

What is Underfoot Matters

1.1 What is Underfoot Matters



Notes:

What is Underfoot Matters: How Flooring Products Deliver IAQ, Wellness, and Health

1.2 Program Registration

PROGRAM REGISTRATION

BNP Media is a registered provider with The American Institute of Architects Continuing Education System. Credit(s) earned upon completion of this course will be reported to AIA CES for AIA members. Certificates of completion for both AIA members and non-AIA members are available upon request.

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1.4 Course Overview



This course provides a thoughtful discussion of why a holistic approach towards sustainability is important. A multi-attribute approach towards product sustainability from the different viewpoints of lifecycle, acoustics, indoor air quality are important. Additionally, sustainability should be considered with an environmental and social approach. Through this course, we will understand what aspects of sustainability should be considered while choosing flooring products. We will also examine third party product and green building certifications, allowing the design professional tools to make sustainable decisions with confidence.

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1.5 Learning Objectives



LEARNING OBJECTIVES

Upon completion of this course, the learner will be able to:

- Explain the human impact from design and materials used in the built environment and explore the multiple environmental and social aspects that contribute towards holistic approach to sustainability.
- Analyze flooring products and evaluate their impacts upon indoor environmental quality.
- Describe the materials, methods, and approaches in flooring and the certifications that help to secure a sustainable environment.
- Survey and apply the LEEDv4.1 and WELL Building standard, with a particular focus on the role of flooring within these standards.

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1.6 A Healthy Society Requires a Healthy Planet



Notes:

Nature and the benefits that it provides to people are the foundation of our global economy, our culture, and the overall human experience. We depend on clean air, water, food, medicine, energy, and building materials that nature provides, but these very ecosystems are threatened or already in decline. Maintaining nature for the benefit of current and future generations is one of humanity's greatest challenges.

In order to be effective, climate messages must tap into our intrinsic motivations. It's our universal aspiration for ourselves to be healthy, for our families to be well, for our businesses and communities to thrive. That's what moves us to act. There's a great deal of overlap between what's good for people and what's good for the planet. Investing in electrification, selecting low emitting materials and optimizing natural light are climate mitigation and human health strategies. It's an approach that benefits all of us.

1.7 Planet + People and the Built Environment



Notes:

Source: Architecture 2030 + Mindful Materials + AIA Materials Pledge

Image Source: Arch Daily – 18 Robinson/KPF Singapore

COVID-19 has changed the world a lot on fundamental levels. The pandemic has made us realize how quickly our social and economic stability can be disrupted at a global scale. More importantly, we have realized that this is just the beginning. Environmental issues are a far greater threat to long-term societal and economic stability.

Over the past decades, changes in climate have affected certain areas of the world more acutely than others. However, the severity, frequency and number of people and areas affected has now become global and is steadily getting worse. The building sector contributes about 40% of annual global GHG emissions. Global building stock will double in area by 2060. As an industry, we play a critical role in addressing climate change and can consider this as an opportunity to drive a positive impact instead of taking a negative approach. However, if there is anything we have learnt from the pandemic is that we must address these global issues in a comprehensive and holistic manner by approaching overall ESG issues.

1.8 Environmental Social Governance



Notes:

Corporate Social Responsibility has evolved further in the last several years to a much more robust and holistic framework. Today, widely known as ESG, ESG stands for Environmental, Social and Governance. In a business context, sustainability is about the company's business model, i.e. how its products and services contribute to sustainable development. It is also about a company's risk management, i.e. how it manages its own operations to minimize negative impact. The transition from sustainability to ESG performance indicates a maturation of business practices to a more precise measurement of a portfolio's performance. As the industry becomes more sophisticated, we need to improve the way we collect and track metrics to build ESG management accordingly.

1.9 What Does Sustainability Mean?



Notes:

What does sustainability mean?

Even 10 years ago, sustainability might simply reference flooring using recycled wood, or chairs made from recycled plastic. But today that definition has evolved.

Today, sustainability is more than just environmentally friendly products, it is also about creating a healthier planet and population. And there is a great need for buildings to address Health.

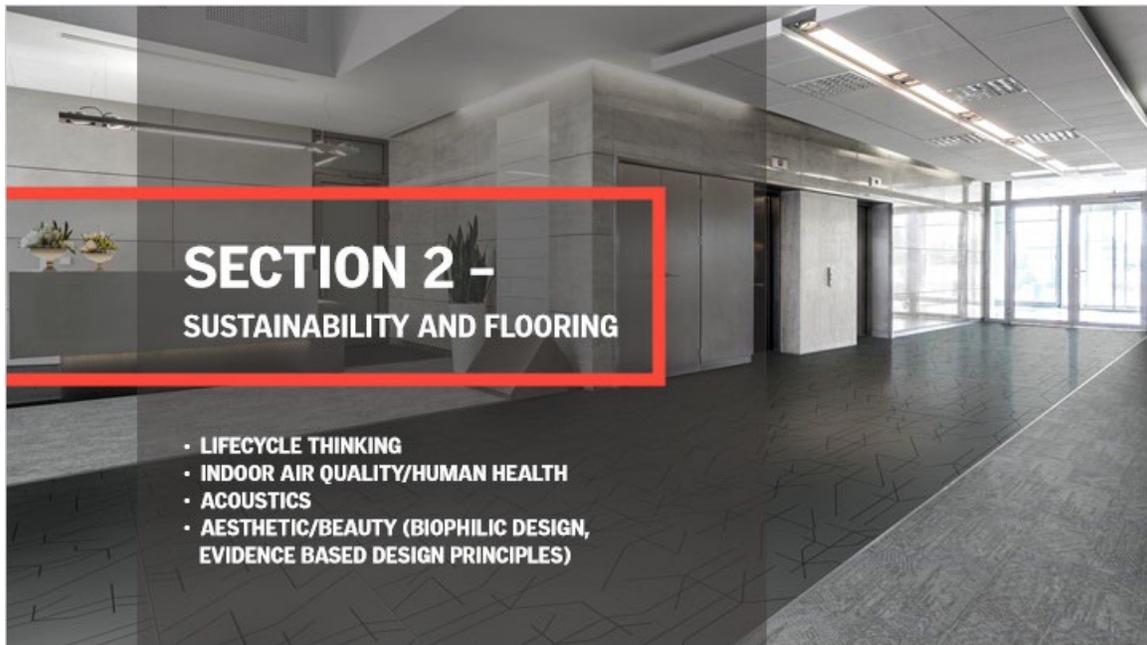
A great example of holistic sustainability would be the AIA Materials Pledge.

Commit to dedicating resources to meet as many pledge metrics as possible to full transparency and optimization of building materials

The pledge commits to:

- Support Human Health by preferring products which support and foster life throughout their lifecycles and seek to eliminate the use of substances that are hazardous.
- Support Social Health & Equity by preferring products from manufacturers who secure human rights in their own operations and in their supply chains, and which provide positive impacts for their workers and the communities where they operate.
- Support Ecosystem Health by preferring products which support and regenerate the natural air, water, and biological cycles of life through thoughtful supply chain management and restorative company practices.
- Support Climate Health by preferring products which reduce carbon emissions and ultimately sequester more carbon than emitted.
- Support a Circular Economy by reusing and improving buildings and by designing for resiliency, adaptability, disassembly and reuse aspiring to a zero-waste goal for global construction activities.

1.10 Section 2



Notes:

Sustainability is not just the what, but the how. An all-encompassing approach to sustainability covers every point of a product's lifecycle, from raw materials, manufacturing, and distribution to installation methods and end-of-life recycling.

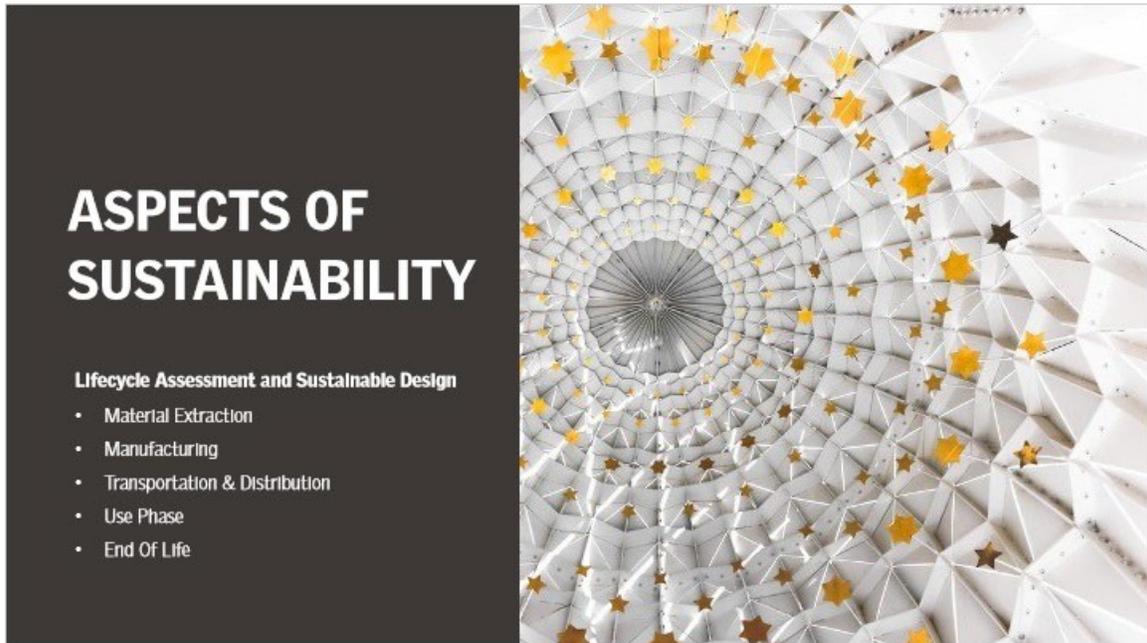
1.11 Exploring System Wide Impacts from Actions



Notes:

Exploring System Wide Impacts from Actions

1.12 Aspects of Sustainability



Notes:

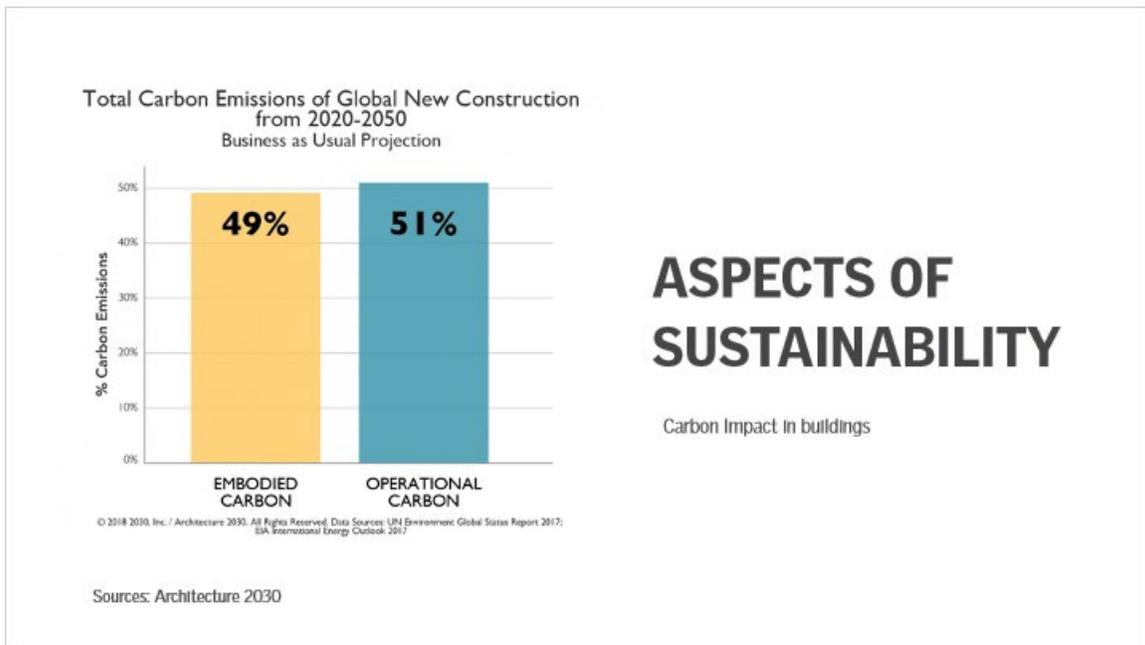
A modern definition of sustainability means seeking the very best outcome for the building, the environment, and the occupant. To accomplish this type of sustainability, a holistic and systems-wide approach is needed.

The best way to start any holistic adoption process is to start with a systems and lifecycle thinking approach.

Lifecycle thinking, as defined by the United Nations Lifecycle Initiative, is a “way of thinking that includes the economic, environmental, and social consequences of a product or process over its entire life.”

A lifecycle assessment (LCA) is a tool that can be used to evaluate the potential environmental impacts of a product, material, process, or activity. An LCA is a comprehensive method for assessing a range of environmental impacts across the full lifecycle of a product system, from materials acquisition to manufacturing, use, and final disposition. LCA study results help to promote the responsible design and redesign of products and processes, leading to reduced overall environmental impacts and the reduced use and release of more toxic materials. LCA studies identify key materials and processes within the products' lifecycles that are likely to pose the greatest impacts, including occupational and public toxicity impacts. These assessments allow businesses to make product improvements through environmentally sound process, material, and design choices.

1.13 Aspects of Sustainability



Notes:

Through the use of LCA, the GWP or Global Warming Potential of a product can be determined. Carbon is a big contributor to this. The embodied carbon emissions of building products and construction represent a significant portion global emissions. When we look at all the new construction that is projected to take place between now and 2050, we see the critical role embodied carbon plays.

1.14 Carpet Tile



Notes:

Carpet can be a model of sustainable design. Leading sustainable carpet tiles feature a backing that is PVC free and is 40 percent lighter than traditional carpet backing. This makes it easier to install and less expensive to ship. It also incorporates a minimum of 35 percent pre-consumer recycled content. The most sustainable options feature certification as Living Building Challenge Red-List Free and are manufactured locally in the U.S.A.

Performance:

Provides permanent tile dimensional stability.

Tiles are impervious to moisture damage from spills and water extraction cleaning.

Main body of tile provides an effective moisture barrier (not applicable at the seams).

Able to be installed in high moisture conditions up to 99 percent RH with new technological systems.

New installation tab systems virtually eliminates harmful VOCs. This odorless, dry installation system can be used in place of the traditional wet spread adhesives method and can be installed on any substrate. This technology provides a faster install with the flexibility of a floating modular floor with no glue.

Declare, HPD and CRI Green Label Certified.

1.15 Product Example

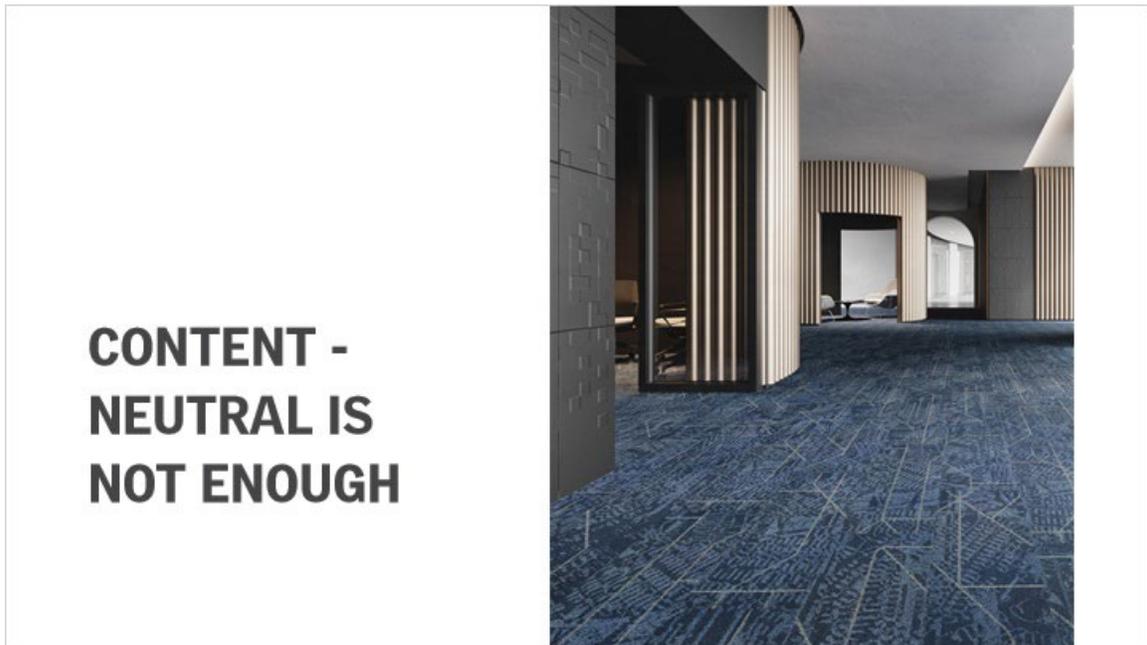


Notes:

Lifecycle assessment (LCA) is a method for quantifying the environmental impacts of a product throughout its lifecycle that can be applied to any product. The primary stages include:

Product (A1-A3), which includes extraction and upstream processing of materials, transportation, and manufacturing impacts.

1.16 Carbon Positive Products



Notes:

Carbon Positive Products

Carbon Positive products draw from the Living Products Challenge to support and contribute to healthier commercial environments and their end users by being free of toxins and other harmful chemicals of concern, while also protecting the outside environment. Additionally, the manner of manufacturing aligns with socially responsible practices that are respectful of workers' rights.

Look for carpets that meets the stringent requirements of Living Product Challenge Petal Certification and are domestically manufactured at "Living Sites." Living Sites and their products achieve certification through efforts to streamline operations, such as decreasing water usage and focusing on special processes and community partnerships that lower environmental impact. Using the Living Product framework, the carpet produced under these requirements has a net positive impact for people and the environment through innovations in materials, manufacturing, and community involvement.

1.17 End of Life: Take Back Programs



Notes:

End of Life: Take Back Programs

Responsibility does not end at installation. To continue environmental stewardship, a leading flooring manufacturer uses recycled content in more than 500 of their products and offer customers accessible ways to recycle carpet through recycling programs. Recycled products, like plastic bottles, may form the basis of new flooring products, or worn out flooring is recycled and converted into nylon and polypropylene pellets for the automotive parts and furniture industries. A network of carpet recyclers creates an environmentally responsible outlet for worn flooring.

1.18 Human Health and Indoor Environment



Notes:

Human Health and Indoor Environment

1.19 Indoor Air Quality (IAQ)

INDOOR AIR QUALITY (IAQ)

The quality of the air within the built environment, based on concentrations of pollutants and thermal conditions that affect the health, comfort, and performance of occupants.



Notes:

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1.20 Indoor Air Quality (IAQ)



INDOOR AIR QUALITY (IAQ)

- When IAQ is good, buildings are great places to work, to learn, and to heal.
- When it is not, satisfaction with the indoor environment and productivity decrease; and health concerns increase.

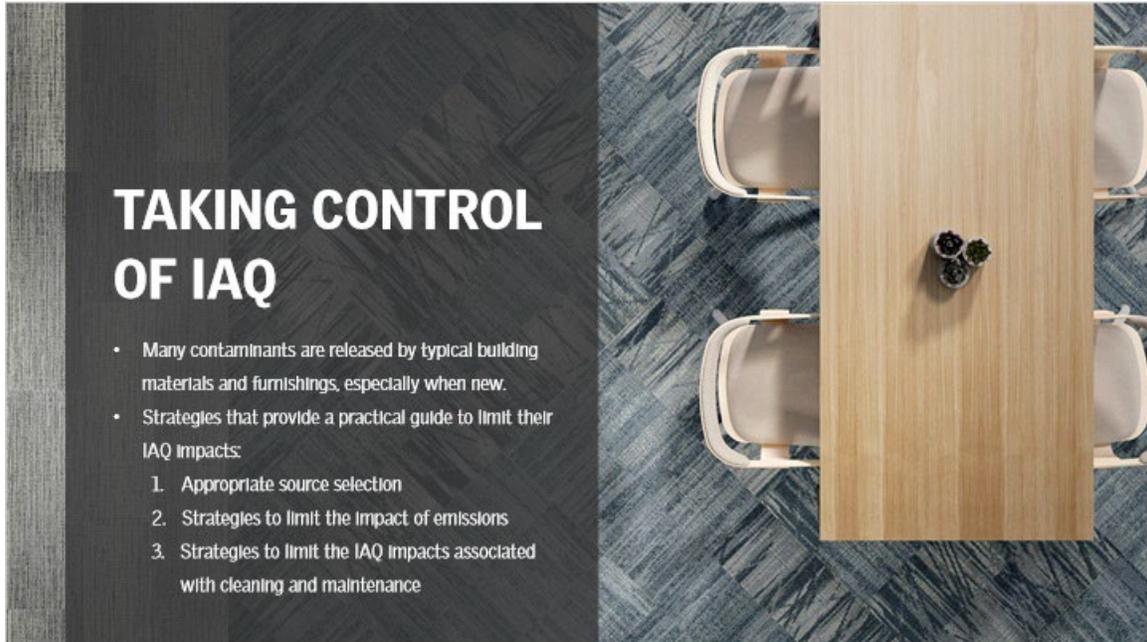
Notes:

In the indoor environment, indoor air quality (IAQ) affects occupants and their ability to perform; and creates positive or negative impressions of customers, clients, and other visitors to a building. When IAQ is good, buildings are great places to work, to learn, and to heal. When it is not, satisfaction with the indoor environment and productivity decrease; and health concerns increase.

Understanding and controlling common indoor pollutants is fundamental for providing quality indoor air.

Examples of common VOCs are benzene, formaldehyde, toluene, xylene, styrene, and tetrachloroethylene. Some VOCs, such as styrene and limonene, can react with nitrogen oxides or with ozone to produce new oxidation products and secondary aerosols, which can cause sensory irritation symptoms. The ability of VOCs to cause health effects varies greatly from those that have no known health effects to those that are highly toxic. The effects of VOC exposure depend on several factors including the type of VOC, the amount of VOC and the length of time a person is exposed.

1.21 Taking Control of IAQ

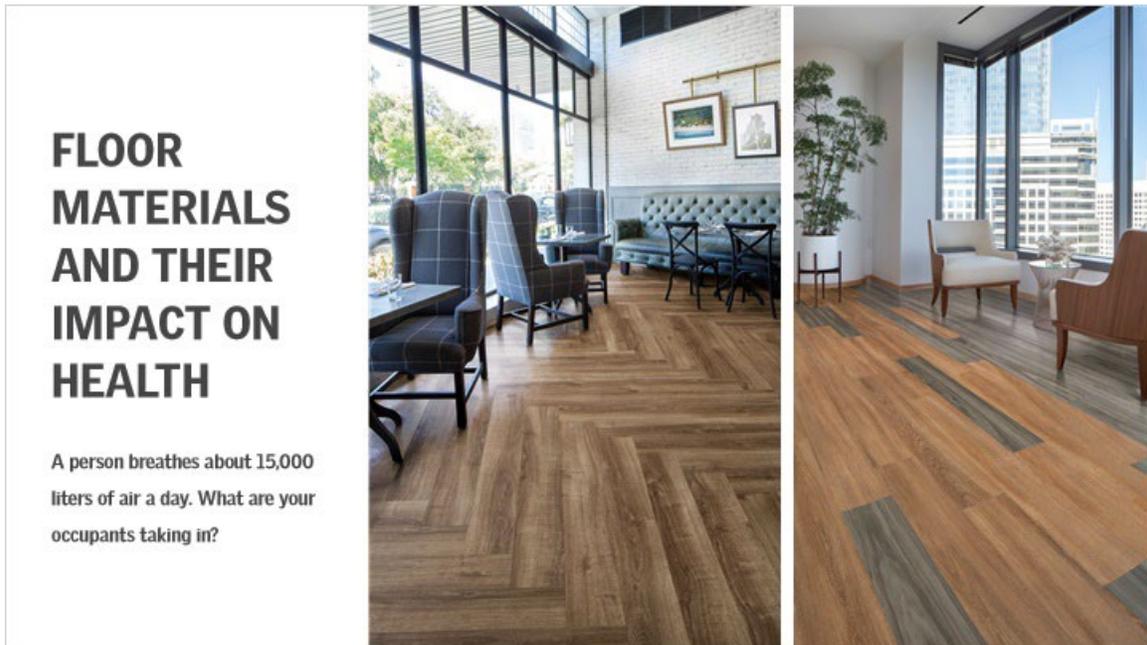


Notes:

Strategies that provide a practical guide to limit their IAQ impacts include the following three objectives:

1. Appropriate source selection
2. Strategies to limit the impact of emissions
3. Strategies to limit the IAQ impacts associated with cleaning and maintenance

1.22 Floor Materials and Their Impact on Health



Notes:

With the sustainability goals defined for a project, picking materials that support and adhere to your philosophy is vital. Flooring materials can have a profound impact on occupant health and overall building sustainability.

This impact of material on human health is finally receiving the attention it deserves. Numerous studies are cataloging the effects of the things we surround ourselves with.

The EPA reports indoors air pollutants can be 2 to 5 times higher than those outdoors.

The American Lung Association counts 14 million days of school being missed each year from the effects of indoor air quality. Asthma triggers, increased headaches, frequent fatigue, lower student performance, tiredness, as well as sick building syndrome can be side effects of poor indoor air quality.

1.23 Floor Materials and Their Impact on Health

FLOOR MATERIALS AND THEIR IMPACT ON HEALTH



Sources of exposure:

- Gases and particles: from office machines, cleaning products, construction materials and activities, flooring and furnishings, perfumes, cigarette smoke
- Fungal, mold, and bacteria: from water-damaged building materials, microbial growth, insects,
- Outdoor pollutants
- Indoor temperatures, relative humidity, and ventilation levels affect how individuals respond to the indoor environment

Notes:

Indoor environments are highly complex and building occupants may be exposed to a variety of contaminants (in the form of gases and particles) from office machines, cleaning products, construction materials and activities, flooring, and furnishings, perfumes, cigarette smoke, water-damaged building materials, microbial growth (fungal, mold, and bacterial), insects, and outdoor pollutants. Other factors such as indoor temperatures, relative humidity, and ventilation levels can also affect how individuals respond to the indoor environment.

Because of the high area of coverage throughout a building, floors carry an enormous impact, for good or bad. Flooring products with harmful chemicals are a prime contributor of contaminants and VOCs in buildings.

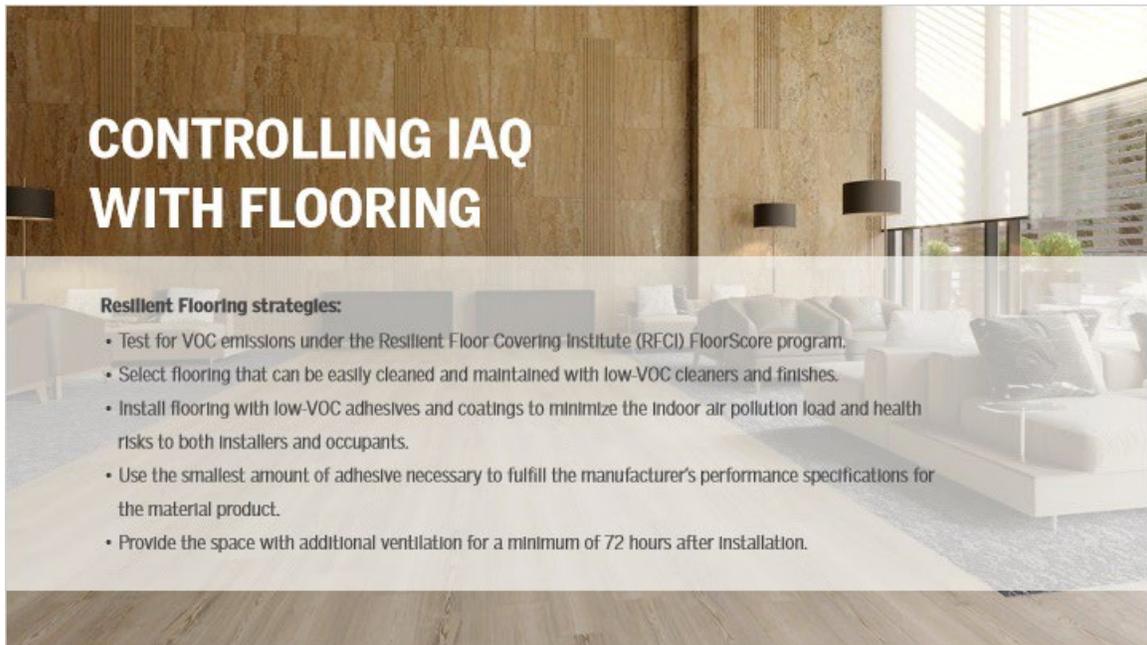
1.24 Controlling IAQ with Flooring



Notes:

Flooring selection depends on many factors including aesthetics, thermal comfort, building acoustics, and light levels (reflectance effects on daylighting performance and considerations for glare). Due to the predominance of surface area, flooring materials have a substantial direct impact on IAQ via emissions of contaminants, therefore flooring materials will have a major impact on a building's indoor environment.

1.25 Controlling IAQ with Flooring



Notes:

For Resilient Flooring, there are several strategies to safeguard IAQ:

- Test for VOC emissions under the Resilient Floor Covering Institute (RFCI) Floor Score program.
- Select flooring that can be easily cleaned and maintained with low-VOC cleaners and finishes.
- Install flooring with low-VOC adhesives and coatings to minimize the indoor air pollution load and health risks to both installers and occupants.
- Use the smallest amount of adhesive necessary to fulfill the manufacturer's performance specifications for the material product.
- Provide the space with additional ventilation for a minimum of 72 hours after installation.

1.26 Controlling IAQ with Flooring



CONTROLLING IAQ WITH FLOORING

Soft Flooring strategies:

- Test for VOC emissions under the Green Label Plus testing program.
- Select flooring that can be easily cleaned and maintained.
- Select flooring that has a permeable backing to prevent liquids from penetrating the backing layer or subfloor where moisture can result in mold and bacterial growth.
- Roll out and condition new flooring in a clean, dry space prior to installation to minimize emission rates after installation.
- Use the smallest amount required of the least toxic adhesive system compatible with the selected soft flooring product.

Notes:

For soft flooring, the following protocols are important in choosing the most sustainable flooring:

- Test for VOC emissions under the Green Label Plus testing program.
- Select flooring that can be easily cleaned and maintained.
- Select flooring that has a permeable backing to prevent liquids from penetrating the backing layer or subfloor where moisture can result in mold and bacterial growth.
- Roll out and condition new flooring in a clean, dry space prior to installation to minimize emission rates after installation.
- Use the smallest amount required of the least toxic adhesive system compatible with the selected soft flooring product.

1.27 The Negative Side Effects of Flooring Materials



THE NEGATIVE SIDE EFFECTS OF FLOORING MATERIALS

Adverse material effects can occur during the manufacturing, use, or disposal phase of a product.

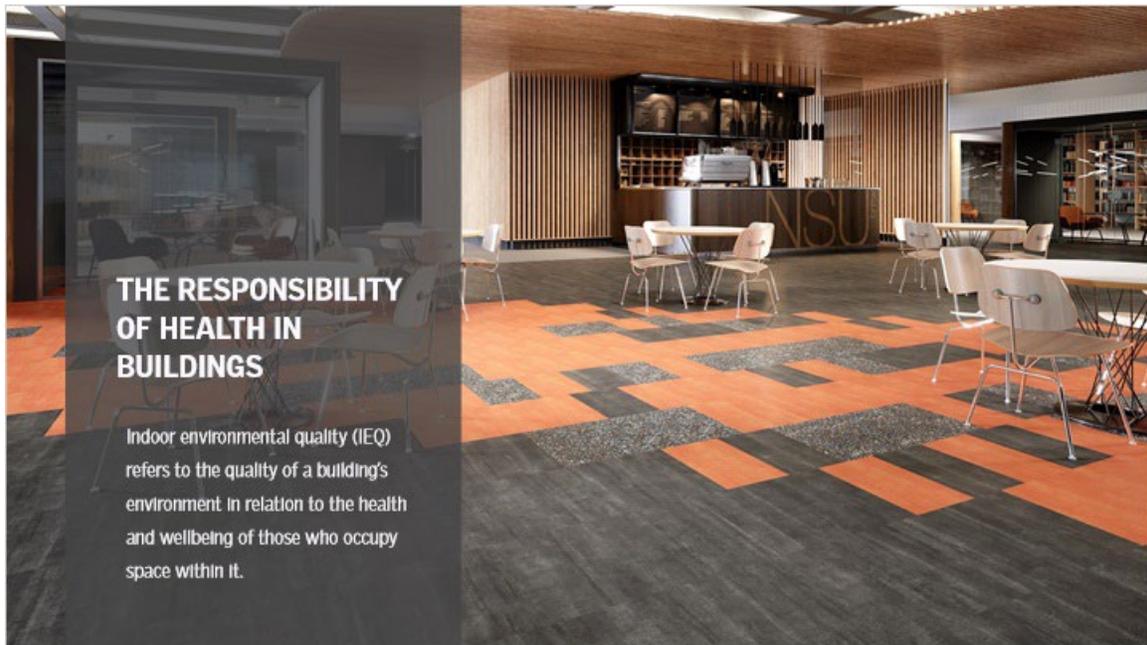
- Some materials are carcinogenic and/or disrupt endocrine, respiratory, and neurological systems. Lead and asbestos are now consistently avoided materials although decades passed between health risks proven and action to regulate.
- High temperatures & high indoor humidity can increase indoor pollutant concentration.

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Some materials are carcinogenic and/or disrupt endocrine, respiratory, and neurological systems. Lead and asbestos are now consistently avoided materials although decades passed between health risks proven and action to regulate. High temperatures & high indoor humidity increase indoor pollutant concentration, raising greater concerns about health impacts.

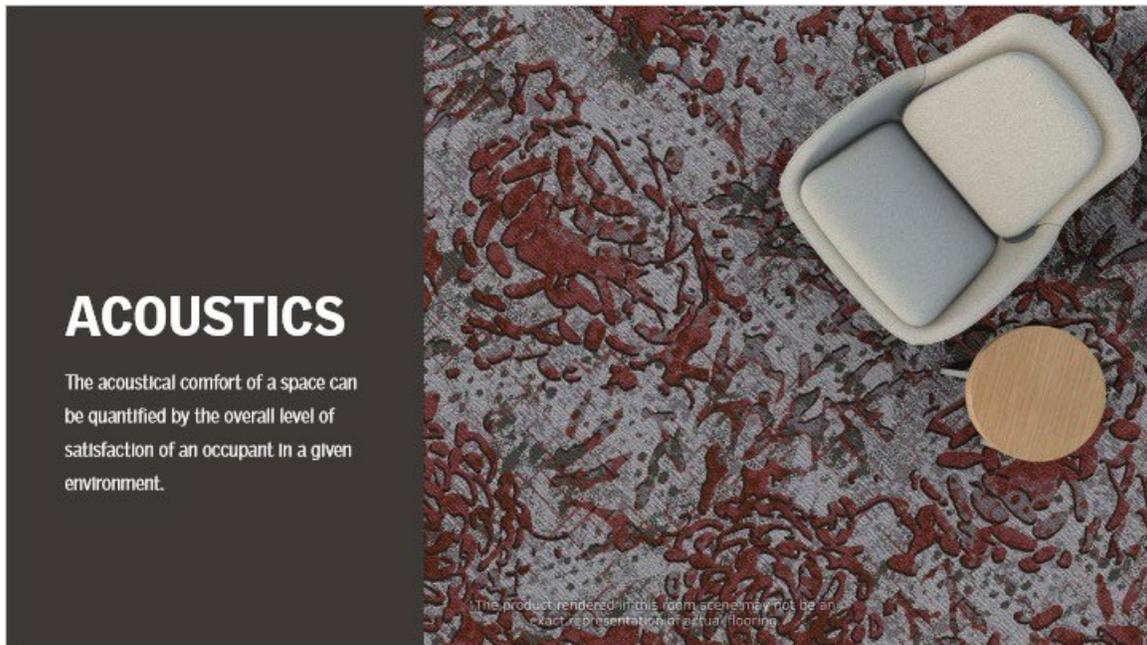
1.28 The Responsibility of Health in Buildings



Notes:

Because of the increasing emphasis placed on sustainability and knowledgeable product choice, the term indoor environmental quality, or IEQ, has been developed. IEQ refers to the quality of a building's environment in relation to the health and wellbeing of those who occupy space within it.

1.29 Acoustics



Notes:

The quality of a physical space or indoor built environment is influenced by so many different factors. The color, light, materials, all impact the character of the space.

Acoustics comfort refers to an indoor environment that is conducive to providing speech intelligibility, speech privacy, low distractions and annoyance, and sound quality.

And, according to ongoing research at the Center for the Built Environment (CBE), it is the lowest performing IEQ factor in green buildings. Moreover, in all buildings surveyed, the level of acoustic satisfaction was rated as the lowest performance IEQ factor, and the only negative (dissatisfaction) factor overall.

Office noise impairs workers' ability to recall information and even do basic arithmetic.

1.30 The Effects of Best-practice Acoustical Design



Notes:

However, existing research into the effects of best-practice acoustical design within a space suggests that a holistic approach to addressing the issue of acoustical comfort in the built environment is achievable.

Adding mass and glazing to partition elements, sealing gaps at connections and doors and providing airspace between enclosed spaces bolsters sound privacy and increases occupant comfort. Replacing areas of hard surfaces in a space with absorptive materials can reduce reflected sound energy and better facilitate acoustical privacy or, conversely, improve speech projection. Consistent background noise levels can be introduced into a space using a sound masking system, thus improving the signal-to-noise ratio in favor of acoustical privacy between occupants.

1.31 Flooring Examples

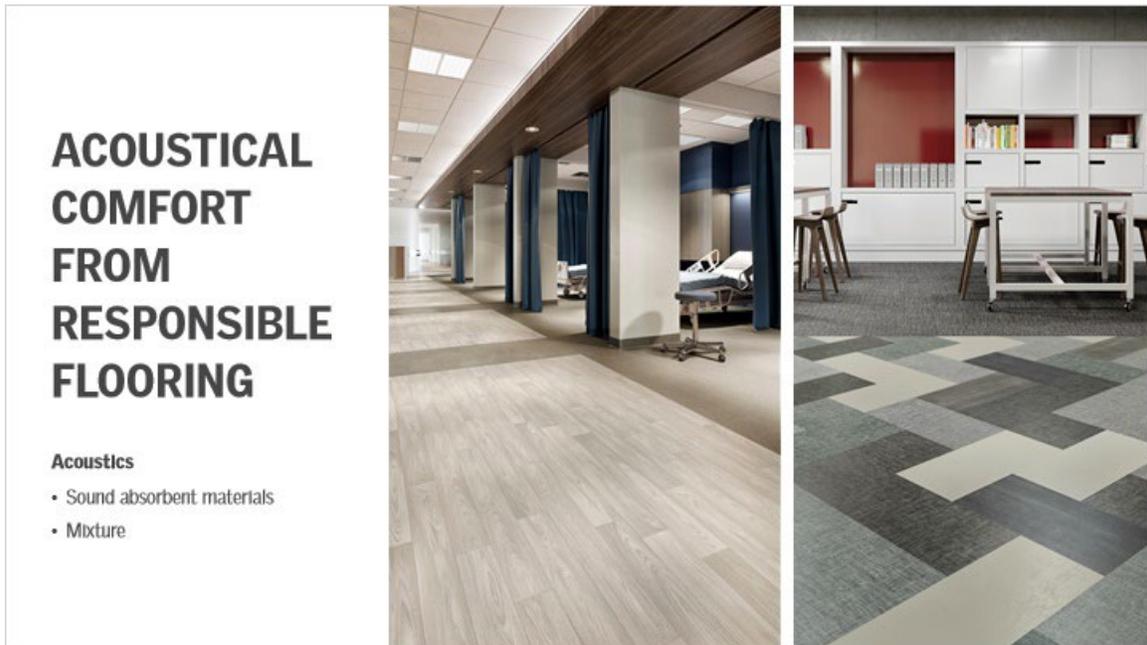


Notes:

Examples of flooring- Recognizing that flooring plays a large part in sound control and different options, we are always striving to provide multiple options. For example, cushion backed carpet tile offers substantial moisture management, sound reduction and enhanced comfort under foot. Noise Reduction Coefficient = 0.25; carpet tiles absorb 25% of ambient sound, performs 2x better in reducing sound transmission compared to hard surfaces. Flooring is comprised of a lot more than just carpet, which is why leading manufacturers have created sound control in hard surface, on LVT, with loose lay options.

In particular with physical comfort, providing cushioned flooring in areas that require standing or walking for extended periods of time to reduce discomfort, foot and joint pain, and inflammation.

1.32 Acoustical Comfort from Responsible Flooring



Notes:

Noise control is an issue in nearly all work environments. However, not all noise is detrimental to productivity (Hok, 2013). Noise over which an employee has an element of control is less distracting to that employee (Kjellberg, Landstrom, Tesarz, Soderberg, & Akerlund, 1996). Designers can control noise by absorbing it with fabrics and carpets, by blocking it with furniture, panels, or partitions, and by covering it.

1.33 Biophilic Design



Notes:

Biophilia is humans' innate desire to connect with the natural World.

Biophilic Design uses elements from nature in buildings to foster our connection with the environment. This includes daylighting, windows with views, patterns found in nature, water features, indoor plants, and natural elements like brick and wood. Building siting, orientation, massing, fenestration, and space planning are ways of incorporating this design practice, which can improve performance and wellbeing of occupants.

1.34 Biophilic Design Benefits

BIOPHILIC DESIGN BENEFITS

Connecting occupants back to nature means wellness:

- Faster learning rates
- Improved performance
- Increased happiness and focus
- Improved retention
- Greater ability to cope with stress
- Plants improve indoor air quality
- Save on cost from absenteeism
- Naturally lit spaces save on energy expenses



Notes:

Biophilic design strategies have proven benefits for the people inside:

- Faster learning rates
- Improved performance
- Increased happiness and focus
- Improved retention
- Greater ability to cope with stress
- Plants improve indoor air quality
- Save on cost from absenteeism
- Naturally lit spaces save on energy expenses

1.35 Impact of Biophilic Design Flooring



IMPACT OF BIOPHILIC DESIGN FLOORING

Biophilic design & flooring

- Natural fibers
- Wood
- Tile with natural patterns
- Color

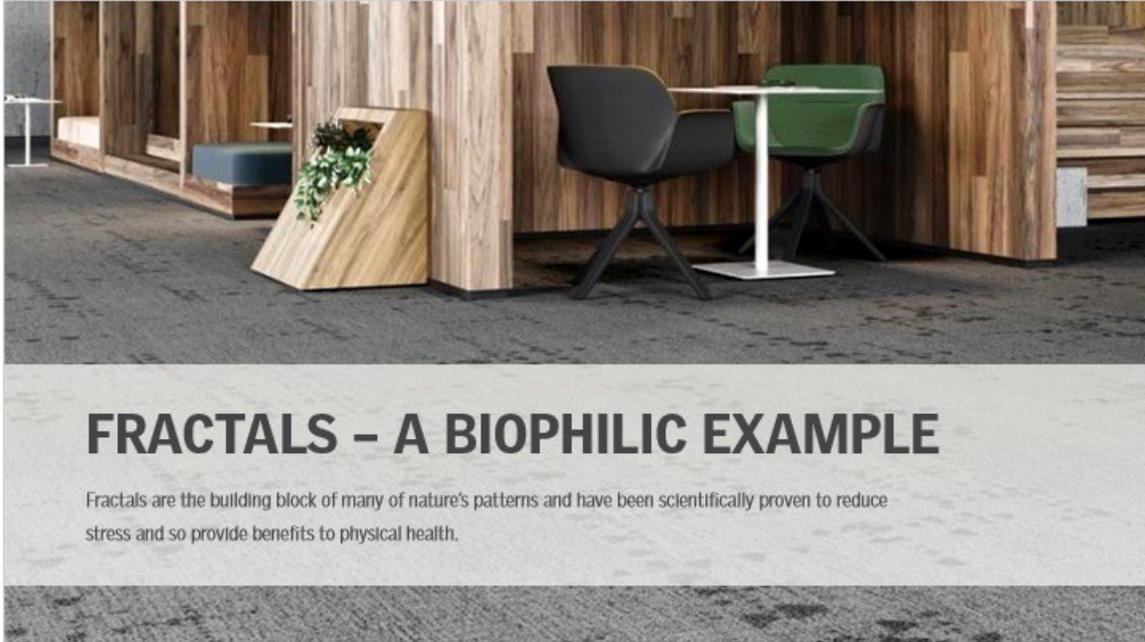
Notes:

Flooring selection plays a key role when considering a design plan to increase employee engagement and wellness.

Access to nature, views, and daylight address the innate human desire to be close to nature – biophilia. Large open windows and outdoor areas give employees access to natural daylight and views that provide a sensory charge. Sensory change and variability provides sensory stimulation that helps employees stay alert throughout the day. Access to daylight and views to nature; added texture with natural materials; and color or graphic changes in large spaces help to stimulate the senses while keeping distraction at bay. Color as a design element, enhances productivity in some interesting ways.

From a biophilic lens - one which seeks to better connect occupants to the surrounding environment – flooring has unique possibilities. Natural fibers or wood can be installed to bring elements of nature into the built workspace. Tiles with natural patterning can have the same effect. And flooring utilizing color cues can support the mood and tasks within designated spaces.

1.36 Fractals – A biophilic Example



Notes:

As the building blocks of nature's patterns, fractals have been proven to reduce stress and provide physical health benefits. Integrating fractal patterns into carpet designs allows Relaxing Floors to bring those qualities to interior spaces, thereby taking its place as a culmination of art, science and human design.

1.37 Additional Positive Impact from Responsible Flooring

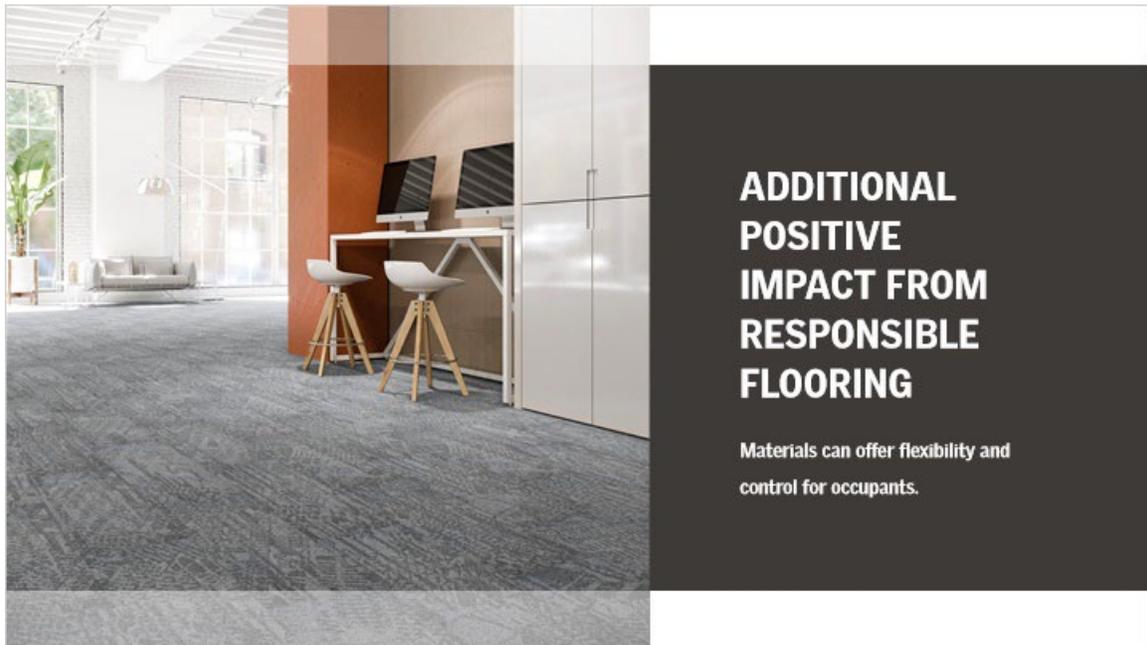


Notes:

Occupant engagement, and in particular, employee engagement has received attention from academic researchers dating back to the 1960's. Goffman (1961) offered an early definition of "engagement" that operationalizes it as investment of attention and physical effort in a particular role.

Taken as a whole, definitions of employee engagement suggest that an employee's involvement, physical and psychological, with his or her work and workplace is paramount. This is also true for academic and healthcare environments. The better holistic support created by the environment, the better the outcome for the occupant and organization.

1.38 Additional Positive Impact from Responsible Flooring

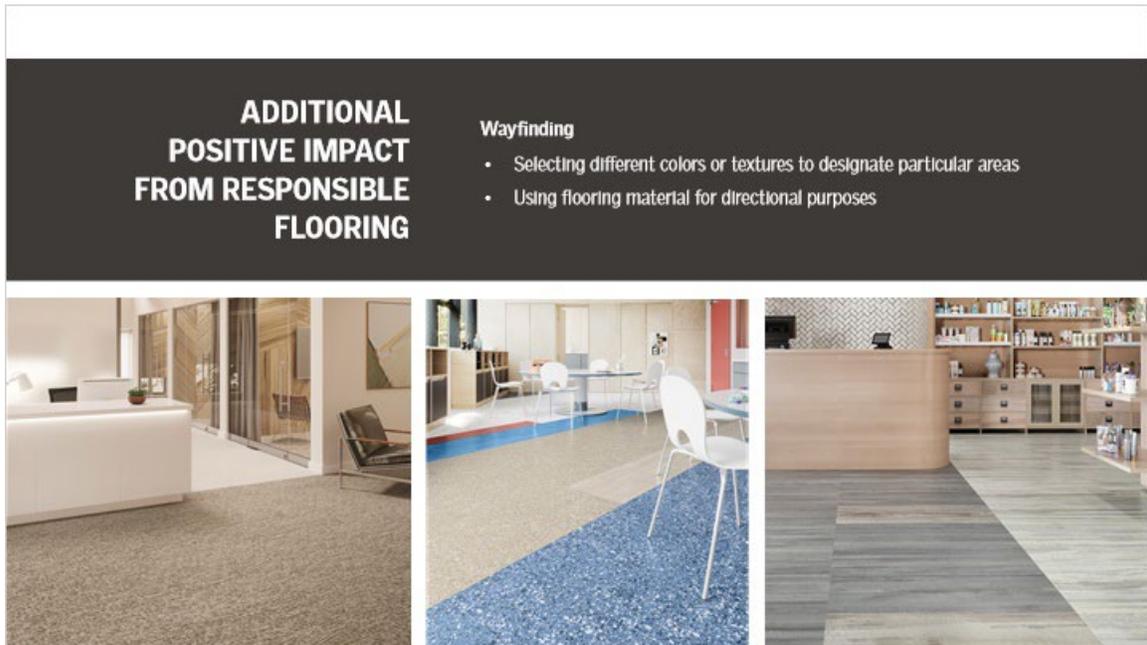


Notes:

Human wellness in the physical workspace is related to opportunities for engagement, motivation, satisfaction, and performance.

When the workspace is designed and designated in a way that creates a supportive environment for employees to invest in their work and in their company, it demonstrates a respect for the employees (Sodexo, 2015). Feelings of respect can then trigger those drivers of engagement, particularly employee growth and empowerment, leading to increased innovation and productivity. Students learn better. Patients in healthcare environments experience less stress and heal more quickly.

1.39 Additional Positive Impact from Responsible Flooring

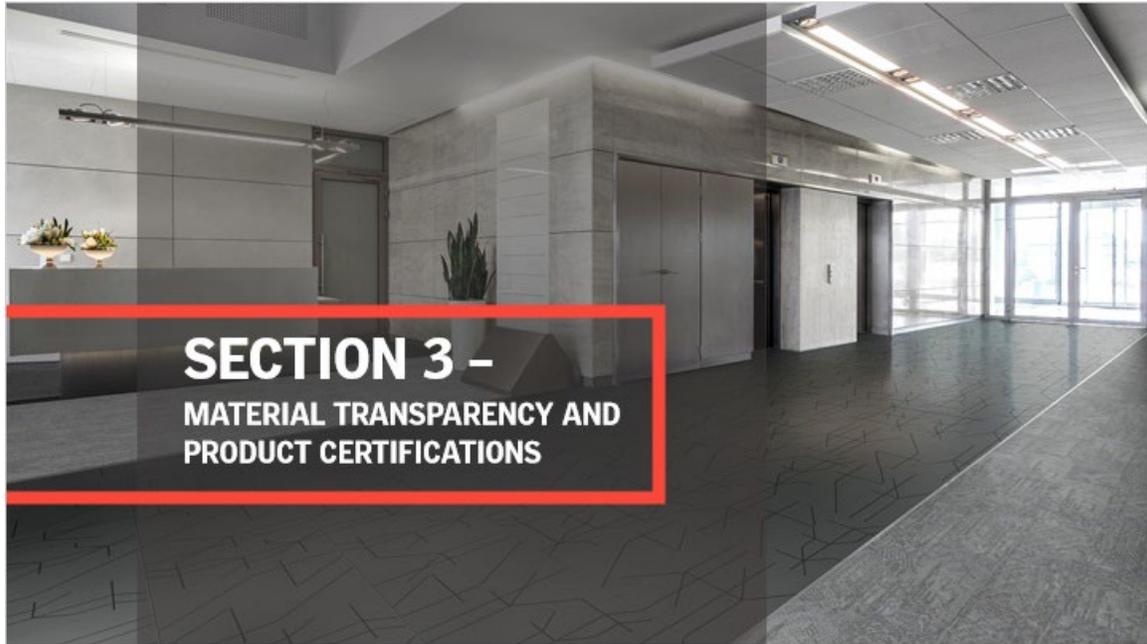


Notes:

Flooring can also be used as a wayfinding tool. Wayfinding is the use of colors or graphics to convey location or direction within a space. Wayfinding is a dynamic relationship with the workspace (Passini & Arthur, 1992). Different colors or textures can be used to identify team areas or corporate branding. Wayfinding can also be achieved through differing lighting patterns and interior architecture.

Flooring can be selected to designate team areas or neighborhoods, to lead employees to private or collaborative spaces, or to lead employees to outdoor access points. Different colors, textures, or patterns of flooring are effective ways to meet this goal.

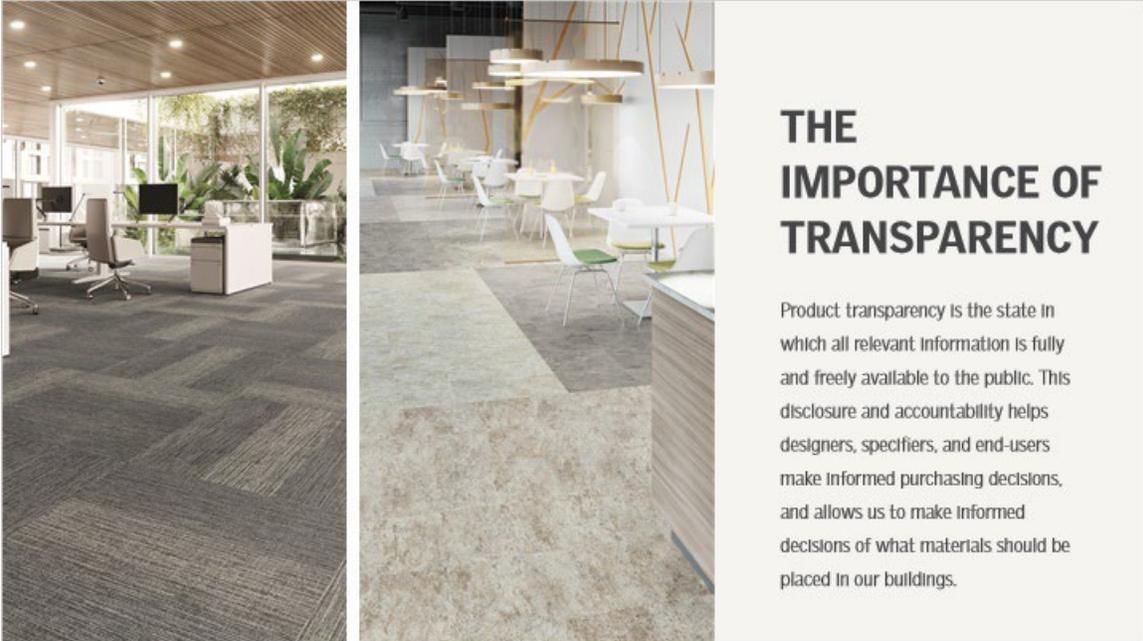
1.40 Section 3



Notes:

Section 3: Material Transparency and Product Certifications

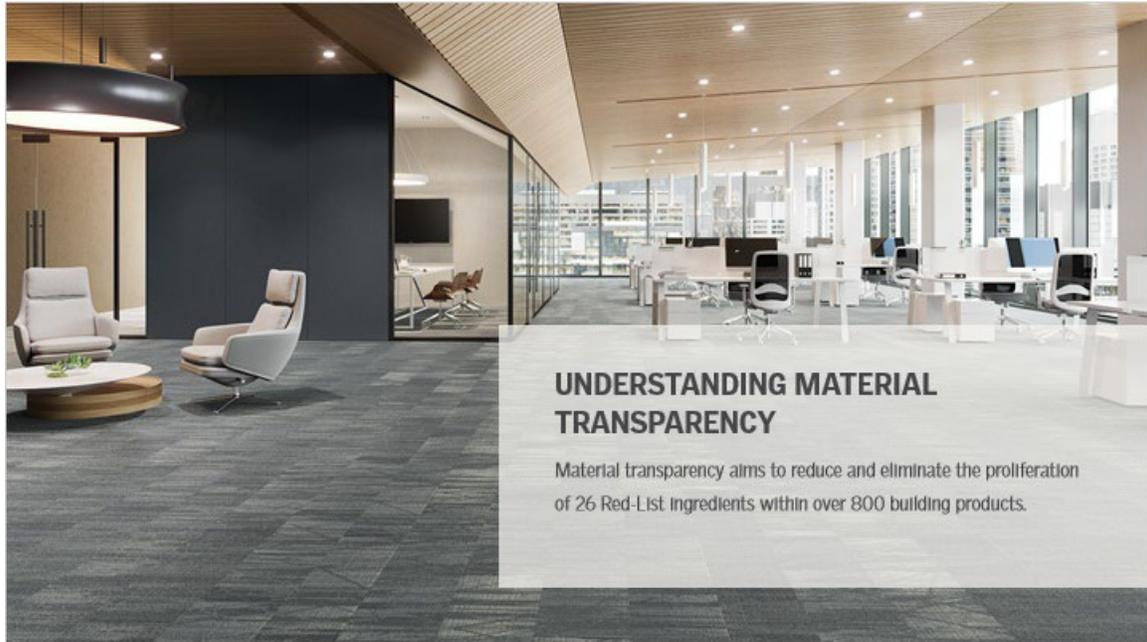
1.41 The Importance of Transparency



Notes:

Specifying appropriate flooring is a complex project, requiring knowledge about the comfort, health, and safety of occupants and an understanding of how to control common indoor pollutants to provide quality indoor air. Determining the floor material type is the beginning of a process that includes how to mitigate exposure to VOCs and minimize the impact of cleaning and maintaining the flooring. There are numerous programs, organizations, and certifications that can assist in determining the right flooring for the building, occupants, and activities.

1.42 Understanding Material Transparency



Notes:

If all the elements in a building add together toward a greater sustainability goal – the goal of TOTAL wellness -- then knowing what is in each product entering that equation is vital.

Do the products selected support your institutional goals? Will these elements work together to achieve sustainability goals? Do they add together to create the best outcome for the building, the environment, and the occupant?

Red-List ingredients are the “worst in class” additives that have known health side effects, identified by the International Living Future Institute. Material transparency aims to reduce and eliminate the proliferation of 26 red-list ingredients within over 800 building products.

1.43 Material Health & Transparency



MATERIAL HEALTH & TRANSPARENCY

Material Health – the ingredients that go into a product and the potential health and environmental degradation that could occur as a result from inferior ingredients

Chemicals of Concern – material components that are found on various hazard listings (i.e. ILFI's Red-List, Perkins + Will's Precautionary List, Healthcare without Harm's Flooring Criteria) and include, but are not limited to, polyvinyl chloride (PVC) and coal fly ash

Red-List – "worst-in-class" chemicals of concern that are ubiquitous to the built environment

Material Optimization – replacing harmful chemicals/ingredients with "healthier" substitutions

Transparency – providing information that is fully and freely available to the public

Notes:

First let's start by going over a lot of common terminology we see and hear when talking about material sustainability.

Material Health we'll define as the ingredients that go into a product and the potential health and environmental degradation that could occur as a result from inferior ingredients. Many of you are probably familiar with older concerns on material health as it relates to asbestos and lead. Technology's prevalence has not only led people to become more conscious of inferior product inputs in common products, but it also gives them the power to easily find alternative products if adverse to certain information. Many industries are experiencing increase in interest of material health such as flooring, furniture, cosmetics, and toiletries. When talking about material health we're looking for chemicals of concern in products such as PVC and Coal Fly Ash are common no-nos. Chemicals of concern are defined on many hazard listings like ILFI's Red-List (which we talked on some last week), Perkins & Will's Precautionary List, and Healthcare without harm to name a few. As described from last week, Red-List refers to the listing created by International Living Future Institute that is comprised of chemicals of concern that are ubiquitous to the built environment.

How to manufacturer's address these bad chemicals and ingredients?

Material Optimization is how, where harmful ingredients/chemicals are replaced with "healthier substitutions". This process is easier said than done. It takes lots of research and experimentation with formulas sometimes to get adequate/similar performance from replacing long-time used ingredients. Some inputs still do not have adequate replacements for certain products, but many times material optimization can be readily met because old formulations were never questioned in the first place, not because it was impossible to do so.

All of this brings us to Transparency, which is providing information that is fully and freely available to the public. In the sustainable building world, transparency is asked beyond material ingredients – transparency can be asked of company governance and facility environmental compliance.

1.44 ILFI Declare

Declare.

Final Assembly: Glasgow, VA, USA
Life Expectancy: 15 Years
End of Life Options: Take Back Program (Various Locations), Recyclable (100%)

Ingredients:
Coating: Limestone, Ethylene-Propylene Copolymer, Butadiene Acrylate, Tackifier, Propylene Homopolymer, Polyethylene, Ammonium Lauryl Sulfate, Carbon Black
Amorphous, Sodium Polyacrylate Thickener, Ethylene Maleic Anhydride Copolymer, Calcium Carbonate; Primary: Polyethylene Terephthalate, Propylene Homopolymer;
Scrim: Filament Glass Fibers, Modified Acrylic Copolymer; Yarn: Nylon 6, Nylon 6,6, Titanium Dioxide; Topical: 2-Propenoic Acid, 2-Methyl-, Butyl Ester, Polymer with Butyl 2-Propenoate and Methyl 2-Methyl-2-Propenoate, Potassium Lauryl Phosphate, 4,4'-Dihydroxydiphenylsulfone- Formaldehyde-p-Phenolsulfonic Acid Copolymer; Dyes: Red Colorant, Yellow Colorant, Black Colorant, Blue Colorant, Orange Colorant, Red Colorant, Yellow Pigment

Living Building Challenge Criteria:
DPM: 3000 Ex: 01 NOV 2018
VOC Content: N/A VOC Emissions: CDPH Compliant
Declaration Status LBC Red List Free
 LBC Compliant
 Declared

INTERNATIONAL LIVING FUTURE INSTITUTE™ www.declareproducts.com

DECLARE. DISCLOSES PRODUCT INFORMATION, PROMOTING TRANSPARENCY.

The bottom of a Declare label can attest to a product's status under the Living Future Institute's Living Building Challenge (LBC) criteria so our products can further disclose:

- If Volatile Organic Compounds (VOC) are present and/or CDPH compliant
- Being Red-List Free (containing no worst-in-class harmful materials)
- LBC Compliancy (There may or may not be red-list ingredients and have a temporary exception)
- Declared (If a product contains a known Red-List ingredient, it is recognized and disclosed by manufacturer)

Notes:

The ILFI Declare certification is process for disclosing product ingredients in a transparent way, allowing manufacturers an opportunity to connect with consumers. For designers, the Declare product database streamlines material specification and certification for sustainable design. The ILFI Materials Red-List is a chemical guide that calls out chemicals of concern with a description and links to additional information. The Red-List contains the worst in class materials prevalent in the building industry. The chemicals on the Red-List are: 1) polluting the environment, 2) bio-accumulating up the food chain until they reach toxic concentrations and 3) harming construction and factory workers.¹⁶ Responsible manufacturers are taking major steps to eliminate Red-List chemicals from their manufacturing processes.

1.47 Flooring Declarations and Certifications



Notes:

NSF/ANSI 140 Standard is a sustainability assessment for carpet. The standard quantifies the reduction of the environmental footprint of carpet, including landfill diversion, carbon dioxide emissions, energy consumption, waste generation, water usage, and hazardous air pollutants per square yard of carpet; and identifies economic, environmental, and social benchmarks throughout the supply chain.

1.48 Flooring Declarations and Certifications



FLOORING DECLARATIONS AND CERTIFICATIONS

Carpet and Rug Institute Green Label Plus

Notes:

The Carpet and Rug Institute (CRI) Green Label Plus is a standard for indoor air quality program for carpet, adhesives, and cushion. The purpose of the program is to ensure that customers are purchasing the very lowest emitting products on the market. The GLP testing program meets or exceeds all regulatory requirements for emissions, including CA 01350, and is accredited by the American National Standards Institute (ANSI) to ISO 17065 specifications.¹³

Products are tested by Underwriter Laboratories (UL) using the ASTM D5116-Standard Guide for Small-Scale Environmental Chamber Determinations of Organic Emissions from Indoor Materials/Products. Additionally, GLP-certified products, including carpet, are recognized by the U.S. Green Building Council's LEED version 4 standard as a Low-Emitting Materials Third Party Certification and can contribute one point to a building's LEED score.¹³

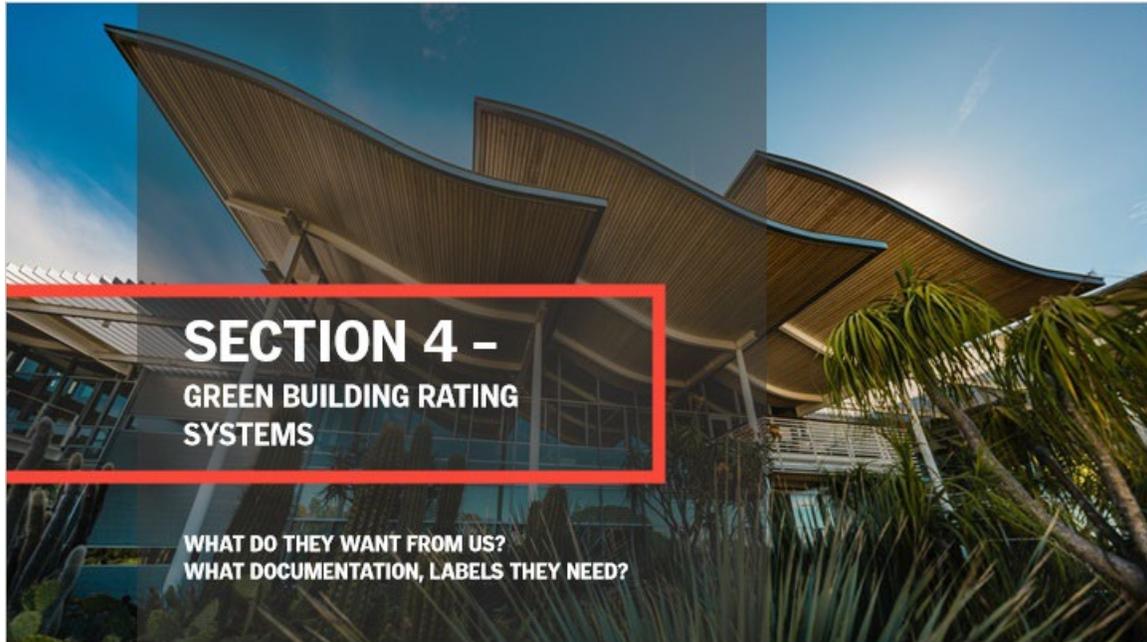
1.49 Flooring Declarations and Certifications



Notes:

FloorScore, developed by the Resilient Floor Covering Institute (RFCI) along with Scientific Certification Systems (SCS), is a program designed to test and certify resilient flooring materials and adhesives. It is based on compliance with indoor air quality emission requirements adopted in California. Recognized by a variety of environmental programs, FloorScore certified products can contribute to better indoor air quality.

1.50 Section 4



Notes:

So we've talked about of the very informative sustainability concepts, labels and documentation? So what does this have to do with green building? We are going to look at a few of the most widely known green building rating systems. What do these rating systems want from us? How can we apply to their requests?

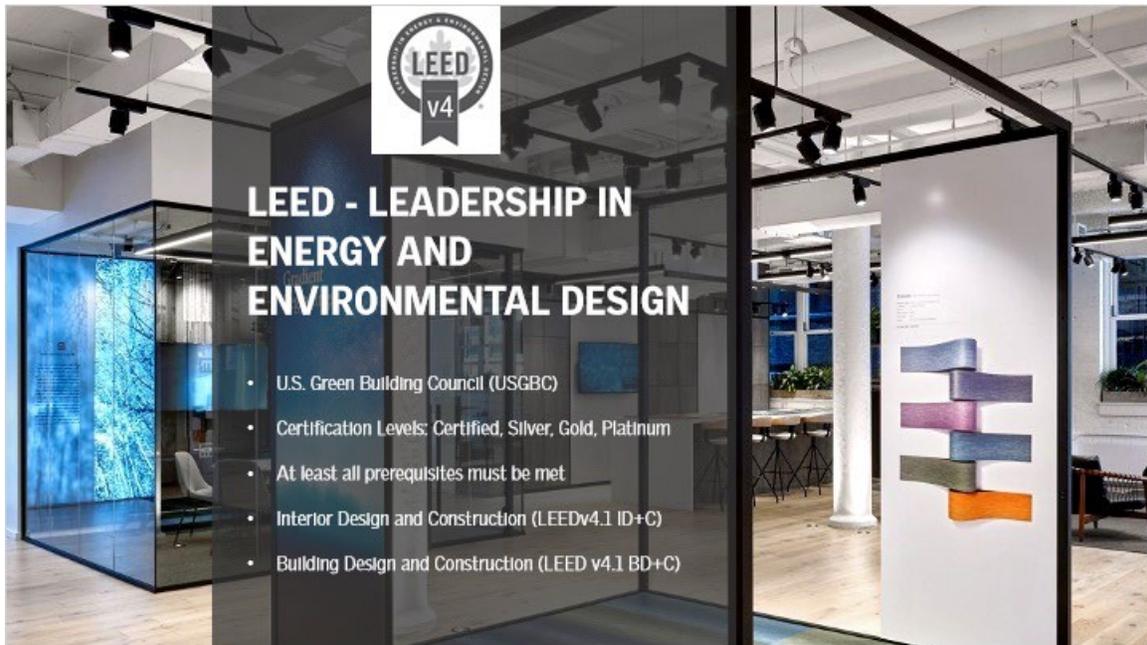
1.51 LEED v4.1 BD+C

Sustainable Sites (SS)
Location and Transportation (LT)
Water Efficiency (WE)
Energy & Atmosphere (EA)
Materials & Resources (MR)
Indoor Environmental Quality (EQ)
Innovation (IN)

Notes:

There are multiple sections to LEED v4.1 BD+C, including integrative Process and Project Planning, water efficiency, energy and atmosphere, materials and resources, location and transportation, sustainable sites, indoor environmental quality, and regional priority. Each category listed here will be broken down into prerequisites (required) and credits (optional for higher certification level).

1.52 LEED



Notes:

LEED, or Leadership in Energy and Environmental Design, is the most widely used and recognized green building certification standard. It is administered by the U.S. Green Building Council (USGBC). LEED provides a framework to create healthy, energy efficient, cost effective buildings for a varying amount of building and purpose types. There are 4 levels of LEED certification: LEED Certified, Silver, Gold, and Platinum. All prerequisites achieved attain a LEED certified building and the amount of optional credits pursued and achieved can earn one a higher certification level. The subset of certification we focus on most is Interior Design and Construction (ID+C) and Building Design and Construction (BD+C).

1.53 LEED v4.1

**LEED V4.1 BD+C / ID+C
MATERIALS AND RESOURCES (MR)**

Credit Potential:

- **Building Product Disclosure & Optimization - Environmental Product Declarations**
 - 20 products from 5 manufacturers
 - Lifecycle Assessment (LCA)
 - EPDs
 - Optimization available
- **Responsible Sourcing Raw Material**
 - Bio-based
 - Reuse
 - Recycled Content
 - 25% value of total cost
- **Material Ingredient Disclosure**
 - HPDs
 - Declare
 - ANSI/BIFMA - furniture
 - 20 products from 5 manufacturers

Notes:

Section Materials and Resources (MR) in the BD+C chapter of LEED v4.1 contains multiple credits requesting information we discussed earlier.

Building Impact Reductions they ask for Lifecycle Assessments or EPDs to fully understand the impact that products will have on the overall building footprint. Having products with an EPD to comply with this credit.

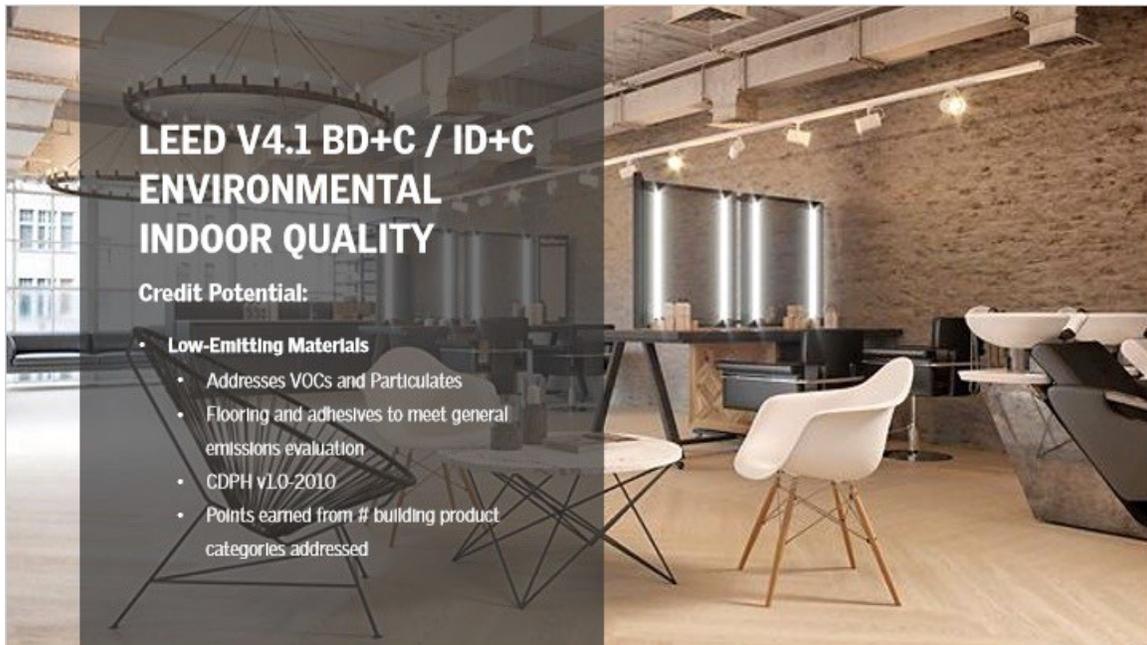
For EPDs, our products EPDs cannot help earn credits alone - LEED asks for 20 EPDS from at least 5 different manufacturers.

For Credit "Responsible Sourcing of Raw Materials" our products can help earn credits from their recycled content. This is available through Option 2 of Leadership Extraction Practices. Recycled content will be evaluated for 25% of total cost of permanently installed products. Post-consumer recycled content plus ½ pre-consumer recycled content.

Products meeting recycled content criteria are valued at 100% of their cost for the purposes of credit achievement calculation.

Lastly in the MR category we can comply in the Material Ingredient Disclosure credit. This is also an area where teams must have 20 different products from 5 different manufacturers.

1.54 LEED v4.1



Notes:

The section entitled Environmental Indoor Quality (EQ) has prerequisites that concern indoor air quality performance that addresses ventilation and comfort, preventing on-site smoking, and requiring minimum acoustic performance that addresses noise.

Credits in Environmental Quality section include, but are not limited to, enhancing and assessing Indoor Air Quality, promoting occupant connection to nature through quality views, integrating daylight to promote health and lower dependence on electricity, enhancing thermal and acoustical performance, and requiring low-emitting materials from a variety of building products used in a project. The credit we can assist with in the EQ category is the Low-Emitting Materials one that addresses VOCs in indoor environments as to minimize chemical contaminants that reduce air quality.

The credit asks for general emissions evaluations on a number of different permanently installed product types like flooring, adhesives and sealants, furniture, paints, and wood. These are considered categories in the credit and points are awarded to teams by the amount of categories they are able to provide emission testing for. General emission testings will confirm compliance with CDPH v1.0-2010 as asked for in LEED.

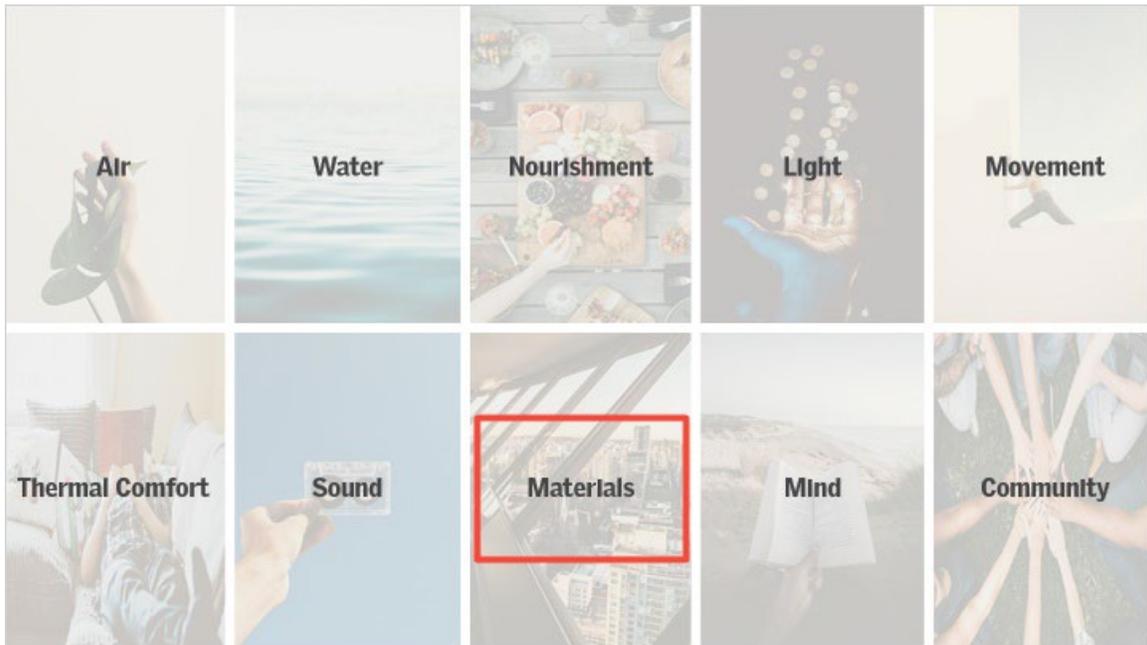
1.55 WELL v2 Overview



Notes:

WELL, created by Delos Living, and administered by International WELL Building Institute, is the only green building standard to solely promote optimal human health and performance within the built environment.

1.56 WELL v2 Standard



Notes:

The new WELL v2 standard sets performance requirements in 10 categories relevant to occupant health in the built environment – Air, Water, Nourishment, Light, Movement, Thermal Comfort, Sound, Materials, Mind, and Community. These 10 categories, or concepts, are comprised of universal preconditions and flexible optimizations for a building to achieve a range of certification. There is a WELL v1 that projects can still apply for, but the standard was reconfigured to make the implementation more equitable for any type of building throughout the world. WELL Certified™ spaces can help create a built environment that improves the nutrition, fitness, mood, sleep patterns, and performance of its occupants. There is a familiar concept in here that also is mentioned in other green building rating systems: water. However, because WELL is solely focused on human interest, water is addressed for quality and availability vs efficiency in operations.

Each of the 10 concepts defines the standard and then explains how to achieve the specific features. So here you have overarching concepts and features that make up the concept, with features either being Prerequisites that must be achieved or Optimizations that earn extra points to teams. Within the 10 concepts, there are 110 points available to each project. One category, MATERIALS, specifically deals with material ingredients and transparency.

1.57 WELL v2 Materials Concept



Notes:

The Materials concept contains preconditions that include restricting lead and asbestos, limiting mercury, abating hazardous materials like asbestos and PCBs, and providing an assessment of outdoor structures for harmful ingredients. Points can be earned for higher certification in the Materials concept controlling emissions from indoor building materials, reducing hazardous materials in products, and purchasing and installing products with ingredient disclosures via Declare, HPDs, or other foreign equivalents. There are 14 features within the materials concept. Many features cover waste and outdoor maintenance and structures. The features from this concept we will focus on are X10-X14. Let's dive into each one and see how we comply with this human-based standard WELL.

1.58 Feature 10



FEATURE 10 IN MATERIALS CONCEPT 'VOLATILE COMPOUND REDUCTION'

PT1: Volatile Organic Compounds; Halogenated Flame Retardants at less than 100 ppm or extent allowed by local code:

- 20% by cost newly installed

PT2: Semi-Volatile Organic Compounds:

Total phthalates at less than 100 ppm or extent allowed by code:

- 20% by cost newly installed

PT3: Renovation, Repair, Replacement Requirements

Notes:

Optimization Feature 10 "Volatile Compound Reduction" within the Materials Concept.

This feature through parts 1 through part 3 looks at volatile organic compounds and the future renovation, repair, and replacement requirements as it relates to said VOCs.

Part 1 is evaluating halogenated flame retardants and requires they are present less than 100 ppm or extent allowed by local codes as some regions are more strict on these material additions. This again, like in LEED, is a feature that our products alone cannot help satisfy. 20% by cost of permanently installed products must meet the criteria.

Part 2 evaluates total phthalates. Must be less than 100 ppm or extent allowed by local code. Same as part 1 this is required for 20% of total cost of permanently installed products to achieve.

Part 3 is mostly on the project team to have plan in place for renovation, repair, and replacements of products.

1.59 Feature 11 & 12



**FEATURE 11 IN MATERIALS CONCEPT
'LONG-TERM EMISSION CONTROL'**

PE1: Furniture Emissions
PE2: Flooring and Insulation Emissions:
Must meet emission thresholds CDPH v1.0-2010 or more recent version

**FEATURE 12 IN MATERIALS CONCEPT
'SHORT-TERM EMISSION CONTROL'**

PE1: Manage Product Emissions: Adhesives, Sealants, paints, and Coatings
Meet VOC emission Thresholds in CDPH v1.0-2010 or more recent version
Points earned by volume of compliance

PE2: Manage Product Content: Adhesives, Sealants, Paints and Coatings. VOC
thresholds in SCQAMD Rule 1113 2011 or Rule 1168 2017. % of cost earns points.

Notes:

Optimization Feature 11 "Long-term Emission Control."

Part 1 of this feature is for furniture.

But part 2 is where our products can shine. In part 2 it is looking at flooring specifically (along with insulation). This part requires VOC emission thresholds are met in compliance with CDPH v1.0-2010 or the more recent version. The more recent version would be v1.2-2017 which we do meet and have on our certificates.

Optimization Feature 12 "Short-term Emission Control" within the Materials Concept.

This feature is also looking at VOC emissions but for adhesives, sealants, paints, and coatings inside building.

Naturally we will only be able to provide documentation for adhesives. Points are earned by % of total volume of products.

Just like the last feature, this one requires that we meet emission thresholds of CDPH v1.0-2010 or newer version for adhesives.

Pt 2 looks for product content compliance with SCAQMD Rule 1113 2011 or Rule 1168 2017.

1.60 Feature 13



Notes:

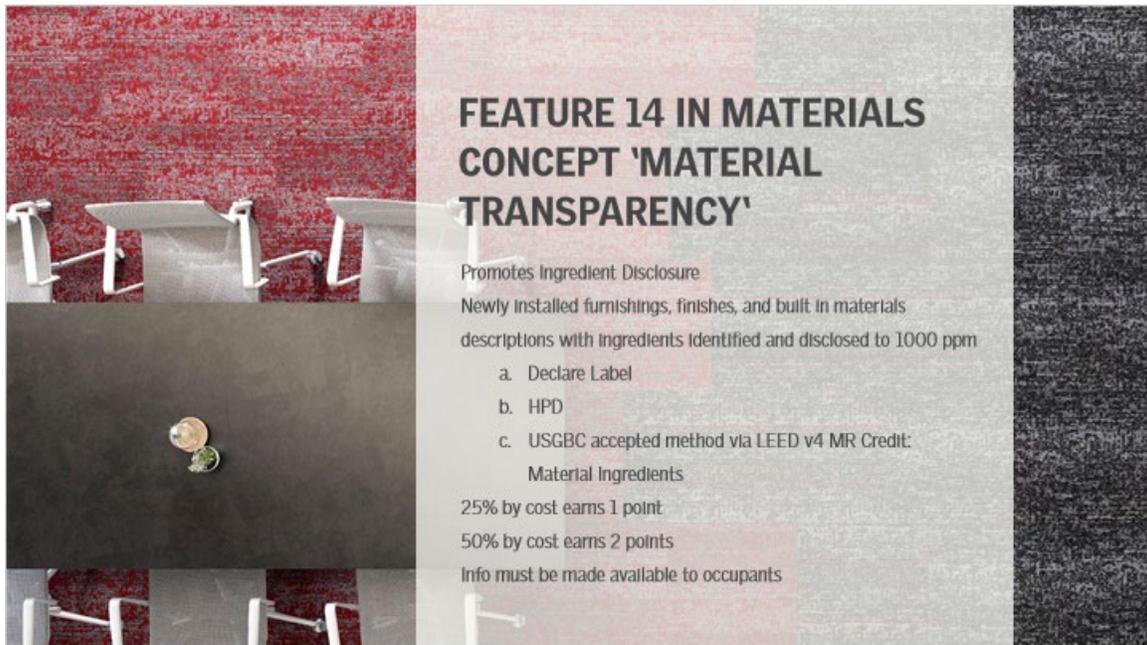
Optimization Feature 13 “Enhanced Material Precaution” within the Materials Concept, Enhanced Material Safety – There is only 1 part to this feature and it can be achieved for projects if newly installed furniture and materials complies with some combination of following programs. This includes flooring.

- Declare Label: Red-List Free or LBC Compliant
- No Greenscreen benchmark 1, List Translator 1, or List Translator Possible 1 substances over 1000 ppm
- Cradle to Cradle Material Health Certified
- Living Product Challenge Label

15% compliance by cost earns 1 point

25% compliance by cost earns 2 points

1.61 Feature 14



Notes:

Optimization Feature 14 in Materials Concept, 'Material Transparency' promotes ingredient disclosure.

Newly installed furnishing, finishes, and built-in materials have some combination of materials descriptions with ingredients identified and disclosed to 1000 ppm.

- 1.) Declare Label,
- 2.) HPD, or
- 3.) Any method accepted in LEED v4 BPDO, Material Ingredients Option 1: Material Ingredient Reporting

25% by cost earns 1 point

50% by cost earns 2 points

1.62 Flooring

FLOORING

"Flooring contributes to such a huge footprint on a building. Especially in interiors, renovation and tenant improvement projects flooring plays a vital role. Building products impact the indoor environment which in turn impacts human health. From lifecycle standpoint, products that are durable require to be replaced less often thus extending need for product to be going to landfill than some of the less performing products. Products that are carbon neutral will ensure that overall buildings carbon footprint is less. The building industry contributes to 40% of the global greenhouse gas emissions therefore, choosing the right product is very important from sustainability standpoint."

Notes:

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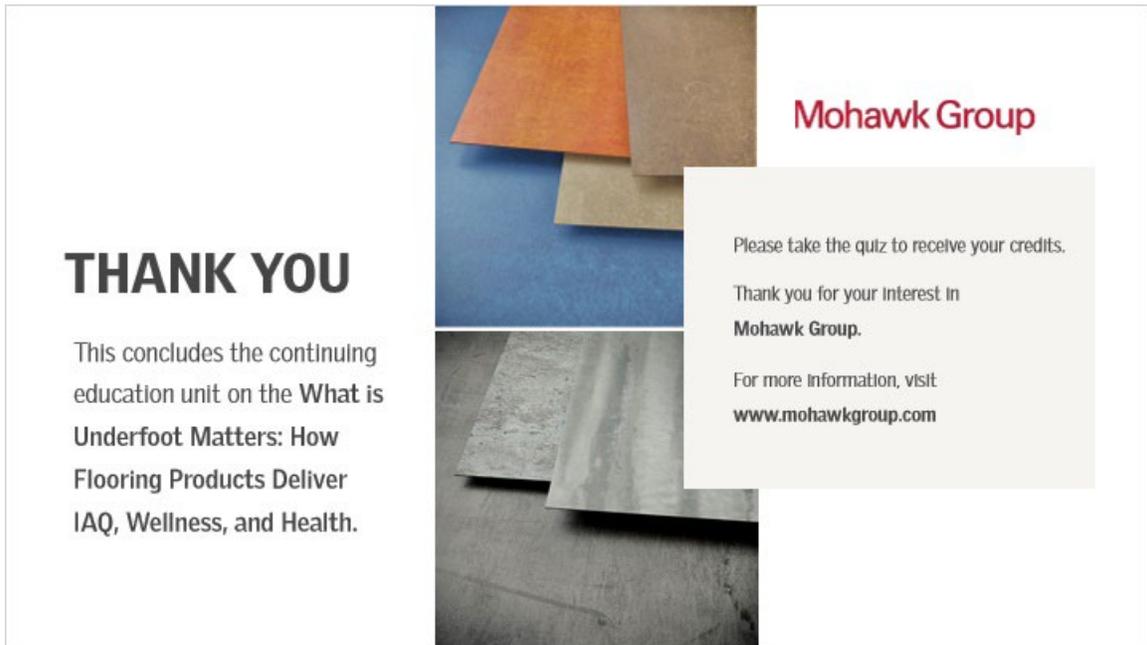
1.63 Believing in Better



Notes:

Responsible, sustainable flooring offers an innovative product with reduced environmental and social impacts. Good flooring has long-reaching impacts. It provides a critical piece of the sustainable puzzle, promoting and protecting wellness for the building, its occupants, and the surrounding environment.

1.64 Thank You



THANK YOU

This concludes the continuing education unit on the **What is Underfoot Matters: How Flooring Products Deliver IAQ, Wellness, and Health.**

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