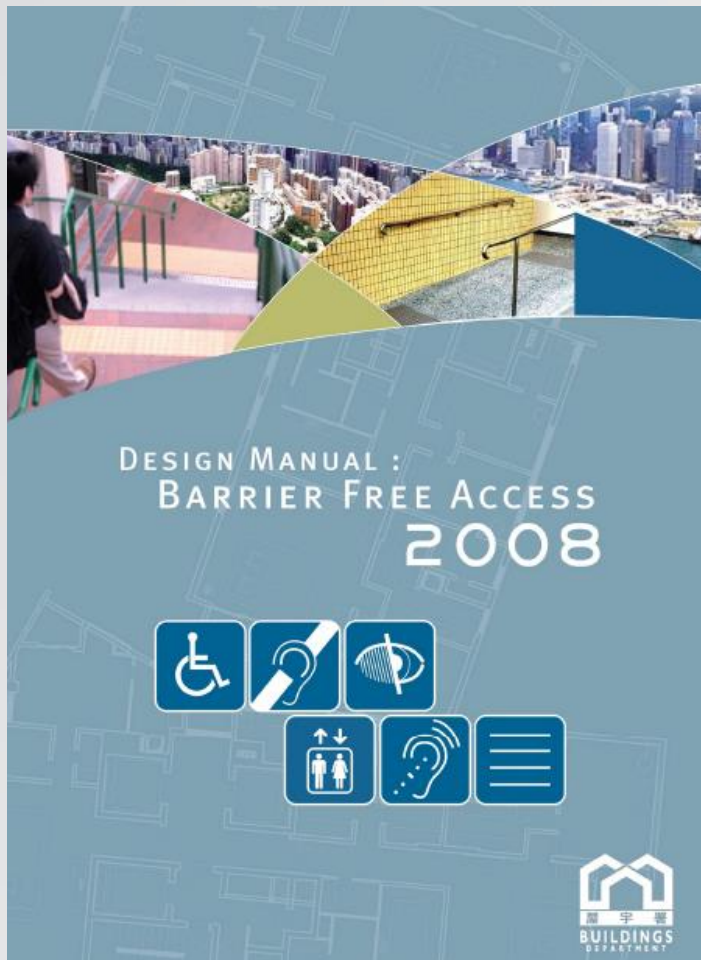
- (a) W.C. cubicles should, where possible, be unisex and accessible from a corridor so that they can be used by either sex with assistance from members of the opposite sex, if necessary.
- (b) If two or more accessible unisex facilities are provided, at least one should be of opposite handed layout to the other(s).

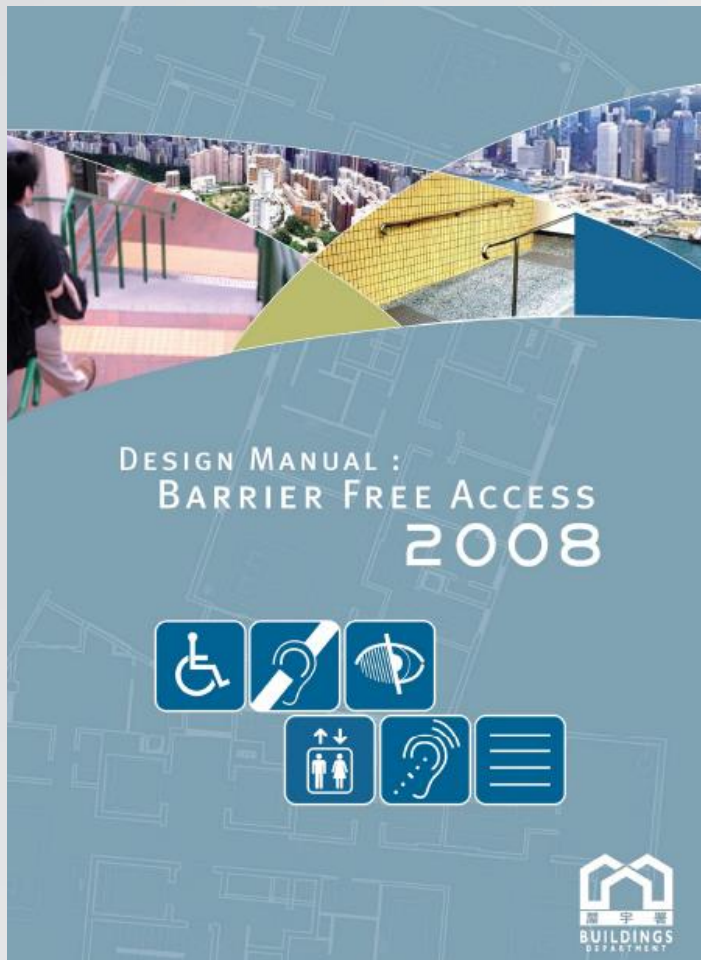
W.C. Cubicles

- (c) The clear distance between the watercloset and the wash basin should not be more than 600 mm for the users' convenience after toileting. The clear manoeuvring space within the cubicle shall not be less than 1500 mm x 1950 mm.
- (d) The angle between the two grab rails should be within the range of 80° to 90°.

Toilet / Compartment Doors

- (e) Double swing doors which open both inwards and outwards may be provided in any toilets or cubicles. Sliding door is equally acceptable provided that it is not heavy or awkward to use.





Source:
<http://www.bd.gov.hk/english/documents/code/bfa2008/content.pdf>

Example

Recommended Design Requirements

Lift Control Buttons

- (a) The graphics for tactile markings for open-door and close-door push buttons, emergency alarm button, and main entrance level are shown in Figure 41 for reference.
- (b) Call button panels should be provided at both sides of door openings.

Keypad design

- (c) In cases where difficulties are encountered to fully comply with the obligatory requirements of installation of lift control buttons in high-rise buildings, keypad control device in conjunction with a conventional lift control panels in lifts for persons with a disability should be provided. Proposed standardized positions of buttons for keypad control device are shown in Figure 42 for reference.

The keypad should: -

- (i) have control buttons of minimum dimension of 20 mm;
- (ii) have Braille and tactile markings following the standard as stipulated in paragraphs 80(6) and 80(8);
- (iii) be installed between 900mm to 1200mm from finished floor level of the lift car;
- (iv) have adequate luminous contrast between the tactile markings on the buttons and the background;
- (v) have voice announcement and visual indication of the floors registered; and

HWB 5 WASTE ODOUR CONTROL

IEQ 4

EXTENT OF APPLICATION

All buildings.

OBJECTIVE

- Reduce nuisance caused by odour leaving enclosed waste disposal and recycling spaces .

REQUIREMENT

- 1 credit for installing odour sensor at all discharge points from enclosed waste disposal and recycling spaces.

Credit: **1**

HIGHLIGHTS

- Clarified requirement when a ventilation system is adopted for several RCP, MRC or MRR together
- Clarified accepted de-odourising system

Install an odour sensor at each discharge point from all enclosed waste disposal and recycling spaces including refuse collection points (RCP), refuse storage and material recovery chambers (RS&MRC) and refuse storage and material recovery room (RS&MRR).

The sensors should have the capability to alert the operation station or the security station and identify the room when 5 odour units based on an averaging time of 20 seconds [1] is detected.

OR

Propose an alerting strategy (e.g. a sensing system) that could identify the room smell condition while on an averaging time of 20 seconds [1] is detected.

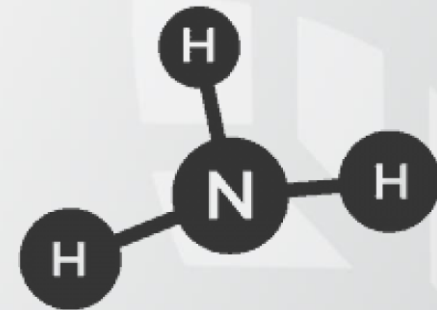
The proposal should be endorsed by a Hong Kong professional institution qualified holder in mechanical or building services discipline.

The proposal should identify minimum the below:

1. Sensing system design
2. Design supporting (e.g. International references, technologies)
3. Layout and Schematic Drawings to outline the design, if applicable including MVAC drawing layout, MVAC schematic and control diagram



Fig. 4: Node MCU



HWB 6 ACOUSTICS AND NOISE (a)

IEQ 18

EXTENT OF APPLICATION

- All buildings for parts (a) (i), (b) (i) and (c)
- All buildings with tenanted spaces for parts (a)(2)
- Residential buildings* for part (b) (2)

OBJECTIVE

- Ensure the building occupied spaces are in comfortable noise environment.

REQUIREMENT

- (a) Room Acoustics
 - (i) 1 credit for demonstrating that mid-frequency reverberation time in applicable spaces of landlord's-controlled area meets the prescribed criteria of different types of premises. **Credit: 1**
 - (ii) 1 credit for demonstrating that mid-frequency reverberation time in applicable rooms of non-landlord meets the prescribed criteria of different types of premises. **Credit: 1**

HIGHLIGHTS

- Grouped credit to facilitate assessment
- (a) Room Acoustics: Limits dovetail with EB. Separate owner's area and tenant's area for RT
- (b) Noise Isolation: Limits dovetail with EB.
- (c) Background Noise: Limits dovetail with EB. Accept both NR and NC for background noise

The average reverberation time for mid frequencies (500Hz, 1kHz and 2kHz) and noise assessment criterion, should be:

- 1) Office type premises: 0.4 to 0.6s
- 2) Classrooms and similar premises: 0.4 to 0.6s
- 3) Residential premises, hotels and apartments: 0.4 to 0.6s
- 4) Indoor games halls, indoor swimming pools: 1.5 to 2s
- 5) Common areas in shopping malls:
 - a) Average reverberation time for mid frequencies between 1.0 to 1.5s, or
 - b) Noise reduction coefficient (NRC) for ceiling ≥ 0.7

For buildings **without** the abovementioned spaces, with no spaces where speech intelligibility is important, or with rooms of a special acoustical nature, **submit a schedule of spaces** present in the building and relevant justifications for this credit to become not applicable.

HWB 6 ACOUSTICS AND NOISE (b)+(c)

IEQ 19

EXTENT OF APPLICATION

- All buildings for parts (a) (i), (b) (i) and (c)
- All buildings with tenanted spaces for parts (a)(2)
- Residential buildings* for part (b) (2)

OBJECTIVE

- Ensure the building occupied spaces are in comfortable noise environment.

REQUIREMENT

- (b) Noise Isolation
 - (i) 1 credit for demonstrating airborne noise isolation between, spaces fulfils the prescribed criteria. **Credit: 1**
 - (ii) 1 BONUS for demonstrating impact noise isolation between floors fulfils the prescribed criteria. **Credit: 1B**
- (c) Background Noise
1 credit for demonstrating background noise levels from both external sources and building services equipment are within the prescribed criteria. **Credit: 1**

HIGHLIGHTS

- Grouped credit to facilitate assessment
- (a) Room Acoustics: Limits dovetail with EB. Separate owner's area and tenant's area for RT
- (b) Noise Isolation: Limits dovetail with EB.
- (c) Background Noise: Limits dovetail with EB. Accept both NR and NC for background noise

Type of Premises	Weighted SRI	Level Difference
Between offices/ conference rooms/ retail shops	R_w 44	$D_{nT,w}$ 38
Between hotel rooms/ serviced apartments/ function rooms/ activity rooms	R_w 52	$D_{nT,w}$ 46
Between classrooms	R_w 37	$D_{nT,w}$ 31
Between bedrooms to living rooms (same unit)	R_w 46	$D_{nT,w}$ 40
Between bedroom to bedroom/ living room to living room (different units)	R_w 52	$D_{nT,w}$ 46
Between bedroom to bedroom (same unit)	R_w 44	$D_{nT,w}$ 38

Type of Premises	Weighted Normalised Impact Sound Pressure Level (by laboratory)	Weighted Normalised Impact Sound Pressure Level (On site measurement)
Floors separating normally occupied space,	$L_{n,w}$ 64	$L'_{n,w}$ 70

Criteria

Internal noise level (NR and NC value should be consistently used in the project):

- 1) Office type premises: NR/NC 40
- 2) Classrooms and similar premises: NR/NC 35
- 3) Residential premises, hotel and apartments: NR/NC 35
- 4) Common areas in shopping malls: NR/NC 45
- 5) Indoor games halls & Indoor swimming pools: NR/NC 50

HWB 7 INDOOR VIBRATION

IEQ 21

EXTENT OF APPLICATION

All buildings.

OBJECTIVE

- Avoidance of excessive vibration from building services equipment and other external sources within site boundary.

REQUIREMENT

- 1 credit for demonstrating vibration levels not exceeding the prescribed criteria.

Credit: **1**

HIGHLIGHTS

- Dovetail with EB
- Added guidance as per ISO 2631-2:2003, BS 6472-1:2008, BS 6472-2:2008 [3], Department of Environment and Conservation of NSW - Assessing Vibration: a technical guideline.

HWB 8 INDOOR AIR QUALITY

IEQ 6,7,8

EXTENT OF APPLICATION

- All buildings for part (a)
- All buildings with enclosed and/ or semi-enclosed car park of areas more than 10% of Construction Floor Area for part (b).

OBJECTIVE

- Demonstrate that airborne contaminants do not give rise to unacceptable levels of air pollution in the building

REQUIREMENT

- (a) Indoor air quality in occupied spaces

Path 1

2 credits for demonstrating compliance with the prescribed limits for Carbon monoxide (CO), Nitrogen dioxide (NO₂), Ozone (O₃), Carbon dioxide (CO₂), Respirable suspended particulates (PM₁₀), Total volatile organic compounds (TVOCs), Formaldehyde (HCHO) and Radon (Rn) in the sampled occupied spaces. **Credit: 2**

1 credit for demonstrating compliance with the prescribed limits for Airborne bacteria and conduct the Mould assessment in the sampled occupied spaces.

Credit: 1

HIGHLIGHTS

- Grouped credit to facilitate assessment
- (a) Indoor air quality in occupied spaces: Expanded assessment scope to all buildings. Accept either sampling or a full EPD IAQ certificate.
- (b) Air quality in car park: Revised extent of application for air quality in car park. Added calculation method for MV car park. Specified time for NV car park.
- (c) Mould prevention and control: New objective. Accept either mould resistant building and fitting materials or humidity control in normally occupied spaces.

HWB 8 INDOOR AIR QUALITY

REQUIREMENT

Path 2

- 3 credits for submitting a valid IAQ Certification Scheme (Good Class) certificate issued by the Environmental Protection Department (EPD) covering the whole building.
1 additional BONUS if Excellent Class is achieved.

Credit: **3 + 1B add**

- (b) Air quality in car park
1 credit for demonstrating compliance with the pollutant concentration limits specified in ProPECC PN 2/96.

Credit: **1**

At least one sampling point should be located at each type of IAQ area as defined by the applicant.

Parameter	8-hour average acceptance limit [3]
Carbon dioxide (CO ₂)	<1,800 mg/m ³ or <1,000 ppmv
Carbon monoxide (CO)	<7,000 µg/m ³ or <6.1 ppmv
Nitrogen dioxide (NO ₂)	<150 µg/m ³ or <80 ppbv Plus [1 hour] <200 µg/m ³ or <106 ppbv
Ozone (O ₃)	<120 µg/m ³ or <61 ppbv
Respirable suspended particulate (PM ₁₀)	<100 µg/m ³
Total volatile organic compounds (TVOC)	<600 µg/m ³ or <261 ppbv
Formaldehyde (HCHO)	<100 µg/m ³ or <81 ppbv Plus [30 mins] <100 µg/m ³ or <81 ppbv
Radon (Rn)	<167 Bq/m ³
Airborne bacteria	<1,000 cfu/m ³
Mould	Prescriptive Checklist

Air Quality in Car Park

Carbon monoxide (CO)

$$QF = \frac{q^{\circ}CO}{3600} D_{pc} \frac{1 \times 10^6}{CO_{lim}} \text{ (idling)}$$

$$QF = \frac{q^{\circ}CO}{3600} D_{tc} \frac{1 \times 10^6}{CO_{lim}} D(\text{travelling})$$

Nitrogen dioxide (NO₂)

$$QF = \frac{q^{\circ}NO_2}{3600} D_{pc} \frac{1 \times 10^6}{NO_{2lim}} \text{ (idling)}$$

$$QF = \frac{q^{\circ}NO_2}{3600} D_{tc} \frac{1 \times 10^6}{NO_{2lim}} D(\text{travelling})$$

Q_F = required air quantity per second (m³ /s)

q[°]CO = basic value of CO emission per vehicle (assumed to be 120 g/hr,veh if no reference information)

q[°]NO₂ = basic value of NO₂ emission per vehicle (assumed to be 24 g/hr,veh if no reference information)

CO_{lim} = maximum permissible CO concentration (mg/m³ CO)

NO_{2lim} = maximum permissible NO₂ concentration (mg/m³ NO₂)

HWB 9 THERMAL COMFORT

IEQ 13,14

EXTENT OF APPLICATION

All buildings.

OBJECTIVE

- Ensure that buildings and systems are tested practicable and the specified thermal comfort conditions can be achieved under conditions of normal occupancy and expected heat gains.

REQUIREMENT

(a) Thermal Comfort Analysis

- 2 credits for conducting thermal comfort analysis and demonstrate that normally occupied spaces can fulfil the thermal comfort requirements.

Credit: **2**

(b) Thermal Comfort Measurement

- 1 additional BONUS credit for conducting on-site measurements to verify the thermal comfort performance

Credit: **1B add**

HIGHLIGHTS

- Thermal Comfort Analysis: Analysis required based on ventilation system
- Thermal Comfort Measurement: New bonus for measurement.



HWB 9 THERMAL COMFORT

1. Natural ventilation spaces

The spaces with natural ventilation must be equipped with operable windows / doors that can be readily opened and adjusted by the occupants. Maintenance window is not considered as operable windows. Mechanical ventilation / cooling equipment for the space shall not be provided.

Demonstrate that daily average indoor operative temperatures in *normally occupied space* meet the 80% acceptability limits for 80% of days in the hottest month. The determination of 80% acceptability limits should refer to ASHRAE 55-2013 [2].

2. Mechanical ventilation spaces

Mechanical cooling equipment for the space shall not be provided, mechanical ventilation with unconditioned air may be utilised.

Demonstrate that daily average indoor operative temperatures in *normally occupied space* meet the 80% acceptability limits for 80% of days in the hottest month. The determination of 80% acceptability limits should refer to ASHRAE 55-2013.

3. Air-conditioned spaces

Demonstrate that the predicted Mean Vote (PMV) in *normally occupied space* is between -1 and $+1$. The calculation of PMV should refer to ASHRAE 55-2013.

HWB 10 ARTIFICIAL LIGHTING

IEQ 16,17

EXTENT OF APPLICATION

All buildings.

OBJECTIVE

- Promote indoor lighting design which is comfortable for occupants' indoor activities.

REQUIREMENT

- (a) Artificial lighting in normally occupied spaces
1 credit for achieving the prescribed lighting performance in normally occupied spaces. **Credit: 1**
- (b) Artificial lighting in not normally occupied spaces and unoccupied spaces
1 credit for achieving the prescribed lighting performance in not normally occupied spaces and unoccupied spaces. **Credit: 1**

HIGHLIGHTS

- Clarify respective parameters for normally occupied spaces, not normally occupied spaces and unoccupied spaces
- Added guidance for representative rooms.

HWB 10 ARTIFICIAL LIGHTING

IEQ 16,17

Table HWB 10-1

Surfaces	Reflectance of surfaces
Ceiling	0.6
Walls	0.3
Working planes	0.2
Floor	0.1

HWB 11 DAYLIGHT

EXTENT OF APPLICATION

Residential, office and education buildings.

OBJECTIVE

- To achieve satisfactory daylight performance in indoor normally occupied spaces by considering the sufficiency of daylight illuminance and the potential risk of excessive sunlight penetration.

REQUIREMENT

- 2 BONUS for demonstrating at least 55% of the total area of the studied normally occupied spaces achieves spatial Daylight Autonomy_{300/50%} ($sDA_{300/50\%}$) and no more than 10% of the same area receives Annual Sunlight Exposure_{100,250} ($ASE_{1000, 250}$).

Credit: **2B**

HIGHLIGHTS

- New methodology to assess daylight and over-lit area by spatial Daylight Autonomy and Annual Sunlight Exposure – method used by LEED, WELL, Green Mark and Green Star
- Follow IES LM-83-12 Approved Method: IES Spatial Daylight Autonomy (sDA) and Annual Sunlight Exposure (ASE).

HWB 12 BIOLOGICAL CONTAMINATION

IEQ 2,3

EXTENT OF APPLICATION

All buildings .

OBJECTIVE

- To reduce the risk of biological contamination by adopting appropriate design precautions of the water supply systems, HVAC systems and other water features

REQUIREMENT

- 1 credit for complying with the recommendations given in the Code of Practice for Prevention of Legionnaires' Disease 2016 Edition in respect of Water Supply Systems, HVAC Systems and other Water Features.

Credit: 1

HIGHLIGHTS

- Updated requirements as per the Code of Practice for Prevention of Legionnaires' Disease 2016 Edition

Water Supply Systems

Hot Water Supply Systems – Section 4.4.1.1

Cold Water Supply Systems – Section 4.5.1

HVAC Systems

Cooling Tower – Section 4.2.1

Air Handling Unit / Fan Coil Unit – Section 4.3.1
Items (a) – (d)

Air Duct and Air Filters – Section 4.3.2 Items (a) – (c)

Humidifiers – Section 4.3.3 Items (a) – (c)

Air Washers – Section 4.3.4 Items (a), (b) and (d)

Other Water Features

Architectural Foundations – Section 4.6.1

Spa Pools (Whirlpools) – Section 4.7.2

Q & A



END

