A Guide on Indoor Air Quality Certification Scheme for Offices and Public Places

(2019)

Indoor Air Quality Management Group
The Government of the Hong Kong Special Administrative Region

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PURPOSE

This guide sets out the procedures to participate in the Indoor Air Quality Certification Scheme for Offices and Public Places.

BACKGROUND

2. To improve the indoor air quality (IAQ) and promote public awareness of the importance of IAQ, we have implemented an IAQ Management Programme. One of the core tasks of the Programme is to launch a voluntary IAQ Certification Scheme for Offices and Public Places (hereafter refers as "Certification Scheme") in September 2003 to encourage property owners and management to adopt good IAQ management practices in their premises. Premises that are used as offices or public places and served by mechanical ventilation and air conditioning (MVAC) system may join the Certification Scheme.

3. Key features of the Certification Scheme are—

(a) a 2-level IAQ objectives (Excellent Class and Good Class) is used as the benchmark to assess IAQ of premises/buildings;

(b) a voluntary and self-regulatory approach is adopted for annual certification;

(c) participation is free but premises/building owners or management are responsible for all expenses, including but not limited to, employing accredited IAQ Certificate Issuing Body (CIB) to assess IAQ of their premises/buildings against the IAQ objectives;

(d) CIB will issue an IAQ certificate for premises/building owners or management to register with the IAQ Information Centre if the IAQ objectives are complied with. The certificate and the IAQ labels provided by the IAQ Information Centre should be put up at a prominent location for the public information;

(e) the certificate is valid for 12 months. For certificate renewal, a full set of parameters on IAQ objectives shall be measured/assessed once every 5 years, and for the 4 years in between, only carbon dioxide, respirable suspended particulates and mould need to be measured/assessed annually if certain conditions are met;

(f) certification is generally made on the basis of a building as a unit. Nevertheless, premises/building owners or management can choose to certify certain parts or certain floors of a building; and

(g) premises/building owners or management have to manage post-certification IAQ to ensure IAQ is maintained at the certified level.

4. Since the launch of the Certification Scheme in 2003, the World Health Organization (WHO) has published two IAQ guidelines in 2009 and 2010[1] respectively on dampness and mould, and selected pollutants (viz. formaldehyde (HCHO), radon, carbon monoxide (CO), nitrogen dioxide (NO_2), benzene, naphthalene, polycyclic aromatic hydrocarbons (PAHs), trichloroethylene and tetrachloroethylene). Taking into account local circumstances and the practicability of adopting the latest WHO's IAQ guidelines, the IAQ objectives of the Certification Scheme have been revised for implementation starting from 1 July 2019 as provided in this Certification Guide ("this Guide").

APPLICABILITY

5. In general, buildings or enclosed areas for the use as offices or public places which are served by MVAC system may join the Certification Scheme. MVAC system means the equipment, distribution network and terminal that provide, either collectively or individually, the processes of heating, cooling, humidification, dehumidification, ventilation or air-purification or any other associated processes to a conditioned space. It does not cover window-type air conditioners or split-type air conditioners[2]. Public places is defined as "any theatre, place of public entertainment of any kind, or other place of general resort, admission to which is obtained by payment or to which the public have or are permitted to have access". Examples of eligible buildings are office buildings, shopping malls, hotels, restaurants, theatres, cinemas and funeral parlours, etc.

6. The certification is generally made on the basis of a building as a unit. Nevertheless, premises/building owners or management can choose to certify certain parts or certain floors of a building. Where a shopping mall or scheduled premises[3] listed under Schedule 2 of the Public Health and Municipal Services Ordinance (Cap. 132) forms part of the building, it is required to be certified separately. The location of the certified premises/buildings must be clearly stated in the application form and the certificate.

7. In principle, a building or premises comprising both "office" and "public place" (such as an office tower having several floors of shopping mall and a bank having separate office and public areas) or several building blocks on the same land lot can be certified as one entity for one single certificate so long as the IAQ assessments are conducted in accordance with this Guide.

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[1] *WHO guidelines for indoor air quality: dampness and mould*, WHO Regional Office for Europe, 2009.
WHO guidelines for indoor air quality: Selected pollutants, WHO Regional Office for Europe, 2010.

[2] Enclosed area served by MVAC system and split-type/window-type air conditioners simultaneously may join the Certification Scheme.

[3] As at July 2018, the scheduled premises listed are restaurants, dancing establishment, theatres, cinemas, funeral parlours and factory canteens.

CERTIFICATION STEPS

8. The following steps should be taken to participate in the Certification Scheme:

(a) owner/management of premises/building to engage a CIB;
(b) CIB to carry out a walkthrough inspection to check if the premises/building has any IAQ problem;
(c) owner/management of the premises/building to rectify the IAQ problems with the assistance of the CIB, if any;
(d) CIB to conduct IAQ measurement and mould assessment, and advise owner/management of the premises/building to take remediation action if necessary;
(e) CIB to certify the premises/building in compliance with IAQ objectives and issue a certificate;
(f) owner/management of the premises/building to send to the IAQ Information Centre the certificate for registration together with a copy of the certification report;
(g) IAQ Information Centre to return the certificate to owner/management of the premises/building with a registration number and to provide IAQ labels for display in prominent location(s) for the public information;
(h) owner/management of the premises/building to manage post-certification IAQ; and
(i) owner/management of the premises/building to initiate annual re-certification.

The application procedures are summarised in a flowchart at **Annex 1**.

Step 1 – Engage an IAQ Certificate Issuing Body

9. Under the Certification Scheme, walkthrough inspection, on-site measurement and mould assessment as well as IAQ compliance assessment shall be performed by CIB accredited by Hong Kong Accreditation Service (HKAS) under the Hong Kong Inspection Body Accreditation Scheme (HKIAS) or by an accreditation body who is a recognised partner of HKAS under mutual recognition arrangement.

10. The CIB shall consist of competent examiner(s) to perform the certification work under the Certification Scheme A competent examiner is defined as:

(a) For certification of commercial buildings and public places

A registered professional engineer (RPE) in building services, gas, chemical, environmental, marine and naval architecture or mechanical discipline who is registered under the Engineers Registration Ordinance (Cap. 409); or

A person with a master degree in engineering, architecture, environmental science or other relevant qualification, and having relevant experience in carrying out IAQ certification.

(b) For certification of government and quasi-government buildings*

(i) Requirement (a) above; or

(ii) A public officer appointed in writing by the Director of Architectural Services or the Director of Electrical and Mechanical Services, as having relevant qualification and experience in carrying out IAQ certification.

* including government leased/owned premises within a commercial or a joint venture building.

11. The IAQ Information Centre is maintaining a list of CIBs which is available at the IAQ Information Centre and its website http://www.iaq.gov.hk.

12. Since IAQ is a complex subject requiring expertise from various disciplines, specialists may be required at different stages of the certification process. During the IAQ certification, the competent examiner of the CIB will lead a team of relevant personnel and is responsible for the following activities:

(a) carry out a walkthrough inspection of premises/building to check if there are any IAQ problems;

(b) provide recommendations, general advice or relevant information on practices commonly adopted to address the IAQ problems, if any;

(c) conduct IAQ measurement and mould assessment;

(d) certify the premises/building if the measurement/assessment results are in compliance with the IAQ objectives; and

(e) advise owner/management of the premises/building to manage post-certification IAQ as set out in paragraph 53 of this Guide.

Step 2 – Conduct Walkthrough Inspection

13. The CIB will gain first-hand visual appreciation for the building's hygienic and maintenance condition through a walkthrough inspection. The CIB should conduct the walkthrough inspection together with the owner/management of the premises/building. A non-exhaustive checklist is provided in **Annex 2** to facilitate the inspection. CIBs should exercise their professional judgment to modify the checklist according to different premises/building uses and previous inspection experience as well as to develop tailor-made checklists for specific situations. Reference could also be made to Chapter 7 of Guidance Notes for the Management of Indoor Air Quality in Offices and Public Places.

14. For new buildings, the walkthrough inspection should be conducted after occupancy and when the building conditions are representative.

Step 3 – Rectify any IAQ Problems

15. If any IAQ problems are identified, the owner/management of the premises/building should rectify them. Reference could be made to Chapters 7 and 8 of the Guidance Notes for the Management of Indoor Air Quality in Offices and Public Places.

Step 4 – Conduct IAQ Measurement and Mould Assessment

16. The CIB may proceed to carry out IAQ measurement/assessment after the walkthrough inspection if it considers that there are no obvious irregularities or the irregularities have been rectified.

17. For certification of a premises comprising both "office" and "public place" or several building blocks on the same land lot as one entity for single certificate, these areas are considered individually in the determination of number of sampling points and their locations, and the quality control requirements (except that it is acceptable to have one set of outdoor air measurement data to support the application) as well as in the determination of whether the certification criteria are met.

18. For new buildings, the IAQ measurements/assessments should be conducted after occupancy and when the building conditions are representative.

IAQ Parameters

19. A total of 12 IAQ parameters as listed in Table 1 shall be measured/assessed. The 11 parameters to be measured involve 10 chemical parameters (8-hour carbon dioxide (CO_2), 8-hour carbon monoxide (CO), 8-hour respirable suspended particulates (PM_{10}), 1-hour and 8-hour nitrogen dioxide (NO_2), 8-hour ozone (O_3), 30-minute and 8-hour formaldehyde (HCHO), 8-hour total volatile organic compounds (TVOC), and 8-hour radon (Rn)), and a 8-hour biological parameter (airborne bacteria).

20. The mould parameter as listed in Table 1 shall be assessed according to the prescriptive checklist by walkthrough inspecting all accessible areas for possible mould growth and identify the factors facilitating mould growth as set out in **Annex 3**. The CIB may carry out the mould inspection during the walkthrough inspection if it considers appropriate, and should conduct the mould inspection together with the owner/management of the premises/building.

Sampling Criteria

21. Measurement should not be made in any part of the premises/building where it is not served by MVAC system, such as store rooms, plant rooms, switch rooms, or kitchens (in the case of restaurants), etc.

Sampling Period

22. CIBs should conduct IAQ measurements covering periods of high occupancy of public places. When it is not practicable to conduct IAQ measurements during periods of high occupancy, CIBs should conduct the measurements during periods that would properly represent the IAQ of the premises/building. CIBs should explicitly state in the certification report whether the measurements are conducted during periods of high occupancy or not, and should provide justifications in case the measurements are not conducted during periods of high occupancy[4]. As a general reference, highest occupancy period for shopping mall should cover Friday, weekend and public holiday. For office area, the highest occupancy period should include normal office hours.

23. Measurement for assessing the compliance of the 8-hour IAQ objectives should be made on an 8-hour basis. Where it is not practicable to take 8-hour continuous measurement, surrogate measurement (i.e. an intermittent measurement strategy based on the average of half-hour measurements conducted at four time-slots) is also acceptable. CIBs should take into account the operation pattern of the premises/building when choosing the four time-slots. As a guideline, the four time-slots should be evenly distributed over the business hours for office buildings whereas for public places they should cover the worst-case scenario such as periods of highest occupancy.

24. Measurement for assessing the compliance of 1-hour NO_2 objective should be made within a four-hour period covering the expected highest indoor NO_2 levels during the operating hours of the premises/building, e.g. if the expected highest level is at 6:00 p.m., measurement should be conducted during 6:00 p.m. ± 2 hours. In Hong Kong, the outdoor emission is in general the main source of indoor NO_2, thus sampling should be done during high outdoor NO_2 emission period, such as the period of peak traffic, when there is lack of indoor source (such as gas-, oil-burning appliances like stoves, ovens, water heaters, etc.). When surrogate measurement is used for assessing the compliance of 8-hour NO_2 objective, the extension of one of the four half-hour measurements to one hour measurement is also accepted for assessing the compliance with the 1-hour objective.

25. Measurement for assessing the compliance of 30-minute HCHO can be made any time during the operation of the premises/building. However, CIBs should take into account the

[4] If the assessment period cannot meet the requirements, supplementary document such as client's email, questionnaire and letter with client signature should be provided to demonstrate that the assessment period covers the worst-case scenario.

operation pattern of the premises/building. The measurement period should cover the worst-case scenario such as periods of highest occupancy or human activities.

Number of Sampling Points

26. The guidelines for the minimum number of sampling points required are:

Total floor area to be certified (served by MVAC system) (m^2)	Minimum Number of Sampling Points
< 3,000	1 per 500 m^2
3,000 - < 5,000	8
5,000 - < 10,000	12
10,000 - < 15,000	15
15,000 - < 20,000	18
20,000 - < 30,000	21
≥ 30,000	1 per 1,200 m^2

However, CIBs should exercise their professional judgment to take additional samples if necessary.

27. For certification of lift lobbies, public corridors and multi-floor buildings, the number of sampling points should not be less than—

(a) the corresponding minimum number of sampling points as set out in paragraph 26, and

(b) 30% of the number of floors of the building concerned.

The sampling points should be properly distributed at different levels of the building as far as practicable.

28. As outdoor air measurement data may provide hints on whether outdoor pollutants contribute to poor IAQ, at least one set of all the IAQ parameters (including relative humidity (RH) under the mould parameter) should, in parallel, be monitored outdoors in close proximity to the fresh air intakes of the study areas. Where accessible, samplers/monitor inlets should be located approximately 1 m off the edge of the fresh air duct inlets and enclosed in appropriate shelters to avoid direct sunlight and moisture. Other representative locations should be considered if the fresh air intake is not accessible.

Siting Indoor Monitoring Locations

29. Since IAQ may be affected by the effectiveness of the MVAC systems, the susceptibility of the occupants, and the potential sources expected from the occupant density or activities, sampling points should in general be chosen using the following criteria:

(a) distributed among individual MVAC zones;
(b) include areas under complaints; and
(c) cover areas with both high and low occupant density.

30. If floor areas among the floors to be certified are different, priority should be given to floors with the largest area, subject to actual occupancy situation, when siting sampling points.

31. During field data collection, monitors should be sited at the selected sampling location using the following general guidelines:

(a) representing the primary workstation layout and work activities;
(b) of minimal disturbance of work activities within the study area;
(c) at least 0.5 m from corners or windows;
(d) at least 0.5 m from walls, partitions, and other vertical surfaces (e.g. file cabinets);
(e) not directly in front of air supply diffusers, induction units, floor fans, or heaters, or the exhaled breath of the operator, etc.;
(f) not under direct sunlight that will impact instrumentation;
(g) preferably not in hallways or passageways;
(h) at least 1 m away from localised IAQ pollution sources such as photocopiers, printers, etc.;
(i) not within 3 m of an elevator if sampled at a corridor/lobby;
(j) not within 2 m of doors;
(k) not obstructive to, or interfering with, occupant egresses from the study area under normal or emergency situations;
(l) not at the junction connected to stations of public transport facilities; and
(m) placing inlets of samplers/monitors at a height of about 1.1 m above the floor.

32. If the certified area comprises area of special IAQ concern[5] (e.g. canteen), at least one sampling point should be located at each type of special IAQ area.

[5] An area of special IAQ concern refers to an area of higher risk of higher indoor air pollutant concentration during normal operations in comparison to other areas of concern.

Measurement and Assessment Methods

33. For the purpose of the Certification Scheme， the detailed assessment requirements for mould is at **Annex 3** and the detailed methods for measuring the other 11 IAQ parameters are set out in **Annex 4**.

Sample Management

(a) Real-time monitoring data

34. The data collected by real-time monitors should be taken every 5 minutes either with data logging devices or by recording properly in a field data log sheet[6]. The instrument operating conditions should also be properly recorded in a field log sheet.

(b) Integrated sample

35. Before sampling, a unique identification code should be assigned to each sample collected. The identification code will indicate the type of sample, the sampling location, and whether the sample is a primary or duplicate sample. Information on the types of sampling equipment, pump airflow rates, start/stop times, sampling conditions, names of technicians, and other appropriate sample collection information should also be documented.

36. After sampling, the chemical samples as collected in sampling tubes/filters/bags/canisters, etc. should be treated, stored and analysed as per manufacturers' recommendations if available, or otherwise, within a maximum period of 5 days. To ensure sample integrity, appropriate precautions against damage, deterioration and contamination of samples during transportation, storage and handling should be taken. For bacterial samples, they should be delivered to the microbiology laboratory within 24 hours for incubation.

Quality Control

37. CIBs should ensure the competence of all who participate in the IAQ survey and certification process. All measurements should be conducted using calibrated instrument/equipment and the calibration should be conducted according to manufacturer's specifications where available. Also, the calibration standards should have a well-defined traceability to certified reference materials (CRMs), if available.

38. Real-time monitors should be checked before use. Time must be allowed for the real-time monitors to reach steady state before taking measurements. Records should be maintained for each of the real-time monitors, including the following minimum data:

(a) manufacturer's name, serial number or other unique identification;

[6] If radon monitors cannot collect data every 5 minutes due to their performance constraint, these monitors are allowed to collect data at a minimum measurement interval of the monitors.

(b) real-time monitors' compliance with the product specifications;
(c) the manufacturer's instructions;
(d) dates, results and copies of reports and certificates of all calibrations, adjustments, and the due date of next calibration;
(e) the maintenance plan and maintenance carried out to date; and
(f) any damage, malfunction, modification or repair to the monitors.

39. To ensure the data quality, a quality control (QC) plan including sample preparation and handling, calibration, data processing, etc. should be prepared. At least one sample or 10% of the total field samples for each identifiable part inspected (e.g. whole office building; the office part of a composite building with both offices and shopping mall; certain floors of a building covered by the certification, etc.), whichever is larger, should serve as field blanks and accompany the samples to the field and back to the laboratory, without being used for sampling. Similarly, at least one sample, or 10% of the total field samples for each identifiable part inspected, whichever is greater, should be collected as duplicate samples. To prevent contamination or deterioration of the integrated samples, the chain-of-custody log detailing the storage and treatment of samples prior to analysis should be prepared.

Compliance Requirements

40. The IAQ objectives in Table 1 will be used as the benchmark for assessing compliance, except for the alternative measurement of TVOC as set out in paragraph 41 below. The compliance requirements are—

(a) at least 80% of the sample points of each of the parameters comply with the relevant IAQ objectives;
(b) for each of the chemical and biological parameters, no sample points should exceed more than 50% of the relevant IAQ objectives; and
(c) for mould parameter, all compulsory items of the mould checklist should comply with the requirement, whereas the supplementary inspection items are optional for inspection.

41. TVOC objective is also considered met if the measurements of 5 individual volatile organic compounds (VOCs) as set out in WHO's IAQ guidelines[7] are in compliance with the requirements set out in Table 2. Details are—

(a) if the level of TVOC measured exceeds the level in Table 1, measurement of individual VOCs as listed in Table 2 may be carried out at the failed sampling points;
(b) measurements of individual VOCs should be conducted with analytical methods based on the United States Environmental Protection (USEPA)'s organic (TO)

[7] *WHO guidelines for indoor air quality: Selected pollutants*, WHO Regional Office for Europe, 2010.

compendium procedures or other standard or properly validated methods;

(c) a TVOC-failed sampling point complying with all the 5 individual VOCs objectives in Table 2 will be regarded as a passed sampling point in respect of TVOC for Good Class; and the sum of the measured levels of 5 VOCs also complying with the Excellent Class TVOC objective will be regarded as a passed sampling point in respect of TVOC for Excellent Class; and

(d) the number of passed sampling points of TVOC measurements and of individual VOC re-measurements will be added together when calculating the 80% compliance percentage.

Non-compliance Areas

42. The owners/management of the premises/buildings should carry out remedial actions on those non-compliance areas. CIBs may carry out IAQ re-measurements/assessment for those failed parameters after remedial actions have been taken.

Step 5 – Sign off IAQ Certificate

43. If the IAQ objectives are met, the CIB may sign off the "Certificate of Indoor Air Quality for Offices and Public Places" (a sample of the Excellent Class and Good Class Certificates are at **Annex 5**). The CIB shall obtain the electronic copy of the certificate from the IAQ Information Centre, and colour print the certificate on "vellum laid" paper of 100 gram per square meter (GSM). All entries in the certificate shall be type printed. Paper sample can be obtained from the IAQ Information Centre. The presentation of the building name and name of certified location should align with the IAQ Information Centre's required format (refer to http://www.iaq.gov.hk) The CIB should then issue the certificate together with a certification report (**Annex 6**) to the owner/management of the premises/building.

44. Except for measurement/assessment of PM_{10}, CO_2 and mould for the purpose of certificate renewal (see paragraphs 56 and 57 below), CIBs are required to complete the certification process within 12 months after the first IAQ parameter is measured/assessed. If a set of IAQ compliant data is only available one year beyond the first IAQ parameter is measured/assessed, CIBs are required to re-measure/re-assess the full set of the 12 IAQ parameters.

45. The CIB is also required to advise owner/management of the premises/building to adopt appropriate post-certification measures to ensure that IAQ is maintained at the certified level (please see paragraph 53 below).

Step 6 – Apply for Registration

46. Upon receipt of the certificate and the certification report from the CIB, the owner/management of the premises/building should submit the following documents to the IAQ Information Centre (see paragraph 60 for its address):

(a) the original copy of an application form (**Annex 7**);

(b) the original copy of the certificate issued by the CIB; and

(c) a duplicate copy of the certification report. Facsimile copy is not accepted.

47. To avoid delay in the processing of the application, correct and consistent information should be provided in the application form, executive summary and certification report.

Step 7 – Complete Registration

48. The IAQ Information Centre is responsible for inserting a registration number on the certificate and upload the information contained in the certificate to the Centre web page for public information. The Centre will keep a copy of the certification report for record only.

49. Upon receipt of the application form, the certificate and the certification report, the Centre will endeavour to—

(a) return the certificate to the owner/management of the premises/building with a registration number within 7 working days upon receipt of the submission contains all the information required; or

(b) issue an e-mail/letter requesting for supplementary information within 5 working days upon receipt of the submission if the information required is incomplete.

50. Upon receipt of the certificate returned from the Centre and the IAQ labels provided, the owner/management of the premises/building should display the certificate and/or labels at prominent location(s) of the premises/building for public information.

51. A certificate is valid for a period of 12 months, starting on the date the CIB signs off the certificate unless for the annual re-certification as set out in Step 9 below (paragraph 54 to 57).

52. Owners/management of the premises/buildings have to remove the IAQ certificates from displaying at the premises/buildings within 7 days after the expiry of the certificates. They are required to return the expired certificates to the IAQ Information Centre for record. For premises/buildings that have expired certificates and the owners/management have also decided not to apply for certificate renewal, the IAQ labels must be removed and returned to the IAQ Information Centre for record within 3 months after the expiry of the certificates.

Step 8 – Manage Post-Certification IAQ

53. The CIB is responsible to advise the owner/management of the premises/building on how to manage post-certification IAQ. The owner/management of the premises/building should endeavour to adopt the following measures to ensure that IAQ is maintained at the certified level:

(a) develop an IAQ management programme (please refer to Chapter 5 of Guidance Notes for the Management of Indoor Air Quality in Offices and Public Places);
(b) ensure proper operation and maintenance of the MVAC system according to the checklist in **Annex 8**;
(c) exercise good housekeeping;
(d) take appropriate measures to control emission of pollutants during major alteration and renovation;
(e) use products/equipment with low emission of indoor air pollutants; and
(f) take appropriate measures to prevent mould growth and water damage, and carry out remediation when necessary.

Step 9 – Initiate Certificate Renewal

54. Within three months before the expiry of the current certificate, the owners/management of the premises/building may engage a CIB to start the re-certification measurements and assessments. A renewed certificate could be prepared for certification purpose if the compliance requirements as stipulated in paragraphs 40 and 41 are met. If the application for certificate renewal is submitted to the IAQ Information Centre not later than three months after the expiry date of the last certificate, the starting date of the renewed certificate will be the first day after the expiry date of the last certificate. Otherwise, the start date of the renewed certificate will be the date the CIB signs the certificate.

55. The registration procedures for certificate renewal are the same as the first time application as set out in Step 6 above (paragraphs 46 and 47) and the information required in the re-certification report are set out in **Annex 6**. The following paragraphs set out the requirements for certificate renewal.

Renewal during the first to fourth annual re-certification

56. For the first to the fourth annual re-certification (i.e. the second to the fifth year), only CO_2, PM_{10} and mould are required to be measured/assessed in accordance with the respective IAQ objectives in Table 1 and the prescriptive checklist for mould in **Annex 3**, and certified by CIBs. CIBs must also confirm that there is no change to the usage of the premises/buildings which may adversely affect the IAQ and that there is no major alteration, or change to the operation or maintenance of the MVAC system.

57. However, the full list of 12 IAQ parameters must be measured/assessed for the purpose of re-certification under the following circumstances:

(a) when there is a change to the usage of the premises/buildings which may adversely affect the IAQ (e.g. from office to gymnasium, shopping mall, or karaoke establishment, etc.); or

(b) when there is a major alteration, or change to the operation or maintenance of the MVAC system; or

(c) when there is a change of IAQ from Good to Excellent Class; or

(d) if the application for certificate renewal is submitted to the IAQ Information Centre more than three months after the expiry date of the last certificate.

In such circumstance, the starting date of the renewed certificate will be the date the CIB signs the certificate. This will be regarded as the start of a new 5-year cycle.

Renewal during the fifth annual re-certification

58. For the fifth annual re-certification (i.e. the sixth year), CIBs will need to assess and certify the full list of IAQ parameters in Table 1 to start another 5-year cycle.

FEES

59. Participation in the Certification Scheme is free of charge. However, owners/management of premises/buildings are responsible for all expenses associated with participating in the scheme (e.g. cost for employing the CIB for certification and undertaking remedial actions, etc.).

ENQUIRIES

60. For any enquiries related to the Certification Scheme, please contact the IAQ Information Centre at:

Indoor Air Quality Information Centre
HKPC Building
78 Tat Chee Avenue
Kowloon Tong, Kowloon

Telephone : 2788 6177
Fax : 2788 6181
Email : enquiry@iaq.gov.hk
Homepage: http://www.iaq.gov.hk

TABLE 1: IAQ OBJECTIVES FOR OFFICES & PUBLIC PLACES

Parameter			Excellent Class	Good Class
Pollutant	**Averaging Time**	**Unit**		
Carbon Dioxide (CO_2)	8-hour	mg/m^3	1,440	1,800
		ppmv	800 [a]	1,000 [a]
Carbon Monoxide (CO)	8-hour	$\mu g/m^3$	2,000 [b]	7,000 [c]
		ppmv	1.7	6.1
Respirable Suspended Particulates (PM_{10})	8-hour	$\mu g/m^3$	20 [d]	100 [d]
Nitrogen Dioxide (NO_2)	8-hour	$\mu g/m^3$	40 [c]	150 [e]
		ppbv	21	80
	1-hour	$\mu g/m^3$	100 [c]	200 [c]
		ppbv	53	106
Ozone (O_3)	8-hour	$\mu g/m^3$	50 [b]	120 [f]
		ppbv	25	61
Formaldehyde (HCHO)	8-hour	$\mu g/m^3$	30 [b]	100 [b]
		ppbv	24	81
	30-minute	$\mu g/m^3$	70 [c]	100 [c]
		ppbv	57	81
Total Volatile Organic Compounds (TVOC)	8-hour	$\mu g/m^3$	200 [b]	600 [b]
		ppbv	87	261
Radon (Rn)	8-hour	Bq/m^3	150 [g]	167 [c]
Airborne Bacteria	8-hour	cfu/m^3	500 [h,i]	1,000 [h,i]
Mould	---	---	Assessment in form of prescriptive checklist in Annex 3 [j]	

Legends:

a. USEPA (2017), *Facilities Manual Volume 2: Architecture and Engineering Guidelines.* A more stringent value is set for Excellent Class than the recommended time weighted average in this manual.
b. Finnish Society of Indoor Air Quality and Climate (2001), *Classification of Indoor Climate 2000: Target Values, Design Guidance and Product Requirements.*
c. WHO (2010), *WHO guidelines for indoor air quality: Selected pollutants*. A more stringent level is set for Excellent Class 1-hour NO_2 and 30-minute HCHO than the guidance level in this guideline. The Excellent Class objective of 8-hour average NO_2 is made reference to the corresponding WHO annual level. The WHO 24-hour averaging reference level for CO has been adopted as the 8-hour objective in the above table. Information from WHO has been taken into account for radon value in the above table, though WHO has no 8-hour averaging reference level for radon.
d. WHO (2006), *Air Quality Guidelines Global Update 2005. Particulate matter, ozone, nitrogen dioxide and sulfur dioxide*. The Excellent and Good class objectives of PM_{10} in the above table is made reference to WHO annual and 24-hour averaging reference level for PM_{10}, respectively.
e. EPD (1987), Hong Kong Air Quality Objectives under the Air Pollution Control Ordinance (Cap. 311).
f. WHO (2000), *Guidelines for Air Quality*.
g. USEPA (2016): *A Citizen's Guide to Radon*. (Note: 4 pCi/L or 150 Bq/m^3 is USEPA Action Level).
h. ACGIH (1986), American Conference of Governmental Industrial Hygienists (ACGIH) committee activities and reports "Bioaerosols: Airborne viable microorganisms in office environments: sampling protocol and analytical procedures", Applied Industrial Hygiene.
i. The exceedance of bacterial count does not necessarily imply health risk but serve as an indicator for further investigation.
j. WHO (2009), *WHO guidelines for indoor air quality: dampness and mould*.

TABLE 2: IAQ OBJECTIVES FOR INDIVIDUAL VOCS

Compound	8-hour Average
Benzene	5.3 ppbv [a] (17 µg/m^3)
Tetrachloroethylene	37 ppbv [a] (250 µg/m^3)
Trichloroethylene	43 ppbv [a] (230 µg/m^3)
Naphthalene	1.9 ppbv [a] (10 µg/m^3)
Polycyclic Aromatic Hydrocarbons (as benzo(a)pyrene)	1.2×10^{-4} ppbv [a] (1.2 ng/m^3)

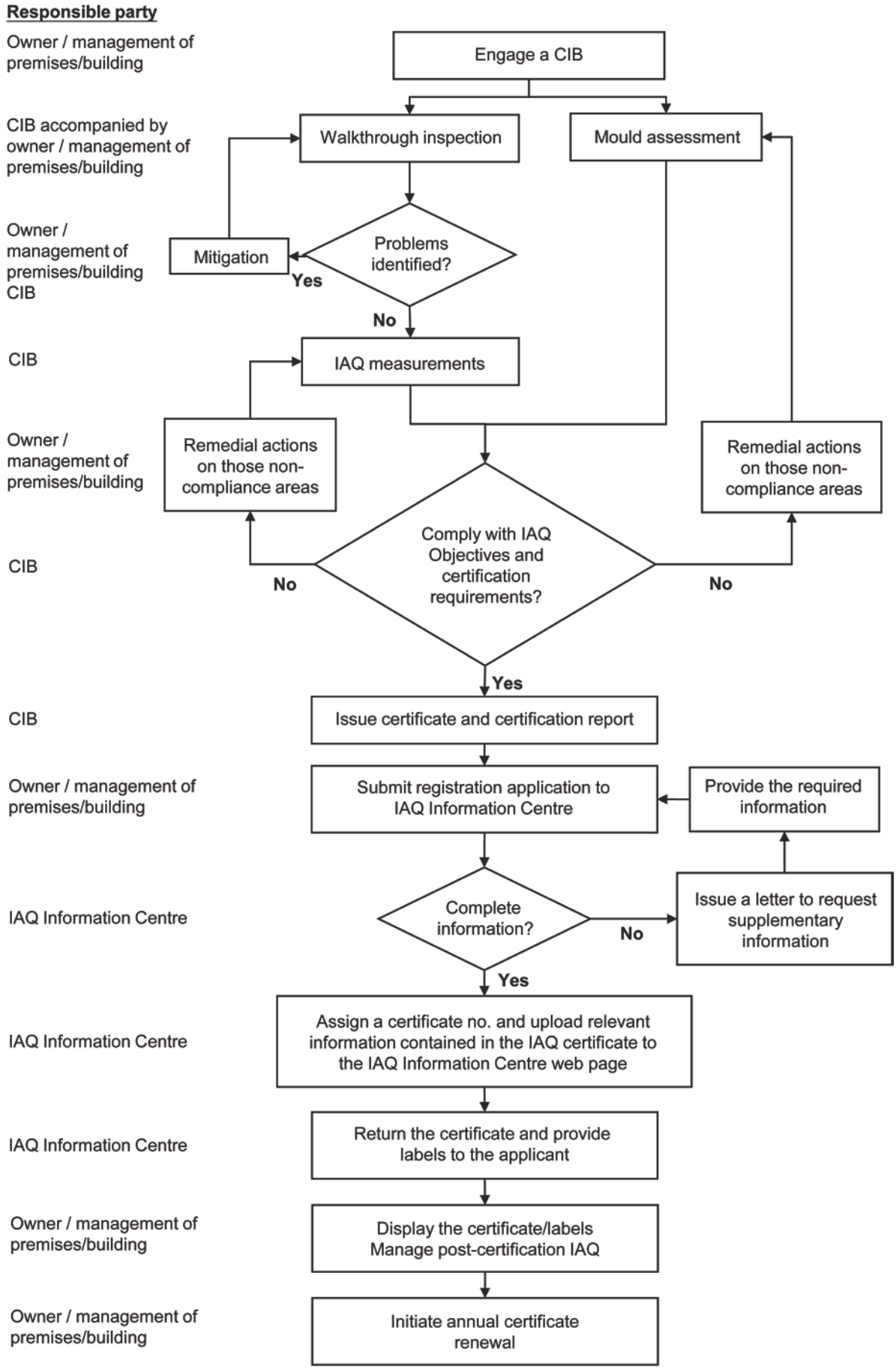
Legends:

a. WHO (2010), *WHO guidelines for indoor air quality: Selected pollutants*. Information from WHO has been taken into account for values of benzene, tetrachloroethylene, trichloroethylene, naphthalene and benzo(a)pyrene in the above table, though WHO has no 8-hour averaging level for these chemicals.The objectives are applicable to both Excellent and Good Classes. Compliance with the respective objective of the five individual VOC species is regarded as meeting Good Class TVOC objective. If at the same time the sum of the five individual VOC is less than or equal to 200 µg/m^3 (the Excellent Class TVOC objective level), it will be regarded as complying with the Excellent Class TVOC objective.

Note: All conversion calculations are based on data from NIST Standard Reference Database 69 – October 2018 Release: *NIST Chemistry Webbook*.

ANNEX 1

FLOWCHART FOR APPLICATION PROCEDURE



ANNEX 2

CHECKLIST FOR WALKTHROUGH INSPECTION

General

Check whether there is any—

- Odour
- Dirty or unsanitary conditions (e.g. excessive dust)
- Visible fungal growth or mouldy odour (often associated with problem of excessive moisture)
- Staining or discolouration of building materials
- Sanitary conditions in equipment such as drain pans and cooling towers
- Inadequate ventilation
- Inadequate exhaust air flow
- Blocked vents
- Uneven temperature
- Overcrowding
- Poorly-maintained filters
- Personal air cleaners (e.g. ozone generators)
- Presence of hazardous substances
- Unsanitary mechanical room, or trash or stored chemicals in mechanical room

Specific

Potential sources of contaminants

- Enquire about any recent change in the physical set-up and use of the space (e.g. open office space converted to closed offices, transformation of office space into a waiting room or computer room, etc.).
- Inspect the loading dock and car parks connected with the premises/building:
  - Are they properly ventilated?
  - Are stairways, elevator shafts, and ducts acting as pathways for automobile exhaust and diesel fumes?
  - Are carbon monoxide sensors (for ventilation control) and alarms installed in the garage calibrated and operating properly?
- Are stoves and other sources fitted with exhaust system?
- Is the building less than a year old, or has any area been renovated, redecorated or newly furnished within the past month?
- Are suitable cleaning products being employed? Is time of use optimum, so as to reduce exposure of occupants?
- Do any activities involve the use of large amounts of chemicals, especially highly volatile solvents? Is solvent odour present? Are soaked materials and solvents being disposed of

properly?

- Have pesticides been improperly applied?
- Is the trash properly disposed of daily?
- Is extra ventilation or a separate ventilation system being used where there are localised sources? Is the ventilation system recirculating volatile organic compounds from a source throughout the building?
- Are there any mouldy, damp odour or evidence of a previous flood or water leak?
- Records should be examined for evidence of recent renovation, painting, installation of plywood or particleboard, replacement of carpets, and installation of new furniture.
- Are there dirt marks or white dust on diffusers, indicating particulates entering from the ventilation system?
- Are carpets cleaned regularly?

MVAC system

- Is the amount of fresh air provided to the premises/building in line with the latest version of ASHRAE Standard 62?
- Are the electrostatic precipitators the approved type from Fire Services Department?
- Where is the fresh air intake duct located? Is it blocked up? Is it near the cooling tower? Is it at street level or near a car park (air intakes located below third-floor level can intake fumes from vehicular traffic and parking garages)? Are heavy industries located nearby? Is there any construction work going on nearby?
- Are the fresh air controls and dampers functioning properly?
- Is the minimum fresh air damper opening set at approximately 15%?
- Are all air distribution dampers functioning properly and cleared of obstruction?
- Are filters installed and maintained properly (e.g. no bypassing, not overloading with dust)?
- Is the filtering system designed for primary filters rated between 10% and 30% dust-spot efficiency, and for secondary filters rated between 40% and 85% dust-spot efficiency?
- Are the fan motors and belts working properly?
- Are diffusers and exhaust outlets close together, causing short-circuiting?
- Is the air-conditioning system turned off any time during the day?
- Is there a regular schedule for cleaning and maintenance of the MVAC system?
- Are all the components of the MVAC system regularly inspected for leaks or breaches, etc.?
- Are the cooling towers treated according to the latest edition of *Code of Practice for Prevention of Legionnaires' Disease* published by Electrical and Mechanical Services Department?
- Are the mechanical rooms clean and free of contaminants (e.g. refuse or chemicals)?
- Are the exhaust fans operating properly?
- Are all air distribution paths unobstructed?

ANNEX 3

CHECKLIST FOR ASSESSING THE COMPLIANCE WITH THE IAQ OBJECTIVES ON MOULD UNDER THE IAQ CERTIFICATION SCHEME FOR OFFICES AND PUBLIC PLACES (TECHNICAL GUIDELINES OF THE CHECKLIST IS IN THE APPENDIX)

1. General Information of the Premises

Building Name: _____

Building Address: _____

Date of Inspection: _____ **Time:** _____ **Weather:** _____

Temperature (Outdoor/Indoor): ____ **°C /** ___ **°C** ____ **Relative Humidity (Outdoor/Indoor):** _____ **% /** ___ **%** _

Inspected by: _____ **Contact No.:** _____

2. Compulsory Items

Criteria	Complied with	Not complied with	Remarks (e.g. Location/Observation/ Measure/Reference)
2.1 Evidence of growth of moulds			
2.1.1 No observable possible mould growth present.			
2.1.2 No detectable damp/musty odour.			
2.2 Prevention of dampness and control of excess moisture			
2.2.1 Indoor relative humidity is maintained at a level below 70%.			Relative humidity:_____% (record the range of relative humidity measured if more than 1 sampling point)
2.2.2 No water condensation observed on any indoor surfaces or materials.			
2.3 Indicators of dampness and mould growth/remediation			
2.3.1 No leaks, flooding, wet floors, window leakage (that causes mould growth) present. If there is/are sign(s) of leaks, flooding, etc. occurred in the past 12			

Criteria	Complied with	Not complied with	Remarks (e.g. Location/Observation/ Measure/Reference)
months, remedial measures have been taken to stop the leaks, flooding, etc. and to prevent recurrence of similar incidents. *(Please describe briefly the incident(s) and remedial measures[1] taken in the "Remarks" column.)*			
2.3.2 If there is/are sign(s) of possible mould growth in the past 12 months, remedial measures have been taken to clean up the possible mould and prevent its recurrence. *(Please describe briefly the observations and remedial measures[1] taken in the "Remarks" column.)*			
2.4 Housekeeping			
2.4.1 Presence of housekeeping records. (e.g. records of carpet cleaning, MVAC system servicing and incidence of water leak or flood in the past 12 months, etc.).			
2.4.2 For areas with carpets, carpet cleaning is conducted at least once per year.[2]			

3. Supplementary Inspection Items (Optional)

Supplementary Inspection Items	Remarks (e.g. Location/Observation/Measure/Reference)
3.1 Design, operation and maintenance of indoor ventilation system	
3.1.1 Do the design and construction of the premises and ventilation systems comply with relevant international technical codes and guidelines? If "Yes", please provide the name of the technical code or guideline (e.g. ASHRAE Standard, CIBSE Code) in the "Remarks" column.	
3.1.2 Is air ducting regularly inspected and cleaned (as necessary)? If "Yes", please describe briefly the inspection frequency and relevant records in the "Remarks" column.	
3.1.3 Is air balancing regularly checked (as necessary)? If "Yes", please describe briefly the frequency and relevant records in the "Remarks" column.	
3.1.4 Are the following MVAC equipment regularly checked and cleaned (as necessary)?	
- Air-cooled chillers	
- Cooling towers	
- Fresh air intakes	
- MVAC equipment room	
- Air filters	
- Cooling/Heating coils	
- Drain pans	
- Fan coils	
- Air grilles/diffusers	

Supplementary Inspection Items	Remarks (e.g. Location/Observation/Measure/Reference)
3.2 Housekeeping	
3.2.1 For areas with carpets, are the carpets regularly cleaned with a vacuum cleaner equipped with high efficiency particulate air filter (HEPA filter)? If "Yes", please provide the cleaning method and the model of the vacuum cleaner in the "Remarks" column.	
3.2.2 Any management system[3] to provide a healthy indoor environment which is free of excess moisture and mould?	
3.2.3 Are water dispensers properly installed? Any instructions and guidelines to the users to avoid water spillage?	
3.2.4 Any measure(s) is/are taken to avoid water spills, leaks and flood? If 'Yes', please describe briefly the measure(s) taken in the "Remarks" column.	

[1] May make reference to United States Environmental Protection Agency, *Mold Remediation in Schools and Commercial Buildings*, EPA 402-K-01-001 2008.

[2] May make reference to the website of the National Carpet Cleaning Association of UK (http://www.ncca.co.uk/faq.php).

[3] May make reference to Indoor Air Quality Management Group, the Government of Hong Kong Special Administrative Region: *Guidance Notes for the Management of Indoor Air Quality in Offices and Public Places*, Chapter 5 , "The 7-step IAQ Management Programme", January 2019.

- End -

Technical Guidelines for Understanding the Checklist for Assessing the Compliance with the IAQ Objectives on Mould under the IAQ Certification Scheme for Offices and Public Places

Introduction

The objective of this set of technical guidelines is to enhance the understanding on the Checklist for Assessing the Compliance with IAQ Objectives on Moulds ("Checklist"). The assessment involves a walkthrough inspection to inspect accessible areas for possible mould growth and identify the factors present to facilitate mould growth. Compliance of the compulsory items given in the Checklist could provide evidence that the building or premises is unlikely to have mould problems.

Part 1: General Information of the Premises

All the general information including the building's name and address, inspection date, weather conditions on the date of inspection, name and contact number of the person who conducts the inspection (the "inspector"[8]) must be provided.

Part 2: Compulsory Items

2.1 Evidence of growth of moulds

2.1.1 Observable mould growth

Although mould growth is made up of microscopic structures, the mould colonies are easily seen as they enlarge. Mould colonies typically appear as patches, varying from about a few mm to 1 cm in diameter, usually dark in colour. When many colonies join together, bigger irregular patches will appear (Figure. 2.1a).

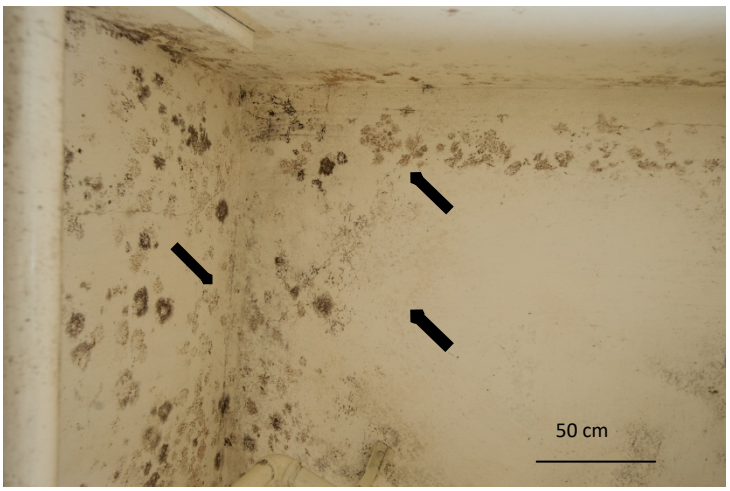


Figure 2.1a: Patches of observable mould (arrows) on a painted cement wall

[8] The term "inspector" is only used in its general sense but not specifically referring to the "approved inspector" in the Hong Kong Inspection Body Accreditation Scheme operated by Hong Kong Accreditation Service.

For visual inspection, it is different from the other IAQ parameters with measurement conducted which require identification of sampling points. Instead, the inspector should inspect all accessible locations with sources of potential water leakage and/or ingress. The inspector should note that mould growth usually appears as circular patches with regular margin whereas stain patches are usually irregular in appearance. Examples of observable mould growth in the indoor environment are shown in Figure 2.1b to 2.1e. Table 2.1.1 is a template to record observable possible mould growth.

Figure 2.1b: Mould growth on metal ceiling tiles

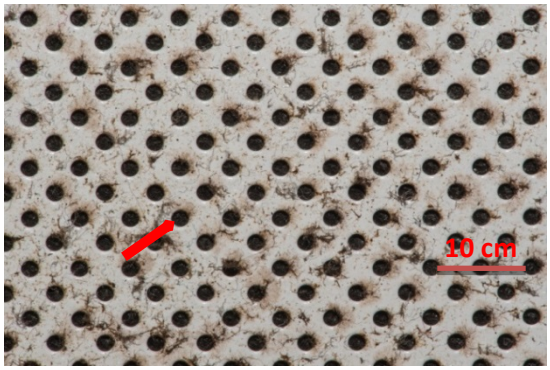


Figure 2.1c: Mould growth on/around air diffusers

Figure 2.1d: Mould growth on aluminum window frame

Figure 2.1e: Mould growth on carpet next to water dispenser

Table 2.1.1: Locations of observable possible mould growth

Location	Location/ Floor	Estimated possible mould growth area (m^2)	Not observed	Acceptable or not? (Y/N) (Note 1)
On ceilings/ceiling tiles, especially for locations close to water sources				
On/around air diffusers				
On window frames				
On carpets near water source e.g. water dispensers				
On walls, especially for locations close to water sources				
Area near indoor plants				
Others (please describe)				

Note 1: Small areas of observable mould damage (< 0.3 m^2)[(1)] confined to few locations are unlikely to pose much risk and hence considered to be acceptable. However, the inspector should advise the premises/building owner or management to identify the reason for the observable possible light mould growth and rectify the problem.

2.1.2 Detectable damp/musty odour

Damp/musty odour is caused by growth activities of micro-organisms, especially mould growth under damp conditions. It is an unpleasant odour which smells like decaying organic materials. The inspector should walk through all accessible areas of the building/premises, including those areas with restricted/insufficient ventilation and areas near water sources, to detect any damp or musty odour to fill in the Checklist.

2.2 Prevention of dampness and control of excess moisture

When the relative humidity (RH) is high and the air or any surfaces of materials in the indoor environment is cold, the moisture-holding capacity of the air will drop to allow the water vapour to condense. This condensed water will provide the water necessary for the growth of mould.

2.2.1 Indoor relative humidity

The RH should be measured during field data collection by a psychrometer, hygrometer or other equivalent measurement device with readouts for the data logging. Measurement conducted during the measurement of other IAQ parameters is accepted. Table 2.2.1a is a template for recording the RH in the indoor environment. Table 2.2.1b shows the guidelines for the minimum number of sampling points required. More than 80% of the sampling points with the 8-hour average RH should be maintained at a level below 70%. Surrogate measurement is also accepted where it is not practicable to take 8-hour continuous measurement. Requirements on the sampling period for surrogate measurement should make reference to *A Guide on Indoor Air Quality Certification Scheme for Offices and Public Places (2019)*[(2)]:

Sampling points at locations different from that for measuring other IAQ parameters are accepted but should be chosen according to the following criteria:

(a) distributed among individual mechanical ventilation and air conditioning (MVAC) zones;
(b) include areas under complaints; and
(c) cover areas with both high and low occupant density.

Locations of the sampling points should be documented.

During field data collection, the measurement device should be sited at the selected sampling location using the following general guidelines:

(a) representing the primary workstation layout and work activities;
(b) of minimal disturbance of work activities within the study area;
(c) at least 0.5 m from corners or window;
(d) at least 0.5 m from walls, partitions, and other vertical surfaces (e.g. file cabinets);
(e) not directly in front of air supply diffusers, induction units, floor fans, or heaters, or the exhaled breath of the operator, etc.;
(f) not under direct sunlight that will impact instrumentation;
(g) preferably not in hallways or passageways;
(h) at least 1 m from localised IAQ pollution sources such as photocopiers, printers, etc.;
(i) not within 3 m of an elevator if sampled at a corridor/lobby;
(j) not within 2 m of doors;
(k) not obstructive to, or interfering with, occupant egresses from the study area under normal or emergency situations;
(l) not at the junction connected to stations of public transport facilities; and
(m) placing inlets of samplers/monitors at a height of about 1.1 m above the floor.

Table 2.2.1a: Indoor relative humidity

Location of sampling point	8-hr average RH measurement
Point 1	%
Point 2 and so on	%
>80% of sampling points with RH less than 70%?	Y/N

Table 2.2.1b: The Guidelines for the minimum number of sampling points required (Note 1)

Total floor area to be certified (served by MVAC system) (m^2)	Minimum number of sampling points
< 3,000	1 per 500 m^2
3,000 - < 5,000	8
5,000 - < 10,000	12
10,000 - < 15,000	15
15,000 - < 20,000	18
20,000 - < 30,000	21
$\geqslant$ 30,000	1 per 1,200 m^2

Note 1: Additional samples should be taken if necessary.

2.2.2 Water condensation

At the time of inspection, the inspector should also look for any observable signs of water condensation on any surfaces with temperatures which are lower than the ambient air temperature. Table 2.2.2 is a template for recording condensation events in order to complete the Checklist.

Table 2.2.2: Evidence of condensation events

Possible locations for water condensation	No	Yes (i.e. Non-compliance)	Requires maintenance/ replacement
Air diffuser surfaces (e.g. Fig.2.2a Condensate on air diffuser surface)			
Window panes/frames (e.g. Fig.2.2b Condensate on window pane)			
Walls, particularly those directly opposite to air diffusers			
Ceiling or ceiling tiles			
Others (please specify)			

Figure 2.2a: Condensate on air diffuser surface

Figure 2.2b: Condensate on window pane

2.3 Indicators of dampness and mould growth/remediation

2.3.1 Present and past water damage

Water damage caused by leaks, flooding, wet floors, window leakage will promote mould growth. At the time of inspection, the inspector should look for any signs of existing and past water damages in the building/premises. If there are signs of past water release incidents, the inspector should check if there is any remediation taken (such as records of cleaning, maintenance and/or replacement of failure parts, etc.) to stop the incident and prevent its recurrence. Table 2.3.1 is a template for record of both existing and past water damages for completing the Checklist.

Table 2.3.1: Evidence of water damage

Evidence	Location inspected	Observed? (Y/N) (Note 1)	Details of incident, remediation taken if applicable
Active water intrusion such as leaky plumbing, leaks through the cracks in walls and roofing, sewage backflow, etc.			
Active water leakage in Air Handling Unit (AHU) (e.g. Fig.2.3a)			
Active water accumulation owing to poor design of architecture plenum (e.g. Fig. 2.3b)			
Signs of past water leakage or flood (e.g. water stained carpet in Fig. 2.3c, water damaged ceiling in the ceiling void due to flooding in upper floor in Fig. 2.3d, water damage on ceiling next to an improperly sealed door in Fig. 2.3e)			
Others (please specify)			

Note 1: Non-compliance if there is any existing water damage at the time of inspection or no remedial measures have been taken to stop the past incident of leak or flooding and prevent its recurrence.

Figure 2.3a: Active water leakage in Air Handling Unit (AHU) room and the wet ceiling below the AHU room

Figure 2.3b: Poor design of architecture plenum of outdoor air intake leading to accumulation of water behind the louver

Figure 2.3c: Water stained carpet due to past water damage

Figure 2.3d: Water damaged ceiling in the ceiling void due to flooding in upper floor in the past

Figure 2.3e: Past water damage on ceiling next to an improperly sealed door

2.3.2 Past possible mould growth

Other than the signs of past water damage incidents, the inspector should also investigate if there are any indications of possible mould growth in the past such as new patches of paint, installation of one or a few new ceiling tiles, stains on air grilles and streak marks on surfaces indicating cleaning activities. If these indications are observed, the inspector should check if the cause(s) for the past incident of possible mould growth has been identified and actions taken to prevent its recurrence, along with proper records documenting such actions. All details should be entered into the Checklist.

2.4 Housekeeping

In addition to remediation works, good management of building/premises is also essential to prevent mould growth. Proper building design, good housekeeping, effective performance of the MVAC system are all essential to avoid water incident in buildings or premises.

2.4.1 Housekeeping records

The inspector should check if building/premises owner or management maintains any proper housekeeping records such as regular and preventive maintenance records of the MVAC system with scheduled cleaning and/or replacement of air filters, diffusers, as well as return and exhaust air grilles, records of regular carpet cleaning, water incidents, remedial measures taken in the past 12 months and occupant complaints, etc.

2.4.2 Carpet cleaning

Dust is a major source of nutrients for mould growth, therefore carpet cleaning is essential for removal of accumulated dust which indirectly lowers the probability of mould growth. For areas with carpets, the inspector should check if the building/premises owner or management has the record of carpet cleaning conducted at least once per year.

Part 3: Supplementary Inspection Items (Optional)

The supplementary inspection items are optional, which are aimed to encourage the building/premises owner or management to take further steps to enhance their indoor environment for prevention of mould problem if resources are available. Detailed guidelines for each item are given under this section to help the inspector complete the Checklist.

3.1 Design, operation and maintenance of indoor ventilation system

3.1.1 Design and construction of the premises and ventilation system

There are a number of relevant international technical codes or guidelines for the design and construction of buildings and ventilation systems for prevention of dampness and control of excess moisture. The inspector should check if the building/premises owner or management have followed the international standards for design of MVAC system. The ventilation requirements in Table 3.1.1a and 3.1.1b have made reference to the relevant American Society for Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE) Standard and The Chartered Institution of Building Services Engineers (CIBSE) Code[3,4] and the situation in Hong Kong.

Table 3.1.1a: Ventilation for acceptable IAQ

Item	Requirements	Complied with?	
		Yes	No
Occupancy Density	For Office: Layout Plan (7–10 occupants/100m^2)		
	For Mall: Occupancy Permit (40 transient occupants/100m^2)		
Ventilation Rate	For Office: 8.5 L/s/person		
	For Mall: 4.6 L/s/person		

Table 3.1.1b: Criteria for IAQ and ventilation

Item	Requirements	Complied with?	
		Yes	No
Extract (exhaust air) rates	Rooms with high volume printing (30min/h): 20L/s/machine		
	Office washroom 6L/s per WC-urinal		
Fresh Air (floor area)	Minimum ventilation rate >0.3L/s/m^2 internal floor area		

3.1.2 Air duct inspection and cleaning

Air duct should be inspected and cleaned regularly. The frequency of cleanliness inspection suggested by National Air Duct Cleaners Association in *ACR, The NADCA Standard For Assessment, Cleaning, Restoration of HVAC Systems 2013*[5] is given in Table 3.1.2 for reference.

Table 3.1.2: Frequency of MVAC system cleanliness inspection

MVAC system cleanliness inspection — recommended Intervals (Commercial Buildings)					
Air-handling unit		**Supply duct**		**Return/Exhaust duct**	
Annually		**Annually**		**Annually**	
Yes	**No**	**Yes**	**No**	**Yes**	**No**

3.1.3 Air balancing checking

Air balancing should be checked if systems are renovated or changed so as to regulate air flow to achieve designed flow rate. The air balancing checking suggested in *2011 ASHRAE Handbook, HVAC Applications*[6], is given in Table 3.1.3 for reference.

Table 3.1.3 Time for air balancing checking

Air balancing checked	Yes	No
At time of commissioning		
After renovation of premises		
At time of changes made to MVAC equipment and/or system		

3.1.4 MVAC equipment checking and cleaning

According to ANSI/ASHRAE Standard 180-2012, *Standard Practice for Inspection and Maintenance of Commercial Building HVAC Systems*[7], the following items should be regularly checked and cleaned if necessary.

- Air-cooled chillers
- Cooling towers
- Fresh air intakes
- MVAC equipment room
- Air filters
- Cooling/Heating coils
- Drain pans
- Fan coils
- Air grilles/diffusers

3.2 Housekeeping

3.2.1 Carpet cleaning

As stated in Section 2.4.2 above, cleaning of carpet is necessary for removal of accumulated dust which indirectly lowers the probability of mould growth. Other than frequent carpet cleaning, vacuum cleaner equipped with HEPA filter is suggested to be used for its high effectiveness for dust removal. Table 3.2.1 provides the recommended method and equipment for carpet cleaning.

Table 3.2.1 Carpet cleaning method and equipment

Method of cleaning[8] (Note 1)		
	Yes	**No**
Wet “shampoo” cleaning		
Absorbent pad/compound		
Dry compound		
Steam cleaning		
Equipment used (manufacturer specification)		
	Yes	**No**
Vacuum cleaner fitted with HEPA filter		
Carpet pile comb		

Note 1:
Wet “shampoo” cleaning — a low rpm (revolution per minute) rotating brush shower application of detergent foam system. After vacuuming with rotary brush agitation and resulting extraction of dry dust/dirt, rinse the carpet by hot or cold water and remove extra moisture with MVAC system switched on to assist drying.
Absorbent pad/compound — a low moisture cleaning system. After vacuuming with rotary brush agitation and extraction of dry dust/dirt, apply pre-conditioning liquid to carpet for lubrication and use absorbent pad to agitate and extract.

Dry compound — a low/restricted moisture compound cleaning system. After vacuuming with rotary brush agitation and extraction of dry dust/dirt, apply dry compound as per manufacturer specification and agitate with dual cylindrical brush and then vacuum to extract compound.

Steam cleaning — also known as “hot water extraction cleaning”. A common household carpet cleaning method also adopted for commercial application with industrial grade “steam cleaners”.

3.2.2 IAQ management system

Implementation of an IAQ management programme will help provide a healthy indoor environment for the occupants. It is also a good practice for the building/premises owner or management to properly document all prevention, maintenance and remediation records for future reference and provide instructions or guidelines to the occupants about good housekeeping practices to avoid water incidents under the programme. Suggested documentation for a good IAQ Management programme is given in Table 3.2.2.

Table 3.2.2 Suggested documentation for an IAQ management programme

Activity	Documentation	
	Yes	No
IAQ management system in place — IAQ Management Plan[9]		
Maintenance log for past water incident (12 months)		
Remedial actions documented		
Evaluation of effectiveness of actions taken		
Guidelines on good housekeeping practices to occupants		

3.2.3 Water dispensers

Areas close to the water dispensers are potential water sources for mould growth. The building/premises owner or management should provide clear and documented instructions and guidelines to the users to avoid water spillage. It is also recommended that the water dispensers should be installed at proper locations without carpet for easy cleaning in case of spillage.

3.2.4 Preventive measures for water damage

The building/premises owner or management should note that it is always a good practice to implement preventive measures to avoid any water incidents. Good housekeeping practices including regular checking of plumbing and sewage systems for any leakage or backflow, inspection of building structures such as cracks on roof, walls and windows, etc. should be conducted and properly documented.

References

1. **American Industrial Hygiene Association.** Recognition, Evaluation, and Control of Indoor Mold (eds. B. Prezant, D.M. Weakes, and J.D.Miller) pp. 24. AIHA 2008.
2. **Indoor Air Quality Management Group, the Government of Hong Kong Special Administrative Region*:*** A Guide on Indoor Air Quality Certification Scheme for Offices and Public Places (2019), January 2019. Available at http://www.iaq.gov.hk.
3. **American Society for Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE):** ANSI/ASHRAE Standard 62.1-2016, ASHRAE Standard Ventilation for Acceptable Indoor Air Quality. Atlanta, GA. 30329-2305.
4. **The Chartered Institution of Building Services Engineers (CIBSE):** KS17: Indoor Air Quality and Ventilation (CIBSE Knowledge Series). London, UK. 2011.
5. **National Air Duct Cleaning Association:** ACR, The NADCA Standard for Assessment, Cleaning, Restoration of HVAC Systems 2013. Mt. Laurel, NJ. USA.
6. **American Society for Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE):** Proportion flows in the distribution system (sub-mains, branches, and terminals) according to specified design quantities. Chapter 38, 2011 ASHRAE Handbook, HVAC Applications.
7. **American Society for Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE):** ANSI/ASHRAE Standard 180-2012, Standard Practice for Inspection and Maintenance of Commercial Building HVAC Systems. Atlanta, GA. 2012.
8. **Institute of Inspection, Cleaning and Restoration Certification:** IICRC S100 Standard for Professional Cleaning of Textile Floor Coverings – 6th edition, Sec. 8.6 Vancouver, WA. IICRC, 2015.
9. **Indoor Air Quality Management Group, the Government of Hong Kong Special Administrative Region:** Guidance Notes for the Management of Indoor Air Quality in Offices and Public Places, January 2019. Available at http://www.iaq.gov.hk.

ANNEX 4

MEASUREMENT METHODOLOGIES FOR IAQ PARAMETERS

Below are measurement methodologies that should be used for determining the IAQ parameters under the Certification Scheme. To conduct a valid sampling programme, all equipment or methods adopted should have appropriate measurement range and limit of detection to cover the respective IAQ objectives.

(a) *Carbon Dioxide and Carbon Monoxide*

The level of carbon dioxide and carbon monoxide should be measured by a real-time monitor, such as a non-dispersive infrared (NDIR) analyser or electrochemical detector.

(b) *Radon*

The level of radon should be measured by an electronic radon monitor which is approved by US National Radon Proficiency Program or the National Radon Safety Board, or with equivalent performance.

(c) *Formaldehyde*

The level of 8-hour formaldehyde should be determined by active or passive sampling followed by analysis methods such as high performance liquid chromatography (HPLC) as below:

i) Active sampling and analysis by HPLC based on the United States Environmental Protection Agency (USEPA) TO-11A method; or

ii) Passive sampling and analysis by HPLC based on the method with the following features:

- Analysis method: desorption of hydrazone and analysis by HPLC; and
- Lower detectable limit of less than 6 $\mu g/m^3$ (8-hour average).

The level of 30-minute formaldehyde should be determined by active sampling and analysis by HPLC based on the USEPA TO-11A method or other equivalent standard methods. If standard methods are not used, it shall be sufficiently justified and the method used shall be properly validated.

Real-time measurement of formaldehyde can also be used.

(d) *Nitrogen Dioxide*

The level of 8-hour nitrogen dioxide should be quantified by passive sampling using absorbent filter containing triethanolamine for nitrogen dioxide absorption and analysed by spectrophotometry at a wavelength of 545 nm*, or by real-time portable analyzers.

* Reference should be made to the method developed by the Yokohama City Research Institute of Environmental Science, Japan.

The level of 1-hour nitrogen dioxide should be quantified by real-time portable analysers, such as chemiluminescence detector, electrochemical type or direct measurement of absorption (at 450nm) type analysers.

(e) *Ozone*

The level of ozone should be measured by real-time instruments, such as heated metal oxide semiconductors, electrochemical, UV photometric or chemiluminescence detectors.

(f) *Respirable Suspended Particulates*

The level of respirable suspended particulates should be determined by the following methods:

i) A gravimetric analysis method based on the IP-10A method of the USEPA Compendium of Methods for the Determination of Air Pollutants in Indoor Air (EPA/600/4-90/010); or

ii) A real-time monitoring method with analyzers, such as optical scattering or piezoelectric monitors.

(g) *Total Volatile Organic Compounds*

For continuous 8-hour sampling, the analytical method with whole air sampling by passivated canisters or solid sorbents and followed by direct flame ionisation detection based on the USEPA compendium method TO-12 should be used.

For real-time monitoring, monitors such as a photo-ionisation detector (PID) or a flame ionisation detector (FID) could be used. However, the CIB should be cautious when using a real-time PID instrument as the readings could be interfered by the presence of other non-VOC compounds such as anesthetic or disinfecting gases. For calibration of the real-time monitors, isobutylene (2-methylpropene) should be used as the reference calibration gas.

As an alternative compliance of TVOC objective, the measurements of individual VOCs including benzene, trichloroethylene, tetrachloroethylene and naphthalene as listed in Table 2 could be conducted by the following methods:

i) Active sampling and analysis by Gas Chromatograph/Mass Spectrometry (GC/MS) based on USEPA TO-17 method;

ii) Passive sampling and analysis by GC/MS based on ISO 16017-2 method; or

iii) Other equivalent standard methods. If standard methods are not used, it shall be sufficiently justified and the method used shall be properly validated.

The measurements of Polycyclic Aromatic Hydrocarbons (as benzo(a)pyrene) in Table 2 could be conducted by active sampling with filters and sorbent cartridges and analysis by GC/MS based on USEPA TO-13A method or other equivalent standard methods. If standard methods are not used, it shall be sufficiently justified and the method used shall be properly validated.

(h) *Airborne Bacteria*

The level of airborne bacteria should be quantified using samplers such as Andersen multi-hole impactor, Reuter Centrifugal Sampler (RCS), Surface Air System (SAS) bioaerosol sampler, or cyclone scrubber and reference should be made to the "Field Guide for the Determination of Biological Contaminants in Environmental Samples" published by the American Industrial Hygiene Association (AIHA) in 1996.

For office buildings, 5-minute integrated samples should be collected at four time-slots evenly distributed within the 8-hour sampling period at each sampling point. For public places, samples should be collected at four time-slots covering the worst case scenario such as periods of highest occupancy.

For analysis of airborne bacteria, tryptic soy agar plates (less than 1-month in age) should be used for culturing bacteria and the plates should be incubated at 30^{o}C ($\pm$ 1^{o}C or better) for 48 hours in a microbiology laboratory prior to performing bacterial count. Colony counts should be done according to the specification of the manufacturer of the samplers. Standard aseptic techniques should be practiced throughout the whole process.

Indoor Air Quality Certificate

室內空氣質素檢定證書

Valid period :
有效日期 : _____ to 到 _____

I hereby certify that the indoor air quality of the following location(s) has fully complied with the Excellent Class of the Indoor Air Quality Objectives.
本人證明下列地點的室內空氣質素完全符合「卓越級」室內空氣質素指標。

Name of building
建築物名稱 : _____

Address
地址 : _____

_____

Certified location(s)
已檢定地點 : _____

_____

Name of competent examiner
合資格檢驗師姓名 :_____

IAQ Certificate Issuing Body
室內空氣質素證書簽發機構 :_____

Signature
簽署 :_____

Date of issue
簽發日期 :_____

Certificate No.
證書編號 :_____

Organisation Chop
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Indoor Air Quality Certification Scheme for Offices and Public Places
辦公室及公眾場所室內空氣質素檢定計劃

Indoor Air Quality Information Centre
室內空氣質素資訊中心

環境保護署
Environmental Protection Department

Indoor Air Quality Certificate

室內空氣質素檢定證書

Valid period
有效日期 : _____ to 到 _____

I hereby certify that the indoor air quality of the following location(s) has fully complied with the Good Class of the Indoor Air Quality Objectives.
本人證明下列地點的室內空氣質素完全符合「良好級」室內空氣質素指標。

Name of building
建築物名稱 : _____

Address
地址 : _____

_____

Certified location(s)
已檢定地點 : _____

_____

Name of competent examiner
合資格檢驗師姓名 :_____

IAQ Certificate Issuing Body
室內空氣質素證書簽發機構 :_____

Signature
簽署 :_____

Date of issue
簽發日期 :_____

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Organisation Chop
機構印鑑

Indoor Air Quality Certification Scheme for Offices and Public Places
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Indoor Air Quality Information Centre
室內空氣質素資訊中心

環境保護署
Environmental Protection Department

ANNEX 6

CONTENTS OF IAQ CERTIFICATION REPORT

1. CIBs should include the following in the IAQ certification report for certification of the 12 parameters:

   (a) an Executive Summary on the premises/building information and certification results, using the format prescribed in the Appendix (including but not limited to: whether the certified area is only part of the building or the whole building; any exclusions, such as certain areas or floors; whether government premises is present in the certified private premises; etc.);
   (b) when the certified area is served by more than one MVAC system, the number of MVAC systems and their serving area;
   (c) major IAQ problems identified during the walkthrough inspection and mould assessment, and the remedial actions taken;
   (d) a set of layout drawing for the premises/building with the sampling points indicated;
   (e) results of IAQ measurements/assessment and compliance rate with respect to the relevant IAQ objectives for each of the IAQ parameters;
   (f) names and details of laboratories employed for analysis of integrated chemical/biological samples;
   (g) evidence for complying with "Sample Management" (paragraph 34 to 36 of this Guide) and "Quality Control" (paragraph 37 to 39 of this Guide);
   (h) if the assessment period cannot meet the requirements in paragraph 22, supplementary proof should be provided to demonstrate that assessment period covers the worst-case scenario. For other premises, e.g. clubhouse, the aforementioned supplementary documents are required as proof;
   (i) advice to owners/management of the premises/building to manage post-certification IAQ; and
   (j) completed prescriptive checklist for mould.

2. For certificate renewal requiring the measurement/assessment of CO_2, PM_{10} and mould only, the following information must be included in the certification report:

   (a) an Executive Summary on the premises/building information and certification results, using the format prescribed in the Appendix (including but not limited to: whether the certified area is only part of the building or the whole building; any exclusions, such as certain areas or floor no., whether government premises is present in the certified private premises; etc.)
   (b) when the certified area is served by more than one MVAC system, the number of MVAC systems and their serving area should be reported;

(c) major IAQ problems identified during the re-certification and the remedial actions taken;

(d) a set of layout drawing for the premises/building with the sampling points indicated;

(e) results of the CO_2 and PM_{10} measurements, mould assessment and compliance rate with respect to the relevant IAQ objectives for each of the IAQ parameters;

(f) evidence for complying with “Sample Management” (paragraph 34 to 36 of this Guide) and “Quality Control” (paragraph 37 to 39 of this Guide);

(g) if the assessment period cannot meet the requirements in paragraph 22, supplementary proof should be provided to demonstrate that assessment period covers the worst-case scenario. For other premises, e.g. clubhouse, the aforementioned supplementary documents are required as proof;

(h) additional advice to owners/management of the premises/building to manage post-certification IAQ, if any; and

(i) completed prescriptive checklist for mould.

APPENDIX TO ANNEX 6

EXECUTIVE SUMMARY OF THE CERTIFICATION REPORT

(1) Name of building: _____

(2) Full address: _____

_____

_____

(3) Total number of floors of certified area: _____

(4) Age of building: _____

(5) Assessment of whole building:

☐ Yes (Total floor area: _____ m^2)

☐ No. Please specify the certified location(s) and areas as well as exclusions, if any:

_____

_____

_____

_____

_____

(6) Name of owner/management* of building/certified location(s):
** Delete as appropriate*

_____

(7) Contact person(s): _____

(8) Telephone number: _____

(9) Fax number: _____

(10) E-mail address (if any): _____

(11) Nature of applicant:

☐ Education ☐ Non-government

☐ Government ☐ Quango

(12) Change of applicant nature from previous application? (not applicable to new application)

☐ Government to Private

☐ Private to Government

☐ No change

(13) If the certified area is privately owned, is government premises present in the certified location?

☐ No

☐ Yes, please state name of government premises:

_____

(14) Has the following occurred during the validity period of the last certificate (only applicable to re-certification):

☐ Change to the usage of premises/buildings which may adversely affect IAQ

☐ Major alteration/change to the operation or maintenance of MVAC system

☐ Change of IAQ from Good to Excellent Class

☐ No change

(15) Main function of certified premises/building (only select one):

☐ Bank
☐ Clubhouse
☐ Complex building
☐ Exhibition/Convention
☐ Hotel
☐ Leisure & Cultural Entertainment
☐ Library
☐ Municipal services
☐ Office
☐ Restaurant
☐ School/Education
☐ Shopping mall
☐ Sports centre
☐ Theatre/Hall
☐ Other: _____

(16) The certified location consists of mainly: ☐ Office ☐ Public place

(17) Type of ventilation system: (if there is major change/alteration in MVAC system from the last certificate, please attach proof, e.g. MVAC drawings)

☐ Constant Air Volume (CAV)
☐ Variable Air Volume (VAV)
☐ Fan Coil Unit (FCU)
☐ Primary Air Handling Unit (PAU)
☐ Air Handling Unit (AHU)
☐ Other: _____

(18) Is the certified area served by more than one set of MVAC system?

☐ No

☐ Yes (please indicate serving area of each system):

_____

(19) Presence of reheat system:

☐ Yes
☐ No
☐ Other: _____

(20) Presence of humidity control system: ☐ Yes
☐ No
☐ Other: _____

(21) For office buildings, do the following premises form part of the building?

Premises	Existence		Measurements taken in these premises?	
	Yes	No	Yes	No
Dancing establishment	☐	☐	☐	☐
Cinema/Theatre*	☐	☐	☐	☐
Funeral parlour	☐	☐	☐	☐
Restaurant/Factory canteen*	☐	☐	☐	☐
Shopping mall	☐	☐	☐	☐
Others (Please specify): _____			☐	☐

** Delete as appropriate*

(22) Date, time, and period[#] of assessment (attach justification from applicant if necessary):

_____

_____

_____

 # Refers to the sampling period conducted, i.e. 8-hour continuous measurement or surrogate measurement

(23) Date of mould inspection

_____

_____

_____

(24) Individual IAQ parameters measurement/assessment results:
(For re-certification application requiring the measurement of CO_2 and PM_{10}, and assessment of mould, please provide the data on CO_2 and PM_{10}, and mould assessment results only.)

(*Note: please also submit a softcopy of all measurement results in accordance with IAQ Information Centre's prescribed format.*)

Parameter		**No. of sample points collected**	**Highest concentration recorded***	**Percentage of compliance**
Carbon dioxide (CO_2)	8-hour		ppmv / mg/m^3 *	%
Carbon monoxide (CO)	8-hour		ppmv / mg/m^3 *	%
Respirable suspended particulates (PM_{10})	8-hour		$\mu g/m^3$	%
Nitrogen dioxide (NO_2)	8-hour		ppbv / $\mu g/m^3$ *	%
	1-hour		ppbv / $\mu g/m^3$ *	%
Ozone (O_3)	8-hour		ppbv / $\mu g/m^3$ *	%
Formaldehyde (HCHO)	8-hour		ppbv / $\mu g/m^3$ *	%
	30-minute		ppbv / $\mu g/m^3$*	%
Total volatile organic compound (TVOC)#	8-hour		ppbv / $\mu g/m^3$*	%
Radon (Rn)	8-hour		Bq/m^3	%
Airborne bacteria	8-hour		cfu/m^3	%
Relative humidity for Mould	8-hour		%	%
Mould		All compulsory items complied? Y/N Supplementary items checked? Y/N		

 # For alternative compliance check of the TVOC objective with individual VOC measurement, please provide details by completing the table in item (25) below.

** Delete as appropriate*

(25) Individual VOC measurement results (if applicable):

(For re-certification requiring the measurement of CO_2, PM_{10}, and assessment of mould only, please leave this blank)

VOC Species	No. of sample points collected	Highest concentration recorded among all sampling points
Benzene		ppbv / μg/m^{3*}
Tetrachloroethylene		ppbv / μg/m^{3*}
Trichloroethylene		ppbv / μg/m^{3*}
Naphthalene		ppbv / μg/m^{3*}
Polycyclic Aromatic Hydrocarbons (as benzo(a)pyrene)		ppbv / ng/m^{3*}
For Excellent class only — Sum of 5 VOCs$^{\#}$		ppbv / μg/m^{3*}

 # If the sum of the measurement levels of 5 VOCs is ≤200 μg/m^3, then it is regarded as a passed sampling point in respect of TVOC for Excellent Class.

** Delete as appropriate.*

(26) Based on the assessment results, _____ Class of the IAQ objectives is attained for the above building/location(s)*.

** Delete as appropriate*

(27) An IAQ Certificate duly signed by me together with the full IAQ Certification Report are attached.

(28) I, the undersigned, confirm that the information provided above is true and correct to the best of my knowledge.

Name of competent examiner : _____

IAQ Certificate Issuing Body : _____

Accreditation Registration Number : _____

Telephone no. : _____

Fax no. : _____

Email address (if any) : _____

Signature : _____

Date : _____

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ANNEX 7

APPLICATION FOR REGISTRATION OF IAQ CERTIFICATE UNDER THE IAQ CERTIFICATION SCHEME FOR OFFICES AND PUBLIC PLACES

I, the undersigned, would like to apply for registration of Indoor Air Quality (IAQ) Certificate under the IAQ Certification Scheme for Offices and Public Places for the following building/certified location(s):

Name of building (in English) : _____

(in Chinese) : _____

Full address (in English) : _____

_____

(in Chinese) : _____

Certified location(s)[#] (in English) : _____

(in Chinese) : _____

[#] *Please state "the whole building" if the whole building is certified; if not, please specify the locations certified.*

Reminder: Name of building, full address and certified location(s) written on the application form must be the same as on IAQ Certificate. The IAQ Information Centre may suggest revision where necessary.

2. This is (please tick as appropriate):

☐ the first-time application

☐ the _____ time of renewal*.
The certificate number of the last submission is _____

** Please fill in the number of times of renewal as appropriate.*

3. I confirm that I have engaged an IAQ Certificate Issuing Body to carry out IAQ measurement and assessment in the above building/certified location(s), with the original copy of the IAQ Certificate and the duplicate copy of the Certification Report signed off by its competent examiner as attached.

4. I agree to disclose the information contained in the IAQ Certificate to the public in the IAQ Information Centre website and related publications.

5. After registration of the Certificate, please (tick as appropriate)

☐ post the Certificate to _____.

☐ notify me for collection of the Certificate at the IAQ Information Centre

Name[@] : _____

Company : _____

Position : _____

Telephone No.[@] : _____

Fax No. : _____

Email address (if any)[@] : _____

Signature : _____

Date : _____

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[@] *The applicant should be the owner/management of the premises/building. To facilitate IAQ Information Centre to contact the applicants when necessary, CIBs should advise the applicants to provide a person, or persons, who have knowledge about the application as the contact point(s) and provide their contact details.*

ANNEX 8

CHECKLIST FOR POST-CERTIFICATION MAINTENANCE FOR MVAC SYSTEM

I. Area Usage

- Any changes in the original usage of the places of which the MVAC system was designed for? For example, office use changed to shops or restaurants?
- Any change of number of occupants?

II. Maintenance Records

- MVAC equipment regularly maintained as recommended by the manufacturers?
- Any modification/replacement of MVAC equipment? New equipment capacity as per originally designed?
- Air ducting regularly cleaned as recommended?
- Air balancing regularly checked and maintained?

III. MVAC Equipment

(a) Chillers

- coils properly cleaned?
- any refrigerant and oil leakages?

(b) Cooling towers

- regularly cleaned and treated in accordance with Code of Practice for Prevention of Legionnaires' Disease (published by Electrical and Mechanical Services Department)?

(c) Fresh air intakes

- regularly cleaned?
- wire guard in place?
- any new possible pollution sources (e.g. exhausts, garbage collection and bus stops, etc.) located near the fresh air intakes?

(d) MVAC equipment room

- clean and dry?
- chemicals or refuse stored?
- drain points/pans blocked?

(e) Air filters

- securely fixed to the housing without any bypassing of unfiltered air?
- pre-filter and final filters properly installed?
- filter indicators/alarms properly installed and functioning?
- regularly cleaned and replaced?

(f) Cooling/Heating coils

- regularly cleaned?
- any rust?

(g) Drain pans

- outlet clogged?
- condensate easily drained?
- regularly cleaned?

(h) Automatic controls

- are all fans, AHUs, etc. programmed to start and stop as designed?
- all control relays function properly?
- fire dampers/volume control dampers set as per designed?
- damper actuators function and set properly?
- temperature and humidity sensors functioning properly?
- thermostats, humidistats, limit switches set and function properly?

(i) Fans

- fan blades clean?
- ductwork/inlet/outlet properly and securely connected?

(j) Fancoils

- thermostats properly set?
- filters regularly cleaned?
- drip pans properly installed, insulated and pitched?
- chilled water and condensate pipe work properly insulated?

(k) Ductwork

- properly sealed?
- regularly cleaned?
- access doors properly closed?
- insulation intact?

(l) Air grilles/diffusers

- properly sealed?
- smudge marks on air outlets?
- regularly cleaned?
- air plenums regularly cleaned?
- volume dampers/blades regularly cleaned and properly set as per design?