



THE
WELL
BUILDING STANDARD®

VERSION 1.0



WELL Building Standard®

Version 1.0

October 20th 2014

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THE WELL BUILDING STANDARD® EXECUTIVE SUMMARY

The WELL Building Standard focuses on the people in the building.

Over the last decade, green building standards and standard-setting organizations have made significant strides towards the market transformation of the building industry, resulting in a rapid expansion of green buildings and environmentally conscious building practices throughout the world.

Over the same period, strategies to enhance human health and wellbeing have played a relatively small role in the evolution of building standards. We believe that the time has come to elevate human health and comfort to the forefront of building practices and reinvent buildings that are not only better for the planet—but also for people.

1. This is the first standard of its kind that focuses attention solely on the health and wellness of building occupants.
2. WELL identifies 102 performance metrics, design strategies, and procedures that can be implemented by the owners, designers, engineers, contractors, users and operators of a building.
3. WELL is based on a thorough review of the existing research on the effects of indoor spaces on individuals, and has been advanced through a comprehensive peer review.
4. In order to achieve the requirements of the WELL Building Standard, the space must undergo a process that includes an onsite assessment and performance testing by a third-party.



A Wellness Standard for Buildings

The WELL Building Standard marries best practices in design and construction with evidence-based health and wellness interventions. It harnesses the built environment as a vehicle to support human health, wellbeing and comfort. WELL Certified™ spaces and WELL Compliant™ core and shell developments can thus lead to a built environment that can help improve the nutrition, fitness, mood, sleep patterns and performance of its occupants. This is achieved in part by implementing strategies, programs and technologies designed to encourage healthier, more active lifestyles and reducing occupant exposure to harmful chemicals and pollutants.

This document presents the overall strategies, performance targets, and certification and compliance steps required for projects to meet the WELL Building Standard v1.0.

Version 1.0

WELL Building Standard v1.0 is optimized for commercial and institutional buildings and can be applied to three types of projects:

- 1) New Construction and Major Renovations;
- 2) Tenant Improvements; and
- 3) Core and Shell Developments.

Future refinements will address the specific requirements of multifamily residences, retail and restaurants, sports facilities and convention centers, schools, and healthcare facilities. Projects representing these typologies are invited to register and join our ongoing pilot process.



ORGANIZATIONAL STRUCTURE

WELL is the culmination of seven years of rigorous research in collaboration with leading physicians, scientists and industry professionals. The WELL Building Standard® was pioneered by Delos and is managed and administered by the International WELL Building Institute (IWBI). The WELL Building Standard is third-party certified through IWBI's collaboration with the Green Building Certification Institute (GBCI) – the certification body for the LEED® Green Building Rating System.

International Well Building Institute, PBC (IWBI)

The IWBI is a public benefit corporation (B-Corp) that is dedicated to transforming buildings to support the health and wellness of the people who live, work and go to school in them. Public benefit corporations are an emerging U.S. corporate structure for corporations committed to balancing public benefits with profitability – harnessing the power of private capital for greater good. Delos created the IWBI as a subsidiary devoted exclusively to managing and sharing the WELL Building Standard globally pursuant to a Clinton Global Initiative commitment to improve the way people live by developing spaces that enhance occupant health and quality of life.

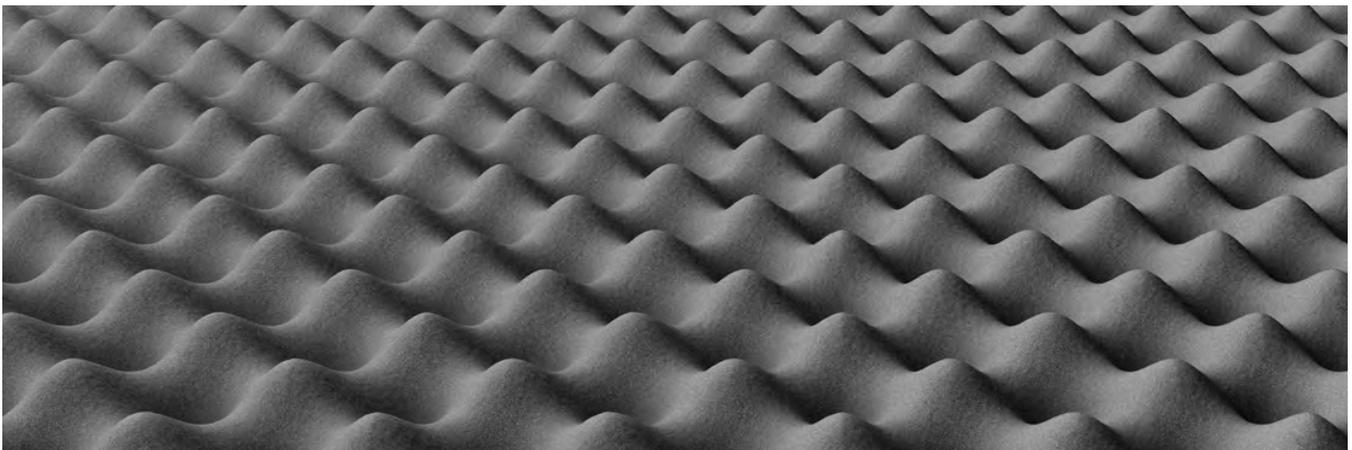
The IWBI has committed to direct 51% of net profits, after taxes, generated by WELL Building Certification project fees toward charitable contributions and impact investment focused on health, wellness, and the built environment.

Delos Living LLC

Delos® is pioneering the integration of health and wellness technologies into the places we live, work and learn. By placing health and wellness at the center of design, construction, technology and programming decisions, Delos is transforming our homes, offices, schools and other indoor environments into spaces that actively contribute to human health and wellbeing.

Alignment with Green Building Standards

The WELL Building Standard is designed to work harmoniously with the LEED Green Building Rating System, the Living Building Challenge, and other leading global green building standards. We encourage projects to pursue both WELL and standards that address environmental sustainability.



WELLNESS – A COMPLEX ISSUE

Comprehensive and interdisciplinary approaches are necessary to meaningfully address the complex issues of human health and wellbeing. A narrow focus on select aspects of health is inadequate to the task. Many factors of the physical environment have a significant impact on day-to-day health and productivity, but it is often the interactions between multiple environmental factors that matter most. A growing body of research supports these claims but until recently, little had been done to translate research into practice. The WELL Building Standard draws from multiple disciplines of scientific study, and presents an integrative approach that reinvents the built environment around its occupants, transforming the places we live, work and learn into systems intended to promote and improve human health and wellbeing.

Interactions between Humans and the Built Environment

Traditional healthcare delivery systems primarily focus on addressing health after people have already become sick. With rising costs and the increased burden of chronic diseases such as diabetes, cardiovascular disease and cancer, people are turning to more lifestyle-oriented and preventative approaches to health. The WELL Building Standard is founded on the understanding that facets of our environment interact with personal, genetic and behavioral factors to shape our overall health and wellbeing. WELL recognizes that many unconscious behaviors are dictated by external cues and thus, it has carefully considered interactions between humans and the built environment that not only shape our physical health but also our behavior.

The Basis for the WELL Building Standard

The WELL Building Standard v1.0 is a product of seven years of research and development consulting with an expert peer review process encompassing a scientific, practitioner, and medical review. The WELL Building Standard was developed by integrating scientific and medical research and reviewing existing literature on environmental health, behavioral factors, health outcomes and demographic risk factors. By compiling leading practices in building design and management and referencing existing standards and best practice guidelines set by governmental and professional organizations, WELL works to harmonize and clarify existing thresholds and requirements. Where important issues have not been adequately addressed by the literature, the WELL Building Standard relies on expert consultation as the basis for defining performance requirements.

WELL is largely performance-based; in most cases, specific, measurable thresholds are provided that must be met. However, for some strategies, specific metrics have not yet been established, but strong, causal evidence suggests there are benefits to implementation.

Research shows that wellness can be a very personal experience, so the WELL Building Standard is designed to comprehensively cover the various individual needs of building occupants while also building a common foundation for measuring wellness in the built environment.

WELLographies™

A rich body of research supported the development of the underlying concepts and requirements of the WELL Building Standard. The content of the research will be available in published WELLographies. The WELLographies will provide the content and references for all main topics that constitute the WELL Building Standard. WELLographies cite the major regulatory guidelines and relevant medical and scientific literature on the topics covered.

Acknowledgements

We would like to thank all parties involved in the review of the WELL Building Standard and the supporting WELLographies. The WELL Building Standard has been reviewed by leading scientists, practitioners from the building industry and physicians from leading medical institutions.

Scientists were consulted to help prioritize the factors that contribute to wellness. In order to assess the applicability of WELL in practice, building professionals and other stakeholders were asked for input. We give special thanks to CGI, USGBC, ILFI, GBCI and CBRE who have given institutional support for our efforts.

With gratitude and excitement, we also acknowledge our collaboration with the Mayo Clinic Center for Innovation to jointly operate the WELL Living Lab, which will be the first lab exclusively committed to research, development and testing of both new and existing innovations designed to improve the health and wellbeing of individuals as they live and work within built environments.

We are especially grateful for the support of Cleveland Clinic Wellness over the last few years. The organization has been an inspirational example of the effect that wellness policies can have on the health and wellbeing of the staff of an institution. Under the leadership of Dr. Michael F. Roizen, Cleveland Clinic Wellness has conducted a review of the WELL Building Standard and WELLographies.

A complete list of reviewers can be found in Appendix H and at www.wellcertified.com.



ORGANIZATION OF THE WELL BUILDING STANDARD®

The WELL Building Standard is organized into seven categories of wellness called Concepts: Air, Water, Nourishment, Light, Fitness, Comfort and Mind. Each Concept is comprised of Features, which are further divided into Parts and Requirements.

WELL Building Standard Features, Parts, and Requirements

The WELL Building Standard is composed of 102 Features that are applied to each building project. Every Feature is intended to address specific health, comfort or knowledge aspects. Each Feature is subdivided into Parts, tailored to a specific building type. This means that depending on the building type (e.g. Tenant Improvement, New Construction), only certain Parts of a given Feature may be applicable. Within each Part are one or more Requirements, which dictate specific parameters or metrics to be met. In order for a project to receive credit for a particular Feature, all of its *applicable* component Parts specifications must be satisfied.

Features can be:

- Performance-based standards that allow flexibility in how a project meets acceptable quantified thresholds.
- Prescriptive standards that require specific technologies, design strategies or protocols to be implemented.

The compulsory WELL Features are categorized as Preconditions—necessary for WELL Silver Certification or WELL Core and Shell Compliance. Optimizations are not required to achieve WELL Silver Certification, but create a flexible pathway towards WELL Certification at the Gold or Platinum level. For Core and Shell projects, at least one Optimization in each Concept is required for WELL Core and Shell Compliance.

Preconditions

These Features represent the core of the WELL Building Standard. Preconditions can be thought of as the foundation for wellness in the built environment. For certification or compliance to be awarded, all applicable Preconditions must be met.

Optimizations

These features include optional technologies, strategies, protocols and designs that can be applied to a project to qualify for WELL Certification at either the Gold or Platinum level, depending on the total number of Optimizations achieved. One Optimization within each concept is required for WELL Core and Shell Compliance. IWBI recommends that all projects strive to achieve as many Optimizations as possible.

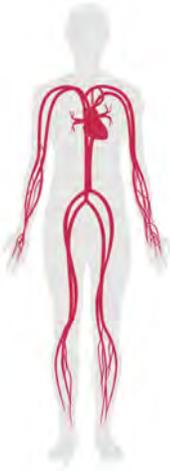
Intentions of Features in the WELL Building Standard

Each WELL Building Standard Feature is designed to address issues that impact the health, comfort or knowledge of occupants. Many WELL Features intended to improve health are supported by existing government standards or other standards organizations. Some WELL Features are intended to change behavior through education and corporate culture, providing, for example, information and support for making positive lifestyle choices.

WELLNESS AND BODY SYSTEMS

Each Feature of the WELL Building Standard is ascribed to the human body systems that are intended to benefit from its implementation. This enables project teams to classify the intended benefits of each WELL Feature and develop a comprehensive set of strategies. While there are different ways to group the body's various systems, the WELL Building Standard considers each Feature's impact on the following categories of body systems:

Cardiovascular System



The cardiovascular system consists of the heart, vessels and blood. Its primary function is to supply nutrients and remove waste from the tissues of the body. However, stress, unhealthy diets and lifestyle choices, and exposure to environmental pollutants can negatively impact cardiovascular health and lead to the development of chronic conditions that reduce quality of life.

The WELL Building Standard addresses factors that are vital to maintaining cardiovascular health; stress, nutrition, fitness and environmental pollutants. Comfort Features are designed to mitigate stress and help limit harmful hormone levels in the body. Healthy diets and active lifestyles control body weight and strengthen the muscles of the heart. Elimination of environmental pollutants in air, such as tobacco and VOCs – which directly harm the heart and vessels – also contribute towards good cardiovascular health.

Digestive System



The digestive system consists of the mouth, esophagus, stomach, intestines, and the auxiliary organs – liver and pancreas – that produce digestive hormones and enzymes. This complex system is responsible for nutrient breakdown, absorption and assimilation. In addition, the gut is the largest reservoir of microorganisms in the body, which assist digestion and play a role in immune health. These critical functions are compromised by poor dietary habits, stress and by microbes and environmental pollutants in the foods we eat and surfaces that we touch

Features of the WELL Building Standard support interventions that reduce factors that negatively impact digestive health. Comfort Features are designed to mitigate stress, which affects the health and function of the microbiome. Proper diets help to limit consumption of harmful toxins and substances which can cause digestive discomfort and allergic reactions. Treatment of surfaces helps to prevent microbes and toxins from entering our digestive system via our foods.

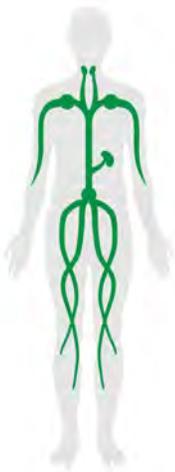
Endocrine System



The endocrine system is made up of hormone-secreting glands. Hormones are chemical compounds that regulate many important processes including growth, immunity, metabolism, reproduction, mood and digestion. Unfortunately, stress, environmental pollutants and many of today's foods and products contain chemicals that disrupt the function of the endocrine system and can cause a variety of health problems.

The Features of the WELL Building Standard aim to minimize exposure to endocrine system disruptors. Comfort Features are designed to reduce stress and levels of potentially harmful hormones that can cause chronic health conditions. Nourishment Features reduce consumption of substances that mimic hormones and disrupt proper endocrine regulation of digestion. Mitigation of environmental pollutants limit exposure to toxins and compounds that interfere with the endocrine regulation of many of the body's functions.

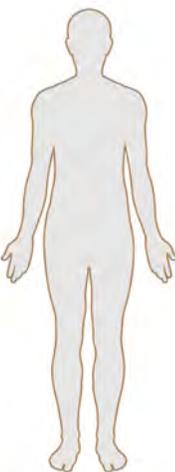
Immune System



The immune system is a complex cohort of highly specialized cells, proteins, tissues and organs that make up the body's defense system against internal and foreign disease-causing agents. It is affected by the cumulative effect of toxins, poor sleep, nutrition and excessive stress. Failure to maintain proper immune function can increase the incidence of infections by bacterial and viral pathogens, and contribute towards the development of chronic conditions such as arthritis, diabetes, cardiovascular or respiratory disease and even cancer.

The Features that collectively form the WELL Building Standard aim to promote and enhance immune health. The use of non-toxic materials limits exposure to chemicals that weaken immune function. Water and air filtration systems limit exposure to bacterial and viral pathogens and allergens. In addition, WELL includes Features that are designed to reduce stress and improve nutrition and fitness, which help strengthen immune function.

Integumentary System



The skin, hair and nails form the outer layer of the body, also referred to as the integumentary system. The largest organ system by weight, the integumentary system provides the first line of defense against injury and infections. It protects internal organs from impact, prevents water loss, regulates body temperature and defends the body against foreign pathogens and harmful toxins. The skin is also host to a large community of symbiotic microorganisms that produce a moisturizing layer and aid in immune function.

The WELL Building Standard is developed to help maintain integumentary system integrity, as it requires that building materials are absent of toxins that could be harmful if absorbed through the body's outermost layers.

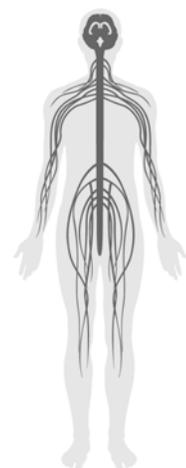
Muscular System



The human muscular system supports posture, joint stability and movement. It is also responsible for generating heat through the contraction of muscles. Balanced diet and fitness greatly affect muscular health, as they ensure the muscles receive adequate nutrients to develop and function properly.

The WELL Building Standard contains Features that are designed to encourage or enhance the opportunity for safe physical activity and healthier diets. To complement this, ergonomic designs are intended to reduce the likelihood of ligament strain and muscular injuries. Other Features promote the use of active furnishings or design principles that encourage more opportunities for physical activity.

Nervous System



The nervous system is divided into the central nervous system, made up of the brain and spinal cord, and the peripheral nervous system, composed of nerves that traverse the entire body. The nervous system is the main control center of the body; it directly and indirectly controls nearly every internal function of the body, senses and interacts with the external world and it is responsible for thought, language, mood and personality.

The WELL Building Standard places utmost importance on supporting neurologic and cognitive function through a variety of interventions. Light Features work to promote proper alignment of the circadian rhythm, which controls sleep and wake cycles. Features that mitigate environmental toxins in air and water limit exposure to substances that can affect cognitive health and performance. Nourishment, fitness and comfort Features work in tandem to support neurologic health by providing adequate nutrition, levels of physical activity, enhancement of sleep and by reducing stress.

Reproductive System



The reproductive system consists of specialized structures in the brain, specialized hormones and the various sex organs of males and females. The reproductive system's importance is greater than its ability to produce and support offspring; this system plays a role in growth and development, maturation and mood.

The WELL Building Standard introduces Features intended to help maintain reproductive health. Proper diet and exercise are two important factors that are addressed by WELL; these are complemented by toxin avoidance strategies that help support reproductive health.

Respiratory System



The respiratory system includes the mouth, nose, diaphragm, the trachea and the airways that reach deep into the lungs. The respiratory system works in tandem with the circulatory system in order to provide oxygen and remove carbon dioxide from the tissues of the body.

The Features of the WELL Building Standard help maintain proper respiratory system function by improving the quality of the air we breathe, limiting exposures to molds and microbes and by improving access to opportunities for greater fitness. Removal of particulate matter from ambient air reduces the risk of direct damage to the lungs. Mitigation of molds and microbes reduces the incidence of infections and allergic reactions. Fitness Features are intended to help to improve breathing and the overall strength of the respiratory system.

Skeletal System



The skeletal system not only provides support and movement; it protects the organs against impact, stores minerals, produces blood cells and aids in hormone regulation. Similar to the closely related muscular system, skeletal health is heavily affected by proper nutrition and safe physical activity.

The WELL Building Standard is grounded in the latest research in universal design and ergonomics to improve posture and alignment and limit physical stress. In addition, Features provide guidelines for fitness and nutrition that are designed to support skeletal system health and function.

Urinary System



The urinary system consists of the kidneys, ureters, bladder, and the urethra. The urinary system has an extraordinary number of critical functions that include the filtration of toxins, balance of blood pH and electrolytes, maintenance of blood pressure, and the elimination of waste through urine. The kidneys are sensitive organs that can be damaged by exposure to toxins, chronic high blood pressure, or excessive quantities of alcohol, medications or high-sugar foods.

The Features of the WELL Building Standard help support urinary health by reducing stress and exposure to toxins and infection-causing pathogens. Comfort Features designed to reduce stress can help prevent the likelihood of high blood pressure and hormone levels that negatively affect urinary function. Restriction of toxins and pathogens can help limit the incidence of urinary infections and other potentially serious problems.

PROJECT TYPOLOGIES

The Features of the WELL Building Standard could be applied across many real estate sectors, but Version 1.0 is optimized for commercial and institutional office buildings. To be sure, not all of the WELL Features apply to all office buildings; the number and type of Features applicable depend on the stage of construction. The WELL Building Standard is therefore organized into typologies, which take into account the specific set of considerations that are unique to a particular building type or phase of construction. For the WELL Building Standard v1.0, there are three project typologies.

| Typology | Preconditions | Optimizations | Total |
|--|---------------|---------------|-------|
| Core and Shell Compliance | 25 | 26 | 51 |
| Tenant Improvements Certification | 37 | 64 | 101 |
| New Construction and Major Renovations Certification | 41 | 61 | 102 |

Core and Shell Compliance

Core and Shell Compliance applies to ground-up projects where the tenants are unknown or multi-tenant buildings seeking to implement the basic conditions necessary to achieve the WELL Building Standard. The Core and Shell typology addresses the building envelope, window locations and glazing, building proportions, heating, cooling and ventilation systems, as well as water quality as it is supplied to the building. This typology also encourages consideration of the site in relation to amenities and opportunities for wellness.

WELL Certification is not applicable at the Core and Shell stage because many factors affecting indoor environmental quality and tenant policy have not been established. Core and Shell Compliance is not a certification—it is a verified compliance path that helps make WELL Certification easier for Tenant Improvement. Compliance is used to denote the limited number of Features that can be implemented, and the award of WELL Core and Shell Compliance is a one-time determination based on the condition and performance of the core and shell project as of the date of award. For Core and Shell projects to achieve compliance, all Preconditions must be met, as well as at least one Optimization from every Concept.

Tenant Improvements Certification

Projects located in an existing buildings can achieve certification under the Tenant Improvements typology, with a combination of design and technology upgrades as well as with the appropriate selection of building materials, finishes and furniture. Projects may achieve WELL Silver Certification by meeting all Preconditions and may achieve Gold and Platinum certification if sufficient WELL Optimizations are adopted. In Core and Shell Compliance buildings, some WELL Features may already apply towards tenant improvement certification, making certification easier. This is not, however, a prerequisite, as WELL Certification may also be achieved in buildings that have not received an award of WELL Core and Shell Compliance.

New Construction and Major Renovations Certification

New Construction and Major Renovations present the greatest opportunities for the highest levels of WELL Certification. This typology is, in essence, the sum of requirements for the two previous typologies. The model

WELL Certified™ building is one in which the requirements of the WELL Building Standard are considered beginning in the design phase, and implemented through construction and operations.



PILOT PROGRAM

Given the unique opportunities and challenges presented by different building types, additional time and resources are needed to aggregate the necessary scientific and institutional support to refine the WELL Building Standard to the specific needs of additional project typologies. As such, Pilot Programs are in development to test and refine how WELL can best apply to different building types.

The development of Pilot Programs will be undertaken in conjunction with key partners in a formal process that respects the specific circumstances of a new vertical and its associated typologies. Pilot partners are selected based on their capacity to test, refine and implement WELL for the chosen building vertical and applicable typologies. The WELL Building Standard is a continuously evolving program that is updated as improved evidence and technologies become available. Current pilots include the following:

Education

Places of learning, including elementary schools, middle schools, high schools and higher education facilities must provide for the needs of teachers and students of all ages. There are several differences between education facilities and offices that justify the need for an independent pilot addendum.

Residential Multifamily

Residential multifamily settings include market-rate and affordable housing, dormitories, and senior independent living facilities. The range of activities undertaken in the home varies greatly from those in an office. Homes are the places where people prepare and eat meals, sleep, and gain respite from the world. The WELL Building Standard for multifamily residences must reflect and support these varied needs. Single-family homes and duplexes are not currently part of the residential pilot.

Athletic Facilities

Some facilities, such as gymnasiums and spas, require stricter standards of hygiene and safety because such environments involve frequent dermal contact with surfaces shared across large numbers of people. Well Features must address the challenging nature of the interior environments of these types of facilities, the number and rate turnover of occupants, and their degree of physical activity.

Retail

Retail centers, including shops, restaurants and malls, are another opportunity to design and construct buildings to the WELL Building Standard. Retail spaces are unique in that they simultaneously house and cater to two distinct groups: the transient consumer and the staff, who spend many more hours in the facility. Many retail centers provide food, increasing the importance and relevance of many of the WELL Nourishment Features.

Arenas

Large public buildings, such airports, convention centers, stadiums, and sports or events complexes must serve large volumes of people and provide a wide variety of functions. WELL Features that apply to these building types must address the complexity, size, and variety and volume of users that frequent these environments.

Healthcare

Healthcare facilities care for the most vulnerable. WELL Features that apply to hospitals, clinics, medical offices, and nursing homes must address the needs of the ill and recovering, creating conditions that are conducive to healing by alleviating stress, mitigating the spread of disease, providing nutritious food, and improving occupant comfort.



WELL CERTIFICATION

Projects may achieve WELL Certification at the Silver, Gold, or Platinum level if a sufficient number of Features are met. To maintain WELL Certification, spaces must be recertified a minimum of every three years. Three years is considered the maximum timeframe allowed before recertification is required because building conditions can deteriorate over time to the point of adversely affecting the health and wellness of occupants. The process for WELL Certification and WELL Compliance is summarized below.

Project Registration

Projects seeking to achieve the WELL Building Standard must register with the IWBI through WELL Online, IWBI's web platform for managing the WELL Certification process. Project teams may register at any point as they progress through the design and development process. However, it is advantageous to register as close to the beginning of the process as possible so that strategies to meet the WELL Building Standard can be integrated from the very beginning.

WELL Accredited Professionals

The breadth of the WELL Building Standard encompasses knowledge across several disciplines, from both theoretical and applied standpoints. The IWBI will launch the WELL Accredited Professional (WELL AP) program in early 2015. Currently, project teams have the option to engage Provisional WELL APs as consultants. Provisional WELL APs are accredited professionals in the building industry who are trained on the conceptual and applied frameworks of the WELL Building Standard and experienced in its application on registered and certified WELL projects.

Documentation Process and Project Adherence

While the WELL Building Standard is based largely upon performance to measurable criteria, demonstrating adherence to WELL also requires detailed documentation to verify that certain Features have been met. The project team will be required to submit certain requested documents, including annotated documents and letters of assurance, to demonstrate adherence to Features being pursued.

WELL Commissioning

WELL Commissioning ensures that the building is performing as intended and can help to maintain and improve its level of performance over time. WELL Commissioning is completed by an authorized assessor who will spend approximately one to three days in the building to validate the project's design documentation and to complete a series of performance tests that focus on air, water and lighting quality. Testing is completed according to IWBI's sampling protocols based on the size and type of the project, and samples are sent to a third-party lab for analysis.

If the project meets all performance requirements, it is ready to submit for final certification. If the project is not performing in specific areas, the project team is given an opportunity to identify the cause and make the necessary corrections. In assessing adherence, a project's WELL Building Standard assessor will grade each Concept independently from other Concepts on a numerical scale. Failure to achieve all applicable Preconditions in any Concept will preclude an award of WELL Certification or WELL Core and Shell Compliance. Once all

applicable Preconditions have been achieved, higher levels of certification are possible. In evaluating award levels, all Optimization Features are treated equally.

All WELL Features are subject to verification on-site by an assessor during WELL Commissioning—even those accounted for by letters of assurance or annotated documents. The assessor may therefore provide additional documentation for final certification in the form of an inspection document.

Scoring

Concept scores and the final wellness score are calculated based on the following algorithm for the number of WELL Features applicable to a specific typology:

Total Preconditions = TP

Preconditions Achieved = PA

Total Optimizations = TO

Optimizations Achieved = OA

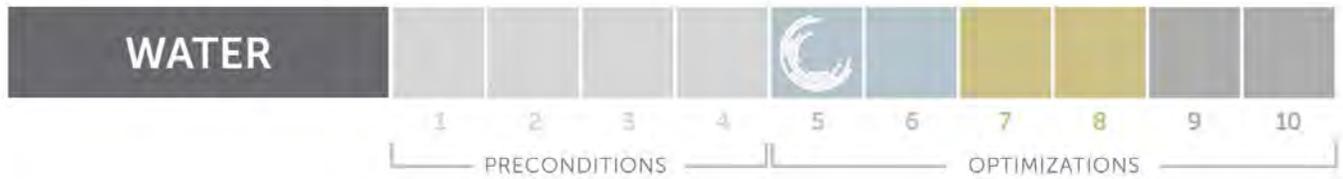
FAIL: IF $(PA/TP) < 1$ THEN Wellness Score = $(PA / TP) * 5$ (rounded down to the nearest whole number)

PASS: IF $(PA/TP) = 1$ THEN Wellness Score = $5 + (OA / TO) * 5$ (rounded down to the nearest whole number)

The example below shows an office that successfully meets the requirements of the WELL Building Standard as applied to the New Construction typology. With all Preconditions met and 29 Optimizations met, it will receive the Concept Scores calculated below and a final Wellness Score of 7 (with rounding applied).

| Concept | Preconditions | | Optimizations | | Wellness Score |
|-----------------------|---------------|-----------|---------------|-----------|----------------|
| | Applicable | Achieved | Applicable | Achieved | |
| Air | 12 | 12 | 17 | 3 | 5.9 |
| Water | 5 | 5 | 3 | 0 | 5.0 |
| Nourishment | 8 | 8 | 7 | 7 | 10.0 |
| Light | 4 | 4 | 7 | 2 | 6.4 |
| Fitness | 2 | 2 | 6 | 3 | 7.5 |
| Comfort | 5 | 5 | 7 | 2 | 6.4 |
| Mind | 5 | 5 | 14 | 12 | 9.3 |
| Total | 41 | 41 | 61 | 29 | 7.4 |
| Final Wellness Score: | | | | | 7 |

Based on these calculations, a score would be displayed per Concept on a scale such as the one for Water shown below. The scale below reflects a Concept Score of 5 with all Precondition Features in Water having been satisfied.

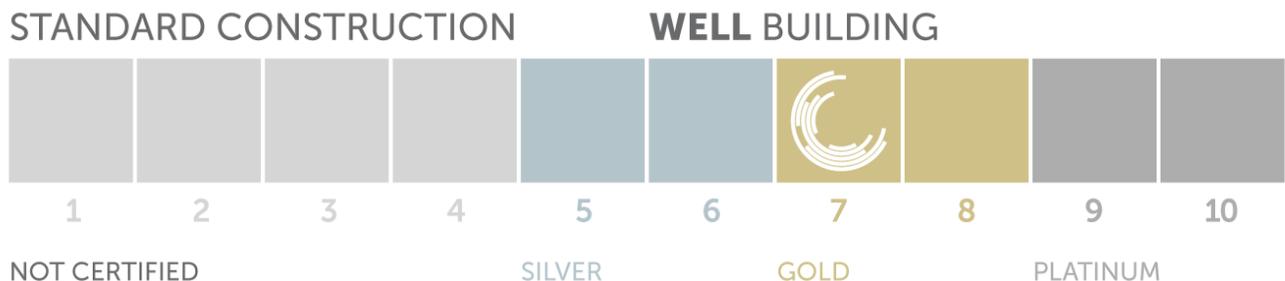


Lower scores (0 – 4) comprise the compulsory Precondition Features; a score less than 5 would denote failure to meet the Preconditions in that Concept and thus a failure for overall certification or compliance. Silver scores (5 – 6) mean that all compulsory Precondition Features have been met in the Concept. Gold scores (7 – 8), and Platinum scores (9 – 10) comprise the non-compulsory optimizations.

Well Certification

WELL Certified projects meet a score of at least 5 for all WELL Concepts, meaning that they have met all Preconditions. To achieve a higher score, projects must pursue Optimization Features. Because health and wellness objectives vary from one building to the next, the WELL Building Standard provides flexibility by weighing all Optimization equally, enabling project teams to select the Optimizations that best suit the intended health interventions of their project.

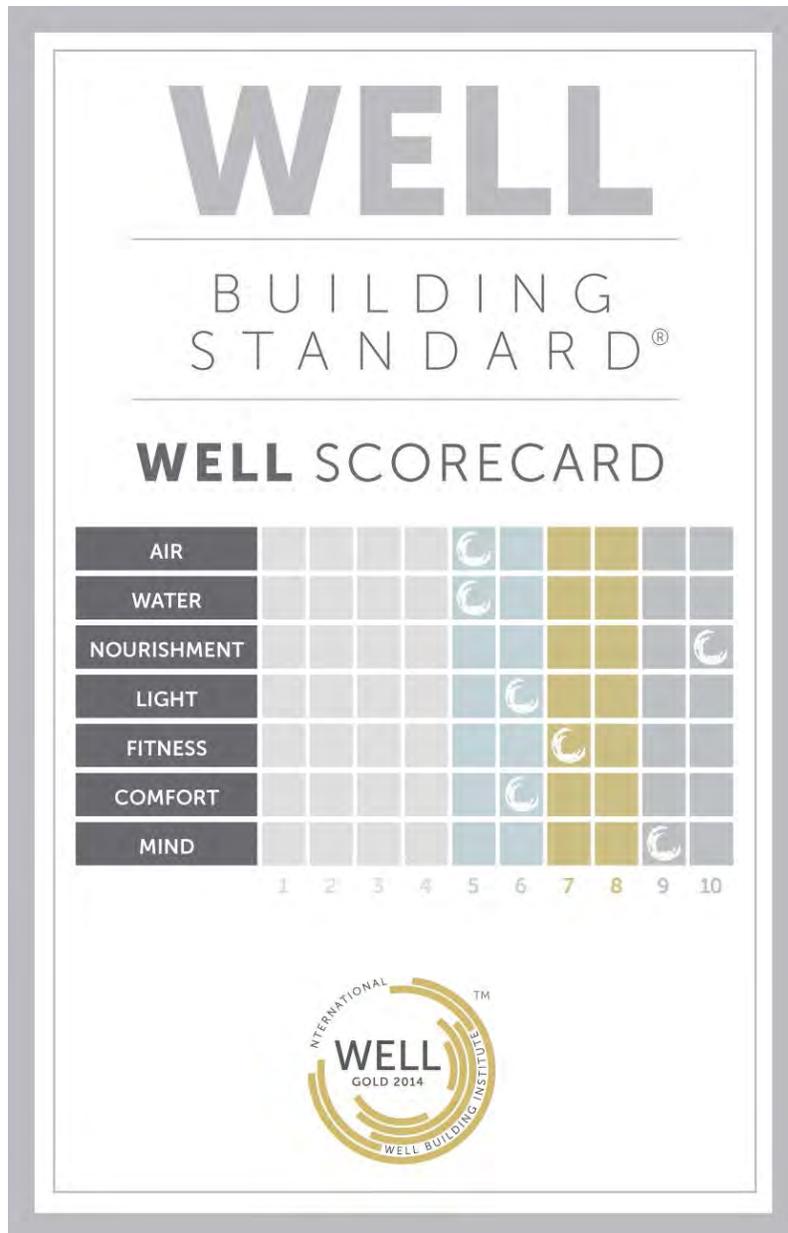
The image below shows the aggregate score for the example above, yielding Gold level certification.



- Silver level certification is achieved by meeting 100% of the Preconditions applicable to the typology (a Wellness Score of 5 or 6).
- Gold level certification is achieved by meeting 100% of the Preconditions applicable to the typology, as well as 40% or more of the Optimizations overall (a Wellness Score of 7 or 8).
- Platinum level certification is achieved by meeting 100% of the Preconditions applicable to the typology, as well as 80% or more of the Optimizations overall (a Wellness Score of 9 or 10).

WELL Scorecard

The WELL Scorecard is the aggregate of all of the Wellness Scales for each Concept. The scorecard shows Gold level certification for the building example above:



Well Compliance for Core and Shell

WELL Core and Shell Compliant projects must achieve a score of at least 5 for all WELL Concepts, meaning that they have met all Preconditions and one Optimization of their choice from each Concept.

Recertification Requirements

WELL Certification is valid for three years from the date of the certification award letter. In order to maintain certification after that time, a project must be re-commissioned and apply for recertification to verify that the building continues to perform to the WELL Building Standard. During recertification, projects may submit evidence of achievement of additional Features to improve their score or achieve a higher level of certification.

Project scores may drop if WELL Features have not been properly maintained since initial certification, and certification will be revoked if the quality of the interior environment has declined below the thresholds required in the WELL Building Standard.

Recertification is not available for WELL Core and Shell Compliance because WELL Core and Shell Compliance is a one-time determination that, as of the date of the award, a project has achieved all applicable requirements of the WELL Building Standard as applied to the core and shell of a building.



This table shows which Features are Preconditions and Optimizations for the different typologies of the Commercial and Institutional standard. Refer to the tables in the beginning of each Concept for details about the applicability of specific Parts.

For occupied spaces to obtain WELL Certification™, all Preconditions are required for the Silver level and completion of Optimizations allow projects to receive higher award levels. For Core & Shell projects to achieve WELL Compliance™, all Preconditions are required, as well at least one Optimization from every Concept.

WELL BUILDING STANDARD® FEATURES MATRIX

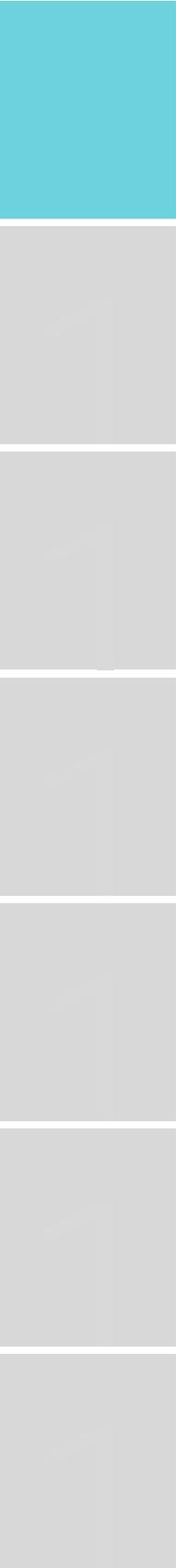
| COMPLIANCE | PRECONDITION | OPTIMIZATION | Core & Shell | Tenant Improvement | New Construction |
|---------------|-------------------------------------|--------------|--------------|--------------------|------------------|
| CERTIFICATION | PRECONDITION | OPTIMIZATION | | | |
| Air | | | | | |
| 01 | Air quality standards | P | P | P | P |
| 02 | Smoking ban | P | P | P | P |
| 03 | Ventilation effectiveness | P | P | P | P |
| 04 | VOC reduction | P | P | P | P |
| 05 | Air filtration | P | P | P | P |
| 06 | Microbe and mold control | P | P | P | P |
| 07 | Construction pollution management | P | P | P | P |
| 08 | Healthy entrance | P | O | P | P |
| 09 | Cleaning protocol | | P | P | P |
| 10 | Pesticide management | P | | P | P |
| 11 | Fundamental material safety | P | P | P | P |
| 12 | Moisture management | P | O | P | P |
| 13 | Air flush | | O | O | O |
| 14 | Air infiltration management | O | O | O | O |
| 15 | Increased ventilation | O | O | O | O |
| 16 | Humidity control | | O | O | O |
| 17 | Direct source ventilation | | O | O | O |
| 18 | Air quality monitoring and feedback | | O | O | O |
| 19 | Operable windows | O | O | O | O |
| 20 | Outdoor air systems | | O | O | O |
| 21 | Displacement ventilation | | O | O | O |
| 22 | Pest control | | O | O | O |
| 23 | Advanced air purification | O | O | O | O |
| 24 | Combustion minimization | O | O | O | O |
| 25 | Toxic material reduction | | O | O | O |
| 26 | Enhanced material safety | | O | O | O |
| 27 | Antimicrobial surfaces | | O | O | O |
| 28 | Cleanable environment | | O | O | O |
| 29 | Cleaning equipment | | O | O | O |
| Water | | | | | |
| 30 | Fundamental water quality | P | P | P | P |
| 31 | Inorganic contaminants | P | P | P | P |
| 32 | Organic contaminants | P | P | P | P |
| 33 | Agricultural contaminants | P | P | P | P |
| 34 | Public water additives | P | P | P | P |
| 35 | Periodic water quality testing | | O | O | O |
| 36 | Water treatment | O | O | O | O |
| 37 | Drinking water promotion | O | O | O | O |

WELL BUILDING STANDARD® FEATURES MATRIX

| COMPLIANCE | PRECONDITION | OPTIMIZATION | Core & Shell | Tenant Improvement | New Construction |
|--------------------|--|--------------|--------------|--------------------|------------------|
| CERTIFICATION | PRECONDITION | OPTIMIZATION | | | |
| Nourishment | | | | | |
| 38 | Fruits and vegetables | | | P | P |
| 39 | Processed foods | | P | P | P |
| 40 | Food allergies | | P | P | P |
| 41 | Hand washing | | | P | P |
| 42 | Food contamination | | | P | P |
| 43 | Artificial ingredients | | O | P | P |
| 44 | Nutritional information | | O | P | P |
| 45 | Food advertising | | O | P | P |
| 46 | Safe food preparation materials | | | O | O |
| 47 | Serving sizes | | | O | O |
| 48 | Special diets | | | O | O |
| 49 | Responsible food production | | | O | O |
| 50 | Food storage | | | O | O |
| 51 | Food production | | O | O | O |
| 52 | Mindful eating | | | O | O |
| Light | | | | | |
| 53 | Visual lighting design | | | P | P |
| 54 | Circadian lighting design | | | P | P |
| 55 | Electric light glare control | | | P | P |
| 56 | Solar glare control | | O | P | P |
| 57 | Low-glare workstation design | | | O | O |
| 58 | Color quality | | | O | O |
| 59 | Surface design | | | O | O |
| 60 | Automated shading and dimming controls | | | O | O |
| 61 | Right to light | | O | O | O |
| 62 | Daylight modelling | | O | O | O |
| 63 | Daylighting fenestration | | O | O | O |
| Fitness | | | | | |
| 64 | Interior fitness circulation | | P | | P |
| 65 | Activity incentive programs | | | P | P |
| 66 | Structured fitness opportunities | | | O | O |
| 67 | Exterior active design | | O | O | O |
| 68 | Physical activity spaces | | O | O | O |
| 69 | Active transportation support | | O | O | O |
| 70 | Fitness equipment | | O | O | O |
| 71 | Active furnishings | | | O | O |

WELL BUILDING STANDARD® FEATURES MATRIX

| COMPLIANCE | PRECONDITION | OPTIMIZATION | Core & Shell | Tenant Improvement | New Construction |
|----------------|---------------------------------|--------------|--------------|--------------------|------------------|
| CERTIFICATION | PRECONDITION | OPTIMIZATION | | | |
| Comfort | | | | | |
| 72 | ADA accessible design standards | P | P | P | P |
| 73 | Ergonomics: visual and physical | | P | P | P |
| 74 | Exterior noise intrusion | P | O | P | P |
| 75 | Internally generated noise | O | P | P | P |
| 76 | Thermal comfort | P | P | P | P |
| 77 | Olfactory comfort | | O | O | O |
| 78 | Reverberation time | | O | O | O |
| 79 | Sound masking | | O | O | O |
| 80 | Sound reducing surfaces | | O | O | O |
| 81 | Sound barriers | | O | O | O |
| 82 | Individual thermal control | | O | O | O |
| 83 | Radiant thermal comfort | O | O | O | O |
| Mind | | | | | |
| 84 | Health and wellness awareness | P | P | P | P |
| 85 | Integrative design | P | P | P | P |
| 86 | Post-occupancy surveys | | P | P | P |
| 87 | Beauty and design I | P | P | P | P |
| 88 | Biophilia I - qualitative | O | P | P | P |
| 89 | Adaptable spaces | | O | O | O |
| 90 | Healthy sleep policy | | O | O | O |
| 91 | Business travel | | O | O | O |
| 92 | Workplace health policy | | O | O | O |
| 93 | Workplace family support | | O | O | O |
| 94 | Self-monitoring | | O | O | O |
| 95 | Stress and addiction treatment | | O | O | O |
| 96 | Altruism | | O | O | O |
| 97 | Material transparency | O | O | O | O |
| 98 | JUST organization | | O | O | O |
| 99 | Beauty and design II | | O | O | O |
| 100 | Biophilia II - quantitative | O | O | O | O |
| 101 | Innovation feature I | O | O | O | O |
| 102 | Innovation feature II | O | O | O | O |



AIR

BACKGROUND

The most fundamental component of our health is the air we breathe; humans can survive no longer than a few minutes without it. Globally, the quality of our shared outdoor air is deteriorating due to pollution from particulates, ozone and other chemicals. We are also subjected to interior environments that have poor indoor air quality, often due to off-gassing from materials within the building. These emissions contribute to conditions such as asthma, allergies and other upper respiratory challenges.

The reactions people have to indoor air contaminants vary widely and depend on multiple factors including the concentration of the contaminant, the rate of intake and the length of exposure. Pollution-source removal, proper ventilation and air filtration are some of the most effective means of achieving high indoor air quality. In the United States, the Environmental Protection Agency (EPA) sets National Ambient Air Quality Standards (NAAQS) according to ongoing research and monitoring. These standards create exposure limits based on both duration and concentration for carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter and sulfur dioxide. The WELL Building Standard® expands upon these requirements by incorporating standards from additional agencies, such as the World Health Organization (WHO).

In addition to limiting pollutant concentrations, WELL incorporates best practices from industry organizations whose guidelines are evidence-based and recommended by professionals. One such group is the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), which regularly updates its building handbook to include new techniques for enhancing air quality in buildings. Although ASHRAE is a technical society without a legal mandate, many state and local governments have modeled their codes based on ASHRAE's standards. In addition, the U.S. Green Building Council's LEED® program continues to set new standards for both air filtration and material selection to improve air quality.

Another significant contributor to indoor air quality are the surfaces within an indoor environment, which tend to accumulate airborne germs. To help minimize transmission through contact with unsanitary surfaces, the WELL Building Standard provides a thoroughly researched approach that combines the installation of appropriate materials with the implementation of protocols to regularly and effectively disinfect targeted areas.

INTENT

The WELL Building Standard for Air establishes requirements to create optimal indoor air quality to support the health and well-being of building occupants.

AIR CERTIFICATION MATRIX

| COMPLIANCE CERTIFICATION | PRECONDITION | OPTIMIZATION | Core & Shell | Tenant Improvement | New Construction |
|---|--------------|--------------|-----------------|-----------------------|---------------------|
| | PRECONDITION | OPTIMIZATION | | | |
| 1 AIR QUALITY STANDARDS | | | | | |
| 1: Standards for Volatile Substances | P | | P | P | P |
| 2: Standards for Particulate Matter and Inorganic Gases | - | | P | P | P |
| 3: Below-Grade Air Quality Standards | P | | P | P | P |
| 2 SMOKING BAN | | | | | |
| 1: Indoor Smoking Ban | P | | P | P | P |
| 2: Outdoor Smoking Ban | P | | - | P | P |
| 3 VENTILATION EFFECTIVENESS | | | | | |
| 1: Ventilation Design | P | | P | P | P |
| 2: Demand Controlled Ventilation | P | | P | P | P |
| 3: System Balancing | - | | P | P | P |
| 4 VOC REDUCTION | | | | | |
| 1: Interior Paints and Coatings | P | | P | P | P |
| 2: Interior Adhesives and Sealants | P | | P | P | P |
| 3: Flooring | P | | P | P | P |
| 4: Insulation | P | | P | P | P |
| 5: Furniture and Furnishings | - | | P | P | P |
| 5 AIR FILTRATION | | | | | |
| 1: Filter Accommodation | P | | P | P | P |
| 2: Particle Filtration | P | | P | P | P |
| 3: Air Filtration Maintenance | P | | P | P | P |
| 6 MICROBE AND MOLD CONTROL | | | | | |
| 1: Cooling Coil Mold Reduction | P | | P | P | P |
| 2: Mold Inspections | - | | P | P | P |
| 7 CONSTRUCTION POLLUTION MANAGEMENT | | | | | |
| 1: Duct Protection | P | | P | P | P |
| 2: Filter Replacement | P | | P | P | P |
| 3: VOC Adsorption Management | P | | P | P | P |
| 4: Construction Equipment | P | | - | P | P |
| 5: Dust Containment and Removal | P | | P | P | P |
| 8 HEALTHY ENTRANCE | | | | | |
| 1: Permanent Entryway Walk-Off Systems | P | | O | P | P |
| 2: Entryway Air Seal | P | | O | P | P |
| 9 CLEANING PROTOCOL | | | | | |
| 1: Cleaning Plan for Occupied Spaces | - | | P | P | P |
| 10 PESTICIDE MANAGEMENT | | | | | |
| 1: Pesticide Use | P | | - | P | P |

11 FUNDAMENTAL MATERIAL SAFETY

- 1: Asbestos and Lead Restriction
- 2: Lead Abatement
- 3: Asbestos Abatement
- 4: Polychlorinated Biphenyls Abatement

| | | |
|---|---|---|
| P | P | P |
| P | P | P |
| P | P | P |
| P | P | P |

12 MOISTURE MANAGEMENT

- 1: Bulk Water – Exterior Management
- 2: Interior Bulk Water Damage Management
- 3: Capillary Water Management
- 4: Wetting by Convection and Condensation

| | | |
|---|---|---|
| P | ○ | P |
| P | ○ | P |
| P | ○ | P |
| P | ○ | P |

13 AIR FLUSH

- 1: Air Flush

| | | |
|---|---|---|
| - | ○ | ○ |
|---|---|---|

14 AIR INFILTRATION MANAGEMENT

- 1: Air Leakage Testing

| | | |
|---|---|---|
| ○ | ○ | ○ |
|---|---|---|

15 INCREASED VENTILATION

- 1: Increased Fresh Air Supply

| | | |
|---|---|---|
| ○ | ○ | ○ |
|---|---|---|

16 HUMIDITY CONTROL

- 1: Relative Humidity

| | | |
|---|---|---|
| - | ○ | ○ |
|---|---|---|

17 DIRECT SOURCE VENTILATION

- 1: Pollution Isolation and Exhaust

| | | |
|---|---|---|
| - | ○ | ○ |
|---|---|---|

18 AIR QUALITY MONITORING AND FEEDBACK

- 1: Indoor Air Monitoring
- 2: Air Data Record Keeping and Response
- 3: Environmental Measures Display

| | | |
|---|---|---|
| - | ○ | ○ |
| - | ○ | ○ |
| - | ○ | ○ |

19 OPERABLE WINDOWS

- 1: Full Control
- 2: Outdoor Air Measurement
- 3: Window Operation Management

| | | |
|---|---|---|
| ○ | ○ | ○ |
| ○ | ○ | ○ |
| ○ | ○ | ○ |

20 OUTDOOR AIR SYSTEMS

- 1: Dedicated Outdoor Air Systems

| | | |
|---|---|---|
| - | ○ | ○ |
|---|---|---|

21 DISPLACEMENT VENTILATION

- 1: Displacement Ventilation Design and Application
- 2: System Performance

| | | |
|---|---|---|
| - | ○ | ○ |
| - | ○ | ○ |

22 PEST CONTROL

- 1: Pest Reduction
- 2: Pest Inspection

| | | |
|---|---|---|
| - | ○ | ○ |
| - | ○ | ○ |

23 ADVANCED AIR PURIFICATION

- 1: Carbon Filtration
- 2: Air Sanitization
- 3: Air Quality Maintenance

| | | |
|---|---|---|
| ○ | ○ | ○ |
| ○ | ○ | ○ |
| ○ | ○ | ○ |

24 COMBUSTION MINIMIZATION

- 1: Appliance and Heater Combustion Ban
- 2: Low-Emission Combustion Sources
- 3: Engine Exhaust Reduction

| | | |
|---|---|---|
| ○ | ○ | ○ |
| ○ | - | ○ |
| ○ | - | ○ |

25 TOXIC MATERIAL REDUCTION

- 1: Perfluorinated Compound Limitation
- 2: Flame Retardant Limitation
- 3: Phthalate (Plasticizers) Limitation
- 4: Isocyanate-Based Polyurethane Limitation
- 5: Urea-Formaldehyde Restriction

| | | |
|---|-----------------------|-----------------------|
| - | <input type="radio"/> | <input type="radio"/> |
| - | <input type="radio"/> | <input type="radio"/> |
| - | <input type="radio"/> | <input type="radio"/> |
| - | <input type="radio"/> | <input type="radio"/> |
| - | <input type="radio"/> | <input type="radio"/> |

26 ENHANCED MATERIAL SAFETY

- 1: Precautionary Material Selection

| | | |
|---|-----------------------|-----------------------|
| - | <input type="radio"/> | <input type="radio"/> |
|---|-----------------------|-----------------------|

27 ANTIMICROBIAL SURFACES

- 1: High-Touch Surface Coating

| | | |
|---|-----------------------|-----------------------|
| - | <input type="radio"/> | <input type="radio"/> |
|---|-----------------------|-----------------------|

28 CLEANABLE ENVIRONMENT

- 1: Material Properties
- 2: Cleanability

| | | |
|---|-----------------------|-----------------------|
| - | <input type="radio"/> | <input type="radio"/> |
| - | <input type="radio"/> | <input type="radio"/> |

29 CLEANING EQUIPMENT

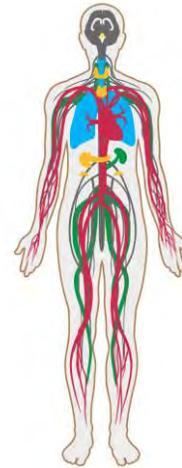
- 1: Equipment and Cleaning Agents
- 2: Chemical Storage

| | | |
|---|-----------------------|-----------------------|
| - | <input type="radio"/> | <input type="radio"/> |
| - | <input type="radio"/> | <input type="radio"/> |

AIR QUALITY STANDARDS

Pollutants generated indoors such as Volatile Organic Compounds (VOCs), combustion byproducts and airborne particles are known to trigger nausea, asthma and allergies. While ambient outdoor air is often better quality, natural ventilation methods, operable windows and doors, and general envelope infiltration can harm indoor air quality if external air quality conditions are poor.

This feature requires that an accredited assessor complete a performance test after occupancy as an independent means of verifying that the building, whether naturally or mechanically ventilated, is meeting critical air quality requirements.



Cardiovascular
Endocrine
Immune
Integumentary
Nervous
Respiratory

PART 1: STANDARDS FOR VOLATILE SUBSTANCES

The following conditions are met:

- a.¹ Formaldehyde levels less than 27 ppb.
- b.¹ Total volatile organic compounds less than 500 $\mu\text{g}/\text{m}^3$.

PART 2: STANDARDS FOR PARTICULATE MATTER AND INORGANIC GASES

The following conditions are met:

- a.² Carbon monoxide less than 9 ppm.
- b.² $\text{PM}_{2.5}$ less than 15 $\mu\text{g}/\text{m}^3$.
- c.³ PM_{10} less than 50 $\mu\text{g}/\text{m}^3$.
- d.³ Ozone less than 51 ppb.
- e.² Nitrogen dioxide less than 53 ppb.

PART 3: BELOW-GRADE AIR QUALITY STANDARDS

The following conditions are met:

- a.⁴ Radon less than 4 pCi/L in the lowest occupied level of the project.

02

SMOKING BAN

In the United States alone, smoking tobacco is related to over 400,000 annual premature deaths from cancer or cardiovascular and respiratory diseases. On average, life expectancy of a smoker is 10 years less than a non-smoker. Even so, secondhand smoke indirectly exposes others to the same toxins, expanding the number of people subject to health risks from smoking.

This feature bans smoking in and around buildings, which requires the implementation of policies to prohibit smoking indoors and adjacent to the building, along with signage to educate individuals about its harmful effects.



Cardiovascular
Digestive
Endocrine
Immune
Integumentary
Muscular
Nervous
Reproductive
Respiratory
Skeletal
Urinary

PART 1: INDOOR SMOKING BAN

Building policy reflects the following:

- a.⁵ Smoking and the use of e-cigarettes is prohibited inside the building.

PART 2: OUTDOOR SMOKING BAN

Signage is present to indicate:

- a.¹ A smoking ban within 7.5 m [25 ft] (or the maximum extent allowable by local codes) of all entrances, operable windows and building air intakes.
- b. A smoking ban on all decks, patios, balconies, rooftops and other regularly occupied exterior building spaces.
- c. The hazards of smoking, in areas beyond 7.5 m [25 ft] of all entrances, with a distance of not more than 30 m [100 ft] between signs (if smoking is permitted in the area).



03

VENTILATION EFFECTIVENESS

Indoor activities such as cooking, cleaning, building operations and occupant respiration can degrade air quality. Many indoor pollutants from these activities can cause discomfort, loss of focus and allergic reactions, but it would be difficult to test for every potential pollutant. Therefore, CO₂ levels serve as a proxy for other indoor pollutants.

This feature sets a foundation for ventilation rates, which can be adjusted according to measured concentrations of carbon dioxide. It is based on ASHRAE requirements for adequate ventilation, which include separate options for mechanically ventilated and naturally ventilated buildings. The requirements in this feature—and other ventilation-related features—follow that same division.



Cardiovascular
Nervous
Respiratory

PART 1: VENTILATION DESIGN

One of the following requirements is met for all spaces:

- a.⁶ Ventilation rates comply with all requirements set in ASHRAE 62.1-2013 (Ventilation Rate Procedure or IAQ Procedure).
- b.⁶ Projects comply with all requirements set in any procedure in ASHRAE 62.1- 2013 (including the Natural Ventilation Procedure) and demonstrate that ambient air quality is compliant with either the U.S. EPA'S NAAQS or passes the Air Quality Standards in the WELL Building Standard for at least 95% of all hours in the previous year.

PART 2: DEMAND CONTROLLED VENTILATION

For all spaces with an occupant density greater than 25 people per 93 m² [1,000 ft²], one of the following requirements is met:

- a.⁷ A demand controlled ventilation system regulates the ventilation rate of outdoor air to keep carbon dioxide levels in the space below 800 ppm.
- b.⁷ Projects that have met the Operable windows Feature demonstrate that natural ventilation is sufficient to keep carbon dioxide levels below 800 ppm at designed occupancies.

PART 3: SYSTEM BALANCING

The following is met:

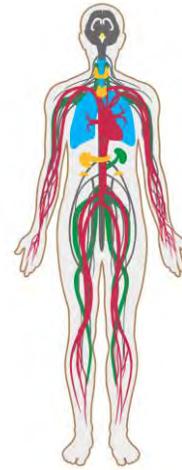
- a. As part of commissioning, the HVAC system undergoes testing and balancing and produces a balancing report.

04

VOC REDUCTION

Indoor air quality is often degraded by volatile organic compounds (VOCs) that off-gas from paints, finishes and other coatings. Levels of VOCs can be 5 times higher indoors than outdoors. These gases, at high concentrations, are known to cause irritation, nausea and loss of coordination.

This feature requires that building finishes be carefully selected to allow spaces to meet the WELL Air Quality Standards feature. While not specifically addressed in this feature, note that objects or furniture made with harmful materials, may cause buildup of VOCs if brought indoors after building completion.



Cardiovascular
Endocrine
Immune
Integumentary
Nervous
Respiratory

PART 1: INTERIOR PAINTS AND COATINGS

The VOC content of all paints and coatings must meet all limits set by the following, as applicable:

- a.¹ California Department of Public Health (CDPH) Standard Method v1.1-2010.
- b.¹ Suggested Control Measure (SCM) for Architectural Coatings or South Coast Air Quality Management District (SCAQMD) Rule 1113, effective June 3, 2011.

PART 2: INTERIOR ADHESIVES AND SEALANTS

The VOC content of all adhesives and sealants must meet all limits set by the following, as applicable:

- a.¹ California Department of Public Health (CDPH) Standard Method v1.1-2010.
- b.¹ South Coast Air Quality Management District (SCAQMD) Rule 1168, June 2005.

PART 3: FLOORING

The VOC content of flooring must meet all limits set by the following, as applicable:

- a.¹ California Department of Public Health (CDPH) Standard Method v1.1-2010.

PART 4: INSULATION

The VOC content of thermal and acoustic insulation installed in ceilings and walls must meet all limits set by the following:

- a.¹ California Department of Public Health (CDPH) Standard Method v1.1-2010.

PART 5: FURNITURE AND FURNISHINGS

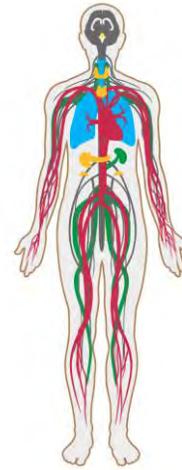
The VOC content of all furniture and furnishings must meet all limits set by the following, as applicable:

- a.¹ ANSI/BIFMA e3-2011 Furniture Sustainability Standard sections 7.6.1 and 7.6.2, tested in accordance with ANSI/BIFMA Standard Method M7.1-2011.

AIR FILTRATION

Air quality is subject to variability due to weather, dust, traffic and localized sources of pollutants. Seasonal variations in ozone, particles and pollen can affect occupants who are prone to asthma, cardiovascular disease and allergies.

This feature requires proper filtration to achieve reliable air quality performance over time. Carbon filters are designed to absorb volatile pollutants and remove the largest of particles, while media filters are meant to address smaller particles. This feature is especially important when outdoor air quality routinely fails the pollutant concentrations outlined in the WELL Air Quality Standards feature.



Cardiovascular
Endocrine
Immune
Integumentary
Nervous
Respiratory

PART 1: FILTER ACCOMMODATION

The following is in place in ventilation assemblies:

- a. Rack space to accommodate future carbon filters.

PART 2: PARTICLE FILTRATION

One of the following requirements is met:

- a.¹ MERV 13 (or higher) media filters are used in the ventilation system to filter outdoor air and MERV 8 (or higher) media filters are used in the ventilation system to filter recirculated air.
- b. Project demonstrates that for 95% of all hours in a calendar year, ambient outdoor PM₁₀ and PM_{2.5} levels are below the limits set in the WELL Air Quality Standards Feature.

PART 3: AIR FILTRATION MAINTENANCE

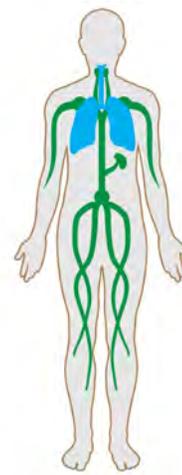
To verify that the filtration system continues to operate as designed, projects must annually provide IWBI with:

- a. Records of air filtration maintenance, including evidence that filters have been properly maintained as per the manufacturer's recommendations.

MICROBE AND MOLD CONTROL

Mold often grows on cooling coils in HVAC systems due to moisture condensation and is introduced into the building's indoor air. It is also prevalent on or within wall assemblies if water damage occurs or if there is improper detailing in humid locations like kitchens and bathrooms. Mold spores can cause allergic reactions and respiratory problems that can in some cases be severe.

This feature requires the use of ultraviolet germicidal irradiation (UVGI) devices to manage mold and bacteria on cooling coils as well as inspections for signs of mold outside of the air handling system.



Immune
Integumentary
Respiratory

PART 1: COOLING COIL MOLD REDUCTION

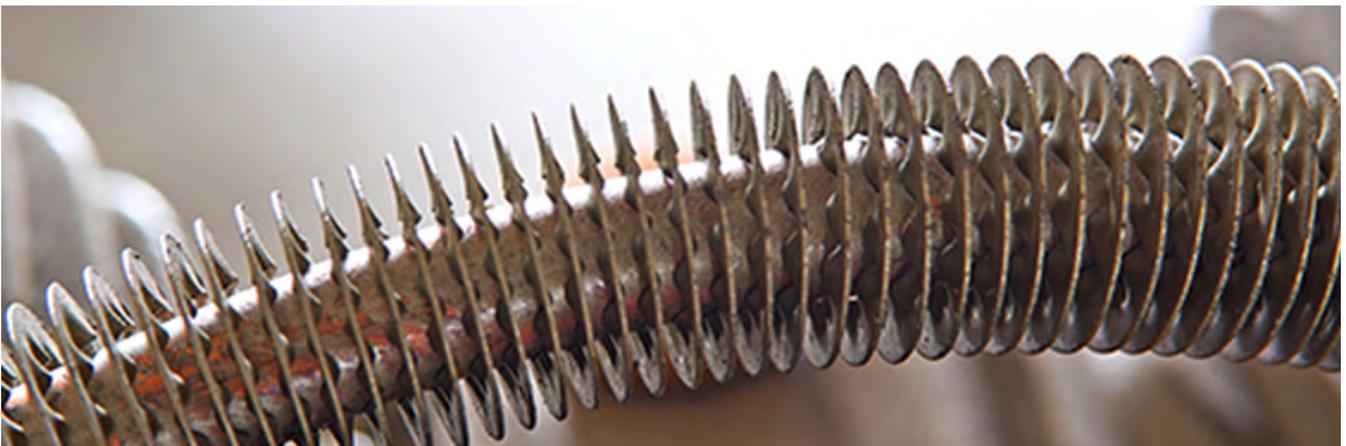
In buildings that rely on a mechanical system for cooling, the following method of suppressing mold growth is required:

- a. Ultraviolet lamps are employed on the cooling coils and drain pans of the mechanical system supplies. Irradiance reaching a the cooling coil and drain pan, including the plenum corners, is modeled..
- b.⁹ Lamps produce ultraviolet radiation at a wavelength of 254 nm so as not to generate ozone.
- c.¹¹ Lamps have ballasts housed in a NEMA-rated enclosure.

PART 2: MOLD INSPECTIONS

During the WELL performance audit, the following are inspected:

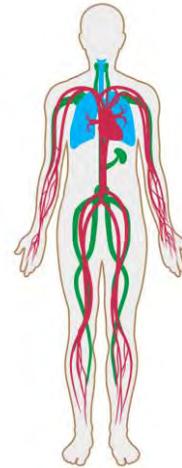
- a.¹² No visible signs of discoloration and mold on ceilings, walls or floors.
- b.¹² No signs of water damage or pooling.



CONSTRUCTION POLLUTION MANAGEMENT

Proper design and selection of materials are important factors in creating healthy indoor air quality, yet this strategy can be compromised if equal care is not taken during construction to clear the space of dust, chemical vapors and other debris. Pollutants inadvertently introduced into the space will increase the likelihood of failing indoor air quality standards.

This feature, based on industry best practices, ensures that steps are taken to minimize the introduction of air pollutants during construction and to remove pollutant build-up before occupancy.



Cardiovascular
Immune
Integumentary
Respiratory

PART 1: DUCT PROTECTION

To prevent pollutants from entering the ventilation system, all ducts are either:

- a.¹ Sealed and protected from possible contamination during construction.
- b. Vacuumed out prior to installing registers, grills and diffusers.

PART 2: FILTER REPLACEMENT

To prevent pollutants from entering the air supply post-occupancy, if the ventilation system is operating during construction then the following requirement is met:

- a.¹ All filters are replaced prior to occupancy.

PART 3: VOC ADSORPTION MANAGEMENT

To prevent building materials from absorbing and later releasing VOCs emitted by other (source) materials during construction, the following requirements are met:

- a.¹ A secure area is designated to store and protect adsorptive materials including but not limited to carpets, acoustical ceiling panels, fabric wall coverings, insulation, upholstery and furnishings.
- b.¹ Adsorptive materials remain in original packaging (or otherwise sealed in polyethylene sheeting) and stored in designated secure area until they are installed.
- c.¹ Wet materials including but not limited to adhesives, wood preservatives and finishes, sealants, glazing compounds, paints and joint fillers are installed and allowed to fully cure, prior to installation of adsorptive materials.

PART 4: CONSTRUCTION EQUIPMENT

To reduce particulate matter emissions from both on-road and non-road diesel fueled vehicles and construction equipment, the following requirements are met:

- a.⁸⁵ All non-road diesel engine vehicles comply with the US EPA's Tier 4 PM emissions standards or local equivalent when applicable. Engines may be retrofitted with verified technology (required to be US EPA or California Air Resources Board approved) as of the time the equipment is first placed on the jobsite.
- b.⁸⁵ All on-road diesel engine vehicles meet the requirements set forth in the US EPA model year 2007 on-road standards for PM, or local equivalent when applicable. Engines may be retrofitted with verified technology (required to be US EPA or California Air Resources Board approved) as of the time the equipment is first placed on the job site.
- c.⁸⁵ All equipment, vehicles and loading/unloading is located away from air intakes and operable openings of adjacent buildings when available.

PART 5: DUST CONTAINMENT AND REMOVAL

The following procedures are followed during building construction:

- a.¹ All active areas of work are isolated from other spaces by sealed doorways or windows or through the use of temporary barriers.
- b.¹ Walk-off mats at entryways reduce the transfer of dirt and pollutants.
- c.¹ Saws and other tools use dust guards or collectors to capture generated dust.
- d.¹ Vacuum cleaners with HEPA-grade filters and brooms with sweeping compounds or wetting agents are used on a daily basis to keep the job site clean.



HEALTHY ENTRANCE

Occupants often enter buildings with unwanted chemicals, biological contaminants and particles on their shoes. Bacteria, toxins from roads and agricultural chemicals are some of the pollutants that might aerosolize once they enter the building. In addition, as occupants walk through entry doors potentially polluted air can enter the building.

This feature requires methods to help prevent pollutants from entering a building. Requirements include floor systems that capture pollutants from shoes and strategies to reduce airflow from the outside to indoor occupied spaces.



Cardiovascular
Immune
Respiratory

PART 1: PERMANENT ENTRYWAY WALK-OFF SYSTEMS

To capture particulates from occupant shoes at all regularly used entrances, one of the following is installed and is maintained on a weekly basis:

- a.¹ Permanent entryway system comprised of grilles, grates or slots, which allow for easy cleaning underneath, at least the width of the entrance and 3 m [10 ft] long in the primary direction of travel.
- b.¹ Rollout mats, at least the width of the entrance and 3 m [10 ft] long in the primary direction of travel.
- c.¹ Material manufactured as an entryway walk-off system, at least the width of the entrance and 3 m [10 ft] long in the primary direction of travel.

PART 2: ENTRYWAY AIR SEAL

One of the following is in place to slow the movement of air from outdoors to indoors at the main building entrance:

- a. Building entry vestibule with double doors.
- b. Revolving entrance doors.
- c. At least 3 normally-shut doors that separate occupied space from the outdoors. For example, a space on the fifth-floor could be separated by the exterior building doors, the first-floor elevator doors and the fifth-floor elevator doors. This option is applicable only for buildings whose entrance lobby is not a regularly occupied space.

CLEANING PROTOCOL

Regular cleaning is an important practice for a healthy indoor environment. On the other hand, cleaning chemicals and improper techniques can undermine indoor air quality. An adequate cleaning regimen using non-toxic, hypoallergenic cleaners helps reduce bioloads, pests, environmental allergens and unpleasant odors without chemicals that might adversely impact indoor air quality.

This feature incorporates the development of a written protocol, in accordance with appendix table A4, including the frequency, supplies and equipment, procedures and training to improve cleaning regimens.



Immune
Reproductive
Urinary

PART 1: CLEANING PLAN FOR OCCUPIED SPACES

To achieve sufficient and regular removal of debris and pathogenic microorganisms, a cleaning plan is created in accordance to Appendix Table A4 and presented during staff trainings that includes the following elements:

- a. A list of high-touch and low-touch surfaces in the space (see Appendix Table A1).
- b. A schedule that specifies, for each high-touch and low-touch surface, the extent and frequency (e.g. daily, weekly) that a surface be cleaned, sanitized or disinfected.
- c. Cleaning protocol and dated cleaning logs are maintained and available to all occupants.



PESTICIDE MANAGEMENT

Some pesticides and herbicides are known carcinogens, while others have a role in endocrine disruption and affect the nervous system. These chemicals contaminate rivers and groundwater through rainwater runoff and eventually make their way back up the food chain to people.

This feature requires the creation of pest management systems that reduce pesticide and herbicide use and eliminate highly toxic chemicals. Most pest management systems do not prohibit the application of harmful chemicals, so this feature further requires that only approved products be used.



Cardiovascular
Digestive
Endocrine
Immune
Nervous
Reproductive
Respiratory

PART 1: PESTICIDE USE

The following conditions are required concerning all pesticides and herbicides used on outdoor plants:

- a. ¹⁴ Pesticide and herbicide use is minimized by creating a use plan based on Chapter 3 of the San Francisco Environment Code Integrated Pest Management (IPM) program.
- b. ¹⁴ Only pesticides with a hazard tier ranking of 3 (least hazardous) as per The City of San Francisco Department of the Environment's (SFE) Reduced-Risk Pesticide List are used. Refer to Appendix Table A2 for more details.



FUNDAMENTAL MATERIAL SAFETY

Some hazardous materials that are no longer used in the United States, such as asbestos and PCBs (polychlorinated biphenyls), are often encountered in older buildings. Others, including lead, remain in limited use.

This feature restricts the presence of added lead and asbestos in building materials and limits occupant exposure to these hazards where they might exist in older structures. Refer to Table A3 in the Appendix for specific chemical names and registration numbers.



Cardiovascular
Nervous
Respiratory

PART 1: ASBESTOS AND LEAD RESTRICTION

The following materials composition requirements are met for all building materials:

- a. Asbestos.
- b.³⁶ Not more than 100 ppm (by weight) added lead.

PART 2: LEAD ABATEMENT

For repair, renovation, or painting on buildings constructed prior to 1978, lead evaluation and abatement is conducted in accordance with the below guidelines.

- a.³¹ An on-site investigation of the commercial space conducted by a certified risk assessor or inspector technician to determine the presence of any lead-based hazards in paint, dust, and soil using the definitions in US EPA 40 CFR Part 745.65 for residential dwellings or child-occupied facilities.
- b.³¹ All commercial and institutional spaces found to have lead-based hazards must adhere to US EPA 40 CFR Part 745.227 work practice standards for conducting lead-based paint activities, as outlined for multi-family dwellings.
- c.³¹ Adherence to final rules, as they are proposed by the EPA, regarding the lead renovation, repair and painting program for public and commercial buildings (RIN: 2070-AJ56) supersedes adherence to definitions and protocols outlined in EPA 40 CFR Part 745 for residential dwellings or child-occupied facilities.

PART 3: ASBESTOS ABATEMENT

To reduce hazards in buildings with known or suspected asbestos, the following testing, evaluation and abatement is conducted:

- a.³³ Projects conduct asbestos inspection every three years through an accredited professional per Asbestos Hazard Emergency Response Act (AHERA)'s Asbestos Model Accreditation Plan (MAP), National Standards for Hazardous Air Pollutants (NESHAP) accredited asbestos consultant (State or local equivalent) or by a United States Environmental Protection Agency (U.S. EPA) EPA accredited company experienced in asbestos assessment.
- b.³³ In accordance with the Asbestos Hazard Emergency Response Act (AHERA), development, maintenance and update of asbestos management plans, including all necessary actions to minimize asbestos hazards: repair, encapsulation, enclosure, maintenance and removal, follow protocol detailed in the Asbestos-Containing Materials in Schools Rule (40 CFR part 763).
- c.³³ Projects conduct post-abatement clearance in accordance with Asbestos Hazard Emergency Response Act (AHERA) Asbestos-Containing Materials in Schools (40 CFR part 763).

PART 4: POLYCHLORINATED BIPHENYLS ABATEMENT

Any projects constructed or renovated between 1950 and 1977 and undergoing current renovation or demolition carry out the following:

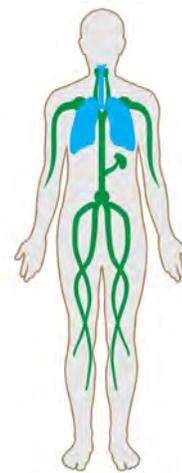
- a.³⁴ Conduct evaluation and abatement of materials in accordance with the United States Environmental Protection Agency (U.S. EPA) Steps to Safe PCB Abatement Activities.
- b.³⁴ Conduct removal and safe disposal of PCB-containing fluorescent light ballasts in accordance with United States Environmental Protection Agency (U.S. EPA) guidelines.



MOISTURE MANAGEMENT

Good design principles and strategies to mitigate water damage help preserve good indoor air quality. Moisture enters buildings and building assemblies in four ways: bulk water, capillary water, air-transported moisture and vapor diffusion. In addition to preventing wetting from all four channels, managing moisture is also about promoting drying potential.

This feature requires actions for each type of moisture movement. Properly managing moisture can reduce the health risks of pests, mold and bacterial loads.



Immune
Integumentary
Respiratory

PART 1: BULK WATER – EXTERIOR MANAGEMENT

The following requirement is met:

- a. A continuous drainage plane—weather-resistive barrier (WRB) integrated with flashing systems at penetrations—is constructed interior to the exterior cladding.

PART 2: INTERIOR BULK WATER DAMAGE MANAGEMENT

To prevent leaks and water damage, one of the following is installed:

- a. Manual shut-off (governed or activated per use) or automatic shut-off at point-of-connection for all hard-piped fixtures.
- b. Building wide plumbing leak detection system.

PART 3: CAPILLARY WATER MANAGEMENT

To prevent the wicking of porous building materials, one of the following capillary break methods is used:

- a. Free-draining spaces (such as between exterior claddings or WRBs in wall assemblies).
- b. Non-porous materials (such as closed-cell foams, waterproofing membranes and metal) are used between porous materials, such as “sill sealer” between concrete foundation walls and mud sills of above-grade walls.

PART 4: WETTING BY CONVECTION AND CONDENSATION

To mitigate wetting through convection and conduction, the following requirement is met for all assemblies (particular attention is taken to ensure that common thermal bypasses at penetrations and unintended air pathways are sealed):

- a. Continuous air barrier.

13

AIR FLUSH

An air flush is a technique that can help reduce pollutants (such as VOCs and particulate matter) that are inadvertently introduced into indoor environments during construction.

This feature requires an air flush at the completion of construction activities in order to effectively remove pollutants from indoor environments. Given the time required to conduct a flush, emphasis should be placed on the management of construction pollution as the first priority.



Cardiovascular
Immune
Respiratory

PART 1: AIR FLUSH

A building air flush is performed while maintaining an indoor temperature of at least 15 °C [59 °F] and relative humidity below 60%, at one of the following volumes:

- a.¹ A total air volume of 4500 m³ of outdoor air per m² of floor area [14,000 ft³ per ft² of floor area] prior to occupancy.
- b.¹ A total air volume of 1000 m³ of outdoor air per m² of floor area [3500 ft³ per ft² of floor area] prior to occupancy, followed by a second flush of 3500 m³ of outdoor air per m² of floor area [10,500 ft³ per ft² of floor area] post-occupancy. While the post-occupancy flush is taking place, the ventilation system must provide at least 0.1 m³ per minute of outdoor air per m² of floor area [0.3 CFM fresh air per ft² floor area] at all times.



AIR INFILTRATION MANAGEMENT

A building's air quality and thermal comfort is compromised by leaks and gaps that break the building's air barrier. These weak points are not only wasteful, but can also lead to conditions conducive to growth of molds and the infiltration of pests or polluted air.

This feature is a performance test to check for air leakages in the building envelope. Such tests are often used to optimize a building's energy efficiency and can also be used to maintain indoor air quality and comfort.



Immune
Respiratory

PART 1: AIR LEAKAGE TESTING

The following is performed after substantial completion and prior to occupancy to ensure the structure is airtight:

- a. ²⁵ Envelope commissioning in accordance with ASHRAE and NIBS Guidelines (for new construction or structural renovation).



INCREASED VENTILATION

The guidelines put forth by ASHRAE provide the basis for acceptable indoor air quality, but not necessarily for best-in-class air quality for buildings. Unusually high building occupancy, a high risk of accidents that might degrade air quality or spare capacity to install filtration make exceeding ASHRAE requirements a worthwhile strategy.

This feature requires buildings to design and supply rates of fresh air that are 30 percent higher than are typically provided.



Cardiovascular
Immune
Respiratory

PART 1: INCREASED FRESH AIR SUPPLY

The following is required in terms of the rate of fresh air supply to all regularly occupied spaces:

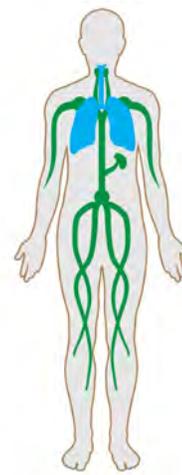
- a.¹ Exceed ASHRAE fresh air supply rates met in the WELL Ventilation Effectiveness feature by 30%.



HUMIDITY CONTROL

Extremely low humidity is associated with the aerosolization of microbes and the persistence of dust, which can be irritating to the skin, eyes and mucus membranes. Conversely, high humidity is associated with the development of mold and other organisms that produce odors and can be irritating to sensitive individuals.

This feature requires buildings to provide humidification when relative humidity is low and dehumidify when relative humidity is high. This feature is dependent on local climate conditions and expected humidity.



Immune
Integumentary
Respiratory

PART 1: RELATIVE HUMIDITY

At least one of the following is required:

- a. ⁸ A ventilation system with the capability to maintain relative humidity between 30% to 50% at all times by adding or removing moisture from the air.
- b. Modeled humidity levels in the space are kept within 30% to 50% for at least 95% of all business hours of the year. Buildings in climates with narrow humidity ranges are encouraged to pursue this option.



DIRECT SOURCE VENTILATION

Indoor sources of pollution can be isolated. Cleaning closets can be a source of harmful chemical vapors, including VOCs linked to carcinogenic, reproductive and developmental issues. Copy rooms can be a source of ozone and particulate matter, which are associated with respiratory and cardiopulmonary diseases. Bathrooms can be a source of mold and mildew that release toxins associated with allergies, asthma and immune compromise.

This feature requires the isolation of indoor pollution sources in separate rooms or exhausted cabinets to minimize their effect on overall indoor air quality. Considerations to minimize risk of exposure include location and adjacency to occupied spaces and restricted access, while direct exhaust helps expel pollutants at the source.

PART 1: POLLUTION ISOLATION AND EXHAUST

All cleaning and chemical storage units, all areas containing copiers or printers more than 1 m [3 ft] tall and all bathrooms meet the following conditions:

- a. Closed from adjacent spaces with self-closing doors and either deck-to-deck partitions or a continuous hard ceiling.
- b.¹ Exhausted so that all air is expelled rather than recirculated.



Immune
Respiratory



AIR QUALITY MONITORING AND FEEDBACK

Building performance is highly variable and has a direct effect on indoor air quality. To maintain ideal performance metrics, projects must continuously gather data on building performance. WELL requires the continuous gathering and transmission of data to a central repository that is used to update the standard on regular intervals.

This feature requires real-time measurement, recording and transmission of key indoor air quality metrics as well as ambient outdoor air quality. This data is reported to the building occupants and to the IWBI.



Cardiovascular
Integumentary
Nervous
Respiratory

PART 1: INDOOR AIR MONITORING

Monitors measure 2 of the following pollutants in a regularly occupied space within the building, at intervals no longer than once an hour, and results are annually transmitted to the IWBI:

- a. Particle count (resolution 35,000 counts per m^3 [1000 counts per ft^3] or finer) or particle mass (resolution $10 \mu g/m^3$ or finer).
- b.¹ Carbon dioxide (resolution 25 ppm or finer).
- c. Ozone (resolution 10 ppb or finer).

PART 2: AIR DATA RECORD KEEPING AND RESPONSE

To consistently meet the WELL parameters, projects provide a written policy specifying:

- a. Detailed enforcement strategies for monitoring and record-keeping of parameters listed in the Air Quality Standards Feature.
- b. Records be kept for a minimum of 3 years, including full data from field inspectors or laboratory results where appropriate.
- c. Detailed plan for action and remediation of unacceptable conditions.

PART 3: ENVIRONMENTAL MEASURES DISPLAY

Real-time display of the following indoor environmental parameters are made available per $930 m^2$ [10,000 ft^2] of regularly occupied space on a screen no smaller than 15 cm [5.9 inches] by 13 cm [5.1 inches]:

- a. Temperature.
- b. Humidity.
- c. Carbon dioxide concentration.
- d. Sound levels.

OPERABLE WINDOWS

Achieving natural ventilation through open windows, doors and louvers can provide a positive occupant experience but challenges the ability to maintain strict control over interior air quality. When weather and local environmental conditions are suitable for high quality outdoor air, WELL encourages natural ventilation strategies. Open windows can then provide a supply of fresh air and lower levels of carbon dioxide and VOCs, rather than introducing particulate matter and ozone into the space from outside.

This feature requires that local outdoor air quality conditions, including annual prevailing breeze patterns and average contaminant levels, be analyzed before integrating operable windows into the design.



Cardiovascular
Respiratory

PART 1: FULL CONTROL

The following requirement is met:

- a. ¹³ Every regularly occupied space has operable windows that provide access to fresh air and daylight.

PART 2: OUTDOOR AIR MEASUREMENT

Outdoor ozone, PM₁₀, temperature and humidity is monitored based on the following requirement, and data collected is made available to the building occupants:

- a. A data-gathering station located within 0.8 km [0.5 mi] of the building.

PART 3: WINDOW OPERATION MANAGEMENT

If the outdoor air measurement system indicates that outdoor air either (i) exceeds ozone levels of 51 ppb or PM₁₀ levels of 50 µg/m³; (ii) has a temperature of 8 °C [15 °F] above or below indoor set temperature; or (iii) has a relative humidity above 60%, then one of the following is used to discourage occupants from opening windows:

- a. Software on occupants' computers or smartphones.
- b. Indicator lights at all windows.



OUTDOOR AIR SYSTEMS

Dedicated outdoor air systems separate the imperatives of heating and cooling from ventilation requirements so that optimal air quality and thermal comfort can be independently achieved.

Although there is evidence that thermal comfort and space conditions may improve through the use of dedicated outdoor air systems (DOAS), ASHRAE does not currently have a separate published and peer reviewed standard or design guide for them. A properly designed DOAS can save energy compared to conventional systems while always supplying the appropriate amount of ventilation. This feature sets requirements for projects implementing DOAS systems.



Respiratory

PART 1: DEDICATED OUTDOOR AIR SYSTEMS

The following requirements are met:

- a. Dedicated outdoor air systems are used for heating and/or cooling systems.
- b.⁹² The project achieves ASHRAE 55-2013 standards for thermal comfort for at least 75% of all regularly occupied space.
- c. A detailed design review of the proposed system is conducted by an independent, qualified and registered professional mechanical engineer (not employed or compensated by the mechanical engineer of record). The review addresses thermal comfort (temperature, humidity, air velocity etc.) and ventilation rates, as well as overall serviceability and system reliability. Report must demonstrate satisfactory compliance with all applicable ASHRAE standards and codes.



DISPLACEMENT VENTILATION

By providing ventilation at the normal breathing zone displacement ventilation enhances air change effectiveness. Since heat in a room is naturally stratified, displacement ventilation ensures that air is not delivered and pushed through the return air path (often the dirtiest portion of the air stream) and also tends to concentrate some pollutants near the ceiling. Once there, the pollutants are out of the breathing zone and more easily removed. Displacement ventilation supplies air at very low velocity levels at or near floor level. Air then rises and returns at the ceiling level.

This feature supports a thermally comfortable indoor environment through a carefully designed and efficient displacement ventilation system.



Cardiovascular
Immune

PART 1: DISPLACEMENT VENTILATION DESIGN AND APPLICATION

One of the following is met for projects implementing a displacement ventilation system for heating and/or cooling:

- a.⁴¹ Low side wall air distribution with the air supply temperature slightly cooler or warmer than the desired space temperature. The system must use the System Performance Evaluation and ASHRAE Guidelines RP-949 as the basis for design.
- b.³⁷ Underfloor Air Distribution (UFAD) with the air supply temperature slightly cooler or warmer than the desired space temperature. This system must use ASHRAE's UFAD Guide (Design, Construction and Operations of Underfloor Air Distribution Systems) as the basis of design. Displacement ventilation applied as part of an underfloor air distribution system must be installed at a raised floor height whereby the under floor area can be cleaned on an annual basis.

PART 2: SYSTEM PERFORMANCE

The following requirements are met:

- a. A Computational Fluid Dynamics (CFD) analysis is conducted for the displacement ventilation system.
- b.⁹² The displacement ventilation system meets ASHRAE 55-2013 (Thermal Environmental Conditions for Human Occupancy) for comfort for at least 75% of all regularly occupied space.

PEST CONTROL

Unhygienic conditions lead to the buildup and growth of organisms that emit irritating compounds, which can trigger asthma and allergic reactions. Dust mites and pests attracted by food are common sources of indoor allergens.

To minimize allergenic pests, this feature requires that pest inspections be conducted regularly, food be stored and sealed and furniture be covered in washable covers.



Immune
Respiratory

PART 1: PEST REDUCTION

The following are met:

- a. All non-refrigerated perishable food, including pet food, is stored in sealed containers.
- b. All indoor garbage cans (except paper recycling bins) less than 113 liters [30 gallons] have lids and hands-free operation.
- c. All indoor garbage cans greater than 113 liters [30 gallons] have a lid.

PART 2: PEST INSPECTION

During every WELL audit, a thorough inspection is performed to ensure that there are none of the following:

- a. Signs of infestation by cockroaches, termites or other pests.



ADVANCED AIR PURIFICATION

Some circumstances justify greater investment in air purification strategies. For example, proximity to highly traveled roads and seasonal variation can affect outdoor air quality, increasing ozone and VOC content. Additionally, wet climates tend to have high levels of airborne mold.

This feature requires the use of carbon filters to remove VOCs and ozone, and ultraviolet sanitizers to irradiate bacteria, viruses and mold spores present in circulating air.



Cardiovascular
Immune
Respiratory

PART 1: CARBON FILTRATION

To reduce VOCs in the indoor air, one of the following requirements is met:

- a. An activated carbon filter is used in the main air ducts to filter recirculated air. Replacement is required as recommended by the manufacturer.
- b. A standalone air purifier with a carbon filter is used in all regularly occupied spaces. Purifiers must be sized appropriately to the space it is serving. Filter replacement is required as recommended by the manufacturer.

PART 2: AIR SANITIZATION

Spaces with more than 10 occupants use one of the following technologies to treat recirculated air, either integrated within the central ventilation system or as a standalone device:

- a. ¹⁵ Ultraviolet germicidal irradiation.
- b. Photocatalytic oxidation.

PART 3: AIR QUALITY MAINTENANCE

As evidence that the selected filtration/sanitization system chosen continues to be fully operational, projects must annually provide IWBI with:

- a. Records of air filtration/sanitization maintenance, including evidence that the filter and/or sanitizer has been properly maintained as per the manufacturer's recommendations.

COMBUSTION MINIMIZATION

Although fireplaces and gas stoves have aesthetic benefits, they can be detrimental to indoor air quality. If not effectively sealed off from the living space, they contribute harmful combustion byproducts such as carbon monoxide and particulate matter.

This feature prohibits combustion in occupied spaces to eliminate the single most harmful source of indoor pollution. It also requires that any combustion equipment serving the building meet stringent clean-burning standards, and that vehicles are discouraged from idling near the building.



Cardiovascular
Respiratory
Urinary

PART 1: APPLIANCE AND HEATER COMBUSTION BAN

The following are forbidden in regularly occupied spaces:

- a.²⁹ Combustion-based fireplaces, stoves, space-heaters, ranges and ovens.

PART 2: LOW-EMISSION COMBUSTION SOURCES

All combustion equipment used in the project for heating, cooling, water-heating, process heat, or power generation (whether primary or back-up) must meet California's South Coast Air Quality Management District rules for pollution:

- a.³⁹ Internal combustion engines.
- b.³⁹ Furnaces.
- c.³⁹ Boilers, steam generators, and process heaters.
- d.³⁹ Water heaters.

PART 3: ENGINE EXHAUST REDUCTION

Signage, visible from pick-up, drop-off and parking areas indicates:

- a. Idling with vehicle engines on for more than 30 seconds is prohibited.

TOXIC MATERIAL REDUCTION

Although they are either known to or widely suspected of causing health problems, many hazardous or potentially hazardous substances are still used in the manufacture of building materials. A precautionary approach—taking reasonable steps to minimize risks and avoid a hazard—suggests avoiding such substances when possible.

This feature identifies some potentially harmful chemical compounds commonly found in building materials, and suggests avoiding them in certain applications. Refer to Table A3 in the appendix for specific chemical names and registration numbers.



Endocrine
Reproductive

PART 1: PERFLUORINATED COMPOUND LIMITATION

No perfluorinated (PFCs) compounds present in the following condition:

- a.³⁶ At levels equal to or greater than 100 ppm in components that constitute at least 5% by weight of a furniture or furnishing (drapes/curtains) assembly.

PART 2: FLAME RETARDANT LIMITATION

Halogenated flame retardants are limited in the following components to 0.01% (100 ppm) to the extent allowable by local code:

- a.³⁶ Window and waterproofing membranes, door and window frames and siding.
- b.³⁶ Flooring, ceiling tiles and wall coverings.
- c.³⁶ Piping and electrical cables, conduits and junction boxes.
- d.³⁶ Sound and thermal insulation.
- e.³⁶ Upholstered furniture and furnishings, textiles and fabrics.

PART 3: PHTHALATE (PLASTICIZERS) LIMITATION

DEHP, DBP, BBP, DINP, DIDP or DNOP [often found in polyvinyl chloride (PVC)] are limited in the following components to 0.01% (100 ppm):

- a.³⁶ Flooring, including resilient and hard surface flooring and carpet.
- b.³⁶ Wall coverings, window blinds and shades, shower curtains and furniture and upholstery.
- c.³⁶ Plumbing pipes and moisture barriers.

PART 4: ISOCYANATE-BASED POLYURETHANE LIMITATION

Isocyanate-based polyurethane products are not used in:

- a.¹⁶ Foam-in-place insulation.
- b.¹⁶ Interior finishes.

PART 5: UREA-FORMALDEHYDE RESTRICTION

Urea-formaldehyde are limited in the following components to 100 ppm:

- a.¹ Furniture or any composite wood products.
- b.¹ Laminating adhesives and resins.
- c.¹ Thermal insulation.



ENHANCED MATERIAL SAFETY

Many chemicals used in building materials have not been fully evaluated for safety and may be known or suspected carcinogens, mutagens, or endocrine, developmental and reproductive disruptors. Voluntary programs in the market allow suppliers that have carefully screened the composition of their products and avoided potentially harmful substances to be recognized for their achievements.

This feature promotes the use of products that have been independently verified to be free of many suspected hazards.



Cardiovascular
Digestive
Endocrine
Immune
Integumentary
Muscular
Nervous
Respiratory

PART 1: PRECAUTIONARY MATERIAL SELECTION

At least one of the following requirements are met:

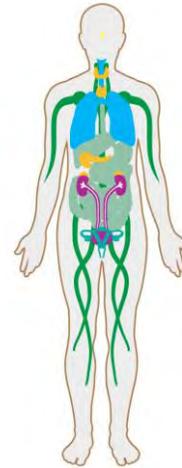
- a.¹³ The project completes all Imperatives in the Materials Petal under Living Building Challenge 3.0.
- b.¹ At least 25% of products by cost (including furnishings, built-in furniture, and all interior finishes and finish materials) are Cradle to Cradle Certified™ with a v2 Gold or Platinum or a v3 Silver, Gold or Platinum Material Health Score.
- c.¹ At least 25% of products by cost (including furnishings, built-in furniture, and all interior finishes and finish materials) have no GreenScreen v1.2 List Translator 1 or List Translator P1 substances at concentrations over 100 ppm, as verified by an independent third party accredited by the the Health Product Declaration (HPD) Collaborative.
- d.¹ Some combination of requirements b and c.



ANTIMICROBIAL SURFACES

Cleaning processes are often effective at reducing the bacterial load on given surfaces, yet in conditions where there is airborne bacteria, high moisture or surfaces that are touched frequently, the bioload returns soon after the cleaning compounds dissipate.

This feature employs the use of materials that consistently clean surfaces by reacting to or physically disrupting microbes. This approach suppresses microbe build-up on surfaces while minimizing the use of cleaning chemicals.



Digestive
Endocrine
Immune
Integumentary
Reproductive
Respiratory
Urinary

PART 1: HIGH-TOUCH SURFACE COATING

All non-porous surfaces designated as high-touch (refer to Appendix Table A1) are coated or comprised of a material that meets the following:

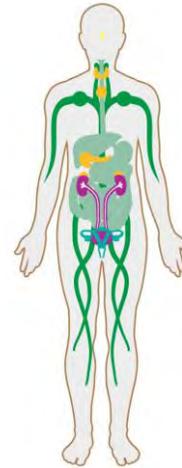
- a. ²¹ EPA testing requirements for antimicrobial activity.
- b. Abrasion-resistant and non-leaching.



CLEANABLE ENVIRONMENT

Surfaces exposed to frequent human touch can harbor microbes and toxins for extended periods of time. However, these surfaces can be more easily kept sanitary if they facilitate easy cleaning and are designed with a more suitable surface material. This reduces the need for toxic cleaning products and may enable the space to be cleaned less often.

This feature requires that high-touch surfaces are smooth, corrosion-resistant and easily sanitized to maintain cleanliness.



Digestive
Endocrine
Immune
Integumentary
Reproductive
Urinary

PART 1: MATERIAL PROPERTIES

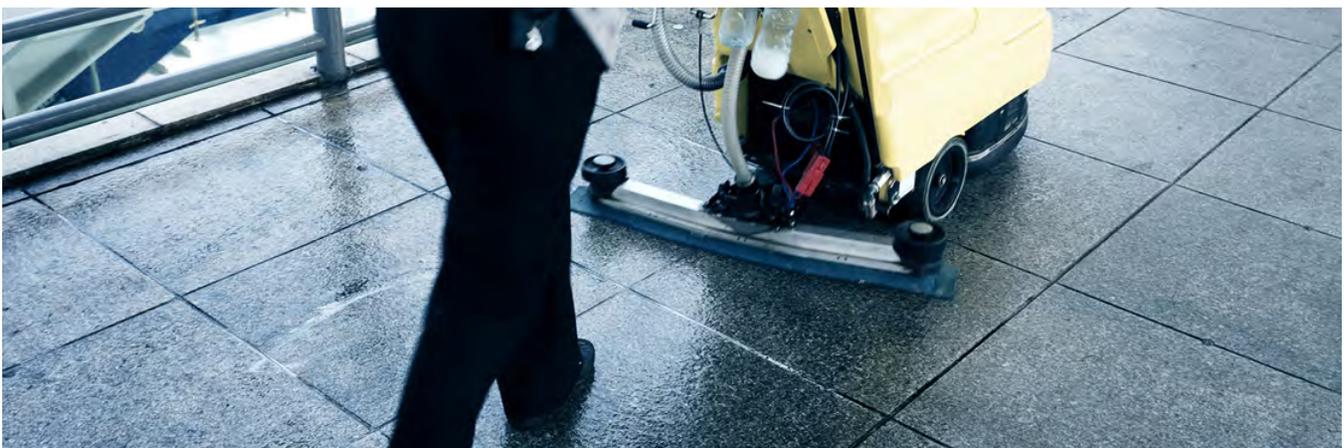
High-touch and non-porous surfaces (refer to Appendix Table A1) meet the following requirements:

- a. Constructed of corrosion-resistant materials.
- b. Smooth and free of macroscopic defects.
- c. Finished to maintain smooth welds and joints.

PART 2: CLEANABILITY

The following requirements are met:

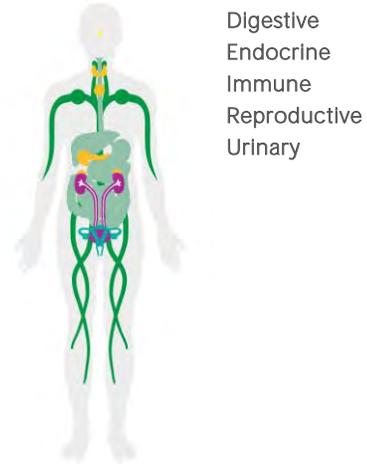
- a.³⁰ No permanent wall-to-wall carpeting is used; only removable rugs, removable carpet tiles or hard surfaces are allowed.
- b. The building provides adequate flexible storage space for all permanent, movable items to allow high-touch surfaces to be completely cleared during cleaning.
- c. Free of sharp internal angles, corners and crevices.
- d. Right angles between wall, windows and floors are sealed with waterproof sealant.



CLEANING EQUIPMENT

High performance cleaning equipment increases the effectiveness of cleaning practices. Cleaning equipment that removes debris and fomite material not only prevents the spread of contaminants, but also reduces repeat work and contact time with potentially harmful chemicals for cleaning staff.

This feature specifies cleaning equipment designed to achieve efficient disinfection of surfaces, reduce cross-contamination and decrease exposure to toxic cleaning chemicals.



PART 1: EQUIPMENT AND CLEANING AGENTS

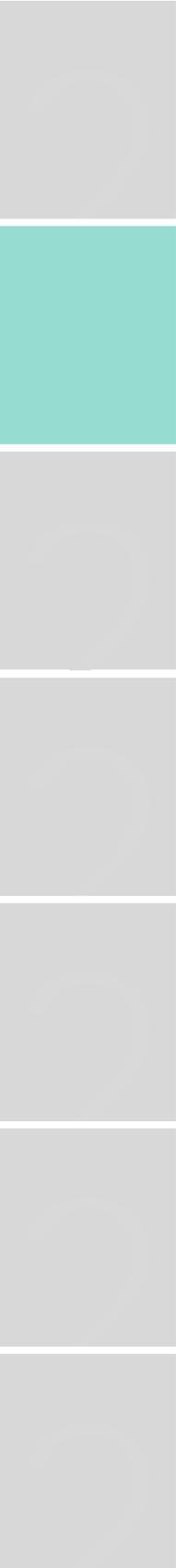
All cleaning equipment meets the following:

- a.²³ Mops, rags and dusters used to clean all non-porous surfaces consist of microfiber with a denier no higher than 1.0.
- b.²⁴ Cleaning products are certified by either the EPA's Design for the Environment, Underwriters Laboratories' EcoLogo or Green Seal.
- c.²³ Mops are hands-free.
- d.⁴⁰ Vacuum cleaners contain filters with a HEPA rating.
- e. Mobile UV cleaning devices have an output of at least 4 mW/cm² and are used as recommended by manufacturer.

PART 2: CHEMICAL STORAGE

All cleaning equipment meets the following:

- a.²⁶ In cleaning storage areas, bleach and ammonia-based cleaning products are kept in separate bins from one another.
- b.²³ Any bins and bottles of bleach and ammonia-based cleaning products are affixed with large, color-coded labels indicating they are not to be mixed.



WATER

BACKGROUND

Clean drinking water is a basic prerequisite for human health, yet many people receive water that has been exposed to potentially harmful levels of biological, chemical and mineral contaminants. The source of water pollution sometimes can be traced back to industry and its related processes, but pollution can be introduced simply as a function of a community's general infrastructure. Contaminants like lead, arsenic, glyphosate, atrazine and microbes that are naturally occurring or inadvertently introduced into our water can pose serious threats to human health.

The Clean Water Act of 1974 is the foremost piece of legislation that we rely on to ensure safe U.S. surface water quality. The U.S. Environmental Protection Agency (EPA) works to implement this Act and others and publishes threshold concentration guidelines for water contaminants. These thresholds are set based on the likelihood of cancer and other adverse health effects in cases where levels are exceeded. Nevertheless, drinking water contamination is a persistent problem. In a 2009 report, the EPA warned, "Threats to drinking water are increasing," adding, "We can no longer take our drinking water for granted."

Chlorine and other additives are commonly used to protect water from pathogenic organisms, but these substances can lead to the introduction of disinfectant byproducts like trihalomethanes (THMs), which can also be harmful to human health. Further, pharmaceutical and personal care products (PPCPs) and other emerging contaminants increasingly are finding their way into our water supplies.

The taste of water is affected by hardness and turbidity leading many people to drink bottled water; however, that doesn't necessarily solve the problem. Overreliance on bottled water has environmental drawbacks, but even putting aside those concerns, the quality of bottled water is subject to similar standards as tap water.

The same standards for quality are typically applied across all uses of potable water. This can represent a significant waste of resources, since each use does not require the same characteristics. The WELL Building Standard® seeks to simultaneously preserve this resource while enhancing its quality for human health in the context of different uses. Therefore, WELL requires a broad initial assessment to evaluate a building's water source. From there, filtration can be installed to meet the thresholds required for each use. Buildings can continue to perform periodic testing to maintain quality water over time.

INTENT

The WELL Building Standard for Water promotes safe and clean water through proper filtration and other methods, requiring the appropriate quality of water for various uses.

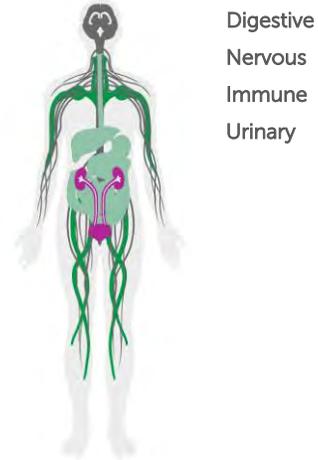
WATER CERTIFICATION MATRIX

| COMPLIANCE CERTIFICATION | PRECONDITION | OPTIMIZATION | Core & Shell | Tenant Improvement | New Construction |
|---|--------------|--------------|-----------------|-----------------------|---------------------|
| | PRECONDITION | OPTIMIZATION | | | |
| 30 FUNDAMENTAL WATER QUALITY | | | | | |
| 1: Sediment | P | | P | P | P |
| 2: Microorganisms | P | | P | P | P |
| 31 INORGANIC CONTAMINANTS | | | | | |
| 1: Dissolved Metals | P | | P | P | P |
| 32 ORGANIC CONTAMINANTS | | | | | |
| 1: Organic Pollutants | P | | P | P | P |
| 33 AGRICULTURAL CONTAMINANTS | | | | | |
| 1: Herbicides and Pesticides | P | | P | P | P |
| 2: Fertilizers | P | | P | P | P |
| 34 PUBLIC WATER ADDITIVES | | | | | |
| 1: Disinfectants | P | | P | P | P |
| 2: Disinfectant Byproducts | P | | P | P | P |
| 3: Fluoride | P | | P | P | P |
| 35 PERIODIC WATER QUALITY TESTING | | | | | |
| 1: Quarterly Testing | - | | O | O | O |
| 2: Water Data Record Keeping and Response | - | | O | O | O |
| 36 WATER TREATMENT | | | | | |
| 1: Organic Chemical Removal | O | | O | O | O |
| 2: Sediment Filter | O | | O | O | O |
| 3: Microbial Elimination | O | | O | O | O |
| 4: Water Quality Maintenance | O | | O | O | O |
| 37 DRINKING WATER PROMOTION | | | | | |
| 1: Drinking Water Taste Properties | O | | O | O | O |
| 2: Drinking Water Access | - | | O | O | O |
| 3: Water Dispenser Maintenance | - | | O | O | O |

FUNDAMENTAL WATER QUALITY

Though there are many ways to measure water quality, testing for all potential contaminants can be cumbersome and expensive. However, untreated water can harbor dangerous pathogens and other contaminants. Especially in locations where access to potable water is limited, certain simple criteria can be measured to indicate an acceptable level of safety and quality without the need for excessive testing.

To assess water safety under a variety of circumstances, this feature requires performance tests for total coliform bacteria and turbidity: two measures that serve as an indicator for the possible presence of many other harmful contaminants.



Digestive
Nervous
Immune
Urinary

PART 1: SEDIMENT

A sample of all water being delivered to the project area for human consumption meets the following minimum requirement during the WELL performance audit:

- a. ⁵⁰ Turbidity of the water sample is less than 0.3 NTU.

PART 2: MICROORGANISMS

A sample of all water being delivered to the project area for human consumption meets the following requirement during the WELL performance audit:

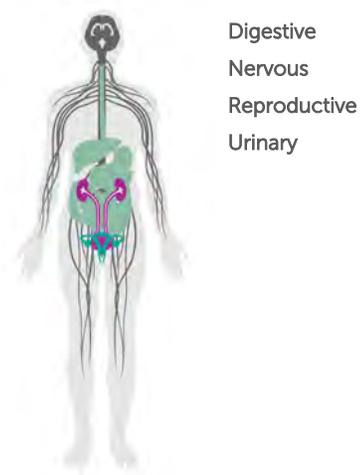
- a. ⁵⁴ Total coliforms (including *E. coli*) are not detected in the sample.



INORGANIC CONTAMINANTS

Many dissolved metals that contaminate water supplies can be acutely or chronically toxic. Contamination varies widely by geographic location and water source, spurring the need for localized testing. Exposure to even small amounts of inorganic contaminants such as lead, mercury and arsenic have been linked to the development of various cancers, neurological damage, and other adverse health effects.

This feature sets maximum safety limits for several inorganic contaminants in drinking water. If necessary, reverse osmosis (RO) systems or Kinetic Degradation Fluxion (KDF) filters can remove dissolved metals.



PART 1: DISSOLVED METALS

Water from all kitchen faucets and drinking fountains, if present, meets the following requirements:

- a. ⁵³ Lead less than 0.01 mg/L.
- b. ⁵⁴ Arsenic less than 0.01 mg/L.
- c. ⁵⁴ Antimony less than 0.006 mg/L.
- d. ⁵⁴ Mercury less than 0.002 mg/L.
- e. ⁴³ Nickel less than 0.012 mg/L.
- f. ⁵⁴ Copper less than 1.0 mg/L.



ORGANIC CONTAMINANTS

Organic contaminants pose serious threats to human health; they have been associated with increased risk for cancers and a variety of other adverse health effects. Organic contaminants in surface and ground water derive from both natural and man-made sources, including industrial activities that inadvertently leach chemical runoff into water sources.

This feature sets maximum safety limits for organic contaminants like polychlorinated biphenols (PCBs), benzene, and styrene. Activated carbon filters are effective at removing these and other harmful chemical substances, but they cannot effectively eliminate microorganisms.



Digestive
Nervous
Endocrine
Immune
Urinary
Reproductive

PART 1: ORGANIC POLLUTANTS

Water from all kitchen faucets and drinking fountains, if present, meets the following requirements:

- a. ⁴⁵ Styrene less than 0.0005 mg/L.
- b. ⁴⁴ Benzene less than 0.001 mg/L.
- c. ⁴⁴ Ethylbenzene less than 0.3 mg/L.
- d. ⁵⁴ Polychlorinated biphenols less than 0.0005 mg/L.
- e. ⁵⁴ Vinyl Chloride less than 0.002 mg/L.
- f. ⁴⁴ Toluene less than 0.15 mg/L.
- g. ⁵³ Xylenes (Total: m, p and o) less than 0.5 mg/L.
- h. ⁵⁴ Tetrachloroethylene less than 0.005 mg/L.



AGRICULTURAL CONTAMINANTS

Exposure to herbicides, pesticides and fertilizers that enter the water supply from agricultural and stormwater runoff has been linked to kidney, liver, gastrointestinal and reproductive health issues. While these are typically not found in high enough concentrations to cause acute health problems, they can be difficult to contain and remediation strategies often require action at the municipal and industrial level.

This feature calls for the responsible management of herbicide, pesticide and fertilizer usage to help limit leaching into water sources. This feature also sets maximum safety limits for common pesticides and herbicides detected in indoor drinking water. If detected, these contaminants can be removed with carbon filters.



Digestive
Nervous
Endocrine
Urinary
Reproductive
Cardiovascular

PART 1: HERBICIDES AND PESTICIDES

Water from all kitchen faucets and drinking fountains meets the following requirements:

- a.⁴⁴ Atrazine less than 0.001 mg/L.
- b.⁵³ Simazine less than 0.002 mg/L.
- c.⁵⁴ Glyphosate less than 0.70 mg/L.
- d.⁵⁴ 2,4-Dichlorophenoxyacetic Acid less than 0.07 mg/L.

PART 2: FERTILIZERS

Water from all kitchen faucets and drinking fountains meets the following requirements:

- a.⁵⁴ Nitrates as N less than 10 mg/L.



PUBLIC WATER ADDITIVES

There are a number of reasons chemicals are added to a water supply. For example, chlorine and chloramine may be added to act as a disinfectant, and fluoride is added to prevent tooth decay. Although small amounts of these chemicals are beneficial to the safety and health of the population, excessive exposure could lead to adverse effects. In laboratory animals, some disinfection byproducts have been shown to increase the risk of cancer and other adverse health issues.

This feature requires the use of reverse osmosis (RO) systems and activated charcoal filters to remove harmful byproducts like trihalomethanes (THMs) from water sources while maintaining appropriate levels of chlorine, chloramine, and fluoride.



Digestive
Reproductive
Respirator

PART 1: DISINFECTANTS

Water from faucets, drinking fountains, showers and baths meets the following requirements:

- a.⁴² Residual Chlorine less than 0.6 mg/L.
- b.⁵⁴ Residual Chloramine less than 4 mg/L.

PART 2: DISINFECTANT BYPRODUCTS

Water from faucets, drinking fountains, showers and baths meets the following requirements:

- a.⁵⁴ Total Trihalomethanes less than 0.08 mg/L.
- b.⁵⁴ Total Haloacetic Acids less than 0.06 mg/L.

PART 3: FLUORIDE

Water from all faucets and drinking fountains meets the following requirements:

- a.⁵³ Fluoride less than 1.5 mg/L.



PERIODIC WATER QUALITY TESTING

Changing industrial practices and temporal variations in temperature, pH, and weather may affect the leaching rate of inorganic metals into drinking water sources. In most cases, a one-time test and the use and maintenance of appropriate filters is sufficient to ensure good quality water. However, where possible, more routine testing can help to reaffirm that a building is consistently receiving high quality water.

Quarterly testing for inorganic metals ensures that water quality is maintained year-round. This feature requires that detailed records are kept of all tests, and that a remediation plan is in place for cases where unacceptable water quality has been detected.



Digestive
Nervous
Immune
Urinary

PART 1: QUARTERLY TESTING

Water from all kitchen faucets and drinking fountains is tested quarterly for the presence of the following dissolved metals or metalloids. Projects annually submit water quality results to the IWBI.

- a. Lead.
- b. Arsenic.
- c. Mercury.
- d. Nickel.
- e. Copper.

PART 2: WATER DATA RECORD KEEPING AND RESPONSE

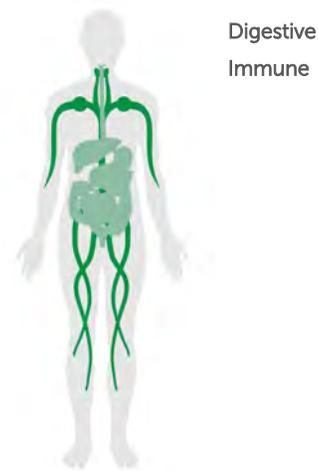
Projects provide a written policy specifying:

- a. Detailed enforcement strategies for monitoring and keeping record of water quality parameters listed in the WELL Building Standard.
- b. Records be kept for a minimum of 3 years, including full data from field inspectors or laboratory results where appropriate.
- c. Detailed plan for action and remediation of unacceptable conditions.

WATER TREATMENT

There are many types of contaminants that may compromise water quality, from pathogens and heavy metals to pesticides. While routine testing helps keep track of potential contaminants, reliance on sampling alone cannot guarantee the elimination of all risk. Droughts, disruptions to water supply, flooding, and construction and infrastructure changes can temporarily affect water quality.

This feature prescribes technologies designed to maintain high water quality irrespective of changes to the water supply through the provisioning of various precautionary filtration and sterilization processes. Options include carbon filters, sediment filters, and UV sanitization.



PART 1: ORGANIC CHEMICAL REMOVAL

Water from all faucets, drinking fountains, showers and baths is treated with the following:

- a. Activated carbon filter.

PART 2: SEDIMENT FILTER

Water from all faucets, drinking fountains, showers and baths is treated with the following:

- a. Filter rated to remove suspended solids.

PART 3: MICROBIAL ELIMINATION

Water from all faucets, drinking fountains, showers and baths is treated with one of the following:

- a. UVGI water sanitation.
- b. NSF filter rated to remove microbial cysts.

PART 4: WATER QUALITY MAINTENANCE

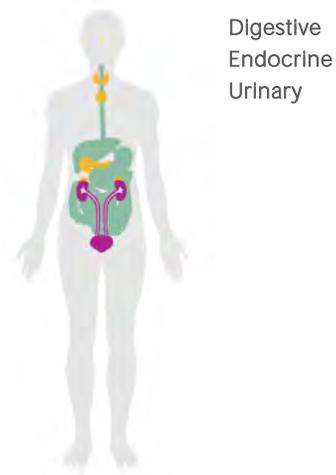
To verify that the selected filtration/sanitation system chosen continues to operate as designed, projects must annually provide IWBI with:

- a. Record-keeping for a minimum of 3 years, including evidence that the filter and/or sanitizer has been properly maintained as per the manufacturer's recommendation.

DRINKING WATER PROMOTION

Access to clear, good-tasting water helps promote good hydration. Many otherwise healthy people unknowingly suffer from mild dehydration, resulting in avoidable symptoms like constipation, dry skin and headaches. Improving the taste and appearance of tap water encourages increased water consumption and reduces reliance on bottled water.

This feature sets limits for dissolved minerals that can compromise the taste and appearance of water, and requires that drinking water is easily accessible throughout the building.



PART 1: DRINKING WATER TASTE PROPERTIES

Water from all faucets and drinking fountains meets the following requirements:

- a.⁵⁴ Aluminum less than 0.2 mg/L.
- b.⁵⁴ Chloride less than 250 mg/L.
- c.⁵⁴ Manganese less than 0.05 mg/L.
- d.⁴⁷ Sodium less than 270 mg/L.
- e.⁵⁴ Sulfates less than 250 mg/L.
- f.⁵⁴ Iron less than 0.3 mg/L.
- g.⁵⁴ Zinc less than 5 mg/L.
- h.⁵⁴ Total Dissolved Solids less than 500 mg/L.

PART 2: DRINKING WATER ACCESS

To encourage water consumption, the following are met:

- a. At least one dispenser is located within 30 m [100 ft] of all parts of regularly occupied floor space (minimum one per floor).

PART 3: WATER DISPENSER MAINTENANCE

The components of the water dispenser that provide drinking water are cleaned with the following regularity:

- a.⁴⁸ Daily, for mouthpieces, protective guards, and collective basins, to prevent lime and calcium build-up.
- b.⁴⁸ Quarterly, for outlet screens and aerators, to remove debris and sediment.



NOURISHMENT

BACKGROUND

The industrialization of agriculture in the last half-century has increased access to and altered the quality and quantity of the foods available to us. Packaged foods have led to an increase in the intake of refined flours, sugars and oils that not only add "empty" calories, but also interfere with the body's internal homeostatic mechanisms. This makes it physiologically difficult to control hunger, interfering with the body's ability to burn fat and increasing the risk of numerous chronic diseases.

While the components and ingredients that often make up our foods represent a significant a reasonable concern, another point for consideration involves changes to cultural food practices. Busy lives and longer workdays are encouraging unhealthy behavior, including eating meals on the go and in front of the TV, snacking in between meals and eating large-portioned restaurant meals. Further, snack foods that are of low nutritional quality are engineered to be tastier and more addictive. These foods are often supported by colorful and enticing advertisements that inundate our environments, from vending machines to drug stores and supermarket shelves.

Unfortunately, these aspects of our food culture and eating practices have contributed to the rise of obesity, heart disease, diabetes, liver disease and cancer. Research suggests that the kinds of highly refined and processed ingredients that are now found in many commonly consumed foods can be detrimental to our health. Further, the way we produce, store and prepare foods can have a significant impact on the quality of our meals.

Food consumption decisions, eating habits and preparation practices all represent not only points of concern, but also venues for health improvement. It is possible to put in place policies and structure our physical environments so that people may more easily make more informed eating choices, and more powerfully benefit from good nutrition.

INTENT

The WELL Building Standard® for Nourishment requires the availability of fresh, wholesome foods, limits unhealthy ingredients and encourages better eating habits and food culture.

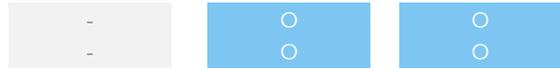
NOURISHMENT CERTIFICATION MATRIX

| COMPLIANCE CERTIFICATION | PRECONDITION | OPTIMIZATION | Core & Shell | Tenant Improvement | New Construction |
|---|--------------|--------------|-----------------|-----------------------|---------------------|
| | PRECONDITION | OPTIMIZATION | | | |
| 38 FRUITS AND VEGETABLES | | | | | |
| 1: Fruit and Vegetable Variety | - | | - | P | P |
| 2: Fruit and Vegetable Promotion | - | | - | P | P |
| 39 PROCESSED FOODS | | | | | |
| 1: Refined Ingredient Restrictions | P | | P | P | P |
| 2: Trans Fat Ban | P | | P | P | P |
| 40 FOOD ALLERGIES | | | | | |
| 1: Food Allergy Labeling | P | | P | P | P |
| 41 HAND WASHING | | | | | |
| 1: Hand Washing Supplies | - | | - | P | P |
| 2: Contamination Reduction | - | | - | P | P |
| 3: Sink Dimensions | - | | - | P | P |
| 42 FOOD CONTAMINATION | | | | | |
| 1: Cold Storage | - | | - | P | P |
| 2: Food Preparation Separation | - | | - | P | P |
| 43 ARTIFICIAL INGREDIENTS | | | | | |
| 1: Artificial Substance Labeling | O | | O | P | P |
| 44 NUTRITIONAL INFORMATION | | | | | |
| 1: Detailed Nutritional Information | O | | O | P | P |
| 45 FOOD ADVERTISING | | | | | |
| 1: Advertising and Environmental Cues | O | | O | P | P |
| 2: Nutritional Messaging | O | | O | P | P |
| 46 SAFE FOOD PREPARATION MATERIALS | | | | | |
| 1: Cooking Material | - | | - | O | O |
| 2: Cutting Surfaces | - | | - | O | O |
| 47 SERVING SIZES | | | | | |
| 1: Meal Sizes | - | | - | O | O |
| 2: Dinnerware Sizes | - | | - | O | O |
| 48 SPECIAL DIETS | | | | | |
| 1: Food Alternatives | - | | - | O | O |
| 49 RESPONSIBLE FOOD PRODUCTION | | | | | |
| 1: Sustainable Agriculture | - | | - | O | O |
| 2: Humane Agriculture | - | | - | O | O |
| 50 FOOD STORAGE | | | | | |
| 1: Storage Capacity | - | | - | O | O |
| 2: Temperature Control | - | | - | O | O |
| 51 FOOD PRODUCTION | | | | | |
| 1: Gardening Space | O | | O | O | O |
| 2: Planting Support | O | | O | O | O |

52 MINDFUL EATING

1: Eating Spaces

2: Break Area Furnishings



FRUITS AND VEGETABLES

The regular consumption of fresh fruits and vegetables is the cornerstone of a healthy diet. Consuming fresh and minimally processed fruits and vegetables can lower the risk of developing various chronic diseases and can help with weight management. However, less than 1 in 3 Americans currently consume the recommended daily amounts of fruits or vegetables, and currently, only 1 in 5 schools in the U.S. offer either as snacks.

To encourage more people to incorporate fruits and vegetables as a central component of their diet, this feature requires that a variety of each is readily available where food is provided. These requirements are not applicable to projects that do not provide food service or vending.

PART 1: FRUIT AND VEGETABLE VARIETY

If solid foods are sold or distributed on the premises by (or under contract with) the project owner, the following are provided or offered for sale:

- a. At least 5 varieties of fruits (containing no added sugar), at least 2 of which are non-dried.
- b. At least 5 varieties of non-fried vegetables.

PART 2: FRUIT AND VEGETABLE PROMOTION

Cafeterias operated or contracted by the project owner, if present, include the following design interventions:

- a.⁷³ A “healthy convenience” checkout line for only fruit and vegetable purchases.
- b.⁷³ Vegetable dishes placed in front of checkout counter.
- c.⁷³ Fruits placed in a bowl or in a stand at the checkout location.
- d.⁷³ Menu posted with color photos of fruits and vegetables served.



Cardiovascular
Digestive
Endocrine
Immune



PROCESSED FOODS

Foods that contain highly processed ingredients tend to have low nutritional value, and consuming them can create imbalances in the endocrine system and spur the growth of gut microflora.

This feature prohibits or limits the main components of highly processed and industrialized foods (refined sugars, flours and oils) to encourage the consumption of healthy cuisines.



Cardiovascular
Digestive
Endocrine
Reproductive
Urinary

PART 1: REFINED INGREDIENT RESTRICTIONS

All food, beverages, snacks and meals sold or distributed on the premises by (or under contract with) the project owner meet the following conditions:

- a.⁷⁸ No beverage with more than 30 g of sugar per container is sold or distributed through catering services, vending machines or pantries. Bulk containers of 1.9 L (2 quart) or larger are exempt from this requirement.
- b.⁷⁸ In beverage vending machines and on food service menus, at least 50% of slots or listings are products that have 15 g or less of sugar per 240 mL [8 oz] serving.
- c.⁷⁸ No individually sold, single-serving, non-beverage food item contains more than 25 g of sugar.
- d.⁵⁵ In any foods that contain a grain flour, whole grain is the primary grain ingredient by weight.

PART 2: TRANS FAT BAN

All foods, beverages, snacks and meals sold or distributed on the premises by (or under contract with) the project owner do not contain:

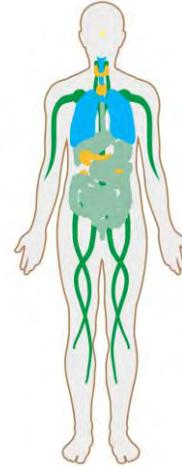
- a.⁵⁶ Partially-hydrogenated oil.



FOOD ALLERGIES

Without clear labeling of ingredients, individuals with allergies face an increased risk of exposure to allergens. The FDA requires that all packaged foods explicitly declare the presence of common allergens, and several municipalities and state governments have additional guidelines for prepared food served in food service establishments.

This feature requires that all foods, beverages, snacks and meals are labeled with the 8 most common food allergens plus gluten. This includes not only packaged foods, but also any prepared food items as well.



Digestive
Endocrine
Immune
Integumentary
Respiratory

PART 1: FOOD ALLERGY LABELING

Wherever foods are sold or distributed on the premises by (or under contract with) the project owner, foods are clearly labeled to identify that they contain the following allergens:

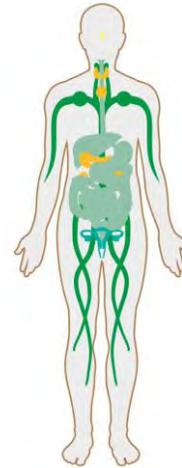
- a.⁵⁷ Peanuts.
- b.⁵⁷ Fish.
- c.⁵⁷ Shellfish.
- d.⁵⁷ Soy.
- e.⁵⁷ Milk and dairy products.
- f.⁵⁷ Egg.
- g.⁵⁷ Wheat.
- h.⁵⁷ Tree nuts.
- i.⁵⁷ Gluten, in compliance with the definitions and restrictions set forth by the FDA in 21 C.F.R. § 101.91.



HAND WASHING

Hand washing is one of the most important and effective means of reducing the transmission of pathogens. Regular rinsing with soap and water provides an effective and convenient method for reducing the spread of unwanted germs. Even drying hands with towels also helps remove bacteria from hands, more so than using an air dryer.

This feature requires that sinks, soap and paper towel dispensers are readily accessible in appropriate environments.



Digestive
Endocrine
Immune
Integumentary
Reproductive

PART 1: HAND WASHING SUPPLIES

The following are provided, at a minimum, at all sink locations:

- a.⁷⁶ Fragrance-free non-antibacterial soap.
- b.⁶⁸ Disposable paper towels. (Air dryers are not forbidden, but are supplemented.)

PART 2: CONTAMINATION REDUCTION

One of the following is provided at all sink locations:

- a.⁶⁸ Liquid soap in dispensers with disposable and sealed soap cartridges.
- b.⁷⁶ A bar of soap on a fast-draining rack.

PART 3: SINK DIMENSIONS

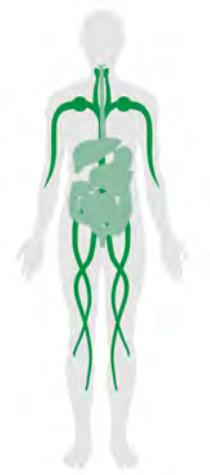
Bathroom and kitchen sinks meet the following requirements:

- a.⁷⁰ Sink column of water is at least 20 cm [8 inches] in length.
- b.⁷⁰ The horizontal distance between the center of the column of water to the edge of the sink is at least 10 cm [4 inches] in all directions.

FOOD CONTAMINATION

Foods such as meat and poultry pose an increased risk of becoming contaminated with bacteria. Gastrointestinal problems that result from exposure to these pathogens can be reduced by preparing these foods at high temperatures and by following a precautionary protocol during meal preparation.

This feature requires the separation of raw foods from prepared foods in preparation and storage areas to reduce the risk of pathogen cross-contamination. Clear labeling is equally as important as it ensures healthy preparation habits.



Digestive
Immune

PART 1: COLD STORAGE

Cold storage spaces contain the following:

- a. ⁷¹ At least one removable, cleanable drawer or container located at the bottom of the unit, designated and labeled for storing raw foods (uncooked meat, fish and poultry).
- b. A visual display of holding temperatures to ensure accurate representation of storage temperatures.

PART 2: FOOD PREPARATION SEPARATION

The following conditions are met:

- a. ⁶⁹ Food preparation areas have distinct, designated seamless cutting boards for raw foods (uncooked meats, fish and poultry) and ready-to-eat foods (2 minimum).
- b. ⁶⁹ Each commercial food preparation or communal dining area has at least 2 separate sinks.



ARTIFICIAL INGREDIENTS

Many artificial ingredients are typically added to highly processed foods to improve taste and to extend shelf-life. Since these additives do not contribute to a food's nutritional value, and tend to appear in foods with low nutritional qualities, they should be avoided as often as possible.

This feature requires the clear labeling of all artificial colors, sweeteners and preservatives present in foods and meals to allow consumers to make more informed dietary choices.



Digestive
Nervous
Urinary

PART 1: ARTIFICIAL SUBSTANCE LABELING

Foods and meals sold or distributed on the premises by (or under contract with) the project owner are labeled to indicate that they contain the following:

- a. Artificial colors.
- b.¹⁰ Artificial flavors.
- c.¹⁰ Artificial sweeteners.
- d.¹⁰ Brominated vegetable oils.
- e.¹⁰ Potassium bromate.
- f.¹⁰ BHA (Butylated Hydroxyanisole).
- g.¹⁰ BHT (Butylated Hydroxytoluene).



NUTRITIONAL INFORMATION

Access to complete nutritional information allows consumers to make informed dietary choices. The FDA has been setting strict requirements for nutrition labeling in packaged foods for many years, and several municipal administrations have extended a labeling regulation to apply to prepared foods as well.

This feature requires that food sold and distributed on the premises - whether packaged or served prepared - are labeled with the total calories, macronutrient content and a complete list of ingredients. Many commercial kitchens already use software to organize recipes that can be repurposed to display nutrition information.



Cardiovascular
Digestive
Muscular
Skeletal

PART 1: DETAILED NUTRITIONAL INFORMATION

For foods or beverages sold or distributed on the premises by (or under contract with) the project owner, the following are accurately displayed (per meal or item) on packaging, menus or signage:

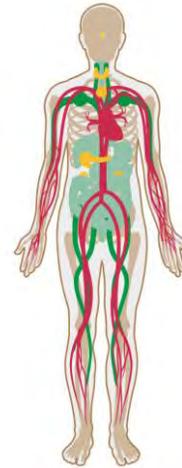
- a. ⁷⁴ Total calories.
- b. ⁶¹ Macronutrient content (total protein, total fat and total carbohydrate) in weight and as a percent of FDA estimated daily requirements.
- c. ⁶¹ Micronutrient content in weight or international units (IU) and as a percent of FDA estimated daily requirements.
- d. ⁶¹ Total sugar content.



FOOD ADVERTISING

Limiting exposure to the advertising of unhealthy foods can help decrease the likelihood that individuals will make unhealthy eating choices. Additionally, by providing access to information about nutrition, individuals can learn about and develop better eating habits.

This feature eliminates the advertising of unhealthy foods, while promoting the advertising of better food choices such as fresh fruits and vegetables and low-calorie meals.



Cardiovascular
Digestive
Endocrine
Immune
Integumentary
Skeletal

PART 1: ADVERTISING AND ENVIRONMENTAL CUES

The following is met:

- a.⁷⁷ Advertisements for any food or beverage items that do not conform to the requirements set forth in the Processed Foods Feature are not purposefully displayed on the premises.

PART 2: NUTRITIONAL MESSAGING

Using prominent displays such as educational posters, brochures or other visual or written media, all designated eating areas contain at least 3 instances of messaging intended to achieve each of the following requirements:

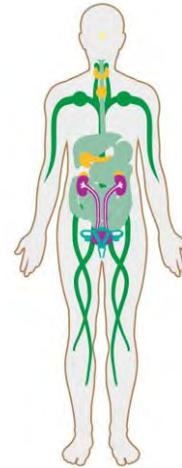
- a.⁷⁷ Encourages the consumption of whole, natural foods and cuisines.
- b.⁷⁷ Discourages the consumption of sugary or processed foods, beverages and snacks.



SAFE FOOD PREPARATION MATERIALS

Food preparation equipment can be a source of contaminants that are harmful to human health. Porous surfaces can harbor harmful pathogens while chemical additives often used to impart special properties to food preparation equipment, such as non-stick coatings, can leach or volatilize.

This feature suggests safer options for food preparation equipment and restricts materials that may use additives known to constitute a danger to human health or to be harmful to the environment.



Digestive
Endocrine
Immune
Integumentary
Reproductive
Urinary

PART 1: COOKING MATERIAL

Pots, pans and other cooking tools used to prepare food (except cutting boards) are made entirely of one or more of the following inert materials:

- a.⁶⁷ Ceramics, except those containing lead.
- b.⁶⁷ Cast iron.
- c.⁶⁷ Stainless steel.
- d.⁶⁷ Glass.
- e.⁶⁷ Coated aluminum.
- f. Solid (non-laminated) wood that is untreated or treated with food-grade mineral or linseed oil.

PART 2: CUTTING SURFACES

All cutting boards are made from the following materials, and are replaced when they become excessively worn or have deep grooves from cutting:

- a.⁷⁵ Marble.
- b.⁷⁵ Plastic.
- c.⁷⁵ Glass.
- d.⁷⁵ Pyroceramic.
- e.⁷⁵ Solid (non-laminated) wood that is untreated or treated with food-grade mineral or linseed oil.

SERVING SIZES

Excess caloric intake, especially through easy access to oversized meal options, can lead to a variety of adverse health conditions. Thus, reducing the size and caloric content of meals can reduce the tendency to unconsciously overeat, thereby preventing unhealthy weight-related problems and instilling healthier eating habits.

This feature reduces unintended overconsumption without imposing restrictions on consumer choice.



Cardiovascular
Digestive
Endocrine
Immune

PART 1: MEAL SIZES

Where food is prepared to order by (or under contract with) the project owner, for at least half of all available entrées, the following option is available and listed on the menu:

- a. ⁵⁸ A version or portion of the entrée that is 650 calories or less and at a reduced cost to the larger, regular version.

PART 2: DINNERWARE SIZES

Where food sold or distributed on the premises by (or under contract with) the project owner is self-serve and requires the use of a serving plate or bowl, each of the following is met:

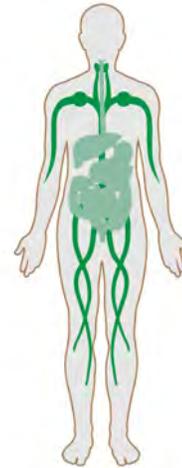
- a. Plates are no larger than 20 cm [8 inches] in diameter.
- b. Bowls are no larger than 355 mL [12 oz].
- c. Cups are no larger than 355 mL [12 oz].



SPECIAL DIETS

Individuals with food allergies or dietary restrictions often encounter difficulty in finding suitable meal options. Clear labeling can prevent unintended exposure to allergens or restricted food items, but if a sufficient variety of alternatives is unavailable, these individuals may be at higher risk for consuming restricted and potentially harmful foods.

This feature requires establishments that provide or sell food to include a variety of meal options available to those with common food allergies or dietary restrictions.



Digestive
Immune
Integumentary

PART 1: FOOD ALTERNATIVES

Meals or catering provided by (or under contract with) the project owner includes at least one suitable option for each of the following criteria:

- a.³² Peanut-free.
- b.⁶⁰ Gluten-free, in compliance with the definitions and restrictions set forth by the FDA in 21 C.F.R. § 101.92.
- c.⁶⁰ Lactose-free.
- d.⁶⁰ Egg-free.
- e.⁶⁰ Vegan (contains no animal products).
- f.⁶⁰ Vegetarian (contains no animal products, except for eggs and dairy).



RESPONSIBLE FOOD PRODUCTION

Organic and sustainable farming practices are designed to reduce environmental pollution and to increase the quality of life of the livestock that we rely upon for food. Organic agriculture makes up a rapidly growing share of food grown in the United States due to increasing demand from conscientious consumers. Making environmentally-friendly food choices reduces human exposure to pesticide residues, hormones, and antibiotic-resistant bacteria.

This feature requires the adoption of organic and free-range agricultural products.



Cardiovascular
Immune

PART 1: SUSTAINABLE AGRICULTURE

All produce sold or distributed on the premises by (or under contract with) the project owner meets the following criteria:

- a. ⁶³ USDA Certified Organic labeling.

PART 2: HUMANE AGRICULTURE

All meat, egg and dairy products sold or distributed on the premises by (or under contract with) the project owner meets the following criteria for the humane treatment of livestock:

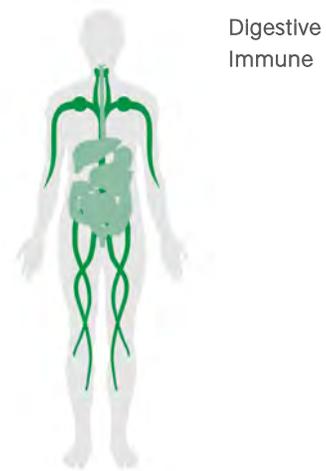
- a. ⁶⁴ Humane Certified™ labeling.
- b. USDA Certified Organic labeling.



FOOD STORAGE

Many refrigerators are not designed for preserving the taste and nutrient content of fruits and vegetables, which are better stored at slightly higher temperatures. Additionally, crisper drawers are often too small to store a sufficient amount of fruits and vegetables for a moderately sized group of people.

This feature requires refrigerators and/or other food storage equipment that provide sufficient storage space for produce and that include temperature control capabilities.



PART 1: STORAGE CAPACITY

The space provides cold storage that meets the following requirements:

- a. Refrigerator contains at least 2 separate crisper drawers.
- b. Each crisper drawer is at least 1 L [0.35 ft³] per occupant (no more than 700 L [24.7 ft³] maximum is required).

PART 2: TEMPERATURE CONTROL

Refrigerators include at least 2 separate compartments that meet the following temperature requirements:

- a.⁶⁵ 1 °C to 4 °C [34 °F to 39 °F]. See Appendix Table N1 for a list of foods to store at this temperature range.
- b.⁶⁵ 6 °C to 12 °C [43 °F to 54 °F]. See Appendix Table N1 for a list of foods to store at this temperature range.



FOOD PRODUCTION

Growing produce and other plants allows us to become engaged with our food production and increases our access to healthy, fresh and nutrient-rich foods. Studies show that gardening leads to better eating habits and an increased appreciation of natural foods.

This feature provides occupants with the space, infrastructure and tools necessary to grow and harvest vegetables and other edible plants.



Cardiovascular
Digestive
Immune
Muscular
Skeletal

PART 1: GARDENING SPACE

A space at least 0.1 m² [1 ft²] per occupant is allocated for one of the following:

- a.²² A garden.
- b.²² A greenhouse.

PART 2: PLANTING SUPPORT

Adequate quantities of the following supplies are provided to grow and maintain herbs or other edible plants in the Gardening Space provided:

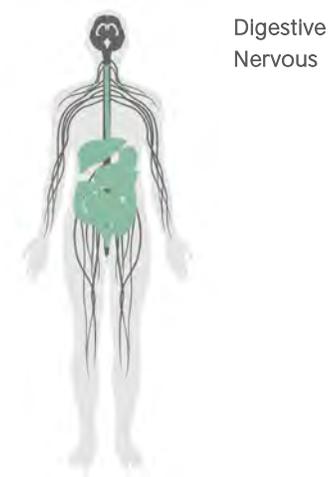
- a.²² Planting medium.
- b.²² Irrigation.
- c.²² Lighting.
- d.²² Plants.
- e. Gardening tools.



MINDFUL EATING

Demanding work schedules and a lack of communal eating areas often leads people to eat in isolation during meal breaks. Eating alone can cause overeating and contribute to stress that is related to the lack of social interaction with others.

This feature provides building occupants with dedicated spaces for eating and socializing with others. Time spent in these break areas can lead to better eating habits, strengthen social interactions and help reduce stress.



PART 1: EATING SPACES

An eating space (or multiple spaces) adheres to the following requirements:

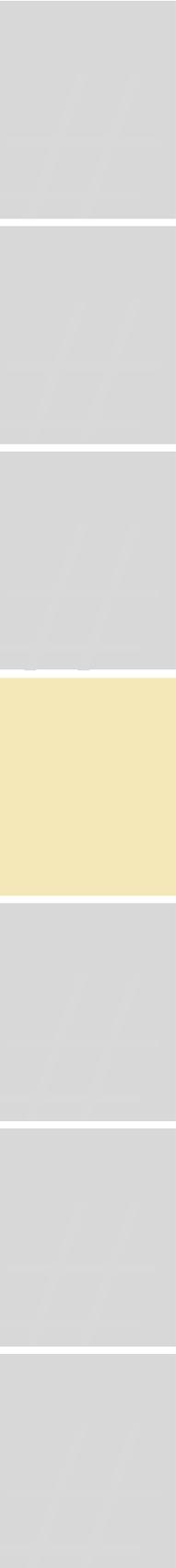
- a. Contains tables and chairs to accommodate at least 25% of total employees at a given time.
- b. Is located within 60 m [200 ft] of at least 90% of occupants.

PART 2: BREAK AREA FURNISHINGS

Eating spaces contain all of the following:

- a. Refrigerator, microwave and sink.
- b. Amenities for dish washing.
- c. At least one cabinet or storage unit available for employee use.
- d. Includes eating utensils, including spoons, forks, knives and microwave-safe plates and cups.





LIGHT

BACKGROUND

"Light" is a visible form of electromagnetic radiation, bordered in the spectrum of wavelengths by ultraviolet radiation at the smaller end, and infrared at larger wavelengths. Current lighting codes and guidelines provide illuminance recommendations for different room types, as derived from usual lighting requirements for typical activities that occur in each room. These standards, created by technical groups such as Illuminating Engineering Society of North America (IESNA), ensure good visual acuity in a variety of tasks to avoid eyestrain and to minimize productivity losses and headaches.

In addition to facilitating vision, light influences the human body in a number of other, non-visual ways. Humans and animals have an internal clock that synchronizes physiological functions on roughly a 24-hour cycle, even in continuous darkness, called the circadian rhythm. Multiple physiological processes—spanning from periods of alertness and sleep to digestion—are regulated in part by the variance and interplay of hormones that are part of this cycle.

Light is the most important external cue for keeping the body's internal clock synchronized. It enters through the eye and can be received by intrinsically photosensitive retinal ganglion cells (ipRGCs). Given that people spend much of their waking day indoors, insufficient illumination can lead to a drift of the circadian phase, especially if paired with light trespass at night. Lower levels of light during the day can also cause drowsiness, especially in the afternoon. The body requires both periods of brightness and darkness at appropriate points throughout the day to maintain optimal circadian rhythm.

The WELL Building Standard® seeks to go much further than conventional lighting guidelines to look not only at visual acuity and glare avoidance, but also to recognize the important role that the non-image-forming ipRGCs have in creating alerting and circadian phase-shifting effects.

INTENT

The WELL Building Standard® for Light provides illumination guidelines that are aimed to minimize disruption to the body's circadian system and enhance productivity and provide appropriate visual acuity where needed. It also requires specialized lighting systems designed to increase alertness, enhance occupant experience and promote sleep.

LIGHT CERTIFICATION MATRIX

| COMPLIANCE CERTIFICATION | PRECONDITION | OPTIMIZATION | Core & Shell | Tenant Improvement | New Construction |
|--|--------------|--------------|-----------------|-----------------------|---------------------|
| | PRECONDITION | OPTIMIZATION | | | |
| 53 VISUAL LIGHTING DESIGN | | | | | |
| 1: Visual Acuity for Working | - | | - | P | P |
| 2: Task Lighting | - | | - | P | P |
| 54 CIRCADIAN LIGHTING DESIGN | | | | | |
| 1: Melanopic Light Intensity in Work Areas | - | | - | P | P |
| 55 ELECTRIC LIGHT GLARE CONTROL | | | | | |
| 1: Lamp Shielding | - | | - | P | P |
| 56 SOLAR GLARE CONTROL | | | | | |
| 1: View Window Shading in Workspaces | ○ | | ○ | P | P |
| 2: Daylight Management in Work Areas | ○ | | ○ | P | P |
| 57 LOW-GLARE WORKSTATION DESIGN | | | | | |
| 1: Workstation Orientation | - | | - | ○ | ○ |
| 58 COLOR QUALITY | | | | | |
| 1: Color Rendering Index | - | | - | ○ | ○ |
| 59 SURFACE DESIGN | | | | | |
| 1: Work Area Wall and Ceiling Lightness | - | | - | ○ | ○ |
| 60 AUTOMATED SHADING AND DIMMING CONTROLS | | | | | |
| 1: Automated Sunlight Control | - | | - | ○ | ○ |
| 2: Responsive Light Control | - | | - | ○ | ○ |
| 61 RIGHT TO LIGHT | | | | | |
| 1: Lease Depth | ○ | | ○ | ○ | ○ |
| 2: Windows and Workspaces | - | | - | ○ | ○ |
| 62 DAYLIGHT MODELLING | | | | | |
| 1: Healthy Sunlight Exposure | ○ | | ○ | ○ | ○ |
| 63 DAYLIGHTING FENESTRATION | | | | | |
| 1: Window Sizes for Workspaces | ○ | | ○ | ○ | ○ |
| 2: Window Transmittance in Work Areas | ○ | | ○ | ○ | ○ |
| 3: Uniform Color Transmittance | ○ | | ○ | ○ | ○ |

VISUAL LIGHTING DESIGN

Adequate light levels are needed for a broad variety of activities, including reading and working with detail. Brightness levels also contribute to the perception of spaciousness, as well as to the visual appeal of illuminated spaces. Light intensity is measured with photopic lux (or foot candles), which is the weighted response of the 4 visual photoreceptors within the retina of the eye. These 4 photoreceptors are a mix of rod and cone cells that determine our perception of color and brightness.

The following feature establishes standards for light levels.



Endocrine
Muscular
Nervous

PART 1: VISUAL ACUITY FOR WORKING

The ambient lighting system at workstations or desks is:

- a. Able to maintain an average of 215 lux [20 fc] or more measured on the horizontal plane, 0.76 m [30 inches] above finished floor. The lights may be dimmed in the presence of daylight, but they are able to independently achieve these levels.
- b. Zoned in independently controlled banks no larger than 46.5 m² [500 ft²] or 20% of open floor area of the room (whichever is larger).

PART 2: TASK LIGHTING

If ambient light at workstations or desks is below 300 lux [28 fc]:

- a. ⁸¹ Task lights providing 300 to 500 lux (28 to 46 fc) at the work surface is available upon request.



CIRCADIAN LIGHTING DESIGN

Exposure to light regulates the circadian rhythm, which determines sleep and wake cycles. To promote alertness and activity, the human circadian cycle is most sensitive to lights of high frequency and intensity. Conversely, lights of low frequency and intensity signal the circadian rhythm to decrease energy and prepare for rest.

This feature aims to provide lighting conditions that reinforce the natural patterns of the human circadian cycle. The Equivalent Melanopic Lux (EML) is a measurement of light's effects on the circadian cycle. EML can be used to determine how interior lighting conditions may be optimized to support the circadian function. See Appendices L1 and L2 for more information on how to calculate the EML of individual lamps and larger spaces.



Cardiovascular
Digestive
Endocrine
Immune
Muscular
Nervous

PART 1: MELANOPIC LIGHT INTENSITY IN WORK AREAS

Light models (which may incorporate daylight) show that the following conditions are met for at least 4 hours per day for every day of the year:

- a. At least 250 equivalent melanopic lux is present within at least 75% of workstations, on the vertical plane facing forward 1.2 m [4 ft] above finished floor (to simulate the view of the occupant).



ELECTRIC LIGHT GLARE CONTROL

Non-diffuse bright indoor lights create uneven levels of brightness in the visual field. The resulting glare can cause visual fatigue and discomfort.

This feature sets limits on glare based on measures of luminous intensity, or luminance per area of light source. This quantity, often given in cd/m^2 or foot-lamberts, can be measured directly or calculated from lighting specification sheets with sufficient detail. Light fixtures of greater luminous intensity require a greater shielding angle to reduce the likelihood of creating direct glare for occupants.

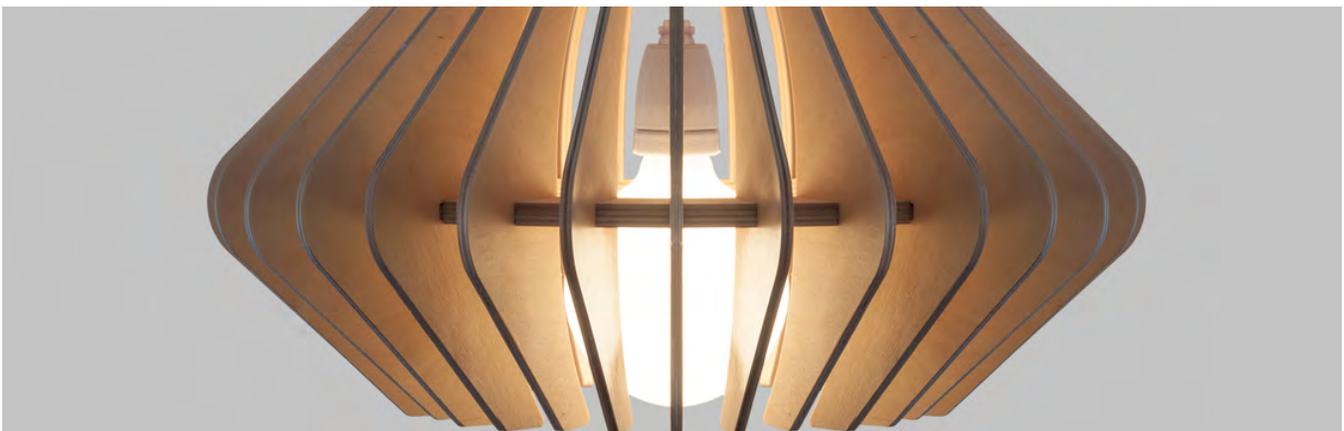


Muscular
Nervous
Skeletal

PART 1: LAMP SHIELDING

Lamps with the following luminance are shielded by the angles listed below or greater:

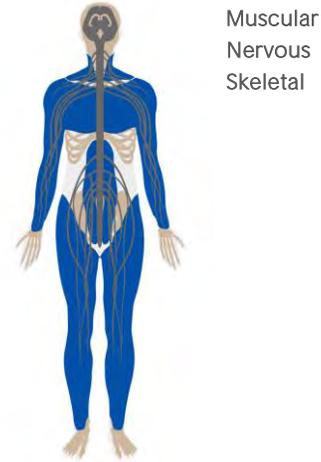
- a. Less than $20,000 \text{ cd}/\text{m}^2$ [5800 foot-lamberts], including reflected sources: no shielding required.
- b. ⁷⁹ $20,000$ to $50,000 \text{ cd}/\text{m}^2$ [5800 to 14,500 foot-lamberts]: 15° .
- c. ⁷⁹ $50,000$ to $500,000 \text{ cd}/\text{m}^2$ [14,500 to 145,000 foot-lamberts]: 20° .
- d. ⁷⁹ $500,000 \text{ cd}/\text{m}^2$ [145,000 foot-lamberts] and above: 30° .



SOLAR GLARE CONTROL

Though bright levels of light during the day are conducive to good health, uneven levels of brightness in the visual field can cause visual fatigue and discomfort as the eyes rapidly attempt to adjust to these differences.

This feature prescribes a variety of solutions for effectively managing disruptive glare emanating from windows, including shading designs, baffles, controls, and dimmable glass.



PART 1: VIEW WINDOW SHADING IN WORKSPACES

At least one of the following is present for all glazing less than 2.1 m [7 ft] above the floor:

- a. ⁸⁰ Interior window shading or blinds that are controllable by the occupants or on a timer.
- b. External shading systems that are controllable by the occupants or on a timer.
- c. Variable opacity glazing, such as electrochromic glass, which can reduce transmissivity by 90% or more.

PART 2: DAYLIGHT MANAGEMENT IN WORK AREAS

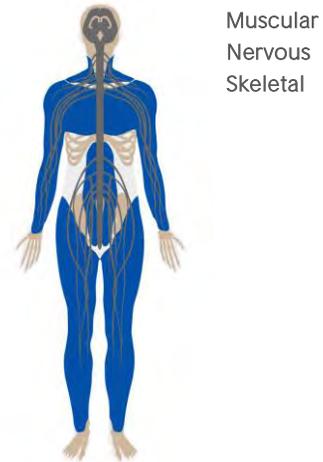
At least one of the following is required for all glazing greater than 2.1 m [7 ft] above the floor:

- a. ⁸⁰ Interior window shading or blinds that are controllable by the occupants or on a timer.
- b. External shading systems that are controllable by the occupants or on a timer.
- c. Interior light shelves to reflect sunlight toward the ceiling.
- d. A film of micro-mirrors on the window that reflect sunlight toward the ceiling.
- e. Variable opacity glazing, such as electrochromic glass, which can reduce transmissivity by 90% or more.

LOW-GLARE WORKSTATION DESIGN

Concentrated, high-intensity lights can cause glare and lead to visual discomfort. Glare is commonly generated when these lights reflect off glossy surfaces in and around workspaces. The resulting discomfort can be a hindrance to a comfortable and effective work environment.

This feature seeks to minimize glare through the spatial orientation of workstations.



PART 1: WORKSTATION ORIENTATION

To minimize glare caused by incoming sunlight, the following conditions are met for desks located within 4.5 m [15 ft] of view windows:

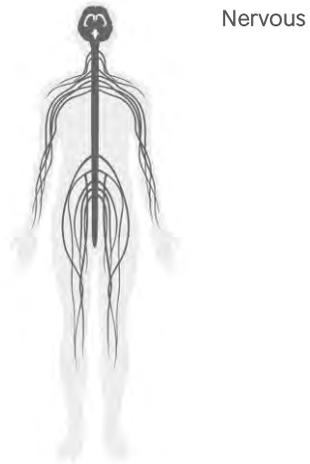
- a. ⁸¹ All computer screens are oriented such that computer screens face within 20° perpendicular to the plane of the nearest window.



COLOR QUALITY

Light color quality impacts visual appeal and can either contribute to or detract from occupant comfort. Poor color quality reduces visual acuity and the accurate rendering of illuminated objects. For instance, foods, human skin tones and plants may appear dull or unsaturated under lights that have low color quality metrics.

Though there are many ways to measure color quality, the color rendering index (CRI) is the most commonly reported and captures R1-R8 metrics. However, this does not accurately represent the saturation of warmer hues, which is part of the R9 metric. This feature includes the R9 metric as an extension of CRI to assure that lights with high color quality are in place.



PART 1: COLOR RENDERING INDEX

To accurately portray colors in the space and enhance occupant comfort, all electric lights (except decorative fixtures, emergency lights and other special-purpose lighting) meet the following conditions:

- a. ⁸⁰ Color Rendering Index Ra (CRI, average of R1 through R8) of 80 or higher.
- b. ⁸⁰ Color Rendering Index R9 of 50 or higher.



SURFACE DESIGN

Exposure to light is the primary means by which humans experience the non-visual effects of light, such as the regulation of the circadian cycle. Exposure can depend on the reflective quality of surfaces, which can affect the intensity of light that our eyes receive.

This feature defines the reflective quality of surfaces to control the overall light intensity within a space. Higher light reflective values (LRV) reflect more light from the source resulting in maximum light intensity, an effect that promotes alertness and activity. Lower LRVs absorb light from the source and result in lower overall light intensity.

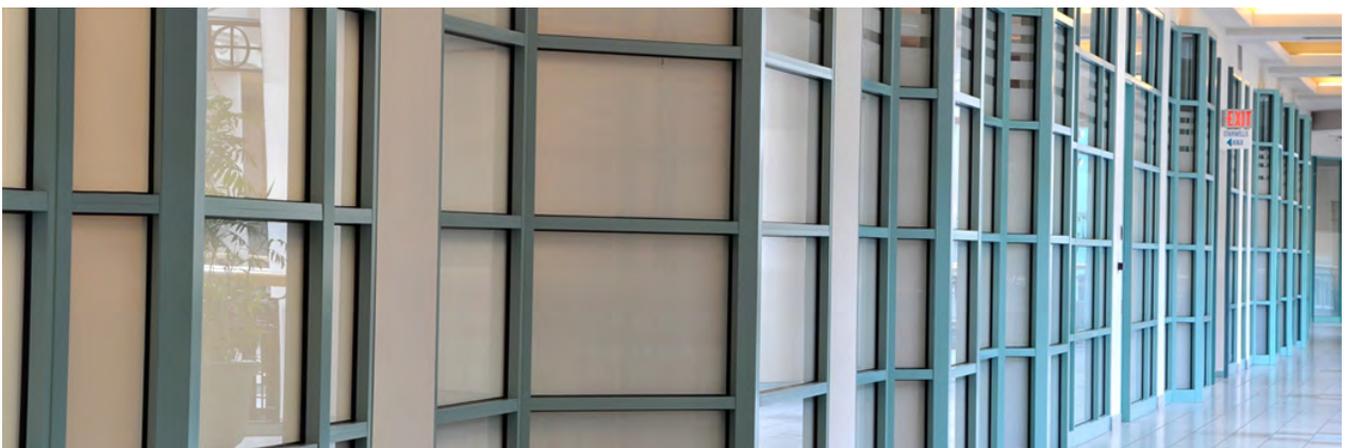


Endocrine
Muscular
Nervous

PART 1: WORK AREA WALL AND CEILING LIGHTNESS

The following Light Reflectance Values (LRV) are met:

- a. ⁸⁰ Ceilings have an average LRV of 0.8 (80%) or more for at least 80% of surface area in regularly occupied spaces.
- b. ⁸⁰ Walls have an average LRV of 0.7 (70%) or more for at least 50% of surface area directly visible from regularly occupied spaces.
- c. Furniture systems have a LRV of 0.5 (50%) or more for 50% of visible surface area within regularly occupied spaces.



AUTOMATED SHADING AND DIMMING CONTROLS

Design features such as adjustable window shades and lights with dimmers must be actively managed to be effective. However, automated controls can help to ensure that these systems continually operate as intended and meet designed benefits such as glare avoidance and energy reduction.

This feature requires automated control systems to ensure that window shades are effectively utilized to block glare from sunlight and that lighting controls are employed to limit artificial light output when sunlight is meeting designed light levels.



Endocrine
Immune
Muscular
Nervous
Reproductive
Skeletal

PART 1: AUTOMATED SUNLIGHT CONTROL

All windows larger than 0.55 m² [6 ft²] have the following:

- a.⁸⁰ Shading devices that automatically engage when light sensors indicate that sunlight could contribute to glare at workstations.

PART 2: RESPONSIVE LIGHT CONTROL

The following requirements are met in all major workspace areas:

- a.⁸⁰ All lighting except decorative fixtures are programmed into motion sensors to automatically dim to 20% or less (or switch off) when the zone is unoccupied.
- b.⁸⁰ All lighting has the capacity and is programmed to dim continuously in response to daylight.



RIGHT TO LIGHT

Psychological health is benefitted greatly through exposure to adequate levels of sunlight. Proximity to large windows, outdoor views and daylight in indoor spaces are some of the most sought-after elements of design. As such, buildings should utilize daylight as a primary source of lighting to the greatest extent possible.

To ensure that daylight is maximized within buildings, this feature sets minimum dimensions for window openings, and minimum distances from windows to regularly occupied spaces.



Cardiovascular
Digestive
Endocrine
Immune
Muscular
Nervous
Reproductive

PART 1: LEASE DEPTH

The lease depth (distance between the building core and the exterior façade) maintains the following dimensions:

- a. Does not exceed 7.5 m [25 ft] for 75% of the area for all regularly occupied spaces.

PART 2: WINDOWS AND WORKSPACES

The following conditions are met:

- a. 75% of all desks are within 7.5 m [25 ft] of an atrium or a window with views to the exterior.
- b. 95% of all desks are within 12.5 m [41 ft] of an atrium or a window with views to the exterior.



DAYLIGHT MODELLING

Exposure to appropriate amounts of natural light provides a connection to nature that reinforces circadian rhythms and reduces dependence on electricity for artificial lighting. Buildings can be designed to ensure that people who spend the majority of their time indoors still have access to daylight.

This feature requires that individuals inside a building receive ample exposure to natural sunlight.



Cardiovascular
Digestive
Endocrine
Immune
Muscular
Nervous
Reproductive

PART 1: HEALTHY SUNLIGHT EXPOSURE

Lighting simulations demonstrate that the following conditions are expected:

- a.¹ Spatial daylight autonomy (sDA_{300,50%}) is achieved for at least 55% of regularly occupied space. In other words, at least 55% of the space receives at least 300 lux [28 fc] of sunlight for at least 50% of operating hours each year.
- b.¹ Annual sunlight exposure (ASE_{1000,250}) is achieved for no more than 10% of regularly occupied space. In other words, no more than 10% of the area can receive more than 1000 lux [93 fc] for 250 hours each year.



DAYLIGHTING FENESTRATION

Exposure to natural light can improve mood, alertness and overall health. Ideal lighting begins with proper exposure to diffuse daylight as well as careful design of windows and glazing to avoid excessive glare and heat gain. Balancing energy performance, thermal comfort and access to quality daylight are essential to proper building design.

This feature outlines design parameters for windows to optimize the quantity and quality of daylight.



Cardiovascular
Digestive
Endocrine
Immune
Muscular
Nervous
Reproductive

PART 1: WINDOW SIZES FOR WORKSPACES

The following conditions are met:

- a. Window-wall ratio as measured on external elevations exceeds 20% and does not exceed 60%. Percentages greater than 40% require external shading or intelligent glazing to control unwanted heat gain and glare.
- b. Between 40% and 60% of window area is at least 7 feet above the floor (Daylight Glass).

PART 2: WINDOW TRANSMITTANCE IN WORK AREAS

The following visible transmittance (VT) conditions are met for all non-decorative glazing.

- a. All glazing located above 7 feet from floor (Daylight Glass) has VT of 60% or more.
- b. All glazing located below 7 feet from floor (Vision Glass) has VT of 50% or more.

PART 3: UNIFORM COLOR TRANSMITTANCE

All windows used for daylighting meet the following requirement:

- a. Windows have transmittance in accordance with circadian lighting design.



FITNESS

BACKGROUND

Physical inactivity poses one of the most significant threats to public health in industrialized societies. It is attributable to 9.4% of all deaths worldwide, or 3.5 million people every year. Modern transportation, labor-saving conveniences and sedentary jobs have created an environment in which millions of people fail to reach the minimum level of activity necessary to help prevent metabolic syndrome, type 2 diabetes, heart disease and other chronic conditions. In the United States alone, less than 5% of adults meet physical activity recommendations, as set forth by the Centers for Disease Control (CDC) and the American College of Sports Medicine (ACSM).

Research in exercise physiology has introduced various potential avenues for improving fitness, however. Evolving knowledge of how exercise impacts the body's muscles and metabolic machinery suggests that the benefits of even small amounts of intense exercise can extend beyond caloric burn. This challenges the traditional view that the primary goal of exercise is to simply off-set excess caloric intake from the modern diet, and further, has implications on the type of fitness strategies that may prove to be most effective.

Beyond strategies that depend on an individual's changes in lifestyle, there is also great potential for fitness interventions that encompass the passive adoption of active behaviors. Urban planning and building design that is more consciously constructed to encourage regular movement and physical activity, as well as active transportation, are among several significant intervention strategies.

INTENT

The WELL Building Standard® for Fitness allows for the seamless integration of exercise and fitness into everyday life by providing the physical features and components to support an active and healthy lifestyle.

FITNESS CERTIFICATION MATRIX

| COMPLIANCE CERTIFICATION | PRECONDITION | OPTIMIZATION | Core & Shell | Tenant Improvement | New Construction |
|--|--------------|--------------|-----------------|-----------------------|---------------------|
| | PRECONDITION | OPTIMIZATION | | | |
| 64 INTERIOR FITNESS CIRCULATION | | | | | |
| 1: Stair Accessibility | P | | P | - | P |
| 2: Stairs Promotion | P | | P | - | P |
| 3: Facilitative Aesthetics | P | | P | - | P |
| 65 ACTIVITY INCENTIVE PROGRAMS | | | | | |
| 1: Activity Incentive Programs | | | - | P | P |
| 66 STRUCTURED FITNESS OPPORTUNITIES | | | | | |
| 1: Professional Fitness Program | | | - | ○ | ○ |
| 2: Fitness Education | | | - | ○ | ○ |
| 67 EXTERIOR ACTIVE DESIGN | | | | | |
| 1: Pedestrian Amenities | | | ○ | ○ | ○ |
| 2: Pedestrian Promotion | | | ○ | ○ | ○ |
| 3: Walk Score® | | | ○ | ○ | ○ |
| 68 PHYSICAL ACTIVITY SPACES | | | | | |
| 1: Site Space Designation for Offices | | | ○ | ○ | ○ |
| 2: External Exercise Spaces | | | ○ | ○ | ○ |
| 69 ACTIVE TRANSPORTATION SUPPORT | | | | | |
| 1: Bicycle Storage and Support | | | ○ | ○ | ○ |
| 2: Post Commute and Workout Facilities | | | ○ | ○ | ○ |
| 70 FITNESS EQUIPMENT | | | | | |
| 1: Low-Intensity Equipment | | | ○ | ○ | ○ |
| 2: High-Intensity Equipment | | | ○ | ○ | ○ |
| 71 ACTIVE FURNISHINGS | | | | | |
| 1: Active Workstations | | | - | ○ | ○ |
| 2: Prevalent Standing Desks | | | - | ○ | ○ |

INTERIOR FITNESS CIRCULATION

In many climates, outdoor exercise is not a viable option for much of the year. Interior pathways and stairs can provide a convenient and healthy means of active transportation utilizable year-round. To encourage greater use, these paths and stairs should be aesthetically pleasing and be connected to high-traffic routes.

This feature employs prominent designs and appealing aesthetics to promote the use of stairs and walking paths and to discourage reliance on elevators.



Cardiovascular
Muscular
Skeletal

PART 1: STAIR ACCESSABILITY

The following requirements are met at every major building entrance:

- a.⁸⁷ Wayfinding signage and point-of-decision prompts to encourage stair use. At least one sign per elevator bank and one per building entrance.

PART 2: STAIRS PROMOTION

In buildings of 4 or fewer floors, at least one staircase meets the following requirements.

- a.²⁷ Located within 7.5 m [25 ft] of the entrance of the building in its main orientation space or lobby.
- b.²⁷ Placed visually before the elevators, if present, upon entering from the main entrance.
- c.⁸⁷ Stair widths set at a minimum of 1.4 m [56 inches].
- d.²⁷ Stairs are accessible to all regular building occupants during all regular business hours.

PART 3: FACILITATIVE AESTHETICS

Both stairs and paths of frequent travel display elements of aesthetic appeal through the incorporation of at least 2 of the following:

- a.⁸⁷ Artwork, including decorative painting.
- b.⁸⁷ Music.
- c.²⁷ Daylighting using windows or skylights of at least 1 m² [8 ft²] in size.
- d.⁸⁷ View windows to the outdoors or building interior.
- e. Light levels of at least 20 fc [215 lux] when the stairs are in use.

ACTIVITY INCENTIVE PROGRAMS

Lack of physical activity can lead to a variety of negative health consequences. Research shows that even small incentives can significantly affect individuals' decisions and behaviors. Incentives that encourage greater levels of physical activity can help develop positive and lasting fitness habits.

This feature relies on existing federal programs, as well as components of corporate wellness plans to enable employees to adopt more physically active lifestyles.



Cardiovascular
Digestive
Muscular
Skeletal

PART 1: ACTIVITY INCENTIVE PROGRAMS

An incentive plan with at least 2 out of the following is developed and implemented:

- a. ⁸⁸ Transportation Fringe Benefits in Section 132(f) of the U.S. Internal Revenue Code, including those relating to bicycle commuting and mass transit.
- b. ⁸² \$200 or greater reimbursements in every 6-month period an individual meets a 50-visit minimum to the gym.
- c. Fully subsidized entrance/game fees of up to \$240 per year for participation in races, group fitness activities and sports teams for interested employees.
- d. Fully subsidized fitness or training programs up to \$240 per year for courses offered in professional gyms, studios or other fitness facilities.
- e. \$50 or greater subsidy per year for bicycle share membership for interested employees.



STRUCTURED FITNESS OPPORTUNITIES

Access to fitness programs and advice developed by experts can help individuals achieve physical health goals and targets. Additionally, individuals with special considerations may also need further guidance to ensure they engage in physical activity routines that are safe and appropriate.

This feature requires access to personalized fitness advice and group classes. Affording individuals access to such services is an important step towards making exercise a part of a healthy work culture.



Cardiovascular
Digestive

PART 1: PROFESSIONAL FITNESS PROGRAM

The following are offered:

- a. ⁸⁴ Onsite fitness or training programs.

PART 2: FITNESS EDUCATION

Classes from a qualified professional are offered to cover the following:

- a. Different modes of exercise.
- b. Safe fitness techniques.
- c. Comprehensive exercise regimens.



EXTERIOR ACTIVE DESIGN

When activity is part of daily routine, fitness comes naturally. Integrating elements of active design into the building and site, and creating cyclist and pedestrian-friendly environments can help incentivize activity. Thoughtful urban planning considers the importance of locating popular amenities, such as restaurants, grocery stores and schools within walking distance of each other, enabling healthy habits, such as walking or cycling as active alternatives to a more sedentary mode of travel.

This feature requires exterior design details and amenities that facilitate more active living. Incorporating these principles is particularly important for projects that are isolated from an urban center where automobile transportation predominates.



Cardiovascular
Muscular
Nervous
Respiratory
Skeletal

PART 1: PEDESTRIAN AMENITIES

Sites in which the building takes up less than 75% of the total lot size provide at least one of the following within highly-trafficked areas, such as building entrances, public transportation stops and walking paths:

- a.⁸⁷ Benches.
- b.⁸⁷ A cluster of movable chairs and tables.
- c.⁸⁷ Drinking fountain or water refilling station.

PART 2: PEDESTRIAN PROMOTION

To encourage more pedestrian activity, sites in which the building takes up less than 75% of the total lot size include at least two of the following:

- a.⁸⁷ A water fountain or other water feature.
- b.⁸⁷ A plaza.
- c. A garden.
- d.⁸⁷ Public art.

PART 3: WALK SCORE®

To encourage neighborhood connectivity and daily activity, the following requirement is met:

- a.⁸⁶ The building address has a Walk Score® of 70 or greater.

PHYSICAL ACTIVITY SPACES

Buildings that contain an interior fitness space can incentivize occupants to engage in more regular exercise. Flexible fitness spaces allow for low-impact exercises like Yoga or Pilates, or more intense activities, such as high-intensity interval training or plyometrics. In addition to fitness amenities within a building, convenient access to nearby gyms and/or outdoor fitness-friendly spaces encourages participants to consistently engage in fitness-related activities.

This feature requires proper space allocation or institutional arrangements to support fitness and exercise.



Cardiovascular
Muscular
Skeletal

PART 1: SITE SPACE DESIGNATION FOR OFFICES

Spaces with more than 10 regular occupants provide the following:

- a. ⁸⁷ Dedicated exercise space that is at least 18.6 m² [200 ft²] plus 0.1 m² [1 ft²] per regular building occupant, up to a maximum of 370 m² [4000 ft²].

PART 2: EXTERNAL EXERCISE SPACES

At least one of the following is accessible within 0.8 km [0.5 mi] walking distance of the building:

- a. ⁸⁷ Parks with playgrounds, workout stations, trails or an accessible body of water.
- b. ¹ Free access to gyms, playing fields or swimming pools.



ACTIVE TRANSPORTATION SUPPORT

Active transportation is an effective strategy for improving fitness levels and reducing the carbon footprint. Biking and walking, in particular, are healthy, low-impact modes of transportation that can help maintain a healthy weight and cardiovascular health. Providing amenities and facilities on-site can support an occupant's ability to engage in these healthy commuting options.

This feature requires that showers and bicycle storage be provided on-site or near the building entrance.



Cardiovascular
Muscular
Nervous

PART 1: BICYCLE STORAGE AND SUPPORT

The following are provided onsite or within 200 m [650 ft] of the building's main entrance:

- a. Basic bicycle maintenance tools, including tire pumps, patch kits and hex keys available for use.
- b.¹⁸ Separate and secure bicycle storage for at least 5% of regular building occupants, as well short-term bicycle storage for at least 2.5% of all peak visitors.

PART 2: POST COMMUTE AND WORKOUT FACILITIES

The following are provided onsite or within 200 m [650 ft] of the building's main entrance:

- a.¹⁸ One shower with changing facility for first 100 regular building occupants and one additional shower for every 150 regular building occupants thereafter.
- b. One locker for every 2 regular building occupants.

FITNESS EQUIPMENT

Convenient access to different types of exercise equipment can make regular exercise habits easier to achieve. High- and low-intensity exercise each provide unique health benefits, from muscle development and bone density maintenance to improvements in cardiovascular and neurological health. Providing equipment that allows for a variety of exercises gives occupants a wider range of benefits.

This feature requires the provision of exercise equipment in the building that supports both low- and high-intensity activity.



Cardiovascular
Immune
Muscular
Skeletal

PART 1: LOW-INTENSITY EQUIPMENT

Some combination of the following is provided in the interior fitness space free of charge, for use by 1% of regular building occupants and accompanied by instructions for safe use:

- a.²⁷ Treadmills.
- b.²⁷ Elliptical machines.
- c.²⁷ Rowing machines.
- d.²⁷ Stationary exercise bicycles.

PART 2: HIGH-INTENSITY EQUIPMENT

Some combination of the following is provided in the interior fitness space free of charge, for use by 1% of regular building occupants and accompanied by instructions for safe use:

- a.²⁷ Multi-station equipment.
- b.²⁷ Bench-press with a self-spotting rack.
- c.²⁷ Full squat-rack.
- d.²⁷ Pull-up bar.

ACTIVE FURNISHINGS

Individuals often view exercise as a means to achieve weight loss, but research indicates that physical inactivity is a risk factor for disease regardless of an individual's weight. Active furnishings can help promote passive physical activity during the workday and will complement other fitness strategies.

This feature requires the implementation of active furnishings.



Cardiovascular
Muscular
Skeletal

PART 1: ACTIVE WORKSTATIONS

At least one of the following requirements is met:

- a. Treadmill desks available for 5% or more of employees, and available for any employee to reserve.
- b. Bicycle desks available for 5% or more of employees, and available for any employee to reserve.

PART 2: PREVALENT STANDING DESKS

At least 60% of workstations feature one of the following:

- a. Adjustable height standing desk.
- b. Standard desk with desk-top height adjustment stand.





COMFORT

BACKGROUND

The indoor environment should be a place of comfort. In pursuit of that vision, the WELL Building Standard® focuses on significantly reducing the most common sources of physiological disruption and irritation and on enhancing acoustic, ergonomic and thermal comfort.

Our sense of hearing is an integral part of our lives, one that plays both a public and a private role. Sound allows us to communicate with each other, yet it can also help us relax or focus us to reach optimal productivity. The WELL Building Standard aims to enhance acoustic comfort to shape environments that enhance social interaction, learning and productivity.

Ergonomics and universal design play a significant role in mitigating physical and mental stress. These design strategies not only provide access for people with limited mobility, but also prevent injury by encouraging navigable spaces for everyone. The WELL Building Standard promotes comprehensive ergonomics solutions that help prevent stress and injury and facilitate comfort and well-being.

Thermal comfort plays a large role in the way we experience the places where we live and work. The WELL Building Standard takes a holistic approach to thermal comfort and provides a combination of strategies to address occupant issues.

INTENT

The WELL Building Standard for Comfort establishes requirements designed to create a distraction-free, productive and comfortable indoor environment.

COMFORT CERTIFICATION MATRIX

| COMPLIANCE CERTIFICATION | PRECONDITION | OPTIMIZATION | Core & Shell | Tenant Improvement | New Construction |
|--|--------------|--------------|-----------------|-----------------------|---------------------|
| | PRECONDITION | OPTIMIZATION | | | |
| 72 ADA ACCESSIBLE DESIGN STANDARDS 1: ADA Regulations | | | P | P | P |
| 73 ERGONOMICS: VISUAL AND PHYSICAL 1: Visual Ergonomics 2: Desk Height Flexibility 3: Seat Flexibility | - - - | | | P P P | P P P |
| 74 EXTERIOR NOISE INTRUSION 1: Sound Pressure Level | | | P | O | P |
| 75 INTERNALLY GENERATED NOISE 1: Acoustic Planning 2: Mechanical Equipment Sound Levels | - O | | | P P | P P |
| 76 THERMAL COMFORT 1: Ventilated Thermal Environment 2: Natural Thermal Adaptation | | | P P | P P | P P |
| 77 OLFACTORY COMFORT 1: Source Separation | | | - | O | O |
| 78 REVERBERATION TIME 1: Reverberation Time | | | - | O | O |
| 79 SOUND MASKING 1: Sound Masking Use 2: Sound Masking Limits | - - | | | O O | O O |
| 80 SOUND REDUCING SURFACES 1: Ceilings 2: Walls | - - | | | O O | O O |
| 81 SOUND BARRIERS 1: Wall Construction Specifications 2: Doorway Specifications 3: Wall Construction Methodology | - - - | | | O O O | O O O |
| 82 INDIVIDUAL THERMAL CONTROL 1: Free Address 2: Personal Thermal Comfort Devices | - - | | | O O | O O |
| 83 RADIANT THERMAL COMFORT 1: Lobbies and Other Common Public Spaces 2: Offices and Other Regularly Occupied Spaces | | | O - | O O | O O |

ADA ACCESSIBLE DESIGN STANDARDS

Ensuring that individuals with physical disabilities have access and mobility in newly constructed or renovated buildings is an important aspect of an equitable building environment.

This feature requires compliance with current Americans with Disabilities Act (ADA) design regulations, regardless of building age or location. ADA requirements are intended to protect the right of people with disabilities to participate in everyday life by ensuring access to buildings and facilities.



Muscular
Skeletal

PART 1: ADA REGULATIONS

The following requirement is met:

- a. ⁸⁹ Buildings comply with current ADA Standards for Accessible Design.



ERGONOMICS: VISUAL AND PHYSICAL

Overuse of the same muscles and ligaments over time can cause discomfort and strain the body, especially in occupational environments that require repetitive tasks. Under such conditions, the effects of even slight visual or physical discomfort are compounded.

This feature ensures that occupants are free to adopt a variety of comfortable sitting and standing positions.



PART 1: VISUAL ERGONOMICS

To help alleviate eye and neck strain, the following requirement is met:

- a. ⁸³ All computer screens are adjustable in terms of height and distance from the user.

PART 2: DESK HEIGHT FLEXIBILITY

At least 30% of workstations have the ability to alternate between sitting and standing positions through one of the following:

- a. Adjustable height standing desk.
- b. Desk-top height adjustment stands.
- c. Pairs of fixed-height desks of standing and seated heights (which need not be located adjacent to each other).

PART 3: SEAT FLEXIBILITY

Furnishings are adjustable in the following ways:

- a. ⁸³ Workstation chair height levels are adjustable within a range of 0.38 m [15 inches] to 0.5 m [19.9 inches].
- b. ⁸³ Workstation seat depth is adjustable within a range between 0.41 m [16 inches] to 0.53 m [21 inches].

EXTERIOR NOISE INTRUSION

Loud or repetitious exterior noises can be a source of stress, particularly in urban areas where they can be unrelenting. Preventing excessive exterior noise from reaching building interiors can help improve occupant well-being and comfort.

This feature sets indoor sound level limits for noises originating outside of the building. These limits help ensure that exterior noise does not distract building occupants.



Cardiovascular
Endocrine
Nervous

PART 1: SOUND PRESSURE LEVEL

Each regularly occupied space meets the following sound pressure level as measured when the space and adjacent spaces are unoccupied, but within 1 hour of normal business hours:

- a. Average sound pressure level from outside noise intrusion is less than or equal to 50 dBA.



INTERNALLY GENERATED NOISE

In addition to electronics, HVAC systems and other office devices, occupants themselves are major sources of indoor noise. As office and workspaces are increasingly designed to promote employee interaction, occupants can experience decreased levels of privacy and acoustic comfort, especially when different types of users share space.

The intent of this feature is to reduce distractions and enable speech privacy without impairing collaboration. These requirements can be met by limiting the amount of sound emanating from building systems and creating quiet zones for activities that require freedom from distraction.



Cardiovascular
Endocrine
Nervous

PART 1: ACOUSTIC PLANNING

An acoustic plan is developed that includes identifying the following:

- a. ⁹⁰ Loud and quiet zones of work.

PART 2: MECHANICAL EQUIPMENT SOUND LEVELS

The mechanical equipment system meets the following requirements once interior build-out is complete in the following spaces:

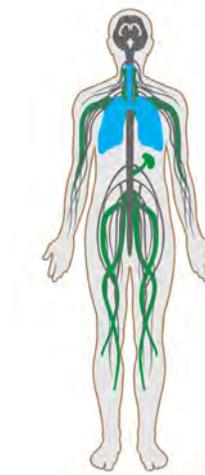
- a. ⁹⁰ Open office spaces: maximum noise criteria (NC) of 40.
- b. ⁹⁰ Enclosed offices: maximum noise criteria (NC) or 35.
- c. ⁹⁰ Conference rooms and breakout rooms: maximum noise criteria (NC) of 25.
- d. ⁹⁰ Teleconference rooms: maximum noise criteria (NC) of 20.



THERMAL COMFORT

Thermal comfort can affect mood, focus and productivity. However, preferences are highly personal and differ greatly from one individual to another. Balancing the energy requirements of large buildings with these varied occupant preferences can be challenging.

This feature uses best practices to ensure a sufficient level of comfort for the majority of occupants. ASHRAE Standard 55 specifies that thermal comfort can be achieved in two ways, either through the Standard Comfort Zone or the Adaptive Comfort Zone.



Immune
Integumentary
Nervous
Respiratory

PART 1: VENTILATED THERMAL ENVIRONMENT

All spaces in mechanically-ventilated projects meet the design, operating and performance requirements in the following criteria:

- a. ⁹² ASHRAE Standard 55 2013 Section 5.3, Standard Comfort Zone Compliance.

PART 2: NATURAL THERMAL ADAPTATION

All spaces in naturally-ventilated projects meet the following criteria:

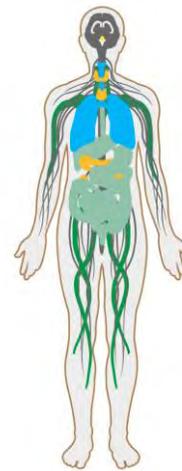
- a. ⁹² ASHRAE Standard 55-2013 Section 5.4, Adaptive Comfort Model.



OLFACTORY COMFORT

Excessively strong or distinct odors can disrupt physical and psychological comfort, and even trigger allergic reactions, nausea and headaches. Limiting these odors is a simple strategy that can contribute greatly to occupant comfort and well-being.

This feature supports building policy that discourages strong smells from chemicals and fragrances. The feature strives to keep interior environments odorless.



Digestive
Endocrine
Immune
Integumentary
Nervous
Respiratory

PART 1: SOURCE SEPARATION

All restrooms, janitorial closets, kitchens, cafeterias and pantries prevent strong odors from migrating to workspaces through one of the following separation methods:

- a. Negative pressurization.
- b. Interstitial rooms.
- c. Vestibules.
- d. Hallways.
- e. Automatic doors.

REVERBERATION TIME

In spaces with high reverberation times, the sound of voices and footsteps take longer to dissipate, contributing to higher levels of ambient noise. This reverberation can cause additional stress, as well as reduced focus and attention.

This feature seeks to establish lower reverberation time to help maintain comfortable sound levels. This performance specification can be met through the use of sound-absorbing materials on various surface and design elements.



Cardiovascular
Endocrine
Nervous

PART 1: REVERBERATION TIME

The following spaces have maximum reverberation time (RT60) as described:

- a. ⁹⁰ Conference rooms: 0.6 seconds.



SOUND MASKING

Complete silence can be just as distracting as loud environments as they highlight sudden acoustical disturbances and decrease speech privacy. Sound masking provides a low level of background noise that can help lessen the contrast in the case of an aural interruption.

This feature aims to mitigate uncomfortable acoustic disruptions and increase speech privacy by providing low background noise through the use of sound masks.



Immune
Nervous

PART 1: SOUND MASKING USE

All open office workspaces use the following:

- a. ⁹⁰ Sound masking systems.

PART 2: SOUND MASKING LIMITS

If sound masking systems are used, they comply with the following maximum sound levels, when measured from the nearest workspace:

- a. ⁹⁰ Open office spaces: 48 dBA.
- b. ⁹⁰ Enclosed offices: 42 dBA.

SOUND REDUCING SURFACES

Proper design and construction are not always enough to achieve acoustic comfort in buildings. Sound transmission from internal and external sources, footfall noise and voices from adjacent spaces are difficult to control. However, sound reduction treatments such as wall panels, ceiling baffles and surface enhancements can help with reverberation management to improve acoustic comfort.

The intent of this feature is to design spaces that incorporate absorptive surfaces to reduce unwanted noise reverberation. The noise reduction coefficient (NRC) is an average value that determines the absorptive properties of materials. The larger the NRC value, the better the material is at absorbing sound under standardized conditions.



Cardiovascular
Endocrine
Nervous

PART 1: CEILINGS

The following spaces, if present, have ceilings that meet the specifications described:

- a.⁹⁰ Open office spaces: NRC of at least 0.9 for the entire surface area of the ceiling (excluding lights, skylights, diffusers and grilles).
- b.⁹⁰ Conference and teleconference rooms: NRC of at least 0.8 on at least 50% of the surface area of the ceiling (excluding lights, skylights, diffusers and grilles).

PART 2: WALLS

The following spaces, if present, have walls which meet the NRC specifications described:

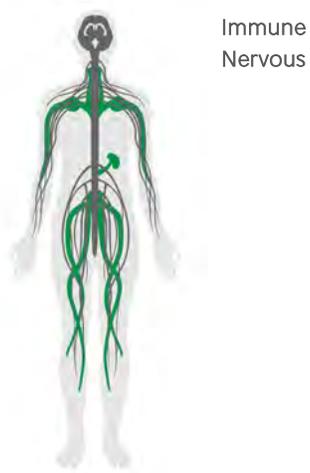
- a.⁹⁰ Open office spaces: minimum NRC of 0.8 on walls or panels of at least 25% of the surface area of the surrounding walls.
- b.⁹⁰ Cubicle style offices: partitions reach to head height and have a minimum NRC of 0.8.
- c.⁹⁰ Enclosed offices, conference and teleconference rooms: minimum NRC of 0.8 on at least 25% of the surface area of surrounding walls.



SOUND BARRIERS

Noise from adjacent spaces can be very disturbing to building occupants. Careful detailing and high quality construction materials can greatly improve the sound reducing abilities of an interior partition or door.

This features aims to increase acoustic comfort by reducing sound transmission from adjacent spaces through construction detailing that exceeds standard practice.



PART 1: WALL CONSTRUCTION SPECIFICATIONS

The following spaces, if present, have interior partition walls which meet the Noise Insulation Class (NIC) described:

- a.⁹⁰ Enclosed offices: minimum NIC of 35 when a sound masking system is present, or of 40 when no sound masking system is used.
- b.⁹⁰ Teleconference rooms: minimum NIC of 53 on walls adjoining private offices, conference rooms or other teleconference rooms.
- c.⁹⁰ Conference rooms: minimum NIC of 53 on walls adjoining private offices, teleconference rooms or other conference rooms.

PART 2: DOORWAY SPECIFICATIONS

Doors connecting to the teleconference rooms, conference rooms and private offices are constructed with at least one of the following:

- a.⁹⁰ Gaskets.
- b.⁹⁰ Sweeps.
- c.⁹⁰ Non-hollow core.

PART 3: WALL CONSTRUCTION METHODOLOGY

All interior walls enclosing offices, conference rooms and teleconference rooms are constructed for optimal performance by reducing air gaps and limiting sound transmission through the following:

- a.⁹⁰ Properly sealing all acoustically rated partitions at the top and bottom tracks.
- b.⁹⁰ Staggering all gypsum board seams.
- c.⁹⁰ Packing and sealing all penetrations through the wall.

INDIVIDUAL THERMAL CONTROL

Thermal comfort preferences are highly individual, and can be affected by metabolism, body type and clothing. These factors make it nearly impossible to find a temperature that will satisfy all occupants at the same time.

This feature requires spaces to vary in temperatures and gives occupants the flexibility to select a work area where they are most comfortable (termed “free address”). It also provides personalized thermal comfort devices.



Immune
Integumentary
Nervous
Respiratory

PART 1: FREE ADDRESS

Projects over 200 m² [2150 ft²] have the following free address requirement:

- a. The building provides a thermal gradient of at least 3 °C [5 °F] across open office spaces, between rooms or between floors.
- b. All open office spaces with occupants performing tasks that require similar workstations allow for at least 50% free address to allow occupants to select a work space with a desired temperature.

PART 2: PERSONAL THERMAL COMFORT DEVICES

The following condition is met in spaces with 10 or more occupants in the same heating or cooling zone:

- a. Occupants have access to personal thermal comfort devices such as fans (excluding space heaters).



RADIANT THERMAL COMFORT

Buildings can achieve a better balance between occupant comfort and energy efficiency by separating temperature controls and fresh air supply systems.

This feature enhances thermal comfort through the use of radiant heating and cooling elements independent of ventilation systems.



Immune
Integumentary
Nervous
Respiratory

PART 1: LOBBIES AND OTHER COMMON PUBLIC SPACES

All lobbies and other common spaces meet the requirements set forth in ASHRAE Standard 55-2013 for thermal comfort through the use of one of the following systems:

- a.⁹³ Hydronic heating and/or cooling systems.
- b.⁹³ Electric radiant floors.

PART 2: OFFICES AND OTHER REGULARLY OCCUPIED SPACES

At least 50% of the floor area of all offices and other regularly occupied spaces meets the requirements set forth in ASHRAE Standard 55-2013 for thermal comfort through the use of one of the following systems:

- a.⁹³ Hydronic heating and/or cooling systems.
- b.⁹³ Electric radiant systems.





MIND

BACKGROUND

While we often conceptualize mental and physical health as separate domains, our minds and bodies are inextricably connected. For instance, exercise increases the release of serotonin, which can elevate mood and regulate the sleep cycle. These interrelationships can also instigate negative feedback loops.

The growing knowledge of the connection between mental and physical health has changed the way we perceive and understand disease etiology. We have come to recognize the important and complex relationships between our biology, thoughts and emotions. The effects of stress demonstrate this interconnectedness particularly clearly. There is a growing body of evidence suggesting stress can cause or worsen existing illnesses through various mechanisms. For this reason, medical science now ranks stress alongside smoking, inactivity, alcohol intake and poor diet as a primary risk factor for many chronic diseases.

Because the mind plays a vital role in an individual's overall health and well-being, an atmosphere that supports a healthy mental state can have significant physical benefits. Interventions to mediate stress can either be direct or indirect. This includes providing access to therapies that help promote relaxation and address mental or emotional trauma, instituting policies that improve sleep hygiene or encourage altruism and community engagement, and promoting the use of sensor technologies that increase awareness of physiological and environmental factors to inform positive behavioral changes.

INTENT

The WELL Building Standard® for Mind requires design, technology and treatment strategies designed to provide a physical environment that optimizes cognitive and emotional health.

MIND CERTIFICATION MATRIX

| COMPLIANCE CERTIFICATION | PRECONDITION | OPTIMIZATION | Core & Shell | Tenant Improvement | New Construction |
|--|--------------|--------------|-----------------|-----------------------|---------------------|
| | PRECONDITION | OPTIMIZATION | | | |
| 84 HEALTH AND WELLNESS AWARENESS | | | | | |
| 1: WELL Building Standard Guide® | P | | P | P | P |
| 2: Health and Wellness Library | - | | | P | P |
| 85 INTEGRATIVE DESIGN | | | | | |
| 1: Stakeholder Charrette | P | | P | P | P |
| 2: Development Plan | P | | P | P | P |
| 3: Stakeholder Orientation | P | | P | P | P |
| 86 POST-OCCUPANCY SURVEYS | | | | | |
| 1: Occupant Survey Content | - | | | P | P |
| 2: Information Reporting | - | | | P | P |
| 87 BEAUTY AND DESIGN I | | | | | |
| 1: Beauty Mindful Design | P | | P | P | P |
| 88 BIOPHILIA I - QUALITATIVE | | | | | |
| 1: Nature Incorporation | O | | P | P | P |
| 2: Pattern Incorporation | O | | P | P | P |
| 3: Nature Interaction | O | | P | P | P |
| 89 ADAPTABLE SPACES | | | | | |
| 1: Stimuli Management | - | | | O | O |
| 2: Privacy | - | | | O | O |
| 3: Space Management | - | | | O | O |
| 4: Workplace Sleep Support | - | | | O | O |
| 90 HEALTHY SLEEP POLICY | | | | | |
| 1: Non-Workplace Sleep Support | - | | | O | O |
| 91 BUSINESS TRAVEL | | | | | |
| 1: Travel Policy | - | | | O | O |
| 92 WORKPLACE HEALTH POLICY | | | | | |
| 1: Health Benefits | - | | | O | O |
| 93 WORKPLACE FAMILY SUPPORT | | | | | |
| 1: Parental Leave | - | | | O | O |
| 2: Employer Supported Child Care | - | | | O | O |
| 3: Family Support | - | | | O | O |
| 94 SELF-MONITORING | | | | | |
| 1: Sensors and Wearables | - | | | O | O |
| 95 STRESS AND ADDICTION TREATMENT | | | | | |
| 1: Mind and Behavior Support | - | | | O | O |
| 2: Stress Management | - | | | O | O |
| 96 ALTRUISM | | | | | |
| 1: Charitable Activities | - | | | O | O |
| 2: Charitable Contributions | - | | | O | O |

97 MATERIAL TRANSPARENCY

- 1: Material Information
- 2: Accessible Information



98 JUST ORGANIZATION

- 1: JUST Participation



99 BEAUTY AND DESIGN II

- 1: Ceiling Height
- 2: Artwork
- 3: Spatial Familiarity



100 BIOPHILIA II - QUANTITATIVE

- 1: Outdoor Biophilia
- 2: Indoor Biophilia
- 3: Water Feature



101 INNOVATION FEATURE I

- 1: Innovation 1 Proposal
- 2: Innovation 1 Support



102 INNOVATION FEATURE II

- 1: Innovation 2 Proposal
- 2: Innovation 2 Support



HEALTH AND WELLNESS AWARENESS

Understanding the requirements for wellness is often the first step to better health. Therefore, exposure and access to health-oriented literature is necessary to promote better wellness practices.

This feature promotes the availability of health and wellness literature, including detailed descriptions of WELL features and their benefits. A library of information provides an additional educational resource that encourages deeper understanding of health and wellness behaviors.



PART 1: WELL BUILDING STANDARD GUIDE®

Explanatory guides allow occupants to familiarize themselves with and benefit from features that are incorporated into the project, as well as to gain a broader understanding of health and wellness factors beyond the built environment. The following are provided:

- a. A manual (available to all occupants) describing all WELL Building Standard features of the project.

PART 2: HEALTH AND WELLNESS LIBRARY

A digital and/or physical library of resources that focus on mental and physical health and meets the following criteria:

- a. Contains at least one book title and one magazine subscription for every 20 occupants.
- b. Is prominently displayed and readily available to all occupants.

INTEGRATIVE DESIGN

A truly collaborative design process ensures that construction and upkeep of a space follows the original expectations and goals for the building. Including wellness throughout the design process guarantees that health-promoting criteria are understood by everyone creating and using the space.

This feature requires all stakeholders to meet at various points throughout the project development – pre-design planning, design development, construction and post-construction – to determine and ensure adherence to the collective wellness goals.



PART 1: STAKEHOLDER CHARRETTE

Prior to the design and programming of the project, all stakeholders, including at a minimum the owner, architects, engineers and facilities management team meet to:

- a.¹ Perform a values assessment and alignment exercise within the team to inform any project goals as well as strategies to meet occupant expectations.
- b.¹ Discuss the needs of the occupants, focusing on wellness.
- c. Set future meetings to stay focused on the project goals and to engage future stakeholders who join the process after the initial meeting, such as contractors and sub-contractors.

PART 2: DEVELOPMENT PLAN

A written document detailing the building's health-oriented mission is produced with the consent of all stakeholders and incorporate all of the following:

- a. Building site selection, taking into account public transportation.
- b. WELL concepts of air, water, nourishment, light, fitness, comfort and mind.
- c.¹ Plans for implementation of the above analyses and decisions.
- d. Operations and maintenance plans for facility managers and building policy requirements related to wellness.

PART 3: STAKEHOLDER ORIENTATION

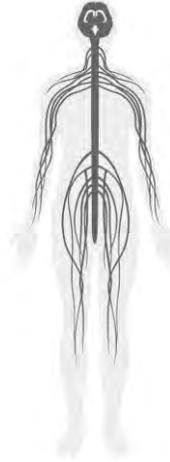
Upon construction completion, the designers, owners, managers and facilities staff must:

- a. Tour the building as a group.
- b. Discuss how building operations will support adherence to the WELL Building Standard.

POST-OCCUPANCY SURVEYS

Given the diversity of built environments, it is difficult to prescribe a comprehensive set of features that are effective across all settings. Occupancy surveys can be useful in measuring the extent to which a building is effectively promoting and protecting the health and comfort needs of its occupants.

This feature uses occupancy surveys to offer insight into the success of WELL features in a particular building environment, and to provide feedback for the improvement of the WELL Building Standard.



PART 1: OCCUPANT SURVEY CONTENT

The Occupant Indoor Environmental Quality (IEQ) Survey™ from the Center for the Built Environment at UC Berkeley is given to a representative sample of at least 30% of regular occupants at least once per year unless otherwise noted. The IEQ Survey covers the following topics of occupant satisfaction:

- a.³⁵ Acoustics.
- b.³⁵ Thermal comfort, including humidity and air flow, at least twice a year (once during the cooling season and once during the heating season).
- c.³⁵ Furniture and space layout.
- d.³⁵ Workspace light levels.
- e.³⁵ Odors, stuffiness and other air quality concerns.
- f. Drinking water access.

PART 2: INFORMATION REPORTING

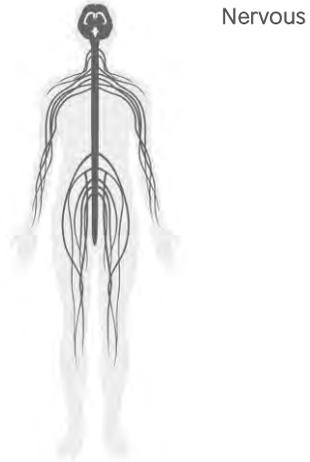
Aggregate results from surveys are reported within 30 days to the following groups:

- a.⁵⁹ Building owners and managers.
- b. Building occupants (upon request).
- c. International WELL Building Institute.

BEAUTY AND DESIGN I

A physical space in which design principles align with an organization's core cultural values can positively impact employees' mood and morale. Integrating aesthetically pleasing elements into a space can help building occupants derive a measure of comfort or joy from their surroundings.

This feature is derived from the Beauty and Spirit Imperative of the Living Building Challenge and strives to construct thoughtfully designed environments that positively impact the mood and comfort level of occupants.



PART 1: BEAUTY MINDFUL DESIGN

The project contains features intended for all of the following:

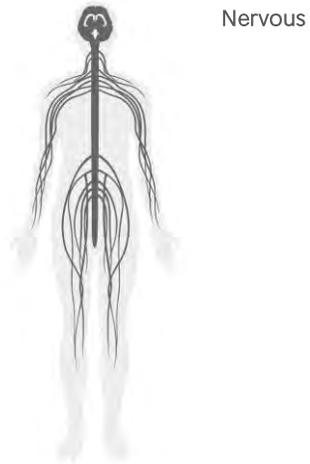
- a.¹³ Human delight.
- b.¹³ Celebration of culture.
- c.¹³ Celebration of spirit.
- d.¹³ Celebration of place.
- e.¹³ Meaningful integration of public art.



BIOPHILIA I - QUALITATIVE

Until relatively recently in human history, people had constant interaction with living things and their natural surroundings. Biophilia is an emerging field that recognizes our psychological need to be around life and life-like processes. Interior environments that are cold, sterile and devoid of life diminish our experience, mood and happiness and can even inhibit recovery time.

This feature recognizes the importance of creating an interior environment that nurtures the innate human-nature connection. As modeled after the Living Building Challenge, the biophilia requirements involve conducting historical, cultural, ecological and climatic studies to inform biophilic elements and creating a biophilic framework that tracks biophilia at each design phase of the project.



PART 1: NATURE INCORPORATION

A biophilia plan is developed that includes a description of how the project incorporates nature through the following:

- a.¹³ Environmental elements.
- b.¹³ Lighting.
- c.¹³ Space layout.

PART 2: PATTERN INCORPORATION

A biophilia plan is developed that includes a description of how the project incorporates the following:

- a.¹³ Nature's patterns throughout the design.

PART 3: NATURE INTERACTION

A biophilia plan is developed that provides sufficient opportunities for human-nature interactions:

- a.¹³ Within the building.
- b.¹³ In the site space external to the building.

ADAPTABLE SPACES

Healthy work environments should be designed to mitigate stress and optimize productivity, and should therefore be sufficiently adaptable for working, focusing, collaborating, and resting as needed.

This feature creates a productive work environment that is free of distracting stimuli and includes spaces that are designed for focused work and that encourage short naps.



Cardiovascular
Immune

PART 1: STIMULI MANAGEMENT

Seating and spatial layouts are organized into separate workplace zones and provide differing degrees of sensory engagement. Regularly occupied spaces that are 372 m² [4000 ft²] or larger provide separate zones for the following (the remaining 50% is attributed as desired):

- a. Collaboration zones taking up at least 25% of the space, no more than 4 seats per 19 m² [200 ft²] and at minimum, one visual vertical surface area for sharing ideas or work.
- b. Focus zones taking up at least 25% of the space, enclosable or semi-enclosable rooms with no more than 2 seats per 19 m² [200 ft²].

PART 2: PRIVACY

Areas greater than 1860 m² [20,000 ft²] provide at least one privacy room to unwind, focus and meditate. Space(s) meet three of the following requirements:

- a. Are at least 7 m² [75 ft²] for every 372 m² [4000 ft²].
- b. Provide ambient lights at 200 lux [19 fc] or less and 2700 K or less.
- c. Include a plant wall covering at minimum 50% of a wall or potted plants covering at minimum 15% of the floor area.
- d. Include a water feature at least 60 cm [2 ft] in height.
- e. Have Noise Criteria (NC) at 30 or better as measured from within the space.
- f. Provide an audio device with a selection of nature sounds and volume control.
- g. Provide at least 3 different types of seats; cushioned reclining chair, floor chair with back support and at least 3 meditation cushions of varying sizes.
- h. Provide storage cabinets with closeable doors for shoes, mats, blankets and cushions.

PART 3: SPACE MANAGEMENT

To minimize clutter and maintain a comfortable, well-organized environment, minimal storage requirements are addressed through the provision of:

- a. Allow at minimum 1.5 m² (15 ft²) built in, overhead storage cabinet spaces per 20 m² (215 ft²).
- b. A locker for each regular occupant with 1 or more shelves, at least 0.25 m³ [9 ft³] in volume.

PART 4: WORKPLACE SLEEP SUPPORT

Short naps are an effective and healthy means for improving mental and physical acuity, even more so than caffeine, which can disrupt sleep. To facilitate occupant alertness, provide adequate space to accommodate one or more of the following furniture options; at least one of which must be provided for the first 30 regular building occupants and an additional one for every 100 regular building occupants thereafter:

- a.⁵² Couch.
- b.⁵² Cushioned roll-out mat.
- c.⁵² Sleep pod.
- d.⁵² Fully reclining chair.
- e.⁵² Hammock.



HEALTHY SLEEP POLICY

High-quality sleep is essential to good health. Adequate sleep improves mental health, is necessary for maintaining sustained mental and physical performance throughout the day, and can help to prevent unhealthy weight gain.

This feature sets reasonable work hour limits that reinforce a healthy sleep and wake rhythm, puts a time limit on engagement with work tasks, provides appropriate places for recovery and renewal, and formalizes explicit food and drink provisioning to bolster good sleep patterns. Adopting this feature demonstrates the organization values quality of sleep and understands its impact on overall worker productivity and well-being.



Cardiovascular
Endocrine
Immune
Muscular

PART 1: NON-WORKPLACE SLEEP SUPPORT

The following requirements are met:

- a. For non-shift work, introduce organizational cap at midnight for late night work and communications.
- b. Provide employees with a 50% subsidy on software and/or applications that monitor daytime sleep-related behavior patterns such as activity levels, caffeine and alcohol intake, and eating habits.



BUSINESS TRAVEL

Business travel is often associated with a number of negative health outcomes such as self-reported poor health, obesity and an increased risk for cardiovascular disease. Research from the World Bank indicates that business travel is associated with higher total medical claim costs, the highest increase attributed to psychological disorders related to stress.

This feature aims to reduce the physical and mental stress associated with business travel by promoting policies that provide opportunities to maintain a fitness regimen, as well as to help protect healthy sleeping habits and personal relationships.



Cardiovascular
Nervous

PART 1: TRAVEL POLICY

In order to reduce stress related to business travel, employers promote the following policies:

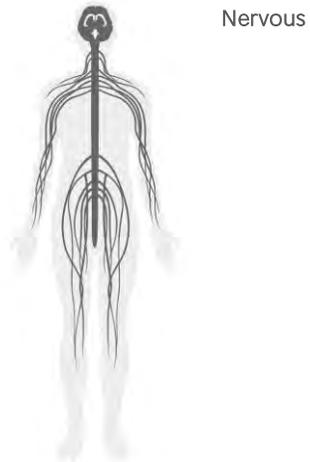
- a. Employees are provided the option to select non red-eye flights or are given the option to work remotely on the day of arrival from a red-eye flight.
- b. Employees are not required to take business trips for which the total travel time (including layovers, wait times and travel to and from terminals) exceeds both 5 hours and 25% total trip duration.
- c. During long business trips (domestic travel lasting more than 2 weeks and international travel lasting more than 4 weeks), employees are given the time-off and budget to fly home for at least 48 hours or to fly a friend or family member to meet them.
- d. Employees are reimbursed for any gym usage fees incurred during their travel.



WORKPLACE HEALTH POLICY

Protecting employee health should be of the utmost importance since it greatly affects many aspects of work including productivity, concentration, and the health of coworkers. Employees often feel overwhelmed and unable to take appropriate rest or time away from work to recover. Workplace health policies can support an employee's physical and mental well-being even when the employee is off-site.

This feature provides support to improve the overall health and satisfaction of workers and their families.



PART 1: HEALTH BENEFITS

Employers provide at least one of the following:

- a. Employer-based health insurance for part- and full-time workers, as well as their spouse and dependents, or subsidies to purchase individual insurance through an exchange.
- b. Flexible spending accounts.
- c. Health spending accounts.
- d.⁹¹ On-site immunizations or time off during the workday to receive immunizations.
- e.²⁰ Workplace policies that encourage ill employees to stay home or work remotely.



WORKPLACE FAMILY SUPPORT

Work-life balance can often be overlooked and employees' personal lives can lose priority to their work responsibilities. Policies regarding family care ensure that workers are able to take the necessary time off for self-care, while having the peace of mind that their loved ones are receiving proper care as well.

This feature provides support to improve work-life balance.



Digestive
Endocrine
Immune
Respiratory

PART 1: PARENTAL LEAVE

Employers provide the following:

- a.¹⁷ Paid parental leave for 6 weeks for each parent.
- b.⁴⁶ An additional 12 weeks of unpaid parental leave.

PART 2: EMPLOYER SUPPORTED CHILD CARE

Employers provide at least one of the following:

- a.⁶⁶ On-site child care centers compliant with local child care licensure.
- b.⁶⁶ Subsidies or vouchers for child care.

PART 3: FAMILY SUPPORT

Employers provide the following:

- a.⁴⁶ At least 12 weeks of unpaid leave for the care of a seriously ill child, spouse, domestic partner, parent-in-law, grandparent, grandchild or sibling.
- b.⁵¹ The option to use paid sick time for the care of a child, spouse, domestic partner, parent, parent-in-law, grandparent, grandchild or sibling.
- c.⁵¹ All nursing mothers with break times of at least 15 minutes, every 3 hours.

SELF-MONITORING

Self-monitoring devices that accurately observe and quantify changes to the body over time show great promise in promoting awareness of one's health status. These technologies can provide a powerful tool for gaining personal insight into the physiological states of the body, thereby encouraging positive behavioral and lifestyle changes.

This feature requires that employers offer to each employee for his/her personal use a self-monitoring device that accurately measures and tracks biomarkers associated with occupant health and wellness, including, but not limited to, heart rate variability, sleep quality and duration, activity levels and body mass.



Cardiovascular

PART 1: SENSORS AND WEARABLES

A sensor capable of measuring at least 2 of the following parameters is made available to each occupant for his/her personal use and is subsidized by at least 50%:

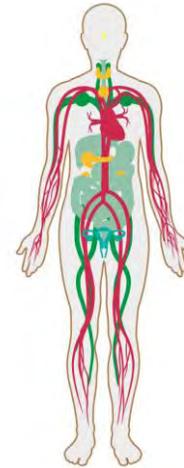
- a. ⁹⁴ Body weight/mass.
- b. ⁶² Activity and steps.
- c. Heart Rate Variability.
- d. Sleep duration, quality and regularity.



STRESS AND ADDICTION TREATMENT

An important and complex relationship exists between our mental and physiological states. Chronic stress adversely impacts the body, from the nervous to the cardiovascular system. Substance addiction is one of the most damaging manifestations of stress, combining the toxicity of the substance itself with the mental distress associated with social stigma and/or attempts to quit. In recent years, refinements in addiction treatment and stress reduction therapies, as well as pharmacological interventions have been successful in helping to mitigate these debilitating conditions.

This feature can complement other workplace wellness programs to help reduce employee stress levels, diminish addictive tendencies and prevent relapses.



Cardiovascular
Digestive
Endocrine
Immune
Integumentary
Reproductive

PART 1: MIND AND BEHAVIOR SUPPORT

An on-site program that addresses psychological and behavioral distress is made available to workplace occupants through:

- a. ⁹⁷ Employee Assistant Programs (EAPs) offering short-term treatment and referrals to qualified professionals for depression, anxiety, substance use, addiction and co-occurring mental health issues.

PART 2: STRESS MANAGEMENT

An on-site stress management program is made available to occupants through:

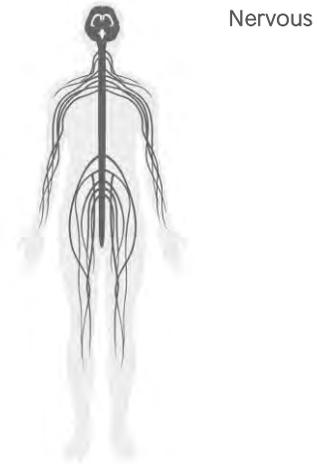
- a. A qualified counselor offering group, private workshops and referrals.



ALTRUISM

Considerable evidence demonstrates beneficial health and wellness outcomes associated with acts of generosity and charity. For this reason, altruistic sentiments and behaviors are more commonly being incentivized within the workplace.

This feature encourages employees to engage in altruistic activities outside of work, which can enhance well-being and health, contribute to a strong community identity and promote social cohesion.



PART 1: CHARITABLE ACTIVITIES

Individuals are given the option to take paid time from work to participate in volunteer activities as follows:

- a. 8 hours of paid time organized by employer for a registered charity twice a year.

PART 2: CHARITABLE CONTRIBUTIONS

Employers commit to the following:

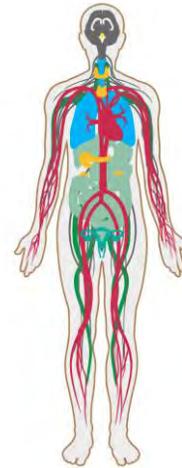
- a. Contributing annually to a registered charity to match employee donations.



MATERIAL TRANSPARENCY

Just as consumers have a right to know the contents of the food they consume (whether to avoid an allergic reaction or to make healthier nutrition choices), they should be able to find out what is in the products that make up the buildings they occupy.

This feature requires the disclosure of material composition as a step towards better product choices.



Cardiovascular
Digestive
Endocrine
Immune
Integumentary
Nervous
Reproductive
Respiratory

PART 1: MATERIAL INFORMATION

At least 50% (as measured by dollar value) of interior finishes and finish materials, furnishings (including workstations) and built-in furniture have one of the following material descriptions:

- a. ¹⁹ Declare Label.
- b. ²⁸ Health Product Declaration.
- c. ¹ Any method accepted in LEED v4 MR credit's "Building product disclosure and optimization - material ingredients" credit, Option 1: material ingredient reporting.

PART 2: ACCESSIBLE INFORMATION

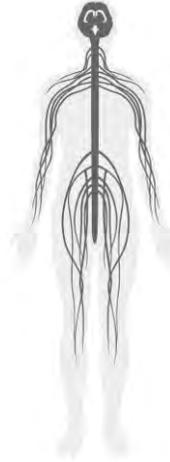
The following condition is met:

- a. All declaration information is compiled and made readily available to occupants either digitally or as part of a printed manual.

JUST ORGANIZATION

Organizations that espouse fair, equitable and just treatment toward their workforce help create a culture of lower stress and greater employee satisfaction, as well as a heightened sense of loyalty. By transparently sharing their policies and investments decisions, organizations not only allow employees, clients and patrons to determine if their personal values are shared by the organization, but also provide them the opportunity to voice their opinion about the organization's social equity practices.

This feature uses JUST participation to support fair and equitable organizations.



PART 1: JUST PARTICIPATION

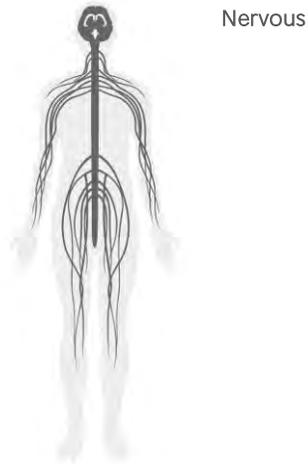
The following requirement is met:

- a. ⁷² The organization participates in the JUST program operated by the International Living Future Institute (for more information, see www.justorganizations.com).
- b. ⁷² The organization's participation in the JUST program, as well as information on how to access the program's publicly viewable database, is made known to employees.

BEAUTY AND DESIGN II

A beautiful and meaningful space in which design aesthetics are expressly considered can have a positive impact on occupant morale and mood. Elements that provide visual complexity, balance and proportion can impart a sense of comfort and ease and potentially reduce stress.

This feature realizes the application of best practice guidelines, room proportions, integration of artwork and interventions that enhance familiarity to create a visually appealing space.



PART 1: CEILING HEIGHT

Ceiling height that is proportional to room dimension provides an expansive, comfortable and open feel to interior space. Floor to ceiling heights for regularly occupied spaces meets the following requirements:

- a. ⁹⁶ Rooms of width 9 m [30 ft] or less have ceiling height of at least 2.75 m [9 ft].
- b. Rooms of width greater than 9 m [30 ft] have ceiling height of at least 2.75 m [9 ft] plus at least 0.15 m [0.5 ft] for every 3 m [10 ft] over 9 m [30 ft].

PART 2: ARTWORK

Integration of artwork to interior space adds complexity to the visual field. The following requirements are met:

- a. Entrances and lobbies contain at a minimum one sculptural piece and 2 additional pieces of hung artwork for every 74 m² [800 ft²] of space.
- b. Every regularly occupied space greater than 28 m² [300 ft²] includes at least one piece of artwork and an additional piece for every additional 19 m² [200 ft²].

PART 3: SPATIAL FAMILIARITY

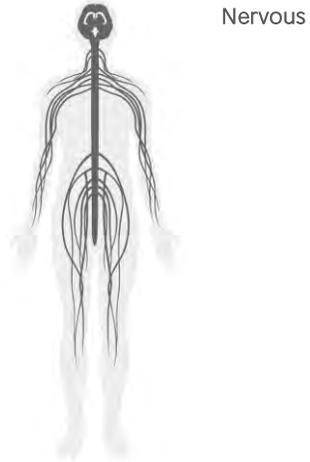
Artwork can be used to establish wayfinding, aid in orientation and provide spatial familiarity. The following requirements are met:

- a. Regularly occupied spaces of 929 m² [10,000 ft²] or larger on a single floor establish point of reference every 372 m² [4000 ft²] through use of artwork that is distinct in shape and color, adequately illuminated and at least 1.8 m [5.9 ft] in height.
- b. Single regularly occupied spaces over 372 m² [4000 ft²] are visually grouped into 2 or more zones through the use of at least 2 or 3 of the following unifying design elements: (i) lighting, (ii) furniture color and (iii) flooring pattern/color.
- c. ³⁸ Corridors over 9 m [30 ft] in length end in artwork or a view window to the exterior with a sill height no taller than 91 cm [3 ft] from the floor and with at least a 30 m [100 ft] vista.

BIOPHILIA II - QUANTITATIVE

Biophilia recognizes our psychological need to be around life and life-like processes. The direct experience of nature or nature-derived patterns can improve experience, mood and happiness.

This feature calls for provision of indoor design elements reminiscent of the natural environment, including water features and plantings, as well as access to outdoor gardens and landscaped areas.



PART 1: OUTDOOR BIOPHILIA

At least 25% of the project site size meets the following requirements:

- a. Features either landscaped grounds or rooftop gardens accessible to building occupants.
- b.⁹⁵ Consists of, at minimum, 70% plantings including tree canopies (within the 25%).

PART 2: INDOOR BIOPHILIA

Wall and potted plants are incorporated into the design of interior space according to the following:

- a.⁹⁵ Potted plants or planted beds cover at least 1% of floor area per floor.
- b.⁹⁵ A plant wall per floor, covering a wall area equal or greater to 2% of the floor area, or covering the largest of the available walls, whichever is greater.

PART 3: WATER FEATURE

The following requirement is met:

- a.⁹⁵ At least one water feature for every 9,290 m² [100,000 ft²] that is 1.7 to 1.8 m [5.8 to 6 ft] in height and that exposes occupants to the sight and sounds of still and moving water.

INNOVATION FEATURE I

As the scientific understanding of health continues to evolve, so too does the ability to address complex issues of promoting wellness through the built environment. Recent discoveries in neuroscience for example, have led to new insights in light's impact on the human brain, opening the door for addressing sleep disruption through improvements in lighting design. It is likely that similar discoveries will continue to be made. The WELL Building Standard embraces the creative thinking that is needed to address complex ways in which interior spaces contribute to health and wellness.



PART 1: INNOVATION 1 PROPOSAL

The feature meets the following requirements:

- a. Fits into one of the existing wellness concepts.
- b. Relates to the wellness concept in a novel way that is not already covered in the WELL Building Standard.

PART 2: INNOVATION 1 SUPPORT

The feature is supported by the following:

- a. The feature is fully substantiated by existing scientific, medical, and industry research and is consistent with applicable laws and regulations and leading practices in building design and management.



INNOVATION FEATURE II

The WELL Building Standard encourages project teams to propose novel wellness features that promote wellness in ways that are not already addressed.



PART 1: INNOVATION 2 PROPOSAL

The feature meets the following requirements:

- a. Fits into one of the existing wellness concepts.
- b. Relates to the wellness concept in a novel way that is not already covered in the WELL Building Standard.
- c. Does not fall under the same concept as a feature already receiving credit under Innovation Feature I.

PART 2: INNOVATION 2 SUPPORT

The feature is supported by the following:

- a. The feature is fully substantiated by existing scientific, medical, and industry research and is consistent with applicable laws and regulations and leading practices in building design and management.



Appendix A: Glossary

General Terms

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| Acute Exposure | Single exposure to an environmental condition (not lasting more than a day). Acute exposures contrast with chronic exposures, which are prolonged and repeated. Single exposures still have effects on health. |
| Allergic Reaction | An exaggerated or pathological reaction (sneezing, respiratory irritation, itching or skin rashes) to substances that are without comparable effect on the average individual. |
| Alveoli | Small thin-walled air-containing compartments of the lung that are typically arranged in saclike clusters that give the tissue a honeycomb appearance and expand its surface area for the purpose of air exchange. |
| Alzheimer's Disease | A type of dementia marked by the loss of cognitive ability, affecting memory, thinking and behavior generally over a period of 10 to 15 years. |
| Asthma | Chronic inflammatory disease of the airways. Asthma attacks are often triggered by exposure to allergens, and during an attack the airways spasm, alternatively swelling and narrowing, causing the individual to wheeze or gasp for air. |
| Building Envelope | The separation between the interior and the exterior environments of a building, restricting transfer of air, water, heat, light, noise and creatures. |
| Chronic Diseases | Any disease that is persistent or has long-lasting health effects. |
| Chronic Exposure | Repeated, continuous exposure to a substance or condition over an extended period from several years to a lifetime. |
| Circadian Rhythms | Internal clock that keeps the body's hormones and bodily processes on a roughly 24-hour cycle, even in continuous darkness. |
| Collaboration Zone | A physical area within a building that encourages group interplay and discussion though its strategic layout and design. |
| Cone Cells | Photosensitive cells in the eye used to differentiate colors and brightness in moderate and high levels of illumination. |
| Diabetes | A group of diseases that impact the metabolism due to insufficient insulin production (Type 1) and/or high insulin resistance (Type 2), and a leading cause of death. Results in poor blood sugar control, frequent urination, increased thirst, increased hunger and other symptoms. |
| Environmental Product Declaration (EPD) | Quantified environmental data for a product with pre-set categories of parameters based on the International Organization of Standards (ISO) 14040 series of standards, but not excluding additional environmental information. |
| Fenestration | An opening in a surface (as a wall or membrane). |
| Focus Zone | A physical area within a building that encourages concentration and attentiveness to a task among occupants though its strategic layout and design. |
| Free Address | Ability for occupants to be able to choose their own workspace within the office or workplace. |
| Fungi | Any of a group of unicellular, multicellular or syncytial spore-producing organisms feeding on organic materials. |
| Glazing | Glasswork, which must be carefully designed in order to avoid excessive glare and heat gain. |
| Health Product Declaration (HPD) | A standard format for reporting product content and associated health information for building products and materials. |
| Heart Disease | A class of disease that affects the heart, arteries, capillaries or veins. |
| Heating, Ventilating, and Air Conditioning System (HVAC) | Equipment, distribution systems and terminals that provide the processes of heating, ventilating or air conditioning. |
| High Efficiency Particulate Air (HEPA) Filter | Filter which removes 99.97% of all particles greater than 0.3 micrometers and satisfies standards of efficiency set by the Institute of Environmental Sciences and Technology. |
| High-touch Surfaces | Surfaces that are frequently touched by building users and occupants such as door knobs, hand rails and tables. See Table A1. |
| Homeostasis | A state of having regulated responses to environmental conditions to retain stability. |
| Immune System | The integrated body system of organs, tissues, cells and cell products such as antibodies that differentiates self from non-self and neutralizes potentially harmful organisms or substances. |

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| Immuno-compromised | An inability to develop a normal immune response, usually as a result of disease, malnutrition or medical therapy that affects the immune system. |
| Inflammation | Localized protective reaction of tissue to irritation, injury or infection, characterized by pain, redness, swelling and sometimes loss of function. |
| Intrinsically Photoreceptive Retinal Ganglion Cells (ipRGCs) | Relay environmental light levels to the suprachiasmatic nucleus through the retinohypothalamic tract. Most sensitive to blue light. |
| Liver | An organ that plays a vital role in a range of important metabolic processes including detoxification, protein synthesis and glycogen storage. |
| Malnutrition | A condition that results from insufficient nutrient intake, excess nutrient intake or nutrient intake in the wrong proportions. |
| Metabolic | Any biochemical process that occurs within an organism that is necessary to sustain life. |
| Metabolic Syndrome | A cluster of medical conditions or risk factors that increase the chances of developing cardiovascular disease, diabetes fatty liver disease and several cancers. |
| Metamers | Different spectral distributions of light which produce the same response on the cones and are therefore visually identical. |
| Nanoparticles | Particles between 1 and 100 nanometers in size. |
| Nap Pod | A personal dedicated resting space optimized to offer a short but regenerative sleep. |
| National Ventilation Procedure | ANSI/ASHRAE Standards 62.1 is the recognized standard for ventilation system design and acceptable procedure with regards to establishing an effective ventilation system. |
| Neurocognitive Diseases | Diseases of the brain and nervous system. |
| Obesity | A medical condition in which the accumulation of excess adipose tissue poses an adverse effect on health. |
| Occupational Safety and Health Administration (OSHA) | Outlines current indoor air quality guidelines for the workplace. |
| Pathogen | An infectious biological agent such as bacteria, virus and fungus that is capable of causing disease in its host. |
| Photocatalytic oxidation (PCO) | Achieved when you combine UV light rays with a TiO ₂ -coated filter. |
| Public Health Goals (PHGs) | Unenforced regulations developed by California Office of Environmental Health Hazard Assessment. Similar in concept to the EPA's Maximum Contaminant Level Goal (MCLG). |
| Radioactivity | The energy and particles which are released during the decomposition process of atomic nuclei is called radiation. |
| Regularly Occupied Space | Areas where workers are seated or standing as they work inside a building. |
| Respiratory Failure | Inadequate gas exchange by the respiratory system, with the result that oxygen and/or carbon dioxide levels leaving the heart cannot be maintained within their normal ranges. |
| Retina | Light-sensitive membrane found at the back end of the eyeball that receives the image produced by the lens. |
| Rod Cells | Photosensitive cells in the eye used to discern peripheral vision in low levels of illumination. |
| Sick Building Syndrome (SBS) | A set of symptoms, such as headache, fatigue, eye irritation and breathing difficulties, that typically affect workers in modern airtight office buildings, and that are believed to be caused by indoor pollutants and poor environmental control. |
| Sleep Hygiene | Personal habits and practices that help maximize sleep quality. |
| Tissues | A group of cells that perform a common and specified function. At an organizational level, tissues are between cells and organs. |
| Toxicity | Extent to which a substance is harmful to a living thing. |
| Trail | Any outdoor pathways designated for pedestrian or biker use. |
| Ultraviolet Germicidal Irradiation (UVGI) | A sterilization method that uses ultraviolet (UV) light to break down microorganisms by destroying their DNA. |
| Ultraviolet Germicidal Irradiation (UVGI) | A sterilization method that uses ultraviolet (UV) light to break down microorganisms by destroying their DNA. Often used in a variety of applications, such as food, air and water purification. |
| Universal Design (UD) | Designing objects and spaces with aesthetically pleasing while maximizing accessibility, usability and operability regardless of the user's age, ability and other factors. |

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| Ventilation Rate | Rate of exchange of outside air, as well as the circulation of air within the building. |
| Wayfinding | Act of spatial problem solving. |
| Weather Resistant Barrier (WRB) | A sheet, spray- or trowel-applied membrane or material layer that prevents the passage of liquid water even after long or continuous exposure to moisture. |
| Zeitgebers | Physical stimuli which have an impact on the body's circadian rhythm. Examples include light, temperature and eating or drinking behaviors. |

Substances

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| 2,4-Dichlorophenoxyacetic Acid (2,4-D) | A major herbicide that is very susceptible to running off or leaching into ground and surface water sources. |
| Acrylamides | A potentially toxic and potentially cancer-causing substance that can be naturally present in uncooked, raw foods in very small amounts. |
| Aerosols | Substances consisting of very fine particles of a liquid or solid suspended in a gas. For example, mist which consists of very fine droplets of water in air. |
| Allergen | Environmental substance that can produce an allergic reaction in the body but may not be intrinsically harmful. Common allergens include pollen, animal dander, house dust, feathers and various foods. |
| Antibody | Proteins generally found in the blood that detect and rid the body of potentially damaging organisms, such as bacteria and viruses. |
| Antimony | A naturally occurring metal found in ore deposits; the most common form of antimony is antimony trioxide, which is used as a flame retardant. |
| Arsenic | An element found in the earth's crust that has applications in various industrial processes, however runoff from factories, agricultural practices and natural deposits can lead to high concentrations in water. |
| Asbestos | A naturally occurring mineral that was commonly used in insulation because of its chemical and flame resistance, tensile strength and sound absorption properties. It is now known to be a leading cause of mesothelioma and lung cancer. |
| Atrazine | Among the most widely used pesticides in the United States and among the most commonly detected pesticide in drinking water. |
| Benzene | Widely used as a precursor to various materials such as detergents, dyes, pesticides, Styrofoam, nylon and other synthetic fibers. |
| Carbohydrate | Any of a group of organic compounds that includes sugars, starches, celluloses and gums and serves as a major energy source to support bodily functions and physical activity. Easily digestible carbohydrates found in white bread, pastries and soda may contribute to weight gain and promote diabetes and heart disease. |
| Carbon Monoxide | Colorless, odorless and highly poisonous gas formed by incomplete combustion. Replaces oxygen in hemoglobin, limiting blood's ability to deliver oxygen and can lead to death. |
| Carcinogens | A compound that increases the risk of developing cancer. |
| Chloramine | A disinfectant formed when ammonia is added to chlorine and is commonly used as a secondary disinfectant in public water systems. |
| Chlorine | A highly irritating, greenish-yellow gaseous halogen, capable of combining with nearly all other elements, produced principally by electrolysis of sodium chloride and used widely to purify water, as a disinfectant and bleaching agent. |
| Coarse Particles | Particulate matter larger than 2.5 micrometers and smaller than 10 micrometers in diameter; also called PM ₁₀ . Often found near roadways and dusty industries. |
| Copper | Metallic element that enters water sources through natural deposits, but contamination most commonly occurs through corrosion of copper or brass. |
| Cortisol | A hormone that plays a primary role in stress, during which it increases blood sugar, suppresses the immune system and aids in protein, fat and carbohydrate metabolism. Also undergoes diurnal variation, playing an important role in the sleep-wake cycle. |
| Decorative Glazing | Coating on window surfaces purely for aesthetic purposes with no other functionality. |
| Ethylbenzene | A naturally occurring component of crude oil and a combustion byproduct. |
| Fine Particles | Particulate matter 2.5 micrometers in diameter or smaller. Can be directly emitted from combustion sources such as forest fires or can form when gases emitted from power plants, industries and automobiles react in the air. Also called PM _{2.5} . |

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| Flame Retardants | Chemicals used in thermoplastics, thermosets, textiles and coatings that inhibit or resist the spread of fire. Some of these chemicals have been linked to cancer, delayed development, low IQ and thyroid disruption. |
| Food Additives | Substances typically added to processed foods to enhance or preserve flavor or appearance. |
| Formaldehyde | A colorless gas compound, HCHO. Used for manufacturing melamine and phenolic resins, fertilizers, dyes and embalming fluids as preservatives and disinfectants. |
| Fructose | A simple sugar that is found naturally in small amounts in fruits and vegetables, but which occurs in extremely large quantities in many modern foods. High fructose intake has been implicated in liver disease, inflammation, metabolic syndrome, diabetes, heart disease and cancer. |
| Fungicides | Chemicals applied to crops or structures to reduce the harmful effects of mold, mushrooms and other fungi. |
| Glucose | A simple sugar that occurs widely in most plant and animal tissue. It is the principal circulating sugar in the blood and the major energy source of the body. Once eaten, carbohydrates break down immediately into glucose. Elevated blood glucose levels are one of the distinguishing elements of diabetes. |
| Glyphosate | A non-selective herbicide used in many pesticide formulations; exposure may result from its normal use due to spray drift, residues in food crops and from runoff into drinking water sources. |
| Haloacetic Acid | When chlorine and chloramine are added to water and react with other organic matter to produce haloacetic acids known as a disinfectant byproduct (DBP), these can damage internal organs and the nervous system in elevated concentrations and can lead to can |
| Herbicides | A group of pesticides commonly used on farms and lawns to eliminate weeds from the fields. |
| Hormones | A chemical released by a cell, gland or organ that transmits a signal to another part of the body. |
| Hydrogenation | Made by forcing hydrogen gas into oil at high pressure in order to increase the shelf life and prevent rancidity of an oil. |
| Inorganic Chemicals | Refers to a chemical compound that is not "organic". Broadly, compounds not containing carbon. |
| Iron | Necessary for healthy blood circulation, but excessive iron particles in water can provide a shelter for disease-causing bacteria. |
| Lead | A naturally occurring metal found deep within the ground. Used in creation of old pipes, ceramics and paint. Also the stable final element of uranium's radioactive decay series. |
| Manganese | Small amounts are required for a healthy diet, but higher amounts may cause neurological damage. |
| Melatonin | "Sleep hormone" whose production by the body is regulated by the circadian rhythm and the presence of light. |
| Mercury | A naturally-occurring poisonous metal element which occurs naturally in the earth's surface. |
| Microflora | Bacteria and microscopic algae and fungi, especially those living in a particular site or habitat. |
| Nickel | Enters groundwater and surface water by dissolution of rocks and soils, from atmospheric fallout and biological decays and waste disposal. |
| Nitrogen Dioxide (NO ₂) | A product of combustion mainly found near burning sources (for instance, wood smoke and traffic combustion). |
| Nutrient | A chemical that is required for metabolic processes, which must be taken from food or another external source. Macronutrients taken from food sources include carbohydrates, proteins, fats and vitamins. |
| Organic Chemicals | Broadly refers to chemical compounds that possess carbon-based atoms, generally found in biological systems. |
| Oxidized Lipids | A lipid, any of a diverse group of organic compounds including fats, oils, hormones and certain components of membranes that are grouped together because they do not interact appreciably with water, combined chemically with oxygen. |
| Ozone | Triatomic form of oxygen. Hazardous to the respiratory system at ground level, but a layer in the upper atmosphere blocks much of the ultraviolet radiation from the sun. |
| Partially Hydrogenated Oil | Vegetable oils that have been hydrogenated or partially hydrogenated for the purpose of being solid at room-temperature, which contain trans-fats. |
| Particulate Matter | A complex mixture of elemental and organic carbon, salts, mineral and metal dust, ammonia and water that coagulate together into tiny solids and globules. |
| Perfluorinated Compound (PFC) | A family of fluorine-containing chemicals with unique properties to make materials stain- and stick-resistant. |
| Petrochemical | A chemical that is made from petroleum or natural gas. |

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| Polychlorinated Biphenyls (PCBs) | A former commercially produced synthetic organic chemical compound that may be present in products and materials produced before the 1979 PCB ban. |
| Polyunsaturated Fat | Polyunsaturated fats are among the "good" fats that can help reduce cholesterol levels and risk of heart disease and stroke. Polyunsaturated fats are found in sunflower, corn, soybean and flaxseed oils, walnuts and many fish. |
| Polyurethane | A synthetic resin used chiefly in paints and varnishes. Diisocyanates in polyurethane products can be toxic if inhaled or touched during installation. |
| Polyvinyl Chloride (PVC) | An inexpensive plastic that is widely used for many objects. Exposure to its chemical precursors, additives and products of combustion can be harmful. |
| Radon | Radioactive, carcinogenic noble gas generated from the decay of natural deposits of uranium. |
| Saturated Fat | Typically solid at room temperature, saturated fats are among the "bad" fats that raise blood cholesterol levels. Saturated fats are found in high concentrations in butter, bacon, beef and cheese. |
| Serotonin | Neurotransmitter hormone produced in the gut and brain stem which regulates mood, sleep and digestion. |
| Simazine | Widely used in agriculture as an herbicide to control weeds; high levels of simazine exposure over a short period can cause weight loss and blood damage. |
| Sodium | Sodium is a vital nutrient, however is unhealthy in high amounts. |
| Sulfate | Sulfates occur naturally and can erode into water supplies; the health effects of sulfates are uncertain, but ingesting large amounts has been linked to negative health effects. |
| Tetrachloroethylene | A chlorinated hydrocarbon used as a dry cleaning solvent, an additive in textile processing and metal degreasing that has been linked to cancer. |
| Toxicant | Any toxic substance, generally created by human activity. |
| Toxin | A poisonous substance produced by a living organism. |
| Trihalomethane | Chlorine in water can combine with organic matter to form compounds called disinfectant byproducts (DBPs), such as trihalomethanes. |
| Ultrafine Particles | Also called nanoparticles, ultrafine particles are a subcategory of P _{2.5} which are exclusively less than 0.1 µm. Due to the small size they are often airborne and can easily reach the alveoli of the lungs. |
| Urea-formaldehyde (UF) | A low-cost thermosetting resin that is used in the wood product industry. |
| Volatile Organic Compounds (VOCs) | Organic, and therefore carbon and hydrogen containing, materials which evaporate and diffuse easily at ambient temperature. VOCs are emitted by a wide array of building materials, paints and common consumer products. |
| Xylene | Typical applications include solvents for the printing, rubber and leather industries as well as ingredients in paper and fabric coatings. |

Units and Measure

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| Air Changes Per Hour (ACH) | A measure of how many times the volume of air within a defined space is replaced, used in the context of building ventilation and air tightness. |
| Annual Sunlight Exposure (ASE) | Percentage of space in which the light level from direct sun alone exceeds a pre-defined threshold (such as 1000 lux) for some quantity of hours (such as 250) in a year. |
| A-Weighted Decibel (dBA) | Acoustic decibel modified using "A-weighting" to adjust the frequency-dependent response of human hearing. |
| Candela (cd) | Measurement of luminous intensity and the SI base unit of light. |
| Clothing Insulation (CLO) | Clothing insulation is the resistance to heat transfer provided by clothing measured in clo (1 clo = 0.155 m ² K/W = 0.88°F ft ² /BTU). |
| Color Rendering Index (CRI) | Comparison of the appearance of 8 to 14 colors under a light source in question, to a blackbody source of the same color temperature. CRI or Ra refers to the average of the first 8 comparisons and R9 describes the lighting accuracy on red surfaces. |
| Correlated Color Temperature (CCT) | Spectral distribution of electromagnetic radiation of a blackbody at a given temperature. For example, the color temperature during the daytime is approximately 15,000 K, while during sunset is approximately 1,850 K. |
| Cubic feet per minute (CFM) | Measures the mass of gas that passes through a certain point. |
| Decibel (dB) | A unit of measurement for sound. The decibel is a logarithmic unit so an increase in 10 decibels equals an increase by a factor of 10. |

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| Dry Bulb Temperature (DBT) | Temperature of air measured by a thermometer freely exposed to the air but shielded from radiation and moisture. This temperature is usually thought of as air temperature and it is the true thermodynamic temperature. Dry bulb temperature does not take humidity into account. |
| Equivalent Continuous Level (LAeq) | The time averaged sound pressure level on the A-weighted scale, converted to decibels. |
| Footcandle (fc) | Unit of illuminance, equivalent to one lumen per square foot. |
| Frequency (f) | The number of times an event repeats itself per a specified unit of time. Hertz (Hz) is a common unit for frequency and equals cycles per second i.e. 1 Hz = 1 cycle/second. Most commonly used with waves (sound and light) and is the number of times the wave repeats itself at its particular wavelength. |
| Illuminance (Lux) | Amount of light passing through a given area in space. Measured in lux or foot-candles. |
| Impact Insulation Class (IIC) | Extent to which a physical structure blocks out sound, typically used in describing flooring, a higher IIC reduces footfall noise, and other impact sounds. |
| Light Reflectance Value (LRV) | Rating from 0 (black) to 100 (white) describing the amount of visible and usable light that reflects from (or absorbs into) a painted surface. |
| Lumens | Measure of luminous flux, derived from the SI base unit candela, and therefore weighted to the eye's sensitivity to light; 1 W of light at 555 nm equates to 683 lumens. |
| Luminance (cd/m ²) | Measurement of how bright a surface or light source will appear to the eye. Measured in candela/m ² or foot-lamberts. |
| Luminous Flux | Total luminous output of a light source, measured in lumens. Weighted to the eye's visual sensitivity. |
| Luminous Intensity | Radiant power weighted to human vision, describing light emitted by a source in a particular direction. Measured by the candela. |
| Lux | Unit of illuminance, one lux being equivalent to one lumen per square meter. |
| Maximum Contaminant Level Goal (MCLG) | Concentration of a substance in drinking water believed to result in no adverse effects. Derived from on Population Adjusted Dose and estimated daily water consumption, fraction of exposure from water and body weight. |
| Maximum Contaminant Levels (MCL) | Enforceable water quality limits for a substance, based on the Maximum Contaminant Level Goal, but taking into account technology and cost limitations of treatment. |
| Mean Radiant Temperature (MRT) | The uniform surface temperature of an imaginary black enclosure in which an occupant would gain or lose the same amount of radiant heat as in the actual non-uniform space; MRT is a primary driver of human thermal comfort, roughly equal in influence to air temperature. |
| Megawatt (mW) | Unit of measurement for light. |
| Melanopic Lux (EML) | A measure of light used to quantify how much a light source will stimulate melanopsin's light response. |
| Metabolic Rate (MET) | Rate that chemical energy in the body is converted to heat and mechanical energy. |
| Micro-Ra | Roughness rating of a physical surface, averaged in micro-meters & micro-inches. |
| Minimum Efficiency Reporting Value (MERV) | Value assigned to an air filter to describe the amount of different types of particles removed when operating at the least effective point in its life. |
| Nephelometric Turbidity Units (NTU) | Measure the turbidity of water. |
| Noise Criteria (NC) | Define the sound pressure limits of the octave band spectra ranging from 63-8000 Hz. The noise criteria equals the lowest curve which is not exceeded in the spectrum. |
| Noise Isolation Class (NIC) | Field test for determining the sound transmitting abilities of a wall. Higher NIC values indicate better sound insulation i.e. more effective sound cancellation between spaces. NIC specifications are defined in ASTM Standard E366. |
| Noise Reduction Coefficient (NRC) | Average value that determines the absorptive properties of materials. |
| Parts per Billion (PPB) | Measurement of the mass of a chemical or contaminate per unit volume of water. |
| Parts Per Million (PPM) | A unit of measurement to express very dilute concentrations of substances. |
| PicoCurie per Liter (pCi/L) | A non-SI unit of radioactivity. |
| Relative Humidity (rH) | Ratio of partial pressure of water vapor in the air to the saturation pressure of water vapor at the same temperature and pressure. |

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| Reverberation Time (RT) | Time it takes for sound to decay. The most commonly used reverberation time is RT60, the time it takes for the sound level to decrease 60 decibels. Additional reverberation time measurements are RT20 and RT30, for decreases of 20 and 30 decibels, respectively. |
| Sound Pressure Level (SPL) | Sound pressure level (SPL), also known as acoustic pressure, is the pressure variation associated with sound waves. Usually measured in decibels, the acoustic pressure is a ratio between the measured value and a reference value; a common reference is threshold of hearing or the minimum sound level that the average person can hear. |
| Sound Transmission Class (STC) | A laboratory method for determining the sound transmission through a wall. Higher STC values indicate more effective noise isolation than lower ones. STC specifications are found in ASTM Standards E90-09 and E1425. |
| Spatial Daylight Autonomy (sDA) | Percentage of floor space where a minimum light level (for example 300 lux) can be met completely for some proportion (for example 50%) of regular operating hours by natural light. |
| Visible Transmittance (VT) | Amount of light in the visible portion of the spectrum that passes through a glazing material. |
| Walk Score® | A measurement that takes into account a building inhabitants' physical output; it is recommended a building obtains a Walk Score® of 70 or greater. |
| Wavelength (λ) | The distance between two points on a wave in which the wave repeats itself. Often used to describe light waves. |

Appendix B: Citations

Citations are organized by the endnote number found next to each requirement letter in the WELL Building Standard. The reference codes below the citation refer to a specific feature number, part number and requirement letter.

- 1 U.S. Green Building Council. *LEED v4: Reference Guide for Building Design and Construction*. Washington D.C.: U.S. Green Building Council; 2013: 37, 43-44, 542-43, 545, 541-552, 567, 605, 623, 645-53, 658-61, 682, 685-6, 723-4.
 - 1.1.a USGBC's LEED v4: Reference Guide for Building Design and Construction EQ Credit: Indoor Air Quality Assessment requires demonstration of formaldehyde levels less than 27 ppb.
 - 1.1.b USGBC's LEED v4: Reference Guide for Building Design and Construction EQ Credit: Indoor Air Quality Assessment requires demonstration of total VOC levels less than 500 µg/m³.
 - 2.2.a EQ Credit: Indoor Air Quality Assessment requires prohibition of smoking outside the building except in designated smoking areas located at least 25 feet from all entries, outdoor air intakes and operable windows.
 - 4.1.a USGBC's LEED v4 EQ Credit: Low-Emitting Materials requires all paints and coatings wet-applied on site to meet the applicable VOC limits of the CDPH and the additional VOC content requirements.
 - 4.1.b Adherence to SCM for Architectural Coatings or SCAQMD Rule 1113 satisfies the requirements of EQ Credit: Low-Emitting Materials for VOC content for wet-applied products.
 - 4.2.a USGBC's LEED v4 EQ Credit: Low-Emitting Materials requires all sealants and adhesives wet-applied on site to meet the applicable VOC limits of the CDPH and the additional VOC content requirements.
 - 4.2.b USGBC's LEED v4 EQ Credit: Low-Emitting Materials requires that all adhesives and sealants wet-applied on site must meet the applicable VOC limits of the SCAQMD Rule 1168.
 - 4.3.a USGBC's LEED v4 EQ Credit: Low-Emitting Materials requires flooring on site meet the applicable VOC limits of the CDPH when tested in accordance with Standard Method v1.1-2010.
 - 4.4.a USGBC's LEED v4 EQ Credit: Low-Emitting Materials requires insulation to not exceed limits set by California Department of Public Health (CDPH) Standard Method v1.1-2010.
 - 4.5.a USGBC's LEED v4 EQ Credit: Low-Emitting Materials requires furniture and furnishings to comply with ANSI/BIFMA e3-2011 Furniture Sustainability Standard sections 7.6.1 and 7.6.2, and be tested in accordance with ANSI/BIFMA Standard Method M7.1-2011.
 - 5.2.a USGBC's LEED v4 EQ Credit: Enhanced Indoor Air Quality Strategies requires ventilation systems for outdoor air with particle filters to have a MERV of 13 or higher or Class F7 or higher (CEN Standard EN 779-2002) particle air filters.
 - 7.1.a USGBC's LEED v4 EQ Credit: Construction Indoor Air Quality Management Plan requires the sealing of all ductwork, registers, diffusers, and returns when stored on site or not in service.
 - 7.2.a USGBC's LEED v4 EQ Credit: Construction Indoor Air Quality Management Plan requires the removal of all temporary filtration media and replacement with new filters before occupancy.
 - 7.3.a USGBC's LEED v4 EQ Credit: Construction Indoor Air Quality Management Plan requires protection of stored materials from moisture in dry conditions indoors, under cover, and off the ground or floor.
 - 7.3.b USGBC's LEED v4 EQ Credit: Construction Indoor Air Quality Management Plan requires protection of stored materials from moisture in dry conditions indoors, under cover, and off the ground or floor.
 - 7.3.c USGBC's LEED v4 EQ Credit: Construction Indoor Air Quality Management Plan requires wet materials to be installed and allowed to dry at minimum 24 hours prior to installation of absorptive materials.
 - 7.5.a USGBC's LEED v4 EQ Credit: Construction Indoor Air Quality Management Plan, Pathway Interruption requires sealing of doorways, windows, or tenting off areas as needed using temporary barriers, such as plastic separations.
 - 7.5.b USGBC's LEED v4 EQ Credit: Construction Indoor Air Quality Management Plan, Pathway Interruption requires provision of walk-off mats at entryways to reduce introduced dirt and pollutants.
 - 7.5.c USGBC's LEED v4 EQ Credit: Construction Indoor Air Quality Management Plan, Pathway Interruption requires use of dust guards and collectors on saws and other tools.

- 7.5.d USGBC's LEED v4 EQ Credit: Construction Indoor Air Quality Management Plan, Housekeeping requires use of vacuum cleaners with high-efficiency particulate filters and sweeping compounds or wetting agents for dust control when sweeping.
 - 8.1.a USGBC's LEED v4: Reference Guide for Building Design and Construction EQ Credit: Enhanced Indoor Air Quality Strategies requires permanent entry walk-off systems.
 - 8.1.b USGBC's LEED v4: Reference Guide for Building Design and Construction EQ Credit: Enhanced Indoor Air Quality Strategies requires permanent entry walk-off systems.
 - 8.1.c USGBC's LEED v4: Reference Guide for Building Design and Construction EQ Credit: Enhanced Indoor Air Quality Strategies requires permanent entry walk-off systems.
 - 13.1.a USGBC's LEED v4 EQ Credit: Indoor Air Quality Assessment requires performance of a building flush-out by supplying a total air volume of 14,000 cubic feet of outdoor air per square foot of gross floor area.
 - 13.1.b USGBC's LEED v4 EQ Credit: Indoor Air Quality Assessment requires that the space may be occupied only after delivery of a minimum of 3,500 cubic feet of outdoor air per square foot of gross floor area.
 - 15.1.a USGBC's LEED v4 EQ Prerequisite: Minimum Indoor Air Quality Performance requires using the minimum outdoor air intake flow for mechanical ventilation systems using the procedure from ASHRAE 62.1–2010.
 - 17.1.b USGBC's LEED v4: Reference Guide for Building Design and Construction EQ Credit: Enhanced Indoor Air Quality Strategies requires no recirculation of air.
 - 18.1.b USGBC's LEED v4: Reference Guide for Building Design and Construction EQ Credit: Minimum Indoor Quality Performance requires carbon dioxide monitoring within each thermal zone for mechanically ventilated spaces.
 - 25.5.a USGBC's LEED MR Credit sets limits for furniture and medical furnishings including textiles, finishes and dyes, to less than 100 ppm of at least four out of five chemical groups, including urea-formaldehyde.
 - 25.5.b USGBC's LEED MR Credit sets limits for furniture and medical furnishings including textiles, finishes and dyes, to less than 100 ppm of at least four out of five chemical groups, including urea-formaldehyde.
 - 25.5.c USGBC's LEED MR Credit sets limits for furniture and medical furnishings including textiles, finishes and dyes, to less than 100 ppm of at least four out of five chemical groups, including urea-formaldehyde.
 - 26.1.b USGBC's LEED v4 MR Credit: Building Product Disclosure and Optimization allows Cradle to Cradle v2 Gold or Platinum or v3 Silver, Gold or Platinum as one way to achieve Option 2.
 - 26.1.c USGBC's LEED v4 MR Credit: Building Product Disclosure and Optimization allows GreenScreen v1.2 Benchmark as one way to achieve Option 2. The List Translators are equivalent to the Benchmark.
 - 26.1.d USGBC's LEED v4 MR Credit: Building Product Disclosure and Optimization allows projects to combine allowed materials lists in meeting the 25% threshold.
 - 62.1.a LEED v4 Indoor Environmental Quality Credit: Daylight, Option 1 requires that at least 55% of space receives at least 300 lux of sunlight for an award of 2 points.
 - 62.1.b LEED v4 Indoor Environmental Quality Credit: Daylight, Option 1 requires that annual sunlight exposure ASE(1000,250) is achieved for no more than 10% of regularly occupied space.
 - 68.2.b The LEED v4 Sustainable Sites Credit: Joint Use of Facilities requires collaboration with school districts or other decision making bodies to provide access to gyms, fields, and swimming pools to non-school events and functions.
 - 85.1.a USGBC's LEED BD+C: Healthcare requires project teams to create a health mission statement and to address shared values, goals, and strategies.
 - 85.1.b USGBC's LEED BD+C: Healthcare requires the generation of an Owner's Project Requirements (OPR) document that outlines ways to optimize occupant health.
 - 85.2.c USGBC's LEED BD+C: New Construction requires projects to perform a number of analyses and to document how analyses informed building and site design decisions.
 - 97.1.c USGBC's LEED v4 Building Product Disclosure and Optimization Credit requires projects to have a publicly available inventory, Health Product Declaration, Cradle to Cradle Certified, or other specially approved programs.
- 2 U.S. Environmental Protection Agency. National Ambient Air Quality Standards. 40 CFR part 50. <http://www.epa.gov/air/criteria.html>. Revised October 2011. Updated December 14, 2012. Accessed September 16, 2014.

- 1.2.a The EPA's 2012 NAAQS require ambient air in cities to keep 8-hr average levels of carbon monoxide below 9 ppm and 1-hr averages below 35 ppm, not to be exceeded more than once per year.
- 1.2.b The EPA's 2012 NAAQS require PM_{2.5} to be less than 12 µg/m³ for a primary annual mean, secondary annual mean of 15 µg/m³ and a 24-hour concentration of 35 µg/m³, averaged over three years .
- 1.2.e The EPA's 2012 NAAQS for nitrogen dioxide require a nitrogen dioxide annual mean less than 53 ppb.
- 3 **World Health Organization. *WHO Air Quality Guidelines for Particulate Matter, Ozone, Nitrogen Dioxide and Sulfur Dioxide*. Geneva: World Health Organization; 2005: 9, 14.**
- 1.2.c The WHO's Air Quality Guidelines for Particulate Matter, Ozone, Nitrogen Dioxide, and Sulfur recommend 24-hour average PM₁₀ limits of less than 50 µg/m³.
- 1.2.d The WHO's Air Quality Guidelines for Particulate Matter, Ozone, Nitrogen Dioxide, and Sulfur Dioxide recommend ozone limits at 100 µg/m³ 8-hour mean.
- 4 **U.S. Environmental Protection Agency. A Citizen's Guide To Radon: The Guide to Protecting Yourself And Your Family From Radon. <http://www.epa.gov/radon/pdfs/citizensguide.pdf>. Published May 2012. Accessed September 16, 2014.**
- 1.3.a The EPA's A Citizen's Guide to Radon recommends radon levels to be less than 4 pCi/L.
- 5 **State of New York. Regulation of Smoking in Public and Work Places § 1399. https://www.health.ny.gov/regulations/public_health_law/section/1399/. Revised 2009. Accessed September 15, 2014.**
- 2.1.a The State of New York's Regulation of Smoking in Public and Work Places does not permit smoking indoors at places of employment.
- 6 **American Society of Heating, Refrigerating and Air-Conditioning Engineers.y. Atlanta: ASHRAE; 2013.**
- 3.1.a ASHRAE's Standard 62.1: Ventilation for Acceptable Indoor Air Quality provides guidelines for ventilation rates.
- 3.1.b ASHRAE's Standard 62.1: Ventilation for Acceptable Indoor Air Quality provides ventilation rates.
- 7 **Illinois Department of Public Health. Illinois Department of Public Health Guidelines for Indoor Air Quality. http://www.idph.state.il.us/envhealth/factsheets/indoorairqualityguide_fs.htm. Updated May 2011. Accessed September 15, 2014.**
- 3.2.a The IDPH's Guidelines for Indoor Air Quality recommend properly ventilated buildings should have carbon dioxide levels with a floor or building average of 800 ppm or less.
- 3.2.b The IDPH's Guidelines for Indoor Air Quality recommend properly ventilated buildings should have carbon dioxide levels with a floor or building average of 800 ppm or less.
- 8 **U.S. Environmental Protection Agency. A Brief Guide to Mold, Moisture, and Your Home. <http://www.epa.gov/mold/moldguide.html>. Published 2010. Accessed September 15, 2014.**
- 16.1.a The EPA's A Brief Guide to Mold, Moisture, and Your Home recommends maintaining relative humidity between 30% and 50%.
- 9 **National Air Duct Cleaners Association (NADCA). *NADCA White Paper on Ultraviolet Lighting Applications in HVAC Systems*. http://nadca.com/sites/default/files/userfiles/documents/2014/bod_final_approved_draft_uv_paper_9-20_-_pdf.pdf. Accessed October 8, 2014.**
- 6.1.b NADCA's White Paper on Ultraviolet Lighting Applications in HVAC Systems states that to avoid ozone production, use UVC lamps with a wavelength of 254 nm.
- 10 **Center for Science in the Public Interest. Chemical Cuisine. <http://www.cspinet.org/reports/chemcuisine.htm#bht>. Published 2014. Accessed September 23, 2014.**
- 43.1.b The CSPI's Chemical Cuisine reports evidence that most flavoring chemicals also occur in nature and are probably safe, but are used almost exclusively in junk foods.
- 43.1.c The CSPI's Chemical Cuisine states that evidence continues to mount that artificial sweeteners negatively impact the digestive microbiome, leading to glucose intolerance and metabolic dysregulation.

- 43.1.d The CSPI's Chemical Cuisine reports that brominated vegetable oil leaves residue in the human body, and in animal studies has been shown to cause heart lesions, changes in the liver, and impaired growth and behavioral development.
- 43.1.e The CSPI's Chemical Cuisine reports that potassium bromate is banned in most countries, but not in the U.S., where it is frequently used in baked goods.
- 43.1.f The CSPI's Chemical Cuisine reports that BHA is classified as "reasonably anticipated to be a human carcinogen" by the Department of Health and Human Services.
- 43.1.g The CSPI's Chemical Cuisine reports that BHT increases the risk of various cancers in animals and has been shown to accumulate in human fat.
- 11 The National Electrical Manufacturers Association. Enclosures for Electrical Equipment (1000 Volts Maximum). <http://www.nema.org/Standards/ComplimentaryDocuments/NEMA-250-2008-contents-and-scope.pdf>. Published 2008. Accessed September 15, 2014.
- 6.1.c NEMA Standards Enclosures for Electrical Equipment recommends appropriately rated enclosures be used, since ultraviolet light and moisture inside HVACs can damage ballasts.
- 12 National Center for Healthy Housing and American Public Health Association. National Healthy Housing Standard. http://www.nchh.org/Portals/0/Contents/NHHS_Full_Doc.pdf. Published 2014. Accessed September 15, 2014.
- 6.2.a The National Healthy Housing Standard states that building materials shall show no signs of mold.
- 6.2.b The National Healthy Housing Standard states that building materials shall show no signs of water damage.
- 13 International Living Future Institute. *Living Building Challenge 3.0*. Seattle; 2014: 38, 43-49, 60
- 19.1.a The International Living Future Institute's Living Building Challenge 3.0 Imperative 07 requires full control of windows.
- 26.1.a The International Living Future Institute's Living Building Challenge 3.0 Imperatives 10 and 12 require independently verified declarations of products.
- 87.1.a The International Living Future Institute's Living Building Challenge 3.0 Imperative 19 requires design features to support human delight.
- 87.1.b The International Living Future Institute's Living Building Challenge 3.0 Imperative 19 requires design features to support celebration of culture.
- 87.1.c The International Living Future Institute's Living Building Challenge 3.0 Imperative 19 requires design features to support celebration of spirit.
- 87.1.d The International Living Future Institute's Living Building Challenge 3.0 Imperative 19 requires design features to support celebration of place.
- 87.1.e The International Living Future Institute's Living Building Challenge 3.0 Imperative 19 requires design features to support meaningful integration of public art.
- 88.1.a The International Living Future Institute's Living Building Challenge 3.0 Imperative 9 requires a plan that outlines the incorporation of nature through environmental elements in the project.
- 88.1.b The International Living Future Institute's Living Building Challenge 3.0 Imperative 9 requires a plan that outlines the incorporation of nature through lighting elements in the project.
- 88.1.c The International Living Future Institute's Living Building Challenge 3.0 Imperative 9 requires a plan that outlines the incorporation of nature through space layout in the project.
- 88.2.a The International Living Future Institute's Living Building Challenge 3.0 Imperative 9 requires a plan that outlines the incorporation of nature's patterns through design of the project.
- 88.3.a The International Living Future Institute's Living Building Challenge 3.0 Imperative 9 requires a plan that outlines the interaction with nature within the building.
- 88.3.b The International Living Future Institute's Living Building Challenge 3.0 Imperative 9 requires a plan that outlines the interaction with nature external to the building.
- 14 San Francisco Department of the Environment. Integrated Pest Management Ordinance. <http://www.sfenvironment.org/article/city-staff/pest-management>. Published 2011. Accessed September 14, 2014

- 10.1.a The San Francisco Department of the Environment's Integrated Pest Management recommends that pesticide products be used as a last result, only after other non-chemical management options have been exhausted.
- 10.1.b The San Francisco Department of the Environment's Integrated Pest Management Ordinance assigns hazard tiers to pesticide products from lowest to highest concern.
- 15 U.S. Environmental Protection Agency. *Residential Air Cleaners: A Summary of Available Information*. Washington, DC: U.S. Environmental Protection Agency; August 2009.
- 23.2.a The EPA's Residential Air Cleaners document recommends use of UV air duct sanitizers in conjunction with filters.
- 16 U.S. Environmental Protection Agency. Methylene Diphenyl Diisocyanate and Related Compounds Action Plan. http://www.wftaylor.com/wp-content/uploads/2012/03/EPA_MDI_Action_Plan.pdf. Published April 2011. Accessed October 17, 2014.
- 25.4.a The EPA's Methylene Diphenyl Diisocyanate and Related Compounds Action Plan outlines the risk of exposure to isocyanate-based compounds.
- 25.4.b The EPA's Methylene Diphenyl Diisocyanate and Related Compounds Action Plan outlines the risk of exposure to isocyanate-based compounds.
- 17 State of California. *Unemployment Insurance Code*. §3301.
- 93.1.a The State of California Unemployment Insurance Code provides six weeks of wage replacement benefits to employees who take time off to care for a new child.
- 18 U.S. Green Building Council. Sustainable Site 4: Alternative Transportation – Bicycle Storage and Changing Rooms. <http://www.usgbc.org/node/1731996?return=/credits>. Published 2009. Accessed October 17, 2014.
- 69.1.b USGBC's LEED v4 LT Credit: Bicycle Facilities requires separate and secure bicycle storage for at least 5% of regular building occupants (minimum 4) and short-term bicycle storage for at least 2.5% of all peak visitors.
- 69.2.a USGBC's LEED v4 LT Credit: Bicycle Facilities requires at least one on-site shower with changing facility for the first 100 regular building occupants and one additional shower for every 150 regular building occupants thereafter.
- 19 Declare. The Ingredients Label for Building Projects. <https://ilbi.org/about/About-Docs/handouts-docs/declare-postcard>. Seattle: International Living Future Institute; Accessed September 15, 2014.
- 97.1.a Declare provides a platform for manufacturers to communicate material product content.
- 20 National Partnership for Women and Families. Paid Sick Days: Good for Business, Good for Families. <http://www.nationalpartnership.org/research-library/work-family/psd/paid-sick-days-good-for-business-and-workers.pdf>. Published August 2012. Accessed October 16, 2014.
- 92.1.e National Partnership for Women and Families' Paid Sick Days: Good for Business, Good for Workers identifies that when ill employees are able to stay home, the spread of disease slows and the workplaces are both healthier and more productive.
- 21 U.S. Environmental Protection Agency. Antimicrobial Testing Program. <http://www.epa.gov/oppad001/antimicrobialtestingprogram.html>. Published 2014. Accessed September 15, 2014.
- 27.1.a The EPA's Antimicrobial Testing Program provides stringent efficacy standards for disinfectants.
- 22 U.S. Green Building Council. Pilot Credit 82: Local Food Production. <http://www.usgbc.org/node/2743606?return=/pilotcredits>. Published 2009. Accessed October 17, 2014.
- 51.1.a LEED v4: Reference Guide for Building Design and Construction sets a Pilot Credit (local food production) for onsite food production, which requires the provision for onsite food production.
- 51.1.b LEED v4: Reference Guide for Building Design and Construction sets a Pilot Credit (local food production) for onsite food production, which requires the provision of a greenhouse.
- 51.2.a LEED v4: Reference Guide for Building Design and Construction sets a Pilot Credit (local food production) for onsite food production, which requires the provision for onsite food production.
- 51.2.b LEED v4: Reference Guide for Building Design and Construction sets a Pilot Credit (local food production) for onsite food production, which requires the provision of a watering system.

- 51.2.c LEED v4: Reference Guide for Building Design and Construction sets a Pilot Credit (local food production) for onsite food production, which requires the provision of access to sunlight.
- 51.2.d LEED v4: Reference Guide for Building Design and Construction sets a Pilot Credit (local food production) for onsite food production, which requires the provision of vegetable gardens and/or edible nut and fruit-bearing plants.
- 23 Occupational Safety and Health Administration. Protecting Workers Who Use Cleaning Chemicals. <https://www.osha.gov/Publications/OSHA3512.pdf>. Published 2012. Accessed October 17, 2014.
- 29.1.a OSHA/NIOSH's Protecting Workers Who Use Cleaning Chemicals info sheet recommends the use of microfiber mops, rags and dusters.
- 29.1.c OSHA's Protecting Workers Who Use Cleaning Chemicals info sheet recommends the use of hands-free mops.
- 29.2.b Protecting Workers Who Use Cleaning Chemicals info sheet recommends avoiding the mixing of cleaning products that contain bleach and ammonia.
- 24 U.S. Environmental Protection Agency. Greening Your Purchase of Cleaning Products: A Guide for Federal Purchasers. <http://www.epa.gov/epp/pubs/cleaning.htm>. Last updated on 5/12/2010. Accessed October 17, 2014.
- 29.1.b The EPA's Greening Your Purchase of Cleaning Products: A Guide for Federal Purchasers provides a list of green cleaning product resources, including Design for the Environment, EcoLogo and Green Seal labels.
- 25 Zhivov, Alexander and Anis, Wagdi. *Building Air Tightness and Air Barrier Continuity Requirements*. Washington, DC: National Institute of Building Science; 2012.
- 14.1.a NIBS recommends conducting blower door testing and infrared thermography in accordance with ASTM and ISO standards.
- 26 U.S. Environmental Protection Agency. *Chemical Management Resource Guide for School Administrators*, EPA 747-R-06-002. Washington, DC: U.S. Environmental Protection Agency; December 2006.
- 29.2.a The EPA's Chemical Management Resource Guide for School Administrators recommends separate storage for bleach and ammonia products.
- 27 U.S. Green Building Council. Pilot Credit 78: Design for Active Occupants. <http://www.usgbc.org/node/4810558?return=/credits/new-construction/v4>. Published 2013. Accessed October 17, 2014.
- 64.2.a LEED v4 Pilot Credit 78: Design for Active Occupants includes a requirement for a main staircase to be located within 25 ft of any edge of the lobby.
- 64.2.b LEED v4 Pilot Credit 78: Design for Active Occupants includes a requirement to locate a main staircase that is visible before occupants encounter elevators and/or escalators.
- 64.2.d LEED v4 Pilot Credit 78: Design for Active Occupants for primary staircase(s) includes classifying regularly occupied floors for re-entry, allowing all building users to access them, and providing access via stairs to at least 50% of the tenant floors.
- 64.3.c LEED v4 Pilot Credit 78: Design for Active Occupants requires some features, one of which is the provision of daylighting with windows and/or skylights that are at least 8 square feet.
- 70.1.a USGBC's LEED Pilot Credit 78: Design for Active Occupants requires equipment to be provided in the interior fitness space and for use by 5% of regular building occupants.
- 70.1.b USGBC's LEED Pilot Credit 78: Design for Active Occupants requires equipment to be provided in the interior fitness space and for use by 5% of regular building occupants.
- 70.1.c USGBC's LEED Pilot Credit 78: Design for Active Occupants requires equipment to be provided in the interior fitness space and for use by 5% of regular building occupants.
- 70.1.d USGBC's LEED Pilot Credit 78: Design for Active Occupants requires equipment to be provided in the interior fitness space and for use by 5% of regular building occupants.
- 70.2.a USGBC's LEED Pilot Credit 78: Design for Active Occupants requires equipment to be provided in the interior fitness space and for use by 5% of regular building occupants.
- 70.2.b USGBC's LEED Pilot Credit 78: Design for Active Occupants requires equipment to be provided in the interior fitness space and for use by 5% of regular building occupants.

- 70.2.c USGBC's LEED Pilot Credit 78: Design for Active Occupants requires equipment to be provided in the interior fitness space and for use by 5% of regular building occupants.
- 70.2.d USGBC's LEED Pilot Credit 78: Design for Active Occupants requires equipment to be provided in the interior fitness space and for use by 5% of regular building occupants.
- 28 Health Product Declaration Collaborative (HPD). Standard Version 1.0. http://hpdcollaborative.org/standard-documents/hpdstandard_v1_0_121215.pdf. Effective Date: 13 November 2012. Revised: 15 Dec 2012.
- 97.1.b The Health Product Declaration's Standard Version 1.0 provides a human health context for material hazard information (product content and emissions) disclosed in the Environmental Product Declaration (EPD) as well as other sources.
- 29 U.S. Environmental Protection Agency. Protecting your health. <http://www.epa.gov/greenhomes/protectingyourhealth.htm>. Updated December 19, 2012. Accessed October 16, 2014.
- 24.1.a The EPA notes that under certain conditions combustion appliances can release contaminants into the home that can seriously damage health, including combustion pollutants such as carbon monoxide and particulates.
- 30 U.S. Department of Housing and Urban Development. Lead Paint Safety. <http://www.hud.gov/offices/lead/training/LBPguide.pdf>. Washington, D.C. Published March 2001. Accessed October 17, 2014.
- 28.2.a The U.S. HUD's Lead Paint Safety document recommends rugs to be removable and permanent wall-to-wall carpeting not to be used.
- 31 U.S. Environmental Protection Agency. Work Practice Standards for Conducting Lead-Based Paint Activities: Target Housing and Child-occupied Facilities. <http://www.law.cornell.edu/cfr/text/40/745.227>. Published 1996. Accessed September 15, 2014.
- 11.2.a The EPA's Work Practice Standards for Conducting Lead-Based Paint Activities document establishes requirements for conducting lead-based paint activities.
- 11.2.b The EPA's Work Practice Standards for Conducting Lead-Based Paint Activities document establishes requirements for conducting lead-based paint activities.
- 11.2.c The EPA's Work Practice Standards for Conducting Lead-Based Paint Activities document establishes requirements for conducting lead-based paint activities.
- 32 Centers for Disease Control and Prevention. Voluntary Guidelines for Managing Food Allergies In Schools and Early Care and Education Programs. http://www.cdc.gov/healthyyouth/foodallergies/pdf/13_243135_A_Food_Allergy_Web_508.pdf. Published 2013. Accessed October 14, 2014.
- 48.1.a The CDC's Voluntary Guidelines for Managing Food Allergies In Schools and Early Care and Education Programs reports that 50%-62% of fatal or near fatal allergic reactions are caused by peanuts.
- 33 U.S. Environmental Protection Agency. Guidelines for Conducting the AHERA TEM Clearance Test to Determine Completion of an Asbestos Abatement Project. Published 1989: 5
- 11.3.a AHERA's Asbestos Model Accreditation Plan establishes asbestos limits.
- 11.3.b The EPA's Guidelines for Conducting the AHERA TEM Clearance Test to Determine Completion of an Asbestos Abatement Project guidelines establish requirements for conducting post-abatement checks.
- 11.3.c The EPA's Guidelines for Conducting the AHERA TEM Clearance Test to Determine Completion of an Asbestos Abatement Project guidelines establish requirements for conducting post-abatement checks.
- 34 U.S. Environmental Protection Agency. Steps to Safe PCB Abatement Activities. <http://www.epa.gov/epawaste/hazard/tsd/pcbs/pubs/caulk/guide/guide-sect4a.htm>. Published 2012. Accessed 2011.
- 11.4.a The EPA's Steps to Safe PCB Abatement Activities establishes PCB abatement procedures.
- 11.4.b The EPA's Steps to Safe PCB Abatement Activities provides guidance on the handling, storage, and disposal of PCB waste.
- 35 Center for the Built Environment. Occupant Indoor Environmental Quality (IEQ) Survey. <http://www.cbe.berkeley.edu/research/survey.htm>. Accessed September 15, 2014.

- 86.1.a One of the core question areas of CBE's Occupant Indoor Environmental Quality (IEQ) Survey™ is acoustic quality.
- 86.1.b One of the core question areas of CBE's Occupant Indoor Environmental Quality (IEQ) Survey™ is thermal comfort.
- 86.1.c One of the core question areas of CBE's Occupant Indoor Environmental Quality (IEQ) Survey™ is office furnishings and layout.
- 86.1.d One of the core question areas of CBE's Occupant Indoor Environmental Quality (IEQ) Survey™ is lighting.
- 86.1.e One of the core question areas of CBE's Occupant Indoor Environmental Quality (IEQ) Survey™ is air quality.
- 36 U.S. Green Building Council. LEED ID+C Commercial Interiors | v3 – LEED 2009. LEED Pilot Credit 54: Avoidance of Chemicals of Concern. <http://www.usgbc.org/node/2606894?return=/pilotcredits/Commercial-Interiors/v2009>. Accessed September 15, 2014.
- 11.1.b USGBC's LEED v4 Pilot Credit 54, v3 2009 requires that a minimum of 20%, by cost, of at least 3 building product and material types must not contain lead and lead compounds greater than 0.01% (100 ppm) as calculated by mass.
- 25.1.a USGBC's LEED v3 Pilot Credit 54 requires that third party certified building materials may not include perfluorinated compounds at levels equal to or greater than 100 ppm.
- 25.2.a USGBC's LEED v3 Pilot Credit 54 requires that third party certified building products not contain more than 0.01% by mass (100ppm) brominated or halogenated flame retardants containing bromine, chlorine, or fluorine.
- 25.2.b USGBC's LEED v3 Pilot Credit 54 requires that third party certified building products not contain more than 0.01% by mass (100ppm) brominated or halogenated flame retardants containing bromine, chlorine, or fluorine.
- 25.2.c USGBC's LEED v3 Pilot Credit 54 requires that third party certified building products not contain more than 0.01% by mass (100ppm) brominated or halogenated flame retardants containing bromine, chlorine, or fluorine.
- 25.2.d USGBC's LEED v3 Pilot Credit 54 requires that third party certified building products not contain more than 0.01% by mass (100ppm) brominated or halogenated flame retardants containing bromine, chlorine, or fluorine.
- 25.2.e USGBC's LEED v3 Pilot Credit 54 requires that third party certified building products not contain more than 0.01% by mass (100ppm) brominated or halogenated flame retardants containing bromine, chlorine, or fluorine.
- 25.3.a USGBC's LEED v4 Pilot Credit 54 requires that third party certified building products not contain more than 0.01% by mass (100ppm) of phthalates.
- 25.3.b USGBC's LEED v4 Pilot Credit 54 requires that third party certified building products not contain more than 0.01% by mass (100ppm) of phthalates.
- 25.3.c USGBC's LEED v4 Pilot Credit 54 requires that third party certified building products not contain more than 0.01% by mass (100ppm) of phthalates.
- 37 American Society of Heating, Refrigerating and Air-Conditioning Engineers. *UFAD Guide: Design, Construction and Operation of Underfloor Air Distribution Systems*. Atlanta: American Society of Heating, Refrigerating and Air-Conditioning Engineers; 2013.
- 21.1.b ASHRAE's Underfloor Air Distribution Guide provides recommendations for underfloor air distribution systems.
- 38 Queensland Health. Queensland Health Wayfinding Design Guidelines. <http://www.health.qld.gov.au/qhpolicy/docs/gdl/qh-gdl-343-6-1.pdf>. Published 2010. Accessed September 15, 2014.
- 99.3.c Queensland Health's Wayfinding Guidelines recommend easy to recognize, memorable landmarks such as fountains, sculptures and natural views to help establish wayfinding markers.
- 39 South Coast Air Quality Management District. Rules and Regulations, Regulation XI - Source Specific Standards. <http://www.aqmd.gov/home/regulations/rules/scaqmd-rule-book/regulation-xi>. Accessed October 17, 2014.
- 24.2.a The South Coast Air Quality Management District Rule 1110.2 establishes requirements for gaseous- and liquid-fueled engines for the purpose of reducing emission of nitrogen oxides, volatile organic compounds, and carbon monoxide.
- 24.2.b The South Coast Air Quality Management District Rule 1111 establishes requirements for natural gas fired, fan-type central furnaces for the purpose of reducing emission of nitrogen oxides.
- 24.2.c The South Coast Air Quality Management District Rules 1146, 1146.1 and 1146.2 establish requirements for the reduction of nitrogen oxide emissions from natural gas-fired water heaters, boilers, process heaters and steam generators.

- 24.2.d The South Coast Air Quality Management District Rules 1121 and 1146.2 establish requirements for the control of nitrogen oxides from residential natural gas-fired water heaters, large water heaters, small boilers and small process heaters.
- 40 Centers for Disease Control and Prevention. *Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings*. <http://www.cdc.gov/hicpac/pdf/isolation/isolation2007.pdf>. Published 2012. Accessed September 15, 2014.
- 29.1.d The CDC's *Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings* recommends vacuum cleaners be equipped with HEPA filters.
- 41 ASHRAE. *Performance Evaluation and Development of Design Guidelines for Displacement Ventilation, RP-949*. Atlanta, GA: American Society of Heating, Refrigerating, and Air-Conditioning Engineers; 1999.
- 21.1.a The *Performance Evaluation and Development of Design Guidelines for Displacement Ventilation* document recommends air supply temperatures.
- 42 National Water Quality Management Strategy. *Australian Drinking Water Guidelines 6 Version 2.0*. Canberra: National Health and Medical Research Council. 2011:167.
- 34.1.a The *Australian Drinking Water Guidelines* have an aesthetic guideline value of 0.6 mg/L of residual chlorine in drinking water.
- 43 Office of Environmental Health Hazard Assessment. *Public Health Goal for Nickel in Drinking Water*. Sacramento: California Environmental Protection Agency; 2010: 1.
- 31.1.e The California OEHHA has a public health goal for Nickel in drinking water of 0.012 mg/L.
- 44 California Water Boards. *Maximum Contaminant Levels and Regulatory Dates for Drinking Water US EPA vs California*. http://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/documents/dwdocuments/MCLsEPAvsDWP-2014-07-01.pdf. Sacramento: California Water Boards; 2014.
- 32.1.b The California OEHHA regulates Benzene in drinking water to a maximum concentration of 0.001 mg/L.
- 32.1.c The California OEHHA has a public health goal of Ethylbenzene in water of 0.3 mg/L.
- 32.1.f The California OEHHA regulates Toluene in drinking water to a maximum concentration of 0.15 mg/L.
- 33.1.a The California OEHHA regulates Atrazine in drinking water to a maximum concentration of 0.001 mg/L.
- 45 Office of Environmental Health Hazard Assessment. *Public Health Goal for Styrene in Drinking Water*. Sacramento: California Environmental Protection Agency; 2010: 1.
- 32.1.a The California OEHHA has a public health goal of Styrene in water of 0.0005 mg/L.
- 46 *United States Code* (2006). 29 U.S.C. § 2612.
- 93.1.b United States federal law permits eligible individuals to receive up to twelve weeks of unpaid family leave benefits.
- 93.3.a United States federal law permits eligible individuals to receive up to twelve weeks of unpaid family leave benefits.
- 47 New York State Department of Health. *Individual Water Supply Wells - Fact Sheet #3 Recommended Residential Water Quality Testing*. Troy: New York State Department of Health Bureau of Water Supply Protection; 2006.
- 37.1.d NYS DOH notes that water containing more than 270 mg/l of sodium should not be used by people on moderately restricted sodium diets.
- 48 U.S. Environmental Protection Agency (EPA). *Drinking Water Best Management Practices*, EPA 816-B-13-002. Washington, D.C.: U.S. Environmental Protection Agency; April 2013.
- 37.3.a The EPA's *Drinking Water Best Management Practices* recommends cleaning drinking water fountains to remove lime and calcium build-up.
- 37.3.b The EPA's *Drinking Water Best Management Practices* recommends cleaning debris out of all outlet screens and aerators on a regular basis.
- 50 U.S. Environmental Protection Agency (EPA). *National Primary Drinking Water Regulations*, EPA 816-B-13-002. Washington, DC: U.S. Environmental Protection Agency; May 2009.

- 30.1.a The EPA Primary Drinking Water Regulations set maximum Turbidity levels of 0.3 NTU or less in at least 95% of water samples in any month.
- 51 National Partnership for Women and Families. *Expecting Better: A State-by-State Analysis of Laws That Help New Parents*. <http://www.nationalpartnership.org/research-library/work-family/expecting-better-2014.pdf>. Published June, 2014:23. Accessed September 15, 2014.
- 93.3.b The National Partnership for Women and Families' *Expecting Better* identifies that nine US states and the District of Columbia allow some workers to use their leave to care for either a new child or an ill family member.
- 93.3.c The National Partnership for Women and Families' *Expecting Better* recognizes states that improve upon federal law by providing nursing mothers with reasonable break times and a space other than a bathroom to express breast milk at work.
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- 31.1.a The WHO Guidelines for Drinking Water Quality recommend maximum Lead concentrations of 0.01 mg/L.
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- 33.1.b The WHO Guidelines for Drinking Water Quality recommend maximum Simazine concentrations of 0.002 mg/L.
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- 31.1.b The EPA Primary Drinking Water Regulations set maximum Arsenic concentrations at 0.01 mg/L.
- 31.1.c The EPA Primary Drinking Water Regulations set maximum Antimony concentrations at 0.006 mg/L.
- 31.1.d The EPA Primary Drinking Water Regulations set maximum Mercury concentrations at 0.002 mg/L.
- 31.1.f The EPA Secondary Drinking Water Regulations recommend maximum Copper concentrations of 1.0 mg/L.
- 32.1.d The EPA Primary Drinking Water Standards set maximum Polychlorinated biphenol concentrations at 0.0005 mg/L.
- 32.1.e The EPA Maximum Contaminant Level for Vinyl Chloride is 0.002 mg/L.
- 32.1.h The EPA Primary Drinking Water Regulations set maximum Tetrachloroethylene concentrations at 0.005 mg/L.
- 33.1.c The EPA Primary Drinking Water Regulations set maximum Glyphosate concentrations at 0.70 mg/L.
- 33.1.d The EPA Primary Drinking Water Regulations set maximum 2,4-Dichlorophenoxyacetic Acid concentrations at 0.07 mg/L.
- 33.2.a The EPA Primary Drinking Water Regulations set maximum Nitrate concentrations at 10 mg/L.

- 34.1.b The EPA Primary Drinking Water Regulations set Maximum Residual Disinfection Level of Chloramine concentrations at 4.0 mg/L.
- 34.2.a The EPA's 1998 Final Rule for Disinfection By-products set the total concentration for trihalomethanes at 0.08 mg/l.
- 34.2.b The EPA's 1998 Final Rule for Disinfection By-products set the total concentration for five Haloacetic acids at 0.06 mg/l.
- 37.1.a The EPA Secondary Drinking Water Regulations recommend maximum Aluminum concentrations of 0.2 mg/L.
- 37.1.b The EPA Secondary Drinking Water Regulations recommend maximum Chloride concentrations of 250 mg/L.
- 37.1.c The EPA Secondary Drinking Water Regulations recommend maximum Manganese concentrations of 0.05 mg/L.
- 37.1.e The EPA Secondary Drinking Water Regulations recommend maximum Sulfate concentrations of 250 mg/L.
- 37.1.f The EPA Secondary Drinking Water Regulations recommend maximum Iron concentrations of 0.3 mg/L.
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- 38.2.c Smarter Lunchrooms Can Address New School Lunchroom Guidelines and Childhood Obesity recommends that fruits are made available at the checkout location.
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- 55.1.c To avoid glare caused by bright light sources, lamps should be shielded. The minimum shielding angle for lamp luminance of 50,000 - 500,000 cd/m² is 20°.
- 55.1.d To avoid glare caused by bright light sources, lamps should be shielded. The minimum shielding angle for lamp luminance of 500,000 cd/m² and above is 30°.
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- 58.1.a The U.S. GSA's *Facilities Standard for the Public Buildings Service Tier 1 High Performance* rating requires CRI of 80 or higher.
- 58.1.b The GSA's *Facilities Standard for the Public Buildings Service Tier 2 High Performance* requires a Color Rendering Index R9 of at least 50.
- 59.1.a The GSA's *Facilities Standard for the Public Buildings Service Baseline* requires an average LRV for ceilings of 80% or greater.
- 59.1.b The GSA's *Facilities Standard for the Public Buildings Service Tier 2 High Performance* recommends an average LRV on walls of 70%.
- 60.1.a The GSA's *Facilities Standard for the Public Buildings Service* notes that automatic shade controls help occupants manage luminance levels.
- 60.2.a The GSA's *Facilities Standard for the Public Buildings Service* notes that automatic controls for occupancy save energy.
- 60.2.b The GSA's *Facilities Standard for the Public Buildings Service* notes that automatic controls for daylight dimming save energy.
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- 73.3.a BIFMA's Ergonomics Guideline recommends workstation chair height level that allows users to sit comfortably with their feet on the floor or footrest with a torso-to-thigh angle not less than 90 degrees.
- 73.3.b BIFMA's Ergonomics Guideline recommends workstation seat depths allow users to sit comfortably without undue pressure behind the knees and with their back properly supported by the backrest.
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- 64.1.a NYC Active Design Guidelines: Promoting Physical Activity and Health in Design recommends including permanent signage encouraging stair use, to be integrated with the building's wayfinding program.
- 64.2.c NYC Active Design Guidelines recommends a strategy for making stairs wide enough for traveling in groups, or in two directions, a width of at least 56 inches can comfortably accommodate this.
- 64.3.a NYC Active Design Guidelines recommends strategies for encouraging stair use through a number of methods, including the incorporation of artwork into the stair environment.
- 64.3.b NYC Active Design Guidelines recommends strategies for encouraging stair use through a number of methods, including adding music to stairwells.
- 64.3.d NYC Active Design Guidelines recommends strategies for encouraging stair use through a number of methods, including highlighting interesting views onto nature or interior areas.
- 67.1.a NYC Active Design Guidelines identifies the design of pedestrian-friendly streets with a number of features, including benches, as a key recommended measure to encourage active environments.
- 67.1.b NYC Active Design Guidelines recommends strategies for creating pedestrian and bicycle-friendly public spaces, including the provision of both movable and fixed seating.
- 67.1.c NYC Active Design Guidelines recommends strategies for increasing walking, including the provision of supportive infrastructure along walking routes, such as drinking fountains and water refilling stations.
- 67.2.a NYC Active Design Guidelines recommends strategies for creating pedestrian and bicycle-friendly public spaces, including the provision of water fountains.
- 67.2.b NYC Active Design Guidelines: Promoting Physical Activity and Health in Design recommends strategies for creating attractive plaza spaces.

- 67.2.d NYC Active Design Guidelines: Promoting Physical Activity and Health in Design recommends incorporating temporary and permanent public art installations into the streetscape to provide a more attractive and engaging environment.
- 68.1.a The NYC Active Design Guidelines recommend providing physical activity spaces such as exercise rooms, active play spaces, and multi-purpose recreational spaces in public, workplace and residential buildings.
- 68.2.a NYC Active Design Guidelines recommend locating places of residence and work near existing recreational facilities, walking paths, parks, and waterfront areas.
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 - 72.1.a The Department of Justice Civil Rights Division's 2010 ADA Standards for Accessible Design set accessibility standards for new construction and alterations.
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 - 75.1.a The General Services Administration's Sound Matters recommends to carefully consider the effect on neighboring workstations when locating supporting activities, i.e. copier rooms, coffee bars, entries to conference rooms.
 - 75.2.a The General Services Administration's Sound Matters recommends a background noise maximum of NC 40 for open plan workspaces.
 - 75.2.b The General Services Administration's Sound Matters recommends a background noise maximum of NC 35 for private offices.
 - 75.2.c The General Services Administration's Sound Matters recommends a background noise maximum of NC 25 for meeting rooms.
 - 75.2.d The General Services Administration's Sound Matters recommends a background noise maximum of NC 20 for teleconference facilities.
 - 78.1.a The General Services Administration's Sound Matters recommends RT60 of 0.6 seconds for meeting rooms.
 - 79.1.a The General Services Administration's Sound Matters recommends that sound masking should be considered a technique to achieve acoustic comfort in contemporary offices.
 - 79.2.a The General Services Administration's Sound Matters recommends sound masking at 45-48 dBA for open plan workspaces.
 - 79.2.b The General Services Administration's Sound Matters recommends sound masking at 40-42 dBA for private offices.
 - 80.1.a The General Services Administration's Sound Matters recommends this NRC value for open plan workspaces.
 - 80.1.b The General Services Administration's Sound Matters recommends this NRC value for meeting rooms and teleconference rooms.
 - 80.2.a The General Services Administration's Sound Matters recommends this NRC value for open plan workspaces.
 - 80.2.b The General Services Administration's Sound Matters recommends this NRC value for quiet open offices which have head-height walls.
 - 80.2.c The General Services Administration's Sound Matters recommends a minimum NRC of 0.8 on at least 25% of two adjacent walls for enclosed workspaces.
 - 81.1.a The General Services Administration's Sound Matters recommends this NIC value for private offices.
 - 81.1.b The General Services Administration's Sound Matters recommends this NIC value for teleconference rooms.
 - 81.1.c The General Services Administration's Sound Matters recommends a minimum NIC of 48 for meeting rooms.
 - 81.2.a The General Services Administration's Sound Matters recommends door gaskets to help prevent noise intrusion into offices.

- 81.2.b The General Services Administration's Sound Matters recommends that the undercut should be shielded in some fashion such as a sweep or drop seal gasket.
 - 81.2.c The General Services Administration's Sound Matters advises that as it relates to acoustics, hollow core doors are only good to poor.
 - 81.3.a The General Services Administration's Sound Matters recommends caulking gypsum partition slabs as an effective sound blocking technique.
 - 81.3.b The General Services Administration's Sound Matters recommends staggering gypsum partition slabs as an effective sound blocking technique.
 - 81.3.c The General Services Administration's Sound Matters recommends plugging holes as an effective sound blocking technique.
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- 20.1.b ASHRAE Standard 55: Thermal Environmental Conditions for Human Occupancy sets best practices for thermal comfort in buildings.
 - 21.2.b ASHRAE Standard 55 provides guidelines for displacement ventilation systems for thermal environmental comfort.
 - 76.1.a ASHRAE Standard 55: Thermal Environmental Conditions for Human Occupancy sets best practices for thermal comfort in buildings.
 - 76.2.a ASHRAE Standard 55: Thermal Environmental Conditions for Human Occupancy sets best practices for thermal comfort in buildings.
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- 83.1.a The Department of Energy identifies radiant heating systems as more efficient and less likely to distribute allergens than forced-air systems.
 - 83.1.b The Department of Energy identifies radiant heating systems as more efficient and less likely to distribute allergens than forced-air systems.
 - 83.2.a The Department of Energy recommends radiant heating systems over forced-air systems as they are usually more efficient and do not distribute allergens.
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- 95 Marcus, C. C. & Sachs, N. A. *Therapeutic Landscapes: An Evidence-based Approach to Designing Healing*. Hoboken: John Wiley & Sons; 2013.
- 100.1.b Marcus and Sachs' *Therapeutic Landscapes: An Evidence-based Approach to Designing Healing* identifies a preference for gardens that have an approximate ratio of 70% greenery to 30% hardscape.
 - 100.2.a Marcus and Sachs' *Therapeutic Landscapes: An Evidence-based Approach to Designing Healing* identifies indoor plantings as a method to simulate an outdoor "green" experience and provide positive distraction.
 - 100.2.b Marcus and Sachs' *Therapeutic Landscapes: An Evidence-based Approach to Designing Healing* identifies indoor plantings as a method to simulate an outdoor "green" experience and provide positive distraction.

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- 96 The New South Wales Planning Department. The Residential Flat Design Code. http://www.planning.nsw.gov.au/programservices/pdf/designcode/03_part03_a.pdf. Published 2002. Accessed September 15, 2014.
- 99.1.a New South Wales Department of Planning's Residential Flat Design Code recommends a minimum ceiling height of 2.7 m [8.8 ft] in all habitable rooms and 2.4 m [7.8 ft] for all non-habitable rooms.
- 97 Employee Assistance Professionals Association. Standards And Professional Guidelines For Employee Assistance Programs. Published 2010. Accessed October 17, 14.
- 95.1.a The OPM's EAPA Standards and Professional Guidelines recommend Employee Assistance Programs with confidential assessments, short-term counseling, referrals, and follow-up services for employees who have personal and work-related concerns or issues.

Appendix C: Tables

The following tables are referred to in various requirements of the Standard. The first letter of the table name denotes the Concept chapter it refers to, e.g. "A" for Air.

Table A1: High Touch Surfaces

Table A2: Reduced Risk Pesticides

Table A3: Materials Restrictions

Table A4: Cleaning Protocol

Table L1: Melanopic Ratio

Table L2: Melanopic and Visual Response

Table N1: Produce Storage Temperatures

Table A1: High-Touch Surfaces

These are surfaces that require more frequent and thorough sanitization. Cleaning protocols should list these surfaces within the project and incorporate the correct cleaning instructions accordingly. Based on CDC Environmental Checklist for Monitoring Terminal Cleaning.

Non-porous

Common Areas

- Tabletops
- Doorknobs
- Elevator buttons
- Telephones
- Public digital devices and keyboards
- Light switches
- Chairs

Bathroom

- Bathroom handles and fixtures
- Countertops in bathrooms
- Toilet handles and lids
- Bathtubs and shower walls and floor
- Interior shower and bath surfaces

Kitchen

- Kitchen handles and fixtures
- Countertops in kitchens

Healthcare

- Non-disposable medical devices
- Bed railing
- Serving trays and bed tables

Porous

Common Areas

- Rugs
- Upholstered furniture covers
- Fabric curtains

Bathroom

- Towels

Bedroom

- Bedding: linens, pillow cases and comforter

Table A2: Reduced Risk Pesticides

This is the full list of pesticides that have a low hazard rank (Tier 3) according to the San Francisco Department of the Environment's (SFE) Reduced-Risk Pesticide List.

Adjuvant

| Name | EPA/SF Code | Ingredients |
|-------------------------|--------------------------|--|
| Competitor | 2935-50173 | Ethyl oleate |
| Pentrabark | 83416-50001 | Polyalkyleneoxide modified heptamethyltrisiloxane |
| Bond Spreader-Sticker | 34704-50033 | Synthetic carboxylated latex 50%, primary aliphatic oxyalkylated alcohol 10% |
| CMR Silicone Surfactant | 1050775-50025 [INACTIVE] | Polymethyl-siloxane, nonionic |

Fungicide

| Name | EPA/SF Code | Ingredients |
|-----------------------------|-------------|-------------------------------|
| Agri-Fos Systemic Fungicide | 71962-1 | Potassium phosphite 45.8% |
| Actinovate | 73314-1 | Streptomyces lydicus WYEC 108 |

Insecticide

| Name | EPA/SF Code | Ingredients |
|--|--------------------------------------|---|
| Advion Ant Bait Arena (Dupont) | 352-664 | Indoxacarb 0.1% |
| Advion Ant Gel (Dupont) | 352-746 | Indoxacarb 0.05% |
| Advion Cockroach Bait Arena (Dupont) | 352-668 | Indoxacarb 0.5% |
| Advion Cockroach Gel Bait (Dupont) | 352-652 | Indoxacarb 0.6% |
| Bacillus thuringiensis insecticides (excluding mosquito control) | Various | Bacillus thuringiensis (various subsp.) |
| BestYet Cedarcide | exemptprod- 009 | Cedarwood oil, amorphous silica |
| BotaniGard ES | 65626-8 [INACTIVE], 82074-1 [ACTIVE] | Beauveria bassiana strain GHA 11.3% |
| Eco Exempt/Essentria Jet Wasp and Hornet Killer | exemptprod- 007 | 2-phenethyl propionate 2%, rosemary oil 3% |
| Terro Ant Killer II, Terro Ant Killer II Liquid Ant Baits, Terro-PCO Liquid Ant Bait | 149-8 | Sodium tetraborate decahydrate 5.4% |
| Essentria IC3 | exemptprod- 013 | Rosemary oil 10%, geraniol 5%, peppermint oil 2%, wintergreen oil, white mineral oil, vanillin, polyglyceryl oleate |
| Gentrol Point Source Roach Control Device | 2724-469 | Hydroprene 96% |
| Intice Thiquid Ant Bait | 73079-7 | Borax, 5% |
| M-pede Insecticide/Fungicide | 62719-515 | Potash soap 49% |
| Niban Granular Bait (equivalent to Terro Multipurpose Insect bait) | 64405-2-AA | Boric acid 5% |
| OhYeah! | exemptprod- 002 | Sodium lauryl sulfate |
| Organocide | exemptprod- 010 | Sesame oil 5% |

Mammal repellent

| Name | EPA/SF Code | Ingredients |
|-----------------------------------|----------------------------------|-----------------------------------|
| Shake-Away Coyote Urine Repellent | exemptprod 014 | Coyote urine 5% limestone 95% |
| Detour | exemptprod- 015 White pepper 3%, | white mineral oil 87%, silica 10% |

Molluscicide

| Name | EPA/SF Code | Ingredients |
|----------------------------|-------------|--|
| Sluggo Slug and Snail Bait | 67702-3 | Phosphoric acid, iron (3+) salt (1:1) 1% |

Table A3: Materials Restrictions

This table specifies the harmful chemicals found in building materials that are disallowed by the WELL Building Standard in the features listed below.

Feature : Fundamental material safety

PRECONDITION

| <u>Chemical Name</u> | <u>CAS</u> |
|---|------------|
| Lead | |
| Neutral anhydrous carbonate $PbCO_3$ | 598-63-0 |
| Trilead-bis(carbonate)- dihydroxide $2Pb CO_3 \cdot Pb(OH)_2$ | 1319-46-6 |
| Lead sulfate $PbSO_4$ | 7446-14-2 |
| Lead sulfate $Pb_x SO_4$ | 15739-80-7 |

Feature : Toxic material reduction

OPTIMIZATION

| <u>Chemical Name</u> | <u>CAS</u> |
|-----------------------------------|---------------------------|
| Polyurethane | |
| Toluene diisocyanates | 584-84-9 |
| Hexamethylene diisocyanate | 822-06-0 |
| Methylene diphenyl diisocyanate | 101-68-8 and 9016-87-9 |
| Phthalates | |
| Diisodecyl phthalate | 26761-40-0 and 68515-49-1 |
| Benzylbutyl phthalate | 85-68-7 |
| Di-n-octyl phthalate | 117-84-0 |
| Dibutyl phthalate | 84-74-2 |
| Diisononyl phthalate | 28553-12-0 and 68515-48-0 |
| Di-2-ethylhexyl phthalate | 117-81-7 |
| Halogenated flame retardants | |
| Tris(2-chloroisopropyl) phosphate | 13674-84-5 |
| Hexabromocyclododecane | 25637-99-4 |
| Pentabromodiphenyl ether | 182346-21-0 |
| Octabromodiphenyl ether | 446255-56-7 |
| Tetrabromobisphenol-A | 79-94-7 |
| Tris(2-chloroethyl)phosphate | 115-96-8 |
| Dechlorane Plus | 13560-89-9 |
| Decabromodiphenyl ether | 1163-19-5 |
| Formaldehyde based resins | |
| Melamine formaldehyde | 82115-62-6 |
| Phenol formaldehyde | 9003-35-4 |
| Urea formaldehyde | 9011-05-6 |

Table A4: Cleaning Protocol

Cleaning Practice Evaluation

An improved cleaning protocol is achieved through a baseline assessment or evaluation prior to incorporation of appropriate changes. A project's cleaning practice must be evaluated to best incorporate the following changes and/or additions.

Cleaning Equipment

Projects must implement a program for the use of sustainable powered cleaning equipment that abide by Green Seal 42, Standard for Commercial and Institutional Cleaning Services for Powered Equipment Use/ Maintenance Plan. Additionally, the following requirements must be met:

1. For projects in humid climates, as designated by ANSI/ASHRAE/IESNA 90.1-2007, powder carpet cleaning systems must be used in place of traditional carpet extraction systems.
2. Battery-powered equipment must be equipped with environmentally preferable gel batteries.
3. Equipment must be designed with safeguards, such as rollers or rubber bumpers, to reduce potential damage to building surfaces.
4. Equipment that eliminates or reduces chemical use and qualifies as a sanitizing device under EPA when used with water and no chemicals, including steam vapor equipment and spray and vac touch free cleaning systems.

Program Protocol

Projects must have in place a cleaning program that addresses the following:

1. Training on Safety: Training on how to reduce and prevent ergonomic injuries and exposure to hazardous materials.
2. Chemical Measuring and Dilution: A control system, for example a wall mounted dispensing system for concentrates, that limits direct handling and worker exposure to chemicals, ensures proper dilution of mixtures and prevents overuse or waste.
3. Training on Procedures: Sequencing of cleaning steps and use of personal protective equipment.
4. Training on Purchasing: Training of purchasing personnel in the selection of green cleaning materials.
5. Annual In-Service Training: Training on use of certified sustainable cleaning products, materials and equipment.

Disinfection and Sanitization

High touch surfaces present increased risk for contamination, particularly in high transit areas. A cleaning protocol must take into account the degree to which disinfection and sanitization are necessary. Unnecessary disinfection and sanitization can negatively impact immune health. Although reduced exposure to microorganisms and parasites result in decreased disease and illness, it is also increasingly linked to a rising prevalence of hypersensitivity disorders and autoimmune diseases, especially in industrialized nations.

Cleaning for Health

Projects must limit use of disinfection products to high touch surfaces in areas including, but not limited to: restrooms, community rooms, gymnasium and workout areas in accordance with Green Seal 42, Standard for Commercial and Institutional Cleaning Services, Cleaning Procedure Requirements:

1. Disinfection (Section 4.6)
2. Restroom Care (Section 4.7)
3. Dining Areas and Break Rooms (Section 4.8)

Floor Care Requisites

Keeping entryway and floor surfaces clean and well maintained contributes greatly to improved indoor air quality.

Entryway and Lobbies

Entryway and floor care is critical to minimizing general indoor contaminant load tracked in from the outdoor environment. Projects must adhere to the below cleaning and maintenance guidelines for entryways and lobbies in order to prevent migration of contaminants into the building.

1. Walk-off mats, indoor and outdoor, should be wet-cleaned once every two days and allowed to dry before being used.
2. The underside of entry mats should be cleaned at least once a day and twice a day during inclement weather.
3. Entry mats must be vacuumed using a vacuum with a beater bar in both directions, at least once a day and twice a day during inclement weather.
4. Non-toxic and environmentally safe ice melting compounds (e.g., non-corrosive, non-phosphate) must be selected through winter months.

Hard Floor and Carpet Care

The objective of a floor maintenance program is to minimize the frequency of stripping or removing the coating and increasing the longevity. The maintenance and restoration process plays a key factor in the longevity.

1. A project's cleaning and maintenance policy must adhere to the Green Seal 42: Standard for Commercial and Institutional Cleaning Services, Cleaning Procedure Requirements, Section 4.5 for Floor Care.

General Product Selection Considerations

All products must be certified in accordance with EPA Design for the Environment (DfE) Standard for Safer Products. This ensures that the below factors have been evaluated and carefully considered within the scope of a green cleaning protocol.

Product Properties

Design for the Environment (DfE) products are evaluated per efficiency and other specialized use methods and cases.

1. Continuous Delivery Systems for Consumers: Certification recognizes consumer products that provide novel continuous delivery systems that reduce the potential for user exposure and other environmental goals.
2. Product Efficiency: Product-category specific testing guarantees that each product can effectively clean common soils and surfaces in its category at the most diluted or least concentrated manufacturer-recommended dilution level.
3. Products Designed for Specialized Industrial Use: Certification extends limited exceptions and conditions to "safer" formulations intended for industrial and institutional applications.

Product Safety

Design for the Environment (DfE) products are systematically evaluated per safety concerns, both potentially impacting human health and environment.

1. Flammability and Safety: Certified products must provide information with regards to combustibility and be screened for ignitability, as defined at 40 CFR 261.21 (a)(1) and flash point as determined by ASTM E502 (or equivalent agreed to by EPA/DfE).
2. Life Cycle Considerations: Certified products and partners abide by energy conservation technologies, sustainable packaging and environmental impact considerations.
3. Hazardous Pollutants: Certified products restrict Volatile Organic Compounds as prescribed by the Ozone Transport Commission (OTC) (federal Clean Air Act, sections 176A and 184) and the California Air Resource Board (CARB).
4. Products Designed for Dermal Contact: Products whose use involves prolonged dermal contact comply with supplemental criteria per DfE Master Criteria for Safer Ingredients and the Food and Drug Administration (FDA) when necessary.

Product Ingredient Safety Considerations

All DfE certified products also meet the Design for the Environment (DfE) Master Criteria for Safer Ingredients.

Health Impact Screening

In order that all certified product ingredients are comprehensively screened and possible human health data gaps addressed, DfE Criteria for Safer Chemical Ingredients data selection and evaluation requires:

1. Appropriate analog data, via predictive models, can also be used to fill data gaps.
2. When an ingredient is not found on a list, raw data for each endpoint is requested.
3. Each component or chemical in a product use threshold lists established by authoritative bodies, such as the IARC and NTP carcinogen lists to screen ingredient endpoints.

Human Health and Environmental Protection

DfE recognized product ingredients are selected to be among the safest in their functional classes and prohibit chemicals with the following human health and/or environmental impacts:

1. Chemicals that release, degrade to, or form byproducts that are CMRs or PBTs.
2. Carcinogens, mutagens, reproductive or developmental toxicants (CMRs).
3. Persistent, bioaccumulative and toxic chemicals (PBTs).

Waste Stream Management

A project must have an active waste reduction and recycling program, including the diversion of landscape waste.

Waste Collection and Recycling

Project recycling and collection of waste must:

1. Provide a protocol for the diversion of landscape waste through strategies that include mulching lawn mowers, composting or similar low impact means.
2. Be conducted in accordance with Green Seal 42, Standard for Commercial and Institutional Cleaning Services, Cleaning Procedure Requirements, Trash Collection and Recycling, Section 4.9.

Waste Stream Assessment

An audit, including data evaluation and documentation, must be executed in accordance with LEED EBOM-2009 MRc6: Solid Waste Management Waste Stream Audit to achieve:

1. Education of building occupants and cleaning staff on results of audit and effective means for waste stream reduction.
2. Effective opportunities for waste source reduction.

Table N1: Produce Storage Temperatures

This table specifies appropriate temperature ranges for storing produce. Information is adapted from the Cornell Storage Guidelines for Fruits and Vegetables.

Cool: 6-12 °C [43-54 °F]

Rosaceae (Apples, Cherries, Peaches, Pears and Strawberries)

Solanaceae (Eggplant, Peppers, Potatoes and Tomatoes)

Leguminosae (Beans)

Cucurbitaceae (Cantaloupe, Cucumbers, Summer Squash, Watermelon and Winter Squash)

Cold: 1-4 °C [34-39 °F]

Vitaceae (Grapes)

Asteraceae (Artichokes, Endive/Escarole and Lettuce)

Umbelliferae (Carrots, Celery, Fennel, Parsley and Parsnips)

Poaceae/Gramineae (Corn)

Chenopodiaceae (Beets, Spinach and Swiss Chard)

Brassicaceae (Broccoli, Brussel Sprouts, Cabbage, Cauliflower, Collards, Kale and Radishes)

Amaryllidaceae/Liliaceae (Asparagus, Chives, Garlic, Leeks and Onions)

Table L1: Melanopic Ratio

This unit Equivalent Melanopic Lux (EML) was proposed by Lucas and others (Lucas et al., "Measuring and using light in the melanopsin age." Trends in Neuroscience, Jan 2014). The authors provided a toolbox which for a desired spectrum derives equivalent "α-opic" lux for each of the five photoreceptors in the eye (three cones, rods, and the ipRGCs). The authors selected scaling constants such that each of the values would be identical to each other and the standard definition of lux for a light spectrum of perfectly uniform energy (CIE Standard Illuminant E).

Given a spectrum of light, each equivalent α-opic lux is related to each other by a constant. The table below shows the example ratios between the equivalent melanopic lux and the standard visual lux for several sources.

To calculate the equivalent melanopic lux (EML), multiply the visual lux (L) designed for or measured in a building by this ratio (R): $EML = L \times R$. For example, if incandescent lights provide 200 lux in a space, they will also produce 108 equivalent melanopic lux. If daylight is modeled to provide the same visual brightness (200 lux), it will also provide 220 equivalent melanopic lux.

Similar melanopic ratios can be determined by incorporating the spectrum of the desired source into the calculations in Table L2. Projects are encouraged to use this approach to obtain more accurate results. Both the authors of the journal article and the IWBI have spreadsheets to aid in this calculation.

| CCT (K) | Light Source | Ratio |
|---------|----------------------|-------|
| 2950 | Fluorescent | 0.43 |
| 2700 | LED | 0.45 |
| 2800 | Incandescent | 0.54 |
| 4000 | Fluorescent | 0.58 |
| 4000 | LED | 0.76 |
| 5450 | CIE E (Equal Energy) | 1.00 |
| 6500 | Fluorescent | 1.02 |
| 6500 | Daylight | 1.10 |
| 7500 | Fluorescent | 1.11 |

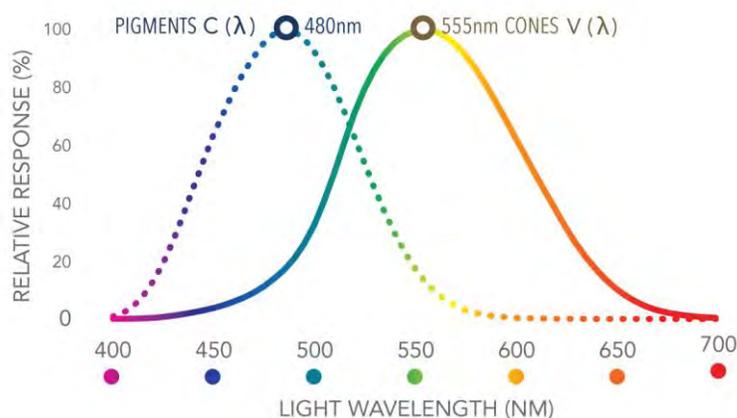


Table L2: Melanopic and Visual Response

To calculate the melanopic ratio of light, start by obtaining the light output of the lamp at each 5 nm increment, either from manufacturer or by using a spectrometer. Then, multiply the output by the melanopic and visual curves given below to get the melanopic and visual responses. Finally, divide the total melanopic response by the total visual response.

| Wavelength | Light Output | Melanopic Curve | Melanopic Response | Visual Curve | Visual Response |
|------------|--------------|-----------------|--------------------|--------------|-----------------|
| 380 | | 0.00015 | | 0.00004 | |
| 385 | | 0.00031 | | 0.00006 | |
| 390 | | 0.00063 | | 0.00012 | |
| 395 | | 0.00133 | | 0.00022 | |
| 400 | | 0.00285 | | 0.0004 | |
| 405 | | 0.00625 | | 0.00064 | |
| 410 | | 0.01384 | | 0.00121 | |
| 415 | | 0.02601 | | 0.00218 | |
| 420 | | 0.04887 | | 0.004 | |
| 425 | | 0.07232 | | 0.0073 | |
| 430 | | 0.10624 | | 0.0116 | |
| 435 | | 0.14492 | | 0.01684 | |
| 440 | | 0.19552 | | 0.023 | |
| 445 | | 0.24805 | | 0.0298 | |
| 450 | | 0.31075 | | 0.038 | |
| 455 | | 0.37816 | | 0.048 | |
| 460 | | 0.45413 | | 0.06 | |
| 465 | | 0.53676 | | 0.0739 | |
| 470 | | 0.62557 | | 0.09098 | |
| 475 | | 0.70857 | | 0.1126 | |
| 480 | | 0.79016 | | 0.13902 | |
| 485 | | 0.85767 | | 0.1693 | |
| 490 | | 0.91449 | | 0.20802 | |
| 495 | | 0.95668 | | 0.2586 | |
| 500 | | 0.98081 | | 0.323 | |
| 505 | | 0.98453 | | 0.4073 | |
| 510 | | 0.96695 | | 0.503 | |
| 515 | | 0.9224 | | 0.6082 | |
| 520 | | 0.86033 | | 0.71 | |
| 525 | | 0.78346 | | 0.7932 | |
| 530 | | 0.69706 | | 0.862 | |
| 535 | | 0.60543 | | 0.91485 | |
| 540 | | 0.51274 | | 0.954 | |
| 545 | | 0.42335 | | 0.9803 | |
| 550 | | 0.33998 | | 0.99495 | |
| 555 | | 0.26511 | | 1 | |
| 560 | | 0.20105 | | 0.995 | |
| 565 | | 0.14819 | | 0.9786 | |
| 570 | | 0.10672 | | 0.952 | |
| 575 | | 0.0752 | | 0.9154 | |
| 580 | | 0.05217 | | 0.87 | |

| | | |
|-----|---------|---------|
| 585 | 0.03578 | 0.8163 |
| 590 | 0.02434 | 0.757 |
| 595 | 0.01645 | 0.6949 |
| 600 | 0.01109 | 0.631 |
| 605 | 0.00747 | 0.5668 |
| 610 | 0.00503 | 0.503 |
| 615 | 0.0034 | 0.4412 |
| 620 | 0.00231 | 0.381 |
| 625 | 0.00157 | 0.321 |
| 630 | 0.00107 | 0.265 |
| 635 | 0.00073 | 0.217 |
| 640 | 0.0005 | 0.175 |
| 645 | 0.00035 | 0.1382 |
| 650 | 0.00024 | 0.107 |
| 655 | 0.00017 | 0.0816 |
| 660 | 0.00012 | 0.061 |
| 665 | 0.00008 | 0.04458 |
| 670 | 0.00006 | 0.032 |
| 675 | 0.00004 | 0.0232 |
| 680 | 0.00003 | 0.017 |
| 685 | 0.00002 | 0.01192 |
| 690 | 0.00002 | 0.00821 |
| 695 | 0.00001 | 0.00572 |
| 700 | 0.00001 | 0.0041 |
| 705 | 0.00001 | 0.00293 |
| 710 | 0 | 0.00209 |
| 715 | 0 | 0.00148 |
| 720 | 0 | 0.00105 |
| 725 | 0 | 0.00074 |
| 730 | 0 | 0.00052 |
| 735 | 0 | 0.00036 |
| 740 | 0 | 0.00025 |
| 745 | 0 | 0.00017 |
| 750 | 0 | 0.00012 |
| 755 | 0 | 0.00008 |
| 760 | 0 | 0.00006 |
| 765 | 0 | 0.00004 |
| 770 | 0 | 0.00003 |
| 775 | 0 | 0.00002 |
| 780 | 0 | 0.00001 |

Totals: _____

Appendix D: Performance, Design, & Protocols

Building Standard features can fall into one of three categories with respect to the interventions necessary for their completion – design elements, protocols or performance standards. Design standards require that a specific technology or design strategy be used. Protocols are also prescriptive, but for building or company policies or schedules. Performance-based standards mandate environmental conditions and therefore are affected by both building design and operation. They are also technology- and practice-neutral, allowing flexibility in how a project meets acceptable quantified thresholds.

01 AIR QUALITY STANDARDS

Part 1: Standards for Volatile Substances

Performance

Part 2: Standards for Particulate Matter and Inorganic Gases

Performance

Part 3: Below-Grade Air Quality Standards

Performance

02 SMOKING BAN

Part 1: Indoor Smoking Ban

Protocol

Part 2: Outdoor Smoking Ban

Protocol

03 VENTILATION EFFECTIVENESS

Part 1: Ventilation Design

Design

Part 2: Demand Controlled Ventilation

Design

Part 3: System Balancing

Design

04 VOC REDUCTION

Part 1: Interior Paints and Coatings

Design

Part 2: Interior Adhesives and Sealants

Design

Part 3: Flooring

Design

Part 4: Insulation

Design

Part 5: Furniture and Furnishings

Design

05 AIR FILTRATION

Part 1: Filter Accommodation

Design

Part 2: Particle Filtration

Design

Part 3: Air Filtration Maintenance

Design

06 MICROBE AND MOLD CONTROL

Part 1: Cooling Coil Mold Reduction

Design

Part 2: Mold Inspections

Performance

07 CONSTRUCTION POLLUTION MANAGEMENT

| | |
|--------------------------------------|----------|
| Part 1: Duct Protection | Protocol |
| Part 2: Filter Replacement | Protocol |
| Part 3: VOC Adsorption Management | Protocol |
| Part 4: Construction Equipment | Protocol |
| Part 5: Dust Containment and Removal | Protocol |

08 HEALTHY ENTRANCE

| | |
|---|--------|
| Part 1: Permanent Entryway Walk-Off Systems | Design |
| Part 2: Entryway Air Seal | Design |

09 CLEANING PROTOCOL

| | |
|---|----------|
| Part 1: Cleaning Plan for Occupied Spaces | Protocol |
|---|----------|

10 PESTICIDE MANAGEMENT

| | |
|-----------------------|----------|
| Part 1: Pesticide Use | Protocol |
|-----------------------|----------|

11 FUNDAMENTAL MATERIAL SAFETY

| | |
|---|--------|
| Part 1: Asbestos and Lead Restriction | Design |
| Part 2: Lead Abatement | Design |
| Part 3: Asbestos Abatement | Design |
| Part 4: Polychlorinated Biphenyls Abatement | Design |

12 MOISTURE MANAGEMENT

| | |
|--|--------|
| Part 1: Bulk Water – Exterior Management | Design |
| Part 2: Interior Bulk Water Damage Management | Design |
| Part 3: Capillary Water Management | Design |
| Part 4: Wetting by Convection and Condensation | Design |

13 AIR FLUSH

| | |
|-------------------|----------|
| Part 1: Air Flush | Protocol |
|-------------------|----------|

14 AIR INFILTRATION MANAGEMENT

| | |
|-----------------------------|--------|
| Part 1: Air Leakage Testing | Design |
|-----------------------------|--------|

15 INCREASED VENTILATION

| | |
|------------------------------------|--------|
| Part 1: Increased Fresh Air Supply | Design |
|------------------------------------|--------|

16 HUMIDITY CONTROL

| | |
|---------------------------|--------|
| Part 1: Relative Humidity | Design |
|---------------------------|--------|

17 DIRECT SOURCE VENTILATION

| | |
|---|--------|
| Part 1: Pollution Isolation and Exhaust | Design |
|---|--------|

18 AIR QUALITY MONITORING AND FEEDBACK

Part 1: Indoor Air Monitoring

Design

Part 2: Air Data Record Keeping and Response

Protocol

Part 3: Environmental Measures Display

Design

19 OPERABLE WINDOWS

Part 1: Full Control

Design

Part 2: Outdoor Air Measurement

Design

Part 3: Window Operation Management

Design

20 OUTDOOR AIR SYSTEMS

Part 1: Dedicated Outdoor Air Systems

Design

21 DISPLACEMENT VENTILATION

Part 1: Displacement Ventilation Design and Application

Design

Part 2: System Performance

Design

22 PEST CONTROL

Part 1: Pest Reduction

Design

Part 2: Pest Inspection

Performance

23 ADVANCED AIR PURIFICATION

Part 1: Carbon Filtration

Design

Part 2: Air Sanitization

Design

Part 3: Air Quality Maintenance

Protocol

24 COMBUSTION MINIMIZATION

Part 1: Appliance and Heater Combustion Ban

Design

Part 2: Low-Emission Combustion Sources

Design

Part 3: Engine Exhaust Reduction

Protocol

25 TOXIC MATERIAL REDUCTION

Part 1: Perfluorinated Compound Limitation

Design

Part 2: Flame Retardant Limitation

Design

Part 3: Phthalate (Plasticizers) Limitation

Design

Part 4: Isocyanate-Based Polyurethane Limitation

Design

Part 5: Urea-Formaldehyde Restriction

Design

26 ENHANCED MATERIAL SAFETY

Part 1: Precautionary Material Selection

Design

27 ANTIMICROBIAL SURFACES

Part 1: High-Touch Surface Coating

Design

28 CLEANABLE ENVIRONMENT

Part 1: Material Properties

Design

Part 2: Cleanability

Design

29 CLEANING EQUIPMENT

Part 1: Equipment and Cleaning Agents

Protocol

Part 2: Chemical Storage

Design

30 FUNDAMENTAL WATER QUALITY

Part 1: Sediment

Performance

Part 2: Microorganisms

Performance

31 INORGANIC CONTAMINANTS

Part 1: Dissolved Metals

Performance

32 ORGANIC CONTAMINANTS

Part 1: Organic Pollutants

Performance

33 AGRICULTURAL CONTAMINANTS

Part 1: Herbicides and Pesticides

Performance

Part 2: Fertilizers

Performance

34 PUBLIC WATER ADDITIVES

Part 1: Disinfectants

Performance

Part 2: Disinfectant Byproducts

Performance

Part 3: Fluoride

Performance

35 PERIODIC WATER QUALITY TESTING

Part 1: Quarterly Testing

Protocol

Part 2: Water Data Record Keeping and Response

Protocol

36 WATER TREATMENT

Part 1: Organic Chemical Removal

Design

Part 2: Sediment Filter

Design

Part 3: Microbial Elimination

Design

Part 4: Water Quality Maintenance

Design

37 DRINKING WATER PROMOTION

Part 1: Drinking Water Taste Properties

Performance

Part 2: Drinking Water Access

Design

Part 3: Water Dispenser Maintenance

Protocol

38 FRUITS AND VEGETABLES

Part 1: Fruit and Vegetable Variety

Protocol

Part 2: Fruit and Vegetable Promotion

Protocol

39 PROCESSED FOODS

Part 1: Refined Ingredient Restrictions

Protocol

Part 2: Trans Fat Ban

Protocol

40 FOOD ALLERGIES

Part 1: Food Allergy Labeling

Protocol

41 HAND WASHING

Part 1: Hand Washing Supplies

Protocol

Part 2: Contamination Reduction

Protocol

Part 3: Sink Dimensions

Design

42 FOOD CONTAMINATION

Part 1: Cold Storage

Design

Part 2: Food Preparation Separation

Protocol

43 ARTIFICIAL INGREDIENTS

Part 1: Artificial Substance Labeling

Protocol

44 NUTRITIONAL INFORMATION

Part 1: Detailed Nutritional Information

Protocol

45 FOOD ADVERTISING

Part 1: Advertising and Environmental Cues

Protocol

Part 2: Nutritional Messaging

Protocol

46 SAFE FOOD PREPARATION MATERIALS

Part 1: Cooking Material

Protocol

Part 2: Cutting Surfaces

Protocol

47 SERVING SIZES

Part 1: Meal Sizes

Protocol

Part 2: Dinnerware Sizes

Protocol

48 SPECIAL DIETS

Part 1: Food Alternatives

Protocol

49 RESPONSIBLE FOOD PRODUCTION

Part 1: Sustainable Agriculture

Protocol

Part 2: Humane Agriculture

Protocol

50 FOOD STORAGE

Part 1: Storage Capacity

Design

Part 2: Temperature Control

Design

51 FOOD PRODUCTION

Part 1: Gardening Space

Design

Part 2: Planting Support

Design

52 MINDFUL EATING

Part 1: Eating Spaces

Design

Part 2: Break Area Furnishings

Design

53 VISUAL LIGHTING DESIGN

Part 1: Visual Acuity for Working

Design

Part 2: Task Lighting

Design

54 CIRCADIAN LIGHTING DESIGN

Part 1: Melanopic Light Intensity in Work Areas

Design

55 ELECTRIC LIGHT GLARE CONTROL

Part 1: Lamp Shielding

Design

56 SOLAR GLARE CONTROL

Part 1: View Window Shading in Workspaces

Design

Part 2: Daylight Management in Work Areas

Design

57 LOW-GLARE WORKSTATION DESIGN

Part 1: Workstation Orientation

Design

58 COLOR QUALITY

Part 1: Color Rendering Index

Design

59 SURFACE DESIGN

Part 1: Work Area Wall and Ceiling Lightness

Design

60 AUTOMATED SHADING AND DIMMING CONTROLS

Part 1: Automated Sunlight Control

Design

Part 2: Responsive Light Control

Design

61 RIGHT TO LIGHT

Part 1: Lease Depth

Design

Part 2: Windows and Workspaces

Design

62 DAYLIGHT MODELLING

Part 1: Healthy Sunlight Exposure

Design

63 DAYLIGHTING FENESTRATION

Part 1: Window Sizes for Workspaces

Design

Part 2: Window Transmittance in Work Areas

Design

Part 3: Uniform Color Transmittance

Design

64 INTERIOR FITNESS CIRCULATION

Part 1: Stair Accessibility

Design

Part 2: Stairs Promotion

Design

Part 3: Facilitative Aesthetics

Design

65 ACTIVITY INCENTIVE PROGRAMS

Part 1: Activity Incentive Programs

Protocol

66 STRUCTURED FITNESS OPPORTUNITIES

Part 1: Professional Fitness Program

Protocol

Part 2: Fitness Education

Protocol

67 EXTERIOR ACTIVE DESIGN

Part 1: Pedestrian Amenities

Design

Part 2: Pedestrian Promotion

Design

Part 3: Walk Score®

Design

68 PHYSICAL ACTIVITY SPACES

Part 1: Site Space Designation for Offices

Design

Part 2: External Exercise Spaces

Design

69 ACTIVE TRANSPORTATION SUPPORT

Part 1: Bicycle Storage and Support

Design

Part 2: Post Commute and Workout Facilities

Design

70 FITNESS EQUIPMENT

Part 1: Low-Intensity Equipment

Design

Part 2: High-Intensity Equipment

Design

71 ACTIVE FURNISHINGS

Part 1: Active Workstations

Design

Part 2: Prevalent Standing Desks

Design

72 ADA ACCESSIBLE DESIGN STANDARDS

Part 1: ADA Regulations

Design

73 ERGONOMICS: VISUAL AND PHYSICAL

Part 1: Visual Ergonomics

Design

Part 2: Desk Height Flexibility

Design

Part 3: Seat Flexibility

Design

74 EXTERIOR NOISE INTRUSION

Part 1: Sound Pressure Level

Performance

75 INTERNALLY GENERATED NOISE

Part 1: Acoustic Planning

Protocol

Part 2: Mechanical Equipment Sound Levels

Performance

76 THERMAL COMFORT

Part 1: Ventilated Thermal Environment

Design

Part 2: Natural Thermal Adaptation

Design

77 OLFACTORY COMFORT

Part 1: Source Separation

Design

78 REVERBERATION TIME

Part 1: Reverberation Time

Performance

79 SOUND MASKING

Part 1: Sound Masking Use

Design

Part 2: Sound Masking Limits

Performance

80 SOUND REDUCING SURFACES

Part 1: Ceilings

Design

Part 2: Walls

Design

81 SOUND BARRIERS

Part 1: Wall Construction Specifications

Design

Part 2: Doorway Specifications

Design

Part 3: Wall Construction Methodology

Design

82 INDIVIDUAL THERMAL CONTROL

Part 1: Free Address

Protocol

Part 2: Personal Thermal Comfort Devices

Protocol

83 RADIANT THERMAL COMFORT

Part 1: Lobbies and Other Common Public Spaces

Design

Part 2: Offices and Other Regularly Occupied Spaces

Design

84 HEALTH AND WELLNESS AWARENESS

Part 1: WELL Building Standard Guide®

Protocol

Part 2: Health and Wellness Library

Protocol

85 INTEGRATIVE DESIGN

Part 1: Stakeholder Charrette

Protocol

Part 2: Development Plan

Protocol

Part 3: Stakeholder Orientation

Protocol

86 POST-OCCUPANCY SURVEYS

Part 1: Occupant Survey Content

Protocol

Part 2: Information Reporting

Protocol

87 BEAUTY AND DESIGN I

Part 1: Beauty Mindful Design

Design

88 BIOPHILIA I - QUALITATIVE

Part 1: Nature Incorporation

Design

Part 2: Pattern Incorporation

Design

Part 3: Nature Interaction

Design

89 ADAPTABLE SPACES

Part 1: Stimuli Management

Design

Part 2: Privacy

Design

Part 3: Space Management

Design

Part 4: Workplace Sleep Support

Protocol

90 HEALTHY SLEEP POLICY

Part 1: Non-Workplace Sleep Support

Protocol

91 BUSINESS TRAVEL

Part 1: Travel Policy

Protocol

92 WORKPLACE HEALTH POLICY

Part 1: Health Benefits

Protocol

93 WORKPLACE FAMILY SUPPORT

Part 1: Parental Leave

Protocol

Part 2: Employer Supported Child Care

Protocol

Part 3: Family Support

Protocol

94 SELF-MONITORING

Part 1: Sensors and Wearables

Protocol

95 STRESS AND ADDICTION TREATMENT

Part 1: Mind and Behavior Support

Protocol

Part 2: Stress Management

Protocol

96 ALTRUISM

Part 1: Charitable Activities

Protocol

Part 2: Charitable Contributions

Protocol

97 MATERIAL TRANSPARENCY

Part 1: Material Information

Design

Part 2: Accessible Information

Design

98 JUST ORGANIZATION

Part 1: JUST Participation

Protocol

99 BEAUTY AND DESIGN II

Part 1: Ceiling Height

Design

Part 2: Artwork

Design

Part 3: Spatial Familiarity

Design

100 BIOPHILIA II - QUANTITATIVE

Part 1: Outdoor Biophilia

Design

Part 2: Indoor Biophilia

Design

Part 3: Water Feature

Design

101 INNOVATION FEATURE I

Part 1: Innovation 1 Proposal

Protocol

Part 2: Innovation 1 Support

Protocol

102 INNOVATION FEATURE II

Part 1: Innovation 2 Proposal

Protocol

Part 2: Innovation 2 Support

Protocol

Appendix E: LEED v4 Overlap

The IWBI and USGBC share similar certification processes and feature intents, particularly as related to air quality. Due to differences in structure and small variations in content, complying with one does not guarantee full credit for the other. However, because of their shared intentions, attainment of WELL features can help achieve certain LEED credits.

02 Smoking ban

EQ: Environmental Tobacco Smoke Control

WELL feature exceeds LEED prerequisite credit.

Exceeds Fulfillment

03 Ventilation effectiveness

EQ: Minimum Indoor Air Quality Performance (Option 1)

WELL feature Part 1 partially achieves LEED credit and exceeds LEED credit criteria for ventilation.

Partial Fulfillment

EQ: Enhanced Indoor Air Quality Strategies (Option 2)

WELL feature Part 2 achieves LEED credit Option 2.

Complete Fulfillment

04 VOC reduction

EQ: Low-Emitting Materials

WELL feature achieves full LEED credit points.

Complete Fulfillment

05 Air filtration

EQ: Enhanced Indoor Air Quality Strategies (Option 1, for mechanically ventilated spaces)

WELL feature Part 2 partially achieves LEED credit Option 1.

Partial Fulfillment

07 Construction pollution management

EQ: Construction IAQ Management Plan

WELL feature achieves LEED credit.

Complete Fulfillment

08 Healthy entrance

EQ: Enhanced Indoor Air Quality Strategies (Option 1, for mechanically ventilated spaces)

WELL feature Part 1 achieves LEED credit Option 1, Section A.

Partial Fulfillment

13 Air flush

EQ: Indoor Air Quality Assessment (Option 1)

WELL feature Part 1 achieves LEED credit Option 1.

Complete Fulfillment

14 Air infiltration management

EA: Enhanced Commissioning (Option 2)

WELL feature Part 1 achieves LEED credit Option 2.

Complete Fulfillment

| | | |
|----|---|----------------------|
| 15 | Increased ventilation | Complete Fulfillment |
| | EQ: Enhanced Indoor Air Quality Strategies (Option 2, for mechanically ventilated or mixed-mode system spaces) | |
| | WELL feature Part 1 achieves LEED credit Option 2. | |
| 17 | Direct source ventilation | Complete Fulfillment |
| | EQ: Enhanced Indoor Air Quality Strategies (Option 1, for mechanically ventilated spaces) | |
| | WELL feature Part 1 achieves LEED credit Option 1. | |
| 25 | Toxic material reduction | Partial Fulfillment |
| | EQ: Low-Emitting Materials | |
| | WELL feature Part 5 partially fulfills Option 1 (Composite Wood Evaluation section). | |
| 55 | Electric light glare control | Partial Fulfillment |
| | EQ: Interior Lighting (Option 2, Section A) | |
| | WELL feature Part 1 achieves LEED credit Option 2, Section A. | |
| 56 | Solar glare control | Complete Fulfillment |
| | EQ: Daylight | |
| | Window shades, an option within the WELL feature, achieves the LEED credit baseline requirement of glare-control devices for all regularly occupied spaces. | |
| 58 | Color quality | Partial Fulfillment |
| | EQ: Interior Lighting (Option 2, Section B) | |
| | WELL feature Part 1 achieves LEED credit Option 2, Section B. | |
| 59 | Surface design | Partial Fulfillment |
| | EQ: Interior Lighting (Option 2, Sections E & F) | |
| | WELL feature Part 1 achieves LEED credit Option 2, Section F. | |
| 62 | Daylight modelling | Partial Fulfillment |
| | EQ: Daylight (Option 1) | |
| | WELL feature Part 1 partially achieves LEED credit Option 1. | |
| 69 | Active transportation support | Partial Fulfillment |
| | LT: Bicycle Facilities | |
| | WELL feature partially achieves LEED credit for Bicycle Storage and Shower Rooms (Case 1 for Commercial or Institutional Projects). | |

| | | |
|-------------------------------|---|---------------------|
| 74 Exterior noise intrusion | EQ: Acoustic Performance (Option 2) WELL feature Part 1 partially achieves LEED credit Option 2. | Partial Fulfillment |
| 75 Internally generated noise | EQ: Acoustic Performance WELL feature Part 2 partially achieves LEED credit. | Partial Fulfillment |
| 76 Thermal comfort | EQ: Thermal Comfort (Option 1) WELL feature Part 1 exceeds LEED credit Option 1. | Exceeds Fulfillment |
| 78 Reverberation time | EQ: Acoustic Performance WELL feature Part 1 partially achieves LEED credit baseline requirement. | Partial Fulfillment |
| 80 Sound reducing surfaces | EQ: Acoustic Performance (Option 2) WELL feature partially achieves LEED credit Option 2. | Partial Fulfillment |
| 85 Integrative design | IP: Integrative Process WELL feature partially achieves LEED credit activities in Energy- and Water-Related categories. | Partial Fulfillment |

Appendix F: Living Building Challenge 3.0 Overlap

IWBI welcomes projects to pursue both the Living Building Challenge alongside WELL in order to promote both environmental and personal sustainability. To make the process easier for projects pursuing both programs, IWBI has organized the WELL Standard so that specific LBC Imperatives are clearly mapped to WELL Features. IWBI can't guarantee that meeting the WELL features will result in LBC certification, however the links are fairly straight forward. It is important to note that pursuing certain features in WELL could allow projects to achieve between 15-35% of LBC Imperatives.

01 Air quality standards

Imperative 08: Healthy Interior Environment

LBC requires indoor air quality testing before and nine months after occupancy - this intent is directly in line with the Air Quality Standards of the WBS in that an air quality test is required during the on-site audit for certification.

Partial Fulfillment

02 Smoking ban

Imperative 08: Healthy Interior Environment

LBC prohibits smoking within the project boundary. WELL also requires signage indicating the hazards of smoking if smoking is allowed beyond 7.5 m of entrances.

Partial Fulfillment

03 Ventilation effectiveness

Imperative 08: Healthy Interior Environment

LBC and the WBS require compliance with the most current version of ASHRAE 62.

Partial Fulfillment

04 VOC reduction

Imperative 08: Healthy Interior Environment

LBC requires all interior building products comply with CDPH Standard Method v1.1-2010, WBS requires low voc emitting paints, coatings, and sealants.

Partial Fulfillment

08 Healthy entrance

Imperative 08: Healthy Interior Environment

LBC requires an entryway approach that addresses particulate reduction tracked in through shoes. WELL requires similar methods be used to reduce particulates at entryways, specifically walk-off mats, dirt track in systems, and grates.

Partial Fulfillment

09 Cleaning protocol

Imperative 08: Healthy Interior Environment

LBC requires an outline of the cleaning protocol and that all cleaning products comply with the EPA DfE program. This is directly in line with the cleaning protocol requirements and cleaning chemical requirements of WELL.

Partial Fulfillment

17 Direct source ventilation

Imperative 08: Healthy Interior Environment

LBC requires dedicated exhaust from janitorial areas, which is also required in WELL.

Partial Fulfillment

| | | |
|----------------------------------|---|----------------------|
| 19 Operable windows | Imperative 07: Civilized Environment | Complete Fulfillment |
| 26 Enhanced material safety | Imperative 10: Red List LBC requires that all projects be Red List compliant. Achieving the Materials petal of LBC is one method of obtaining this WELL feature. | Partial Fulfillment |
| 64 Interior fitness circulation | Imperative 04: Human Powered Living LBC requires the promotion of stairs over elevators through interior layout and quality of stairways - this is directly in line with Part 2 - Stairs Promotion and Part 4 - Elevator and Stair Alignment of the Interior Fitness Circulation feature. | Partial Fulfillment |
| 65 Activity incentive programs | Imperative 04: Human Powered Living LBC requires a transit subsidy which is in line with Part 1.B of the Activity Incentive Programs features. | Partial Fulfillment |
| 69 Active transportation support | Imperative 04: Human Powered Living LBC requires secure storage for human powered vehicles (bicycles), and shower and changing facilities that are accessible by all building occupants. These requirements from LBC are directly in line with Part 1 - Bicycle Storage and Support and Part 2 Post | Partial Fulfillment |
| 87 Beauty and design I | Imperative 19: Beauty and Spirit | Complete Fulfillment |
| 88 Biophilia I - qualitative | Imperative 09: Biophilic environment | Complete Fulfillment |
| 97 Material transparency | Imperative 12: Responsible Industry LBC requires all timber be certified by the Forest Stewardship Council (FSC) and that projects provide 1 Declare product for every 500 square meters of project. The Material Transparency feature of the WBS promotes the use of Declare products and other pr | Partial Fulfillment |
| 98 JUST organization | Imperative 18: JUST Organizations | Complete Fulfillment |

Appendix G: Recommended Documents

The following influential institutions have numerous publications on many aspects of healthy buildings and environmental conditions.

American Chemical Society (ACS)

The ACS is an independent membership organization that promotes scientific research and literature in the field of chemistry. The Chemical Abstracts Service (CAS), a division of the ACS collects and discloses all publicly available substance information.

(2014) CASSISM (CAS Source Index) Search Tool

(2014) SciFinder Database

American College of Sports Medicine (ACSM)

ACSM promotes scientific research in conjunction with education and practical applications of exercise science to enhance physical performance, health, and quality of life.

(2012) ACSM's Health/Fitness Facility Standards and Guidelines

American Counseling Association

(2014) Code of Ethics and Standards

American Heart Association

The American Heart Association, founded by six cardiologists in 1924, funds innovative research, advocates for stronger public health policies and provides tools and information to eliminate cardiovascular diseases and stroke.

(2004) Scientific Statement: Air Pollution and Cardiovascular Disease

American Lung Association

The American Lung Association works to save lives by improving lung health and preventing lung disease through education, advocacy and research.

(2013) State of the Air

American National Standards Institute (ANSI)

ANSI works with organizations to create and manage voluntary national standards for products. The goal of ANSI is to enhance the global competitiveness of U.S. businesses by facilitating the development of standards.

(2009) American National Standard Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools, Part 2: Relocatable Classroom Factors

(2010) American National Standard Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools, Part 1: Permanent Schools

ASHRAE (formerly American Society of Heating, Refrigerating and Air-Conditioning Engineers)

ASHRAE is a worldwide building technology society that focuses on building systems, energy efficiency, indoor air quality, refrigeration and sustainability within the industry.

- (2010) Energy Standard for Buildings Except Low-Rise Residential Buildings (ANSI/ASHRAE/IES Standard 90.1-2010)
- (2011) ASHRAE Handbook HVAC Applications Chapter 60: Ultraviolet Air and Surface Treatment
- (2013) Standard 55: Thermal Environmental Conditions for Human Occupancy
- (2013) Standard 62.1: Ventilation for Acceptable Indoor Air Quality
- (2013) Standard 62.2: Ventilation for Acceptable Indoor Air Quality in Low-Rise Residential Buildings
- (2013) UFAD Guide: Design, Construction and Operation of Underfloor Air Distribution Systems
- (2014) ASHRAE on UVGI

ASTM International (formerly American Society for Testing and Materials)

ASTM International is a globally recognized leader in the development and delivery of international voluntary consensus standards used to improve product quality, enhance safety, facilitate market access and trade, and build consumer confidence.

- (2006) Classification for Determination of Impact Insulation Class
- (2007) Acoustical Performance of Windows, Doors, Skylight and Glazed Wall Systems
- (2009) Airborne Sound Transmission Loss of Building Partitions and Elements
- (2014) Standard Test Method for Measurement of Airborne Sound Insulations in Buildings

Canadian Centre for Occupational Health & Safety

CCOHS promotes the total well-being of working Canadians by providing information, training, education, management systems and solutions that support health, safety and wellness programs.

- (2011) Eye Discomfort in the Office
- (2013) Scent-Free Policy for the Workplace

Centers for Disease Control and Prevention (CDC)

CDC is the United States' national public health institute that aims to protect the country from health threats through detection, research, and control and prevention methods.

- (2006) Do Increased Portion Sizes Affect How Much We Eat?
- (2006) You Can Control Your Asthma
- (2010) Community Gardens
- (2013) Biomonitoring Summary 2,4-Dichlorophenoxyacetic Acid
- (2013) The CDC Guide to Strategies to Support Breastfeeding Mothers and Babies
- (2013) Voluntary Guidelines for Managing Food Allergies In Schools and Early Care and Education Programs

Cradle to Cradle Products Innovation Institute (C2C)

C2C promotes sustainability by administering the Cradle to Cradle Certified Product Standard and providing this information to consumers and regulators to advance independence, openness and transparency.

- (2014) Cradle to Cradle Material Health

Environmental Working Group (EWG)

EWG is a non-profit American environmental organization that specializes in research and advocacy in the areas of toxic chemicals, agricultural subsidies, public lands and corporate accountability.

(2009) National Drinking Water Database

European Commission

The European Commission is the EU's executive body. Its role is to set objectives and priorities for action, propose legislation, manage and implement EU policies and budget, enforce European Law, and represent the EU outside Europe.

(2002) EU Legislation Directive 2002/49/EC

Food and Drug Administration (FDA)

The FDA is responsible for the protection and promotion of public health through the supervision and regulation of foods, dietary supplements and drugs, as well as medical equipment.

(2014) C.F.R. 21 § 101.91

Healthcare Research Collaborative

The Health Care Research Collaborative meets a need expressed by hospital and health system executives for more research to assist them in their efforts to make sustainable choices in health care design, construction, operations, and organization.

(2009) Healthcare Ventilation Research Collaborative: Displacement Ventilation Research

Healthy Building Network

The Healthy Building Network aims to reduce the use of hazardous chemicals in building products as a means of improving human health and the environment.

(2002) Environmental Impacts of Polyvinyl Chloride Building Materials

(2013) Full Disclosure Required: A Strategy to Prevent Asthma Through Building Product Selection

(2014) Phthalate-free Plasticizers in PVC

Illuminating Engineering Society of North America (IESNA)

IESNA maintains illuminance standards for specific tasks by translating lighting knowledge into actions that can benefit the public.

(2003) Guideline for Security Lighting for People, Property, and Public Spaces

(2011) Model Lighting Ordinance

(2011) The Lighting Handbook 10th Edition

International Code Council (ICC)

The ICC constructs safe, affordable, and resilient structures by developing moral codes and standards to be used in the design, build, and compliance process of construction.

(2012) International Energy Conservation Code

International Living Future Institute (ILFI)

The International Living Future Institute encourages the creation of sustainable buildings, sites and communities in countries around the world while educating and motivating a global audience about the need for fundamental and transformative change.

- (2011) The Declare Label
- (2013) JUST User Manual
- (2014) Living Building Challenge 3.0
- (2014) Materials Petal Handbook

International Organization for Standardization (ISO)

ISO develops and publishes international standards to minimize waste and errors, increase productivity, help companies to access new markets, level the playing field for developing countries and facilitate free and fair global trade.

- (2005) Ergonomics of the Thermal Environment (ISO 7730:2005)

International WELL Building Institute (IWBI)

The IWBI is a public benefit corporation whose mission is to improve human health and wellbeing through the built environment. The IWBI administers the WELL Building Standard.

- (2014) WELL Building Standard

Mental Health Foundation

Mental Health Foundation develops and runs research and delivery programs across the UK to end to mental ill health and the inequalities that face people experiencing mental distress, living with learning disabilities or reduced mental capacity.

- (2014) Altruism and Health

National Air Duct Cleaners Association (NADCA)

NADCA's mission is to promote source removal as the only acceptable method of cleaning and to establish industry standards for the association.

- (2014) NADCA White Paper on Ultraviolet Lighting Applications in HVAC Systems

National Institute of Building Sciences

The National Institute of Building Sciences brings together representatives of government, the professions, industry, labor and consumer interests, and regulatory agencies to focus on the identification and resolution of glaring housing issues.

- (2012) Building Air Tightness and Air Barrier Continuity Requirements

National Institute of Occupational Safety and Health (NIOSH)

The National Institute of Occupational Safety and Health is the U.S. federal agency that conducts research and makes recommendations to protect the safety and health of workers, and prevent worker injury and illness; NIOSH functions within the CDC.

- (2014) NIOSH Pocket Guide to Chemicals - CO₂
- (2014) Observation-Based Posture Assessment

National Institutes of Health (NIH)

NIH is made up of 27 Institutes and Centers, each with a specific research agenda to understand the nature and behavior of living systems, and to apply that knowledge to enhance health, lengthen life, and reduce illness and disability.

- (2014) A Noisy Planet: How Loud is Too Loud? How Long is Too Long?

National Resource Defense Council (NRDC)

NRDC is an environmental action group of members, online activists, lawyers, scientists and other professionals advocating for stringent environmental protection.

(1996) Premature Mortality Due to Particulate Air Pollution in 239 American Cities

(2011) Gasping for Air: Toxic Pollutants Continue to Make Millions Sick and Shorten Lives

New York City Department of Design and Construction (DDC)

The DDC is responsible for the design of many civic facilities in New York City, and aims to create buildings that socially responsible, progressively designed and environmentally sound.

(2013) Active Design Guidelines: Promoting Physical Activity and Health in Design

New York City Department of Environmental Protection

The New York City Department of Environmental Protection protects public health and the environment by supplying clean drinking water, collecting and treating wastewater, and reducing air, noise and hazardous materials pollution.

(2013) New York City 2013 Drinking Water Supply and Quality Report

New York State Department of Health

The New York State Department of Health is the governmental body responsible for public health in the state of New York.

(2014) NYS DOH Drinking Water Protection Program: Annual Water Quality Report

Occupational Safety and Health Administration (OSHA)

OSHA, a part of the US Dept of Labor, works to ensure safe and healthful working conditions for working men and women by setting and enforcing standards, and by providing training, outreach, education and assistance.

(1999) OSHA Technical Manual

(2014) Computer Workstations (Glare)

Perkins+Will

Perkins+Will is a global multidisciplinary architecture and design firm whose focus includes social responsibility and sustainable design and brings together high design, functional performance to advance project goals.

(2014) Transparency Precautionary Lists

Pharos Project

The Pharos Project is a campaign for transparency in the building materials market.

(2014) Building Product Library

(2014) Chemical and Material Library

South Coast Air Quality Management District

The SCAQMD is the air pollution control agency for all of Orange County and the urban portions of Los Angeles, Riverside and San Bernardino counties.

(2014) SCAQMD Rule Book

The National Electrical Manufacturers Association (NEMA)

NEMA provides a forum for the development of technical standards that are in the best interests of the industry and users, advocacy of industry policies on legislative and regulatory matters, and collection, analysis, and dissemination of industry data.

(2008) NEMA Standards Enclosures for Electrical Equipment

U.S. Department of Agriculture (USDA)

USDA promotes healthy eating and physical activity choices to improve the health of the country, and aims to expand economic opportunity and sustainability of natural resources.

(2013) Cutting Boards and Food Safety

U.S. Department of Health and Human Services (HHS)

HHS is the principal agency for protecting the health of all Americans and providing essential human services, especially for those who are least able to help themselves.

(2010) The Surgeon General's Vision For A Healthy And Fit Nation

U.S. Department of Housing and Urban Development (HUD)

HUD was established to create strong, sustainable, inclusive communities and quality affordable homes for all. They designate guidelines for home and community construction and development.

(2001) Lead Paint Safety

(2004) Code of Federal Regulations, Housing and Urban Development: Environmental Criteria and Standards: Title 24, Part 51

U.S. Department of Justice (DOJ)

DOJ works to enforce the law and defend the interests of the United States according to the law.

(2010) ADA Standards for Accessible Design

U.S. Environmental Protection Agency (EPA)

The EPA measures and regulates outdoor air and water quality, and works with the major federal law governing toxic substances.

(2005) National Air Toxics Assessments

(2011) National Ambient Air Quality Standards

(2014) Air Quality Index (AQI): A Guide to Air Quality and Your Health

(2014) Clean Air Scientific Advisory Committee

U.S. Green Building Council (USGBC)

USGBC is made up of member organizations, chapters, and student and community volunteers working to create sustainable building industry through LEED, the Greenbuild International Conference, advocacy, credentialing, education and chapter involvement.

(2009) LEED 2009 for Commercial Interiors

(2009) LEED v3: Green Building Design and Construction

(2009) LEED v3: Pilot Credit Local Food Production

(2013) LEED Pilot Credit 75 Clean Construction

(2013) LEED v4 Pilot Credit - Design for Active Occupants

(2013) LEED V4 Sustainable Sites Credit 4 Alternative Transportation

(2013) LEED v4: Reference Guide for Building Design and Construction

(2013) LEED v4: Reference Guide for Interior Design and Construction

Urban Green Council

Urban Green Council is the New York Chapter of the U.S. Green Building Council. They work to advance the sustainability of urban buildings through education, advocacy and research.

(2013) Ensure Operable Windows in Residential Buildings

World Health Organization (WHO)

The WHO, established in 1948 as an agency of the UN, assesses communicable diseases, leads and shapes research priorities, monitors exposure levels and sets environmental standards, and provides technical support to countries.

(1999) Guidelines for Community Noise

(2009) Guidelines for Indoor Air Quality: Dampness and Mould

(2009) Handbook on Indoor Radon: A Public Health Perspective

(2009) WHO Guidelines on Hand Hygiene in Health Care

(2010) New Guidelines for Selected Indoor Chemicals

(2011) Guidelines for Drinking-Water Quality, Fourth Edition

Appendix H: External Reviewers

The IWBI would like to extend its sincere gratitude to the following external reviewers for their time in reviewing and providing critical feedback.

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|--|--|
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