

Health, Wellness & Specifying Luxury Vinyl Tile

Contents

- 01** WELL Building Standard®
- 02** Luxury Vinyl Tile
- 02** Healthy Building Considerations and LVT
- 03** Specifying LVT
- 03** Conclusion
- 04** References

Today, Health-conscious designers, building owners and facility managers are paying more attention and asking more questions than ever before about products that they are purchasing as interest in the health and wellness aspects of the built environment continue to grow.

This paper focuses on one of the fastest growing categories in the built environment – luxury vinyl tile (LVT) flooring – and details how this product can contribute to the WELL Building Standard.

WELL Building Standard®

While green building standards have incorporated elements of health and wellness through credits offered in Indoor Environmental Quality sections, the WELL Building Standard or WELL™ is the first building standard to focus solely on the health and wellness of building occupants.

The WELL Building Standard is organized into seven categories of wellness, as shown in Figure 1, called Concepts: Air, Water, Nourishment, Light, Fitness, Comfort and Mind (IWBI, 2018). Each Concept is comprised of Features, which are further divided into Parts and Requirements.



Figure 1: Seven categories of wellness in WELL™

The WELL Building Standard is composed of 102 Features that are applied to each building project. Because every Feature is intended to address specific human health, comfort or knowledge aspects, the WELL Building Standard is ascribed to the human body systems that are intended to benefit from its implementation. For example, the VOC Reduction Feature which is intended to reduce environmental pollutants in air is ascribed to the cardiovascular system as this contributes toward good cardiovascular health (IWBI, 2018).

Each WELL Feature is based on an extensive evidence based design (EBD) peer reviewed research which documents the effects of indoor spaces on individuals. The Features are further subdivided into Parts, tailored to three specific building types: 1) Core and Shell, 2) New Construction and 3) Major Renovations.



Figure 2: Each WELL Feature is ascribed to a human body system such as the cardiovascular system

In order to achieve the requirements of the WELL Building Standard, the space must undergo a

process that includes an on-site assessment and performance testing by a third party. Similar to other green building rating systems, the WELL score is based on mandatory component called a Precondition and an optional component called an Optimization. Every project must achieve all of the Preconditions. If they do, the project achieves 5 points and can be certified at the Silver level. As shown in figure 3, projects that receive all of the Preconditions and 40% of the Optimizations can be certified as Gold and projects that achieve all of the Preconditions and 80% of the Optimizations can be certified as Platinum. For Core and Shell projects to achieve compliance, all Preconditions must be met, as well as at least one Optimization from every Concept. Luxury vinyl tile can contribute to both Preconditions and Optimizations.

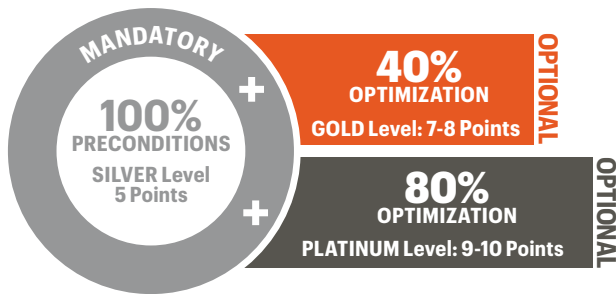


Figure 3: Summary of WELL point allocation scale

Luxury Vinyl Tile

Luxury vinyl tile or LVT is a type of resilient flooring which consists of layers with distinct functions, as shown in Figure 4. As the name implies, resilient flooring is known for its durability and recoverability from impacts associated with a both dynamic and static load. Luxury vinyl tile is the common name for Class III Solid Vinyl Tile which is defined in ASTM F1700 — Standard Specification for Solid Vinyl Floor Tile (ASTM International, 2013). Other common names include luxury vinyl plank (LVP), luxury vinyl and luxury flooring.

Luxury Vinyl Tile Classification

LVT should meet the Class III basic requirements of ASTM F1700. Class III tile is unique, because it contains a beautiful print layer protected by a clear wear layer. This wear layer can vary in thickness, but per ASTM F1700, it must be at least 20 mils thick and contain at least 90% binder content.

Binder consists of vinyl, plasticizers and additives. The binder content in the wear layer gives LVT superior abrasion resistance compared to other types of solid vinyl tile (Class I and Class II). Per ASTM F1700, Class I and Class II tile must contain on average 34% binder content. While the additional binder content increases the initial cost of the LVT, it also increases performance in terms of abrasion resistance.

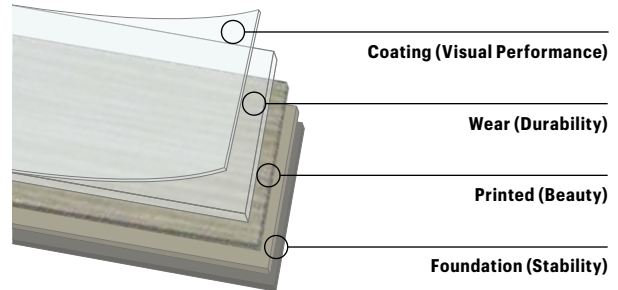


Figure 4: Layers in Class III Solid Vinyl Tile or LVT

Installation Types

LVT can be installed in several ways including: 1) locking/floating, 2) glue-down and 3) self-adhering. Self-adhering LVT products are manufactured for both the commercial and residential markets. Self-adhering products are an important consideration when jobs are time sensitive such as changing flooring in a hospital room. Glue-down products are mainly used for commercial jobs, because they can withstand heavy commercial loads better than locking or floating installations. For this reason locking/floating products are mainly used in residential construction.

Healthy Building Considerations and LVT

A summary of the WELL Features which LVT must meet in the case of Preconditions and can contribute in the case of Optimizations is shown in Table 1. These requirements are similar to other building rating systems such as Leadership in Energy and Environmental Design (LEED) or Green Globes.

Table 1: WELL Features to which LVT contributes

Feature	Title	Type	Concept
4	VOC Reduction	Precondition	Air
11	Fundamental Material Safety	Precondition	Air
25	Toxic Material Reduction	Optimization	Air
28	Cleanable Environments	Optimization	Air
88	Biophilia I - Qualitative	Optimization	Mind

VOC Reduction

Unlike LEED where the Low Emitting Materials Credit is optional, Feature 4 — VOC Reduction requires all newly installed interior flooring including LVT to meet all limits set by the California Department of Public Health (CDPH) Standard Method v1.1-2010. FloorScore is a third party certification which certifies a flooring product meets the CDPH requirements.

Cleanability

In terms of Optimizations, LVT can contribute to Feature 28 — Cleanable Environments in which Part 2 Cleanability requires that only removable rugs, removable carpet tiles or hard surfaces like LVT are allowed.

Product Ingredients

While ASTM F1700 establishes binder content for LVT, it does not limit the types of stabilizers, plasticizers or fillers. Per the mandatory requirements of Feature 11 – Fundamental Material Safety, LVT must contain no asbestos and lead content must be below 100 ppm. Similarly, to meet Feature 25 — Toxic Material Reduction, LVT limits the six ortho-phthalate plasticizers (DEHP, DBP, BBP, DINP, DIDP or DNOP) which could be found in polyvinyl chloride (PVC) to 0.01% (100 ppm). While Feature 97 — Material Transparency requires that at least 50% by cost of interior finishes and finish materials provide either a 1) Declare Label, Health Product Declaration or material ingredients disclosure consistent with LEED v4.

Biophilic Design

Another consideration when selecting LVT for healthy buildings is biophilic design, which is an emerging field that recognizes our psychological need to be around nature and life-like processes. Evidence based design has linked health and wellness benefits such as the benefits shown in Figure 5 (Cooper, 2015) to biophilic design. To support human well-being, WELL Feature 88 — Biophilia I — Qualitative requires project teams to develop a three (3) part Biophilia Plan to describe 1) how nature is incorporated into the design, 2) how nature patterns are incorporated into the design and 3) how the space interacts with nature. Feature 88 is an Optimization in the Mind Category which is

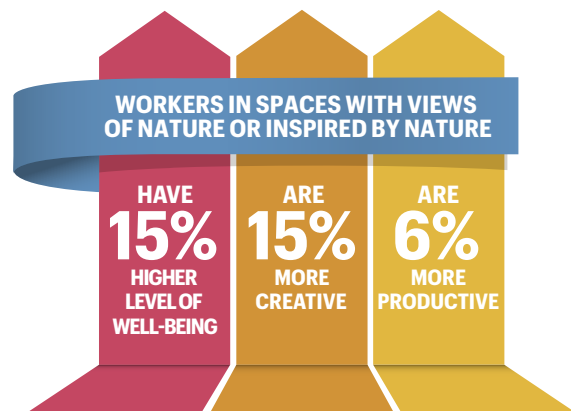


Figure 5: Benefits of Biophilic Design in office environments

ascribed to the nervous system. With beautiful and often nature inspired designs, LVT can contribute to pattern incorporation, Part

1 of the WELL Biophilia Plan as well as to Part 2, when LVT is used to create refuges or calm spaces or to invite or direct (wayfinding) occupants toward a specific space.

Specifying LVT

Not all LVT flooring is the same and assuming so could lead to issues such as maintenance challenges or owner dissatisfaction during the life of the product. So, if LVT is specified due to its high performance and beautiful design patterns, make sure that the clear wear layer is 20 mils thick and contains 90% binder content per ASTM F1700. Wear layer thickness is an issue of diminishing returns. A 20 mil gauge will adequately protect the print film without visually distorting the print image. Thicker wear layers could indent more easily and result in clouding of the printed layer.

Other consideration as shown in Table 2, may include low emitting materials, restriction on material content (e.g. ortho-phthalate or heavy metal free), recyclability or selecting material produced in countries such as the United States where mercury is not used in the vinyl supply chain.

Table 2: Specifying LVT options & considerations.

LVT Layer	Function	Options	Considerations
Coating	Visual Performance	• Ease of Maintenance • Hardness	• FloorScore • Certified Content
Wear Layer	Durability	• >90% binder • 20 mil thickness	• Disclosure • Phthalate Free • Heavy Metal Free
Print Film	Beauty	• Pattern (hide scratches)	• Manufacture Location
Vinyl Back	Stability	• Shape (square/planks)	• Recyclable

Safe production of PVC which includes a mercury and asbestos free supply chain was defined by Michael Braungart, chemist and co-founder of McDonough Braungart Design Chemistry (MBDC) and the Cradle to Cradle design, as one of the following conditions for responsible PVC: (Braungart, 2017)

- Safe PVC production
- Safe additives
- Applications
- Take-back system and recycling
- Commitment and innovation

The safe additives includes production of PVC without heavy metal stabilizers and ortho-phthalates. Best predisposed application are traceable and easily retrievable from the waste stream such as vinyl siding or flooring. Responsible PVC manufacturers should have PVC recycling programs in place and a commitment to developing innovative alternatives to PVC.

Conclusion

Health and wellness continue to grow in market relevance and rating systems like LEED and WELL are driving the human health focus. Product selection plays an important role in healthy buildings. Understanding how products are constructed and their composition is critical when selecting and specifying products. Not all products are created equally, even ones in the same category. For this reason, it is prudent to ask questions and understand the details of what you are purchasing or specifying in your healthy buildings.

References

1. ASTM International. (2013). ASTM F1700 - Standard Specification for Solid Vinyl Floor Tile. West Conshohocken, PA: ASTM International.
2. Braungart, M. and C. Wintraecken (2017). Cradle to Cradle-Breaking with conventional sustainability concepts by defining chemicals positively. Chemical Industry Digest, 46-55.
3. Cooper, G. (2015). Human Spaces: The Global Impact of Biophilic Design in the Workplace. Retrieved from humanspaces: <http://humanspaces.com/wp-content/uploads/2014/10/Global-Human-Spaces-report-2015-US-FINAL.pdf>
4. IWBI. (2018). The WELL Building Standard v1 with Q1 2018 addenda. New York: International WELL Building Institute.