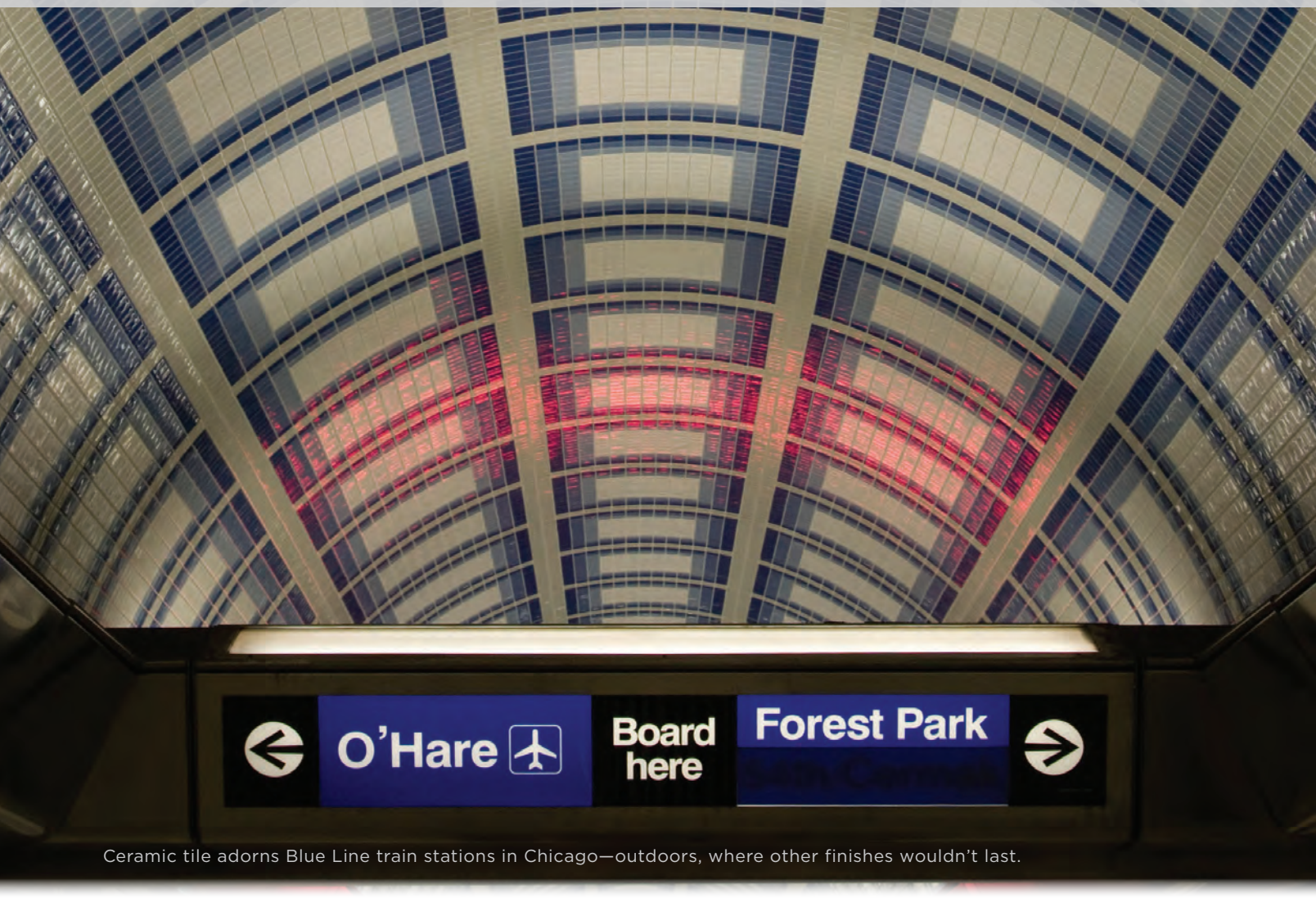
TCNA
Tile Council of North America, Inc.

TILE
THE NATURAL CHOICE

2021

Sustainability
Starts with Standards



Ceramic tile adorns Blue Line train stations in Chicago—outdoors, where other finishes wouldn't last.

Design/Build it to Last

ANSI A137 product performance standards for ceramic and glass tiles

ANSI A118 product performance standards for mortars, grouts, and membranes

ANSI A108 installation and workmanship standards

***TCNA Handbook*: installation systems for ceramic, glass and stone tile**

TCNA
TILE COUNCIL OF NORTH AMERICA, INC.

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CONTENTS

TILE
THE NATURAL CHOICE

Stands the Test of Time

Ceramic tile has been the preferred choice around the world for centuries for its inherent beauty and durability, and because the natural materials used to make tile are so abundant. And the endless design options can make each installation a unique work of art to be enjoyed for generations.

Inspires Design

Explore unlimited design and customization possibilities. Mix colors, textures, patterns, shapes and styles to make every installation unique. Get the look of wood, natural stone, wallpaper, even delicate fabrics, but with the durability of ceramic tile. And with tiles following the latest color trends, color matching is a breeze. You can even take your design to the next level. Find a manufacturer that specializes in custom mosaic murals, waterjet cutting, or hand painting.

Provides Unequaled Versatility

- Hypoallergenic
- Easy to sterilize
- Fire resistant
- Chemical resistant
- Enhanced traction products available
- Stain resistant, easy to clean
- Exteriors, including freeze/thaw climates
- Dry, wet, and submerged applications
- Durable: withstands heavy foot and wheel traffic

Delivers Robust Sustainability

Recycled Content and Waste Reclamation

Many factories are effectively closed loop facilities with zero waste, high levels of recycling, and efficient resource management.

Exceptional Life-Cycle Cost = Best Value

Ceramic tile has an exceptional life cycle. See the life-cycle cost study in this guide for data on how ceramic tile outperforms other floor finishes in terms of cost per square foot over time.

Regional Manufacturing and Raw Materials

With tile manufacturers in many regions of North America, tile and installation products made with local raw materials are widely available, greatly reducing the energy consumption and emissions of long distance shipping. In many cases, the raw materials are mined within 500 miles of both the manufacturing facility and the job site. Plus, the clays and other materials used to make tile are plentiful.

Best Indoor Air Quality and Zero VOCs

The high firing temperature of ceramic tile—generally more than 2000°F—burns off all organic compounds. Plus, ceramic tile is inhospitable to bacteria, fungi, mold, and other irritants that contribute to allergies and asthma. All this allows ceramic and glass tiles to easily meet low-emitting material requirements, contribute to pre-occupancy air quality plans, and provide superior indoor air quality for building occupants.

Lower Energy Needs

Tile can reduce the amount of energy needed for heating and cooling because of its exceptional thermal mass.

Reduced Heat Island Effect

Using light-colored tiles instead of traditional paving materials can lower an area's heat absorption, or heat island effect. Green buildings in urban areas in particular are required to reduce the potential heat island effect.

Building Material Reuse

Tile finishes are among the few surfaces that can be salvaged in a major renovation.

Eco-Friendly Maintenance

No harsh chemicals required!

Ceramic tile is an ideal choice for ventilated façade projects.

Tile can provide an aesthetic advantage, due to the wide range of colors, surfaces and sizes, allowing for virtually unlimited design opportunities.

A ventilated tile façade can reduce a building's energy consumption 20-30% due to the natural chimney effect it creates between the structure and the cladding. Hot air is evacuated in summer, and insulation is more effective in winter.

TILE AND GREEN BUILDING
CREDITS AND REQUIREMENTS

	Leadership In Energy and Environmental Design (LEED v4.1)	2020* International Green Construction Code (Powered by ASHRAE Standard 189.1) *Anticipated
MULTI-ATTRIBUTE SUSTAINABILITY: CONFORMANCE TO GREEN SQUARED®	Pilot Credit—Certified Multi-attribute Products and Materials	901.4.1.4.3 (9.4.1.4.3) Third-Party Multi-attribute Certification
LCA OR EPD	Building Product Disclosure and Optimization—Environmental Product Declarations	901.4.1.4.1 (9.4.1.4.1) Industry-Wide Declaration 901.4.1.4.2 (9.4.1.4.2) Product-Specific Declaration 901.4.1.4.4 (9.4.1.4.4) Product Life Cycle
RECYCLED CONTENT	Building Product Disclosure and Optimization—Sourcing of Raw Materials	901.4.1.1.1 (9.4.1.1.1) Recycled Content
PRODUCT REUSABILITY/ RECYCLABILITY	Building Product Disclosure and Optimization—Sourcing of Raw Materials	901.4.1.1.2 (9.4.1.1.2) Salvaged Material Content
REGIONAL MATERIALS	Building Product Disclosure and Optimization—Sourcing of Raw Materials	901.4.1.2 (9.4.1.2) Regional Materials
CONSTRUCTION/ DESIGN MANAGEMENT	Integrative Process Construction Indoor Air Quality Management Plan Indoor Air Quality Assessment Construction and Demolition Waste Management	901.3.1 (9.3.1) Construction Waste Management 1001.7.2 (10.7.2) IAQ Construction Management
INDOOR ENVIRONMENTAL QUALITY	Low-Emitting Materials Thermal Comfort Interior Lighting	801.4.2.1 (8.4.2.1) Adhesives and Sealants 801.4.2.3 (8.4.2.3) Floor Covering Materials 801.4.2.6 (8.4.2.6) Ceiling and Wall Assemblies and Systems
HEAT ISLAND EFFECT	Heat Island Reduction	501.3.5.1 (5.3.5.1) Site Hardscape
ENERGY EFFICIENCY	Optimize Energy Performance	701.4.2 (7.4.2) Building Envelope Performance Option 701.5 (7.5)
INHERENT DURABILITY	Building Life-Cycle Impact Reduction	1001.10 (10.10) Service Life Plan
OTHER PRODUCT ATTRIBUTES OR MANUFACTURER ENGAGEMENT INITIATIVES	Open Space Building Product Disclosure and Optimization—Sourcing of Raw Materials Building Product Disclosure and Optimization—Material Ingredients Innovation	105.4 Innovative Approaches and Alternative Materials, Design, and Methods of Construction and Equipment 1001.9.5 (10.9.5) Building Green Cleaning Plan

NAHB National Green Building Standard (ICC/ASHRAE 700–2020*) *Anticipated	ANSI/GBI 01-2019 Green Globes	
612.2 Sustainable Products	10.2.1.1 Third-Party Multiple-Attribute Product Certification	**MULTI-ATTRIBUTE SUSTAINABILITY: CONFORMANCE TO GREEN SQUARED®**
611.1 Product Declarations	10.2.1.1 Cradle-to-Gate EPD 10.2.1.2 Cradle-to-Grave EPD	**LCA OR EPD**
604.1 Recycled Content	10.4.1 Sustainable Material Attributes	**RECYCLED CONTENT**
603.1 Reuse of Existing Building 603.2 Salvaged Materials 605.3 Onsite Recycling 605.4 Offsite Recycling	10.5.1 Reuse Structural/Non-Structural Elements 10.5.2 Reused, Refurbished, and Salvaged Materials	**PRODUCT REUSABILITY/ RECYCLABILITY**
609.1 Regional Materials	N/A	**REGIONAL MATERIALS**
605.2 Construction Waste Management Plan	6.1.2 Integrated Design Process 6.2 Environmental Mgmt. During Construction	**CONSTRUCTION/ DESIGN MANAGEMENT**
901.7 Hard-Surface Flooring 901.8 Wall Coverings 901.10 Adhesives & Sealants	11.2.1 Volatile Organic Compounds	**INDOOR ENVIRONMENTAL QUALITY**
505.2 Heat Island Mitigation	7.3.4 Heat Island Effect	**HEAT ISLAND EFFECT**
702.2.2 Energy Performance Levels 703.2 Building Envelope	8.3.1 Building Envelope	**ENERGY EFFICIENCY**
602.1.6 Termite-Resistant Materials 602.1.11 Tile Backing Materials 901.6 Wall-to-wall Carpeting Not Installed	6.3.2 Building Service Life Plan	**INHERENT DURABILITY**
601.3 Building Dimensions and Layouts 601.7 Pre-Finished Materials	10.3 Product Risk Assessment	**OTHER PRODUCT ATTRIBUTES OR MANUFACTURER ENGAGEMENT INITIATIVES**

TCNA BULLETIN
CERAMIC TILE FOR A SAFE AND HEALTHY HOME

Ceramic tile is not only beautiful, it's also healthy for your home. It contains none of the chemicals that have been in the news associated with other flooring products, and it's long-lasting, easy to clean, fire-safe, and offers many slip-resistant choices.

Made of Clay and other Naturally-Occurring Minerals: Free of Formaldehyde, VOCs, and PVC

Ceramic tile* does not contain the chemicals in other floor coverings that are receiving increased attention for their possible adverse health effects, such as formaldehyde,[1-4] VOCs (volatile organic compounds)[5-9] or PVC (polyvinyl chloride).[10-11]

Zero VOCs. Some VOCs emitted by non-ceramic building products can contribute to a wide variety of health problems and "Sick Building Syndrome," according to various health experts.[12-15] Because ceramic tile is fired at extremely high temperatures, producing an inorganic material, it has zero VOCs.*

Formaldehyde-Free. Ceramic tile* contains none of the formaldehyde found in some other floor coverings. Formaldehyde is a chemical long associated with respiratory disorders, and exposure is a particular concern for children and the elderly, according to the Centers for Disease Control (CDC).[16-17] In fact, formaldehyde emissions for several wood-based building and flooring products have been federally restricted since 2011 under the Formaldehyde Standards for Composite Wood Products Act.[18-21] As a fired product, ceramic tile is formaldehyde-free and not subject to this or any other such restriction.

PVC-Free. Ceramic tile* is also free from PVC, a resin used in other types of floor coverings, and regularly a subject of concern and discussion among health experts.[22-33]

The easy solution for flooring? Use ceramic tile, which is free of VOCs, formaldehyde, and PVC!

Occupant Safety

Of the many flooring choices available, ceramic tile stands out when slip/fall safety is a consideration because of the thousands of floor tile choices that are slip-resistant when wet. This is in stark contrast to floorings that, according to their manufacturers, must be kept dry in order to be slip-resistant.

Additionally, ceramic tile* is non-flammable and does not produce smoke in a fire, meeting the flame spread and smoke development requirements of Section 803 of the International Building Code (IBC) for interior wall and ceiling materials.

Environment

The UL-certified Environmental Product Declaration (EPD) for North American-made ceramic tile shows that North American-made ceramic tile has the lowest environmental impact across all impact categories, when compared to other floorings with generic EPDs[34-35] evaluated under the same product category rules.[36] With a 60-year service life[34] this makes ceramic tile both cost-effective and the best choice for reducing negative environmental impacts, resource use, and demolition waste, when compared to flooring products that need to be replaced more frequently.

Disclaimer: The above information is general in nature and is not specific to any one building product. Ceramic tile products and their properties can vary among manufacturers, products lines, and even among tiles in the same product line. Likewise, non-ceramic tile products have their own properties and can also vary among manufacturers and products. Products that contain any of the chemicals referenced above may contain them in manners that are not known to be harmful and/or that comply with applicable health and safety regulations. Contact the manufacturer of a specific building product to learn about its particular characteristics. See opposite for notes and numbered references.

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Notes

[*]Applies to fired ceramics free of any mesh backing or topical sealer. Not all mesh backings and topical sealers produce volatile organic compounds or contribute to flame spread. Consult manufacturer for specific product information if desired.

[†]Based on independent studies performed at TCNA Laboratory on tiles without mesh backing or topical sealers.

[‡]More than 95% of a fired ceramic tile is made from clay and other raw materials found in nature.

[§]Per UL-Certified Environmental Product Declaration (EPD) for North American-made Ceramic Tile.

TCNA GREEN REPORT
LIFE-CYCLE COST STUDY

Because a tile installation will last as long as the building it's installed in, its environmental impacts are minimal when compared to other surface coverings that would have to be replaced numerous times over the life of the building. This also means tile costs less per square foot over the long haul, whereas carpet, vinyl, and other floor coverings are significantly more expensive due to their replacement, maintenance, and refinishing requirements.

Construction cost consulting firm Scharf-Godfrey compared the life-cycle costs of various flooring types. The per year cost for each flooring type includes installation, maintenance, and removal costs. Their comparison, provided below, shows why ceramic tile is the natural choice for sustainable design and long-term value.

Life-Cycle Costs for Floor Finishes (per square foot)

Floor Finish	Installed Cost	Life Cycle Cost	Expected Life (y)	Cost Per Year
Quarry Tile	$6.83	$16.13	50	$0.32
Glazed Ceramic Floor Tile	$7.00	$16.30	50	$0.33
Glazed Porcelain Tile	$8.34	$17.64	50	$0.35
Mosaic Tile	$8.20	$17.50	50	$0.35
Unglazed Porcelain	$8.30	$17.60	50	$0.35
Natural Hardwood	$9.31	$20.80	50	$0.42
Travertine-Turkish	$12.50	$21.80	50	$0.44
Marble	$21.00	$30.30	50	$0.61
Laminate	$8.84	$17.77	25	$0.71
Man-Made Hardwood	$9.58	$18.51	25	$0.74
Portland Cement Terrazzo	$14.88	$24.27	30	$0.81
Stained Concrete	$12.40	$24.60	25	$0.98
Carpet	$3.22	$ 6.50	6	$1.08
Resin Terrazzo	$8.50	$16.53	15	$1.10
Sheet Vinyl	$6.90	$13.90	10	$1.39
Poured Epoxy	$8.18	$15.18	10	$1.52
VCT	$3.91	$18.35	10	$1.83

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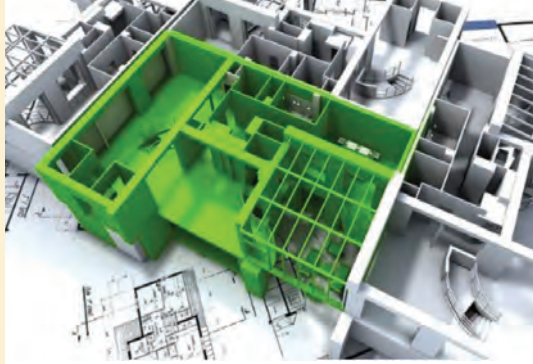


G2 GREEN SQUARED CERTIFIED®

Guide to Green Squared®:

The Tile Industry's Standard and Certification Program for Product Sustainability

2021

Stress-Free Sustainability

GREEN SQUARED CERTIFIED®

Glass Tile
Ceramic Tile
Installation Products

CREDITS

LEED v4.1

Green Globes

NAHB National Green Building Standard

COMPLIANCE

International Green Construction Code

GSA Facilities Standards for Public Buildings

ASHRAE Standard for the Design of High-Performance Green Buildings

CONFIDENCE

Life Cycle-Based, Multi-Attribute Criteria

Verification by Leading Certification Bodies

Listed in National Institute of Building Sciences' Whole Building Design Guide

Recommended by the US EPA for Federal Purchasing

For certified product lines, visit greensquaredcertified.com

CONTENTS

WHAT IS **GREEN SQUARED®?**

Green Squared® is the world's only multi-attribute sustainability standard and certification program for tile and the associated products needed to install it.

When you see the Green Squared Certified® mark, it means a product meets the broad array of rigorous sustainability requirements of the American National Standard Specifications for Sustainable Ceramic Tiles, Glass Tiles and Tile Installation Materials (ANSI A138.1).

Including raw material extraction, end of product life management, and all life cycle stages in-between, Green Squared is a true cradle-to-grave performance standard that eliminates the need to cross evaluate single-attribute sustainability claims.

Products independently verified as conforming to the Green Squared standard may bear the Green Squared Certified mark. To be in conformance, products must meet a battery of requirements and electives, as set forth in the standard.

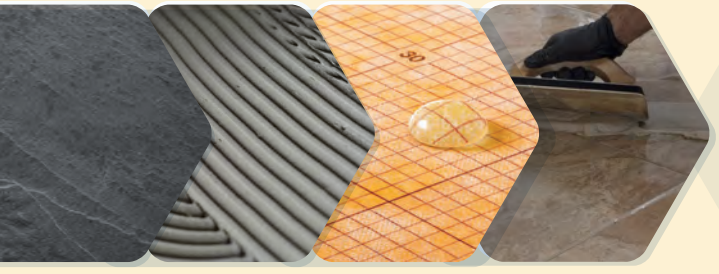
Qualities of the Green Squared Standard

Thorough Green Squared incorporates a full range of sustainability issues into one standard, one mark — allowing for easy marketplace recognition of sustainable tiles and tile installation materials.

Standardized Criteria Green Squared establishes performance-based thresholds, setting the bar for technical specification of sustainable tiles and installation materials.

Clarity As the tile industry's own sustainable product certification program, Green Squared facilitates increased uniformity and decreased confusion in green marketing.

Opportunity By passing rigorous third-party evaluation criteria, certification to the Green Squared standard confers a high level of credibility and a smooth, clear, and responsible path for products to be specified in green building projects.



Sustainable Systems Green Squared addresses the components of a tile installation, allowing the specification and installation of systems of certified conforming products.

THE STANDARD

Developed by an ANSI-accredited committee of green building professionals, manufacturers, distributors, installers, and other stakeholders, the Green Squared standard, ANSI A138.1, contains a spectrum of multi-attribute environmental and social criteria.

PRODUCTS COVERED

Green Squared covers a variety of products, including ceramic and glass tiles, mortars, grouts, backerboards, membranes, and other installation materials.

THIRD PARTY CERTIFICATION

Manufacturers seeking to have their product(s) certified can apply to either of two internationally-recognized Green Squared certification bodies.

SCSglobal SERVICES

UL Environment

PRODUCT LABELING

Once a product is third-party certified as meeting the ANSI A138.1 standard, the certification body awards use of the Green Squared Certified® logo on products, packaging and/or associated literature.

Multi-Attribute Sustainability
(condensed from standard)

Environmental Product Characteristics	Recycled Content/Reclaimed Waste Content
	Indigenous Raw Goods
	Environmental Packaging
	Durability
	Low Emissions
	Environmental Cleaning & Maintenance
	Solar Reflectance Index (SRI)
	Light Reflectance Value (LRV)
	Sound Abatement
	Third Party LCA & EPD
	Participation in LCA Database Initiatives
Environmental Product Manufacturing and Raw Material Extraction	Particulate Emissions
	Combustion and Fuel Usage
	Raw Goods Sourcing & Extraction
	Outsourced Packaging & Manufacturing Services
	Environmental Management Plans & Systems
	Utility Usage
	Renewable Energy
	Manufacturer Waste Diversion/Minimization
	Shipping Material Waste Minimization
End of Life Product Mgmt.	Manufacturer Guidelines on Clean Fill Usage
	Post-Life Material Waste Minimization
Progressive Corporate Governance	Social Responsibility Strategy
	Labor Law Compliance
	Environmental Regulation Compliance
	Health & Safety Regulation Compliance
	Voluntary Participation in Health/Safety Programs
	FTC Green Guides Compliance
	Continuous Community Involvement
	Public Disclosure
	Sustainability Reports
	Certified "Green" Facilities
Innovation	"Above & Beyond" Standardized Criteria
	Innovative Sustainability Technologies
	Carbon Footprint Awareness/Reduction Strategy

THE GREEN SQUARED® STANDARD **ANSI A138.1**

Environmental Product Characteristics

The first section of ANSI A138.1, Environmental Product Characteristics, standardizes product attributes such as the amount of recycled content, level of volatile organic emissions, amount of indigenous raw materials, etc.

Three levels of recycled content and reclaimed waste are defined in the standard. Level one is mandatory for conformance, and levels two and three are elective. Thresholds vary depending on product type.

There are also three standardized levels of indigenous raw material content. Recognizing the environmental burden from transportation, indigenous raw materials are those extracted within 500 miles of the manufacturing site. If transported by rail or sea, the limit is 2000 miles. All three levels are elective.

There are five standard attributes for sustainable packaging. All five are elective, but it is mandatory that at least one be achieved:

- Minimal packaging (packaging cannot exceed a specified percentage of the product weight)
- Recyclable packaging (a specified percentage of the packaging is recyclable)
- On-site reusable packaging (100% reusable on site)
- Biodegradable or compostable packaging (meets specific ASTM biodegradability criteria)
- Recycled content packaging (contains a specified percentage of recycled content)

Mandatory for conformance to ANSI A138.1, a product must meet industry standards for durability and performance. For example, tile must comply with ANSI A137.1. Also mandatory for conformance, a product shall have low (for installation products) or no (for tile) volatile organic compound (VOC) emissions. Environmentally-friendly maintenance instructions must also be available.

Finally, as elective options for conformance to A138.1, criteria for solar reflectance index (SRI), light reflectance value (LRV), and sound abatement are all established. Also, electives for life cycle assessment (LCA) and/or environmental product declaration (EPD) are available.

Environmental Product Manufacturing and Raw Material Extraction

The second section of ANSI A138.1, Environmental Product Manufacturing and Raw Material Extraction, standardizes sustainable production practices.

Mandatory for a product to conform to the standard, buildings containing process equipment shall not allow visible particulate matter (PM) emissions. Additionally, there are four standardized PM pollution control levels based on grain size; the first is mandatory and other three are elective.

It is mandatory that the only types of fuels used are natural gas, LP gas, landfill generated methane, or bio-based fuel. The usage of landfill generated methane or bio-based fuel can earn elective credits.

Elective credits can also be achieved through the use of low nitrogen oxide (NOx) burners and acid gas controls.

Also mandatory for a product to conform, the manufacturer of that product must have a written procurement policy for its raw material suppliers addressing social issues, environmental issues, and applicable requirements for mining laws. Additionally, the manufacturer is expected to maintain a list of all materials used to manufacture the product.

As an elective, the manufacturer may choose to enter into a sustainability-based buying agreement with the raw material suppliers contributing, in aggregate, at least 90% or more of the product by weight.

For outsourced services, such as packaging or additional manufacturing services, manufacturers must require that their service providers have written sustainability policies.

Manufacturers are required to have an environmental management plan that addresses waste minimization, lighting efficiency, heating fuel usage, electricity consumption, and water conservation. There are elective options for minimal water discharge, renewable energy usage, cogeneration, heat recovery or combined heat and power integration, ASHRAE auditing, and ISO 14001 environmental plan registration.

Finally, as electives, several innovative criteria for waste diversion are established. These include incorporation of waste into other manufacturers' products or beneficial reuse projects, donation of finished products to charitable organizations in lieu of disposal, and recycling/reuse of incoming shipping materials.

End of Product Life Management

This section of the standard opens with the following preface:

Inherently, tile products are durable, inert, and intended to have life spans as long as the buildings in which they are installed. They are engineered to serve as permanent finishes capable of outlasting multiple generations of building occupants. Tile product end of life management is pertinent to building demolition waste and small quantities of waste generated during construction.

It is perhaps self-evident—but worth noting—that a product with a long lifetime is more sustainable than a similar product with a short lifespan. When considering the environmental, social, and economic sustainability of a product, all relevant impacts are repeated each time that product is replaced. Ideally, a product's expected service life is at least as long as the building in which it is installed, in which case it's impacts are considered only once.

Although a tiled finish is inherently durable and typically desirable for a lifetime, there are instances in which end of product life must be addressed. Thus, there are end of product life management electives in ANSI A138.1 that are intended for instances where buildings are demolished, scrap waste is generated during construction, or a remodel occurs.

The first end of product life management elective option requires that the product be eligible for use as clean fill. To satisfy this elective, a manufacturer shall provide documentation verifying that the product is inert and solid such that it can potentially be considered along with other eligible construction and demolition debris for state and local Clean Fill acquisition initiatives.

A second elective requires an end of product life collection plans. To satisfy this elective, the manufacturer shall establish and implement a plan that addresses the collection, processing, and recycling or re-tasking of a product for other purposes once the product's useful life is completed.

Progressive Corporate Governance

The fourth section of ANSI A138.1 specifies criteria for Progressive Corporate Governance.

Mandatory for conformance to the standard, a manufacturer shall have a written and implemented social responsibility strategy which addresses at least the following: labor law compliance, forced labor prohibitions, child labor prohibitions, environmental regulation compliance, health and safety regulation compliance, and community involvement.

As an elective, the manufacturer may choose to participate in a voluntary safety program such as OSHA Safety Consultation, Voluntary Protection Program (VPP), or OHSAS 18001.

It is mandatory that all green marketing claims made by the manufacturer be in compliance with the Federal Trade Commission (FTC) Fair Packaging and Labeling Act (FPLA) Green Guides (publicly available) that indicate how the FTC applies Section 5 of the FPLA, prohibiting unfair or deceptive acts or practices in environmental claims.

As an elective, the manufacturer may choose to regularly engage in its community, building upon the community involvement plan established in its mandatory social responsibility strategy.

Also, as an elective, the manufacturer may publicly disclose on an annual basis one of the following: utilities consumption, registered Environmental Management System (EMS) data, or Life Cycle Assessment (LCA) data.

An elective credit is also available if a manufacturer provides a detailed sustainability report each year, conforms to the requirements of the Global Reporting Initiative (GRI), or is selected for inclusion in the Dow Jones Sustainability Index (DJSI).

If a manufacturer has at least one facility with LEED® or Green Globes certification, an elective credit is also available for that.

Additionally, manufacturers are required to have a program in place that demonstrates continued conformance to the specified criteria of ANSI A138.1/Green Squared for all pertinent products.

Innovation

Technological advancement and outstanding achievement, well beyond what is required, can be key to the development of sustainable products and operations. ANSI A138.1 allows products to achieve conformance, in part, through innovation. This may involve exceptional performance well above the requirements set forth in other sections of the standard, and/or innovative performance recognized by the ANSI ASC A108 Committee in categories not otherwise addressed by the standard.

A product may earn up to two electives through exceptional conformance if quantitative criteria already addressed by the standard are greatly exceeded. Either, the most stringent threshold already established for a specific criterion must be exceeded by one and a half times, or certain specific requirements defined in the standard's Appendix C must be met.

For sustainability attributes not directly addressed by the standard, an evolving list of approved innovations is managed by the ANSI ASC A108 Committee. Innovations not included in this list can be added if they are submitted to and approved by the Committee. This can include ecological attributes or processes not otherwise addressed by the standard or innovative corporate governance.

A product may also earn a fourth innovation elective if the product's carbon footprint is provided and prescriptive measures were taken to reduce either the product's or the manufacturing organization's greenhouse gases.

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THIRD PARTY CERTIFICATION
GREEN SQUARED CERTIFIED®

Background on Green Squared Certification

Green Squared® certification was developed by TCNA for independent third-party certifiers to assess if products are in conformance with ANSI A138.1. Products certified under Green Squared may be labeled using the Green Squared Certified mark. This easily-recognizable mark helps architects, designers, and end users choose products, while resting assured that the products they choose meet the industry's broad range of sustainability criteria.

The Green Squared framework for product evaluation and certification is in accordance with ISO Type 1 environmental labeling and declaration requirements (ISO 14024). With so many different brands of green today, Green Squared certification provides authenticity and conveys that the product certified is the real deal. In a marketplace wary of unsubstantiated product sustainability claims, Green Squared third-party validation is provided by well-known and widely-recognized certification bodies.

The Green Squared Certification Process

A manufacturer seeking Green Squared certification for various products they make applies directly to a certification body approved under the Green Squared program. The certification body then makes necessary arrangements with the manufacturer to evaluate if the products meet the ANSI A138.1 standard. This evaluation, which is in accordance with the Green Squared Certification Program Criteria, includes a comprehensive and objective review of the products and the associated manufacturing facility. Based on this evaluation, for those products that meet ANSI A138.1, the certification body authorizes the use of the Green Squared Certified mark.

Global Applicability

The ANSI A138.1 standard, and certification of conformance to that standard (i.e., Green Squared certification) were developed specifically to be relevant to products no matter where in the world they are produced. Developed to meet the sustainability needs of the North American marketplace, the Green Squared standard and certification program provide all producers, foreign and domestic, with a clear benchmark for designing sustainable products that can be accepted by North American green building programs.

Six Steps of Certification

Here's what to expect when pursuing Green Squared® certification of your product(s):

1 APPLICATION PROCESS

Manufacturer interested in having a product certified applies directly to an authorized Green Squared certification agency.

Certification Agencies: SCSglobal SERVICES, UL Environment

2 EVALUATION

The certification process involves the following in determination of ANSI A138.1 conformance:

- General evaluation of the applicant organization
- Product evaluation
- On-site facility evaluation

3 CONFIDENTIALITY

All proprietary information remains confidential between the certification agency and the manufacturer.

4 CERTIFICATION

- Green Squared Certified® mark awarded by certification agency
- Scope of certified products determined by certification agency
- Certifications valid for a five-year period
- Surveillance audits each year
- Re-certification after five years

5 PRODUCT LISTING

- Agency lists all certified products
- Certified products also listed on GreenSquaredCertified.com
- Certified product data syndicated by Ecomedes to Fulcrum, as well as to many public and private A&D purchasing libraries

6 USING THE MARK

- Directly on certified products
- Packaging of certified products
- Promotional literature published about certified products

G2 GREEN SQUARED CERTIFIED®

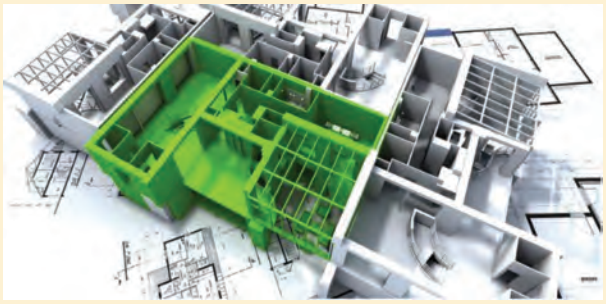
SPECIFYING GREEN SQUARED®
GREEN BUILDING STANDARDS, CODES, AND RATING SYSTEMS

LEED v4.1

Under the LEED pilot credit, *Certified Multi-attribute Products and Materials*, a point toward LEED certification can be earned by using products from manufacturers who have confirmed multiple environmental attributes through an independent, third-party certification, such as Green Squared®.

In order to achieve this point, at least 25%, by cost, of the total value of permanently installed products in a project must have earned certification under any of the following programs: Level® certification for furniture, NSF 140 certification for carpet, NSF 332 certification for resilient flooring, Green Squared certification for tiles and tile installation materials, UL 100 certification for wall board, NSC 373 certification for natural stone, NSF 343 for wallcoverings, and NSF 347 for roofing membranes.

Additionally, the product literature must disclose which sections of the relevant multi-attribute sustainability standard were met, and an LCA (life-cycle assessment) conforming to ISO 14044 must be available, either as a component of or in addition to the product's multi-attribute certification.



Tiles or installation materials that are Green Squared Certified® and for which an LCA is available (or which meet section 3.8.1 of Green Squared®/ANSI A138.1) can contribute:

- 50% of the total product cost for baseline certification
- 75% of the total product cost if ANSI 138.1 Level 2 criteria for recycled/reclaimed content and/or Level 2 criteria for indigenous raw materials were met as part of the certification
- 100% of the total product cost if ANSI A138.1 Level 3 criteria for recycled/reclaimed content and/or Level 3 criteria for indigenous raw materials were met as part of the certification

Sample calculation for a project with $1,000,000 in permanently installed products, including $80,000 of Green Squared Certified tile and $20,000 of Green Squared Certified mortar that meets ANSI A138.1 Level 3 criteria for indigenous raw materials.

Tile installation contribution to the 25%, by cost, of the total value of permanently installed products in the project

$$\frac{(0.5)\ (\$80k \text{ tile value}) + (1.0)\ (\$20k \text{ mortar value})}{\$1M \text{ (all materials value)}} = 6\%$$

In the example above, the contribution of Green Squared Certified® tiles and installation materials toward the 25% minimum would be 6%.

Green Globes ANSI/GBI 01-2019

Under the provisions of Section 10.2, *ANSI/GBI 01-2019 Product Life Cycle*, using Green Squared Certified® products can contribute toward the 19 available points for using products with EPDs or that are third-party certified to multi-attribute standards. Points are awarded for using products with:

EPDs: Generic or Proprietary AND/OR Third-Party Verified Proprietary Life-Cycle Assesments AND/OR Third-Party Certifications to Multiple Attribute Standards

Points are awarded based on the number of products used, as follows:

# of Products	Points	# of Products	Points
30+ products	19 pts	24 products	9 pts
29 products	14 pts	23 products	8 pts
28 products	13 pts	22 products	7 pts
27 products	12 pts	21 products	6 pts
26 products	11 pts	20 products	5 pts
25 products	10 pts	<20 products	No pts

Without limit, using Green Squared Certified tiles or installation materials will contribute to this requirement. Products that also have an LCA or EPD can contribute double.

Sample calculation for a project with 6 Green Squared Certified tiles, 6 Green Squared Certified grouts, 1 Green Squared Certified mortar and 9 other products certified under their respective industry programs:

13 total tiles/tile installation products + 9 other compliant products = 22 total products (7 points)

Using the above example, tile's contribution is 13 out of 22 products, or 59%.

Sample calculation for the same project, but with tile that is Green Squared Certified and has an LCA or EPD:

[(13 Green Squared Certified products with LCA or EPD) x 2]
+ 9 other compliant products
35 total products (19 points)

Using the above example, although 35 total products are achieved, only 30 are required to obtain the maximum points tier. Toward the threshold, tile's contribution is 26 out of 30 products, or 87%.

SPECIFYING GREEN SQUARED®
GREEN BUILDING STANDARDS, CODES, AND RATING SYSTEMS

International Green Construction Code (IgCC) Powered by ASHRAE Standard 189.1

About IgCC: An initiative of the International Code Council (ICC), IgCC was developed as model code language for states and municipalities to establish baseline sustainability requirements for new and existing commercial buildings.

About ASHRAE 189.1: An ANSI-accredited standard, ASHRAE 189.1 was written to be incorporated into governing jurisdictions' codes and ordinances for commercial buildings and enforced by building officials and inspectors.

IgCC and ASHRAE Standard 189.1 are now integrated into a single model code and standard for high-performance buildings.

For compliance with the IgCC, specifically Section 901.4.1.4.3 (ASHRAE 189.1 Section 9.4.1.4.3), *Multiple-Attribute Product Declaration or Certification*, at least 10 different products installed in the building at the time of occupancy shall have a generic EPD, have a proprietary EPD, conform to a third-party multi-attribute certification, or have a third-party reviewed life cycle assessment (LCA).

G2 GREEN SQUARED CERTIFIED®

Each Green Squared Certified® tile or installation material used on a project counts as two products toward the 10-product threshold, as the Green Squared® standard is one of the multi-attribute certification programs specified by the standard.

NAHB National Green Building Standard

Commonly referred to as ICC 700, NAHB's National Green Building Standard is an ANSI-accredited specification for residential construction. Green Squared Certified® tiles and installation materials can help achieve points under section 612.2, Sustainable Products.

Three points are awarded if 50% or more, based on square footage, of all tiles installed in a project have been Green Squared Certified. In order for such tiles to qualify, tile must make up at least 30% of the floor or wall area of the project.

Three points are awarded if 50% or more, based on square footage, of all tile installed in a project have been Green Squared Certified. In order for such tiles to qualify tile in general must make up at least 30% of the floor or wall area of the project.

GSA P-100 Facilities Standards

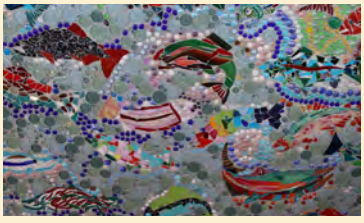
This standard incorporates sustainability criteria into design standards for the construction of government-funded buildings. Section 3.4 (Interior Performance) sets forth several provisions for ceramic tile:

The "Baseline" and Tier 1 High Performance provisions specify that tiles conform to ANSI A137.1, the ANSI standard for ceramic tile, and be Green Squared Certified.

The Tier 2 High Performance and Tier 3 High Performance provisions specify that tiles conform to ANSI A137.1, the ANSI standard for ceramic tile, be Green Squared Certified, and have a publicly-available EPD.

Green Squared Certified tiles and installation materials satisfy GSA's baseline and Tier 1 High Performance tiling requirements. Green Squared Certified products that also have an EPD are eligible for use on Tier 2 and Tier 3 federal building projects.

GREEN SQUARED® IN THE FIELD
PROJECTS WITH GREEN SQUARED CERTIFIED® PRODUCTS



The inherent eco-friendliness of tile and tile installation products is amply demonstrated by Green Squared Certified® products.

Green Squared® is a multi-attribute, industry-wide standard that reflects the North American tile industry's commitment to sustainable manufacturing. The standard provides architects, specifiers, and consumers with a consistent set of criteria for evaluating the sustainability of tile and tile installation products.

Products bearing the Green Squared Certified logo are manufactured according to rigorous sustainability criteria that address a broad range of considerations, from the extraction of raw materials, to reuse or disposal at the end of a product's life.

Manufacturers of Green Squared Certified products invest considerable resources to ensure their facilities and manufacturing practices are socially and environmentally responsible, and to obtain third-party certification.

Besides being robustly sustainable, Green Squared Certified products are also beautiful, as the photos on the following pages illustrate.

The tile and installation products pictured here represent only a handful of the Green Squared Certified products that are currently available. Hundreds of products have been certified, and still more are in the certification process.

PROJECT SITE: Pensacola International Airport
Pensacola, Florida

PROJECT SCOPE: N/A

GREEN SQUARED CERTIFIED PRODUCTS:

- Moonstruck Collection 18" x 36" porcelain planks by Crossville

Pensacola International Airport welcomes nearly two million travelers annually. When it came time to update the flooring throughout the center concourse—the highest traffic area of the facility—airport leaders searched for the most efficient way to renovate the space. The design team planned a seamless renovation by scheduling the tile installation to take place after hours, thus minimizing disruption for travelers and airport staff.

The project specifications required that the flooring offer exceptional durability and low maintenance, while also providing a smooth surface for equipment, luggage, and wheelchairs. The team chose 18" x 36" Green Squared Certified porcelain tile planks for the center concourse. The material's natural look and sustainable features made the decision to choose Green Squared Certified tile simple for an area active in environmental preservation. With its sandstone texture and coastal aesthetic, the tiles evoke the feeling of the beach. To greet travelers in true Pensacola style, the design team artfully incorporated waterjet-cut designs of pelicans, seagulls, and waves into the flooring. Pensacola is recognized as Pelican City thanks to the natural presence of the iconic bird throughout the region. The waterjet-cut pelican designs throughout the concourse are a stunning nod to Pensacola's avian ambassadors.

With the renovation completed, travelers can now experience the first waves of tranquility straight from the plane—well before they reach the beach.

PROJECT SITE: Beckett Park by Cortland Walnut Hill Apartments
Irving, Texas

PROJECT SCOPE: 10,000 square ft

GREEN SQUARED CERTIFIED PRODUCTS:

- Frontier20 Limestone 24x24 porcelain paver, Frontier20 Simply Grey 24x24 porcelain paver by Landmark

Beckett Park by Cortland Apartments is an upscale apartment complex located minutes away from downtown Dallas, Texas. The complex offers several amenities, such as a fitness studio, a community clubhouse, a playground, and a newly renovated resort-style pool and sun deck.

The modernized pool area required a durable, slip resistant, and fade-resistant flooring material to serve Beckett Parks' many residents. With sustainability in mind, Landmark's Frontier20 Green Squared Certified porcelain tile collection was chosen to cover the sun deck, the area surrounding the pool, and the pool trim.

The design team decided to go with a checkered pattern across the entire pool surround using limestone-look and stone-look porcelain pavers. Residents are now welcomed to enjoy the outdoor oasis by lounging by the pool or relaxing under the sun deck gazebos.

PROJECT SITE: Bossard Group Customer Experience Zone
Stroughton, Maryland

PROJECT SCOPE: N/A

GREEN SQUARED CERTIFIED PRODUCTS:

- Simpatico collection and Shades 6" x 24" and 12" x 24" collection by Crossville

Bossard Group, the worldwide leader in modern fastening technology and production, decided they wanted to use the ample space of a former warehouse to showcase the company's full range of fastening elements in a retail-focused environment. Using Bossard's logo as the foundation for the design, the designers envisioned the renovated facility with a classic, uncomplicated aesthetic that also conveys a feeling of modern technology. The designers' attention to detail resulted in an inviting, multi-purpose customer showroom featuring beautifully configured areas decked in surfacing solutions and materials that align with Bossard's reputation for quality and innovation.

The "Customer Experience Zone" is part of the manufacturing warehouse, so the design team recognized the need for durable materials that would be easy to maintain. They agreed ceramic tile was the best choice for the renovated warehouse. Tile from Crossville's Shade collection creates an aesthetically balanced space with a neutral color scheme that will withstand the high traffic demands of a warehouse environment. Green Squared certified tiles made from recycled materials were chosen to complement Bossard Group's high sustainability standards.

By varying the size and finish of the tile, the designers created a subtle take on the segmented 'O' in the Bossard logo. The pattern continues throughout the showroom and around the reception desk area. To complement the showroom, the design team extended the tile to the customer restrooms, while also adding dimensional tile from Crossville's Simpatico collection on the restroom walls.

The materials and design create an exceptional —and uniquely branded— customer experience.

PROJECT SITE: First Church of Christ, Scientist
Winter Park, Florida

PROJECT SCOPE: 6,500 square ft

GREEN SQUARED CERTIFIED PRODUCTS:

- Shades 12" x 24" exterior cladding by Crossville

The First Church of Christ, Scientist in Winter Park, Florida, was facing the dilemma of a deteriorating facility. Eager to continue serving, the church congregation searched for the best option for redesigning the aging church property. It was decided that a new church would be built on the property to meet the fiscal, social, architectural, and spiritual goals the church community wanted to achieve.

Designers decided to go with a modern approach when designing the new facility, while keeping the look of the original building in mind. To create a building that would stand the test of time, the team selected porcelain stone-look tile for the exterior cladding of the new facility. The earth-toned tiles were installed in a horizontal pattern giving the illusion of an elongated building on the property.

"Early in the conceptual phase of the project, we asked the church congregation to provide us with a list of spiritual principles that helped to shape their faith, explained Wade Miller, ACi's senior project designer and project director. "We found that in many ways, selecting Crossville tile, through its material honesty, lasting design integrity, low-maintenance nature, and recycled content composition, matched the guiding tenants of the congregation."

With these tenets in mind, the design team specified porcelain tile with a minimum of 20% recycled content that was Green Squared certified.

PROJECT SITE: Eastland-Fairfield Career and Technical Schools
Groveport, Ohio

PROJECT SCOPE: 1,000+ square ft

GREEN SQUARED CERTIFIED PRODUCTS:

- Metropolitan Ceramics' #507 Puritan Gray Quarry Tile by Ironrock

Eastland-Fairfield Career and Technical Schools serve 16 school districts in Franklin, Fairfield, and Pickaway, Ohio counties. Covering 700 square miles, it is one of the most extensive career and technical programs in the state, with nearly 40 in-demand programs, including studies in the culinary arts.

The school's culinary program includes a full-service commercial kitchen where students can create all types of restaurant cuisine. When designing the culinary arts space, the school knew the kitchen needed a floor that was made to last and would be easy to maintain as future chefs honed their skills in the kitchen classroom.

It was agreed ceramic quarry tile would be the material of choice for the kitchen floor due to quarry tile's durability, longevity, slip resistant options, and hygienic advantages. The school selected Ironrock's #507 Puritan Gray quarry tile for the entire floor of the learning space. Because all Ironrock quarry tile options are Green Squared Certified, the kitchen floor gained the added bonus of being environmentally friendly and sustainable.

PROJECT SITE: Issaquah Salmon Hatchery
Issaquah, Washington

PROJECT SCOPE: 76 square ft

GREEN SQUARED CERTIFIED PRODUCTS:

- Flexcolor® 3D grout in Crystal Moon by MAPEI

Over 100 volunteers gathered to bring Cheryl Smith's artistic design to life with the installation of a mosaic wall at the Issaquah Salmon Hatchery. The Friends of Issaquah Salmon Hatchery (FISH) reached out to Cheryl to be the lead designer of the community wall project after she taught a mini mosaic class for FISH the previous year.

The mosaic wall depicts a variety of salmon swimming through a stream of elaborate bubble designs. Each volunteer was given mosaic tile and a template of a salmon with the freedom to design their own fish.

A key priority of the FISH mosaic wall project was to minimize the impact on the environment, specifically the ecosystem of Pacific Northwest salmon. The wall was solely constructed using recycled mosaic glass and Flexcolor 3D grout by MAPEI. The Green Squared Certified specialty translucent grout complemented the goal of using recycled products, and with its iridescent-effect finish, complemented the aesthetics of the glass tile.

This unique aquatic mural will continue to grace the Issaquah community for many years to come.

PROJECT SITE: T.A. Brown Elementary
Austin, Texas

PROJECT SCOPE: N/A

GREEN SQUARED CERTIFIED PRODUCTS:

- Norway 7" x 36" and Kaleido 12" x 24" by Interceramic

Austin Independent School District's T.A. Brown Elementary School is a state-of-the-art, STEAM (Sciences, Technology, Engineering, Arts, and Mathematics) learning facility for 522 students. The new campus was built to incorporate spaces that allow collaborative, interdisciplinary, and project-based instruction in a flexible learning environment. Designers kept sustainability at the forefront of the project, with goals of achieving a LEED Silver rating and at a minimum, a two-star rating with the Austin Energy Green Building program.

The adaptable learning environment and sustainable systems throughout the building ensure this school will positively impact the lives of the students, teachers, faculty, and community. The school was completed on-time in January 2020, which allowed students to begin the spring semester in the new building.

According to interior designer Roberto Pruneda of ERO Architects, "When designing for high-traffic areas, we like to choose materials that are easy to maintain, durable, and long-lasting like ceramic tile. Ceramic tile is also non-toxic and free of harsh chemicals, which is ideal for areas continuously filled with students. We also wanted to use locally sourced materials that contributed to LEED certification and the building's overall sustainability, so selecting Green Squared Certified ceramic tile was the obvious choice."

Release date: April 2021

Green building standards and rating systems are living documents, and the consensus regarding their use and interpretation is ever-evolving. Check for updates to *Tile: The Natural Choice* at www.TCNAtile.com.

TCNA
TILE COUNCIL OF NORTH AMERICA, INC.

U.S. GREEN BUILDING COUNCIL MEMBER

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TCNA
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Guide to EPDs for Ceramic Tile, Mortar, and Grout Made in North America

2021

Total Transparency

The EPDs for North American-made Ceramic Tile, Mortar and Grout report the environmental footprints of North American-made ceramic tile, mortar and grout across all major impact categories within a 75-year building service life. Specify ceramic tile, mortar and grout covered by the EPDs to fulfill requirements of leading green building programs.

EPD

Environmental Product Declaration

These EPDs are initiatives of the Tile Council of North America and participating members. Data analysis and modeling were performed by WAP Sustainability Consulting and Sphera (formerly Thinkstep). Third-party certification by UL Environment ensures conformance to ISO standards for EPDs and LCAs.

UL CERTIFIED ENVIRONMENTAL PRODUCT DECLARATION UL.COM/EPD

TCNA Tile Council of North America, Inc.

Download EPDs at www.TCNAtile.com

CONTENTS

TOTAL TRANSPARENCY
EPDs FOR NORTH AMERICAN-MADE CERAMIC TILE, MORTAR, AND GROUT

The environmental product declarations (EPDs) for North American-made ceramic tile, mortar, and grout provide a comprehensive overview of how these products impact the environment. The combination of the three provides environmental impact data, per square meter, of the main materials used to set tile.

The EPDs address the most important environmental considerations affecting the well-being of the planet and those who call it home—specifically, global warming, fossil fuel resource depletion, acidification, smog formation, eutrophication, and ozone depletion.

And, because EPDs and product environmental transparency are increasingly required in green construction standards and rating systems, specifying ceramic tiles, mortars, and grouts covered by the EPDs can help achieve green building points and meet transparency requirements. In fact, as most green building standards, codes and rating systems provide incremental credit for the use of each product covered by an EPD, using tile in a project, with the accompanying mortar and grout, means that a single tile installation using materials covered by North American EPDs could potentially contribute "three times (3X)."

The Credibility Process

When selecting construction materials, it's important to know decisions are supported by reliable, life cycle-based sustainability information. For the North American-made Ceramic Tile EPD, the life-cycle assessments were independently performed by WAP Sustainability Consulting, and for Mortars and Grouts,

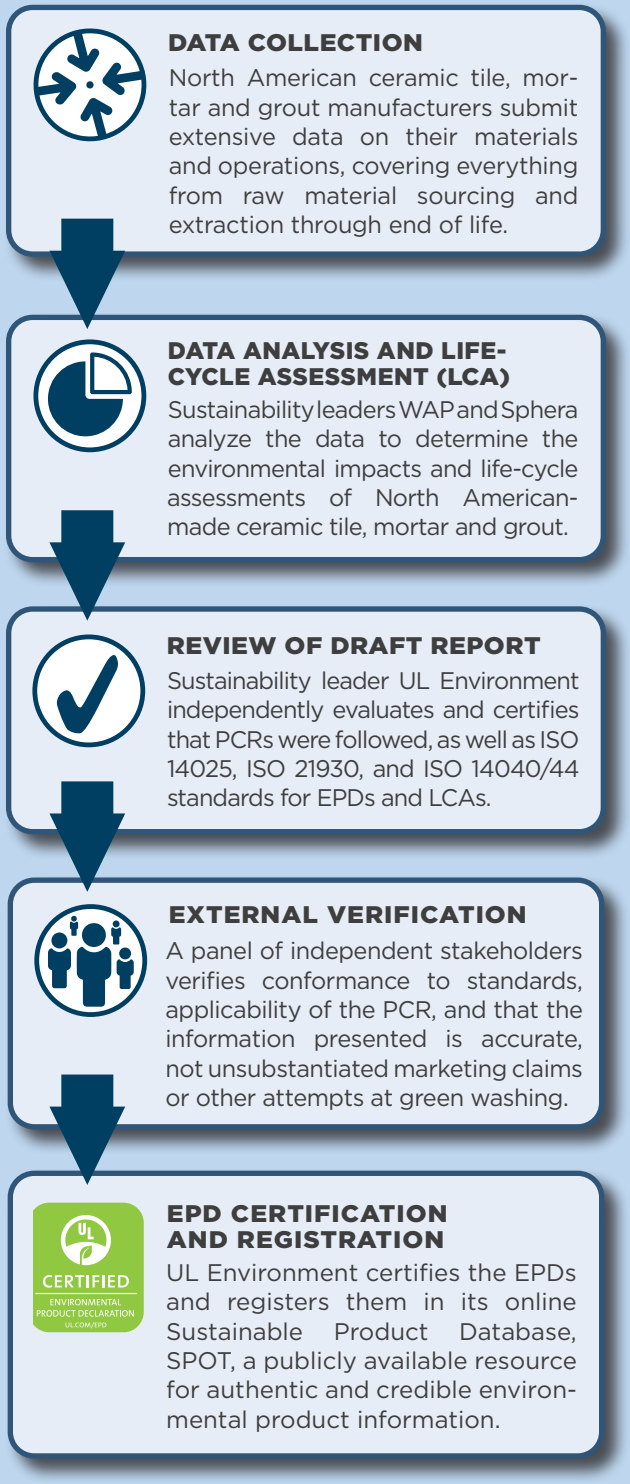
by Sphera (formerly Thinkstep), all per the ISO standard 14040/44, *LCA Principles, Framework, Requirements, and Guidelines.* Additionally, UL Environment, as Program Operator, verified the validity of the LCAs and certified the requirements of ISO 14025, *Principles and Procedures for EPDs*, and ISO 21930, *Core Rules for EPDs of Construction Products and Services,* were met. Conformance to these standards, plus certification of the EPDs by a globally recognized sustainability leader, ensures the EPDs are accurate, not unsubstantiated marketing claims or other attempts at "green washing."

To produce the EPDs, the participating manufacturers provided extensive data on their materials and operations and participated in a cradle-to-grave evaluation of their products, from raw material sourcing/extraction, through manufacturing, delivery, installation, use, and end of life.

For each EPD, the specific environmental impacts measured, and the methodology for measuring those, are dictated by a Product Category Rule (PCR). For the tile EPD, the North American PCR, UL 10010-7 Part B: Flooring EPD Requirements v2.0, was followed. Using product category rules developed for all flooring allows tile covered by the EPD to be compared to other flooring products evaluated under the same PCR.

For the mortar and grout EPDs, international PCRs for factory-made mortar were adapted for North American usage per an addendum published by UL Environment. This allowed the North American PCR to build on criteria that was previously used in the development of EPDs for other types of cementitious construction products. This provides valuable references when analyzing and interpreting EPDs in a global context.

The standardized reporting of tile, mortar and grout



TOTAL TRANSPARENCY
EPDs FOR NORTH AMERICAN-MADE CERAMIC TILE, MORTAR, AND GROUT

required by the PCRs additionally provides transparency and prevents green washing, as all parameters and impacts in the PCR must be reported, not just those areas in which a product performs well.

Products Covered by the EPDs

Because the EPDs are based on aggregated data from all participating manufacturers, they are "generic" or "non-proprietary" EPDs. As most major North American tile industry manufacturers participated, over 85% of North American-made products are covered: 3.4 billion square feet of tile and 2.25 billion kilograms of mortar and grout.

To find out if a specific product line is covered by a certified EPD, contact the participating manufacturers.

Participating Tile Manufacturers

American Wonder Porcelain
Arto
Crossville
Dal-Tile Corporation
Del Conca USA
Florida Tile
Interceramic
Ironrock
Porcelanite Lamosa
Portobello America
Quarry Tile Company
StonePeak Ceramics
Vitromex de Norteamérica

Participating Grout and Mortar Manufacturers

Ardex
Bexel
Bostik
Cemix/Texrite
Crest
Custom Building Products
HB Fuller/Tec
Interceramic
Laticrete
Mapei

The EPDs were initiated by Tile Council of North America (TCNA) and its participating members, with data analysis and modeling by WAP Sustainability and Sphera, and third-party, independent certification by UL Environment.

TCNA
TILE COUNCIL OF NORTH AMERICA, INC.

WAP SUSTAINABILITY CONSULTING

sphera™

UL Environment

UL
CERTIFIED
ENVIRONMENTAL PRODUCT DECLARATION
UL.COM/EPD

Download the EPDs at TCNAtile.com

Just as nutrition labels inform the calorie conscious on food choices, an EPD informs with respect to sustainability. When using the North American-made Tile EPD alongside other flooring products' generic EPDs, one thing is clear: Overall ceramic tile has the lowest 75-year environmental impact per square meter. Similarly, the industry-wide EPDs for North American-made mortar and grout report very low 75-year environmental impacts per installed square meter.

Environmental Facts

Functional unit: 1 m^2 of Ceramic Tile Floor Covering
Reference Service Life (RSL): 75 Years

75 YEAR IMPACT ASSESSMENT	Total
Global Warming Potential (kg CO_2 eq)	19.6
Acidification Potential (kg SO_2 eq)	0.037
Ozone Depletion Potential (kg R11 eq)	6.7E-10
Smog Potential (kg O_3 eq)	0.8
Eutrophication Potential (kg N eq)	0.003
Fossil Resource Depletion (MJ)	32
OTHER INFORMATION	
Zero VOCs	
Boundaries	Cradle to Grave
Recycled Content	Varies
Green Squared Certification®	Some Tiles

Ceramic Tile Ingredients: Clay (69.8%), Sand (6.2%), Talc (1.1%), Feldspar (11.3%), Scrap (6.5%), Frit (0.4%), Calcium Carbonate (1.5%), Ash (1.4%), Additives (0.7%), Ink (0.2%), Glaze (1.1%)

Visit **www.TCNAtile.com** for further information.

Environmental Facts

Functional Unit: 1 m^2 of Installed Grout
(Application Rate, 0.212 kg/m^2)
Reference Service Life (RSL): 75 Years

75 YEAR IMPACT ASSESSMENT*	Total
*Assumes linear extrapolation from 60-year use phase impacts reported in EPD, and equivalence to 60-year impacts for all other phases	
Global Warming Potential (kg CO_2 eq)	0.206
Acidification Potential (kg SO_2 eq)	0.000823
Ozone Depletion Potential (kg R11 eq)	3.75E-10
Smog Potential (kg O_3 eq)	1.24E-02
Eutrophication Potential (kg N eq)	6.78E-05
Abiotic Depletion Potential-Fossil (MJ)*	2.1
*Per CML 2001-2016 LCIA methodology due to unavailability of Fossil Resource Depletion per TRACI 2.1 LCIA methodology	
OTHER INFORMATION	
VOC Emissions-CDPH Section 01350	Meets
Recycled Content	Varies
Green Squared® Certification	Some Grout
ANSI A118.6, ANSI A118.7	Meets

Tile Grout Ingredients: Sand, White Cement, Limestone, Grey Cement, Calcium Aluminate, Calcium Formate, Other Additives

Visit **www.TCNAtile.com** for further information.

Environmental Facts

Functional Unit: 1 m^2 of Installed Tile Mortar
(Application Rate, 4.07 kg/m^2)
Reference Service Life (RSL): 75 Years

75 YEAR IMPACT ASSESSMENT*	Total
*Assumes equivalence to 60-year impacts reported in EPD	
Global Warming Potential (kg CO_2 eq)	2.88
Acidification Potential (kg SO_2 eq)	0.0122
Ozone Depletion Potential (kg R11 eq)	5.69E-09
Smog Potential (kg O_3 eq)	0.201
Eutrophication Potential (kg N eq)	5.62E-04
Abiotic Depletion Potential-Fossil (MJ*)	30.9
*Per CML 2001-2016 LCIA methodology due to unavailability of Fossil Resource Depletion per TRACI 2.1 LCIA methodology	
OTHER INFORMATION	
VOC Emissions-CDPH Section 01350	Meets
Recycled Content	Varies
Green Squared® Certification	Some Mortar
ANSI A118.1, ANSI A118.4, ANSI A118.11, ANSI A118.15, ISO 13007	Meets

Tile Mortar Ingredients: Sand, Calcium Carbonate, Grey Cement, White Cement, Ethylene Vinyl Acetate, Admixture, Cellulose Ether, Other Additives

Visit **www.TCNAtile.com** for further information.

CREDITS AND COMPLIANCE
NORTH AMERICAN-MADE CERAMIC TILE, MORTAR, AND GROUT

LEED v4.1

Under the credit category Building Product Disclosure and Optimization–Environmental Product Declarations, up to 2 points toward LEED certification can be earned by using products with EPDs, such as North American-made ceramic tile, mortar and grout.

Option 1 (1 Point)
Environmental Product Declaration

AND/OR

One point can be earned for using at least 20 different permanently installed "products," which are construction materials that meet one of the specified disclosure criteria and are therefore eligible for the valuation associated with that disclosure criteria. Valuations for such materials are awarded on a per-material basis, and this LEED point is earned by using enough materials that their combined valuations total at least 20 "products."

Disclosure Criteria	Valuation
Proprietary LCA (Internally Reviewed)	1 product
Proprietary EPD (Internally Reviewed)	1 product
Generic EPD (Third-Party Certified)	1 product
Proprietary EPD (Third-Party Certified)	1.5 products

Materials that meet multiple criteria are eligible only for the highest valuation available; the valuations cannot be combined. Also, materials must be sourced from at least five different manufacturers.

Products covered by the North American-made Ceramic Tile, Mortar, and Grout EPDs can each contribute at least ½ product toward the 20-product requirement. For example, for a project with 8 different tiles installed with the same mortar but different grouts (all covered by EPDs), the 17 products (8 tiles, 8 grouts, 1 mortar) would contribute 8.5 "products" toward the 20-product requirement (Example A). In the same scenario, if the mortar, grout, and 1 of the 8 tiles also have a proprietary EPD, the same 17 tiles and related materials would contribute 13.5 "products" (Example B).

Example A
(8 tiles + 1 mortar + 8 grouts) × .5 products = 8.5

Example B
(1 tile × 1 product) + (1 mortar × 1 product)
+ (8 grouts × 1 product) + (7 tiles × .5 products) = 13.5

Option 2 (1 Point)
Multi-Attribute Optimization

One point can be earned by using products with improved, or plans for improved environmental life-cycle impacts when at least 10 of those products are used or those products comprise at least 10% of the total value of permanently installed products in the project. Valuations for such materials are awarded on a per-material basis, and this LEED point is earned by using enough materials that their combined valuations total at least 10 "products" or 10% of the total value of the project.

Optimization Criteria	Valuation
Life-Cycle Impact Reduction Plan	½ product or 50% cost
Reduced Global Warming Potential (GWP)	1 product or 100% cost
10% Reduced GWP	1.5 products or 150% cost
20% Reduced GWP & 5% Reduction in Two Other Impact Categories	2 products or 200% cost

For this LEED point, generic EPDs provide a convenient baseline for comparison, and manufacturers of tiles, mortars, or grouts included in generic EPDs that also have one or more proprietary EPDs have the option to show below-industry-average impacts or an impact reduction plan, either of which can contribute to meeting the 10-product or 10% value threshold.

Example calculation 1: For a project with $1,000,000 in permanently installed products, including $20,000 of mortar and grout with GWP 10% lower than industry average, and $80,000 of ceramic tiles for which the manufacturer has included a publicly available action plan to reduce life-cycle environmental impacts:

$$\frac{[\$20K \text{ (mortar and grout value) x } 150\%] + [\$80K \text{ (tile value) x } 50\%]}{\$1M \text{ (all materials value)}} = 7\%$$

In the previous example using the cost calculation method, the contribution of the tile and related installation materials toward the 10% minimum would be 7% (70% of the requirement).

Example calculation 2: For a project with 2 different tiles with GWP lower than industry average, 1 tile with a life-cycle impact reduction plan, 3 different grouts with life-cycle environmental impact reduction plans, and 1 mortar with GWP 10% lower than industry average:

(2 tiles x 1 product) + (1 tile x .5 product) +
(3 grout x .5 product) + (1 mortar x 1.5 products) = 5.5

In the above example using the product calculation method, the 7 tiles and related installation materials would contribute 5.5 "products" toward the 10-product minimum (55% of the requirement).

Green Globes ANSI/GBI 01-2019

Under the provisions of Section 10.2, *Product Life Cycle*, using North American-made ceramic tiles, mortars, and/or grouts can contribute toward the 29 available points for using products with EPDs.

19 points are awarded for using products with **cradle-to-gate** life-cycle evaluations based on:

EPDs: Generic or Proprietary	AND / OR	Third-Party Verified Proprietary Life-Cycle Assessment	AND / OR	Third-Party Certification to Multiple Attribute Standards

10 points are awarded for using products with **cradle-to-grave** life-cycle evaluations based on:

EPDs: Generic or Proprietary	AND / OR	Third-Party Verified Proprietary Life-Cycle Assessment

Products recognized as having cradle-to-grave life cycle evaluations are additionally recognized for cradle-to-gate.

Points are awarded based on the number of products used. Products with EPDs are valued the same, regardless of whether their EPDs are generic or proprietary; both contribute equally toward the product total.

	# Products	Points
Cradle-to-Gate Life-Cycle Evaluations	30+	19
	29	14
	28	13
	27	12
	26	11
	25	10
	24	9
	23	8
	22	7
	21	6
	20	5
Cradle-to-Grave Life-Cycle Evaluations	10	10
	9	9
	8	8
	7	7
	6	6
	5	5

Without limit, using North American-made ceramic tiles, mortars, and grouts covered by EPDs will contribute to this requirement on a cradle-to-gate and cradle-to-grave basis. Products that are also Green Squared Certified® will earn double points under the cradle-to-gate provisions for also meeting the requirement for products with third-party certifications based on multiple attribute standards.

Sample calculation for a project with 10 tile products, 2 mortars, and 10 grouts covered by the EPD:

7 Points (22 products with cradle-to-gate, covered by EPD)
+ 10 Points (22 products with cradle-to-grave, also covered by EPD)
= 17 Total Points

Sample calculation for the same project, but with 3 of the tile products, 1 mortar and 2 grouts additionally having Green Squared® Certification:

13 Points (28 products; 22 with cradle-to-gate, covered by EPD, 6 of which are additionally recognized as Green Squared Certified®)
+ 10 Points (22 products with cradle-to-grave, also covered by EPD)
= 23 Total Points

NORTH AMERICAN-MADE CERAMIC TILE, MORTAR, AND GROUT

NAHB National Green Building Standard

NAHB National Green Building Standard is commonly referred to as ICC 700. North American-made ceramic tile can help achieve points under Section 611.4, Product Declarations, in this ANSI-approved standard and rating system for residential construction. In this section of the standard, 5 points are awarded if EPDs are submitted for 10 different products installed in the building project. Each building material with an industry-wide EPD contributes a full 'product' toward the 10-product goal. Each building material with a product-specific EPD contributes two 'products' toward the 10-product goal.

Additionally, up to 10 points can be awarded under Section 610, Life Cycle Analysis, for using products with lower environmental impacts, compared to products intended for the same use. To garner points under Section 610, the selected product must improve upon multiple environmental impacts by an average of 15%, with the number of points awarded tied to the number of impact categories in which the selected product performs better.

Number of Impact Categories	Points
4	2
5	3

Applicable Impact Categories:

- Fossil fuel consumption
- Global warming potential
- Acidification potential
- Eutrophication potential
- Ozone depletion potential

The standard requires that the LCA tool used to determine the environmental impacts must be based on a minimum reference service life for a building of 60 years. It allows comparisons to be made between different types of products with the same use. It also allows comparison of individual product impacts to the industry averages for the same product type.

Each tiling product covered by the North American-made tile, mortar and/or grout EPDs contributes a full product toward the 10-product threshold specified by Section 611.4 of this standard. Those which have product-specific EPDs count double, expanding opportunities for garnering the previously discussed 5 points and creating the possibility of satisfying the 10-product requirement solely with tile installations alone!

Furthermore, the North American-made Ceramic Tile, Mortar, and Grout EPDs report environmental impacts over 75 years, as analyzed by GaBi LCA software, according to the requirements of the standard, fulfilling the 60-year minimum building service life with no requirement to account for product replacements.

When choosing between tile and an alternate flooring material, using ceramic tile covered by the EPD is advantageous when building to this standard, because the EPD shows very low environmental impacts in all categories. In fact, tile covered by the EPD has the lowest impact in all six impact categories, as compared to the impacts reported for other common flooring options in their publicly available, generic EPDs. Refer to the 75-year impact analysis graphs included in this guide for details.

When choosing between specific tiles, mortars, and/or grouts, products covered by generic EPDs will additionally contribute when such products also have proprietary EPDs showing impacts that are on average 15% lower, as compared to the industry average reported in the generic EPD, in at least 4 categories.

Additionally, products that are Green Squared Certified® can also contribute points as detailed elsewhere in the NAHB Green Building Standard. Refer to the Tile and Green Building chart in *Tile: The Natural Choice* for details.

International Green Construction Code (IgCC) Powered by ASHRAE Standard 189.1

About IgCC: An initiative of the International Code Council (ICC). IgCC was developed as model code language for states and municipalities to establish baseline sustainability requirements for new and existing commercial buildings.

About ASHRAE 189.1: An ANSI-approved standard, ASHRAE 189.1 was designed to be incorporated into governing jurisdictions' codes and ordinances for commercial buildings and enforced by building officials and inspectors.

IgCC and ASHRAE Standard 189.1 are now integrated into a single model code and standard for high-performance buildings.

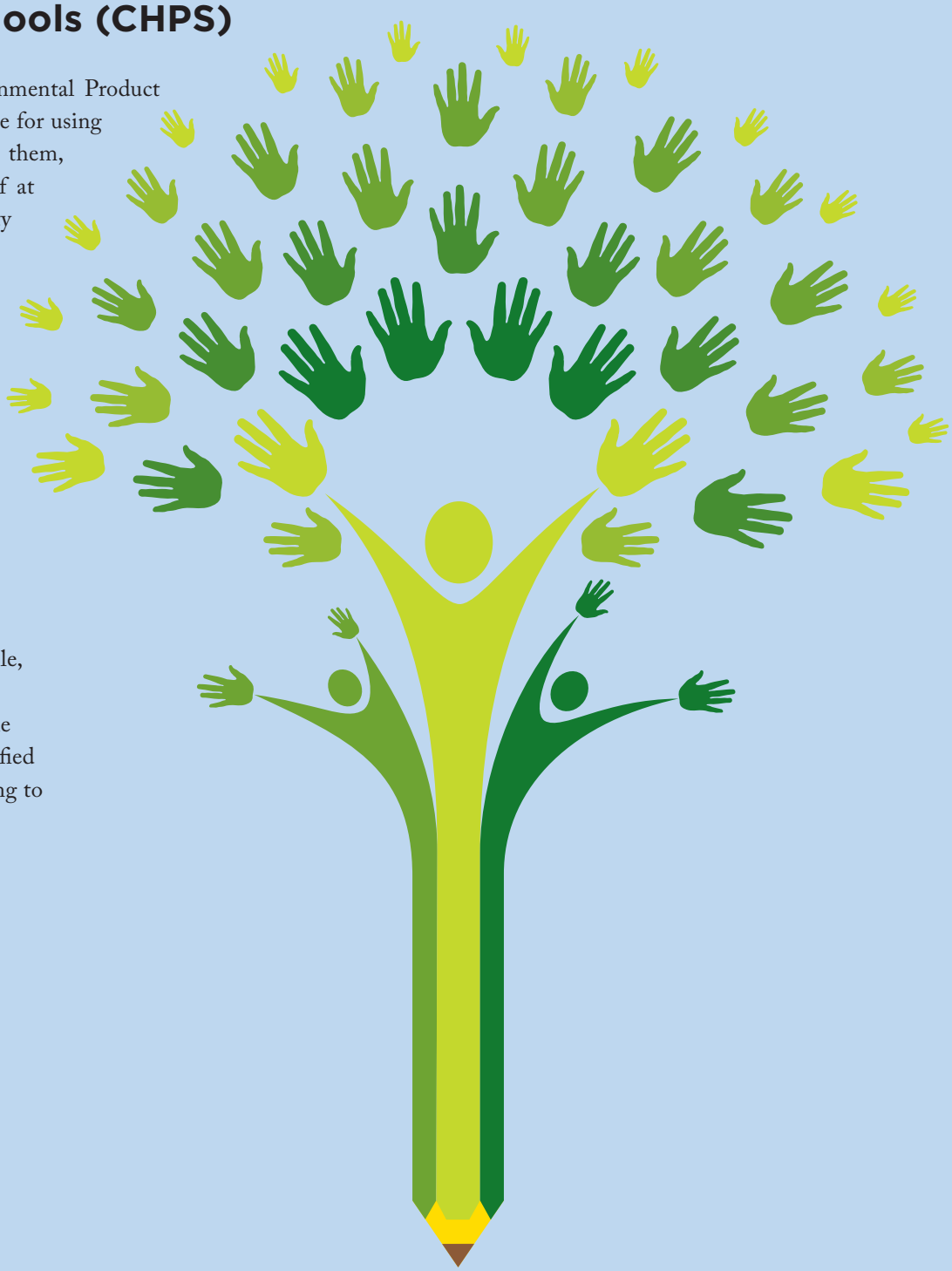
In IgCC Section 901.4.1.4 (ASHRAE 189.1 Section 9.4.1.4.2), *Multiple-Attribute Product Declaration or Certification*, at least 10 different products installed in the building by the time occupancy is allowed shall have a generic EPD, have a proprietary EPD, conform to a third-party multi-attribute certification, or have a third-party reviewed life cycle assessment (LCA).

EPD Each tiling product used, if covered by one or more of the North American made Ceramic Tile, Mortar, and/or Grout EPDs, counts as one product toward the ten-product threshold.

NORTH AMERICAN-MADE CERAMIC TILE, MORTAR, AND GROUT

Collaborative for High Performance Schools (CHPS)

Under Section MW 6.1, Environmental Product Declarations, 2 points are available for using products with EPDs. To earn them, the standard requires selection of at least 10 products with third party certified EPDs conforming to ISO 14025 and/or ISO 21930. Products are valued the same, whether their EPDs are generic or proprietary.



EPD

North American-made ceramic tile, mortar and grout can contribute toward earning these points, as the EPDs have been third-party certified by UL Environment as conforming to ISO standards for EPDs.

CALGreen

This standard is part of the California Building Standards Code and is commonly adopted as model language by developers of green building standards and rating systems in other parts of the country.

Section A5.409.3 for Non-Residential Construction requires at least 50% use of materials or assemblies based on life-cycle assessment (LCA) of their global warming potential (climate change/greenhouse gases) and two more environmental impacts from the list below:

- Fossil fuel depletion
- Stratospheric ozone depletion
- Acidification of land and water resources
- Eutrophication
- Photochemical oxidants (smog)

Tiling products covered by the North American-made Ceramic Tile, Mortar and/or Grout EPDs are eligible for consideration under this section of CALGreen, as the EPDs provides LCA data and address the referenced environmental impacts.

GSA P-100 Facilities Standards

This standard incorporates sustainability criteria into design standards for the construction of government-funded buildings. Section 3.4 (Interior Performance) sets forth several provisions for ceramic tile:

The "Baseline" and Tier 1 High Performance provisions specify that tiles conform to ANSI A137.1, the ANSI standard for ceramic tile, and be Green Squared Certified.®

The Tier 2 High Performance and Tier 3 High Performance provisions specify that tiles conform to ANSI A137.1, the ANSI standard for ceramic tile, be Green Squared Certified,® and have a publicly-available EPD.

Tiles covered by the North American-made Ceramic Tile EPD are eligible for use on Tier 2 and Tier 3 federal building projects, provided they are also Green Squared Certified® and meet the tile performance standards given in ANSI A137.1.

*Note: At the time of this publication, there are no GSA P-100 provisions for tile mortar or tile grout.

ENVIRONMENTAL FOOTPRINT: TILE, MORTAR AND GROUT
A 75-YEAR IMPACT ANALYSIS

Today, North American construction products are increasingly being evaluated based on their 75-year environmental footprint, a time frame chosen for the average service life of a building. Accordingly, the EPDs for North American-made Ceramic Tile, Mortar, and Grout provide long-term environmental impact data. In fact, the North American flooring Product Category Rule (PCR), UL 10010-7, requires EPDs to provide a life-cycle assessment (LCA) with a 75-year impact analysis. This appropriately includes the environmental impacts associated with acquiring a product's raw materials, manufacturing the product, and then delivering, installing, maintaining, and disposing of it, multiplied by the theoretical number of times the product would wear out and would have to be reinstalled (i.e., 75 years divided by the product's service life, in years).

In all six standard LCA environmental impact assessment categories, as included in the EPD for North American-made Ceramic Tile, Mortar, and Grout, the environmental benefits resulting from tile's inherent durability, long life, and low maintenance are clearly realized.

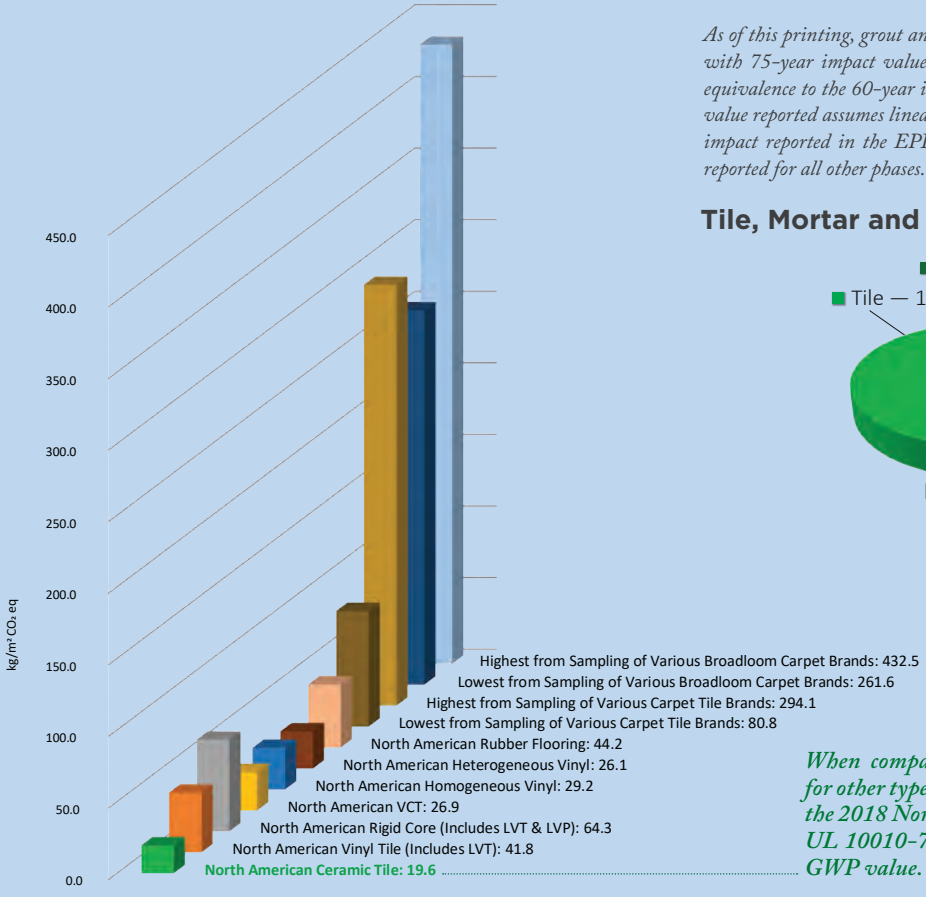
The EPDs for North American-made tiles, mortars, and grouts all report very low 75-year environmental impacts per installed square meter. In fact, when the EPD for North American-made Tile is compared to the generic EPDs for other types of flooring, developed under the same PCR and using the same building service life, North American-made ceramic tile has the lowest overall environmental impact. This includes the lowest Global Warming Potential and the lowest Fossil Fuel Resource Depletion.

Global Warming Potential (GWP)

GWP, commonly referred to as "carbon footprint," is measured by emissions of carbon-equivalent gases and relates to climate change.

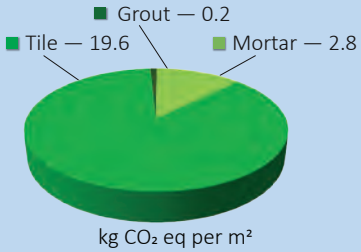
The 75-year GWP for North American-made Ceramic Tile, Mortar and Grout, based on their EPDs, is 19.6 kg CO_2 equivalent (eq.) per square meter for tile, 2.8 kg per m^2 for mortar, and 0.2 kg per m^2 for grout.

GWP: Tile vs Other Types of Flooring



As of this printing, grout and mortar EPDs have not yet been updated with 75-year impact values. For mortar, the value reported assumes equivalence to the 60-year impact reported in the EPD. For grout, the value reported assumes linear extrapolation from the 60-year use phase impact reported in the EPD, and equivalence to the 60-year impact reported for all other phases.

Tile, Mortar and Grout: Combined GWP



When compared to UL Certified EPDs for other types of flooring developed under the 2018 North American Flooring PCR, UL 10010-7, tile has the lowest 75-year GWP value.

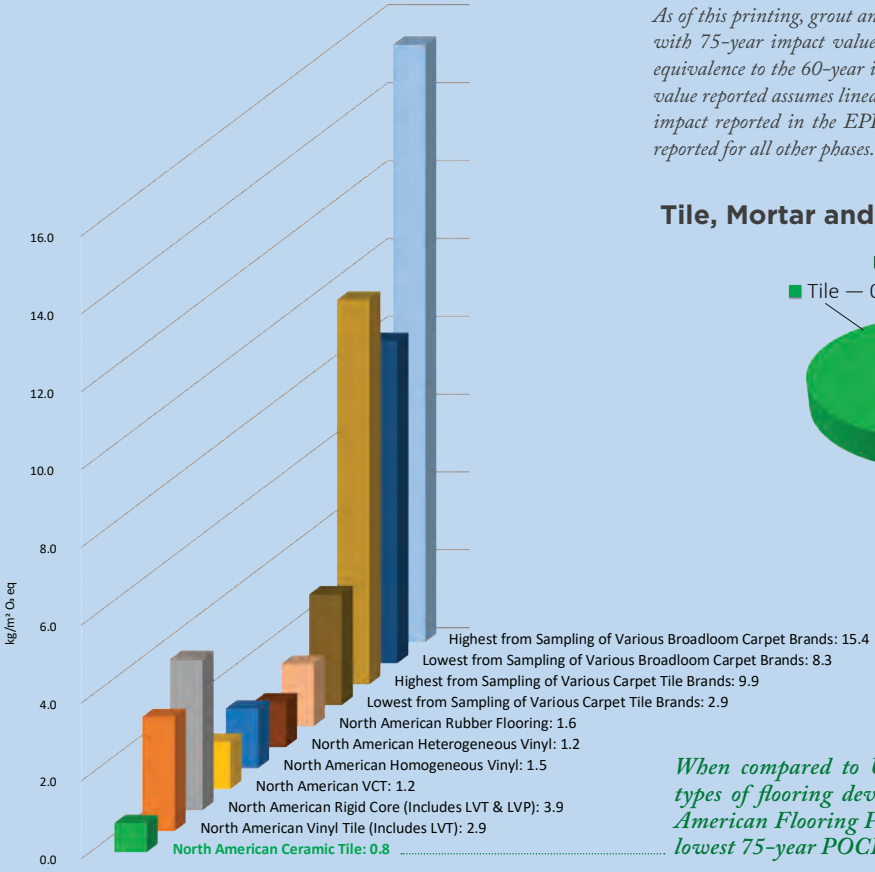
ENVIRONMENTAL FOOTPRINT: TILE, MORTAR AND GROUT
A 75-YEAR IMPACT ANALYSIS

Photochemical Oxidant Creation Potential (POCP)

POCP is directly linked to smog formation. Smog is harmful to humans and animals, most notably for aggravating bronchial-related diseases; it also inhibits plant growth due to decreased UV radiation, and can discolor ground-level materials like building exteriors.

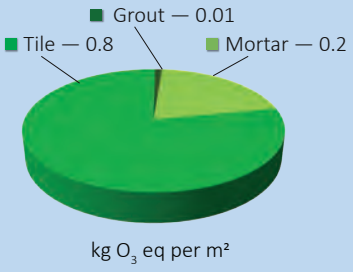
The 75-year POCP for North American-made Ceramic Tile, Mortar, and Grout, based on their EPDs, is 0.8 kg O_3 equivalent (eq.) per square meter for tile, 0.2 kg per m^2 for mortar, and 0.01 kg per m^2 for grout.

POCP: Tile vs Other Types of Flooring



As of this printing, grout and mortar EPDs have not yet been updated with 75-year impact values. For mortar, the value reported assumes equivalence to the 60-year impact reported in the EPD. For grout, the value reported assumes linear extrapolation from the 60-year use phase impact reported in the EPD, and equivalence to the 60-year impact reported for all other phases.

Tile, Mortar and Grout: Combined POCP



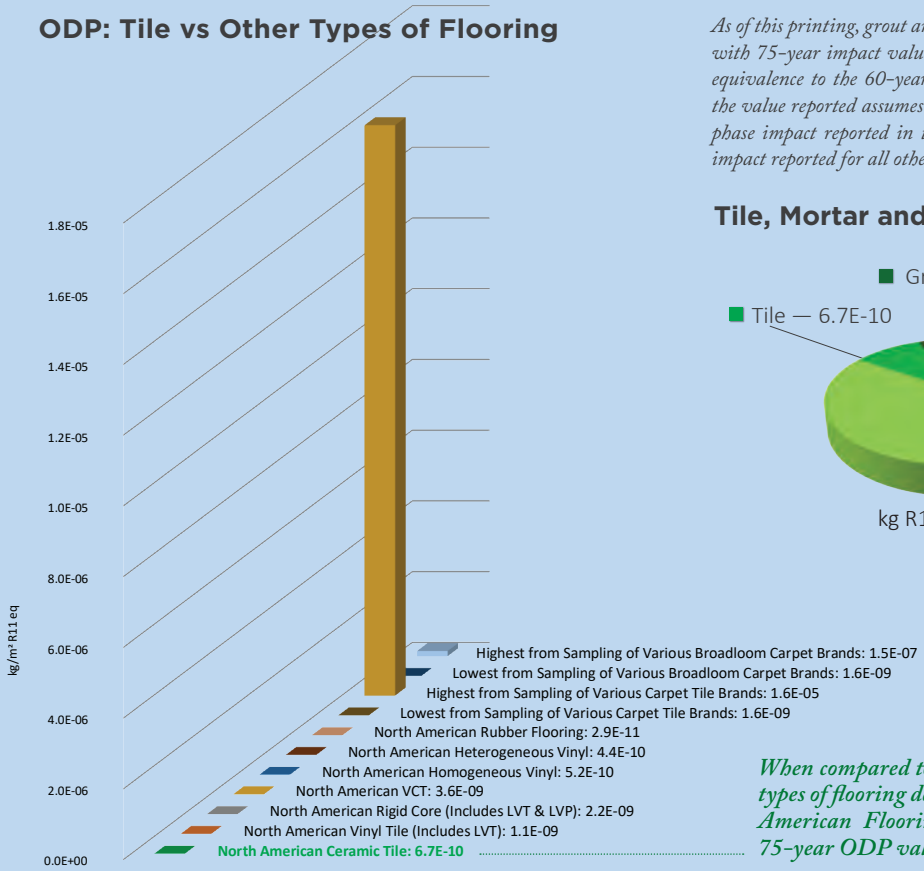
When compared to UL Certified EPDs for other types of flooring developed under the 2018 North American Flooring PCR, UL 10010-7, tile has the lowest 75-year POCP value.

Ozone Depletion Potential (ODP)

Ozone depletion occurs when chlorofluorocarbons (CFCs) and hydrofluorocarbons (HCFCs) reach the stratosphere, react with the sun, and break down the ozone layer. Decreased ozone can lead to an increase in the amount of UV-B radiation that reaches Earth's surface, having harmful effects on human health, animal health, terrestrial and aquatic ecosystems, biochemical cycles, and materials.

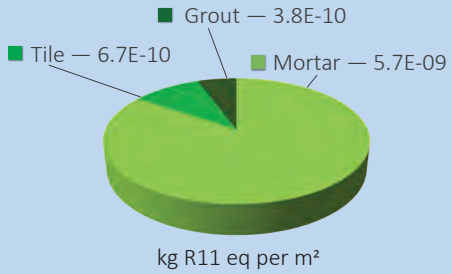
The 75-year ODP for North American-made Ceramic Tile, Mortar, and Grout, based on their EPDs, is 0.00000000067 kg R11 equivalent (eq.) per square meter for tile, 0.0000000057 kg per m^2 for mortar, and 0.00000000038 kg per m^2 for grout.

ODP: Tile vs Other Types of Flooring



As of this printing, grout and mortar EPDs have not yet been updated with 75-year impact values. For mortar, the value reported assumes equivalence to the 60-year impact reported in the EPD. For grout, the value reported assumes linear extrapolation from the 60-year use phase impact reported in the EPD, and equivalence to the 60-year impact reported for all other phases.

Tile, Mortar and Grout: Combined ODP



When compared to UL Certified EPDs for other types of flooring developed under the 2018 North American Flooring PCR, UL 10010-7, tile's 75-year ODP value is among the lowest.

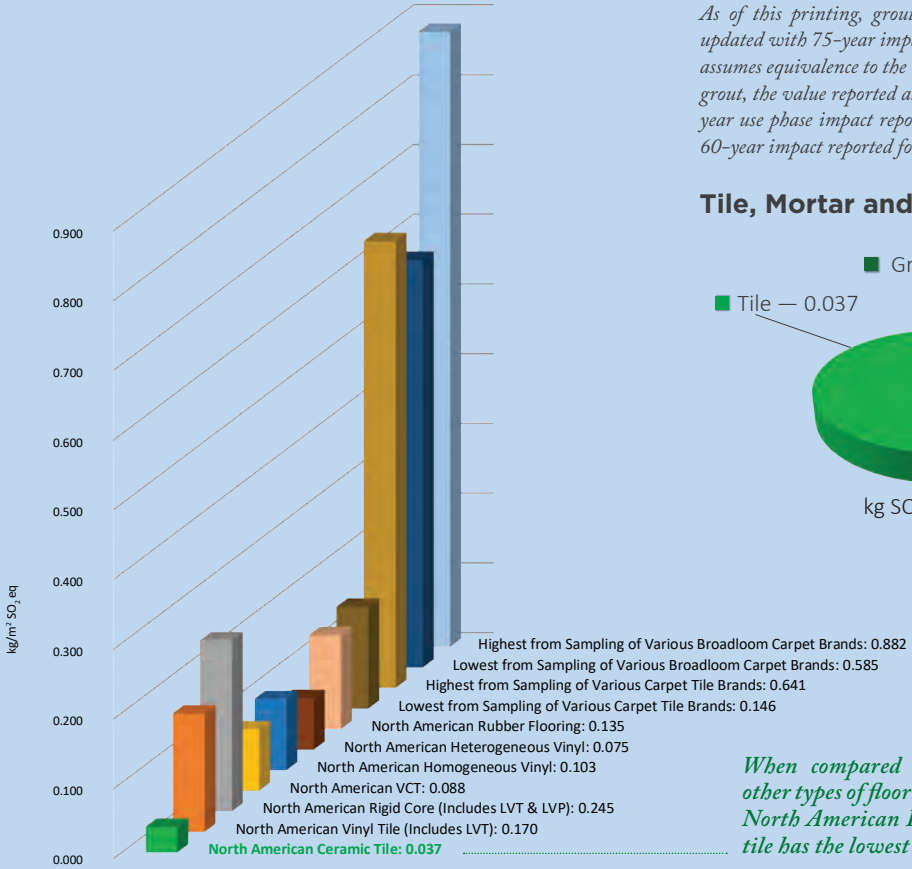
ENVIRONMENTAL FOOTPRINT: TILE, MORTAR AND GROUT
A 75-YEAR IMPACT ANALYSIS

Acidification Potential (AP)

Acidification occurs when soil, groundwater, surface water and atmospheric moisture pH levels are lowered. This can have a harmful impact on organisms, ecosystems, and man-made materials, including buildings.

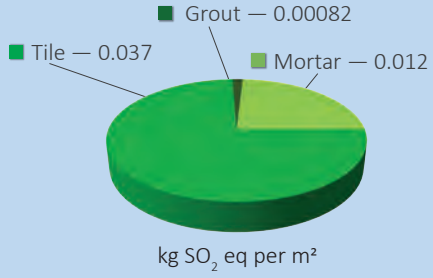
The 75-year AP for North American-made Ceramic Tile, Mortar and Grout, based on their EPDs, is 0.037kg SO_2 equivalent (eq.) per square meter for tile, 0.012 kg per m^2 for mortar, and 0.00082 kg per m^2 for grout.

AP: Tile vs Other Types of Flooring



As of this printing, grout and mortar EPDs have not yet been updated with 75-year impact values. For mortar, the value reported assumes equivalence to the 60-year impact reported in the EPD. For grout, the value reported assumes linear extrapolation from the 60-year use phase impact reported in the EPD, and equivalence to the 60-year impact reported for all other phases.

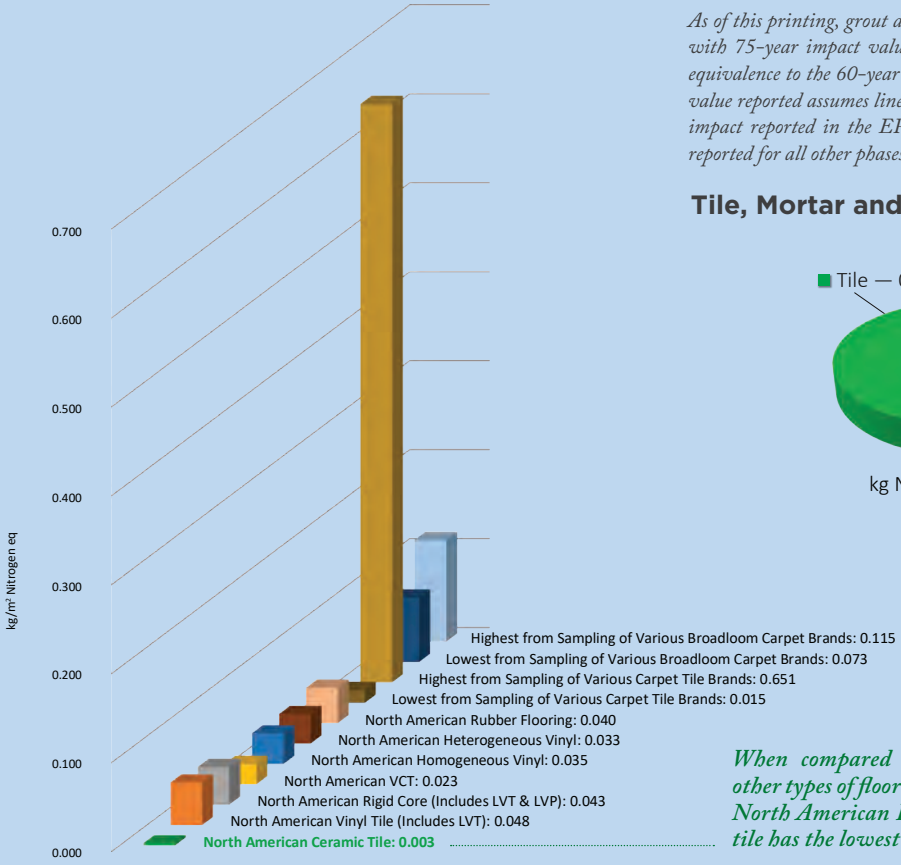
Tile, Mortar and Grout: Combined AP



When compared to UL Certified EPDs for other types of flooring developed under the 2018 North American Flooring PCR, UL 10010-7, tile has the lowest 75-year AP value.

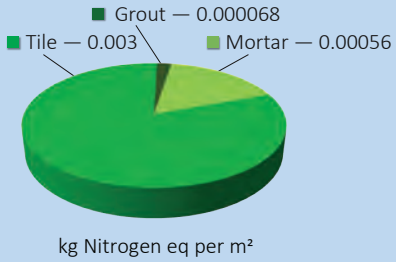
Eutrophication Potential (EP)

EP: Tile vs Other Types of Flooring



As of this printing, grout and mortar EPDs have not yet been updated with 75-year impact values. For mortar, the value reported assumes equivalence to the 60-year impact reported in the EPD. For grout, the value reported assumes linear extrapolation from the 60-year use phase impact reported in the EPD, and equivalence to the 60-year impact reported for all other phases.

Tile, Mortar and Grout: Combined EP



When compared to UL Certified EPDs for other types of flooring developed under the 2018 North American Flooring PCR, UL 10010-7, tile has the lowest 75-year EP value.

Eutrophication is the enrichment of a body of water (or ecosystem) with nutrients needed for photosynthesis, such as carbon dioxide and nutrient compounds containing nitrogen and/or phosphorus, commonly from fertilizer runoff and sewage. It is a significant cause of oxygen depletion in bodies of water, resulting from excess plant and algal growth, causing hypoxic conditions in which marine life cannot be sustained.

The 75-year EP for North American-made Ceramic Tile, Mortar, and Grout, based on their EPDs, is 0.003 kg Nitrogen equivalent (eq.) per square meter for tile, 0.00056 kg per m^2 for mortar, and 0.000068 kg per m^2 for grout.

ENVIRONMENTAL FOOTPRINT: TILE, MORTAR AND GROUT
A 75-YEAR IMPACT ANALYSIS

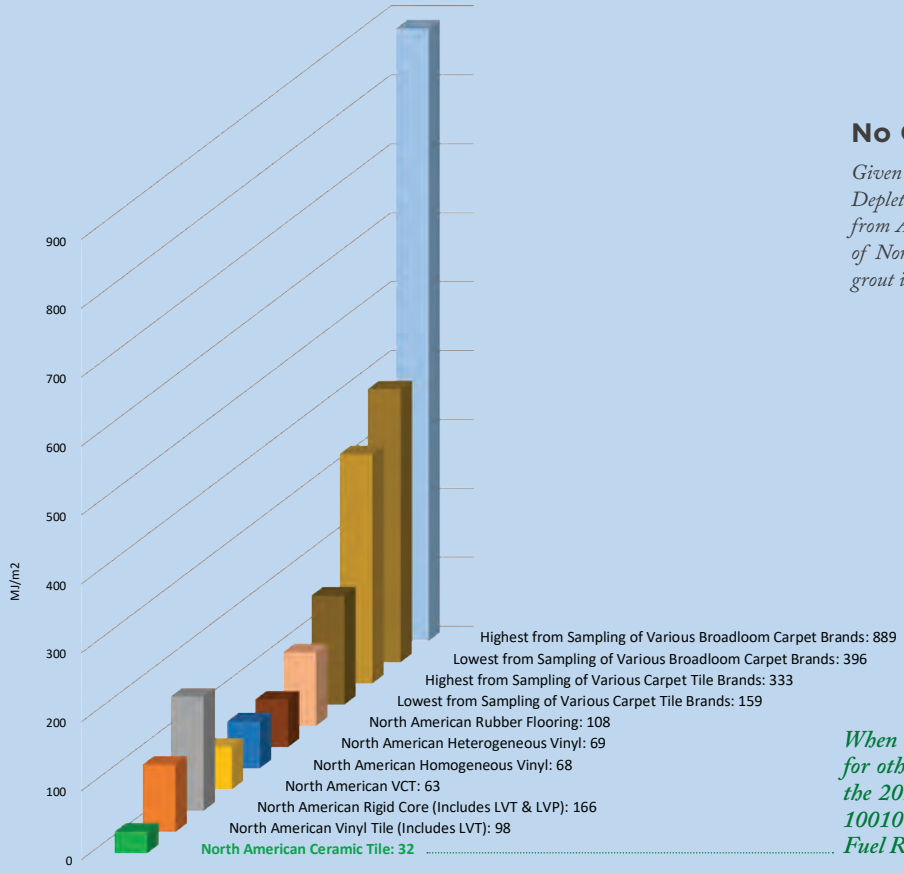
Fossil Fuel Resource Depletion

The utilization of fossil fuel resources throughout the life cycle of a product includes primary non-renewable energy resources such as petroleum, coal, and natural gas used as raw materials and as fuel in the manufacture, installation, maintenance, and disposal of the product. Efforts among environmental life cycle experts have been made to consider depletion of other types of resources, including land and water, but such evaluations are not often included in product LCAs due to difficulties in quantification at the site level.

The Fossil Fuel Resource Depletion over 75 years for North American-made Ceramic Tile, based on its EPD, is 32 MJ per square meter using TRACI 2.1 life cycle impact analysis (LCIA) methodology. Fossil Abiotic Resource Depletion (ADP-f) over 75 years for North American-made Mortar and Grout, based on their EPDs, is 31 MJ per m^2 for mortar and 2 MJ per m^2 for grout using CML 2001-2016 LCIA methodology.

TRACI LCIA methodology is generally preferable over CML in North America based on strong correlations with other impact categories, including Global Warming Potential, Acidification, and Smog Formation.

Fossil Fuel Resource Depletion: Tile vs Other Types of Flooring



No Combined Pie Chart

Given the unavailability of Fossil Fuel Resource Depletion data per TRACI, and inherent differences from ADP-f data per CML, a graphical comparison of North American-made ceramic tile, mortar and grout is not possible.

When compared to UL Certified EPDs for other types of flooring developed under the 2018 North American Flooring PCR, 10010-7, tile has the lowest 75-year Fossil Fuel Resource Depletion.

EPD
TRANSPARENCY SUMMARY: TILE

COMPANY NAME	Industry-Wide
PRODUCT NAME	North America Ceramic Tile: Porcelain, Pressed Floor, Mosaic,Quarry, Glazed Wall
PRODUCT DESCRIPTION	Floor or wall covering which is inert, fire resistant, non-combustible, durable, easy to maintain and made of mineral-based natural materials. Manufacturers include American Wonder Porcelain, Arto, Crossville, Dal-Tile, Del Conca USA, Florida Tile, Interceramic, Ironrock, Porcelanite-Lamosa, Portobello America, Quarry Tile Company, StonePeak Ceramics, and Vitromex
PRODUCT CATEGORY RULE (PCR)+ VERSION	UL PCR Part B: Flooring, 10010-7, Version 2.0, September 2018
CERTIFICATION PERIOD	April 1, 2020 to April 1, 2025
DECLARATION NUMBER	4789101745.101.1
EPD TYPE	☐ PRODUCT SPECIFIC ☑ INDUSTRY AVERAGE
DECLARED/ FUNCTIONAL UNIT	Functional Unit: 1 meter squared

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ENVIRONMENTAL PRODUCT DECLARATION
UL.COM/EPD

GREEN BUILDING QUALIFICATIONS

LEED v4 Building Product Disclosure and Optimization - EPDs, Option 1
ASHRAE 189.1 Material Compliance
IgCC Material Compliance
Green Globes 3.5.1.2.1
NAHB Material Selection

REFERENCE SERVICE LIFE (IF APPLICABLE)	75 Years
LCA SOFTWARE + VERSION	GaBi Database Version 9.2.0.58
IMPACT ASSESSMENT METHOD + VERSION	TRACI 2.1 & CML 2001-2016

LIFECYCLE IMPACT CATEGORIES

The environmental impacts listed below were assessed through the product's lifecycle over 75 years (cradle to grave impacts)—including production, construction, use (including use, maintenance, refurbishment and replacement), and end of life.

	ATMOSPHERE			WATER		EARTH	
	Global Warming Potential refers to long-term changes in global weather patterns that are caused by increased concentrations of greenhouse gases in the atmosphere.	**Ozone Depletion Potential** is the destruction of the stratospheric ozone layer, which shields the earth from ultraviolet radiation that's harmful to life, caused by human-made air pollution.	**Photochemical Ozone Creation Potential** happens when sunlight reacts with hydrocarbons, nitrogen oxides, and volatile organic compounds, to produce air pollution known as smog.	**Acidification Potential** is the result of human-made emissions and refers to the decrease in pH and increase in acidity of oceans, lakes, rivers, and streams – polluting groundwater and harming aquatic life.	**Eutrophication Potential** occurs when excessive nutrients cause increased algae growth in lakes, blocking the underwater penetration of sunlight needed to produce oxygen and resulting in the loss of aquatic life.	**Depletion of Abiotic Resources (Elements)** refers to the reduction of available non-renewable resources, such as metals, that are found on the periodic table of elements, due to human activity.	**Depletion of Abiotic Resources (Fossil Fuels)** refers to the decreasing availability of non-renewable carbon-based compounds, such as oil and coal, due to human activity.
TRACI	19.6 kg CO_2-Equiv.	6.7E-10 kg CFC 11-Equiv.	0.757 kg O_3-Equiv.	0.0371 kg SO_2-Equiv.	0.00268 kg N-Equiv.	N/A kg Sb-Equiv.	N/A MJ
CML	19.7 kg CO_2-Equiv.	5.72E-10 kg R11-Equiv.	0.00176 kg Ethene-Equiv.	0.0323 kg SO_2-Equiv.	0.00536 kg PO_4-Equiv.	1.34E-05 kg Sb-Equiv.	242 MJ

Environment

MATERIAL CONTENT

Material content measured to 1%.

COMPONENT	MATERIAL	AVAILABILITY	MASS%	ORIGIN
Body	Clay	Mineral perpetual	69.78	US, Mexico, Europe
	Sand	Mineral perpetual	6.22	US, Mexico, Europe
	Talc	Mineral perpetual	1.12	US, Mexico, Europe
	Feldspar	Mineral perpetual	11.26	US, Mexico, Europe
	Internal Scrap	Pre-consumer	6.48	US, Mexico, Europe
	Frit	Mineral perpetual	0.41	US, Mexico, Europe
	Calcium Carbonate	Mineral perpetual	1.46	US, Mexico, Europe
	Ash	Mineral perpetual	1.35	US, Mexico, Europe
	Additives	Mineral perpetual	0.66	US, Mexico, Europe
Surface	Ink	Mineral perpetual	0.15	US, Mexico, Europe
	Glaze	Mineral perpetual	1.06	US, Mexico, Europe

ADDITIONAL ENVIRONMENTAL INFORMATION

PRE-CONSUMER RECYCLED CONTENT	VARIES %
POST-CONSUMER RECYCLED CONTENT	VARIES %
VOC EMISSIONS	ZERO/INORGANIC
WATER CONSUMPTION	0.0242 CUBIC METERS

RECYCLING OR REUSE

Ceramic tile can outlast multiple generations of building occupants and is commonly reused in an existing building or salvaged for use in a new building. Solid and inert, it can also be used in a variety of post-life applications such as clean fill, roadway paving, and raw materials used to manufacture new products. To represent a "worst case" scenario, this EPD reports environmental impacts based on 100% of all tile removal waste being disposed of in a landfill.

ENERGY

RENEWABLE ENERGY	5.12 %	13.7	**MJ**
NON-RENEWABLE ENERGY	94.88 %	254	**MJ**

STANDARDS

ANSI A137.1 American National Standard Specifications for Ceramic Tile

ISO 13006 International Organization for Standardization Specifications for Ceramic Tile

ANSI A138.1/Green Squared® American National Standard Specifications for Sustainable Ceramic Tiles, Glass Tiles, and Tile Installation Materials

CERTIFICATIONS

MANUFACTURER CONTACT INFO

NAME	Tile Council of North America (TCNA)
PHONE	864-646-8453
EMAIL	
WEBSITE	www.TCNAtile.com

www.UL.com/environment | environment@ul.com

EPD
TRANSPARENCY SUMMARY: GROUT

COMPANY NAME	**Industry-Wide**
PRODUCT TYPE	**ANSI A118.6, A118.7, and ISO 13007**
PRODUCT NAME	Cement Grout for Tile Installation: Made in North America
PRODUCT DEFINITION	Factory-prepared mixture of cement, aggregate and other ingredients used to fill joints, or the spaces between tiles. Once cured, it is durable, fire-resistant, and moisture insensitive. Manufacturers include Ardex, Bexel, Bostik, Crest, Custom, HB Fuller/TEC, Interceramic, Laticrete, MAPEI, and Cemix/Texrite
PRODUCT CATEGORY RULE (PCR)	IBU Part A & B for Mineral Factory-made Mortar, 07.2014, with UL Addendum
CERTIFICATION PERIOD	**September 30, 2016 to September 30, 2021**
DECLARATION NUMBER	**4787109018.101.1**

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ENVIRONMENTAL PRODUCT DECLARATION
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LIFECYCLE IMPACT CATEGORIES

The environmental impacts listed below were assessed throughout the product's lifecycle – including raw material extraction, transportation, manufacturing, packaging, use, and disposal at end of life.

	ATMOSPHERE			WATER		EARTH	
	Global Warming Potential refers to long-term changes in global weather patterns – including temperature and precipitation – that are caused by increased concentrations of greenhouse gases in the atmosphere.	**Ozone Depletion Potential** is the destruction of the stratospheric ozone layer, which shields the earth from ultraviolet radiation that's harmful to life, caused by human-made air pollution.	**Photochemical Ozone Creation Potential** happens when sunlight reacts with hydrocarbons, nitrogen oxides, and volatile organic compounds, to produce a type of air pollution known as smog.	**Acidification Potential** is the result of human-made emissions and refers to the decrease in pH and increase in acidity of oceans, lakes, rivers, and streams – a phenomenon that pollutes groundwater and harms aquatic life.	**Eutrophication Potential** occurs when excessive nutrients cause increased algae growth in lakes, blocking the underwater penetration of sunlight needed to produce oxygen and resulting in the loss of aquatic life.	**Depletion of Abiotic Resources (Elements)** refers to the reduction of available non-renewable resources, such as metals and gases, that are found on the periodic table of elements, due to human activity.	**Depletion of Abiotic Resources (Fossil Fuels)** refers to the decreasing availability of non-renewable carbon-based compounds, such as oil and coal, due to human activity.
TRACI	**0.203** kg CO2-Equiv.	**3.73E-10** kg CFC 11-Equiv.	**0.0123** kg O3-Equiv.	**8.13E-04** kg SO2-Equiv.	**6.14E-05** kg N-Equiv.	**N/A**	**N/A**
CML	**0.203** kg CO2-Equiv.	**2.94E-10** kg CFC 11-Equiv.	**6.21E-05** kg Ethene-Equiv.	**7.89E-04** kg SO2-Equiv.	**9.40E-05** kg Phosphate-Equiv.	**2.34E-07** kg SB-Equiv.	**2.07** MJ

FUNCTIONAL UNIT One square meter (1 sqm) of installed grout. Life cycle impact results are expressed for 60 years. Assumed application rate is 0.212 kilograms per square meter. Divide results by 0.212 to calculate impact per kilogram of grout.

Environment

MATERIAL CONTENT

Material content measured to 1%.

COMPONENT	MATERIAL	AVAILABILITY	MASS%	ORIGIN
Sand	Sand	Mineral perpetual	53	Locally sourced US, Canada, Mexico
Cement	White cement	Mineral manufactured	27	US, Canada, Mexico, Europe
Limestone	Limestone	Mineral perpetual	10	Locally sourced US, Canada, Mexico
Cement	Grey cement	Mineral manufactured	5	Locally sourced US, Canada, Mexico
Additive	Calcium aluminate	Mineral perpetual	2	Locally sourced US, Canada, Mexico
Additive	Calcium formate	Mineral perpetual	1	Locally sourced US, Canada, Mexico
Additive	Other additives	Various	2	US, Canada, Europe, Asia

ADDITIONAL ENVIRONMENTAL INFORMATION

PRE-CONSUMER RECYCLED CONTENT	VARIES %
POST-CONSUMER RECYCLED CONTENT	VARIES %
VOC EMISSIONS	CDPH 01350 COMPLIANT
WATER CONSUMPTION	0.51 L

RECYCLING OR REUSE

Tile installations with cement grout can last as long as buildings and are often reused for multiple generations of building occupants. Although tile and cement grout can be used in a variety of post-life applications (e.g., clean fill, roadway paving, aggregate for new products, etc.), this analysis adopts a conservative approach and assumes that 100% of tile and associated waste are disposed in a landfill.

ENERGY

RENEWABLE ENERGY	9 %	0.21 MJ
NON-RENEWABLE ENERGY	91 %	2.3 MJ

STANDARDS

ANSI A118.6 American National Standard Specifications, Standard Cement Grouts for Tile Installation
ANSI A118.7 American National Standard Specifications, High Performance Cement Grouts for Tile Installation
ISO 13007 Terms, Definitions and Specifications, Ceramic Tile Grouts and Adhesives
ANSI A138.1/Green Squared® American National Standard Specifications, Sustainable Ceramic Tiles, Glass Tiles and Tiles, and Tile Installation Materials

CERTIFICATIONS

MANUFACTURER CONTACT INFO

NAME	Tile Council of North America (TCNA)
PHONE	864-646-8453
EMAIL	
WEBSITE	www.TCNAtile.com

www.UL.com/environment | environment@ul.com

EPD
TRANSPARENCY SUMMARY: MORTAR

COMPANY NAME	**Industry-Wide**
PRODUCT TYPE	**ANSI A118.1, A118.4/11, A118.15, and ISO 13007**
PRODUCT NAME	Cement Mortar for Tile Installation: Made in North America
PRODUCT DEFINITION	Blend of cement, sand, water retention compounds and other additives used to adhere tile to a substrate. Once cured, it is durable, fire-resistant, moisture insensitive, and maintenance-free. Manufacturers include Ardex, Bexel, Bostik, Crest, Custom, HB Fuller/TEC, Interceramic, Laticrete, MAPEI, and Cemix/Texrite
PRODUCT CATEGORY RULE (PCR)	IBU Part A & B for Mineral Factory-made Mortar, 07.2014, with UL Addendum
CERTIFICATION PERIOD	**September 30, 2016 to September 30, 2021**
DECLARATION NUMBER	**4787109018.102.1**

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LIFECYCLE IMPACT CATEGORIES

The environmental impacts listed below were assessed throughout the product's lifecycle – including raw material extraction, transportation, manufacturing, packaging, use, and disposal at end of life.

	ATMOSPHERE			WATER		EARTH	
	Global Warming Potential refers to long-term changes in global weather patterns – including temperature and precipitation – that are caused by increased concentrations of greenhouse gases in the atmosphere.	**Ozone Depletion Potential** is the destruction of the stratospheric ozone layer, which shields the earth from ultraviolet radiation that's harmful to life, caused by human-made air pollution.	**Photochemical Ozone Creation Potential** happens when sunlight reacts with hydrocarbons, nitrogen oxides, and volatile organic compounds, to produce a type of air pollution known as smog.	**Acidification Potential** is the result of human-made emissions and refers to the decrease in pH and increase in acidity of oceans, lakes, rivers, and streams – a phenomenon that pollutes groundwater and harms aquatic life.	**Eutrophication Potential** occurs when excessive nutrients cause increased algae growth in lakes, blocking the underwater penetration of sunlight needed to produce oxygen and resulting in the loss of aquatic life.	**Depletion of Abiotic Resources (Elements)** refers to the reduction of available non-renewable resources, such as metals and gases, that are found on the periodic table of elements, due to human activity.	**Depletion of Abiotic Resources (Fossil Fuels)** refers to the decreasing availability of non-renewable carbon-based compounds, such as oil and coal, due to human activity.
TRACI	**2.88** kg CO2-Equiv.	**5.65E-09** kg CFC 11-Equiv.	**0.200** kg O3-Equiv.	**0.0122** kg SO2-Equiv.	**5.62E-04** kg N-Equiv.	**N/A**	**N/A**
CML	**2.89** kg CO2-Equiv.	**4.43E-09** kg CFC 11-Equiv.	**9.66E-04** kg Ethene-Equiv.	**0.0118** kg SO2-Equiv.	**1.21E-03** kg Phosphate-Equiv.	**3.51E-06** kg SB-Equiv.	**30.8** MJ

FUNCTIONAL UNIT: One square meter (1 sqm) of installed mortar. Life cycle impact results are expressed for 60 years of use. Assumed application rate is 4.07 kilograms per square meter. Divide results by 4.07 to calculate impact per kilogram of mortar.

Environment

MATERIAL CONTENT

Material content measured to 1%.

COMPONENT	MATERIAL	AVAILABILITY	MASS%	ORIGIN
Sand	Sand	Mineral perpetual	37	Locally sourced US, Canada, Mexico
Calcium carbonate	Calcium carbonate	Mineral perpetual	30	Locally sourced US, Canada, Mexico
Cement	Grey cement	Mineral manufactured	15	Locally sourced US, Canada, Mexico
Cement	White cement	Mineral manufactured	13	US, Canada, Mexico, Europe
Additive	E/VA	Polymer manufactured	1	US, Europe
Additive	Admixture	Mineral perpetual	1	US, Mexico, Europe
Additive	Cellulose ether	Organic rapidly renewable	1	US, Europe
Additive	Other additives	Various	1	US, Canada, Europe, Asia

ADDITIONAL ENVIRONMENTAL INFORMATION

PRE-CONSUMER RECYCLED CONTENT	VARIES %
POST-CONSUMER RECYCLED CONTENT	VARIES %
VOC EMISSIONS	CDPH 01350 COMPLIANT
WATER CONSUMPTION	6.5 L

RECYCLING OR REUSE

Tile installations with cement mortar can last as long as buildings and are often reused for multiple generations of building occupants. Although tile and cement mortar can be used in a variety of post-life applications (e.g., clean fill, roadway paving, aggregate for new products, etc.), this analysis adopts a conservative approach and assumes that 100% of tile and associated waste are disposed in a landfill.

ENERGY

RENEWABLE ENERGY	6 %	2.11 MJ
NON-RENEWABLE ENERGY	94 %	32.5 MJ

STANDARDS

ANSI A118.1 American National Standard Specifications, Dry-Set Cement Mortar
ANSI A118.4/11 American National Standard Specifications, Modified Dry-Set Cement Mortar
ANSI A118.15 American National Standard Specifications, Improved Modified Dry-Set Cement Mortar
ISO 13007 Terms, Definitions and Specifications, Ceramic Tile Grouts and Adhesives
ANSI A138.1/Green Squared® American National Standard Specifications, Sustainable Ceramic Tiles, Glass Tiles and Tiles, and Tile Installation Materials

CERTIFICATIONS

MANUFACTURER CONTACT INFO

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PHONE	864-646-8453
EMAIL	
WEBSITE	www.TCNAtile.com

www.UL.com/environment | environment@ul.com

Release date: April 2021

Green building standards and rating systems are living documents, and the consensus regarding their use and interpretation is ever-evolving. Check for updates to *Tile: The Natural Choice* at www.TCNAtile.com.

TCNA
TILE COUNCIL OF NORTH AMERICA, INC.

U.S. GREEN BUILDING COUNCIL MEMBER

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Why leave it to just anyone?

"Because tile is a permanent finish, the lowest bid should not be the driving factor, but rather who is the most qualified to perform the scope of the work specified."

—TCNA Handbook

A home or any building today is one of the few things still made entirely "by hand" and every aspect of a tile installation relies on the tile contracting company and its installers. How good the finished installation looks, how well it performs, and how long it lasts are in their hands. After painstakingly choosing materials and specifying the performance requirements they must meet, it just doesn't make sense to leave the rest to chance.

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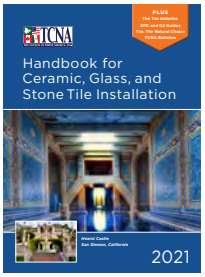

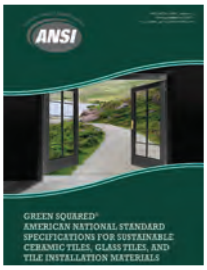

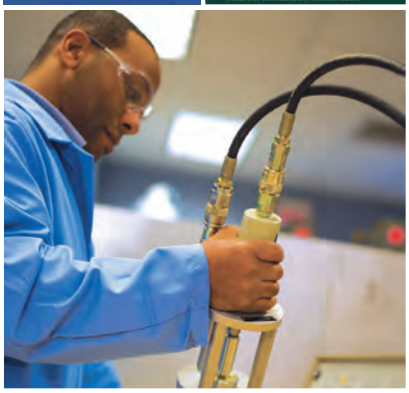

STANDARDS.
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STANDARDS

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Editor and Publisher of the *TCNA Handbook for Ceramic, Glass, and Stone Tile Installation*

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Largest Independent Tile and Installation Materials Testing Laboratory in North America

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EDUCATION

Founding Partner in Installer Education and Certification Programs in the U.S. and Mexico

Publisher of *TCNA Tile Initiative* and *Tile: The Natural Choice*

Publisher of Quarterly Tile Industry Market Reports

Author of Safety, Quality, and Standards-related Articles

Staff Regularly Serve as Keynote and Industry Speakers

ADVOCACY

Consumer and Industry Interests in Legislative, Regulatory, and Environmental Matters

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US $50.00
ISBN 978-1-7330220-9-5
55000>
9 781733 022095