



Circular Letter No.: 2023.191

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Application: BEAM Plus NB Version 2.0

Effective Date: 15 December 2023

### **HWB 4b Enhanced Ventilation (Exhaust Air)**

1. The Technical Circular Letter hereby announces an update to the credit content for **HWB 4b Enhanced Ventilation (Exhaust Air)** under BEAM Plus NB v2.0.
2. The aim of the update is to clarify the assessment scope of exhaust systems under HWB 4b.
3. The requirements given in Section 1.3 and Section 7.3 of the BEAM Plus NB v2.0 Manual (2023 Edition) are hereby updated with the enclosures in Annex A and Annex B of this Technical Circular Letter respectively.
  - Pages Annex A-1 to A-2 shall replace all contents in Section 1.3 Summary of Credits specified in Page 33 of the Manual; and
  - Pages Annex B-1 to B-7 shall replace all contents in Section 7.3 on HWB 4b specified in Pages 350 to 356 of the Manual.
4. Approved PA projects: For projects that have already completed PA and have certain assessment approach approved, the Applicant may opt to adopt the same assessment criteria for FA or voluntarily comply with this Technical Circular Letter. For the avoidance of doubt, the Applicant shall provide PA evidence (e.g., extract of the PA report, documents submitted for assessment in PA, etc.) in subsequent assessments to support the intention of using the same assessment methodology as in PA.

A handwritten signature in black ink, appearing to read "Colin Chung", is written over a horizontal line.

Ir Colin Chung  
Chairperson of Standards Sub-committee

**Annex A:**  
**Updated Credit Content for Section 1.3 under BEAM Plus NB v2.0**

	Section	Credit Requirement	Extent of Application	Credit
HWB 1	Healthy and Active Living	1 BONUS credit for scoring at least 3 items of all applicable design measures for healthy and active living.	All buildings	1 BONUS
HWB 2	Biophilic Design	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.	All Buildings	1 BONUS + 1 additional BONUS
HWB 3	Inclusive Design	(a) Universal Accessibility 1 credit for providing at least ten (10) applicable enhanced provisions as stipulated in the "Recommended Design Requirements" of BFA 2008.  (b) Weather protection and family friendly facilities 1 BONUS credit for providing prescribed weather protection and at least two (2) family friendly facilities.	All Buildings	1 + 1 BONUS
HWB 4	Enhanced Ventilation	(a) Fresh Air Provision  <b>1.1. <u>Fresh air provision in normally occupied spaces</u></b> 1 credit for demonstrating that all normally occupied spaces in the building are provided with increased ventilation.  <b>1.2. <u>Fresh air provision in not normally occupied spaces</u></b> 1 credit for demonstrating that all not normally occupied spaces in the building are provided with adequate ventilation.  <b>1.3. <u>On-site measurements</u></b> 1 additional BONUS credit for conducting on-site measurements to verify the ventilation performance for all normally occupied spaces.	All buildings	3 + 1 additional BONUS

Section	Credit Requirement	Extent of Application	Credit
	(b) Exhaust air		
	1 credit for the provision of an effective ventilation system for spaces where significant indoor pollution sources are consistently generated.		

**Annex B:**  
**Updated Credit Content for Section 7.3 under BEAM Plus NB v2.0**

**7 Health and Wellbeing 7.3 Indoor Environmental Quality**

**HWB 4 Enhanced Ventilation**

**Extent of Application** All buildings

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

**Credits Attainable** 3 + 1 additional BONUS

**Credit Requirement (a) Fresh Air Provision**

**1.1. Fresh air provision in normally occupied spaces**

1 credit for demonstrating that all normally occupied spaces in the building are provided with increased ventilation.

**1.2. 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.

**1.3. On-site measurements**

1 additional BONUS credit for conducting on-site measurements to verify the ventilation performance for all normally occupied spaces.

**(b) Exhaust Air**

1 credit for the provision of an effective ventilation system for spaces where significant indoor pollution sources are consistently generated.

**Assessment**

**(a) Fresh Air Provision**

Prepare a schedule of all spaces present in the building. Categorise the spaces into normally occupied, not normally occupied and unoccupied according to the space type matrix in Appendix 9 of this manual.

Specify the system (mechanical or natural) used to ventilate the spaces.

Spaces with significant indoor air pollution sources such as toilets, car park, refuse room and plant room are excluded from the assessment. Staircases are also excluded.

The provision of fresh air louvre for bare shell spaces is not accepted as an approach to achieve the ventilation requirement of the credits. The ventilation requirement of the credits can only be achieved through provision of fresh air equipment (such as PAU, AHU, FAF etc.) or by natural ventilation as stated below.

**1.1. Fresh air provision in normally occupied spaces**

Demonstrate compliance with the below criteria.

**1.1.1. Mechanically ventilated spaces**

Provide a report demonstrating that the minimum ventilation rates stipulated in ASHRAE Standard 62.1-2016 [1] in all normally occupied spaces are exceeded by at least 30%.

1 American Society of Heating Refrigeration and Air Conditioning Engineers – ANSI/ASHRAE Standard 62.1-2016 Ventilation for Acceptable Indoor Air Quality.

### 1.1.2. Naturally ventilated spaces

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

#### i. 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.

#### ii. 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 Plan D [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].

The below requirements should be fulfilled in the CFD simulation:

1. Surrounding buildings and terrain shall be included in the model based on the GIS information from Lands Department, the Government of HKSAR;
2. The surrounding area shall be at least, 2H (H being the building height (m) of the tallest building on the project site) or 200m away from the project site boundary, whichever is larger. The buildings within

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- 2 Buildings Department – APP-130 Lighting and Ventilation Requirements – Performance-based Approach. [ONLINE]. Available at: <https://www.bd.gov.hk/doc/en/resources/codes-and-references/practice-notes-and-circular-letters/pnap/APP/APP130.pdf>. [Accessed April 2021].
  - 3 Site Wind Availability System. [ONLINE]. Available at: [http://www.pland.gov.hk/pland\\_en/info\\_serv/site\\_wind/site\\_wind/index.html](http://www.pland.gov.hk/pland_en/info_serv/site_wind/site_wind/index.html). [Accessed April 2021].
  - 4 American Society for Testing Materials. ASTM E 2267-03. Specifying and Evaluating Performances of Single Family Attached and Detached Dwellings – Indoor Air Quality. 2003.

the surrounding area can be simplified to block;

3. The terrain area shall be in a size of at least, 10H (H being the building height (m) of the tallest building on the project site) or 1000m × 1000m, whichever is larger, with the project placed in the centre; and
4. Buoyancy and turbulence driven flows need not be considered.

Prepare a Natural Ventilation Report including the following content:

1. Summary of naturally ventilated spaces highlighting compliance;
2. All assumptions made;
3. Methodology; and
4. Results.

The Natural Ventilation Report should be endorsed by a locally qualified professional who has at least 3 years of relevant experience in natural ventilation design and CFD modelling. The Locally Qualified Professional shall attain at least one of the following local professional qualifications:

- Member of The Hong Kong Institution of Engineers (MHKIE);
- Member of Hong Kong Institute of Qualified Environmental Professionals Limited (MHKIQEP);
- Registered Energy Assessors (REA), under the Buildings Energy Efficiency Ordinance (Cap. 610); and
- Registered Professional Engineer (R.P.E.), under the Engineers Registration Ordinance (Cap. 409).

The accepted disciplines of the above local professional qualifications include Building Services, Mechanical, Electrical, Energy and Environmental.

CV of the Locally Qualified Professional shall be provided to demonstrate that the Locally Qualified Professional holds the required local professional qualification(s) and with the relevant experience.

## **1.2. Fresh air provision in not normally occupied spaces**

### **1.2.1. Mechanically ventilated spaces**

Demonstrate compliance with the minimum ventilation rates stipulated in ASHRAE Standard 62.1-2016 in all not normally occupied spaces.

### **1.2.2. Naturally ventilated spaces**

Demonstrate the ventilation rates in all not normally occupied spaces meets 1.7 ACH. Methodology should follow the performance path as specified under 1.1.2 (ii) above.

## **1.3. On-site measurements**

Additional BONUS credit will be granted only if the credits in part (a) (1.1) have been achieved.

Prepare a measurement methodology which includes the proposed measurement locations and methodology.

#### 1.3.1. Mechanically ventilated spaces

Demonstrate, by measurement, the required amount of outdoor air corresponding to the design outdoor air flow rate is provided. Accepted measurement methods include the following:

- i. ASHRAE 111 [5]; **OR**
- ii. Tracer gas techniques in accordance with ASTM E741[6]

At least one sampling point should be present in each normally occupied space usage.

If the measurement results demonstrate unmet requirement in part (a) (1.1) (i.e. measurement results showing ventilation rate of any normally occupied space not exceeding 30% of the minimum ventilation rate), the credit in both part (a) (1.1) and part (a) (1.3) will not be awarded.

#### 1.3.2. Naturally ventilated spaces

Demonstrate, by measurement, the design ACH is achieved. Tracer gas decay test in accordance with ASTM E 741 or equivalent is an accepted measurement method.

At least one sampling point should be present in each normally occupied space type. For each normally occupied space usage, the sampling locations should cover all orientations and low, mid and high floors.

If the measurement results demonstrate unmet requirement in part (a) (1.1) (i.e. measurement results showing ventilation rate of normally occupied space not exceeding 30% of the minimum ventilation rate), the credit in both part (a) (1.1) and part (a) (1.3) will not be awarded.

#### (b) Exhaust Air

The coverage applies to spaces that consistently produce pollutants. Examples of such areas include toilets, car parks, and refuse rooms, where indoor pollutants may accumulate. There have been concerns regarding the applicability to all plant rooms, which are primarily designed to house HVAC equipment, electrical distribution panels, water pumps and other machinery necessary to maintain the building's functionality.

Most of these rooms are equipped with exhaust air systems, which not only contribute to the smooth operation of the equipment but also play a pivotal role in promoting the safety, health, and well-being of personnel occupying the building.

For instance, ventilation in boiler rooms ensures the supply of fresh air for combustion and prevents overheating, while exhaust systems in battery rooms may be designed to disperse potential gaseous mixtures to non-hazardous levels.

A pollutant refers to any substance introduced into the environment, either intentionally or unintentionally, that has harmful or toxic effects on living organisms or the natural environment.

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5 American Society of Heating Refrigeration and Air Conditioning Engineers – ANSI/ASHRAE Standard 111-2008 Measurement, Testing, Adjusting and Balancing of Building HVAC Systems

6 ASTM International – ASTM E471-11 Standard Test Method for Determining Air Change in a Single Zone by Means of a Tracer Gas Dilution

It is worth emphasizing that the primary objective of the credit is to address the effective elimination of indoor pollutants. Consequently, plant rooms that do not generate pollutants during normal operating conditions are exempt from the assessment process. For instance, plant rooms housing ELV equipment, lift machines, water pumps, or server appliances fall into this exemption category.

Although ventilation systems are typically incorporated into electrical plant rooms such as transformer rooms, switch-rooms, and UPS rooms, their primary function revolves around preventing heat buildup rather than removing pollutants. Hence, these rooms are excluded from the assessment.

Plant rooms housing HVAC equipment are provided with ventilation systems to ensure acceptable ambient temperature, safety and comfort of personnel. The exhaust systems also serve as a means of dispersion in the event of a major leak. However, since no pollutants are produced during normal operation, these rooms are likewise exempt from the assessment.

It is important to note that only those plant rooms that consistently generate pollutants will be included in the assessment. Examples include battery rooms, plant rooms with grease interceptor/ grease traps and plant rooms where activities like chemical mixing, filtration, and sewage treatment etc. are carried out on an ongoing basis, leading to the continuous release of pollutants into the environment.

Provide design criteria that have been adopted and the details of the ventilation system designs providing local exhaust where concentrated pollutant sources are likely to be present. ASHARE Standard 62.1 – 2016 and CIBSE Guide B 2016 [7] are accepted references for this credit. Justification is needed for other references.

Submit exhaust air rate calculation demonstrating the compliance of design criteria and equipment specifications.

## Submittals

### (a) Fresh Air Provision

Supporting Documents <i>Please provide softcopies with filename prefix as indicated on the leftmost column below.</i>		PA	CA	FA/ RFA
HWB_04a_00	BEAM Plus NB submission template for HWB 4a	✓	✓	✓
HWB_04a_01	Summary of Fresh Air Provision in Normally Occupied Spaces [Appendix A] (Applicable to part 1.1)	✓	✓	✓
HWB_04a_02	Summary of Fresh Air Provision in Not Normally Occupied Spaces [Appendix B] (Applicable to part 1.2)	✓	✓	✓
HWB_04a_03	Summary of Measurement Results of Fresh Air Provision in Normally Occupied Spaces [Appendix C] (Applicable to part 1.3)	-	✓	✓



HWB_04a_04	Schedule of all spaces present in the building	✓	✓	✓
HWB_04a_05	Mechanical Ventilation Report (Applicable to parts 1.1 and 1.2)	✓	✓	✓
HWB_04a_06	Endorsed Natural Ventilation Report (Applicable to parts 1.1.2 performance path and 1.2.2)	✓	✓	✓
HWB_04a_07	CV of the professional as per requirements in the assessment (Applicable to parts 1.1.2 performance path and 1.2.2)	✓	✓	✓
HWB_04a_08	MVAC fan schedule and air side schematics (Applicable to parts 1.1 and 1.2) ; and	✓	✓	✓
	MVAC equipment catalogue (Applicable to parts 1.1 and 1.2)	-	✓	✓
HWB_04a_09	MVAC layout plan (Applicable to parts 1.1 and 1.2)	-	✓	✓
HWB_04a_10	Floor Plan highlighting locations of primary opening that provided in all naturally ventilated normally occupied rooms (Applicable to Part 1.1.2 Prescriptive Path only)	✓	✓	✓
HWB_04a_11	Window and opening schedules showing the areas of the primary openings that provided in all naturally ventilated normally occupied rooms (Applicable to Part 1.1.2 Prescriptive Path only)	✓	✓	✓
HWB_04a_12	Calculation of the ratio of the total area of the primary openings provided in the room to the floor area of the room (Applicable to Part 1.1.2 Prescriptive Path only)	✓	✓	✓
HWB_04a_13	Specification on provision of measurement methodology, measurement and report (Applicable to part 1.3)	✓	-	-
HWB_04a_14	Measurement methodology (Applicable to part 1.3)	-	✓	✓
HWB_04a_15	Measurement results (Applicable to part 1.3)	-	✓	✓

**(b) Exhaust Air**

Supporting Documents <i>Please provide softcopies with filename prefix as indicated on the leftmost column below.</i>		PA	CA	FA/ RFA
HWB_04b_00	BEAM Plus NB submission template for HWB 4b	✓	✓	✓
HWB_04b_01	Summary of Exhaust Air Provision [Appendix D]	✓	✓	✓
HWB_04b_02	/	/	/	/
HWB_04b_03	Schedule of spaces that consistently generate pollutants provided with local exhaust, highlighting the exhaust rate	✓	✓	✓
HWB_04b_04	Exhaust air rate calculation	✓	✓	✓
HWB_04b_05	MVAC fan schedule and air side schematics; and	✓	✓	✓
	MVAC equipment catalogue	-	✓	✓
HWB_04b_06	MVAC layout plan	-	✓	✓

**Remarks****(a) Additional Information**

World Health Organization – Health and sustainable development – Natural Ventilation. [ONLINE]. Available at: <https://www.who.int/teams/environment-climate-change-and-health/air-quality-and-health/sectoral-interventions/housing/strategies>. [Accessed April 2021].

Whole Building Design Guide, National Institute of Building Sciences. Natural Ventilation. [ONLINE]. Available at: <https://www.wbdg.org/resources/natural-ventilation>. [Accessed April 2021].

**(b) Related Credit****EU 2 Reduction CO<sub>2</sub> Emissions**

Although enhanced ventilation rate may increase building energy consumption, the Applicant is encouraged to adopt additional energy saving strategies, for instance demand control ventilation to overcome the compromise between indoor environmental quality and energy consumption.

**HWB 5 Waste Odour Control**

While HWB 4 governs the exhaust rate of enclose waste and recycling facilities, HWB 5 stipulates requirements to reduce risk of odour nuisance.

**HWB 8 Indoor Air Quality**

Indoor air quality can be improved via dilution resulted by maintaining suitable ventilation rate.