WELL PERFORMANCE VERIFICATION GUIDEBOOK

Applies to WELL v1, WELL v2 pilot,
WELL v2 and the WELL Performance Rating

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Introduction

The WELL Performance Verification Guidebook (Guidebook) outlines the requirements for completing on-site testing for performance-based feature requirements within the WELL Building Standard (WELL Standard). The processes described pertain to the following versions of the WELL Standard, including all related addenda:

- The WELL Building Standard version 2 (WELL v2) and associated achievements:
    - WELL Certification
    - WELL Core Certification
    - The WELL Score
    - The WELL Performance Rating
    - The WELL Health-Safety Rating
- The WELL Building Standard version 2 pilot (WELL v2 pilot) and associated achievements:
    - WELL Certification
    - WELL Core Certification
- The WELL Building Standard version 1 (WELL v1) and associated achievements:
    - WELL Core and Shell Certification
    - WELL v1 sector-specific pilot certifications

For more information about scheduling on-site testing for WELL Certification and WELL Core Certification, refer to the WELL Program Guidebook. Additionally, for more information about on-site testing requirements for the WELL for residential program, refer to the WELL for residential Performance Verification Guidebook.

How This Guidebook Is Organized

This Guidebook dictates the on-site testing requirements for each feature part that includes *Performance Test* and/or *Sensor Data* as a verification method. It is divided into four sections: General Information and Setup, Performance Testing Requirements, Continuous Monitoring Requirements, and Renewal and Recertification Requirements.

The Performance Testing Requirements section is divided into five WELL Concepts–Air, Water, Light, Thermal Comfort and Sound–each with the applicable WELL parameters.

For each concept, the following information is provided and applies to all parameters associated with that concept, unless otherwise noted:

- Features – a table listing all relevant parameters for that concept, the feature parts where each parameter is referenced and the available test methodologies.
- Quantity of Sample Locations – a table defining the number of samples required as a function of project area.
- Sample Locations & Conditions – where, within the project boundary, each parameter must be measured.
- Test Method – the procedure that must be followed when measuring each parameter.

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- Reporting & Compliance - how results should be reported and the calculations used to determine compliance.
- Device Requirements & Maintenance – the quality and type of device that must be used to measure each parameter.
- WELL Core – guidelines for WELL Core projects, including what project areas to utilize in quantity calculations and how to distribute samples between leased and non-leased spaces.
- Multifamily Residential – guidelines for projects with dwelling units, including what project areas to utilize in quantity calculations and how to distribute samples between tenant spaces and non-leased spaces. The requirements in this Guidebook apply to projects enrolled in WELL at scale, WELL certification or for a WELL rating and excludes projects enrolled in the WELL for residential pilot program.

The *Continuous Monitoring Requirements* section lists the feature parts that include *Sensor Data* as a verification method and outlines the technical specifications and placement requirements for sensors.

General Information and Setup

The following conditions must be met prior to testing:

- Construction is complete*
- Certificate of occupancy has been issued for at least one month
- Minimum of 50% occupancy has been reached*

**As an exception WELL projects that are enrolled in WELL Core (WELL v2, WELL v2 pilot), Core and Shell (WELL v1), and WELL Certification for multifamily projects may perform on-site testing while construction is still underway in tenant spaces and/or before 50% occupancy has been reached. However, project teams and WELL Performance Testing Agents (PTAgents) should be aware that construction activities may negatively affect the on-site test results.*

Additionally, operating conditions during Performance Testing must be representative of those normally experienced by occupants (with relevant building systems commissioned and balanced) unless otherwise noted.

Scope

The scope of on-site testing is determined by the requirements outlined in the WELL Standard and the guidance provided for each parameter in this Guidebook. For WELL Core (WELL v2, v2 pilot) and Core and Shell (WELL v1), refer to the WELL Core guidance listed in the WELL Standard for each feature part to determine the applicable scope. For multifamily residential projects, testing is required in dwelling units unless otherwise noted in the WELL Standard. For recertification in multifamily residential projects, testing is only required in common areas (i.e., dwelling units are excluded).

Sample Point Selection

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The number of samples required for each project is determined based on the project area and reflects the maximum number of samples that should be conducted in a given project. Information on how to determine the sample quantities for each concept is listed in each corresponding section and in the Project Information and Performance Template (PIP). The formula for calculating quantity varies according to project size, as shown in the table below for the Air concept.

Air Concept - All Feature Parts	
Size Interval	**Sampling Rate**
0 - 9,290 m^2 [0 - 100,000 ft^2]	1 per 2,323 m^2 + 1 [1 per 25,000 ft^2 + 1]
9,290 - 46,452 m^2 [100,000 - 500,000 ft^2]	1 per 9,290 m^2 + 4 [1 per 100,000 ft^2 + 4]
> 46,452 m^2 [> 500,000 ft^2]	1 per 46,452 m^2 + 8 [1 per 500,000 ft^2 + 8]

Always round up when calculating sample quantities.

Here is an example of how to calculate the quantity of sample locations for the Air Concept. A project that is 13,935 m² [150,000 ft²] would use the middle row in the table above, and their formula would be as follows:

$$\frac{13{,}935\ m^2}{9{,}290\ m^2} + 4 = 1.5 + 4 = 5.5 \rightarrow 6\ samples$$

$$\frac{150{,}000\ ft^2}{100{,}000\ ft^2} + 4 = 1.5 + 4 = 5.5 \rightarrow 6\ samples$$

This *Sample Locations & Conditions* section under each concept provides PTAgents with instructions on where to take samples within the project boundary. The list of sampling locations should be followed in order of priority from top to bottom. Depending on the project's sample quantity, a PTAgent might not be able to fulfill the requirements for all of the sample locations, especially those lower on the list, before all available samples have been assigned a location.

It is also possible that a PTAgent may have samples remaining after reaching the bottom of the list. In this case, for the following parameters, PTAgents should distribute the remaining samples in any valid test locations:

- Air (all parameters)
- Visual lighting

For the following parameters, if there are more sample locations than applicable spaces, it is acceptable to stop testing once all spaces described have been sampled, as follows:

- Water (all parameters): once all relevant dispensers have been sampled
- Circadian lighting: once all workstations have been sampled
- Thermal Comfort: once all regularly occupied spaces have been sampled

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- Sound: once all spaces in the project described in feature language have been sampled

For example, a 1,925 m² [20,750 ft²] project requires three samples for reverberation time. If such a project had two areas for dining but no areas for fitness or any other areas described in feature language, the PTAgent would sample both dining areas but not use the third sample location. (If the project did not even have these dining areas, it would not be eligible to pursue this Feature, S04.1.)

PTAgents are not permitted to disclose the detailed sampling plan to project teams ahead of testing but may inform the project team of the areas that they will need to access.

If the project is made up of multiple distinct structures, utilize the combined area of all buildings to determine the sample quantities. To determine sample locations, utilize the guidance in the *Sample Locations & Conditions* sections. When picking sample locations, ensure that each structure is tested for at least one parameter. It is not required to test for every parameter in every building, and it may not be possible to do so based on the number of required samples for the project.

Prior to On-Site Testing

The PTAgent must familiarize themselves with the project by reviewing the following, which must be provided by the project team:

- Project scorecard (e.g., a scorecard exported from the WELL platform) annotated to highlight all performance-based feature parts being pursued and, if the PTAgent is contracted to take photographs, all feature parts that list *On-site Photograph* as the verification method type.
- The Project Information and Performance Template (PIP) with the first tab completed.
- As-built floor plan, including furniture layout (if relevant) and room names.
- Approved alternative adherence paths (AAPs) or equivalencies being utilized for any performance-based feature parts.
- For WELL v2 Feature L02 Part 1, the light levels specified for each task. Refer to the Verification tab in the digital standard for more information.
- For WELL v2 Feature T01 Part 1, the assumptions for CLO and MET values, including seasonal variations in these assumptions and any spaces and/or temperatures that would be excluded from feature requirements as defined by the project team. Refer to the Verification tab in the digital standard for more information.

The PTAgent must create a tentative sampling plan and schedule based on this documentation as well as the number of samples required for the project. The PTAgent may share general information about the plan for on-site testing with the project team, but the PTAgent is not permitted to share the exact test locations ahead of time. All relevant areas within the project boundary must meet WELL requirements and are subject to sampling during on-site testing.

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During On-Site Testing

The PTAgent must perform a walkthrough to further familiarize themselves with the layout and operating conditions of the project. To facilitate a smooth on-site visit and ensure that the PTAgent has access to all relevant areas of the project, the project team must arrange for the PTAgent to be accompanied by a member of building management staff. Based on observations made during the walkthrough, the PTAgent may adjust the plan for on-site testing. For example, the PTAgent may move a sampling point from an area of low occupancy to an area of typical occupancy.

Devices and Laboratories

On-site testing is performed either through a method that requires a direct-read device or a method that requires laboratory analysis.

Direct-read devices used to validate compliance with WELL features must be used, maintained and calibrated in accordance with the manufacturers specifications. They must also meet the additional relevant requirements outlined in this Guidebook.

The laboratory must meet the following requirements:

- Be accredited, by one of the following, to analyze each of the specific parameters being tested using the methodology specified in this Guidebook:
    - ISO 17025 certification by a signatory of the International Laboratory Accreditation Cooperation's Mutual Recognition Arrangement (ILAC MRA).
    - An accreditation body authorized by the national, regional or state government.
- Does not have financial or other interest in the outcome of WELL Certification or the results of on-site testing.

The PTAgent must ensure that laboratory samples are collected, analyzed, packaged and transported in accordance with instructions provided by the third-party laboratory. When documenting each sample result, report results with all decimal places and digits provided by the laboratory.

The WELL Performance Testing Provider (PTP) will ensure that all affiliated PTAgents are aware of restrictions on laboratory operations and transportation and how this affects scheduling Performance Tests. For example, water samples for coliform analysis are often not permitted to be shipped on a Friday due to the risk of delays in custody transfer and degradation of samples in storage.

Compliance with Instructions and Protocols

PTAgents are required to ensure that on-site testing is conducted in accordance with the requirements specified in this Guidebook. If it is necessary for the PTAgent to deviate due to

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on-site conditions or other factors beyond the PTAgent's control, the PTAgent must provide a detailed explanation for the deviation in the field notes section of the PIP.

The PTAgent is not permitted to interfere with, manipulate or alter on-site conditions in any way that might affect compliance with WELL requirements. If the PTAgent encounters on-site conditions that do not comply with any one of the requirements in the *Sample Locations & Conditions* sections (e.g., standalone air purifiers are off, operable windows are open, task lights are off) they should notify their project-site contact to identify the issue and determine how to move forward with testing. The project-site contact or member of the project team may adjust site conditions before the PTAgent proceeds with testing. If the PTAgent must proceed with testing under non-compliant conditions, they should include these observations in field notes.

Once the PTAgent has analyzed all on-site data, the preliminary results based on their analysis must be communicated to the project team. If their analysis indicates that any samples do not meet WELL requirements, the project team and PTAgent should take steps to understand and remedy the issue and conduct retesting. Once the results indicate that the WELL requirements are met for all samples, the PTAgent can then submit their documentation package to IWBI for third-party review. The PTAgent and project team should only submit passing results. It is not appropriate for the PTAgent to take more samples than are required so as to withhold unfavorable test results.

As part of the documentation package submitted for third-party review, PTAgents must provide the following:

- The completed PIP tool, including all relevant data entries and field notes.
- A list of the devices used and manufacturer specifications, confirming that all devices meet the requirements described in this Guidebook.
- For the laboratories used to analyze samples:
    - Laboratory accreditations for the relevant test methods and parameters
    - Test methodologies utilized by the laboratory to analyze the related parameters
    - Chain of custody for the parameters analyzed
- Calibration certificates for the devices used confirming that all devices are maintained in accordance with requirements described in this Guidebook.
- Annotated floor plans showing the final sample locations along with the date and time that each sample was collected.
- A minimum of one photograph of each unique equipment setup for each parameter tested at the project site. Photographs demonstrating typical set-up used across projects are not acceptable.
- If the PTAgent's scope includes photographs for feature parts that list *On-site Photographs* as the verification method, photographs demonstrating that the requirements have been met. For more information on what photographs should contain, refer to the Verification tab of the digital standard for the applicable feature part(s).
- Raw data collected for each sample location:
    - Acceptable file types include .xlsx; .csv; .doc; .pdf; .txt
    - Note that proprietary files such as .svl are not acceptable
- If the measurement device does not log data, provide a photograph of the result displayed on the device for each measurement at each sample location.

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- Analysis of raw data including calculations used to determine compliance with the feature part(s).

The documentation package above must be in English or translated into English and uploaded to the WELL platform for review.

Please note that if retesting is required due to PTAgent error, additional fees are the responsibility of the PTP.

Measurement Tolerance

For projects registered under WELL v2 or WELL v2 pilot, several parameters allow for a tolerance applied to the WELL threshold, not each measurement result. For example, compliance with the $PM_{2.5}$ parameter is determined using a tolerance of 20%. Thus, since the WELL feature part requires a maximum threshold of 15 µg/m^3 for $PM_{2.5}$, any result measuring 18 µg/m^3 (or lower) is considered compliant. Pathways that allow for the use of permanently installed continuous monitors do not include tolerances; refer to the Continuous Monitoring Requirements section for more information.

Performance Testing Requirements

Air

Features

Parameter	v2	v2 pilot	Performance Rating	v1	Test Method
Particulate matter	A01 Part 1, A01 Part 5	A01 Part 1, A05 Part 1	PA1, PA2, PM1	01 Part 2	Direct-read
Carbon monoxide	A01 Part 3, A05 Part 3	A01 Part 3, A05 Part 3	PA5, PA6, PM1	01 Part 2	Laboratory or Direct-read
Formaldehyde and acetaldehyde	A01 Part 2, A05 Part 2	A01 Part 2, A05 Part 2	PA3, PA4, PM1	01 Part 1	Laboratory
VOCs (other than formaldehyde and acetaldehyde)	A01 Part 2, A05 Part 2	A01 Part 2, A05 Part 2	PA3, PA4, PM1	01 Part 1, WELL v1 AAP published 25 May 2023	Laboratory
Nitrogen dioxide	A05 Part 3	A05 Part 3	PA6, PM1	-	Laboratory or Direct-read

Ozone	A01 Part 3	A01 Part 3, A05 Part 3	PA5, PM1	01 Part 1	Laboratory or Direct-read

Quantity of Sample Locations

Size Interval	Quantity
0 - 9,290 m^2 [0 - 100,000 ft^2]	1 per 2,323 m^2 + 1 [1 per 25,000 ft^2 + 1]
9,290 - 46,452 m^2 [100,000 - 500,000 ft^2]	1 per 9,290 m^2 + 4 [1 per 100,000 ft^2 + 4]
> 46,452 m^2 [> 500,000 ft^2]	1 per 46,452 m^2 + 8 [1 per 500,000 ft^2 + 8]

Sample Locations & Conditions

Determine sample locations according to the following list, working in order of priority from the top to the bottom:

- Take each sample in a different room.
- Take all samples in regularly occupied space. If there are insufficient regularly occupied spaces relative to the sample quantity, take samples in circulation areas to accommodate the required quantity.
- Take a minimum of one sample in a commercial kitchen, if present.*
- Take a minimum of one sample in an industrial space, if present.*
- Take a minimum of one sample in a room with at least four workstations, if present.
- Take a minimum of one sample on the lowest floor with regularly occupied space(s).
- Take a minimum of one sample on the highest floor with regularly occupied space(s).
- Take a minimum of one sample on each remaining floor with regularly occupied space(s).
- Take remaining samples (if any) in any valid test location.

**For projects where sample locations have been assigned a commercial kitchen and/or industrial space: These sample locations count toward the total sample quantity even though PM_{10} is not being tested in those locations. (In other words, in these projects, there will be fewer samples for PM_{10} given that PM_{10} is not a parameter that is measured in commercial kitchens and industrial spaces.)*

Testing must be conducted under the following conditions:

- For mechanically ventilated spaces, ventilation systems must be on and operating normally.
- Exhaust fans and standalone air purifiers that are manually controlled must be turned on. If they include multiple speed settings, use a middle setting.
- Operable windows must be closed.
- Take samples at a height of 1.1-1.7 m [3.6-5.6 ft] above the finished floor.

- Take samples at least 1 m [3.3 ft] away from windows, walls, doors, direct sunlight, mechanical system supply outlets, fans, heaters or any other significant source of heat or cold.
- Take samples at least 3 m [10 ft] from exterior doors.
- Samples taken to evaluate the thresholds in WELL Feature A01 for a parameter can be analyzed to determine whether the results also meet the thresholds in WELL Feature A05 for that parameter. For example, if all samples taken for Feature A01 Part 1 confirm that both the requirements for A01 Part 1 and A05 Part 1 are met, no additional sampling is required for Feature A05 Part 1.

Test Method

Parameters that are listed in both the laboratory and direct-read subsections may be sampled using either method.

- For testing using direct-read devices (particulate matter, carbon monoxide, ozone, nitrogen dioxide):
    - Record results at least once every minute.
    - Each sample must include at least one continuous hour of data, which must consist of 10 minutes of acclimation time followed by at least 50 minutes of measurement time.
- For testing using laboratory analysis (VOCs, carbon monoxide, ozone, nitrogen dioxide):
    - Prepare and analyze at least one exposure field blank for each parameter per day of sampling unless using vacuum canisters.
    - For formaldehyde and acetaldehyde:
        - Each sample must be collected using an active method (i.e., with sampling pumps) on 2,4-Dinitrophenylhydrazine (DNPH) media.
        - Each sample must be evaluated using a high performance liquid chromatography (HPLC) method for ambient or indoor air quality such as one of the following (note that methods for assessing industrial and product emissions are not acceptable):
            - ISO 16000-3
            - ASTM D5197
            - NIOSH 2016
            - EPA TO-11 (or 11A)
            - EPA Compendium Method IP-6 (or 6A)
    - For VOCs (other than formaldehyde and acetaldehyde):
        - Each sample must be collected using an active method (i.e., with sampling pumps) on sorbent media or using a vacuum canister.
        - Each sample must be evaluated using thermal desorption (if sorbent media is used) and a gas chromatography/mass spectrometry (GC/MS) method for ambient or indoor air quality, such as one of the following:
            - ISO 16000-6
            - ASTM D5197
            - EPA TO-15
            - EPA TO-17
            - ISO 16200-1
            - EN13649

            - NIOSH 1604 (acrylonitrile only, modified methodology acceptable to reach ppb concentrations)
            - OSHA PV2012 (caprolactam only, modified methodology acceptable to reach ppb concentrations)
    - For carbon monoxide:
        - Each sample must be collected using an active method (i.e., with sampling pumps).
        - Each sample must be evaluated using a gas chromatography/discharge ionization detector (GC-DID) method for ambient or indoor air quality such as OSHA ID-210.
    - For ozone:
        - Each sample must be collected using an active method (i.e., with sampling pumps).
        - Each sample must be evaluated by a laboratory using a ion chromatography/ultraviolet-visible (IC-UV/VIS) spectrometry method for ambient or indoor air quality, such as OSHA ID-214.
    - For nitrogen dioxide:
        - Each sample must be collected using an active method (i.e., with sampling pumps).
        - Each sample must be evaluated by a laboratory using an IC-UV/VIS spectrometry method for ambient or indoor air quality such as:
            - OSHA ID-182
            - NIOSH 6014-1

Reporting & Compliance

To determine compliance of each sample:

- For test methods using a direct-read device, the median value collected during the measurement time (not counting acclimation time) must meet the WELL requirement, with the tolerance shown below applied to the WELL threshold.
- For test methods using laboratory analysis, the laboratory-reported value must meet the WELL requirement, with the tolerance shown below applied to the WELL threshold. For measurements reported as below some value, that value is used to determine compliance (e.g., “< 0.002” is interpreted as 0.002). For results reported as not detected (e.g., “N/D”), report as less than the limit of detection (e.g., for a result of N/D with limit of detection of 0.05, report “< 0.05”). Results listed as above a value (e.g., “> 0.3”) are not acceptable. Include the additional tolerance for each parameter shown below.
- Tolerances applied to the WELL threshold:
    - Particulate matter: 20%
    - Formaldehyde and acetaldehyde: 20%
    - VOCs (other than formaldehyde and acetaldehyde): 5%
    - Carbon monoxide: none
    - Ozone: 5%
    - Nitrogen dioxide: 20%

Device/Laboratory Requirements & Maintenance

Parameters listed in both the laboratory and direct-read method sections below may be sampled using either method.

For methods that use a direct-read device (particulate matter, carbon monoxide, ozone, nitrogen dioxide):

- Technical specifications:
    - For particulate matter:
        - Device type: Light-scattering airborne particle counter
        - Lower detectable limit: 1 $\mu g/m^3$ or lower
        - Upper detectable limit: 1,000 $\mu g/m^3$ or higher
        - Instrument accuracy (at the size specified by the manufacturer): ≤ 15%
        - Resolution: 1 $\mu g/m^3$
        - Reporting interval: 1 minute or faster
    - For carbon monoxide:
        - Lower detectable limit: 0.1 ppm or lower.
        - Upper detectable limit: 25 ppm or higher.
        - Resolution: 0.1 ppm.
    - For ozone:
        - Lower detectable limit: 20 ppb or lower.
        - Upper detectable limit: 500 ppb or higher.
        - Resolution: 1 ppb.
    - For nitrogen dioxide:
        - Lower detectable limit: 10 ppb or lower.
        - Upper detectable limit: 500 ppb or higher.
        - Resolution: 1 ppb.
- Maintenance:
    - The device has been validated to perform within the technical specifications listed in the Device Requirements section for each parameter. If accuracy is undefined in this Guidebook, the device must perform within the manufacturer's published accuracy levels. Validation must be done within the year prior to on-site testing and in accordance with a reference standard traceable to a National Metrology Institute, such as NIST, NPL or PTB.

For test methods that require laboratory analysis:

- Unless otherwise noted, all laboratory test methods require active collection using sampling pumps and tubes, as follows:
    - The flow rate and duration specified by the referenced testing methodology must be used.
    - The total sample volume collected must be sufficient to obtain a limit of quantification appropriate for the concentration limit thresholds specified for a parameter.

    - Sampling pumps must be calibrated by a separate flow meter prior to collecting each sample and confirmed to be capable of meeting the airflow rates prescribed by the referenced testing methodology.
    - Total sample volume must be calculated using the average of the airflow rate obtained during the calibration step and the final airflow rate indicated on the flow meter. (Airflow rates documented on the chain of custody [COC] must be the rate indicated on the separate flow meter, not the pump's built-in meter.)
    - Single tube sampling at each test location is acceptable as an alternative to distributed volume pair sampling. Note that any impact to data quality (e.g., insufficient sample volume, breakthrough) is the responsibility of the PTAgent.

WELL Core

- For projects pursuing only Feature A01, Part 1, 2 or 3 and not pursuing Feature A05, Part 1, 2 or 3, calculate the number of samples using either the area of non-leased space OR 2.5% of the total project area, whichever is larger.
    - If non-leased space comprises at least 2.5% of total project area, take all samples in non-leased space.
    - If non-leased space comprises less than 2.5% of total project area, take at least one sample in non-leased space, if present, and one sample in leased space. Take the remaining samples in either leased or non-leased spaces.
- For projects pursuing both Feature A01, Part 1, 2 or 3 and Feature A05, Part 1, 2, or 3:
    - First, calculate the total number of sample locations using the total project area.
    - Then, calculate the minimum number of sample locations needed in non-leased space using the area of non-leased space, if present.
    - All remaining samples are tested in leased space.
    - For the remaining sample locations:
        - If no non-leased space is present, take all samples in leased space.

Additional considerations:

- Once the requirements for sampling in leased versus non-leased spaces have been applied to the WELL Core project, determine the actual sampling locations for each parameter by following the guidance in the relevant *Sample Locations & Conditions* sections. For example, in a WELL Core project that is only pursuing Feature A01 and consists of at least 2.5% non-leased space, the *Sample Locations & Conditions* requirement to “take at least one sample on the highest floor with regularly occupied space” would exclude floors with only leased space.

Multifamily Residential

- For projects targeting Bronze or Silver level of certification (not Gold or Platinum) and only pursuing Feature A01, Part 1, 2 or 3:
    - Calculate the number of samples using the area of common areas.
    - If there are no common areas present, no testing is required.
    - Take all samples in common areas, if present, and not in dwelling units.
- For projects targeting Gold or Platinum level of certification and/or for projects pursuing both Feature A01, Part 1, 2 or 3 and Feature A05, Part 1, 2 or 3:

- First, calculate the total number of sample locations using the total project area.
- Then, calculate the number of sample locations needed in common areas using the area of common areas, if present.
- To calculate the number of sample locations in dwelling units, deduct the number of sample locations in common areas from the number of sample locations required per the total project area.
- If no common areas are present, take all samples in dwelling units.

Water

Features

Parameter	v2	v2 pilot	Performance Rating	v1	Test Method
Turbidity	W01 Part 1	W01 Part 1	PW1	30 Part 1	Direct-read
Coliforms	W01 Part 1	W01 Part 2	PW1	30 Part 2	Laboratory
Disinfectants	W02 Part 1, W04 Part 1	W02 Part 6	PW2, PW4	34 Part 1	Direct-read
Laboratory-based parameters	W02 Part1, W02 Part 2, W04 Part 1	W02 Part 1, W02 Part 2, W02 Part 3, W02 Part 4, W02 Part 5, W02 Part 6, W04 Part 1	PW2, PW3, PW4	31 Part 1, 32 Part 1, 33 Part 1, 33 Part 2, 34 Part 2, 34 Part 3, 37 Part 3	Laboratory

Quantity of Sample Locations

	Turbidity and Coliforms	Disinfectants and Laboratory-Based Parameters
Size Interval	**Quantity**	**Quantity**
0 - 4,644 m^2 [0 - 49,999 ft^2]	2	1
4,645 - 46,451 m^2 [50,000 - 499,999 ft^2]	4	2
≥ 46,452 m^2 [≥ 500,000 ft^2]	6	3

Note: The size intervals in this table are not the same as for other concepts.

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Sample Locations & Conditions

Determine sample locations according to the following:

- For turbidity and coliforms, samples may be taken at fixtures used for handwashing, bathing, drinking water and/or cooking. Include at minimum each of the following:
    - At least one sample at a fixture designed for handwashing or bathing, if present.
    - At least one sample at a fixture designed for drinking water or cooking, if present.
- For disinfectants and laboratory-based parameters, samples may be taken at fixtures used for drinking water and/or cooking. Determine sample locations according to the following list, working in order of priority from the top to the bottom.
    - Take samples from drinking water dispensers that are connected to the building's water source without point-of-use filters, if present.
    - Take samples from drinking water dispensers with point-of-use filters only if there are no dispensers without such filters.
    - Take samples from free-standing refillable drinking water dispensers (which are not connected to a building water source) only if no piped drinking water dispensers are present.
    - If a commercial kitchen is equipped with a secondary fixture used for drinking water, take samples from the drinking water fixture instead of the main kitchen fixture.
- For all Water parameters, determine sample locations according to the following list, working in order of priority from the top to the bottom:
    - For projects with three or more floors (including basement floors), take a minimum of one sample on either of the top two floors.
    - Take each sample on a different floor.
    - When testing on multiple floors, avoid locating a sample directly above another sample (so that various plumbing riser layouts within the project area are represented).
    - Take each sample at least two floors above or below another sample.
    - Take each sample from an outlet that is at least 9 m [30 ft] away from or on a floor above the location where the main water supply enters the building.
    - If there are fewer dispensers than required samples, it is acceptable to stop sampling once each dispenser has been sampled at least once. If this scenario arises, the PTAgents should indicate that no additional dispensers are available for testing in the field notes section of the PIP tool.

Testing must take place under the following conditions:

- Take samples from cold water fixtures. If the fixture has a mix of both cold and hot water, use the coldest setting.
- Do not "flame" (sanitize) or remove the aerator from the fixture.

Test Method

For turbidity:

- For each sample location (i.e., water fixture), take a total of three measurements.

- Follow the manufacturer's instructions for device setup, sample collection and measurement.
- Use and maintain the device and calibration solutions in accordance with the manufacturer's instructions.

For coliforms:

- Obtain the appropriate sampling materials from the laboratory prior to on-site testing.
- Collect one sample per fixture selected for testing.
- Samples are time sensitive and must arrive at the laboratory within the timeline and under the conditions established in the method of analysis (typically within 24 and 30 hours after collection).
- Samples are temperature sensitive and must arrive at the laboratory at the temperature established by the laboratory (typically just above freezing, around 4 °C [39 °F]).

For disinfectants:

- For each sample location (i.e., water fixture), take a total of three measurements.
- Analyze each sample by adding the appropriate reagents as specified by the device manufacturer.

For laboratory-based parameters:

- Obtain the appropriate sampling materials from the laboratory prior to on-site testing.
- Collect one sample per fixture selected for testing.

Reporting & Compliance

To determine compliance with each sample:

- For turbidity and disinfectants:
  - The average value of the three measurements, rounded to the nearest tenth, must meet the WELL requirements.
- For coliforms:
  - Coliforms must be not detected in the sample. Note: MPN of < 2 per 100 mL is considered '"Not detected."
- For laboratory-based parameters:
  - The concentration detected must meet the WELL requirement.
  - For measurements reported as below some value, that value is used to determine compliance (e.g., "< 0.002" is interpreted as 0.002). For results reported as not detected (e.g., "N/D"), report as less than the limit of detection (e.g., for a result of N/D with limit of detection of 0.05, report "< 0.05"). Results listed as above some value (e.g., "> 0.3") are not acceptable.

Device/Laboratory Requirements & Maintenance

- For turbidity:
  - Lower detectable limit: 0.05 NTU or lower.

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    - Accuracy: ±2% of reading.
    - One of the following:
        - Meets or exceeds requirements of EPA Method 180.1.
        - Upper detectable limit of 5 NTU or greater and reporting resolution 0.02 NTU or finer.
    - Maintenance: The device and calibration solutions have been used and maintained in accordance with the manufacturer's instructions.
- For coliforms:
    - Samples must be analyzed using a fermentation or membrane filter technique in accordance with 40 CFR 141.74(a)(1), ISO 9308 or a national standard for determining coliforms in drinking water.
    - Sample results must be reported in either CFU/100 mL or in MPN/100 mL.
- For disinfectants:
    - Device must use one of the following:
        - A method listed by the US EPA "Analytical Methods Approved for Drinking Water Compliance Monitoring under the Disinfection Byproduct Rules" for total and free (residual) chlorine.
        - A method approved by a local government for testing these parameters in drinking water.
    - Maintenance: The device and calibration solutions must have been used and maintained in accordance with the manufacturer's instructions.
- For laboratory-based parameters:
    - For each parameter, samples must be analyzed by a laboratory using a method for assessing drinking water.
    - For each parameter, the limit of detection must be at or below the WELL requirement.

WELL Core

- Calculate the number of samples using the total project area.
    - Exception: For WELL v1, for Features 30 through 34, calculate the number of samples using the area of non-leased space.
- If no drinking water dispensers are present, take samples for drinking water quality from handwashing fixtures.
- If possible, take all samples from fixtures served by untreated piped water (i.e., water from the building's potable water network without a point-of-use filter installed). These samples may be taken from either leased or non-leased space.
    - If water cannot be sampled from untreated piped water, then take at least one sample from a leased space and, if applicable, a second sample from a non-leased space.
    - For projects indicating that they are utilizing AAP [#00122], take all samples in non-leased spaces. AAP [#00122] can be used by projects that meet the following conditions:
        - Drinking water cannot be sampled in leased spaces or cannot be sampled from piped water (i.e., drinking water comes from a non-piped source).
        - Have demonstrated that leased spaces are provided with drinking water of a similar quality as non-leased spaces.

Multifamily Residential

- For projects targeting Bronze or Silver level of certification (not Gold or Platinum):
  - Calculate the number of samples using the area of common areas.
  - Take all samples in common areas, if present (not in dwelling units). If there are no common areas present, no testing is required.
- For projects targeting Gold or Platinum level of certification:
  - First, calculate the total number of sample locations using the total project area.
  - Then, calculate the number of sample locations needed in common areas using the area of common areas, if present.
  - To calculate the number of sample locations in dwelling units, deduct the number of sample locations in common areas from the number of sample locations required per the total project area.
  - If no common areas are present, take all samples in dwelling units.
  - Do not take more than one sample in a single dwelling unit.

Light

The on-site test procedures for the two parameters in Light, visual lighting and circadian lighting, are explained individually since there is minimal overlap between the two.

Features

Parameter	v2	v2 pilot	Performance Rating	v1	Test Method
Visual lighting	L02 Part 1	L02 Part 1	PL1	53	Direct-read
Circadian lighting	L03 Part 1	L03 Part 1	PL2	54	Direct-read

Visual Lighting

Quantity of Sample Locations

Size Interval	Quantity
0 - 9,290 m² [0 - 100,000 ft²]	1 per 149 m^2 + 21 [1 per 1,600 ft^2 + 21]
9,290 - 46,452 m² [100,000 - 500,000 ft^2]	1 per 2,323 m^2 + 80 [1 per 25,000 ft^2 + 80]
> 46,452 m² [> 500,000 ft²]	1 per 9,300 m^2 + 95 [1 per 100,000 ft^2 + 95]

Sample Locations & Conditions

For all WELL programs except WELL v1:

- Tasks are determined by the project team within their documentation uploaded in the WELL platform.
- Determine tasks for sampling according to the both of the following:
    - Take samples for at least two unique tasks.
    - Once a task has been selected for measurement, do not select that same task for additional measurements unless each unique task has been sampled at least once. For example, once a circulation area has been sampled, do not sample a second circulation area unless all other tasks described by the project team have also been sampled.
- For each task identified for testing, determine sample locations using a grid. The grid must be designed as follows:
    - Overlay a 3 m x 3 m [10 ft x 10 ft] grid on the space (i.e., floor plan), centered so that no sample point is within 0.6 m [2 ft] of a wall. Figure 1 below provides an example of how to overlay a grid within a space.
    - Locate samples at the intersection points on the grid.
    - For each task being sampled, take samples at all intersection points on the grid within the space. There are two instances where all intersection points on the grid do not need to be sampled:
        - For the last task being sampled, once the required quantity of samples has been completed, if there are remaining intersection points for that task, those intersection points do not need to be sampled. In this case, begin sampling at the center of the grid, fanning out until all samples have been taken. For example, if a room is large enough to require 10 samples (i.e., it has 10 intersection points based on the grid layout) but only 4 sample locations are still available, then the four intersections at the center of the room would be tested, and the remaining intersections would not be tested.
        - In spaces with a repetitive lighting layout, such as a large open office area or a long corridor, as long as at least four samples have been taken in a representative portion of that space, the remaining intersection points do not need to be sampled.

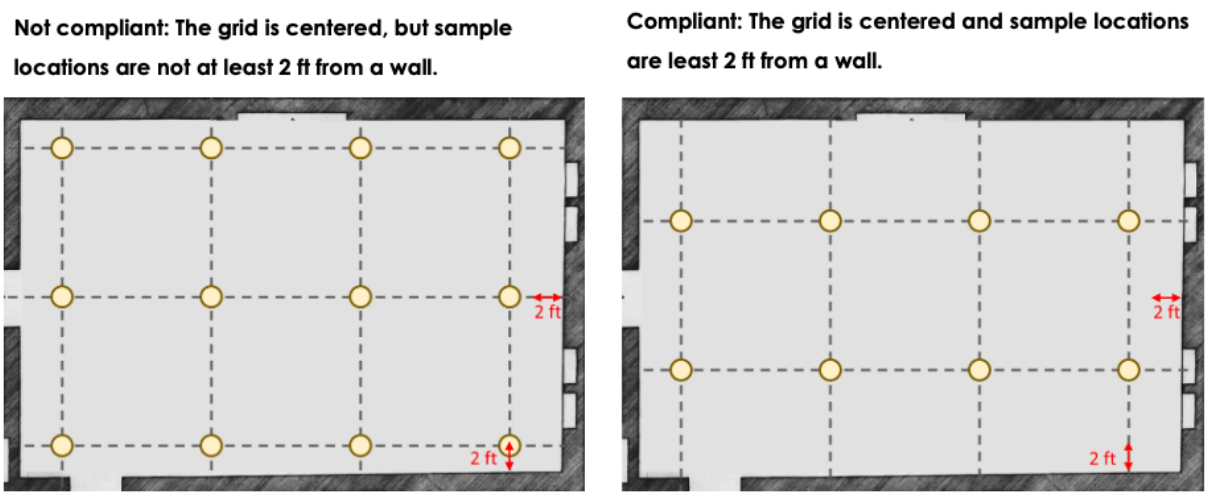

Figure 1: Example of compliant and non-compliant grid layout.

For WELL v1:

Determine sample locations according to the following:

- Locate samples at workstations.
- Take each sample at least 3 m [10 ft] from any other sample for this feature.

Testing must be conducted under the following conditions:

- Take samples at night using electric light only to avoid contributions from daylight.
- If present, supplemental lighting must be turned on and positioned on the work surface in the typical user condition.

Test Method

- Whenever the device is powered on and before taking the first sample, the device must be dark-calibrated according to the manufacturer's instructions, if applicable.
- Each sample must be taken on the horizontal plane with the device aperture facing upward.
- Sample height:
    - For all versions except WELL v1, take each sample at the height of the task provided by the project team via the associated Technical Document for this feature part in the WELL platform.
    - For WELL v1, take each sample on the surface of the desk, which is considered the horizontal work plane.
- When taking a measurement, ensure that the shadow of the PTAgent does not fall on the device aperture.

Reporting & Compliance

To determine compliance:

- For all versions except WELL v1, for each space/task, the average value of all samples taken for each unique space/task must meet the target illuminance established by the project team (found in the Technical Document for this feature part in the WELL platform).
- For WELL v1, the average illuminance must meet the threshold in feature language.

Device Requirements & Maintenance

- Direct-read device: cosine-corrected illuminance meter.
- Technical specifications:
    - Range: includes 10-20,000 lux
    - Maximum acceptable illuminance error: ±5% (at values less than 2,000 lux)
    - Resolution: 1 lux (at values less than 1,000 lux)
- Maintenance: The device has been validated to perform within the technical specifications listed in the Device Requirements section for each parameter. Validation must be done within the eight years prior to on-site testing and conducted in a laboratory accredited to meet ISO/IEC 17025:2017 using a process traceable to a National Metrology Institute, such as NIST, NPL or PTB.

WELL Core

- For projects only seeking the base points:
    - Calculate the number of samples using the area of non-leased space.
    - Take all samples in non-leased space. If there is no non-leased space present, no testing is required.
- For projects seeking the additional point:
    - Calculate the number of samples using the total project area.
    - Access to at least 10% of leased space for testing is required.
    - Take samples for at least one task in non-leased space, if present.
    - Take at least 50% of the required samples in leased space.
    - The remaining samples can be located either in leased or non-leased space.

Multifamily Residential

- For projects targeting Bronze or Silver level of certification (not Gold or Platinum):
    - Calculate the number of samples using the area of common areas.
    - Take all samples in common areas, if present (not in dwelling units).
    - If there are no common areas present, no testing is required.
- For projects targeting Gold or Platinum level of certification:
    - First, calculate the total number of sample locations using the total project area.
    - Then, calculate the minimum number of sample locations needed in common areas using the area of common areas if present.
    - The number of sample locations in dwelling units is at least 50% of the total sample (or all samples remaining after calculating the minimum in common areas, if fewer).
    - Take the remaining samples (if any) in either common areas or dwelling units.
    - If no common areas are present, take all samples in dwelling units.

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- Do not test more than one room in a single dwelling unit, unless all dwelling units have already been tested.

Circadian Lighting

Quantity of Sample Locations

Size Interval	Quantity
0 - 9,290 m² [0 -100,000 ft²]	1 per 186 m² + 10 1 per 2,000 ft² + 10
9,290 - 46,452 m² [100,000 - 500,000 ft²]	1 per 2,323 m² + 56 [1 per 25,000 ft² + 56]
> 46,452 m² [> 500,000 ft²]	1 per 4,645 m² + 66 [1 per 50,000 ft² + 66]

Sample Locations & Conditions

Determine sample locations according to the following requirements:

- Take all samples at workstations.
- Do not take more than three samples in a single room if there are any rooms with workstations that have not been tested.
- Do not take more than one sample at each workstation.
- It is possible that the number of required sample locations for a project does not allow a PTAgent to take samples in all rooms with workstations before available samples are assigned a sample location.
- If there are fewer workstations than required samples, it is acceptable to stop sampling once all workstations have been sampled at least once. If this scenario arises, PTAgents should indicate that no additional workstations are available for testing in the field notes section of the PIP tool.

Testing must be conducted under the following conditions:

- For all versions except WELL v1, take samples at night using only electric light to avoid contributions from daylight.
- For WELL v1, samples must be taken under both daylight and nighttime conditions:
  - For Part 1a, take samples between 9:00 a.m. and 1:00 p.m. to account for the contributions of daylight.
  - For Part 1b, take samples at night using only electric light to avoid contributions from daylight.
- If present, supplemental lighting must be turned on and positioned on the work surface according to typical use.

Test Method

- Each time a device is powered on and before taking a sample, the device must be dark-calibrated according to the manufacturer's instructions, if applicable.

- Take one sample per workstation.
- Take each sample on the vertical plane at a height of 45 cm [18 in] above the work plane with the aperture facing the direction of gaze of the occupant.
- Take each sample with the device mounted on a tripod and placed on a stable surface.
- When taking a measurement, ensure that the shadow of the PTAgent does not fall on the device aperture.

Reporting & Compliance

- Report the illuminance levels in lux and the spectral power at 5 nm increments from 380 nm to 730 nm. The methodology described in Table L2 in WELL (EML = lux × melanopic ratio) will be used to calculate the equivalent melanopic lux using the recorded spectral power values.
- To determine compliance:
    - For all versions except WELL v1:
        - The median EML value of all samples must meet the WELL requirement, with a 5% tolerance applied to the WELL threshold.
        - The minimum EML value must meet half the WELL requirement, with a 5% tolerance applied to the WELL threshold.
    - For WELL v1:
        - For Part 1a, the 25th percentile of the EML values of samples taken during the day must meet the WELL requirement.
        - For Part 1b, for samples taken at night:
            - The median EML value of all samples must meet the WELL requirement.
            - The minimum EML value must meet half the WELL requirement.
        - The feature is achieved if either Part 1a or Part 1b is met.

Device Requirements & Maintenance

- Direct-read device: cosine-corrected optical spectrometer.
- Technical specifications:
    - Wavelength range: includes 380-730 nm
    - Maximum acceptable overall illuminance error: ±5%
    - Optical Resolution: 11 nm or less
    - Range includes: 10-20,000 lux
    - Resolution: 1 lux (at values less than 1,000 lux)
- Maintenance: The device has been validated to perform within the technical specifications listed in the Device Requirements section for each parameter. Validation must be done within the eight years prior to on-site testing and conducted in a laboratory accredited to meet ISO/IEC 17025:2017 using a process traceable to a National Metrological Institute, such as NIST, NPL or PTB.
- Alternate device requirements and protocol:
    - A spectrometer that is *not* cosine corrected but which meets the other device requirements may be used for testing this parameter when it is used in conjunction with a photometer that meets the device requirements for the Visual Lighting parameter. In this case:

        - The photometer and spectrometer must be in the same position when taking measurements, as described in the Test Method section.
        - In the formula EML = lux × melanopic ratio, calculate the melanopic ratio using the data from the spectrometer and calculate the lux using the photometer.

WELL Core

- To calculate the number of samples, use the total project area.
- Testing is required in non-leased space, if present, and in leased space. Access to at least 10% of leased space for testing is required.
    - Take a minimum of one sample in non-leased space, if present. If no non-leased space is present, take all tests in leased space.
    - Take at least 50% of the required quantity of samples in leased spaces.
        - Where working planes are present, take measurements as described for workstations in the *Test Method* section above.
        - Where no working planes are present (for instance, a commercial interior before tenant buildout), take four measurements in the center of the space at 140 cm [55 in] in orthogonal directions. The median value of the four measurements constitutes one sample point.
    - Take the remaining samples in either leased or non-leased space.

Multifamily Residential

- To calculate the number of samples, use the total project area.
- Testing is required in common areas, if present, and in dwelling units.
    - Take a minimum of one sample in common areas, if present. If no common areas are present, take all samples in dwelling units.
    - Take at least 50% of the required quantity of samples in dwelling units. Within dwelling units:
        - Take samples in kitchens, living rooms and home offices (or in the “main room” in studio apartments).
        - Where working planes are present (e.g., kitchen counter, desk in a home office), take measurements as described for workstations in the *Test Method* section above.
        - Where no working planes are present, take four measurements in the center of the space at 140 cm [55 in] in orthogonal directions. The median value of the four measurements constitutes one sample point.
    - Take the remaining samples in either common areas or dwelling units.
    - Do not take more than three samples in a single dwelling unit if there are any dwelling units that have not been tested.

Thermal Comfort

Features

Parameter	v2	v2 pilot	Performance Rating	v1	Test Method
Dry bulb temperature	T01 Part 1	T01 Part 1, T02 Part 1	PT1	76 Part 1, 76 Part 2, 76 Part 3	Direct-read
Mean radiant temperature	T01 Part 1	T01 Part 1, T02 Part 1	PT1	76 Part 1, 76 Part 2, 76 Part 3	Direct-read
Relative humidity	T01 Part 1, T07 Part 1	T01 Part 1, T02 Part 1, T07 Part 1	PT1, PT2	16 Part 1, 76 Part 1, 76 Part 3	Direct-read

Quantity of Sample Locations

Size Interval	Quantity
0 - 9,290 m² [0 - 100,000 ft^2]	1 per 929 m^2 + 3 [1 per 10,000 ft^2 + 3]
9,290 - 46,452 m² [100,000 - 500,000 ft^2]	1 per 2,323 m^2 + 9 [1 per 25,000 ft^2 + 9]
> 46,452 m^2 [> 500,000 ft^2]	1 per 9,290 m^2 + 24 [1 per 100,000 ft^2 +24]

Use the calculator in the PIP tool to determine sample quantities.

Sample Locations & Conditions

Determine sample locations according to the following list, working in order of priority from the top to the bottom:

- Take each sample in a different room.
- Take a minimum of one sample in a commercial kitchen, if present.
- Take a minimum of three samples on the lowest floor with regularly occupied space, with at least one sample in a room with at least four workstations, if present.
- Take a minimum of three samples on the highest floor with regularly occupied space, with at least one sample in a room with at least four workstations, if present.

- Take a minimum of three samples on each remaining floor with regularly occupied space, with at least one sample in a room with at least four workstations, if present.
- If there are fewer regularly occupied spaces than required samples, it is acceptable to stop sampling regularly occupied space once each space has been sampled at least once. If this scenario arises, the PTAgents should indicate that no additional regularly occupied areas are available for testing in the field notes section of the PIP tool.

Testing must be conducted under the following conditions:

- For mechanically ventilated spaces, ventilation systems must be on and operating normally.
- Operable windows must be closed.
- Exhaust fans and standalone air purifiers that are manually controlled must be turned on. If they include multiple speed settings, use a middle setting.
- Take samples at a height of 1.1-1.7 m [3.6-5.6 ft] above the finished floor.
- Take samples at least 1 m [3.3 ft] away from windows, walls, doors, direct sunlight, mechanical system supply outlets, fans, heaters or any other significant source of heat or cold.
- Take samples at least 3 m [10 ft] from exterior doors.

Test Method

- Record results at least once every minute.
- Each sample must include at least 10 minutes of data.
- Additionally, for mean radiant temperature:
    - Mean radiant temperature can be determined one of two ways:
        - Using a spherical or ellipsoidal globe thermometer.
        - Using calculations from the temperature of surrounding walls and surfaces, as described in ASHRAE Handbook–Fundamentals, Chapter 9.10.

Reporting & Compliance

To determine compliance with each sample:

- For PMV:
    - Determine the median value for measurements of dry bulb temperature, mean radiant temperature and humidity.
    - Use these median values in conjunction with values for clothing insulation, metabolic activity and air speed (if applicable) provided by the project team to calculate PMV. Compliance is based on the PMV value meeting the WELL requirement.
- For relative humidity:
    - Compliance is based on the median value collected during the measurement time meeting the WELL requirement, with a 3% tolerance applied to the WELL threshold.

Device Requirements & Maintenance

- Technical specification:
    - For dry bulb temperature:
        - Lower detectable limit: 10 °C [50 °F] or lower.
        - Upper detectable limit: 40 °C [100 °F] or higher.
        - Resolution: 0.5 °C [1 °F].
        - Accuracy: ±0.5 °C [±1 °F].
    - For mean radiant temperature:
        - Lower detectable limit: 10 °C [50 °F] or lower.
        - Upper detectable limit: 40 °C [100 °F] or higher.
        - Resolution: 0.5 °C [1 °F].
        - Accuracy: ±1 °C [±2 °F].
    - For humidity:
        - Lower detectable limit: 10% or lower.
        - Upper detectable limit: 90% or higher.
        - Resolution: 1%.
        - Instrument accuracy: ±3 percentage points from 10-90% relative humidity.
- Maintenance: The device has been validated to perform within the technical specifications listed in the Device Requirements section for each parameter. Validation must be done within the three years prior to on-site testing and in accordance with a reference standard traceable to a National Metrology Institute, such as NIST, NPL or PTB.

WELL Core

- For Feature T01 Part 1:
    - Calculate the number of samples using the area of non-leased space.
    - Take all samples in regularly occupied, non-leased space.
    - If no regularly occupied, non-leased space is present, no testing is required.
- For Feature T02 Part 1 (v2 pilot only):
    - Calculate the number of samples using the total project area.
    - Access to at least 10% of leased space for testing is required.
    - The samples collected for Feature T01 Part 1 in non-leased space may count toward the required number of samples. Take remaining samples in leased space.
- For Feature T07 Part 1:
    - Calculate the number of samples using the total project area.
    - Access to at least 10% of leased space for testing is required.
    - Take at least one sample in non-leased space, if present.
    - Take at least 50% of the required samples in leased spaces.
    - Take the remaining samples either in leased or non-leased spaces.

Additional Considerations:

- Once the requirements for sampling in leased versus non-leased spaces have been applied to the WELL Core project, determine the actual sampling locations for each parameter by following the guidance in the relevant *Test Locations & Conditions*

sections. For example, in a WELL Core project that is pursuing Feature T01, the *Test Locations & Conditions* requirement to “take at least three samples on the highest floor with regularly occupied space” would exclude floors with only leased space.

Multifamily Residential

- For projects targeting Bronze or Silver level of certification (not Gold or Platinum):
  - Calculate the number of samples using the area of common areas.
  - Take all samples in common areas, if present (not in dwelling units).
  - If there are no common areas present, no testing is required.
- For projects targeting Gold or Platinum level of certification:
  - First, calculate the total number of sample locations using the total project area.
  - Then, calculate the minimum number of sample locations needed in common areas using the area of common areas, if present.
  - The number of sample locations in dwelling units is at least 50% of the total sample (or all samples remaining after calculating the minimum in common areas, if fewer).
  - Take the remaining samples (if any) in either common areas or dwelling units.
  - If no common areas are present, take all samples in dwelling units.
  - Do not test more than one room in a single dwelling unit, unless all dwelling units have already been tested.

Sound

Features

Parameter	**v2**	**v2 pilot**	**Performance Rating**	**v1**	**Test Method**
Background noise levels	S02	S02	PS1	-	Direct-read
Sound insulation	S03 Part 2	S03 Part1	PS2	-	Direct-read
Reverberation time	S04 Part1	S04 Part 1	PS3	78 Part 1, 78 Part 2	Direct-read
Sound masking	-	S05 Part 1	-	79, Part 2	Direct-read

Quantity of Sample Locations

	Background Noise Levels & Sound Insulation	**Reverberation Time & Sound Masking**

Size Interval	Quantity	Quantity
0 - 9,290 m² [0 - 100,000 ft²]	1 per 581 m² + 1 [1 per 6,250 ft² +1]	1 per 1,858 m² + 1 [1 per 20,000 ft² + 1]
9,290 - 46,452 m² [100,000 - 500,000 ft²]	1 per 4,645 m² + 15 [1 per 50,000 ft² +15]	1 per 9,290 m² + 5 [1 per 100,000 ft² + 5]
> 46,452 m² [> 500,000 ft²]	1 per 23,226 m² + 23 [1 per 250,000 ft² +23]	1 per 23,226 m² + 8 [1 per 250,000 ft² + 8]

Sample Locations & Conditions

Determine sample locations according to the following list, working in order of priority from the top to the bottom:

- For background noise levels:
  - Take a minimum of one sample on the ground floor or the floor closest to the ground level that contains a space identified in feature requirements.
  - Take a minimum of one sample on the highest floor that contains a space identified in feature requirements.
  - Take a minimum of one sample in each of the four categories identified in the feature requirements, if present.
  - Take each sample in a different room.
- For sound insulation:
  - Take a minimum of one sample on walls for each table row listing combinations of source and receiver rooms outlined in the feature requirements (e.g., between adjacent quiet zones).
- For reverberation time:
  - Take a minimum of one sample in a classroom, a lecture room or a conference room, if present.
  - Take a minimum of one sample in each room type outlined in the feature requirements (e.g., areas for conferencing).
- For sound masking (WELL v2 pilot and WELL v1 only):
  - Take a minimum of one sample in an open office, library, cafeteria or hallway, if present.
  - Take a minimum of one sample in an enclosed office or quiet zone, if present.
- For all parameters
  - If every single space within the project described in feature language has been sampled, it is acceptable to stop sampling. If this scenario arises, PTAgents should indicate that no additional spaces are available for testing in the field notes section of the PIP tool.

Testing must be conducted under the following conditions:

- Take each sample at a height of at least 1.2 m [4 ft] above the finished floor.
- Take each sample a minimum of 1.5 m [5 ft] away from:
  - Internal noise sources such as appliances.
  - Fenestration.

    - Exterior duct, conduit or piping penetrations.
- Take each sample a minimum of 1 m [3.3 ft] away from any reflective surfaces such as walls, columns, desks or office furniture.
    - Avoid any room less than 2 m [6.6 ft] in each dimension, as it would not be possible to take tests 1 m [3.3 ft] away from the surrounding walls, unless there are insufficient rooms larger than this.
- Testing must occur when the space is unoccupied or when the fewest number of residents/staff are on-site or nearby.
    - PTAgents must note sources of noise that may impact the results. Record these observations in the Field Notes and Equipment tab of the PIP tool. Examples include exterior noise intrusion from industrial, pedestrian, traffic, mechanical or weather-related sources and/or interior noise from mechanical sources, occupants, construction or other building services.
- Doors must be closed in the room being tested.
- For background noise levels:
    - For mechanically ventilated spaces, ventilation systems must be on and operating normally.
    - Exhaust fans and standalone air purifiers that are manually controlled must be turned on. If they include multiple speed settings, use a middle setting.
    - Operable windows must be closed.
    - Sound masking systems must be off (if present).
    - Other sound-emitting building services (e.g. escalators, elevators, appliances) must be on and operating normally.
- For sound isolation and reverberation time:
    - Mechanical systems and appliances may be off or on. Note that testing while these systems are operating may require the use of a louder sound source in order for the sound meter to be able to report an accurate result.
- For sound masking (WELL v2 pilot and WELL v1 only):
    - Sound masking systems must be on.

Test Method

For background noise levels:

- Measure the Leq (average sound pressure level) and L10 over a duration of 5 minutes using slow weighting.
    - For dwelling units, see the *Multifamily Residential* section, below.

For sound isolation:

- Select a wall to be tested that separates two rooms: the source room (the room in which the sound is being produced) and the receiving room (the adjacent room, where the **second** measurement is taken).
- Place the loudspeaker 5 m [16 ft] away from the wall that is being tested. (If this room is less than 5 m [16 ft] wide, place the speaker near the wall opposite that being tested.)
    - If a non-omnidirectional speaker is used, aim the loudspeaker into a trihedral corner along the opposite wall (i.e., where two walls join at right angles with the floor).

- Set the loudspeaker to at least 90 dBA. The loudspeaker must operate such that it is audible in the receiving room.
    - Measure L10 in the source room (the “source level”) at least 1 m [3.3 ft] from the loudspeaker.
    - Measure L90 in the receiving room (the “receiving level”) at least 1 m [3.3 ft] from the partition of interest.
- Turn off the loudspeaker and measure L90 in the receiving room (the “receiving ambient”).
- Each sample must include at least 30 seconds of data.
- PTAgents should wear hearing protection when operating loudspeakers.

For reverberation time:

- Take samples according to one of the following methods:
    - Speaker method:
        - Turn the loudspeaker on to approximately 90 dBA using a white/pink noise generator.
        - Once the sound level meter is armed for impulse measurement, turn off the sound source and wait approximately 5 seconds for the sound level meter to capture the response at all frequencies.
        - If the sound meter gives a notification of insufficient signal-to-noise or data quality, delete the test result (i.e., do not record it) and retest at a higher loudspeaker volume.
    - Balloon method:
        - Inflate the balloon to 0.4 m [16 in] diameter.
        - Once the meter is armed for impulse, burst the balloon using a pin or similar object.
        - Allow approximately 5 seconds for the meter to capture response at all frequencies.
- For each sample, take three measurements. It is acceptable to measure RT_{20} or RT_{30} and extrapolate RT_{60} from that value.
- PTAgents should wear hearing protection when operating loudspeakers.

For sound masking (WELL v2 pilot and WELL v1 only):

- Measure L90 over a duration of 30 seconds using slow weighting.

Reporting & Compliance

To determine compliance with each sample:

- For background noise levels:
    - For Leq, the A-weighted and C-weighted measurements must meet the WELL requirements, with a +4 dB tolerance applied to the WELL threshold.
    - For L10, the A-weighted and C-weighted measurement must meet the WELL requirements, with a +9 dB tolerance applied to the WELL threshold.
- For noise isolation:
    - One of the following must be reported:

        - Noise Isolation Class (NIC) is calculated from L10 of the source measurement, L90 of the receiving location with source on and L90 of the ambient background level (source off) of the receiving room. L10 and L90 measurements for NIC calculations are evaluated across 125 Hz and 4 kHz.
        - Sound insulation (Dw) is calculated from Leq of the source measurement and receiving room with source on and off, assuming a room reverberation time of 0.5 seconds (unless known through evaluation of S04.1, as applicable). Both Dw and dBA L90 measurements are evaluated across 100 Hz and 3150 Hz.
        - For WELL v2 pilot only: Speech Privacy Potential (SPP) is the sum of either Noise Criterion (NC) + Noise Isolation Class (NIC) OR background noise (dBA L90) + sound insulation (Dw).
            - Noise Criterion (NC) is the single number criterion based on L90 background noise measurement from 63 Hz to 8 kHz taken in the receiving room space (see *Appendix 1, Sound, Internally Generated Noise, Reporting & Compliance* for additional guidance).
    - To determine compliance of each sample, the reported metric must meet the WELL requirement.
- For reverberation time:
    - For each measurement, report the average RT_{60} value of 500 Hz and 1 kHz for each of the three measurements. For each sample location, the average of the three measurements must meet the WELL requirements.
- For sound masking (WELL v2 pilot and WELL v1 only):
    - The L90 measurement at each location must meet the WELL requirements.

Device Requirements & Maintenance

- Technical specifications:
    - Sound level meter (background noise levels, sound insulation, reverberation time, sound masking):
        - Type 1/Class 1 sound level meter with whole and ⅓-octave measuring capabilities.
        - Must be capable of reporting parametric results as Leq, L90 and L10 using slow weightings.
        - Bandwidth: at least 31.5 Hz to 8 kHz.
        - On-screen resolution: 0.1 dB.
    - Loudspeaker (sound insulation, reverberation time – speaker method):
        - Frequency response: at least 100 Hz to 4 kHz.
        - Maximum SPL output: at least 100 dB at 1 m.
    - Noise generator (sound insulation, reverberation time – speaker method):
        - Capable of producing white/pink noise of equal sound energy across 100 Hz to 4 kHz.
    - Balloon (reverberation time – balloon method):
        - Minimum diameter: 0.4 m [16 in]
- Maintenance:

    - The device has been calibrated according to one of the following:
        - Within the year prior to on-site testing in accordance with ANSI/ASA S1.4-2014 or IEC 61672 1:2013.
        - Within the two years prior to on-site testing in accordance with ANSI/ASA S1.4-2014, IEC 61672 1:2013 or regionally equivalent standard, provided that the following additional requirements are met:
            - The sound level meter has been calibrated at the beginning of each day of testing using a Class 1 sound calibrator.
            - The sound calibrator itself has been calibrated within the two years prior to on-site testing for WELL in accordance with ANSI/ASA S1.40:2006 or IEC 60942:2003.

WELL Core

For background noise levels and reverberation time:

- For projects only seeking the base points:
    - Calculate the number of samples using the area of non-leased space.
    - Sampling is required only in non-leased spaces. Projects without non-leased spaces are not eligible to pursue only the base point. These projects must pursue the scope described in the additional point pathway.
- For projects seeking the additional point:
    - Calculate the number of samples using the total project area.
    - If non-leased space makes up at least 40% of total project area, sampling is only required in non-leased spaces.
    - If non-leased space makes up less than 40% of total project area, sampling is required in non-leased space, if present, and at least 10% of leased space:
        - Take at least one sample in non-leased space, if present.
        - Take at least 50% of the required samples in leased spaces.
        - Take the remaining samples either in leased or non-leased spaces.

For sound insulation:

- Calculate the number of samples using the area of non-leased space. Projects without non-leased spaces are not eligible to pursue this feature.
- Walls built by the project owner (i.e., walls in the extent of developer buildout) are subject to sampling, including demising walls that separate tenant spaces from non-leased space or other tenant spaces.
- Take at least one sample of a wall shared with a leased space. Either the source room (where the sound is being produced) or the receiving room (adjacent to the source room) may be located within the leased space. If the wall is between two leased spaces, both source and receiving room will be in leased space.

For sound masking (WELL v2 pilot and WELL v1 only):

- Calculate the number of samples using the total project area.
- Take at least one sample in non-leased space, if present.
- Take at least 50% of the required samples in leased spaces.

- Take the remaining samples either in leased or non-leased spaces

Multifamily Residential

For background noise levels:

- To calculate the number of samples, use the total area of common areas. If there are no common areas, only one sample is required.
- Take exactly one sample in one dwelling unit.
    - Prioritize a dwelling unit that is located near sources of exterior noise (e.g., road traffic, rooftop mechanical equipment, garage doors) or interior mechanical noise.
    - In this dwelling unit, measure average sound pressure level, Leq, over at least 12 hours. The measurement period must include the hours between 10:00 p.m. and 7:00 a.m..
- Take the remaining samples in common areas, if present, as described in the *Test Method* section, above. If there are no common areas, the only sample required is the sample designated for the dwelling unit.

For sound insulation:

- For WELL v2:
    - To calculate the number of samples, use the total project area.
    - Testing is required in common areas, if present, and in dwelling units.
        - Take a minimum of one sample in common areas, if present.
        - Take at least 50% of the required quantity of samples in dwelling units.
        - Take the remaining samples in either common areas or dwelling units.
        - Do not take more than one sample in a single dwelling unit if there are any dwelling units that have not been tested.
- For WELL v2 pilot: this feature is not verified by a Performance Test.

For reverberation time:

- Calculate the number of samples using the area of common areas.
- Take tests in common areas. This feature does not apply to dwelling units. If the project does not have common areas containing spaces named in feature language, this feature cannot be pursued.

Continuous Monitoring Requirements

General Guidelines

Several WELL features within the WELL Building Standard version 2 (WELL v2) and WELL Ratings can be pursued through the implementation of permanently installed continuous monitors that measure environmental parameters through sensor technology. This section describes the continuous monitoring protocol for each feature and part that incorporates

continuous monitoring as part of the verification method. Unless otherwise noted, these rules apply to all parameters in Table 1.

Note: continuous monitoring and sensor technology are rapidly developing; therefore, this section may be frequently updated to stay current with industry best practices.

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Table 1: Parameters and Features/Parts that Incorporate Continuous Monitoring Pathways

Parameter Name	Parameter Abbreviation	WELL v2 Feature Part	WELL Performance Rating Feature
Particulate Matter 2.5	$PM_{2.5}$	A01 Part 1; A01 Part 5; A05 Part 1; A07 Part 2; A08 Part 1	PA1, PA2, PM1, PM2
Particulate Matter 10	PM_{10}	A01 Part 1; A01 Part 5; A05 Part 1; A07 Part 2; A08 Part 1	PA1, PA2, PM1, PM2
Total Volatile Organic Compounds	TVOC	A01 Part 2; A01 Part 5; A08 Part 1	PA3, PM1, PM2
Carbon Monoxide	CO	A01 Part 3; A01 Part 5; A05 Part 3; A08 Part 1	PA5, PA6, PM1, PM2
Ozone	O_3	A01 Part 3; A01 Part 5; A08 Part 1	PA5, PA6, PM1, PM2
Radon	Rn	A01 Part 4; A01 Part 5	PA9
Carbon Dioxide	CO_2	A03 Part 1; A06 Part 1; A08 Part 1	PA7, PA8, PM2
Formaldehyde	HCOH	A01 Part 5; A08 Part 1	PM1, PM2
Nitrogen Dioxide	NO_2	A05 Part 3; A08 Part 1	PA6, PM2
Temperature (dry-bulb)	T_{db}	A07 Part 2; T01 Part 1; T01 Part 2; T06 Part 1	PT1, PM4, PM5
Relative Humidity	RH	A07 Part 2; T01 Part 1; T01 Part 2; T06 Part 1; T07 Part 1	PT1, PT2, PM4, PM5

For feature parts that list *Performance Test* as the only verification method type, project teams may submit an alternative adherence path documenting a novel sensor-based measurement pathway for consideration. The documentation provided for the AAP should include the following:

- A description of the sensor-based, continuous monitoring strategy implemented in the project
- Evidence demonstrating that the method has been validated and proven to produce accurate results

Monitor Placement

- Installation Location Options:
    - Monitors are installed on a wall (vertically), at a height of 1.1-1.7 m [3.6-5.6 ft] above the finished floor.
    - Monitors are installed on a ceiling (horizontally). This placement option is only applicable in spaces, 1) with ceilings that are no greater than 3.7 m [12 ft] above the finished floor, 2) that do not utilize displacement ventilation, and 3) there is evidence that the air is evenly mixed. Evenly mixed air within a space is documented through a Letter of Assurance from an Engineer, confirming that a space meets requirements of a ventilation guideline listed in A03: Ventilation Design Part 1: Ensure Adequate Ventilation. Monitors utilized for this option must be designed to operate in a ceiling-mounted orientation.
- Monitors must be at least 1 m [3.3 ft] away from: interior doors, windows or other potential influences (e.g., humidifiers, cleaning supplies, printers and photocopiers). Monitors, including devices which are part of air purifiers or fan systems, must not be located in the direct path of airflow from HVAC vents or standalone air purifiers and fans. To the extent possible, sampling points should be at least 5 m [16.4 ft] from exterior doors.
- Additionally, monitors measuring temperature and relative humidity must be at least 1 m [3.3 ft] away from: direct sunlight, mechanical system supply outlets, fans, heaters or any other significant source of heat or cold.

Monitor Density

Table 2: Number of Monitors Required in Occupiable Spaces Based on Project Area

Parameter	Area of Occupiable Space	Monitor Density	Minimum # of Monitors
All Parameters Except Radon	< 3,250 m^2 [35,000 ft^2]	1 monitor per 325 m^2 [3,500 ft^2]	2
	3,250 – 25,000 m^2 [35,000 – 269,100 ft^2]	1 monitor per 500 m^2 [5,400 ft^2]	10
	> 25,000 m^2 [269,100 ft^2]	1 monitor per 1,000 m^2 [10,800 ft^2]	50
Radon	--	1 monitor per 2,300 m^2 [25,000 ft^2]	--

- Monitors must be distributed:
    - Throughout the project and, to the extent possible, in places that are representative of all faces of the building, HVAC zones and regularly occupied

spaces (e.g., open office areas, private offices, conference rooms and classrooms).
    - Across different floors, if applicable, including the lowest and highest regular occupied floor (excluding floors with only leased space In WELL Core projects for features that apply only to non-leased space).
- For WELL Core projects, to calculate the number of monitors, use the area of the space(s) described in the WELL Core Guidance (e.g., for features that apply to non-leased space, use only the area of non-leased space).
- For projects with dwelling units, to calculate the number of monitors:
    - For performance-based features (those requiring monitor measurements to meet thresholds; with the verification type Sensor Data), follow Table 2 monitoring density guidance for the total occupiable space in non-dwelling units areas only (e.g., hallways, lobbies, building management offices). Dwelling units must meet performance-based feature requirements per the Multifamily Residential sections above.
    - For non-performance-based features (those requiring only the installation of monitors without verification of thresholds; with the verification type On-going Data Report or Letter of Assurance – Engineer and photographs), follow Table 2 monitoring density guidance for the total occupiable space of the project (including dwelling units).
- For projects containing large open spaces (e.g., gyms, ball rooms, etc.), one monitor is sufficient for an area of up to 2,500 m^2 [27,000 ft^2] if there is evidence that the air is evenly mixed and contaminant sources are uniform (e.g., CFD model or testing and balancing report indicating ventilation rate is even throughout the space, IAQ report indicating ventilation rate and contaminant levels are even throughout a space). The area of the spaces utilizing this alternative monitor density rate can be subtracted from the occupiable space area used to calculate the monitor density for the remaining spaces. Projects may submit an AAP prior to documentation review to pre-verify which spaces are eligible to utilize the alternative monitor density rate.
- Projects may submit an AAP prior to documentation review to pre-verify proposed monitor locations. The AAP must include the following:
    - Figures and calculations used to determine the proposed monitoring density and total number of monitors.
    - An annotated floor plan with the project size and proposed monitor locations, including mounting height and relevant distances from sources of possible influence (e.g., windows, HVAC vents).
    - Description of how monitor locations were determined.

Hardware Requirements

- Measurements are taken at intervals not larger than 1 hour for radon and not larger than 15 minutes for other parameters. Sensors which report more frequently (e.g., 1 minute, 5 minutes) may report at the greater frequency or average (mean) their results within each 15-minute interval. Radon sensors that can only provide output hourly measurements should be reported in intervals not larger than 15 minutes until a newer measurement is provided by the sensor system.

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- Calibration:
    - All sensors measuring air quality parameters are recalibrated or replaced every three years, and projects submit documentation attesting to their calibration or replacement every three years through the WELL digital platform.
    - There are two acceptable calibration procedures:
        - **Manufacturer Calibration:** The devices are returned to the manufacturer for calibration at the intervals described in the WELL Performance Verification Guidebook.
        - **Field Reference Calibration: The devices are field calibrated using a reference sensor.** This must be done across at least two different concentrations for each contaminant to capture performance over a sufficient range — either using known span gases or exposure to ambient pollution — according to guidance provided by the sensor manufacturer.
- Sensors must provide continuous measurements during occupied hours; missing measurements and data loss will be interpreted as a threshold/range exceedance for that time period when calculating compliance.
    - If sensors are returned to manufacturers for calibration, up to one continuous month of sensor data may be excluded at no penalty to account for this. The project team should submit documentation which clearly documents the dates the sensor is away for calibration.
- Informative Note: continuous monitors connected to a permanent power source reduces potential monitor downtime attributed to power loss.
- Table 3 provides sensor technical specification requirements. Alternatively, continuous monitors that are RESET accredited Grade B or above can be utilized for features and parts that can be met with continuous monitors. RESET accredited monitors utilized for WELL projects must still meet the calibration and measurement interval and reporting frequencies outlined in the Performance Verification Guidebook.

Table 3: Sensor Technical Specification Requirements

Parameter		Unit	Sensor Type	Range	Accuracy	Resolution	Parameter-specific Sensor Requirements
Particulate Matter 2.5	$PM_{2.5}$	µg/m³	Optical/Laser particle counter (light scattering)	1-1000 µg/m3	± 5 µg/m^3 + 20 % at 1-100 µg/m^3	1 µg/m^3	Adjustable particle density (K-factor) to accommodate project/region specific particulate profile
Particulate Matter 10	PM_{10}	µg/m³					
Total Volatile Organic Compounds	TVOC	ppb or µg/m^3	Electrochemical, metal oxide semiconductor	10-2000 µg/m³ (1 - 500 ppb)	± 20 µg/m^3 + 15% at 1-500 µg/m^3 (5 ppb + 15% at 1-200 ppb)	10 µg/m³ (1 ppb)	Calibration gas: ethanol Target gas profile: 22 VOC mixed per Molhav et al.* (1 ppb = 4.57 µg/m^3) OR to project-specific VOC profile Note: data from sensors must be reported in µg/m³ for use in Feature A01.2.
Carbon Monoxide	CO	ppm or mg/m^3	Electrochemical OR metal oxide semiconductor	0.1-25 ppm or mg/m3	± 1 at <10 ppm or mg/m3	0.1 ppm or mg/m³	--
Ozone	O_3	ppb or µg/m^3	Electrochemical	10-500 ppb (20-1000 µg/m³)	± 10 ppb at 0-100 ppb (20 ug/m3 at 0-200 µg/m³)	5 ppb (10 µg/m³)	--
Radon	Rn	pCi/L or Bq/m^3	Alpha track detector (photodiode)	0.1-500 pCi/L	± 5 % at 0.1-5 pCi/L	0.1 pCi/L	--
Carbon Dioxide	CO_2	ppm	Non-dispersive infrared	400-5000 ppm	± 50 ppm + 5 % at 400-2000 ppm	1 ppm	--
Formaldehyde (A08 only)	HCOH	ppb or µg/m^3	Electrochemical OR metal oxide semiconductor	20-1000 ppb	± 20 ppb at 0-100 ppb	1 ppb	--
Nitrogen Dioxide	NO_2	ppb or µg/m3	Electrochemical OR metal oxide semiconductor	5-500 ppb (10-1000 µg/m³)	± 20 ppb at 0-100 ppb (40 ug/m3 at 0-200 µg/m³)	1 ppb or µg/m³	--
Temperature (dry-bulb)	T_{db}	C° or F°	All allowed	10-40 °C [50-100 °F]	± 0.5 °C [± 0.9 °F]	0.5 °C [±0.9 °F]	--
Relative Humidity	RH	%	All allowed	5-95 %	± 5 % at 10-90 %	1%	--

Notes:

- Continuous monitoring sensor requirements may differ from device requirements specified in the Performance Testing Protocols for WELL

- Continuous monitors utilizing sensor types not listed in Table 4 are encouraged to submit an Alternative Adherence Path that includes 1) technical specifications listed in Table 4 and 2) evidence indicating the alternative sensor technology provides performance that is similar or exceeds approved sensor technologies.

* Mølhave, L., Clausen, G., Berglund, B., De Ceaurriz, J., Kettrup, A., Lindvall, T., Maroni, M., Pickering, A.C., Risse, U., Rothweiler, H., Seifert, B. and Younes, M. (1997), Total Volatile Organic Compounds (TVOC) in Indoor Air Quality Investigations. Indoor Air, 7: 225-240. https://doi.org/10.1111/j.1600-0668.1997.00002.x

Sensor Data: Submission and Reporting Requirements

Projects that utilize measurements from continuous monitor devices for non-performance-based features (i.e., those requiring only the installation of monitors; with the verification type On-going Data Report or Letter of Assurance – Engineer and photographs) must submit annual measurement data, after initial certification/award, as part of the on-going data report. Data structure is not defined but must be in a file format compatible with spreadsheet software (e.g., .csv).

Projects that utilize measurements from continuous monitor devices measurements for performance-based features (i.e., those requiring monitor measurements to meet thresholds; with the verification type Sensor Data) must submit measurement data for initial certification/award and recertification/renewal, during the documentation review or performance review cycles. The data must be submitted using the Sensor Data Template and include the following:

- Monitor Master List: a list of all continuous monitors and static parameters for a project. The following data are provided for each monitor (refer to sensor data file template):
    - WELL Project ID
    - Project Name
    - Project Location
    - Local Time Zone
    - Device ID
    - File Name
    - Device Location #
    - Device Location Name
    - Installation Date
    - Installation Height
    - Sensor(s) Type
    - Sensor(s) Range
    - Sensor(s) Accuracy
    - Sensor(s) Calibration Date
    - Sensor(s) Calibration Validity
    - Correction factors (PM2.5, PM10, TVOC sensors only)
- Sensor Data File: measurements are taken intervals not larger than 15 minutes—devices which report more frequently (e.g., 1 minute, 5 minutes) may report at the greater frequency or average (mean) their results within each 15-minute interval. Radon sensors that can only provide output hourly measurements shall be reported in intervals not larger than 15 minutes until a newer measurement is provided by the sensor. The following values are provided for each continuous measurement recording (refer to sensor data file template):
    - Timestamp.
    - Currently Occupied: whether that monitor location is typically occupied during that time period.
    - Measurement Data:
        - Corrected Measurement Data: expressed in units consistent thresholds units listed in WELL v2 or WELL Ratings.

        - Raw Measurement Data: the raw value provided by a sensor, prior to the application of calibration (e.g., gain, offset, user factors, etc.) or correction adjustments to the data. This field only needs to be populated if the sensor system applies adjustments to raw values.
    - An annotated floor plan with the project size and monitor locations.
    - Photographs of each monitor location including, when possible, the background of the space to provide context (e.g., height, away from potential influences).
    - Documentation confirming eligibility for placement of monitors on the ceiling (if applicable).

Calculating Compliance

- Air and Thermal Comfort parameters: At least 90% of each sensor's dataset from regularly occupied hours, including intervals with missing/offline data, either meets the thresholds or are within the ranges listed in the relevant feature. For example, a project is regularly occupied from 08:00-18:00 (10 hours) daily and utilizes monitors with 15-minute measurement intervals. In a 30-day calendar month, the project must report at least 1,080 measurements that are within thresholds/ranges for each sensor to demonstrate compliance (10 hours/day × 4 measurements/hour × 30 day/month x 90% compliance = 1,080).
- For initial award, at least one calendar month of data is required; for recertification/renewal, the time period since the previous award date is considered.

Renewal Requirements

Project teams must follow the renewal requirements outlined in the WELL Program Guidebook. At the time intervals specified, project teams must complete a location-specific assessment to indicate whether alterations made to the project since initial achievement could have impacted feature compliance. The outcome of this assessment determines the testing scope for the renewal. When retesting is required, determine sample quantities using the most current WELL Performance Verification Guidebook at the time of testing.

Project teams must also refer to the Renewal Tool to determine other documentation requirements for renewal, including photographs and Letters of Assurance.

Testing Scope at Renewal

The Renewal Tool will indicate one of three testing scopes for each parameter:

- Full: sample the parameter according to the relevant *Quantity of Sample Locations* section in this Guidebook.
- Reduced: sample the parameter at half the quantity listed in the relevant *Quantity of Sample Locations* section of this Guidebook (round down, minimum one).
- None: the parameter is exempt from re-testing.

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Projects that utilize sensors to validate on-site conditions are not eligible for reduced sampling. All data from all sensors must be submitted and reviewed at the renewal milestone. (See the *Continuous Monitoring Requirements* section.)

Any new feature parts being attempted at renewal/recertification must be sampled in full.

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Appendix 1: On-Site Testing Protocol for WELL v1 Projects

Air

Radon

Features

- WELL v1: Air 01, Part 3: Radon

Quantity of Sample Locations

- Use one radon sampler per 2,300 m^2 [25,000 ft^2] on the lowest occupied floor.

Sample Locations & Conditions

- If the project boundary does not include the floor at grade (i.e., the ground floor) or any below-grade floors of the building, radon testing is not required.
- Radon samplers must be located a minimum distance of:
    - 0.91 m [3 ft] away from windows and exterior doors.
    - 20.3 cm [12 in] away from exterior walls.
    - 50.8 cm [20 in] above the finished floor.

Test Method

- For active test methods:
    - Short-term or long-term sampling media are permitted.
    - The duration of the test is the entire duration of the on-site testing visit by the PTAgent or 48 hours, whichever is less.
- For passive test methods: the duration of the test is at least 48 hours.

Reporting & Compliance

- To determine compliance, every sample location must meet the WELL requirement.
- For test methods that require a direct-read device:
    - Compliance is based on the average value collected during the measurement time.
- For test methods that require laboratory analysis:
    - Compliance is based on the measured concentration on the laboratory report.

Device Requirements

- Passive radon samplers must provide a time-weighted average.

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Sound

Quantity of Sample Locations

	Exterior Noise Intrusion and Internally Generated Noise	Disruptive Music
Size Interval	**Quantity**	**Quantity**
0 - 9,290 m² [0 - 100,000 ft²]	1 per 581 m^2 + 1 [1 per 6,250 ft^2 +1]	1
9,290 - 46,452 m² [100 - 500,000 ft²]	1 per 4,645 m^2 + 15 [1 per 50,000 ft^2 +15]	1
> 46,452 m² [> 500,000 ft²]	1 per 23,226 m^2 + 23 [1 per 250,000 ft^2 +23]	1

Exterior Noise Intrusion (dBA)

Features

- WELL v1: Feature 74, Part 1: Sound Pressure Level

Sample Locations & Conditions

Determine sample locations according to the following list, working in order of priority from the top to the bottom:

- Take at least one sample on the floor closest to ground level.
- Take at least one sample on the floor of the building that is closest to a source of exterior noise on the rooftop of an adjacent building, if present. For example, if an adjacent building has cooling towers located on the roof, take at least one sample on the floor of the project building that is located closest to the noise source.
- Take at least one sample on the floor closest to the mechanical equipment located on the roof of the project building.

Testing must take place under the following conditions:

- For mechanically ventilated spaces, ventilation systems must be off.
- Exhaust fans and standalone air purifiers that are manually controlled must be turned off.
- Operable windows must be closed.
- Sound masking systems (if present) must be off.
- Take each sample at a height of at least 1.2 m [4 ft] above the finished floor.

- Take samples in regularly occupied space within 4.5 m [15 ft] of exterior windows, if present.
- Take each sample a minimum of 1.5 m [5 ft] away from:
    - Internal noise sources such as appliances.
    - HVAC diffusers
- The distance between any two samples must be at least 3 m [10 ft].

Test Method

- Measure the average sound pressure level (Leq) and L10 over a duration of 30 seconds using slow weighting.

Reporting & Compliance

- To determine compliance of each sample, the time-averaged, slow-weighted and A-weighted Leq recorded during the measurement period must meet the WELL requirement.

Device Requirements

- See requirements for background noise levels in this document.

Internally Generated Noise (NC or NR)

Features

- WELL v1: Feature 75, Part 2: Mechanical Equipment Sound Levels

Sample Locations & Conditions

Determine sample locations according to the following list, working in order of priority from the top to the bottom:

- Take all samples in regularly occupied spaces.
- Take at least one sample in a regularly occupied space on the same floor as the mechanical system, if present.
- Take at least one sample in a regularly occupied space on the floor immediately below the mechanical system, if present.
- Take each test on a different floor.

Testing must take place under the following conditions:

- For mechanically ventilated spaces, ventilation systems must be on and operating normally.
- Exhaust fans and standalone air purifiers that are manually controlled must be turned on. If they include multiple speed settings, use a middle setting.
- Operable windows must be closed.
- Sound masking systems, if present, must be off.
- Other sound-emitting building services (e.g., escalators, elevators, appliances) must be on and operating normally.

- In the room where the sample is located, doors must be closed.
- Take each sample at a height of at least 1.2 m [4 ft] above the finished floor.
- Take each sample a minimum of 1.5 m [5 ft] away from:
    - Fenestration.
    - Exterior duct, conduit or piping penetrations.
- The distance between any two samples must be at least 3 m [10 ft].

Test Method

- Measure sound pressure level over a duration of at least 30 seconds using slow weighting.

Reporting & Compliance

- Plot the time-averaged, slow-weighted and Z-weighted (unweighted) sound pressure level (L90) measured at each of the following octave band frequencies against the definitions of Noise Criterion (NC) or Noise Rating (NR). Round down to the nearest 1NC/NR.
    - NR: 31.5 Hz, 63 Hz, 125 Hz, 250 Hz, 500 Hz, 1 kHz, 2 kHz, 4 kHz and 8 kHz.
    - NC: 63 Hz, 125 Hz, 250 Hz, 500 Hz, 1 kHz, 2 kHz, 4 kHz and 8 kHz.
- To determine compliance with each sample: the NC/NR value must meet the WELL threshold.

Device Requirements

- See requirements for background noise levels in this document.

Disruptive Noise Limitation

Features

- WELL v1: Feature 75 Part 7: Disruptive Music Limitation

Sample Locations & Conditions

Testing must take place under the following conditions:

- Take each sample 4.5 m [15 ft] from the entrance to the project.
- Take each sample at a height of at least 1.2 m [4 ft] above the finished floor.
- Take each sample a minimum of 1.5 m [5 ft] away from walls and windows.

Test Method

- For the sample, take two measurements of the average sound pressure level (Leq) over a duration of 30 seconds using slow weighting:
    - For one measurement, the music in the restaurant must be playing.
    - For one measurement, the music must be turned off.

Reporting & Compliance

- To determine compliance of the sample, the difference between the measurement with the music playing and the measurement with the music off must meet the feature requirements.

Device Requirements

- See requirements for background noise levels in this document.

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