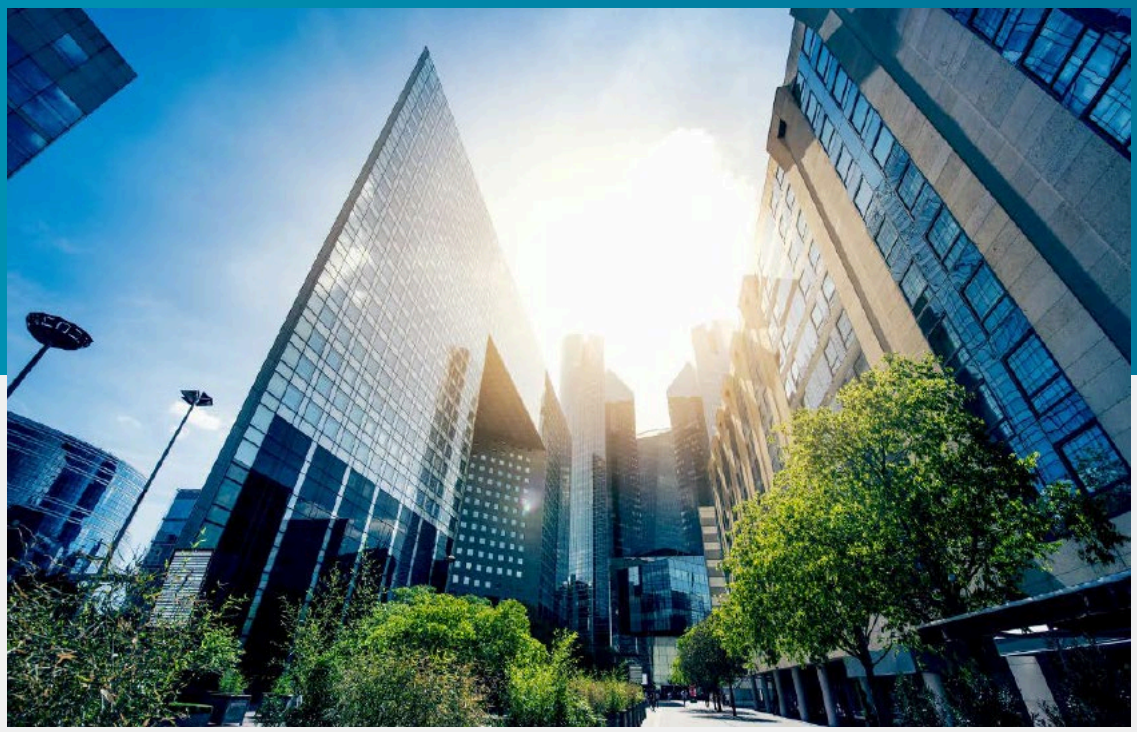
NABERS

The Rules

Indoor Environment for Offices

Version 2.0 – September 2021



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1 Introduction

1.1 Summary

The National Australian Built Environment Rating System (NABERS) is a performance-based rating system managed by the **National Administrator**.

NABERS ratings are expressed as a number of stars, for example:

NABERS rating		Performance comparison
6 stars	★★★★★★	Market leading building performance
5 stars	★★★★★	Excellent building performance
3 stars	★★★	Market average building performance

An accredited NABERS for Offices Indoor Environment rating is awarded when the **National Administrator** certifies a rating completed by an **Assessor**. The **National Administrator** may independently audit the rating and assist in resolving complex technical issues.

The purpose of this document is to give clear requirements for **Assessors** when they are evaluating the performance of offices across **Indoor Environment Quality (IEQ) parameters** with the goal of providing a NABERS rating. (In the context of this document, 'offices' are understood as being workplaces primarily used for administrative, clerical and similar information-based activities.)

In addition to the **Rules**, an **Assessor** is to make use of relevant **rulings** and the **NABERS rating input form**.[1] A list of the documentation required in relation to this document is given in Chapter 12.

1.2 Interpretations of the Rules

Assessments for an accredited rating must comply with the version of the **Rules**, and any relevant **rulings,** current on the day the rating application is lodged to NABERS, unless—

a) the **National Administrator** has specifically approved otherwise in writing, or

b) the assessment is conducted under the terms of a NABERS Commitment Agreement which specifies an earlier version of the **Rules**.

[1] **Rules** texts are amended as required by additional **rulings** which are published on the NABERS website: www.nabers.gov.au.

A **ruling** takes precedence if there is any conflict with the **Rules**. If there is a conflict between **rulings**, the most recent takes precedence.

The implementation of this **Rules** document is summarised as follows:

Application	These **Rules** will apply to office buildings seeking a NABERS Indoor Environment rating. These **Rules** may be used from the date of publication and are mandatory from 1 October 2021.
Feedback and support	**Assessors** are encouraged to provide feedback, as well as any concerns or queries, to the NABERS mailbox at nabers@environment.nsw.gov.au

1.3 Situations not covered by the Rules

These **Rules** are intended to cover most office buildings. If an exceptional situation is encountered and the **Rules** are not easily applicable, the **Assessor** must contact the **National Administrator** for assistance.

Where an **Assessor** is unsure how to apply the **Rules**, the **National Administrator** may resolve the issue by making an interpretation of the **Rules** or by advising the use of a specific procedure that aligns with the intention of the **Rules**. Written correspondence from the **National Administrator** is required as evidence if this occurs.

Procedures not contained within these **Rules** may only be used for a particular rating with prior written approval from the **National Administrator**. Approval to use the same procedure must be sought from the **National Administrator** each time it is proposed to be used. Approval is entirely at the discretion of the **National Administrator**.

1.4 How to use this document

1.4.1 Overview

A NABERS Indoor Environment for Offices rating is calculated by comparing **Indoor Environment Quality (IEQ) parameters** in five different categories:

a) Thermal Services;

b) **Indoor air quality**;

c) Lighting;

d) Acoustics;

e) Office Layout.

Under the NABERS rating system, the number of stars awarded to an office is calculated by benchmarking these **parameters** and comparing them against buildings of the same category, using 12 months of actual data.

The **parameters** measured within each category vary depending on whether it is the Base Building, Whole Building or Tenancy that is being assessed.

1.4.2 Formatting conventions and referencing

The term '**Rules**' refers to a body of works produced by NABERS that specify what must be examined, tested and documented when an **Assessor** conducts a rating. Wherever the term is used in this document from Chapter 3 onwards, it refers to this particular document, *NABERS The Rules – Indoor Environment for Offices*. Other **Rules** documents mentioned in the text are distinguished from the present document by the inclusion of their title.

Notes and **examples**: Text appearing with a grey tint in the background is explanatory text only. It is not to be read as part of the **Rules** and/or is not essential for the proper use of this document.

Text appearing **dark green and bold** is a defined term (see Chapter 2).

All main references to documentation requirements appear *italicised and in aqua font*.

Internal cross references appear as numbered sections (e.g. Section 4.2) or chapters (e.g. Chapter 6) and are hyperlinked. Cross references to an individual **Rules** text are numbered appropriately together with the title of the specific text.

1.5 What is new in this version?

A list of the main changes between this version and the previous version is given in Appendix H.

1.6 Related documents

NABERS The Rules – Energy and Water for Offices, v4.1, 2020

NABERS Annual Monitoring Data Collection Spreadsheet

ANSI/ASHRAE 55-2020: *Thermal Environmental Conditions for Human Occupancy*

ISO16000-3:2001, *Determination of formaldehyde and other carbonyls, Part 3: Active sampling method*

ISO 16200-1:2000, *Workplace air quality sampling and analysis of volatile organic compounds by solvent desorption/gas chromatography, Part 1: Pumped sampling method*

ISO 17025, *General requirements for the competence of testing and calibration laboratories*, 2017

Building Owners and Managers Association (BOMA), *Method of Measurement,* 1989 or 2017

Building Owners and Managers Association (BOMA), *Method of Measurement (Net Rentable Area),* 1985 or 2017

The Property Council of Australia (PCA), *Method of Measurement: Commercial,* 2008 (1997 reprint)

2 Terms and definitions

This chapter lists the key terms and their definitions that are integral to the proper use of this document.

Term	Definition
acceptable data	Data which meets the applicable accuracy and validity requirements of these **Rules**.
accuracy	The degree to which the result of a measurement conforms to the actual value.
	Example: If an instrument had an accuracy of ± 3 %, a reading of 50 ppm means the true value is between 48.5 ppm and 51.5 ppm.
air temperature	A measure of how hot or cold the air is, generally expressed in degrees Celsius (°C). This can be measured indoors (**space temperature**) or measured outdoors (ambient temperature).
air speed	A measure of air movement in a space, expressed in m/s.
ambient sound	A measure of noise in the space, expressed in the 'A' scale or dBA.
Assessor	An accredited person authorised by the **National Administrator** to conduct NABERS ratings.
Auditor	A person contracted to the **National Administrator** to perform audits of NABERS rating applications.
average floor area	The total **occupied** office area divided by the number of **occupied** office floors.
calibration	The process of ensuring equipment is measuring accurately when compared to a manufacturer's standard or specification.
carbon monoxide (CO)	A colourless, odourless, toxic gas that is the product of incomplete combustion and is measured in ppm.
component	An individual portion of each rating **parameter** assessed which is either measured or collected from the **Occupant Satisfaction Survey** and forms part of the final score for the **parameter**.
	Example: Carbon monoxide is a component of **indoor air quality**.
equilibrate	Allowing time for measuring equipment to reach an equilibrium with the surrounding space for accurate and representative readings.

Term	Definition
formaldehyde (CH_2O)	A colourless organic compound measured in ppb or ppm. It can be found in combustion sources and used in pressed wood products such as particle board, medium density fibreboard (MDF) and certain textiles, foams and glues.
horizontal illuminance	Lighting measurements collected on the horizontal plane, measured in lux (lx). **Note:** These measurements are taken flat on the desk to measure light falling on the desk rather than in front of a computer monitor which records light in the vertical plane.
indoor air quality	A broad term used to describe the pollutants which are present within the indoor environment, and which have an impact on the **Indoor Environment Quality**. Pollutants include: a) Carbon dioxide, b) **Carbon monoxide**, c) **Particulate matter**, d) **Formaldehyde** and e) **Total Volatile Organic Compounds (TVOCs)**.
Indoor Environment Quality (IEQ)	The quality of a building's environment in relation to the health and wellbeing of those who occupy space within it. **Note:** IEQ is determined by many factors, including the layout of the space, lighting, air quality, thermal conditions and noise levels.
mean radiant temperature (MRT)	A measure of the average temperature of surfaces surrounding an elected point with which it can exchange thermal radiation. **Note:** The MRT is measured in degrees Celsius using a black globe thermometer.
measurement standard for rated area	The standard used for determining the **Net Lettable Area (NLA)** of a **rated premises**, as set out in: a) The Property Council of Australia (PCA), *Method of Measurement: Commercial*, 2008 (1997 reprint); or b) Building Owners and Managers Association (BOMA), *Method of Measurement*, 1989 or 2017; or c) Building Owners and Managers Association (BOMA), *Method of Measurement (Net Rentable Area)*, 1985 or 2017.
NABERS rating input form	The rating input form provided by NABERS for use by **Assessors** in the calculation of accredited ratings. For NABERS ratings for Offices, this is in the NABERS Rate application.

Term	Definition
National Administrator	The body responsible for administering NABERS, in particular— d) establishing and maintaining the standards and procedures to be followed in all aspects of the operation of the system, and e) determining issues that arise during the operation of the system and the making of ratings, and f) accrediting **Assessors** and awarding accredited ratings in accordance with NABERS standards and procedures. The functions of the **National Administrator** are undertaken by the NSW Government.
Net Lettable Area (NLA)	The floor area, determined in accordance with the **measurement standard for rated area**, of spaces that can be used as offices within the **rated premises**. **Note:** This is essentially the space within the permanent walls of the building, but excluding spaces for: a) Public access and use (including stairs, escalators, lift lobbies and passageways); b) Building mechanical, air conditioning, electrical and other utility services; c) Staff and cleaning facilities (including toilets, tea rooms, and cleaners' cupboards). The **Assessor** should refer to the relevant measurement standard for rated area documents for a definitive list of inclusions and exclusions.
occupants	Refers to those people normally occupying the building as part of a working day.
occupied	A space within the **NLA** of a building that— a) for Base Building ratings – is ready for occupation, b) for Tenancy ratings – is ready for occupation and being actively used as an office, including use as an **office support facility**, c) for Whole Building ratings – is ready for occupation and either being actively used as an office (this includes use as an **office support facility**) or undergoing fitout works.
Occupant Satisfaction Survey (OSS)	A survey conducted by an independent organisation completed by **occupants** of an office building or tenancy. It assesses occupant satisfaction in relation to **Indoor Environment Quality** factors.
office	A workplace primarily used for administrative, clerical and similar information-based activities, including the associated **office support facilities**. **Note:** For reasons of readability, this term is not highlighted throughout this document.

Term	Definition
office floor area	The area of an office or tenancy measured in m^2 which is used to determine the number of sampling locations for a NABERS Indoor Environment rating.
office support facility	A space not dedicated to administrative, clerical or similar information-based activities but which— a) is an adjunct to an office used primarily to provide supporting facilities or services to the office or its **occupants**, and b) is exclusively for the use of office tenants, and c) occupies a space which is fit for office use. This includes facilities for reception, meetings, training, filing and storage, IT and other office equipment, tenant-installed kitchenettes and staff amenities. It can also include child care, refreshment, recreation, and exercise facilities, as long as they for the exclusively for the use of office tenants.
parameter	Comprised of individual measured **components** (e.g. air temperature and **relative humidity**) which form a larger section of the rating, the score of which is used to calculate the final star rating. **Example:** Thermal services and acoustic comfort are individual parameters in the rating.
plant room	The room(s) housing air handling units, boilers, main switchboards etc.
Particulate matter (PM_{10})	Airborne particulate matter less than 10 µm in diameter, which are inhalable.
rating period	The 12-month base period for the rating, requiring at least 12-months of **acceptable data** upon which the rating is based.
rated premises	The tenancy or building to be rated.
rating scope	The scope of the rating – either Base Building, Whole Building or Tenancy.
real-time	Refers to measurements that are recorded (data-logged) at the same time as an air **sample** is collected.
relative humidity	The quantity of water in the air as a percentage of the total quantity of water that the air can hold at a given temperature.
resolution	The ability to be able to separate values reliably. Instrument resolution is the smallest possible separation that an instrument can resolve. **Example:** If an instrument can measure to the nearest 1 ppm, then the resolution is 1 ppm.

Term	Definition
Rules	Authoritative document produced by the **National Administrator** that specifies what must be covered by an **Assessor** in order to produce a rating.
ruling	An authoritative decision by the **National Administrator** which acts as an addition or amendment to this document.
sample	A single portion of air collected so as to provide a representation of the entire air in the locality of the sampling.
sample collection plan	Document showing the location where **samples** are to be collected in the building.
space temperature	A measure of how hot or cold the indoor air is, generally expressed in degree Celsius (°C).
Total Volatile Organic Compounds (TVOCs)	Carbon-hydrogen containing compounds measured in ppb or ppm that easily transform from a solid to a gas at normal ambient temperatures. Sources in an office include: a) Paints, paint strippers, and other solvents; b) Wood preservatives; c) Aerosol sprays; d) Cleansers and disinfectants; e) Moth repellents and air fresheners.
ventilation effectiveness	Measure of air changes and removal of pollutants as demonstrated by the difference between the indoor carbon dioxide and outdoor carbon dioxide readings.

3 Key concepts and procedures

3.1 NABERS Indoor Environment

3.1.1 Base Building ratings

A Base Building rating covers the indoor environment of all office spaces within a building and measures **parameters** that are under the control of the landlord or Base Building.

The **IEQ parameters** assessed from the quantitative measurements include:

a) Acoustic comfort;

b) **Indoor air quality**;

c) Thermal services.

3.1.2 Whole Building ratings

A Whole Building rating covers all factors included in Tenancy and Base Building ratings, including inputs from both the building and its **occupants**.

The **IEQ parameters** assessed from the quantitative measurements and an **Occupant Satisfaction Survey** include:

a) **Indoor air quality**;

b) Thermal services;

c) Acoustic comfort;

d) Lighting; and

e) Office layout.

3.1.3 Tenancy rating

A Tenancy rating covers the indoor environment of offices within a space **occupied** by a single tenant and under the control of that tenant. The quality of the indoor environment is primarily impacted by office activities and operation.

The **IEQ parameters** assessed from the quantitative measurements and an **Occupant Satisfaction Survey** include:

a) Acoustic comfort;

b) **Indoor air quality**;

c) Lighting;

d) Office layout.

3.2 Parameters assessed

3.2.1 General

There are five **parameters** assessed in NABERS IE ratings:

a) Acoustic Comfort;

b) **Indoor air quality**;

c) Lighting;

d) Office Layout; and

e) Thermal Services.

3.2.2 Parameter weightings for each rating scope

NABERS IE ratings weigh the individual **IEQ parameters** based on their importance to occupant health and comfort, as shown in **Table 3.1**.

Table 3.1: Weighting of indoor environment parameters to the overall rating

IEQ parameter	Weighting based on occupant health and comfort		
	Base Building	**Whole Building**	**Tenancy**
Thermal services	40 %	30 %	N/A
Indoor air quality	40 %	30 %	40 %
Acoustic comfort	20 %	15 %	25 %
Lighting	N/A	15 %	25 %
Office layout	N/A	10 %	10 %

3.2.3 Parameters components for each rating scope

Each indoor environment **parameter** is broken down into multiple different **components**, as shown in **Table 3.2**. These **components** are weighted within each **parameter**. For detailed weightings for each **component** within each rating **parameter**, see Appendix E.

Table 3.2: Indoor environment parameters assessed for each rating scope

IE Parameter	Component	Base Building	Whole Building	Tenancy
Thermal services	**Space temperature**	☑	☑	
Spot measurements	**Mean radiant temperature**	☑	☑	
	Air speed	☑	☑	
	Relative humidity (mechanically ventilated)	☑	☑	
	Outdoor **air temperature** (naturally ventilated)	☑	☑	
Annual monitoring	Annual **space temperature** records (hourly data)	☑	☑	
Indoor air quality	Carbon dioxide	☑	☑	☑
	Carbon monoxide	☑	☑	
	Particulate matter (PM10)	☑	☑	☑
	Total Volatile Organic Compounds (TVOCs)		☑	☑
	Formaldehyde		☑	☑
Acoustics	Sound level	☑	☑	☑
Lighting	**Horizontal illuminance**		☑	☑
Occupant Satisfaction Survey	Thermal comfort (Whole Building only), **indoor air quality**, acoustics, lighting and office layout		☑	☑

3.3 The rating period

3.3.1 General

A NABERS rating is based on a 12-month **rating period**. Once certified, the rating is valid for a further 12 months after the **rating period**. This is called the **validity period**.

Because some rating scopes use different types of data, such as annual data and spot measurements, the **rating period** must be determined using **Table 3.3**.

Table 3.3: Determining the rating period

Type of IE rating	Data required
Rating data included	**Rating period** used.
Stand-alone IE rating with spot measurements only	Where the assessment— a) uses spot measurements only (e.g. no annual data is used), and b) is not conducted with any other rating type (such as Energy), then the **rating period** ends on the date the last spot measurement was collected.
Stand-alone IE rating with annual data	Where the assessment— a) uses spot measurements and annual data, and b) is not conducted with any other rating type such as Energy, then the start date and end date of the annual data determines the boundaries within which all other data must be collected. The spot measurements may fall anywhere within the 12-month **rating period**, with a preference for it to be in the last 2 months.
IE rating conducted alongside other NABERS ratings types (e.g. Energy or Water)	For IE ratings conducted with other NABERS rating types, annual data must match the **rating period** for all rating types. Spot measurements collected must be: a) Within the last 2 months of the **rating period** used across all the rating types being assessed; or b) Up to 120 days after the **rating period**.

Spot measurements may only be used once for a single rating application.

In addition to the requirements outlined in **Table 3.3**, spot measurements must be collected within four (4) weeks of completing the **Occupancy Satisfaction Survey** for Whole Building and Tenancy ratings.

3.3.2 Time allowed for assessment

It takes time for the **Assessor** to complete a rating. Therefore 120 days is given to lodge the rating after the end of the **rating period**. Ratings lodged after the 120 days will have a reduced **validity period** to ensure all ratings are based on current data.

The **Assessor** must respond to all questions from the **National Administrator** within 10 working days to avoid impacting the validity of the rating.

More information on the **rating period**, **validity period** and time limits for submission can be found in Appendix A.

3.3.3 Newly built or major refurbishments

New buildings or buildings subject to major refurbishment may begin the rating period for a NABERS assessment when one of the following requirements is met:

a) The entire building is fit for occupation and is 75% occupied; or

b) It has been two years since the certificate of occupancy (or equivalent) was issued.

3.4 Standards for acceptable data

3.4.1 General

An assessment for an accredited NABERS Indoor Environment for Offices rating must be based on the **acceptable data** specified in the **Rules** (including applicable **rulings**) or as directed by the **National Administrator**.

Data must be of an acceptable standard. The decision process for determining **acceptable data** in Sections 3.4.2 below must be followed, except where another process is specifically allowed by a provision of these **Rules**.

Note: Specific procedures related to standards for **acceptable data** in individual sections of these **Rules** take precedence over the standards in Section 3.4.2 below. Where specific procedures are followed, the requirement for compliance with Sections 3.4.2 is deemed to be satisfied.

3.4.2 Acceptable data

All data from all sources used in assessing the office premises must be taken within the same **rating period** as determined in Section 3.3. These data sources include:

a) Annual monitoring records of **space temperature**;

b) Occupant Satisfaction Surveys;

c) On-site measurements;

d) Results of laboratory analysis.

3.5 Site visit

Assessors are required to inspect the **rated premises** in order to:

a) Become familiar with the layout, services and features of the **rated premises**;
b) Confirm that documentation provided for the assessment is accurate, complete and up-to-date;
c) Verify that the measurement strategy developed from building and/or office plans are still valid (confirming two thirds occupancy of sampling floors), marking up the plans to show final sampling locations
d) Verify the sampling locations are appropriate
e) Conducton-site measurements at required times
f) Resolve any other issues that arise.

The inspection must occur during the **rating period** or during the 120 days period following the **rating period**.

An Assessor's inspection of the premises is expected to include a physical check of all floors used for sampling to confirm the tenanted office space is at least two thirds occupied at the time of assessment and to mark the sampling locations on a floor plan.

There may be circumstances where access to part of the building is refused due to safety or security concerns. If this occurs, the **Assessor** must explain why they could not access these spaces and fully document this in the **NABERS rating input form**. Any known impacts on the quality of the information obtained for the assessment must also be fully described (e.g. an **acceptable estimate** must be used in the absence of **acceptable data**).

Only **Assessors** can undertake a site inspection for a NABERS rating. If the **Assessor** cannot conduct the site visit, they may only delegate this task to another **Assessor** accredited specifically for offices.

The **Assessor** lodging the rating is responsible for the accuracy of the data. The **Assessor** must obtain and retain all the evidence required to prove their assumptions for auditing purposes, including but not limited to the documentation requirements listed in Chapter 12.

If there are significant difficulties visiting the site, the **National Administrator** must be notified.

3.6 Documentation and record keeping

3.6.1 Documentation required

An assessment may be based on copies of original documents such as utility bills, signed leases and other records, as long as the **Assessor** is satisfied that they are, or can be verified to be, true and complete records of the original documents or files. Access to original documents is highly desirable if they are available. Partial copies of original documents must be sufficient to identify the original document including date, title and file name.

3.6.2 Record keeping for auditing purposes

Assessors must keep all records on which an assessment is based.

The records kept by **Assessors** must be to such a standard that it would be possible for another **Assessor** or an **Auditor** to accurately repeat the rating using only the documents provided. This includes records of assumptions and all information and calculations used as the basis for **acceptable estimates**. The records kept must be the actual documents used for the assessment or verifiable copies. Summaries or other derivative documents that quote the original source documents are not acceptable, even if prepared by the **Assessor** from original documents.

Digital copies of documents are considered acceptable in all cases.

Records must be kept for seven years from the date the rating application was lodged and be made available for audit on request. **Assessors** remain responsible for ratings they have conducted, even if they move companies.

A list of the usual documentation for a rating is presented in Chapter 12, however, additional documentation may also be required to permit an **Auditor** to accurately repeat the rating using only the documents provided.

4 Sampling floors and locations

4.1 Summary

In order to ensure a fair comparison between spaces or buildings of different sizes, a NABERS Indoor Environment for Offices rating must take into account the following:

a) A representative number of floors to be sampled; and

b) The sampling locations per floor.

The **office floor area** determines both the number of sampling locations and the number of floors to conduct on-site measurements.

Note: The rated area from a NABERS Energy or Water rating for the premises may be used to determine the **office floor area** for a NABERS IE rating. See *NABERS The Rules – Energy and Water for Offices*.

For documentation requirements, see Section 12.2.

4.2 Process overview

The process for determining the sampling floors and locations is as per **Table 4.1**.

Table 4.1: Process overview

Step		Reference
1	Determine the **office floor area**.	4.3
2	Determine the number of **occupied** floors.	4.4
3	Calculate the number of: a) Floors to be sampled; and b) **Samples** per floor.	4.5
4	Select sampling floors.	4.6
5	Select sampling locations.	4.7
6	Prepare a **sample collection plan**.	4.8

4.3 Determine the office floor area

4.3.1 General

To determine the representative number of **samples**, the size of a building or tenancy is considered both in terms of—

a) the **occupied office floor area**, and

b) the number of floors used as office space.

4.3.2 Office floor area for Base Building and Whole Building ratings

For Base Building and Whole Building ratings, the **office floor area** must include all office spaces (including **office support facilities**) in the building.

For vacant spaces and spaces which are not used as offices, see Section 4.3.6.

For documentation requirements, see Section 12.2.1.

4.3.3 Office floor area for Tenancy ratings

For Tenancy ratings, the **office floor area** must include all office spaces (including **office support facilities**) in the building that are used together by the tenant as an interrelated group of facilities to accommodate its business. This condition applies regardless of whether—

a) the office spaces are on one or more floors, and

b) the spaces are occupied on the basis of one or more leases or other agreements, and

c) those leases or agreements are nominally held by one or more associated entities on behalf of the tenant.

Facilities are not included in such an interrelated group if they are:

1) Physically distinct;

2) Managed independently;

3) Presented or branded distinctly;

4) Independent of one another for services.

4.3.4 Multiple building versus single building ratings

A rating must only include one complete building. For precinct buildings or office parks where there are several buildings located at the same address, each building must be rated separately regardless of whether they are—

a) dependent on one another for services (e.g. share a central plant),

b) managed jointly, or

c) presented or branded as one premises.

The following list must be consulted in cases where it is unclear whether there is a single or multiple buildings present. A majority of the following features is evidence of a single building:

1) A common entry point for **occupants**;

2) Interconnected access or the potential for interconnected access between areas;
3) Central shared provision of the common services, such as heating and cooling;
4) Capacity to be offered to a tenant as one building;
5) Single owner;
6) Buildings constructed at the same or within a short period of time of each other (within 2 years) and the original design allowed for the additional construction;
7) Potential for Disability Discrimination Act (DDA) compliant travel horizontally between the buildings without using basement, car park or **plant rooms**;
8) Single public street address (i.e. the address the building is known publicly by);
9) Single LOT number;
10) A reasonable person would assume it is one building.

Where **Assessors** are unsure if buildings should be separated for rating purposes, they should contact the **National Administrator**. The **National Administrator** reserves the right to determine what is considered a majority of features on a case-by-case basis.

4.3.5 Calculate the office floor area

The method for calculating the **office floor area** is as per **Table 4.2**.

Table 4.2: Calculating office floor area

Rating type	Calculation method
NABERS IE rating with a current or concurrent NABERS Energy or Water rating of the same **rating scope**	The rated area calculated from a NABERS Energy or Water assessment is used when a NABERS IE rating is performed for the same site. The area used must be from another NABERS rating of the same **rating scope** (e.g. a Base Building IE rating can use the area from a Base Building Energy rating). However, the **Assessor** should ensure that the rated area used accounts for spaces that are vacant at the time of sampling in line with Section 4.3.6.
Stand-alone NABERS IE for Offices Tenancy rating	The **office floor area** is calculated using the following documentation: a) General information from the tenant's lease about the **NLA** of the space; or b) Measurement of the tenancy office area. The **office floor area** is adjusted as per Section 4.3.6. Compliance to the **measurement standard for rated area** is not required.

Rating type	Calculation method
Stand-alone NABERS IE for Offices Base Building or Whole Building rating	The **office floor area** is calculated using: a) **NLA** for the building specified within an official report, such as a company's annual report; b) Gross Floor Area (GFA); or c) Tenancy stack diagrams. The **office floor area** is adjusted as per Section 4.3.6. Compliance to the **measurement standard for rated area** is not required.

4.3.6 Exclusions to the office floor area

Spaces that have not been used as an office (or an **office support facility**) or are vacant at the time spot measurements are conducted may be excluded from the **office floor area** calculation. This ensures that the **office floor area** is based on actively used office spaces to provide a fair comparison.

4.4 Number of floors

4.4.1 General

The following must be determined:

a) The total number of floors in the building or tenancy; and

b) The number of floors currently used as office space (**occupied** floors).

For documentation requirements, see Section 12.2.1.

4.4.2 Determining the number of occupied office floors

At the time spot measurements are collected, the **Assessor** must visually check each floor/space to verify that it is **occupied** (or vacant), and if **occupied** that it is being used as an office. This verification must be conducted on all floors, not just the floors where **samples** are collected on the sampling day.

Occupied floors exclude ground floor lobbies and floors dedicated to **plant rooms**.

Occupied floors may not equal the number of floors in the building. A floor that has part plant and part **occupied** space is considered a full floor.

4.4.3 Determining the number of floors to assess

The **office floor area** and the number of **occupied** office floors determine the number of floors from which **samples** must be collected. See **Table 4.3**.

Where the **office floor area** and the number of **occupied** floors results in a different number of floors to sample, the higher number of floors must be sampled.

Where the number of floors required for sampling is greater than the number of **occupied** floors in the building, advice must be sought from the **National Administrator**.

Table 4.3: Identifying the number of occupied floors to assess

Occupied office floor area (m^2)	Occupied office floors (number)	Number of occupied floors to be sampled
≤ 2,000	≤ 3	1
≤ 5,000	≤ 8	2
≤ 10,000	≤ 15	3
≤ 20,000	≤ 25	4
≤ 40,000	≤ 35	5
> 40,000	> 35	6

Note: The number of floors required is calculated automatically in the **NABERS rating input form**.

4.5 Number of samples per assessed floor

4.5.1 General

The number of sampling points to be collected on each assessed floor must be determined.

4.5.2 Determining the number of samples per assessed floor

The number of sampling points collected are determined by the **average floor area** across the building as per **Table 4.4**. The **average floor area** is the total **occupied** office area divided by the number of **occupied** office floors.

Where the premises requires a greater number of floors to be sampled than there are **occupied** floors (as determined in Section 4.4.3), the **National Administrator** may require an increased number of samples to be taken per floor.

Table 4.4: Identifying the number of samples required per assessed floor

Average floor area (m^2)	Sampling points per floor
≤ 500	2
≤ 900	3
≤ 2,000	4
> 2,000	5

Note: The number of samples required is calculated automatically in the **NABERS rating input form**.

4.5.3 Additional sample collection

It is acceptable to collect and use more information than the minimum required if collected in accordance with the **Rules**. This is encouraged as it provides a more comprehensive assessment of the premises.

However, it is not acceptable to obtain more data than the minimum and filter the excess data to bias the results. The **Assessor** must always use all the data obtained, provided that it meets these minimum standards and complies with the **Rules**.

It is strictly forbidden for the **Assessor** or their nominated sub-contractor to take a reading and then take another one based on the results from the first, unless specifically advised in these **Rules** (e.g. an unforeseen loud noise during a sound reading).

4.6 Selecting floors to sample

The specific floors that **samples** are to be collected from must be determined and recorded prior to visiting the site, as determined by Section 4.4.3. This information may be recorded in a **sample collection plan**.

Only floors currently **occupied** as office space may be selected for sampling in the following priority order:

a) The highest rated floor;

b) The lowest rated floor;

c) The floor directly underneath a mid-rise **plant room**;

d) The floor directly above that **plant room**;

e) The floor furthest from any central supply fans and main plant;

f) The floor chosen by the **Assessor** to reflect evenly the use of different HVAC systems within the building or tenancy.

Note: For some **components** or **rating scopes**, it may be acceptable to take measurements on a different floor for that given **component**. Where this is the case, it is specified in the relevant section for that measurement (e.g. acoustics measurements for Base Building ratings may be taken on an unoccupied floor to more accurately assess the contribution of the HVAC and the façade to noise in the space).

The **Assessor** must contact the **National Administrator** for guidance if they are unable to determine the floors to be sampled using the rules above.

For documentation requirements, see Section 12.2.2.

4.7 Location of sampling

4.7.1 General

Assessors must determine sampling locations prior to conducting measurements.

Assessors must inspect the site to verify the locations are appropriate and refine the location (in accordance with the **Rules**). The reasons for refining the selected location must be recorded in the **sample collection plan**.

For documentation requirements, see Section 12.2.2.

4.7.2 Office floor sampling requirements

The **Assessor** should obtain office plans for each tenanted floor to be assessed in order to understand the workstation arrangement or **occupant** seating.

Sampling locations on assessed floors must be determined according to the following specifications:

a) In typical open plan office spaces;

b) Collected as close to the compass points as possible (or in line with the building orientation), according to the following priorities:

1) Western or North-western perimeter zone;

2) Northern or North-eastern perimeter zone;

3) Eastern or South-eastern perimeter zone;

4) Southern or South-western perimeter zone;

5) Once perimeter zones are exhausted, the centre zone away from windows.

Measurements along perimeter zones must be taken within 1 m to 3 m of the glazed façade.

Note: The sampling locations should be near the centre of the façade, so that the position is representative of the sunlight exposure to façade and avoids the corners of the building. See **Figure 4.1** and the example below.

Sampling locations on assessed floors must not be—

i) in **office support facilities** (such as kitchens, meeting rooms, storage areas), or

ii) in fully enclosed offices (unless there is no alternative).

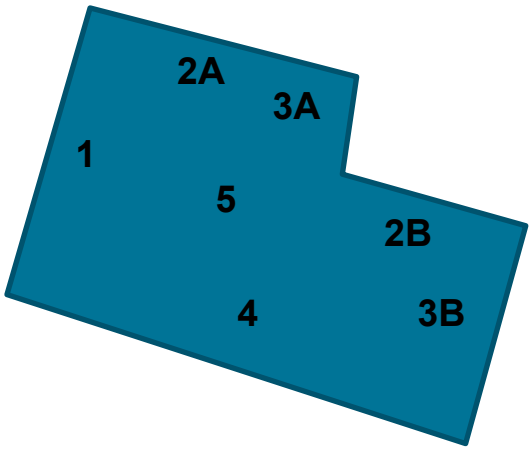


Figure 4.1: Example of sampling locations

Example: A freestanding building with no other buildings nearby, glazing on all sides, would have the samples taken in the following order of priority:

a) Location 1 (Western Façade);
b) Location 2A (North – it receives more sunlight than 2B, as 2B is inset and therefore slightly shaded by the building);
c) Location 3B (East – provides a better representation of the whole floor where sample 2A has been selected);
d) Location 4 (South);
e) Location 5 (Internal).

If the **Assessor** is unsure of the actual locations of the sampling points then they should seek advice from the **National Administrator**.

4.7.3 Plant room sampling requirements

At least one of the major HVAC systems (i.e. **plant rooms**) which supply the space being assessed must be sampled. Up to four **plant rooms** may be sampled to provide a more accurate reflection of the outside air supplied to the building.

Where there is more than one HVAC system or **plant room** in a building or tenancy, **samples** must be selected in the following priority order:

a) The **plant room** which services a majority of the area being assessed (e.g. for a Tenancy rating, the **plant room** that services the relevant tenanted space);

b) The **plant room** which serve the assessed space equally (e.g. where there are small plant rooms or air intakes on each level, the **plant room** which is an adequate representation of the outside air supplied to the space as chosen by the **Assessor**).

A record of how outside air is provided to the building must be retained in the **Assessor's** site notes.

Note 1: The quality of the outside air supplied to the building is assessed for mechanically ventilated buildings to determine the efficacy of the plant.

Note 2: Arrangement of **plant rooms** is typically determined by referring to mechanical drawings, but may also be determined by a thorough site inspection.

Note 3: Depending on the type of building and the type of air-conditioning system, the location of **plant rooms** or air intakes may be located in the ceiling space above the **occupied** floor, in a **plant room** on the floor or in a **plant room** on another floor. For some buildings, the air intake may be located on the roof or outside the building.

4.7.4 Outdoor ambient air sampling requirements

The outdoor ambient **air temperature** must be measured for Base Building and Whole Building ratings in naturally ventilated buildings. This must be taken 1 m to 2 m above the ground near the main pedestrian entrance to the building.

Alternatively, Bureau of Meteorology (BOM) data from the nearest weather station to the building may be used if the BOM weather station—

a) is not more than 20km away, and

b) has similar topography.

4.8 Sample collection plan

4.8.1 General

A **sample collection plan** must be prepared and retained. This is a critical document that plans the assessment and is used for supervision/auditing purposes. It is also helpful when determining future ratings for the **rated premises**.

Each **Assessor** may develop their own **sample collection plan**. As a minimum, a **sample collection plan** must:

a) State the size and the occupancy of the building;

b) Identify whether the building is naturally or mechanically ventilated;

c) Identify the floors to be assessed;

d) Propose sampling locations;

e) Record the actual sampling locations used,

f) Include site notes and/or observations, including the outside air intake.

A template for a **sample collection plan** is provided in Appendix C.

4.8.2 Accuracy of information

The **Assessor** must determine where each **sample** is to be taken, and document it in the preliminary **sample collection plan** prior to visiting the site.

The **sample collection plan** must be adapted where a floor or location is not suitable upon visiting the site, including an explanation why the originally proposed locations were not suitable.

Whilst a client or their representative may advise which spaces are currently leased and in use, it is not permissible for them to make any recommendations or selections with regards to the floors being sampled or the sampling locations.

In instances where a sub-contractor takes the measurements, it remains the **Assessor**'s responsibility to ensure that the sampling locations comply with these **Rules**.

5 Occupant Satisfaction Surveys

5.1 Summary Base Whole Tenancy

This chapter provides requirements where **Occupant Satisfaction Surveys (OSS)** are to be conducted.

This chapter applies to the following **rating scopes**:

a) Whole Building;

b) Tenancy.

Note: The **OSS** elicits the level of satisfaction with various aspects of the indoor environment that cannot be fully assessed through quantitative measurements. It is used to correlate data with the quantitative measurements taken on-site.

For documentation requirements, see Section 12.3.

5.2 Requirements

5.2.1 General

The **Occupant Satisfaction Survey** must be made available to specified **occupants**. The minimum number of responses must have been received before on-site measurements may be taken. If the minimum number of responses is not received by the return date, the rating cannot proceed.

For documentation requirements, see Section 12.3.1.

5.2.2 Parameters requiring Occupant Satisfaction Surveys

Table 5.1: Parameters requiring Occupant Satisfaction Surveys

IE Parameter	Base Building	Whole Building	Tenancy
Thermal services		☑	
Indoor air quality		☑	☑

IE Parameter	Base Building	Whole Building	Tenancy
Acoustics		☑	☑
Lighting		☑	☑
Office Layout		☑	☑

5.2.3 Process

The steps for conducting the **Occupant Satisfaction Survey** are as follows:

a) Visit the website of the survey providers.

b) Collect the information required by the survey provider. The **Assessor** must provide details such as—

1) building name,

2) number of staff to be surveyed, and

3) number of floors over which surveyed staff are located to the survey provider as part of the setting up of the survey.

c) Liaise with the survey provider to set up the online **OSS** for the Whole Building or Tenancy.

d) Allow at least two weeks between contacting the survey provider and commencing the survey on-site.

e) Determine the number of responses required based on the number of **occupants** in the building or tenancy using the NABERS IE Survey Response Rate Calculator in the **NABERS rating input form**.

f) Distribute the survey by email to all staff in the:

1) Building (Whole Building rating); or

2) Tenancy (Tenancy rating).

Visitors and temporary staff (staff with a contract of less than 3 months) must not be included in the survey.

Note 1: **Occupants** will complete the survey online at their convenience during the period of time the survey is open. Participation in the survey is voluntary, anonymous and respondents may opt out at any time.

g) Monitor the progress of completed surveys to assess if the minimum number of staff have correctly completed and returned their surveys. Reminders to the **occupants** may be required if the projections indicate that the target is not being met.

h) Allow the survey to be available to staff for up to four weeks from the date the survey is circulated. Close the survey and collate the results for input into the assessment

spreadsheet. Survey responses must not be accepted after the close of the survey period.

i) Confirm that a valid return rate of the **OSS** has been achieved at the end of the survey period. A new survey must be conducted if the minimum number of responses has not been met. The new survey must be completed prior to the site visit for data collection.

Note 2: Where possible, the survey distribution should be done by the customer (i.e. group manager) so the recipients see that management is interested in the working environment. This will encourage a better response rate.

It is good practice to have the customer provide some advance notice of the survey to the relevant **occupants** through email and staff meetings. This allows any concerns from the **occupants** to be addressed and encourages a greater participation rate.

To help encourage participation, the customer could consider employing a prize incentive to encourage survey participation. The survey provider can assist with this.

5.2.4 Survey provider information

The following independent survey providers are approved by NABERS to conduct an **Occupant Satisfaction Survey**:

a) Building Occupants Survey System Australia (BOSSA)

The University of Sydney (Australia) http://www.ieqanalytics.com/services/bossa	University of Technology, Sydney (Australia) https://uts.edu.au/engauge-bossa

b) Building Use Studies (BUS) – ARUP (United Kingdom)

https://busmethodology.org.uk/

c) Center for the Built Environment (CBE) – The University of California, Berkeley (United States)

https://cbe.berkeley.edu/resources/occupant-survey/

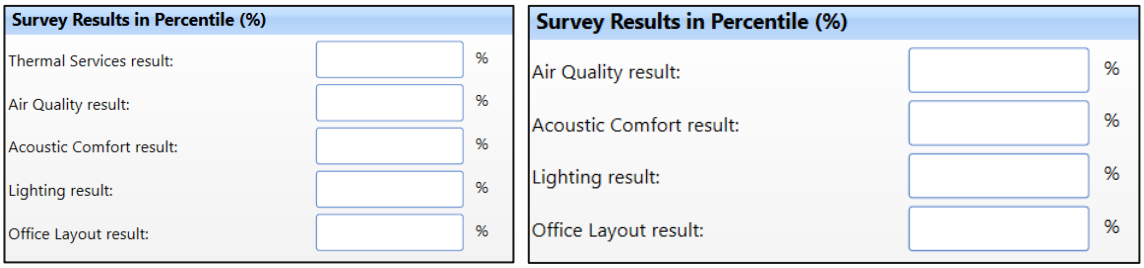
d) Sustainable and Healthy Environments (SHE) – The University of Melbourne, Melbourne (Australia)

https://msd.unimelb.edu.au/she/research/she-post-occupancy-evaluation-survey

Note: The results are treated as equal between the surveys as all survey providers are available to international users.

5.2.5 Entry in to NABERS rating input form

The results from the **Occupant Satisfaction Survey** must be entered in the corresponding Indoor Environment **parameter** fields in NABERS Rate under 'Occupant Satisfaction Survey' > 'Survey Results in Percentile (%)' as per **Figure 5.1** below.



(a) Whole Building Rating (b) Tenancy Rating

Figure 5.1: Indoor Environment parameter fields in NABERS rating input form

The results from the **OSS** are combined with the physical results to give an overall score for each measure. These combined scores give an overall star rating for the building.

6 Site visit

6.1 Summary

NABERS IE Accredited **Assessor**s must ensure all samples are taken according to the **rating scope** undertaken.

This chapter provides requirements for the site visit in relation to—

a) general timings and locations,

b) the use of sub-contractors, and

c) the sampling equipment required.

Note: The site visit is a key part of a NABERS IE assessment where a majority of the data used for the rating is collected. It is essential to plan out the sampling strategy prior to the site visit.
Timings and location of sampling equipment may vary between **ratings scopes**.

For documentation requirements, see Section 12.4.

6.2 Process overview

The process for conducting a site visit is as per **Table 6.1**.

Table 6.1: Process overview

Step		Reference
1	Plan the site assessment by collecting required documentation such as the **office floor area** and plan a sampling strategy.	4.3
2	Conduct a site inspection at the appropriate time, taking into account the following: a) The timing of the **OSS** (for Whole Building and Tenancy ratings), b) The normal operation of the HVAC system, and c) The requirements for spot samples.	6.3 6.4
3	Conduct measurements as required for each **component**, ensuring the equipment used meets the requirements and is sited correctly at each sampling location.	6.5

6.3 Site inspection

6.3.1 General

Assessors must inspect the premises in order to:

a) Become familiar with the layout of the floors and assess which floors are acceptable for conducting measurements (e.g. confirming the number of **occupied** floors);

b) Confirm that documentation provided for the **office floor area** and occupancy is accurate, complete and up-to-date;

c) Verify that the measurement strategy developed from building and/or office plans are still valid (confirming two thirds occupancy of sampling floors), marking up the plans to show final sampling locations;

d) Verify the sampling locations are appropriate and refine the locations;

e) Conduct on-site measurements at required times (e.g. morning and afternoon); and,

f) Resolve any other issues that arise.

An **Assessor**'s inspection must include a physical check of all floors used for sampling to confirm the tenanted office space is at least two thirds **occupied** at the time of assessment. The sampling locations must be marked on a floor plan.

For documentation requirements, see Section 12.4.1.

6.3.2 Restricted access

Where access to all or part of the premises is refused on safety or security grounds, the **Assessor** must explain why they could not access these spaces and fully document the reasons on the rating application. If there are known impacts on the quality of the information obtained for the assessment (e.g. several **occupied** floors could not be sampled) then these must also be fully described.

6.3.3 Use of another NABERS IE Accredited Assessor to undertake the site inspection

Only NABERS IE Accredited **Assessor**s may undertake the site inspection for a NABERS IE rating. The **Assessor** may delegate this task to another **Assessor**, who is also accredited for NABERS IE if they cannot physically conduct the site inspection.

The **Assessor** submitting the rating is responsible for the accuracy of the data and must:

a) Ensure that the inspection is conducted in accordance with the **Rules**; and

b) Retain all the evidence required to prove their assumptions for auditing purposes.

6.3.4 Use of non-Assessor to undertake site inspection

The **Assessor** may sub-contract some or all of the on-site measurements to a third-party organisation specialising in **IEQ** assessments. This is acceptable if the third-party conducting the measurements is:

a) A NABERS IE Accredited **Assessor**; and

b) A qualified indoor environment professional with any of the following certifications or qualifications:

1) Certified Air Quality Professional (CAQP) | CASANZ;
2) Council-Certified Indoor Environmentalist (CIE/C) | IAQA;
3) Certified Occupational Hygienist (COG) | AIOH;
4) Engineer listed in the National Engineering Register (NERG) | EA.

The **Assessor** submitting the rating is responsible for the accuracy of the data and must:

i) Ensure that the inspection is conducted in accordance with the **Rules**; and
ii) Retain all the evidence required to prove their assumptions for auditing purposes.

6.4 Timing of the site inspection

6.4.1 Conducting measurements after an Occupant Satisfaction Survey

For Whole Building and Tenancy ratings, the quantitative site measurements must be conducted after completion of a valid **Occupant Satisfaction Survey**.

On-site measurements must be fully completed within four weeks from the completion of a valid **OSS**. The office layout and condition must not change between the completion of a valid **OSS** and the completion of the on-site measurements.

6.4.2 Operational requirements

Where there is a HVAC system in the building, this system must be operational for the full day of the assessment during normal operating hours and be operating as it normally would on that day.

The HVAC system must not:

a) Be started earlier or later than any typical day during the season; or
b) Have any manual overrides or special sequences used, such as night flushes or economy cycles which may ‘clean out’ the spaces.

The **Assessor** must find records of starting times and operating **parameters** to ensure that this is the case.

Measurements of **occupied** areas must be done with the HVAC system operating for at least one hour prior to the start of measurements.

6.4.3 General timing criteria for spot measurements

All spot measurements collected must reflect the ‘normal’ working environment and be collected at times representative of the use of the space.

Sampling collection must not take place during unusual events or reduced occupancy. This is to ensure that ratings are reflective of the actual building performance. Periods during which sampling may not take place include:

a) Times of reduced occupancy, such as during school holidays, public holidays or planned maintenance works that close sections of buildings to **occupants**;

b) Times where external construction occurs adjacent to building air intakes;

c) Periods of contamination in cooling towers or systems (e.g. mould outbreak);

d) Within five working days of:

1) Chemical cleaning of the HVAC system;

2) Extreme climatic events comprising:

i) Storms adequate to cause flooding in the vicinity of the building;

ii) Large bushfires;

3) Following water damage (from within or externally to the building) prior to full drying and remediation.

Measurements must be assessed during a standard working day, which is 9.00 am to 5.00 pm Monday to Friday, unless otherwise specified.

Parameters that are influenced by **occupants** may only be assessed during normal occupancy hours of 9.00 am to 12.30 pm and 2.00 pm to 5.00 pm Monday to Friday (e.g. carbon dioxide).

Some measurements may be taken slightly outside working hours (e.g. Base Building acoustic measurements and **carbon monoxide**) and are specifically noted in the relevant **component**. A summary of sampling times required by these **Rules** is outlined in Appendix C.

Buildings which operate outside of typical working hours must still be measured within the nominal working hours to maintain a fair comparison to other buildings.

All site measurements should be able to be taken within one day. However, that this may not be possible for larger buildings or if there are problems on-site on the day of the visit. It is permissible to use more than one day for the collection of data if the time between visits is not more than five working days, unless approval for an extension is granted by the **National Administrator**.

6.4.4 Standard for acceptable measurements

Missing data for any location must not be estimated or approximated. The **sample** may be re-measured within five working days, ideally on the same day as the rest of the measurements were taken.

If missing data is noticed more than five working days after all the **samples** have been taken, the **Assessor** must return to site and re-measure all the data.

6.5 Real-time monitoring and air sampling equipment

6.5.1 General

All measurements conducted for an accredited NABERS IE rating must be conducted using **real-time** monitoring equipment which meets the minimum equipment specifications.

Specifications for equipment are listed in each relevant section and a complete list of the equipment specifications are listed in Appendix F.

All **real-time** monitoring equipment must be:

a) **Equilibrated** in the tenanted office building for at least thirty minutes prior to any measurements being undertaken; and

b) Further **equilibrated** and stabilised at each **sample** location for at least a few minutes prior to collecting readings.

Note: The equipment may be owned by the **Assessor** or sub-contractor. It is anticipated that renting equipment will be the most common approach using companies that offer rental of appropriate equipment.

6.5.2 Location of measurement equipment at sampling locations

The location of the primary workstation layout and work activities must be clearly identified. The measurement equipment must be sited according to the following, unless otherwise specified in these **Rules**:

a) Located with minimal disturbance to work activities within the selected area;

b) Located away from occupant access to and from the office area under normal or emergency situations;

c) At least one metre from corners or windows and at least one metre from walls, partitions, and other vertical surfaces (e.g. filing cabinets);

d) At least one metre from localised sources such as photocopiers, printers, or flowering plants as they can emit pollen, etc.;

e) At a height above the ground in the range of 0.6 m to 1.1 m (approximately desk level).

The measurement equipment must *not* be located according to the following guidelines, unless otherwise specified in these **Rules**:

f) Within 3 m of an elevator and within 2 m of doors;

g) Directly in front of air supply diffusers, induction units, floor fans, or heaters, etc.;

h) In hallways or corridors (if possible).

For **plant room** readings, the measurement equipment must not be more than 3 m from the air intake point either inside or outside the building. This requirement is dependent upon suitable access; but inside the building is preferable. If inside the building, the measurement equipment must be on the outside of (before) any filtration.

6.5.3 Standard for acceptable equipment

6.5.3.1 Technical specification

Instrumentation technical specification requirements are set out in Appendix F.

Instruments vary in their response times when **samples** are being collected. To address this issue, at each sampling location the equipment must be allowed to **equilibrate** and readings to stabilise before starting to record the data for the **sample**.

The **Assessor** must contact the **National Administrator** for technical advice or a specific **ruling** on the piece of equipment if they are unable to determine whether the equipment meets the specified requirements or if they would like to request a piece of equipment not listed to be considered for inclusion.

6.5.3.2 Calibration and certification

All measuring instruments and devices must be calibrated to ISO 17025 requirements. A copy of a current certificate of **calibration** is to be retained by the **Assessor** unless otherwise specified in these **Rules**.

Note: For any equipment owned and maintained by the **Assessor**, a copy of the certificate of **accuracy** and/or **calibration** from the manufacturer should be supplied. Equipment should be maintained and calibrated in accordance with the manufacturer's specifications.

6.5.3.3 Provision of rental equipment for undertaking ratings

Where equipment is rented, the **Assessor** must obtain **calibration** certificates and documented evidence from the rental organisation that the equipment has been properly checked prior to shipping. These documents must be valid at the time of sampling and retained by the **Assessor**.

Note: **Assessor**s are recommended to rent equipment from organisations that are able to provide documented evidence of maintaining the equipment to the standards specified. In the event of an audit, the **Assessor** is responsible and accountable for the accuracy of the data.

6.5.3.4 Standard for acceptable equipment

Equipment that does not meet the requirements of these **Rules**, appears damaged or in poor condition must not be used for measurements.

7 Thermal services

7.1 Summary Base Whole Tenancy

This chapter provides requirements for the assessment of thermal services in relation to—

a) assessing both naturally and mechanically ventilated buildings,

b) conducting on-site measurements, and

c) collecting annual temperature data.

This chapter applies to the following **rating scopes**:

1) Base Building; and

2) Whole Building.

Note 1: Thermal comfort is directly linked to people's productivity and is very important for their contentment and wellbeing. The assessment of thermal services is dependent on whether the building is naturally or mechanically ventilated.

Note 2: The standard ANSI/ASHRAE 55-2020: *Thermal Environmental Conditions for Human Occupancy* provides a well-accepted approach for determining 'comfort' ranges for temperature based on **air speed**, **relative humidity** and **mean radiant temperature**.

For documentation requirements, see Section 12.5.

7.2 Process overview

7.2.1 Process overview

The process for the assessment of thermal services is as per **Table 7.1**.

Table 7.1: Process overview

	Step	Reference
1	Determine if the building is mechanically or naturally ventilated.	7.3
2	Conduct on-site measurements at required sampling locations and record all data.	7.4.2 7.5.2
3	Collect annual monitoring temperature records at required sampling locations and calculate percentage of locations which meet requirements. Validate **accuracy** of BMS sensors as required.	7.4.3 7.5.3

7.2.2 Data required

The data required is dependent on the **rating scope**. See **Table 7.2**.

Table 7.2: Data required

Component	Whole Building	Base Building	Tenancy
Occupant Satisfaction Survey (thermal comfort)	☑		
Spot measurements (**space temperature**, **mean radiant temperature**, **relative humidity** and **air speed**)	☑	☑	
Annual monitoring (**space temperature**)	☑	☑	
Outdoor **air temperature** (naturally ventilated only)	☑	☑	

7.3 Natural or mechanical ventilation

The **Assessor** must determine if a building is naturally or mechanically ventilated. Alternatively, a building may be considered 'mixed-mode', meaning that it is naturally ventilated sometimes and mechanically ventilated at other times.

All buildings are considered to be mechanically ventilated by default, unless the **Assessor** confirms that it is naturally ventilated.

Note: NABERS recognises that many buildings have air-conditioning systems that only recirculate air; fresh air is supplied directly without conditioning. These buildings are considered mechanically ventilated for NABERS IE purposes, even though it is understood that windows/louvers are required to be opened in order to ventilate the building. In practice it is recognised that windows/louvres are not opened when the air-conditioning is operating, meaning that thermal comfort is balanced against the amount of fresh air. By assessing these buildings as mechanically ventilated, potential problems are uncovered.

7.4 Thermal assessment for mechanically ventilated buildings

7.4.1 General

The thermal services quantitative measurements for mechanically ventilated buildings include:

a) Spot measurements; and

b) Annual temperature data.

For further information on quantitative and qualitative measurements and how they are approached in a NABERS IE rating, see Appendix B.

For documentation requirements, see Section 12.5.1.

7.4.2 Spot measurement requirements for mechanically ventilated buildings

Spot measurements must be recorded for each variable listed in **Table 7.3** below, at each sampling location.

The spot measurements required at each sampling location are assessed against the Predicted Mean Vote (PMV) as per ANSI/ASHRAE 55.

Table 7.3: Requirements for spot measurements in mechanically ventilated buildings

Variable	Sampling frequency	Sampling requirement	Equipment required
Space temperature (°C)	2 samples: 1 morning; 1 afternoon	One average reading of at least five (5) minutes duration at each sampling location. 10 s logging intervals.	Multipoint logging instrument which meets the following minimum requirements: Range: 5 °C to 50 °C Resolution: 0.1 °C Accuracy: ± 0.6°C across 10 °C to 45 °C
Mean radiant temperature (°C)	2 samples: 1 morning; 1 afternoon	One average reading of at least five (5) minutes duration at each sampling location. 10 s logging intervals.	Multipoint logging instrument which meets the following minimum requirements: Range: 5 °C to 50 °C Resolution: 0.1 °C Accuracy: ± 0.6°C across 10 °C to 45 °C
Relative humidity (%)	2 samples: 1 morning; 1 afternoon	One average reading of at least five (5) minutes duration at each sampling location. 10 s logging intervals.	Multipoint logging instrument which meets the following minimum requirements: Range: 5 °C to 95 % Resolution: 1 % Accuracy: ± 5 % across 20 % to 95 %
Air speed (m/s)	2 samples: 1 morning; 1 afternoon	One average reading of at least five (5) minutes duration at each sampling location. 10 s logging intervals.	Anemometer which meets the following minimum requirements: Range: 0.01 m/s to 2 m/s Resolution: 0.01 m/s Accuracy: ± 3 % over 0 m/s to 2 m/s

7.4.3 Annual temperature data requirements for mechanically ventilated buildings

7.4.3.1 General

The **Assessor** must obtain hourly records of **space temperature** during normal working hours (9 am to 5 pm, Monday to Friday) from a BMS or equivalent system for the entire **rating period**.

Note 1: The inclusion of the annual temperature data **component** is optional, however its omission from the rating will result in this component receiving a score of zero.

For further information on how annual temperature data is scored, see Appendix G.

Note 2: The **National Administrator** has created an *Annual Monitoring Data Collection Spreadsheet* for **Assessor**s to determine the percentage of the year that the monitoring locations achieve the ANSI/ASHRAE 55 standard. This spreadsheet may be found on the member's website under 'Process Documents'. **Assessor**s may also use their own method to make this determination, however any spreadsheets used must be submitted to the **National Administrator** for auditing purposes.

7.4.3.2 Record requirements for annual monitoring of temperature

The records obtained must be from the floors selected for spot measurements and be as close to the sampling locations as possible. Records of annual data must be collected in the following priority order:

a) From the floors selected for spot measurements at the sampling locations;

b) From the floors selected for spot measurements at other locations that are representative of the floor;

c) From alternate floors which have a similar orientation, fit-out and occupant density. Where this third priority is used, an explanation must be provided.

Records must adhere to the specific sampling and verification requirements listed below. The records must be sourced from a BMS or another monitoring program where the sensors meet the following minimum requirements:

1) Range: 10 °C to 40 °C
2) **Resolution**: 0.1 °C
3) **Accuracy**: ± 0.5 %

7.4.3.3 Component specific sampling requirements

In addition to the sampling requirements described in Section 4.7, annual temperature records must also consider the following requirements:

a) Continuous logs of temperature that have occurred over the previous 12-months (the **rating period**) may be sourced from a BMS or another monitoring program;

b) Sensors used for annual monitoring must follow the criteria listed in Section 4.7 as closely as possible.

Note: Sensors are typically mounted high on the wall, making the requirement to measure at a height of 0.6 m to 1.1 m and a distance of 1 m from the wall or window impractical. For this reason, BMS sensors do not need to meet these specific requirements. They should, however, be distributed throughout the floor in accordance with Section 4.7. The location of sensors must be marked on the floor plans and records be retained for auditing purposes.

7.4.3.4 Proportional inclusion of annual temperature data

Annual temperature data may be proportionally included with the following considerations:

a) Verified data which has been obtained for at least 90 % of the **rating period** will be considered to be **acceptable data** to account for the whole **rating period**. Data may not be selectively omitted, even if the threshold of 90 % can still be complied with.

b) Where less than 90 % of the annual data is available, NABERS will allow the inclusion of the available annual data but will limit the score achievable for this component to the relative proportion of data available for the **rating period**.

For guidance on how this inclusion is used in the **NABERS rating input form**, please contact the **National Administrator**.

7.4.3.5 Verification requirements for sensors

Sensors used to obtain annual monitoring data must be validated either independently or by the **Assessor**.

Independent verification may be in the form of a signed statement from a reputable professional in an appropriate field which verifies the calibration of the sensors and the **accuracy** of data collation.

The **Assessor** may validate the sensors by checking a random **sample** of the sensors from which data was used against a NATA-calibrated thermometer. In this situation, the following verifications must be undertaken:

a) At least 25 % of all indoor sensors must be checked once during the **rating period**. For each sensor that is found to be outside the acceptable range, another three sensors must be checked.

b) The reading from the BMS sensor must be within ± 0.5 °C of the NATA-calibrated instrument. The instrument must be left for at least five minutes for equilibration before the test reading is taken.

The data from a sensor found to be outside the acceptable range must either be removed from the rating or in some cases may have a differential applied to the readings so it reads the same value as the calibrated instrument. Contact the **National Administrator** for further guidance on sensors which do not satisfy the validation requirements.

7.5 Thermal assessment for naturally ventilated buildings

7.5.1 General

The thermal services quantitative measurements for naturally ventilated buildings include:

a) Spot measurements; and

b) Annual temperature data.

For documentation requirements, see Section 12.5.2.

7.5.2 Measurements required for spot measurements in naturally ventilated buildings

7.5.2.1 General

The spot measurements at each sampling location are assessed against the 'Adaptive model' as prescribed by ANSI/ASHRAE 55. Average measurements must be recorded for each variable listed in **Table 7.4** below, at each sampling location in accordance with:

a) Section 4.7;

b) Section 6.5.2; and

c) The requirements listed in **Table 7.4**.

Table 7.4: Requirements for spot measurements in naturally ventilated buildings

Variable	Sampling frequency	Sampling requirement	Equipment required
Space temperature (°C)	2 samples: 1 morning; and 1 afternoon	One average reading of at least five (5) minutes duration at each sampling location.	Multipoint logging instrument which meets the following minimum requirements: Range: 5 °C to 50 °C Resolution: 0.1 °C Accuracy: ± 0.6 °C across 10 °C to 45 °C
Mean radiant temperature (°C)	2 samples: 1 morning; and 1 afternoon	One average reading of at least five (5) minutes duration at each sampling location.	Multipoint logging instrument which meets the following minimum requirements: Range: 5 °C to 50 °C Resolution: 0.1 °C Accuracy: ± 0.6 °C across 10 °C to 45 °C
Air speed (m/s)	2 samples: 1 morning; and 1 afternoon	One average reading of at least five (5) minutes duration at each sampling location.	Anemometer which meets the following minimum requirements: Range: 0.01 m/s to 50 m/s Resolution: 0.01 m/s Accuracy: ± 0.6 % over 0 m/s to 2 m/s
Outdoor Air Temperature (°C)	2 samples: 1 morning; and 1 afternoon	One average reading near entrance to the building or from data obtained from BOM weather station (see Section 7.5.2.2).	Multipoint logging instrument which meets the following minimum requirements: Range: 5 °C to 50 °C Resolution: 0.1 °C Accuracy: ± 0.6 °C across 10 °C to 45 °C

7.5.2.2 Specific requirements for outdoor air temperature measurements

In addition to the sampling requirements described above, outdoor air measurements must be taken 1 m to 2 m above the ground near the main pedestrian entrance to the building.

Alternatively, Bureau of Meteorology (BOM) data from the nearest weather station to the building may be used if the BOM weather station—

a) is not more than 20km away, and

b) has similar topography.

BOM-supplied data must be an average of the mean daily outdoor **air temperatures** of the seven sequential days prior to the date spot measurements are taken. The daily average must be determined from either:

1) The average outdoor temperature observations for the 24-hour day, or

2) The average for the minimum and maximum temperatures for the given day.

7.5.3 Measurements required for annual monitoring in naturally ventilated buildings

The requirements for annual monitoring for naturally ventilated buildings are the same as those for mechanically ventilated buildings in Section 7.4.3.2. The following three exceptions to the requirements in Section 7.4.3.2 apply:

a) In the place of hourly indoor temperature data, the **Assessor** must obtain records of the daily average **space temperature** (indoors) during normal working hours from a BMS or equivalent system.

b) The **Assessor** must obtain records of the daily average outdoor **air temperature** measurements. Records should be the daily average data from the nearest weather station, so long as the BOM weather station—

   1) is not more than 20k away, and

   2) has similar topography.

c) The acceptability limits are the 80 % acceptability limits for the ‘Adaptive model’ as described by ANSI/ASHRAE 55. The proportion of **samples** at each location which meet these requirements determines the scores for the annual monitoring component of the rating.

Buildings utilising the naturally ventilated model must use the *Naturally Ventilated Buildings Worksheet* to submit the rating. This spreadsheet can be found on the member’s website under ‘Process Documents’.

8 Indoor air quality

8.1 Summary Base Whole Tenancy

This chapter provides requirements for the assessment of **indoor air quality** in relation to:

a) assessing ventilation effectiveness, and

b) measuring the following indoor air quality components:

1) **Particulate matter (PM_{10})**;

2) **Formaldehyde**;

3) **Total Volatile Organic Compounds (TVOCs)**;

4) **Carbon Monoxide (CO)**.

This chapter applies to the following **rating scopes**:

i) Base Building;

ii) Whole Building; and

iii) Tenancy.

For documentation requirements, see Section 12.6.

Note: Indoor air quality is a major concern to building managers, tenants, and employees because it can impact the health, comfort, wellbeing, and productivity of building **occupants**. Research shows a strong relationship between good **indoor air quality** and employees' performance at work.

Indoor air quality is not a simple, easily-defined concept. It is a constantly changing interaction of complex factors that affect the types, levels and importance of pollutants in the indoor environment. These factors include:

a) Sources of pollutants;

b) Design, maintenance and operation of building ventilation systems; and

c) Occupant perceptions and susceptibilities.

8.2 Data overview for indoor air quality

The data required is as per **Table 8.1**.

Table 8.1: Overview for each component and rating scope

Component	Whole Building	Base Building	Tenancy
Occupant Satisfaction Survey (air quality)	☑		☑

Component	Whole Building	Base Building	Tenancy
Ventilation effectiveness	☑	☑	☑
Particulate matter	☑	☑	☑
Formaldehyde	☑		☑
Total Volatile Organic Compounds	☑		☑
Carbon monoxide	☑	☑	

For documentation requirements, see Section 12.6.1.

8.3 Ventilation effectiveness Base Whole Tenancy

8.3.1 General

Carbon dioxide (CO2) levels must be measured for each sampling location in accordance with **Table 8.2**.

Note: **Ventilation effectiveness** measures the air exchange for the building to identify situations of 'stale air'. CO2 levels can vary significantly in the outdoor air. Therefore, CO2 is measured in the office space and compared to the CO2 in the outdoor air being supplied to the building.

CO2 levels are assessed for all rating types, as it can be an indication of either too many people in the building or of insufficient outside air being provided. The internal CO2 levels are measured in different locations for Base Building, Whole Building and Tenancy ratings, including in the **occupied** zone and near the discharge from supply air diffusers in order to align with the purpose of the rating.

Table 8.2: Measurement requirements for ventilation effectiveness

Rating scope	Sampling frequency	Required CO2 measurements	Equipment required
Base Building	2 samples: 1 morning; and 1 afternoon	• One average reading of at least five (5) minutes at each sampling location near a supply air diffuser to measure the impact from the HVAC system; and • One average reading of at least five (5) minutes at the outdoor air intake in each **plant room** assessed.	Multipoint logging instrument which meets the following minimum requirements: Range: 20 ppm to 3,000 ppm Resolution: 1 ppm Accuracy: 50 ppm

Rating scope	Sampling frequency	Required CO2 measurements	Equipment required
Whole Building and Tenancy	2 samples: 1 morning; and 1 afternoon	• One average reading of at least five (5) minutes duration at each sampling location taken in the **occupied** space to measure the impact of tenant activities. • One average reading of at least five (5) minutes at the outdoor air intake in each **plant room**	

8.3.2 Specific sampling requirements for CO2

The following additional sampling requirements for CO2 measurements must be followed:

a) Base Building ratings:

1) CO2 must be measured near a supply diffuser to receive the direct air flow measurement (e.g. close to 1 m vertically and 1 m horizontally).

2) CO2 must be measured within 3 m from the outdoor intake in the **plant room**(s).

b) Whole Building and Tenancy ratings:

1) CO2 must be measured at a height of 0.6 m to 1.1 m above the floor (approximately at desk level) in the office space.

2) CO2 must be measured within 3 m from the outdoor intake of the relevant air handling unit to the tenanted floor in the **plant room**(s).

3) CO2 measurements must be taken when the space is **occupied**; therefore measurements must not be taken between 12.30 pm and 2 pm.

Note: For Base Building ratings, the CO2 recorded should reflect as closely as possible the levels delivered by the HVAC system without any potential contribution from **occupant** activities.

For Whole Building and Tenancy Ratings, CO2 is assessed as a total effect of the air supplied and **occupant** activities.

8.4 Particulate Matter (PM_{10}) Base Whole Tenancy

8.4.1 General

Particulate Matter (PM_{10}) levels must be measured for each sampling location in accordance with **Table 8.3**.

Note: **Particulate Matter**, or **PM_{10}**, refers to airborne particles less than 10 micrometres in diameter, which can enter the lungs. Particles of this size range are generated from a range of sources from HVAC such as mould, traffic and printers. Assessments for **PM_{10}** are carried out where tenants are actively working.

PM_{10} levels are assessed for all **rating scopes** as the amount of **particulate matter** is influenced by several factors, including:

a) The cleanliness of the tenant;
b) The equipment installed;
c) The management of water damage; and
d) The filtering ability of the ventilation systems.

Table 8.3: Measurement requirements for Particulate Matter (PM_{10})

Rating scope	Sampling frequency	Required PM_{10} measurements	Equipment required
Base Building	2 samples: 1 morning; and 1 afternoon	One average reading of at least five (5) minutes at each sampling location near a supply air diffuser to measure the impact from the HVAC system.	Multipoint logging instrument which meets the following minimum requirements: Range: 0.0001 mg/m^3 to 20 mg/m^3 Resolution: 0.001 mg/m^3 Accuracy: ± 5 % across 0.001 mg/m^3 to 0.150 mg/m^3
Whole Building and Tenancy	2 samples: 1 morning; and 1 afternoon	One average reading of at least five (5) minutes at each sampling location in the **occupied** space to measure the impact of tenant activities.	

8.4.2 Specific sampling requirements for PM_{10}

The following additional sampling requirements for **PM_{10}** measurements must be followed:

Base Building ratings:

a) **PM_{10}** measurement points must be taken near a supply diffuser (e.g. close to 1 m vertically and 1 m horizontally) to receive the direct air flow measurement.

Whole Building and Tenancy ratings:

b) **PM_{10}** must be measured at a height of 0.6 m to 1.1 m above the floor.

c) **PM_{10}** measurements must be taken when the space is **occupied**; therefore measurements must not be taken between 12.30 pm and 2 pm.

Note: For the Base Building rating, the **PM_{10}** recorded should reflect levels delivered by the HVAC system without any potential contribution from **occupant** activities.

For Whole Building and Tenancy ratings, **PM_{10}** is assessed as a total effect of air supply and **occupant** activities.

8.5 Formaldehyde Base Whole Tenancy

8.5.1 General

Formaldehyde levels must be measured for each sampling location with either:

a) **Real-time** equipment, in accordance with **Table 8.4** and Section 8.5.2; or

b) Laboratory analytical methods, in accordance with Section 8.5.3.

Note 1: Formaldehyde is measured in the morning to capture when concentrations have built up over night by using either hand-held equipment or a sampling cartridge which is later analysed at a laboratory.

Real time measurements are taken over a shorter period of time and results are provided at the time of assessment. The laboratory analytical methodology follows *ISO16000-3:2001 Determination of formaldehyde and other carbonyls – Active sampling method* where a sampler is left in the space to collect the **sample** over several hours and is sent to a lab for results and can provide more detailed results.

Formaldehyde levels are only assessed for Whole Building and Tenancy ratings as **formaldehyde** sources are chiefly associated with the office fit out, for example emitted from flooring, furnishings and adhesives.

Table 8.4: Measurement requirements for formaldehyde using real-time equipment

Rating scope	Sampling frequency	Required formaldehyde measurements	Equipment required
Whole Building and Tenancy	1 sample: 1 morning	• One average reading of at least five (5) minutes at each sampling location in the **occupied** space to measure the impact of tenant fit out.	Data logger instrument such as a photo-ionisation detector (PID) which meets the following minimum requirements: Range: 20 ppb to 2,000 ppb Resolution: 1 ppb

Note 2: Equipment reads in ppb will need to be converted to ppm for data entry.

8.5.2 Specific sampling requirements for Formaldehyde using real-time equipment

The following additional sampling requirements for **formaldehyde** measurements using **real-time** equipment must be followed:

a) **Formaldehyde** measurements must be collected between 8.00 am and 12:30 pm.

8.5.3 Measurements of formaldehyde using laboratory analytical methods

Where **formaldehyde** is measured using laboratory analytical methods, a **sample** for each sampling floor must be collected as per the following requirements:

a) The **formaldehyde** concentration must be reported as ppm;

b) A low noise air sampling pump with a dinitrophenylhydrazine-coated silica gel cartridge (e.g. SKC 226-119) must be located on a stable surface with the inlet of the cartridge at a height of 0.6 m to 1.1 m from the floor.

Note 1: Air should be sampled at a rate of 0.1 litres to 0.5 litres per minute over a four to six hour period during the day (between 9:30am to 5pm).

c) Analysis must involve high performance liquid chromatography with ultraviolet detection and have a detection limit or limit of reporting of <1μg/sorbent tube section or better.

Note 2: A NATA accredited laboratory with experience in analysing sorbent cartridges should be used to determine the **formaldehyde** concentration.

d) Where values provided by the NATA-accredited laboratory are reported in mg/m^3, the **Assessor** must convert values to ppm before entering results into the **NABERS rating input form** by using the following formula:

$$\frac{Formaldehyde\ value\ \left(\frac{mg}{m^3}\right) x\ 24.45}{24.45} = Formaldehyde\ results\ (ppm)$$

8.6 Total Volatile Organic Compounds (TVOCs) Base Whole Tenancy

8.6.1 General

Total Volatile Organic Compounds (TVOC) levels must be measured for each sampling location with either:

a) **Real-time** equipment, in accordance with **Table 8.5** and Section 8.6.2; or

b) Laboratory analytical methods, in accordance with Section 8.6.3.

Note 1: **TVOCs** are measured in the morning to capture when concentrations have built up over night by using either hand-held equipment or a sampling cartridge which is later analysed at a laboratory.

Real time measurements are taken over a shorter period of time and results are provided at the time of assessment. The laboratory analytical methodology closely follows ISO 16200-1:2000 – *Workplace air quality sampling and analysis of volatile organic compounds by solvent desorption/gas chromatography, Part 1: Pumped sampling method* where a sampler is left in the space to collect the **sample** over several hours and is sent to a lab for results and can provide more detailed results.

TVOC levels are only measured for Whole Building and Tenancy ratings as TVOCs are released in an office space as a result of tenant activities and the equipment and materials selected for fit out.

Table 8.5: Measurement requirements for TVOCs using real-time equipment

Rating scope	Sampling frequency	Required TVOCs measurements	Equipment required
Whole Building and Tenancy	1 sample: 1 morning	• One average reading of at least five (5) minutes at each sampling location in the **occupied** space to	Data logger instrument such as a photo-ionisation detector (PID) which meets the following minimum requirements: Calibration standard / lamp: Isobutylene / 9.5 eV lamp or 10.6 eV lamp Range: 10 ppb to 10,000 ppb Resolution: 1 ppb

		measure the impact of tenant activities.	

Note 2: Equipment reads in ppb will need to be converted to ppm for data entry.

8.6.2 Specific sampling requirements for TVOCs using real-time equipment

The following additional sampling requirements for **formaldehyde** measurements using **real-time** equipment must be followed:

a) **TVOC** measurements must be collected between 8.00 am and 12:30 pm.

8.6.3 Measurements of TVOCs using laboratory analytical methods

Where **TVOCs** are measured using laboratory analytical methods, a **sample** for each sampling floor must be collected as per the following requirements:

a) **TVOC** concentration must be reported as ppm.

Note 1: The sampling methodology involves two sorbent tubes at each location, one each for polar and non-polar VOCs. The results are summed to obtain total VOC.

b) A charcoal and a XAD-7 sorbent cartridge must be placed at each location.

c) A low noise air sampler pump must be located on a stable surface with the inlet of the cartridge at a height of 0.6 m to 1.1 m above the floor. Individual air samplers must be prepared at each location for the separate collection of non-polar VOC (charcoal cartridge, e.g. SKC 226-01) and polar VOC (XAD-7, e.g. SKC 226-95).

Note 2: Air should be sampled at a rate of 0.1 litres to 0.5 litres per minute over a four to six hour period during the day starting in the morning (between 9:00am to 5:00pm).

d) Analysis must involve gas chromatography with flame ionisation detection or gas chromatography with mass selective detection and have a detection limit or limit of reporting of <10μg/sorbent tube section or better.

Note 3: A NATA-accredited laboratory with experience in analysing sorbent cartridges should be used to determine the VOC concentration.

e) Non-polar VOC must be quantitated as a total by reference to toluene for all chemical species with a retention time between hexane and hexadecane inclusive. Polar VOC is quantitated as a total by reference to methanol or ethanol for all chemical species with a retention time between hexanol and hexadecanol.

f) Total VOC at a given location must be the sum of the non-polar VOC and polar VOC at the same location.

g) Where values provided by the NATA-accredited laboratory are reported in mg/m^3, the **Assessor** must convert values to ppm before entering results into **NABERS rating input form** by using Isobutylene as a calibration standard using the following formula:

$$\frac{TVOC\ Value\ obtained\ \left(\frac{mg}{m^3}\right) x\ 24.45}{24.45} = TVOC\ results\ (ppm)$$

8.7 Carbon Monoxide (CO) Base Whole Tenancy

8.7.1 General

Carbon monoxide (CO) levels must be measured in at least one **plant room** in accordance with **Table 8.6**.

Note: CO is used as a measure of the cleanliness of the intake air and is only measured in the **plant room** at the outside air intake to the building. It is not so much a measure of the outdoor air itself but the location of the intake to ensure it is located away from potential pollution sources, such as chimneys, roadways or loading docks.

CO levels are only measured for Base Building and Whole Building ratings as the tenant will typically have no impact on **carbon monoxide** levels.

Table 8.6: Measurement requirements for Carbon Monoxide (CO)

Rating scope	Sampling frequency	Required CO measurements	Equipment required
Base Building and Whole Building	2 samples: 1 morning; and 1 afternoon	• One average reading of at least five (5) minutes in the **plant rooms** assessed at the outside air intake to the building to measure the cleanliness of the intake air.	Multipoint logging instrument that records **real-time** CO levels which meets the following minimum requirements: Range: 0 ppm to 200 ppm Resolution: 0.1 ppm Accuracy: ± 3 % over the range 0 ppm to 10 ppm

8.7.2 Specific sampling requirements for CO using real-time equipment

The following additional sampling requirements for CO measurements must be followed:

a) For each major HVAC system selected, the **carbon monoxide** level must be measured within 3 m of the outdoor intake of the corresponding air handling unit. Where there is no HVAC system in the building, the measurement must be taken outdoors in the vicinity of the air intake points.

b) Morning and afternoon **carbon monoxide** may be taken slightly outside of normal working hours, as early as 8.00 am and as late as 5.30 pm.

9 Acoustics

9.1 Summary Base Whole Tenancy

This chapter provides requirements for the assessment of acoustic comfort in relation to sampling requirements.

This chapter applies to the following **rating scopes**:

- Base Building;
- Whole Building; and
- Tenancy.

Note: Acoustic comfort plays an important role in occupant satisfaction, well-being and productivity because noise can significantly distract office **occupants**. The main sources of noise in an office are from ringing phones, noisy copy machines and office chatter, which can be exacerbated by the office layout, such as open plan workstations or low partition heights.

Acoustic comfort is measured for all rating types. Tenant furnishings and activities such as the materials chosen for office fit-out, the office layout and occupant behaviour in the tenancy influences sound levels. The Base Building controls variables such as the mechanical systems and façade insulation. Measurements for Base Building ratings may be taken from locations which more accurately reflect the contribution of the Base Building to noise in the space.

For documentation requirements, see Section 12.7.

9.2 Assessment of acoustics

9.2.1 Data required

Table 9.2.1: Data required

Component	Whole Building	Base Building	Tenancy
Occupant Satisfaction Survey (acoustics)	☑		☑
Ambient sound	☑	☑	☑

9.2.2 Measurements requirements

9.2.2.1 General

Acoustic levels must be measured for each sampling location in accordance with **Table 9.3**.

Table 9.2.2.1: Measurement requirements for acoustics

Rating scope	Sampling frequency	Required acoustic measurements	Equipment required
Base Building	1 sample: morning or afternoon	One average reading at each sampling location excluding tenant noise.	A Level 1 or Level 2 sound meter, set to read on 'A' scale to record dbA, which meets the following minimum requirements: Range: 20 dB to 100 dB Resolution: 1 dB Accuracy: ± 2 dB
Whole Building and Tenancy	2 samples: 1 morning and 1 afternoon	One average reading at each sampling location, excluding any non-standard spikes.	Measurements should be taken using a level 1 or level 2 sound meter, set to read on "A" scale to record dbA, which meets the following minimum requirements: Range: 20 dB to 100 dB Resolution: 1 dB Accuracy: ± 2 dB

9.2.2.2 Specific sampling requirements for Base Building ratings

For Base Building ratings, the following additional sampling requirements must be followed:

a) The measurements must capture the sound level in the space under normal building working conditions, excluding any tenant noise.

> **Note 1:** While the number of locations and number of floors must be determined in accordance with Section 4.7, the floors sampled are not required to be the same as those used for other measurements (e.g. thermal services or air quality) to accommodate for the need to assess noise excluding contributions from tenant activities.

b) The party conducting the measurements must ensure that services provided by the Base Building (e.g. HVAC system) are operational while sound measurements are being taken.

> **Note 2:** It is expected that the effect of the building services and external noise will be relatively consistent during the day.

Measurements may be taken at any time in a space which meets the following conditions:

1) The space is an unoccupied space;
2) The space is adjacent to the building façade; and
3) Normal HVAC services are provided to the space.

Where there is no vacant space which meets the above requirements, measurements on tenanted floors may be conducted.

Note 3: These measurements should be done in the morning or afternoon while the HVAC system is operating but with less than 10 % of **occupants** present on the tenanted floor (e.g. from 8.00 am to 9.00 am and from 5pm to 6pm). These measurements can be conducted outside of normal working hours to allow for an accurate assessment of the HVAC noise without the impact from tenants, so long as the HVAC system is operating normally.

If the **Assessor** or their appointed audit sub-contractor is unsure about the tenant noise exclusion method for a NABERS IE Base Building rating, they should contact the **National Administrator** for clarification.

9.2.2.3 Specific sampling requirements for Whole Building and Tenancy ratings

For Whole Building and Tenancy ratings, the following additional sampling requirements must be followed:

a) Measurements must be taken when the space is **occupied**; therefore measurements should not be taken between 12:30 pm and 2:00 pm.

b) The measurements must capture the sound level in the **occupied** space under normal working conditions measured in the “A” scale or dBA.

Note: Care needs to be taken so that intermittent non-standard spikes do not interfere with the readings during the measurement period. An example of a spike that could lead to a re-measurement would be a loud group of people joking and laughing, someone shouting for attention, sirens either internal or external, or something being dropped or broken.

The following is an example of what may be considered to be a normal part of the work environment and should be included in the final readings:

a) Use of office equipment such as printers and photocopiers;
b) Person-to-person or phone conversations held at normal speech levels;
c) Typical street or external noises such as trains or cars going past; and
d) Doors opening and closing.

For documentation requirements, see Section 12.7.1.

10 Lighting

10.1 Summary Base Whole Tenancy

This chapter provides requirements for the assessment of lighting in relation to the measuring **horizontal illuminance**.

This chapter applies to the following **rating scopes**:

a) Whole Building;

b) Tenancy.

Note: Lighting that suits the work being performed is essential to reduce energy wastage and ensure occupant wellbeing. Quality office lighting is necessary, as studies have shown that light and glare can impact people physically and physiologically, affecting both productivity and general wellbeing.

The assessment of lighting is determined through the **Occupant Satisfaction Survey** and on-site measurements for Whole Building and Tenancy ratings. The assessment of lighting is not required for Base Building ratings, as the Base Building typically has very little, if any, influence on light levels.

For documentation requirements, see Section 12.8.

10.2 Assessment of lighting

10.2.1 Data required

The data required is as per **Table 10.1**.

Table 10.1: Data required

Component	Whole Building	Base Building	Tenancy
Occupant Satisfaction Survey (lighting)	☑		☑
Horizontal illuminance	☑		☑

10.2.2 Conducting measurements of horizontal illuminance

Horizontal illuminance must be measured for each sampling location in accordance with **Table 10.2** below.

Table 10.2: Requirements for lighting

Rating scope	Sampling frequency	Required lighting measurements	Equipment required
Whole Building and Tenancy ratings	6 samples: 3 morning and 3 afternoon	Three readings adjacent to each sampling location in the **occupied** space reading ambient conditions in the occupant workspace.	Measurements should be taken using a portable light meter which meets the following minimum requirements: Range: 20 lux to 20,000 lux Resolution: 10 lux Accuracy: ± 5 % **Note:** The equipment must be NATA-calibrated within the last 12 months.

10.2.3 Specific sampling requirements for lighting

The following additional sampling requirements for lighting measurements must be followed:

a) Three light readings must be taken within 5 m to 10 m for each sampling location at different workstations or locations based on varying light levels and proximity to windows.

> **Note 1:** This requirement exists because lighting measurements are relatively easy and quick to take, and lighting levels can change dramatically from one area of an office to another (depending on partition layout, proximity to windows and lighting grids).

b) The locations selected for the three readings must:

1) Be taken at the workstation in the normal working area. This would typically be at a computer.

2) Consider the diverse orientations and locations, as far as is reasonable.

> **Example:** One reading/area/sampling location/measurement faces the window, one measurement with the back towards the windows and one with a partition between the worker and window.

3) Include any obviously bright or dark area that complies with the sampling location (e.g. not in an enclosed office or kitchen).

c) Lighting conditions must not be altered for the readings.

> **Note 2:** For example, blinds are to be left as found and cannot be opened or closed when taking the measurements. The workstation where the readings are taken should be **occupied** or should have been **occupied** within the past hour for this reason.

For documentation requirements, see Section 12.8.1.

11 Office layout

11.1 Summary

This chapter provides requirements for the assessment of office layout in relation to perceived level of comfort.

This chapter applies to the following **rating scopes**:

a) Whole Building;

b) Tenancy.

Note: Office layout can significantly impact staff productivity. Layout attributes which influence perceived level of comfort include the spatial arrangements of walls, partitions, furniture and equipment in relation to fixed elements like windows or heating, ventilation and air conditioning outlets. Because there are so many variables and differing influences and it depends so much on the tasks required of the occupant, there are no physical readings. This measurement of this **parameter** relies solely on the **Occupant Satisfaction Survey**.

For documentation requirements, see Section 12.9.

11.2 Assessment of the office layout

11.2.1 Data required

The data required is as per **Table 11.1**.

Table 11.1: Data required

Component	Whole Building	Base Building	Tenancy
Occupant Satisfaction Survey (Office layout)	☑		☑

11.2.2 Sampling requirements

The data used is based on the results from the relevant section of the **Occupant Satisfaction Survey** as office layout is difficult to measure quantitatively.

For documentation requirements, see Section 12.9.1.

12 Documentation required for accredited ratings

12.1 Summary

Assessors must keep all records on which an assessment is based. Data retained for audit must be in a form which facilitates reviews and makes anomalies easily apparent.

Access to original documents is highly desirable if they are available. Copies of original documents may be used as evidence as long as the **Assessor** is satisfied that they are, or can be verified to be, true and complete records of the original documents or files.

The information in the tables below is required for a rating. It is organised based on the divisions of previous chapters (Chapter 4 through to Chapter 11). All the required information should be obtained from the premises owner/manager before a site visit, and then confirmed during the site visit and subsequent assessment. A site visit helps to verify that the information provided is accurate, current and complete.

Individual ratings may require additional information or documentation depending on the individual circumstances of the **rated premises**.

12.2 Documentation required for Chapter 4: Sampling floors and locations

Topic	Requirements	Documentation
12.2.1 Office area and number of floors	Section 4.3 Section 4.4	Required information: The **Assessor** must retain evidence of the number of occupied floors to validate the data for the **office floor area** used. Documentation examples: Documents that can be used as supporting evidence can include: a) A current NABERS Energy Rating; b) Floor plans; c) Leases; d) Building area schedules.
12.2.2 Sampling requirements	Section 4.6 Section 4.7	Required information: The **Assessor** must retain evidence of the sampling locations used and clearly explain any deviations from the **sample collection plan**. Documentation examples: Documents that can be used as supporting evidence can include: a) Written confirmation from building/facility manager of occupied and tenanted floors; b) A **sample collection plan**.

12.3 Documentation required for Chapter 5: Occupant Satisfaction Survey

Topic	Requirements	Documentation
12.3.1 OSS requirements	Section 5.2	Required information: The **Assessor** must retain the overall results from the provider of the **Occupant Satisfaction Survey**. This includes the number of staff to be surveyed, excluding visiting or temporary staff. Documentation examples: Documents that can be used as supporting evidence can include: a) Official results of the **Occupant Satisfaction Survey** from a recognised survey provider; b) Documentation from a HR manager regarding the total number of full-time staff who work at the site.
		Note: In most instances, the detail of survey responses from each individual will not be part of the report given by the survey provider. This is acceptable.

12.4 Documentation required for Chapter 6: Site visit

Topic	Requirements	Documentation
12.4.1 Site visit	Section 6.3	Required information: The **Assessor** must retain evidence of their site visit, including information regarding: a) Any sub-contractors used; b) BMS start and stop times for sampling day(s); c) Sampling locations used; d) **Calibration** of all equipment used. Documentation examples: Documents that can be used as supporting evidence can include: e) A statement of qualifications of any sub-contractor used; f) A marked floor plan or **sample collection plan**; g) A certificate of **accuracy** or **calibration**.

12.5 Documentation required for Chapter 7: Thermal services

Topic	Requirements	Documentation
12.5.1 Thermal assessment for mechanically ventilated buildings	Section 7.4	Required information: The **Assessor** must retain evidence of the **calibration** of all equipment used for on-site measurements and all data collection in relation to a building's thermal services. Documentation examples: Documents that can be used as supporting evidence can include: a) Records of the **calibration** of the BMS sensors and actions taken to verify results; b) Marked up floor plans marking locations of BMS sensors, identifying sensors used to collect data; c) A spreadsheet of logged data using the *Annual Monitoring Data Collection Spreadsheet for Naturally Ventilated Buildings* or similar for the period specified; or d) A thermal survey report conducted by an independent party meeting the same measurement standards.
12.5.2 Thermal assessment for naturally ventilated buildings	Section 7.5	Required information: The **Assessor** must retain evidence of a building being only naturally ventilated. Documentation examples: a) Drawings/photos of operable windows/louvres; and b) A signed statement that the building does not have a mechanical ventilation system.

12.6 Documentation required for Chapter 8: Indoor air quality

Topic	Requirements	Documentation
12.6.1 Indoor air quality	Section 8.2	Required information: The **Assessor** must retain evidence of all the quantitative measurements taken on-site to ascertain the **indoor air quality** of the premises. This requirement includes retaining information regarding the testing of various pollutants as follows: a) Data collection; b) **Calibration** of all the equipment used; c) Laboratory analysis results with stated method (if applicable); and d) Sampling locations. Documentation examples: Documents that can be used as supporting evidence can include: a) A spreadsheet of recorded data for the period specified; b) A written **indoor air quality** survey report conducted by an independent party and confirmed as meeting the same measurement standards; c) Sampling locations for each measurement recorded on floor plans.

12.7 Documentation required for Chapter 9: Acoustics

Topic	Requirements	Documentation
12.7.1 Acoustics	Section 9.2	Required information: The **Assessor** must retain the following information: Documentation examples: Documents that can be used as supporting evidence can include:

12.8 Documentation required for Chapter 10: Lighting

Topic	Requirements	Documentation
12.8.1 Lighting	Section 10.2	Required information: The **Assessor** must retain the results of the **Occupant Satisfaction Survey** and the following information in relation to their assessment of lighting for the rating: a) Evidence of data collection; b) Sampling locations, including the layout of workstations; c) Evidence of the **accuracy** and/or **calibration** of equipment. Documentation examples: Documents that can be used as supporting evidence can include: a) Spreadsheets showing recorded data for the period specified; b) Sampling locations marked on a floor map; c) Results of the **Occupant Satisfaction Survey** which covers indoor lighting, not including daylight (see Chapter 5).

12.9 Documentation required for Chapter 11: Office layout

Topic	Requirements	Documentation
12.9.1 Office layout	Section 11.2	Required information: The **Assessor** must retain evidence of the office layout. Documentation examples: Documents that can be used as supporting evidence can include: a) Results of the **Occupant Satisfaction Survey** which covers office layout (e.g. spatial comfort) (see Chapter 5 and Section 12.3.1).

Appendices

Summary

Appendix A – The rating period

A.1 Allowance for lodgement

A NABERS rating is based on 12 months of **acceptable data**, called the **rating period**. Once certified, the rating is valid for up to 12 months, called the **validity period**.

It can take time for an **Assessor** to complete a rating. Therefore, a period of 120 calendar days is given to lodge the rating after the end of the **rating period**. Ratings lodged after the 120 calendar days will have a reduced **validity period** to ensure all ratings are based on current data.

The following scenarios illustrate this principle.

Scenario 1

A NABERS rating is lodged with the **National Administrator** within 120 calendar days of the end of the **rating period**. It will be valid for 365 days from the date of certification. See **Figure A.1**.

Example:

a) The **rating period** is 1 January 2017 to 31 December 2017. The due date is therefore 30 April 2018.

b) The **Assessor** lodges the rating on 1 February 2018, and the Administrator certifies it on 5 February 2018. This is before the due date.

c) The rating will therefore be valid for 365 days from the date of certification (5 February 2018).

d) It will expire on 5 February 2019.

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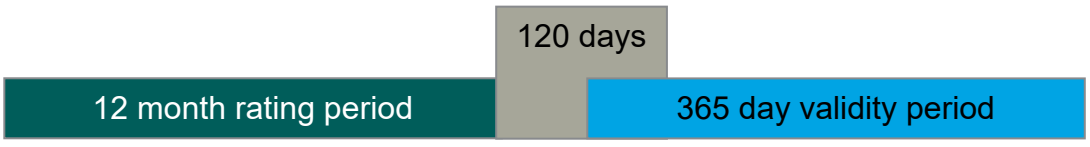

Figure A.1: A rating lodged within 120 days of the end of rating period

Scenario 2

A NABERS rating is lodged with the **National Administrator** more than 120 calendar days after the end of the **rating period**. It will be valid for 365 days from the end of the **rating period**. See **Figure A**.2.

Example:

a) The **rating period** is 1 January 2017 to 31 December 2017. The due date is therefore 30 April 2018.

b) The **Assessor** lodges the rating on 1 June 2018, and the Administrator certifies it on 6 June 2018. This is after the due date.

c) The rating will therefore be valid for 365 days from the end of the **rating period** (31 December 2017).

d) It will expire on 31 December 2018.

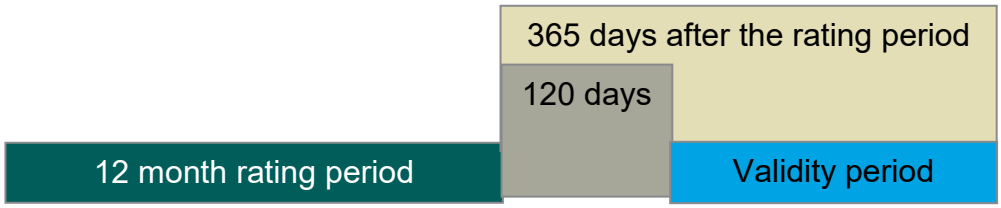

Figure A.2: A rating lodged after 120 days from the end of rating period

A.2 Allowance for responses

Assessors are given 120 days after the **rating period** to lodge ratings with the **National Administrator**. The **Assessor** should allow 10 working days within this 120-day period for a response from the **National Administrator.** The **National Administrator** then allows a further 10 working days for the **Assessor** to respond to any queries that arise from quality assurance checks before certification.

When the **Assessor** is required to provide clarification multiple times, this must be done within the allowable 10 working days period.

If the **Assessor** has not responded adequately to all queries and the rating has not been certified within 120 days of the end of the **rating period** + 10 working days, the rating will only be valid for up to 365 days from the end of the **rating period**. This does not include the time taken by the **National Administrator**.

The following scenario illustrates this principle.

Scenario 3

A NABERS rating is lodged with the **National Administrator** one day before the lodgement due date (120 days from the end of the **rating period**). Depending on how quickly the **Assessor** responds to clarifications, the rating will either be valid for 365 days from the date of certification or 365 days from the end of the **rating period**.

Example:

a) The **rating period** is 1 January 2017 to 31 December 2017. The due date is therefore 30 April 2018.

b) The **Assessor** lodges the rating on 29 April 2018, 119 days after the end of the **rating period**.

c) The **National Administrator** responds on 3 May 2018 requesting further clarification. The **Assessor** must provide adequate clarification by 14 May 2018 (120 days from the end of the **rating period** plus 10 working days) for the rating to be valid for 365 days from the date of certification.

d) If the **Assessor** responds on the 8 May 2018, the rating will be certified and valid until the 8 May 2019.

e) If the **Assessor** does not respond with clarification until the 30 May 2018, the rating will only be valid until 365 days from the end of the **rating period** and therefore will expire on the 31 December 2018.

A.3 Adjusting the rating period

After the rating has been lodged, the **Assessor** may require the **rating period** to be changed. The **rating period** may only be adjusted by a maximum of 62 days from the first lodgement. A new rating will need to be created if the **Assessor** would like to adjust the **rating period** by more than this.

Note: A rating is required to comply with the **Rules** that are current at the time of lodgement. **Assessors** are advised to seek advice and request a **ruling** (if needed) prior to lodging ratings that may require one.

A.4 Lodging successive ratings

For a building which already has a current rating, there are two options to complete another rating of the same type: Replace or Renew.

Note: The **Assessor** will be prompted to select Replace or Renew when creating a rating. This selection can be changed just before the rating is lodged but not after.

Option 1: Replace

The Replace option allows the new certified rating to replace the existing rating immediately upon certification.

There will be loss of the existing rating's remaining **validity period**. This option might be chosen if the new rating is better than the existing rating. See **Figure A.3**.

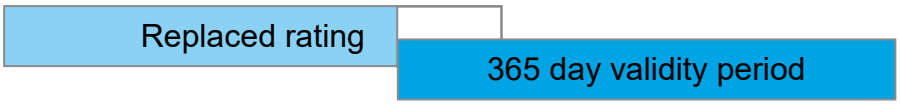

Figure A.3: The existing rating replaced by a new rating

Option 2: Renew

The Renew option allows the new certified rating to begin its **validity period** immediately after the existing rating **validity period** expires. This option is often chosen when a site is most concerned with maximising the **validity period**.

As ratings are based on current data, the new **validity period** cannot not exceed 485 days from the end of the **rating period**. To ensure the new rating maximum **validity period** is achieved, the **validity period** must start within 120 days after the end of the **rating period**.

The following scenario illustrates this principle.

Scenario 4

A NABERS rating is lodged with the **National Administrator** and the Renew option has been selected. The new rating begins its **validity period** within 120 days after the end of the **rating period**. See **Figure A.4**.

Example:

a) The current rating's **validity period** expired 31 December 2017.

b) The **rating period** is 1 October 2016 to 30 September 2017 for the renewal rating.

c) The **Assessor** lodges the renewal 1 November 2017 and it is certified by the **National Administrator** 7 November 2017.

d) The **validity period** for the renewal will be 1 January 2018 to 31 December 2018.

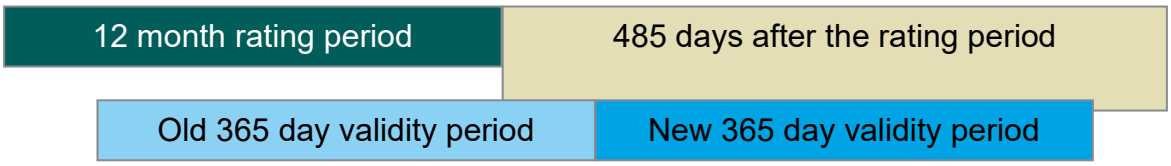

Figure A.4: The validity period for the new rating begins once the old rating expires and the new validity period is 365 days

If the new rating's **validity period** begins more than 120 days after the end of the **rating period,** the validity will be reduced as the **validity period** will exceed 485 days from the end of the **rating period**.

Note: An expired rating can be renewed. The **validity period** will begin on the date of certification, rather than the date the previous rating expired.

The following scenario illustrates this principle.

Scenario 5

A NABERS rating is lodged with the **National Administrator** and the Renew option has been selected. The new rating begins its **validity period** over 120 calendar days after the end of the **rating period**. See **Figure A.5**.

Example:

a) The current rating's **validity period** expired 31 December 2017.

b) The **rating period** is 1 August 2016 to 31 July 2017 for the renewal rating.

c) The **Assessor** lodges the renewal 1 November 2017 and it is certified by the **National Administrator** 7 November 2017.

d) The **validity period** for the renewal will be 1 January 2018 to 28 November 2018, 485 days after the end of the **rating period**.

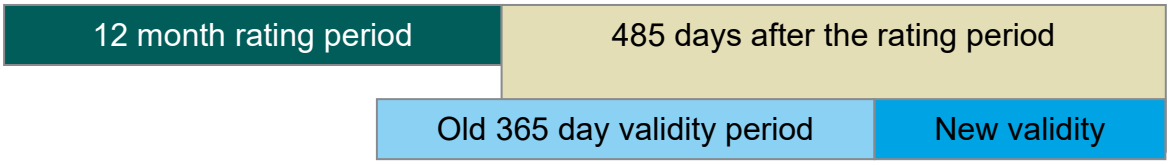

Figure A.5: The validity period for the new rating begins once the old rating expires and the new validity period is less than 365 days

Appendix B – Qualitative and Quantitative Approach

B.1 Qualitative measures (Occupant Satisfaction Survey)

The **Occupant Satisfaction Survey (OSS)** is a qualitative assessment of how a building is performing from the perspective of its **occupants**. The **OSS** is an independent survey, conducted by a third party that allows comparison against sufficiently large data sets for meaningful analysis.

The **OSS** considers occupant satisfaction with the thermal comfort, lighting, noise, **indoor air quality** and office aesthetics. It is conducted for NABERS IE Tenancy and Whole Building ratings.

B.2 Quantitative measures

Quantitative measurements assess a building's IE performance without human perception affecting the results.

The measured **parameters** for thermal comfort are—

a) **space temperature**,

b) **mean radiant temperature**,

c) **relative humidity**, and

d) **air speed**.

The measured **parameters** for **indoor air quality** are—

1) **formaldehyde** (typically due to furnishings, flooring and adhesives),

2) **Total Volatile Organic Compounds (TVOCs)**,

3) **carbon monoxide (CO)**,

4) carbon dioxide (CO2), and

5) inhalable airborne particles (**particulate matter** less than 10 µm in particle diameter, or **PM_{10}**).

NABERS IE also measures sound levels to determine the potential noise disturbance, and light levels to provide an indication of potential for eye strain and the **occupants**' ability to work comfortably.

B.3 Methodologies for quantitatively assessing indoor environment parameters

B.3.1 General

NABERS IE quantitatively assesses **parameters** using a mix of spot measurements and annual monitoring data.

B.3.2 Annual Monitoring

Annual monitoring uses temperature data collected over the entire year, providing insight into building performance across the year. Where possible, understanding ongoing conditions that influence **Indoor Environment Quality** is preferable, and can lead to an improved (higher) rating. Data from ongoing temperature measurements collected in buildings with systems that track, on a constant basis, temperature data can be fed into the NABERS assessment tool.

Annual monitoring data is not mandatory, but it does enable a higher star rating to be achieved.

B.3.3 Spot measurements

In addition to annual monitoring, all **parameters** covered by the **rating scope** are measured on the day of assessment, being a 'moment in time' measurement. The moment in time assessment is made within strict criteria at each location and in some cases is measured in both the morning and the afternoon. This set of one-off measurements, or 'spot measurements' is used to provide an indication of the premises' performance for the rest of the year.

Spot measurements are used because it is not currently viable to collect data for these IE **parameters** over an annual time period as the equipment required to monitor the **parameters** continually is not commonly found in buildings.

Note: This reference to 'moment in time' is to distinguish the measurement from continuous (annual) monitoring, and does not infer an instantaneous reading. Spot measurements may be an instantaneous reading, over a five minute period or potentially measured across an entire day.

To ensure spot measurements are conducted in a consistent manner, specific sampling requirements are outlined in Chapter 4 and Chapter 6, as well as **component** specific requirements listed in the relevant sections for each **component** measured.

Appendix C – Sample collection plan

The table below provides an example summary of timings of sampling requirements. Darker cells indicate a second set of measurements is required in the afternoon following a set of measurements on the same morning. Numbers in the lighter cells relate to the sampling time required at each location. A template of a **sample collection plan** may be accessed on the member's website under 'Process Documents'.

Component	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00
Air temperature (indoor and outdoor)		5 min				5 min				
Relative humidity		5 min				5 min				
Mean radiant temperature		5 min				5 min				
Air speed		5 min				5 min				
Carbon dioxide (indoor)		5 min					5 min			
Carbon dioxide (plant room)	5 min					5 min				
PM_{10}[1]		5 min					5 min			
Formaldehyde	5 min									
TVOCs	5 min									
Carbon monoxide	5 min					5 min				
Ambient sound (Base Building)[2]	5 min							5 min		
Ambient sound (Whole Building and Tenancy)		5 min					5 min			
Lighting		3 readings				3 readings				

[1] For a Base Building rating, sampling may occur between 12.30pm and 2.00pm.
[2] If a vacant floor is used, sampling can occur at any time while the HVAC system is operational.

Appendix D – Data collection required

The following tables are a summary of the different measures and the data that is to be collected. They have been provided for easy reference only and do not form part of these **Rules**. If there is a conflict, the written text of the **Rules** will always take precedence.
Sampling requirements are as per Chapter 4, Chapter 6 and any component specific requirements as listed under each **component**.

Base Building Ratings				
Parameter	**Component (units)**	**Sampling frequency**	**Sampling requirement**	**Reference**
Thermal Services: Spot measurements	Space temperature (°C)	2 samples: 1 morning and 1 afternoon	One average reading of least five (5) minutes duration at each sampling location.	Section 7.4.2
	Mean radiant temperature (°C)	2 samples: 1 morning and 1 afternoon	One average reading of least five (5) minutes duration at each sampling location.	Section 7.4.2
	Air speed (m/s)	2 samples: 1 morning and 1 afternoon	One average reading of least five (5) minutes duration at each sampling location.	Section 7.4.2
	Relative humidity (%) (mechanically ventilated)	2 samples: 1 morning and 1 afternoon	One average reading of least five (5) minutes duration at each sampling location.	Section 7.4.2

Base Building Ratings				
Parameter	**Component (units)**	**Sampling frequency**	**Sampling requirement**	**Reference**
	Outdoor air temperature (°C) (naturally ventilated)	2 samples: 1 morning and 1 afternoon	One average reading of least five (5) minutes 1-2m above the ground at the pedestrian entrance to the building. Or data from a BOM weather station.	Section 7.5.2
Thermal Services: Annual monitoring	Annual space temperature records (°C)	Data covering the **rating period**	For all normal working hours: • Hourly temperature data for mechanically ventilated buildings • Daily average temperature data for naturally ventilated buildings	Section 7.5.3
Indoor Air Quality: Ventilation effectiveness	Carbon dioxide (ppm)	2 samples: 1 morning and 1 afternoon	One average reading of at least five (5) minutes at each sampling location near a supply air diffuser to measure the impact from the HVAC system; and One average reading of at least five (5) minutes at the outdoor air intake in each plant room assessed.	Section 8.3
Indoor Air Quality: Indoor pollutants	Particulates (µg/m^3)	2 samples: 1 morning and 1 afternoon	One average reading of at least five (5) minutes at each sampling location near a supply air diffuser to measure the impact from the HVAC system.	Section 8.4

Base Building Ratings				
Parameter	**Component (units)**	**Sampling frequency**	**Sampling requirement**	**Reference**
	Carbon monoxide (ppm)	2 samples: 1 morning and 1 afternoon	One average reading of at least five (5) minutes in the plant rooms assessed at the outside air intake to the building to measure the cleanliness of the intake air.	Section 8.7
Acoustic comfort	Ambient sound levels (dB)	1 sample: morning or afternoon	One average reading of at least five (5) minutes at each sampling location excluding tenant noise.	Section 9.2.2

Whole Building Ratings				
Parameter	**Component (units)**	**Sampling time**	**Sampling requirement**	**Reference**
Thermal Services: spot measurements	Space temperature (°C)	2 samples: morning and 1 afternoon	One average reading of least five (5) minutes duration at each sampling location.	Section 7.4.2
	Mean radiant temperature (°C)	2 samples: 1 morning and 1 afternoon	One average reading of least five (5) minutes duration at each sampling location.	Section 7.4.2
	Air speed (m/s)	2 samples: 1 morning and 1 afternoon	One average reading of least five (5) minutes duration at each sampling location.	Section 7.4.2
	Relative humidity (%) (mechanically ventilated)	2 samples: 1 morning and 1 afternoon	One average reading of least five (5) minutes duration at each sampling location.	Section 7.4.2
	Outdoor air temperature (°C) (naturally ventilated)	2 samples: 2 morning and 1 afternoon	One average reading of least five (5) minutes 1 m to 2 m above the ground at the pedestrian entrance to the building. Or data from a BOM weather station.	Section 7.5.2

Whole Building Ratings				
Parameter	**Component (units)**	**Sampling time**	**Sampling requirement**	**Reference**
Thermal Services: Annual monitoring	Annual space temperature records (°C)	Data covering the **rating period**	For all normal working hours: • Hourly temperature data for mechanically ventilated buildings • Daily average temperature data for naturally ventilated buildings	Section 7.5.3
Indoor Air Quality: Ventilation effectiveness	Carbon dioxide (ppm)	2 samples: 1 morning and 1 afternoon	• One average reading of at least five (5) minutes at each sampling location taken in the occupied space to measure the impact of tenant activities; and • One average reading of at least five (5) minutes at the outdoor air intake in each plant room assessed.	Section 8.3
Indoor Air Quality: Indoor pollutants	Particulates (µg/m^3)	2 samples: 1 morning and 1 afternoon	One average reading of at least five (5) minutes at each sampling location in the occupied space to measure the impact of tenant activities.	Section 8.4
	Formaldehyde (ppm)	1 morning sample only	Using real-time equipment: One average reading of at least five (5) minutes at each sampling location in the occupied space to measure the impact of tenant fit out. Using laboratory method: One sample per floor assessed, collected over a 4 to 6 hour period.	Section 8.5.2 Section 8.5.3

Whole Building Ratings				
Parameter	**Component (units)**	**Sampling time**	**Sampling requirement**	**Reference**
	Total Volatile Organic Compounds (ppm)	1 morning sample only	Using real-time equipment: One average reading of at least five (5) minutes at each sampling location in the occupied space to measure the impact of tenant fit out. Using laboratory method: One sample per floor assessed, collected over a 4-6 hour period.	Section 8.6.2 Section 8.6.3
	Carbon monoxide (ppm)	2 samples: 1 morning and 1 afternoon	One average reading of at least five (5) minutes in the plant rooms assessed at the outside air intake to the building to measure the cleanliness of the intake air.	Section 8.7.2
Acoustic comfort	Ambient sound levels (dB)	2 samples: 1 morning and 1 afternoon	One average reading at each sampling location, excluding any non-standard spikes.	Section 9.2.2
Lighting	Horizontal light levels (lux)	6 samples: 2 morning and 3 afternoon	Three readings adjacent to each sampling location in the occupied space reading ambient conditions in the occupant workspace.	Section 10.2.2
Occupant Satisfaction Survey	Survey results	N/A	Survey results for: Thermal Comfort, Indoor Air Quality, Acoustic Comfort, Lighting and Office Layout	Chapter 5

Tenancy Ratings				
Parameter	**Component (units)**	**Sampling time**	**Sampling requirement**	**Reference**
Indoor Air Quality: Ventilation effectiveness	Carbon dioxide (ppm)	2 samples: 1 morning and 1 afternoon	One average reading of at least five (5) minutes at each sampling location taken in the occupied space to measure the impact of tenant activities. One average reading of at least five (5) minutes at the outdoor air intake in each plant room assessed.	Section 8.3
Indoor Air Quality: Indoor pollutants	Particulates (µg/m^3)	2 samples: 1 morning and 1 afternoon	One average reading of at least five (5) minutes at each sampling location in the occupied space to measure the impact of tenant activities.	Section 8.4
	Formaldehyde (ppm)	1 morning sample only	Using real-time equipment: One average reading of at least five (5) minutes at each sampling location in the occupied space to measure the impact of tenant fit out. Using laboratory method: One sample per floor assessed, collected over a 4-6 hour period.	Section 8.5.2 Section 8.5.3

Tenancy Ratings				
Parameter	**Component (units)**	**Sampling time**	**Sampling requirement**	**Reference**
	Total volatile organic compounds (ppm)	1 morning sample only	Using real-time equipment: One average reading of at least five (5) minutes at each sampling location in the occupied space to measure the impact of tenant fit out. Using laboratory method: One sample per floor assessed, collected over a 4-6 hour period.	Section 8.6.2 Section 8.6.3
Acoustic comfort	Ambient sound levels (dB)	2 samples: 1 morning and 1 afternoon	One average reading at each sampling location, excluding any non-standard spikes.	Section 9.2.2
Lighting	Horizontal light levels (lux)	6 samples: 3 morning and 3 afternoon	Three readings adjacent to each sampling location in the occupied space reading ambient conditions in the occupant workspace.	Section 10.2.2
Occupant Satisfaction Survey	Survey results	N/A	Survey results for: Indoor Air Quality, Acoustic Comfort, Lighting and Office Layout	Chapter 5

Appendix E – Component weightings by rating scope

Each **parameter** of the rating is given a weighting as described in Section 3.2.2. Within each **parameter**, weightings are given for each **component** required for the specified **rating scope**. The weightings for each of the individual **components** by **rating scope** are given in the tables below.

Table E.1: Thermal Services

Component	Whole Building	Base Building	Tenancy
Occupant Satisfaction Survey (thermal comfort results)	50 %		
Spot measurements (space temperature, mean radiant temperature, relative humidity, air speed)	20 %	40 %	
Annual monitoring (space temperature)	30 %	60 %	

Table E.2: Indoor air quality

Component	Whole Building	Base Building	Tenancy
Occupant Satisfaction Survey (air quality)	50 %		50 %
Ventilation effectiveness (CO_2)	20 %	55 %	20 %
Particulate matter (PM_{10})	10 %	30 %	10 %
Formaldehyde	10 %		10 %
Total volatile organic compounds (TVOCs)	5 %		10 %
Carbon monoxide (CO)	5 %	15 %	

Table E.3: Acoustics

Component	Whole Building	Base Building	Tenancy
Occupant Satisfaction Survey (acoustics results)	50 %		50 %
Ambient sound	50 %	100 %	50 %

Table E.4: Lighting

Component	Whole Building	Base Building	Tenancy
Occupant Satisfaction Survey (lighting results)	50 %		50 %
Horizontal illuminance	50 %		50 %

Table E.5: Office layout

Component	Whole Building	Base Building	Tenancy
Occupant Satisfaction Survey (office layout results)	100 %		100 %

Appendix F – Equipment specification list

All **samples** should be taken using equipment which meets the minimum specifications outlined below. These are minimum requirements only and any equipment used may go beyond these specifications. For the most accurate results, it is recommended that data logging equipment utilise data logging intervals of at least 60 s, with a preference for 10 s intervals.

Parameter	Attribute	Equipment required for site visit measurements	
Thermal Services	Space Temperature (Spot measurements)	Multipoint logging instrument which meets the following minimum requirements:	
		Range	5 °C to 50°C
		Resolution	0.1 °C
		Accuracy	± 0.6 °C across 10 °C to 45 °C
	Space Temperature (Annual monitoring)	Building Monitoring System (BMS) or equivalent sensors which meets the following minimum requirements:	
		Range	10 °C to 40 °C
		Resolution	0.1 °C
		Accuracy	± 0.5 °C
	Mean radiant temperature (MRT)	Multipoint logging instrument (for black globe or black bulb temperature) which meets the following minimum requirements:	
		Range	5 °C to 50 °C
		Resolution	0.1 °C
		Accuracy	± 0.6 °C across 10 °C to 45 °C
	Relative humidity (RH)	Multipoint logging instrument which meets the following minimum requirements:	
		Range	5 % to 95%
		Resolution	1 %
		Accuracy	± 5 % across 20 % to 95%
	Air speed	Multipoint logging instrument (anemometer) which meets the following minimum requirements:	
		Range	0.01 m/s to 2 m/s
		Resolution	0.01 m/s
		Accuracy	± 3 % over 0 m/s to 2 m/s

Parameter	Attribute	Equipment required for site visit measurements	
Indoor Air Quality	Ventilation effectiveness (Carbon Dioxide levels)	Multipoint logging instrument that records real-time carbon dioxide levels and meets the following minimum requirements:	
		Range	20 ppm to 3,000 ppm
		Resolution	1 ppm
		Accuracy	50 ppm
	Particulate matter (PM_{10})	Real-time particulate counter with a sensor based on 90° light scattering which meets the following minimum requirements:	
		Range	0.001 mg/m^3 to 20 mg/m^3
		Resolution	0.001 mg/m^3
		Accuracy	± 5 % across 0.001 mg/m^3 to 0.150 mg/m^3
	Formaldehyde	Multipoint data logger instrument such as a photo-ionisation detector (PID) which meets the following minimum requirements:	
		Range	20 ppb to 2,000 ppb
		Resolution	1 ppb
	Formaldehyde (Laboratory option)	Samples taken using a low-noise air sampling pump with a dinitrophenylhydrazine-coated silica gel cartridge e.g. SKC 226-119 located on a stable surface with the inlet of the cartridge at a height of 1.1 m from the floor. Air should be sampled at a rate of 0.1 to 0.5 L/minute over a 4 to 6 hour period during the day (between 9:30 am and 5 pm). A NATA-accredited laboratory with experience in analysing sorbent cartridges should be used to determine the formaldehyde concentration. Analysis must involve high-performance liquid chromatography with ultraviolet detection and have a detection limit of at least 0.001 mg/m^3.	
	Total volatile organic compounds (TVOCs)	Multipoint data logger instrument such as a photo-ionisation detector (PID) which meets the following minimum requirements:	
		Calibration standard/lamp	Isobutylene/ 9.5 eV lamp or 10.6 eV lamp
		Range	10 ppb to 10,000 ppb
		Resolution	1 ppb
	Total Volatile Organic Compounds	Two sorbent tubes at each location, one for non-polar VOC and the other for polar VOC. The results are combined to obtain total VOC.	

Parameter	Attribute	Equipment required for site visit measurements	
	(TVOCs) (Laboratory option)	A NATA-accredited laboratory with experience in analysing sorbent cartridges should be used to determine VOC concentration. Analysis must involve gas chromatography with flame ionisation detection or gas chromatography with mass selective detection. The detection limit with either analytical method should be at least 0.01 mg/m^3.	
	Carbon monoxide (CO)	Multipoint logging instrument that records real-time carbon monoxide levels which meets the following requirements:	
		Range	0 ppm to 200 ppm
		Resolution	0.1 ppm
		Accuracy	± 3 % over the range of 0 ppm to 10 ppm
Acoustic Comfort	Ambient noise levels	A level 1 or level 2 sound meter, set to read on A scale to record dbA, which meets the following minimum requirements:	
		Range	20 dB to 100 dB
		Resolution	1 dB
		Accuracy	± 2 dB
Lighting	Horizontal illuminance	A portable light meter which meets the following minimum requirements:	
		Range	20 lux to 20,000 lux
		Resolution	10 lux
		Accuracy	± 5 %
		Note: The equipment must be NATA-calibrated and must have been calibrated within the last 12 months.	

Appendix G – Temperature range for annual temperature data

For annual temperature data, the 90 % acceptability limits of ANSI/ASHRAE 55 are applied, expressed as a simple temperature range; see **Figure G.1**.

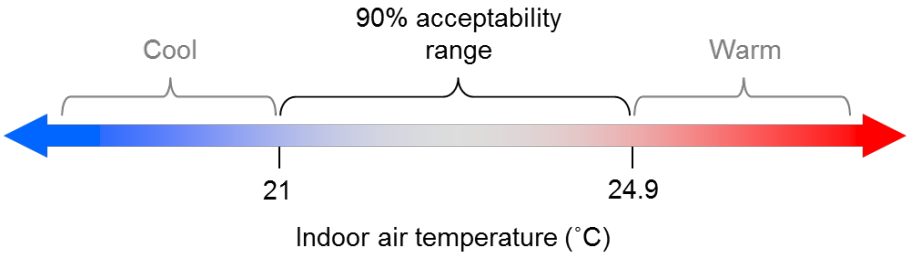

Figure G.1: Space temperature range

Measurements within the **rating period** which fall between 21 °C and 24.9 °C meet the requirements of ANSI/ASHRAE 55. Any temperature point which falls outside this range—

a) during normal working hours, and

b) within the **rating period,**

does not meet the standard.

The proportion of **samples** at each location which meet these requirements determines the scores for the annual monitoring **component** of the rating.

Appendix H – Lists of changes

The following tables record the changes made to v1.2 of *NABERS Rules – Indoor Environment for Offices* in order to produce this major update (v2.0).

***NABERS Rules – Indoor Environment for Offices* – Chapter 1 – Introduction**		
Version 1.2 (old location)	**Version 2.0** (new location)	**Changes made**
1.1	1.1	Generic information regarding which ratings are available for which sectors has been removed. Types of ratings has been removed. Reference to the quality standard for assessment has been removed. 'Objective' has been replaced with 'purpose' and is now contained within the text of the first section. Content has been rewritten for clarity. Link to the documentation requirements in Chapter 12 and the online tool has been added.
1.4.1	1.2	Wording has been clarified. This first part of this section is now standardised text for a NABERS Rules document. A small table detailing *application* and *feedback and support* has been added. Section 1.4.2 has been deleted.
1.4.3, 1.4.4	1.3	Text has been edited for clarity. This section is now standardised text for a NABERS Rules document.

1.2	1.4	The informative text listing the IEQ parameters has been reformatted and reworded for clarity. A briefer version of the star ratings comparison table has been moved to Section 1.1. Section 1.4.2 on Formatting conventions and referencing has been added. Section 1.2.1 and Table 1 has been deleted.
1.3.2	1.5	Text updated and the reader referred to Appendix H.
1.3.3	1.6	Specific documents referenced in the text listed instead of a general requirement to use relevant rulings, auditing procedures and the Assessor Code of Practice.

***NABERS Rules – Indoor Environment for Offices* – Chapter 2 – Terms and definitions**		
Version 1.2 (old location)	**Version 2.0** (new location)	**Changes made**
Appendix B	Chapter 2	All the terms and definitions are now contained at the beginning of the document as per the recent Rules updates and new format. The following terms and definitions have been added: • Acceptable data • Acceptable estimate • Auditor • Measurement standard for rated area • NABERS rating input form • Net Lettable Area (NLA) • Rated premises • Rules The following terms and definitions have been updated:

		• Accuracy • Assessor • Component • Horizontal illuminance • Indoor Air Quality • Indoor Environment Quality • Mean Radiant Temperature • National Administrator • Occupied • Office • Office floor area • Parameter • Rating period • Resolution • Ruling • Total Volatile Organic Compounds (TVOCs)

***NABERS Rules – Indoor Environment for Offices* – Chapter 3 – Key concepts and procedures**		
Version 1.2 (old location)	**Version 2.0** (new location)	**Changes made**
2.1	–	This Section on the assessment process has been deleted.
	3.1	New section added clearly outlining the different rating scopes (Base Building, Whole Building and Tenancy) and how these relate to the IEQ parameters.
2.8.2 **2.5**	3.2	Introduction to section reworded. Heading changed to ‘parameters assessed’ and made into level 2 heading. Weightings in Table 3.1 are the same – only the format was updated.
2.2	3.3	This section has been greatly reduced as much of the information is now contained in Appendix A. Only the first few sections up to the first figure have been included here in Section 3.3. The content is largely the same but it has been reworded and reformatted. The final section ‘data’ has been deleted as the same information is contained at the beginning of Section 3.4.

2.3	3.3.3	Listed under Section 3.3.
–	3.4	Section added on acceptable data and acceptable estimates as per the update to *NABERS The Rules – Energy and Water for Offices*.
2.4	–	Section deleted.
–	3.5	Section added on site visit as per the update to *NABERS The Rules – Energy and Water for Offices*.
2.6 **2.7**	Appendix B	These two sections have been combined into one appendix. The content is the same, just the formatting has been updated.
2.8.1	–	Section deleted.
2.9	3.6	Reference to estimates and determining office floor area deleted. Wording of section clarified and expanded upon in line with standard text of other Rules documents. Reference to documentation in Chapter 12 added.

***NABERS Rules – Indoor Environment for Offices* – Chapter 4 – Sampling floors and locations**		
Version 1.2 (old location)	**Version 2.0** (new location)	**Changes made**
Chapter 3	Chapter 4	Heading changed from 'Sampling Locations' to 'Sampling floors and locations'.
3.1	4.1	Section completely reworded and simplified. References to NLA and adjustment of floor area removed. Use of 'rated area' in *NABERS The Rules – Energy and Water for Offices* only mentioned now in a note.
3.2	4.2	Initial informative text removed. Table completely revised and simplified; 'documentation required' column removed.
3.3	4.3	Section rearranged so that what is included in terms of the type of rating (Base Building, Whole Building, Tenancy) comes first. Section 4.3.1 General added for clarity. Calculation method in Table 4.2 is the same but format has been updated. Section 4.3.4 added detailing multiple building versus single building ratings.

3.4	4.4	Information rearranged slightly and reworded for clarity. Formatting updated but content is the same.
3.5	4.5	Terminology updated from 'average floor size' to 'average floor area'. Note regarding increase number of samples made into body text.
3.6	4.6	Content is the same; only format updated.
3.7	4.7	Slight rewording for clarity. List in Section 4.7.2 has been broken up for clarity. Figure more clearly labelled. Reference to air quality in mechanically ventilated buildings in Section 4.7.3 deleted and some sentences made into notes. Section 4.7.4 reworded slightly and made into a list for clarity.
3.8	4.8	Formatting updated but content is the same.
3.9	12.2	All documentation requirements revised and moved to Chapter 12.

***NABERS Rules – Indoor Environment for Offices* – Chapter 5 – Occupant Satisfaction Survey**		
Version 1.2 (old location)	**Version 2.0** (new location)	**Changes made**
4.1	5.1	Which rating scopes are covered by this chapter was added; content of note is the same.
4.2.1	–	Process overview deleted.
4.2.4	5.2.1 5.2.2 5.2.3	Title of 5.2 changed to 'requirements'. Sections 5.2.1 and 5.2.2 added: recommendations made into requirements that the survey be made available, minimum number of responses obtained etc. List under Section 5.2.3 reviewed and clarified.
4.2.3	5.2.4	SHE survey provider from University of Melbourne added to list. Some of introductory paragraph made into note.
–	5.2.5	Section added on entering information into NABERS rating input form.

4.2.5	–	Section deleted.
4.3	12.3	Documentation requirements moved to Chapter 12.

NABERS Rules – Indoor Environment for Offices – Chapter 6 – Site visit

Version 1.2 (old location)	**Version 2.0** (new location)	**Changes made**
Initial note	6.1	Rating scopes covered by this chapter specified. Second half of note deleted.
5.1	6.2	Step 2 in the process table simplified into a list.
5.2	6.3	Initial list is the same; several paragraphs made into section with headings 'Restricted access' and 'Use of another NABERS IE Accredited Assessor…' Heading of Section 6.3.4 changed from 'sub-contractor' to 'non-Assessor'. Requirements expanded and made much clearer by presence of lists. Documentation required moved to Chapter 12.
5.3	6.4	Formatting updated but content is the same.
5.4	6.5	Section 6.5.1 is the same with format updated. The list in Section 6.5.2 has been broken up into where the measurement equipment can and cannot be located. A requirement to clearly represent the workstation and work activities has been added at the beginning.
5.5	12.4	Documentation requirements moved to Chapter 12.

NABERS Rules – Indoor Environment for Offices – Chapter 7 – Thermal services

Version 1.2 (old location)	**Version 2.0** (new location)	**Changes made**
Initial note and **6.1**	7.1	Information added regarding application of rating scopes and what the chapter covers. Note broken up into two separate notes.

6.2	7.2	Initial paragraph of Section 7.2.1 deleted. Content of 7.2.2 Data required is the same except for final paragraph which has been added to the summary in 7.1.
6.3	7.3	Evidence requirements removed from second paragraph and added to Chapter 12. Third paragraph made into a note.
6.4	7.4 Appendix G	Note 1 added in Section 7.4.3. Only the first paragraph and two notes have been kept in 7.4.3.1; the rest of the text and the figure showing space temperature range that meets ASHRAE 55 has been deleted and moved to a separate appendix. Slight rewording of rest of the section for clarity but the content is largely the same.
6.5	7.5	Wording in Section 7.5.2.2 has been simplified. Requirement for BOM to be 'in close proximity' has been deleted as it was too vague.
6.6	12.5	Documentation requirements moved to Chapter 12.

***NABERS Rules – Indoor Environment for Offices* – Chapter 8 – Indoor air quality**		
Version 1.2 (old location)	**Version 2.0** (new location)	**Changes made**
7.1	8.1	Initial information text and summary combined and completely rewritten. What the chapter contains and which rating scopes it relates to has been added.
7.2	8.2	Content is the same.
7.3	8.3	Initial informative combined with Section 7.3.1. Sentence beginning 'Average measurements of carbon dioxide levels' and subsequent list have been deleted. Table title added and reformatted. Specific sampling requirements are the same but have been reworded slightly for clarity.
7.4	8.4	Initial informative text reformatted. Sentence beginning 'Average measurements of particulate matter' and subsequent list have been deleted.

		Table title added and reformatted. Specific sampling requirements are the same but have been reworded slightly for clarity.
7.5	8.5	Initial informative text combined with Section 7.5.1. Note expanded and requirements for measuring samples clarified. Sentence beginning 'Average measurements of formaldehyde' and subsequent list have been deleted. Table title added and reformatted. Specific sampling requirements are the same but have been reworded slightly for clarity and some information has been made into notes. The permission for the Assessor to use an analytical approach in the first paragraph of Section 7.5.2 has been deleted. The reference to ISO 16000-3 has also been deleted.
7.6	8.6	First paragraph has been deleted. The initial informative text has been combined with Section 7.6.1. Section 8.6.1, Note 1: References to ISO 16200-1 has been added and content has been revised. Initial sentence and list at the beginning of 7.6.1 has been deleted; the table has been titled and reformatted. Section 8.6.3: Specific sampling requirements are the same but have been reworded slightly for clarity and some information has been made into notes. The permission for the Assessor to use an analytical approach in the first paragraph of Section 7.6.2 has been deleted. The reference to ISO 16200-1 has also been deleted.
7.7	8.7	Initial informative text and combined with Section 7.7.1. Initial sentence and list at the beginning of 7.7.1 has been deleted; the table has been titled and reformatted. Title changed of Section 8.7.2 to 'using real-time equipment'.
7.8	12.6	Documentation requirements added to Chapter 12.

***NABERS Rules – Indoor Environment for Offices* – Chapter 9 – Acoustics**		
Version 1.2 (old location)	**Version 2.0** (new location)	**Changes made**
8.1	9.1	Initial text combined with Section 8.1 in a single note. Content is the same. Purpose of chapter and ratings scopes it covers has been added.

8.2	9.2	Sentence beginning 'Average acoustic measurements' and subsequent list have been deleted. Entire section has been revised and has been reorganised based on the specific sampling requirements for Base Building ratings and Tenancy and Whole Building ratings. Content of lists and notes completely revised based on the different rating scopes.
8.3	12.7	Documentation requirements added to Chapter 12.

***NABERS Rules – Indoor Environment for Offices* – Chapter 10 – Lighting**		
Version 1.2 (old location)	**Version 2.0** (new location)	**Changes made**
9.1	10.1	Initial text combined with Section 9.1 into a single note. Content is the same. Purpose of chapter and ratings scopes it covers has been added.
9.2	10.2	Initial sentence and list at the beginning of Section 9.2.2 has been deleted and replaced with the requirement to follow Table 10.2. List under Section 10.2.3 has been simplified and some information made into notes and examples for clarity.
9.3	12.8	Documentation requirements added to Chapter 12.

***NABERS Rules – Indoor Environment for Offices* – Chapter 11 – Office layout**		
Version 1.2 (old location)	**Version 2.0** (new location)	**Changes made**
10.1	11.1	Purpose of chapter and ratings scopes it covers has been added. Content of the note is the same.
10.2	11.2	Content is the same, just reformatted.
10.3	12.9	Documentation requirements added to Chapter 12.

***NABERS Rules – Indoor Environment for Offices* – Chapter 12 – Documentation required for accredited ratings**		
Version 1.2 (old location)	**Version 2.0** (new location)	**Changes made**
End of each chapter	Chapter 12	All the documentation requirements have been moved to a single chapter. Each 'documentation' section in each table has been broken up into 'required information' and 'documentation examples' as appropriate.

***NABERS Rules – Indoor Environment for Offices* – Appendices**		
Version 1.2 (old location)	**Version 2.0** (new location)	**Changes made**
–	Appendix A	New appendix added about the rating period. This is a standard appendix in recently published NABERS Rules texts.
2.6 **2.7**	Appendix B	New appendix added describing the qualitative and quantitative approach of NABERS IE ratings. Content taken from previous Chapter 2.
Appendix A	–	This appendix has become part of Chapter 12.
Appendix B	Chapter 2	All terms and definitions have been moved to their own chapter instead of in an Appendix.
Appendix C	Appendix D	Format updated; content is the same
Appendix D	Appendix E	Format updated; content is the same
Appendix E	Appendix F	Format updated; content is the same
Appendix F	Appendix C	Format updated; content is the same
6.4.2	Appendix G	Information from Section 6.4.2 on assessing thermal services using annual monitoring has been made into this new appendix.
–	Appendix H	New appendix added containing a list of all the changes between this version and the previous version.

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