



## Utilizing GrayWolf for The WELL Building Standard v2

People spend 90 percent of their time indoors so understanding the connection between buildings and the health and wellness of the occupants is an extremely important focus. The WELL Building Standard combines the best in design and construction to promote human health and well-being from years of medical and scientific research. An independent company, Delos, created the International WELL Building Institute™ (IWBI™) in 2013 to address these needs. The IWBI then created The WELL Building Standard, which it also manages. WELL introduced the WELL Building Standard Version 2 in June 2018 as a pilot based on feedback from around the globe. This is a way to make the standard more equitable, global, evidence based, technically robust, collaboratively developed with the community of users and resilient<sup>1</sup>.

The WELL Building Standard has set criteria for ten Concepts of concern in indoor environments: Air, Water, Nourishment, Light, Movement, Thermal Comfort, Sound, Materials, Mind, and Community. Meeting set criteria from WELL for each concept can earn one of three levels of certification: Silver, Gold, and Platinum.

Air, one of the ten Concepts, is broken down into 14 features, 4 preconditions and 10 optimizations. Preconditions are mandatory for

certification for all projects. Each optimization has varying associated points that accumulate towards the level of certification.

A01 Air Quality is a precondition used to ensure there is a basic level of indoor air quality being supplied to the building users determined by public health authorities. For all spaces PM<sub>2.5</sub>, PM<sub>10</sub>, formaldehyde, volatile organic compounds (VOCs), carbon monoxide, ozone and radon must be tested. Table 1 shows the concentration limits for each compound.

Parameter	Concentration <sup>2</sup>
PM <sub>2.5</sub> <sup>3</sup>	<15 µg/m <sup>3</sup>
PM <sub>10</sub> <sup>4</sup>	<50 µg/m <sup>3</sup>
Formaldehyde	< 50 µg/m <sup>3</sup>
TVOCs <sup>5</sup>	<500 µg/m <sup>3</sup> (218ppb)
Carbon Monoxide	<9 ppm
Ozone	<51 ppb
Radon <sup>6</sup>	0.15 Bq/L

**Table 1**

TVOC monitoring requirements can be met if sensor density is at least one per every 3,500ft<sup>2</sup>, measurements are taken at least once per hour, and data from at least the previous month is below 500 µg/m<sup>3</sup> for 90% of regularly occupied hours. All of the pollutants, except radon, must be measured regularly in occupied spaces no

<sup>1</sup> <https://v2.wellcertified.com/>

<sup>2</sup> Consult WELL for Commercial Kitchen Space concentrations.

<sup>3</sup> Consult WELL Standard for areas with higher annual ambient levels for concentration.

<sup>4</sup> Consult WELL Standard for areas with higher annual ambient levels for concentration.

<sup>5</sup> Consult WELL Standard for additional information.

<sup>6</sup> GrayWolf does not offer a radon sensor.





longer than a year apart and must be submitted annually through WELL Online.

There are a maximum of 4 points available for A05 Enhanced Air Quality, broken into 3 Parts. This optimization encourages projects to provide enhanced air quality above current guidelines. Part 1 calls for monitoring PM<sub>2.5</sub> and PM<sub>10</sub> for up to 2 points, Part 2 monitors seven specific VOCs for 1 point, and Part 3 measures carbon monoxide and nitrogen dioxide for 1 point.

Parameter	Concentration	Points	Part
PM <sub>2.5</sub>	<12 µg/m <sup>3</sup>	1	
PM <sub>10</sub>	<30 µg/m <sup>3</sup>		
PM <sub>2.5</sub>	<10 µg/m <sup>3</sup>	2	1
PM <sub>10</sub>	<20 µg/m <sup>3</sup>		
Refer to WELL for complete list of VOCs		1	2
CO	<6 ppm	1	3
NO <sub>2</sub>	<21 ppb		

Table 2

A06 Enhanced Ventilation Design awards up to 3 points after the prerequisite ventilation rates described in A03 Ventilation Design, Part 1 are met. In this feature CO<sub>2</sub> levels are used as a proxy for ventilation rate in order to ensure that a sufficient exchange of outdoor air is occurring. Enhanced exchange rates are directly related to decreased levels of CO<sub>2</sub>, and can reduce other common pollutants. This can combat Sick Building Syndrome and improve occupant health and performance. Part 1, worth 2 points, can be met by being within one of the following indoor CO<sub>2</sub> thresholds:

<sup>7</sup> Values defined by WELL V2 Building Standards.

Threshold	Points
Exceed ASHRAE 62.1-2010 outdoor air supply rate by 30%	1
Exceed ASHRAE 62.1-2010 outdoor air supply rate by 60%	2
CO <sub>2</sub> concentration <900 ppm	1
CO <sub>2</sub> concentration <750 ppm	2
CO <sub>2</sub> concentration < 500 ppm above outdoor levels	1
CO <sub>2</sub> concentration < 350 ppm above outdoor levels	2

Table 3

Prerequisite ventilation rates are described by the ventilation guidelines listed in A03 Ventilation Design, Part 1.

A08 Air Quality Monitoring and Awareness awards up to 2 Points and requires the continuous measurement of at least three of the following parameters, as well as the public display of the readings.

Parameter	Accuracy <sup>7</sup>
PM <sub>2.5</sub> or PM <sub>10</sub>	25% at 50 µg/m <sup>3</sup>
Carbon dioxide	10% at 750ppm
Carbon monoxide	1 ppm within range of 0 to 10ppm
Ozone	10 ppb within range of 0 to 100ppb
Nitrogen dioxide	20 ppb within range of 0 to 100 ppb
Total VOCs	25% at 500 µg/m <sup>3</sup> (218ppb)
Formaldehyde	20 ppb within range of 0 to 100 ppb

Table 3

The monitors must be placed at a minimum density of one per every 325 m<sup>2</sup> [3,500 ft<sup>2</sup>]. All data is analyzed at regularly occupied hours and submitted to WELL Online annually. The monitors must be recalibrated or replaced annually with documentation showing





compliance and submitted to WELL Online annually. If Part 1 is achieved it is possible to go for Part 2, Promote Air Quality Awareness, for one point. Part 2 requires that occupants are able to view the readings from the monitors in real time either through a screen or a website or phone application. If done with a screen, it must be positioned at a height of 1.1-1.7 m [3.6-5.6 ft] per 325 m<sup>2</sup> [3,500 ft<sup>2</sup>] in a regularly occupied space. If shown via a website or phone application, there must be a visible sign that displays where the data may be accessed every 325 m<sup>2</sup> [3,500 ft<sup>2</sup>]. It is encouraged to provide educational material to the occupants on health risks from poor indoor air quality, as well as actions they can take to reduce these risks. This can generate personal investment in air quality from the occupants and encourage positive habits to further curb indoor air pollution.

GrayWolf meters can monitor for a wide array of indoor air quality parameters that can be utilized in WELL certification. GrayWolf can monitor for PM<sub>2.5</sub>, PM<sub>10</sub>, formaldehyde, CO, O<sub>3</sub>, CO<sub>2</sub>, NO<sub>2</sub>, TVOCs, and many more. The meters can be deployed for portable short term monitoring, long term fixed monitoring, and/or be used to calibrate and check alternative fixed sensor performance.

The GrayWolf meters can be utilized as a screening tool for all parameters that require testing to be sent out for laboratory analysis, which can ultimately save time and money. See Tech Note WELL V.2 for specific comparison of GrayWolf technology and WELL's. GrayWolf's intuitive interface enables detailed file names and the ability to store years of data. Data can even be accessed remotely via the cloud with a GrayWolfLive™ subscription. GrayWolf meters can be used for other green building applications, such as LEED, BREEAM, and ASHRAE (See <https://graywolfsensing.com/green-building-indoor-air-quality-iaq-monitors/> for more information) .



Short Term Monitoring

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**Portable Monitoring**



**Fixed Monitoring**