SALUTATIONS AND THANK YOU for perusing this second edition of the TCNA Tile Initiative. This year we bring you information on a number of topics relating to changes to the TCNA Handbook. We are especially proud to be publishing the 2013 Handbook, our 50th Anniversary Edition reflecting fifty years of continuous publication. Did you know there are yet older versions? The first copy we found under TCA was published in 1951 and early Handbooks were only 20 pages. Of course, there were fewer ways to install tile in those days. We haven’t run a correlation study to confirm it, but it seems that growth in our industry is directly proportional to the Handbook page count, with the current Handbook over 350 pages.

The Handbook is a compilation of generic (non-proprietary) guidelines for specifying and installing ceramic, glass, and stone tile. The contents are determined and periodically revised by the TCNA Handbook Committee, a consensus body of experts. TCNA’s role is to manage the administrative process and to help committee members come to consensus on the submissions and proposals the Committee receives, which come in several forms: new installation methods, new informational sections, modifications to existing guidelines, and clarifications. Culminating two years of research and collaboration, the Committee approved for the 2013 Edition a few of each, and three sections of this booklet explain the objectives and practical applications of these changes.

We have also included a section on tile and green building design, to discuss the many exciting developments in this fast-evolving arena. While we have been promoting for years tile’s inherent sustainability (not many other building materials have spectacular installations still around from 2000 years ago), the world is now taking a good close-up look at construction products and starting to demand materials with proven green attributes. We couldn’t be more pleased. Our article points to the ways in which ceramic tile can contribute to green projects today, as well as our goals for the future.

I urge you also to read our bulletin on changes to coefficient of friction (COF) standards. While the subject matter may not tickle your interest at first glance, the changes that have taken place improve consumer safety and affect every individual and business involved in the selection, installation, and maintenance of tile floors.

Thank you again for your interest.

Sincerely,

Eric Astrachan
Executive Director
Tile Council of North America
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The standard for coefficient of friction (COF) for tile floors has changed. Whether you’re manufacturing, specifying, selling, installing, or maintaining ceramic tile floors, it’s important to know the COF of your floor tile according to the new standard and test method, the DCOF AcuTest. Our lab not only runs this test, we helped develop the protocol. Send us your tiles today, and be sure you’re meeting this new and very important safety standard.

Katelyn Simpson
TCNA Laboratory Manager
IN 2012 THE METHOD for measuring the coefficient of friction (COF) of ceramic tiles changed, as specified in the American National Standards Institute (ANSI) national standard specifications for ceramic tile, A137.1. It changed from the ASTM International test method C1028, which measures static coefficient of friction, to the test protocol provided in the A137.1–2012 standard in Section 9.6, known as the DCOF AcuTestSM. This bulletin answers many common questions regarding the change, and a condensed version of this information has been included in the TCNA Handbook.

What is coefficient of friction (COF)?

Coefficient of friction (COF) is the measurement of a tile’s frictional resistance, closely related to traction and slipperiness. Both static and dynamic measurements can be taken. Static coefficient of friction (SCOF) is the frictional resistance one pushes against when starting in motion. Dynamic coefficient of friction (DCOF) is the frictional resistance one pushes against when already in motion. For SCOF and DCOF, a slip occurs when pushing off with more force than the surface can resist. That can happen when the angle of the force changes (e.g., pushing off harder while pressing down less) or when the floor surface becomes more slippery than anticipated.

What is the DCOF AcuTest?

The DCOF AcuTest is an evaluation of the COF of a tile surface under known conditions using a standardized sensor prepared according to a specific protocol. Measurements are made with the BOT-3000, an automated and portable device that measures DCOF. The ANSI standard A137.1–2012 also allows the use of other equivalent tribometers.

Wet measurements use 0.05% sodium lauryl sulfate solution to establish a thin film as would be present when a slip occurs. The precision, repeatability, and reproducibility of the DCOF AcuTest protocol is provided in the A137.1–2012 standard. The test was so named for easy recognition, and to distinguish it from other DCOF measurements using different instruments and/or protocols.

The DCOF AcuTest COF measurement is not a property of the flooring but rather a measurement of the interaction between the sensor, the lubricant, and the tile surface under controlled conditions. It is useful to allow comparison between surfaces or to evaluate how a surface has changed over time. However, while the DCOF AcuTest can provide a useful comparison of tile surfaces, it cannot, nor can any other device, predict the likelihood a person will or will not slip on a tile surface.

Because many variables affect the risk of a slip occurring, the DCOF AcuTest measurement shall not be the only factor in determining the appropriateness of a tile for a particular application.
What is the required COF for ceramic tile?

According to the ANSI A137.1–2012 standard, ceramic tiles selected for level interior spaces expected to be walked upon when wet must have a minimum wet DCOF AcuTest value of 0.42. Tiles with a lower value are not necessarily restricted to dry areas only, but rather are restricted to applications where they are kept dry when walked upon. In the case of residential bathrooms, the common use of bathmats can accomplish this. Similarly, in entranceways, the use of entrance mats can accomplish the same.

Not all products with a DCOF AcuTest value over 0.42 are suitable for all applications. Type of use, traffic, contaminants, maintenance, expected wear, and manufacturer’s guidelines and recommendations are important and must also be considered by the specifier. Section 6.2.2.1.10 of ANSI A137.1–2012 explains this in greater detail and should be reviewed carefully by anyone involved in the specification process before picking the right tile for their next project!

What about the 0.6 ADA requirement?

Previously, there was no required COF value in the ANSI A137.1 standard for wet floors (static or dynamic), although a minimum value of 0.6 wet SCOF measured by ASTM C1028 has been commonly specified for ceramic tile in commercial project specifications for many years.

This likely stemmed from the common misconception that the 1991 Americans with Disabilities Act (ADA) required such. In fact, the ADA did not set a requirement but rather referenced accessibility guidelines (Appendix Section A4.5) that recommended, not required, a value of 0.6 SCOF. But this section failed to specify a means of measurement. With many devices on the market for measuring COF, each producing a different value for the same tile (due to different sensors, geometry, speed of travel, etc.), the recommended 0.6 SCOF value was meaningless. Accordingly, when ADA accessibility guidelines were updated in 2004, and the guidelines for access to federal facilities covered by the Architectural Barriers Act (ABA) were updated, the 0.6 SCOF recommendations were withdrawn for both. For more information see http://www.access-board.gov/ada-aba/final.cfm.

When does the change take effect?

The changes to the A137.1 standard addressed herein were first passed by the accredited national consensus body responsible for ANSI A137.1 and then approved as an American National Standard by ANSI in September 2012. However, it is understood that this represents a big change and improvement to an established norm. Thus, most tile manufacturers and importers are reporting SCOF (per C1028) and DCOF AcuTest values during the inherent transition needed for the market to switch to the new requirements. The tile industry is targeting for this transitional period to end in December 2013.
Why the change in test methods?

While both SCOF and DCOF are relevant to human ambulation, DCOF is more widely used worldwide and arguably relates better to slips occurring while a person is in motion. Moreover, the technology on which the DCOF AcuTest is based was not available in the United States until recently.

The DCOF AcuTest in particular offers several benefits over other methods of measuring COF. First, it is a highly repeatable test method, due in part to the fact that it is an automated process with internal and external reference checks easily made. Also the process by which the sensor is prepared is highly repeatable using a device developed by the Tile Council of North America (TCNA), the drawings and specifications for which have been made freely available. The DCOF AcuTest also more accurately measures the COF of very smooth surfaces. And, because the BOT-3000 device making the measurements is portable, it can easily be used for taking field measurements on installed tiles. This is extremely useful since it is often necessary to measure the COF of tiles in situ, to determine if they have been affected by wear or contaminants.

Supporting research: The required DCOF AcuTest value, for tiles in level interior spaces expected to be walked on while wet, stems from decades of research in Europe and extensive testing at TCNA. Researchers at the University of Wuppertal in Germany (known worldwide for their traction studies) studied human subjects walking on force plates to find the relationship between the tangential force and the vertical force needed for reliable traction; this relationship defines the COF and has been widely studied in the United States and in Europe. It is commonly found to be between 0.2 and 0.3 depending on the individual. The German researchers then considered many different
slippery conditions, different ways people could move on a surface, and accident statistics over many years to recommend to the German national insurance body a minimum wet DCOF value of 0.42 for flooring.¹

In various studies at TCNA, including a study of more than three hundred tile surfaces², TCNA researchers found that 0.60 wet SCOF correlated on average with 0.38 wet DCOF.

Considering both the TCNA research and the years of research in Europe, the ANSI A108 Accredited Standards Committee decided to adopt the German recommendation and include in ANSI A137.1–2012 a required minimum threshold of 0.42 (per the DCOF AcuTest) for level interior spaces expected to be walked upon when wet. By requiring a value higher than 0.38, the new standard provides an additional measure of safety over the widely used ASTM C1028 wet SCOF value of 0.60.

Will floors that met the 0.6 SCOF criteria meet the new 0.42 DCOF AcuTest criteria?

Because many floors that were installed to meet or exceed 0.6 SCOF, as measured by the ASTM C1028 method, in fact greatly exceeded 0.6 SCOF, it is reasonable to expect on average those floors will also exceed the new 0.42 DCOF AcuTest criterion.

However, it is of utmost importance to understand there is no direct relationship between the methods; values on individual tiles cannot be correlated between the two methods. This is because the two methods measure different physical principles with different wetting agents. While a correlation on average, based on hundreds of tiles, has been established between the two methods, there are individual outliers (tiles that fall well outside the correlation) and no mathematical relationship exists to convert from one value to another on individual tiles. To know definitely if a floor meets the minimum 0.42 DCOF AcuTest criterion, it must be measured.

Preventing slip/fall accidents: maintenance, contaminants, and periodic assessments

The DCOF of installed tiles can change over time as a result of wear and surface contaminants. In addition to regular cleaning, deep cleaning and traction-enhancing maintenance may be needed periodically to maintain DCOF values. With the portability and ease of the DCOF AcuTest, periodic evaluation of flooring surfaces is now easily accomplished.

Where floor tiles have a DCOF lower than 0.42, care must be exercised to ensure the tiles are not walked on while wet.


²While the 300 surfaces chosen were selected to represent a wide spectrum of tile surfaces, no claim is made or offered that this represented the entire spectrum of available tile surfaces nor can any inference be made regarding any individual tile surface. ASTM C1028 SCOF measurements and DCOF AcuTest measurements cannot be directly compared or correlated on a per tile basis as different sensors, test conditions, and measurement physics are employed.
In addition to choosing surfaces providing sufficient traction, providing adequate lighting and designing spaces to allow for suitable drainage will reduce slip/fall accidents. Proper footwear and shoe materials can also greatly improve traction and should be considered in any campaign to reduce slips and falls.

What about ramps, exteriors, pools, etc.?

ANSI A137.1–2012 does not address areas other than interior level spaces. For other floor applications, some tile manufacturers may be able to provide guidance based on their proprietary experience. In general though, the specifier must determine which tiles are appropriate for the specific project conditions, considering by way of example, but not in limitation, type of use, traffic, grade of any ramps, expected contaminants, expected maintenance, expected wear, and manufacturers’ guidelines and recommendations.
THIS YEAR, THREE NEW informational sections have been added to the TCNA Handbook to provide construction professionals increased clarity on existing specification guidelines as well as new products and installation systems: The new section on concrete flatness addresses differences between the way concrete specifications and tile specifications typically call out flatness requirements. New sections on reduced thickness porcelain tile (a.k.a. thin tile) and ventilated facades illustrate how new technologies are being used to create new and innovative ceramic tile types and applications.

Measuring Concrete Flatness: F-Numbers vs. the Straightedge Method

Ceramic tile is a rigid material that doesn’t conform to variations in its substrate the way carpet, VCT, and terrazzo do. For a flat tile installation with minimal lippage, a flat substrate is required beneath. Because larger tiles have fewer grout joints (the only places the installer can “bend” the installation), larger tiles require an exceptionally flat substrate. With tiles getting ever larger and larger, substrate flatness has become an increasingly important consideration. This is particularly true for tile contractors, who by necessity bid on jobs without knowing how flat the substrate they will inherit will be.

The vast majority of commercial tile installations, and a significant percentage of residential ones, are bonded directly to concrete slabs. This means when concrete workers are finishing slabs slated for tile, they’re forming the tile installers’ substrate. The flatness of these slabs—the concrete installer’s workmanship, effectively—can be measured in different ways.

Herein lies the challenge for design professionals, GCs, and concrete and tile contractors. Concrete industry requirements for slab flatness differ from tile industry requirements. Many slabs that meet the former don’t meet the latter, and specifications typically don’t call out which trade is responsible for bringing the concrete into tolerance with tile industry flatness requirements, tolerances that are in place in order for the tile contractor to be able to provide a flat installation.

Specifications for concrete generally call for flatness to be measured per ASTM E1155, a test method by which many points of a slab are measured, with the values indicating how much higher or lower each individual point is from an established reference point. Each measurement is plugged into a formula to determine the slab’s overall floor flatness, or its $F_F$. Because its $F_F$ number is an average, individual areas of the concrete may not be flat at all, as long as the high spots balance out the low spots enough to achieve the required $F_F$, which is specified based on the intended use of the area. Typically an $F_F$ of 35 is specified where ceramic tile will be directly bonded to the slab. For the tile contractor, the high and low spots on a slab meeting $F_F$ 35 are the problem areas, the severity of which is directly proportionate to the size of the tile.

Additional issues compound the problem for the tile contractor.

The required $F_F$ applies only to individual sections of a slab, and per the test method, measurements for a given section are taken on one side of construction and isolation joints only. That is to say, the measurements and resulting $F_F$ for a slab section on one side of a construction or isolation joint are not compared to nor required to bear any particular relationship with the adjacent section of the slab. Yet ceramic tile is often expected to continue across such joints seamlessly, a sticky wicket if slab sections finish at different heights.

Now factor in two additional issues: Measurements are not taken in the very places where the most curling of the slab will occur: at column block-outs, the perimeter, and at construction and isolation joints. And, the measurements are taken within a few days of concrete
placement, when the slab is at its flattest, a very different slab than that which the tile contractor inherits. To be fair, many of these issues, although they manifest as problems for the tile contractor, make sense when looked at in context. The shrinkage and curling of a slab has little if anything to do with the workers who placed it. The raw materials used, the concrete mix, and Mother Nature are the true culprits. So it makes sense, when measuring concrete flatness, to eliminate what is outside the concrete contractor’s sphere of influence.

But fast forward a few months. The tile contractor arrives on the jobsite, checking the floor by placing a ten-foot straightedge on randomly chosen spots. This is not so much an assessment of the concrete installer’s workmanship, but rather an evaluation of whether the floor is suitably flat to receive tile. If large tiles are on order, the tile contractor is likely to check more areas and more carefully. Knowing where the worst offenders lie, the seasoned contractor will thoroughly evaluate flatness at construction and isolation joints, column block-outs, and the perimeter. For larger tiles the floor is allowed 1/8” of variation in ten feet; for smaller tiles, 1/4” is allowed in ten feet. Anyplace with more than that is out of tolerance for the tile contractor, and something must be done to bring the floor into tolerance so the tile can be installed flat and without excessive lippage.

The concrete contractor could come back to grind down high spots. The tile contractor could grind and patch individual areas, or pour self-leveler over the whole area. But neither contractor is likely to be planning on doing so if their scope of work, and as such their bids, didn’t include it. This quandary regularly leads to jobsite disputes and change orders. Considering the steadfast popularity of large tiles, the need has escalated for specification writers to solve the dilemma on paper in advance.

New language in the 2013 Handbook requires that specifications provide “a bid allowance for any necessary floor preparation needed to bring the floor into tolerance for tile.” Otherwise, it says, the tile contractor can assume the floor will meet them. It’s imperative that specifiers and GCs understand the consequence of ignoring this requirement: nullification of what are arguably the most important tile workmanship standards from an aesthetics point-of-view. “Industry standards for tile finish flatness and lippage do not apply if the project owner does not provide a substrate that meets required flatness tolerances for tile or authorize the tile contractor to correct substrate flatness issues.”

This new section of the Handbook speaks to the need for project specifications to address contradictions that will inherently exist when referencing standards and requirements from multiple sources. While each industry or trade must supply the specialized information needed to specify quality output within their field, the well-crafted job spec includes realistic solutions for known areas of incongruence, to yield a win-win for all. The tile contractor can include what is needed in the bid package, rather than submit a bare bones bid to get a job, knowing a battle lies ahead over a change order request. The GC’s budget and schedules can be more accurate and a jobsite glitch avoided; and the design firm can deliver on the fabulous installation the owner is expecting.
Reduced Thickness Porcelain Tiles

A new type of ceramic tile—thin tile—gaining traction with design professionals indicates a healthy appetite for new surfacing options and manufacturers ready to satiate it. A sleek, fresh take on ceramic tile, with environmental benefits and unique application possibilities, it’s not hard to see why some manufacturers, distributors, designers, and tile contractors are calling it the next big thing. In addition to the usual wall and floor applications for ceramic tile, thin tile is being marketed for curved surfaces, ventilated facades, furniture (yes, furniture), and as a product exceptionally well suited for remodeling because its thinness can eliminate the need to remove existing finishes.

How thin is it? Approximately 3 mm to 6.5 mm thick, whereas traditional tiles range from approximately 7 mm to 11 mm. Thin tiles are being offered in significantly larger sizes too, some as large as 5’ x 10’, a big reason for their immediate charm.

But along with interesting new capabilities and marked design appeal come the challenges of the unknown. Where and how can these new tiles be used? Some manufacturers are only recommending thin tiles for walls. For those recommending thin tiles for the floor, some require that the stouter variety be used, while others okay thinner versions that are backed with a mesh of fiberglass, plastic, or metal, which adds strength and crack resistance. To further complicate the understanding of where and when they are suitable, the products and recommendations for their installation are still evolving, as the technology for making thin tiles continues to develop.
Currently, no product or installation standards exist for thin tiles, although efforts are underway to develop international product standards and domestic installation standards.

In the meantime, the TCNA Handbook Committee approved a new informational section about thin tiles. It aims to make design professionals aware of the important differences between thin tiles and traditional tiles requiring careful consideration and coordination with the thin tile manufacturer and supplier when developing thin tile projects. Some of the points mentioned are:

• the comparatively lower breaking strength of thin tiles, which requires “handling and installation that take the lower breaking strength into consideration”

• variation in manufacturer recommendations with regard to suitable substrates and applications

• the need to select a compatible setting material, especially for reinforced thin tiles, to bond to the reinforcement

• the need for specialized tools, equipment, and training for the successful installation of thin tiles

• the possible need to flatten the substrate before installation, to facilitate proper bedding of the tile in the mortar setting bed, especially in flooring applications

• the need for sufficient mortar contact between the tile and substrate, especially near the grout joints

• the possibility that the tile manufacturer may require pre-qualified installers

In short, there’s more to specifying thin tile than simply swapping out traditional tile and replacing it with thin tile. It’s imperative that the design professional consult the thin tile manufacturer for all performance and installation criteria.

Ventilated Facades

Already popular in Europe, Asia, and South America, ventilated tile facades are gaining traction fast in North America as a building cladding. The energy savings and numerous additional environmental benefits of tile facades make them a no-brainer for today’s cost-conscious architects with climate in mind. Add in the new possibilities for exterior building design, and it’s no wonder tile facades are on the rise. The 2013 Handbook contains a new section on this exciting trend to provide design professionals general information common to the engineered systems in the market.

FIND IT in the TCNA Handbook
The new section on ventilated facades can be found on Handbook page 26.
Did you know that Green Squared is a hit with architects, designers, and green building professionals? For example, the 2013 edition of the American Society

**ONE OF THE NEWER SECTIONS** in the *TCNA Handbook* is the Green Building Standards and Green Product Selection Guide. This section helps the Handbook user understand the many ways in which ceramic tile is sustainable and contributes to green building initiatives. This guide has been updated for 2013 to reflect the many new and improved benefits that using ceramic tile offers construction design professionals working on green projects. Several green building standards now award points or credits for using ceramic tile. Plus, tile and the materials used to install it, like mortars, grouts, and membranes, now have their own all-encompassing sustainability standard, approved as an American National Standard by ANSI. This standard, called **Green Squared**, simplifies the specification process by identifying truly sustainable products conforming to a battery of stringent sustainability requirements. Read on for more information about **Green Squared**, the ways in which ceramic tile can fit into your next green specification, and what the tile industry is doing to meet the increasing demand for environmental product declarations (EPDs).

**All Squared Away**

The industry’s very own standard and certification program for sustainable tiles and installation materials, **Green Squared**, is on course and moving forward with great momentum. With hundreds of products either certified or in the process of obtaining certification, sustainable product selection is easier than ever.

**Green Squared** is more than just a labeling program for the greenest of green products. It represents North America’s consensus on what is required for a tile, mortar, grout, membrane, or underlayment to be truly sustainable, including a full range of social and ecological attributes most important to the North American green building community. The **Green Squared Certified** mark facilitates marketplace identification of such products. The result is a valuable specification tool, one that is much needed so the industry can have its most sustainable products properly specified into green building projects throughout North America.

**FIND IT** in the TCNA Handbook

The updated Green Building Standards Guide can be found on Handbook page 27.
Green Squared Certification

Products labeled “Green Squared Certified” have been verified through a stringent third party process to meet ANSI A138.1

For more information — contact TCNA at 864-646-8453 or visit www.GreenSquaredCertified.com
of Interior Designers (ASID) Guide to Ecolabels finds Green Squared in accordance with the intent and requirements of some of the most common green building standards and rating systems. Additionally, the National Association of Home Builder’s National Green Building Standard (ICC 700–2012) awards three points for using Green Squared Certified products. Green Squared is also on file with the General Services Administration (GSA), which is working on updates to its Facilities Standards for the Public Buildings Service (P100) in order to more thoroughly mandate sustainability aspects of government buildings.

Both directly and through its manufacturing members and fellow ANSI A108 Committee participants, and also through its involvement in a joint task force of building product industries, TCNA is in regular contact with several architectural, governmental, and green building standards organizations to provide insight and keep abreast of the most current initiatives. As the United States Green Building Council (USGBC) launches the next era of LEED (Leadership in Energy and Environmental Design), it is likely there will be an increased emphasis on industry sustainability standards and possible points for the use of certified products. Also, the U.S. Environmental Protection Agency (EPA) and National Institute for Building Science (NIBS) are looking for ways to update the Whole Building Design Guide (WBDG) to better define and specify green product selection. And in the months and years ahead, industry standards for sustainable products will play an important role in the evolution of the International Green Construction Code (IgCC), the California Green Building Code (CALGreen), and the ASHRAE Standard for the Design of High-Performance Green Buildings (189.1).

Given the growing demand for product sustainability standards and certification programs, the tile industry is in good shape with certification to the Green Squared standard. As the industry’s primary avenue for specifying products into green building projects, you can expect increased participation by manufacturers and references to Green Squared in some of the most well-known green building programs.

Wondering where to find out which products are certified? Visit www.GreenSquaredCertified.com.

Environmental Product Declarations (EPDs): Get to Know Them, Get to Love Them

Environmental product declarations (EPDs) have been around for quite a while and have been used commonly in Europe for over a decade. Recently, there has been an increased interest in EPDs in the North American marketplace which has led to new initiatives by manu-

Environmental Facts

| Functional unit: 1 m² of Ceramic Tile (Porcelain) Floor Covering |
| Reference Service Life (RSL): 50 Years |

60 Year Inventory Analysis

| Energy Demand [MJ x (60 / RSL)] |
| Primary Renewable [MJ x (60 / RSL)] |
| Primary Non-Renewable [MJ x (60 / RSL)] |
| Secondary [MJ x (60 / RSL)] |
| Non-Renewable Material Sources [kg x (60 / RSL)] |
| Waste Output [kg x (60 / RSL)] |
| Non-Hazardous [kg x (60 / RSL)] |
| Hazardous [kg x (60 / RSL)] |

60 Year Impact Assessment

| Global Warming Potential [lb CO₂ eq x (60 / RSL)] |
| Acidification Potential [lb H+ eq x (60 / RSL)] |
| Ozone Depletion Potential [lb CFC-11 eq x (60 / RSL)] |
| Smog Potential [lb O₃ eq x (60 / RSL)] |
| Eutrophication Potential [lb N eq x (60 / RSL)] |

Boundaries: Cradle to Grave

| Company: Clay: 50% |
| Product Name: Quartz: 10% |
| Total Recycled Content %: Feldspar: 40% |
| Green Squared Certified [Y or N]: Misc. Minerals: <0.1% |

Other Attributes:
facturers, certification organizations, and standards developers.

So, what is an EPD? Also known as a Type III environmental label, an EPD is a report of quantified environmental impacts of a product throughout its life cycle. An EPD is not intended to be a claim of environmental superiority. Rather, it is similar in concept to a nutrition label. In theory, an EPD tells a product’s full environmental story in a familiar reporting format so an end user can make an informed decision.

To ensure that an EPD of one product is presented in a manner which is consistent with that of another similar product, product category rules (PCRs) are developed. These rules establish the framework for how evaluations should be made, what information should be reported, and how declarations should be organized within a common category of products.

A true Type III environmental label is provided by an independent third party EPD program operator. This program operator works with manufacturers to evaluate products and provide reports in accordance with relevant PCRs. If a PCR does not exist for a category into which a certain product falls, the program operator engages with relevant industry stakeholders to develop a new PCR. Once completed, that PCR is registered in a publically available PCR library so that it is available for use by other program operators.

In general, the demand for EPDs is being driven by the general desire of the green building community to evaluate product sustainability in two ways: conformance to multi-attribute sustainability performance standards (Type I environmental labels such as Green Squared) and EPDs in conformance with Type III environmental reporting standards. Given that many Type I labeling programs are already in existence for building products, efforts to develop more building product PCRs will likely increase over the next several years so that an equal number of Type III labeling options will be available.

One thing is for sure: EPDs are here to stay. Most green building organizations, including USGBC, are beginning to reference EPDs in standards and rating systems such as LEED. TCNA and its fellow building product trade groups are considering generic EPDs and informing members about options for their products. While not as ubiquitous as labels for carbs and calories, expectations for their widespread use are growing rapidly.

**Going Green, Going Global**

Over the years, the International Organization for Standardization (ISO) has established standards referenced in many national sustainability initiatives. In particular, the ISO 14001 (environmental management) standard and ISO 50001 (energy management) standard are commonly referenced by manufacturers, certifiers, and standards developers. These standards, in conjunction with the ISO 14020 series (environmental labels and declarations) and ISO 14040 series (life cycle
assessments), provide a valuable general framework for sustainability.

While general ISO criteria have been developed, specific product standards for tile have only been developed by national standards development bodies based on the demands of their respective marketplaces. For example, **Green Squared**, though applicable to products no matter where in the world they are produced, is a North American standard developed to meet the sustainability needs of the North American marketplace. In Europe, the EU Ecolabel standard was developed by the European Commission to service the needs, many of which are regulatory, of EU procurement directives.

With several tile industry sustainability standards already developed by national bodies worldwide, and given the existence of several international reference documents already used in the evaluation of general product sustainability, the tile industry’s ISO Technical Committee (ISO/TC 189) is looking into the development of an international specification for sustainable tile products.

While it is understandably difficult to combine social and environmental regulations and norms of multiple countries, an international sustainability standard would help unify the global industry and facilitate international trade. In other words, the aim is to speak a common language worldwide regarding product sustainability. Many elements of **Green Squared** are being considered for inclusion in an international sustainability standard.

As this effort moves forward, TCNA will continue to represent the North American tile industry and facilitate understanding of **Green Squared** on the global scene. Be on the lookout as this initiative gains exposure in the years ahead.
Five new tile installation methods are included in the 2013 TCNA Handbook. Four are similar, variations of the one coat mortar bed method for installing tile on walls. The fifth is a floor method where sound reduction is desired for the space below the tile installation. Additionally, two methods were revised; the steam shower methods now include membrane permeability requirements for continuous use applications.

One Coat Mortar Bed Walls in Wet Areas

Traditional mortar beds and “one coat” mortar beds are similar in their function as a tile substrate and in the materials used. The principle difference is the presence of rigid backing behind one coat mortar beds, allowing installers to produce a tile-ready substrate after just one application of wall mortar. By contrast, a traditional mortar bed over wood or metal studs requires two applications of mortar. The first is a “scratch coat” of wet wall mortar, troweled onto metal lath fastened to and spanning the space between the studs. This layer dries to form a rough, semi-rigid wall. A second coat of mortar adds the necessary rigidity and is manually formed and finished into a smooth, flat substrate. In the one coat method, the rigid backing eliminates the need for a scratch coat, hence the moniker one coat.

The one coat method is well established and was already included in the Handbook as a wall method (W222). New methods B440 and B441 have been added to facilitate specification of one coat mortar bed walls in wet areas with drains. Method B440 is for use where a bathtub, prefabricated shower base, or other manufactured receptor will contain and direct water to a drain; Method B441 is for areas where the floor, sloped to one or more drains, will be formed with mortar and tiled. Although similar, separate methods are provided to show the difference in configuration at the wall/floor interface. Both methods require that the rigid backing behind the wall mortar be one of the several backer boards already prescribed by the Handbook for use in wet areas. Other backer materials not specified in the Handbook for wet areas, including gypsum wall board, fall outside the methods but are accepted in some localities. In such cases however, it is important to check if the manufacturers warrant use of their products in the specific applications being considered.

Whether the one coat or traditional variety, mortar bed walls are a good option when an exceptionally flat substrate is needed, for example to meet the tighter substrate tolerance for larger tiles. A
very flat substrate may also be desired for mosaics, particularly light-reflecting polished stones and porcelain tiles, because mosaics conform to the substrate, potentially highlighting highs and lows. Unique to mortar bed methods is their ability to accommodate variations in tile thickness, as is characteristic of ungauged stone. Despite variations in thickness, an installer can produce a flat installation by pressing thicker pieces into fresh mortar. This is called wet-setting or fresh-setting and typically requires an experienced installer. Mortar beds also enable installers to build out walls to specific elevations and, if needed, varying elevations within the same installation. The thickness of mortar required to do so determines if the one coat method can be used (3/8" to 3/4" thick) or if a traditional mortar bed is required (3/4" to 1-1/2" thick).

Revision to Steam Shower Methods: Required Perm Rating for Continuous Use Applications

The 2013 TCNA Handbook contains new guidelines for the waterproof membranes used on walls in continuous-use steam showers. Now, steam shower installation methods SR613 and SR614 require the use of a bonded waterproof membrane, between tile and substrate, with a water vapor permeance, or “perm rating,” of 0.5 perms or less. Or, if the perm rating is higher, a secondary membrane is now required behind the tile substrate. The perm rating is the amount of moisture vapor that a membrane allows to pass through in a given time under a given pressure, and the new requirements are aimed at limiting the amount of moisture vapor allowed to escape steam showers through the walls. This is particularly important where steam showers are run continuously, such as those found at fitness clubs and hotels. In addition to adding guidelines on perm ratings and secondary membranes, the Handbook Committee also voted to require a specific test method for measuring the perm rating: ASTM E96 Procedure E, tested at 90% relative humidity.

The TCNA Handbook Committee has been considering this issue for several years, seeking to limit the amount of moisture vapor escaping from steam showers because of the damage it can do to surrounding building materials. For example, for steam showers with stud framed walls, excessive vapor transmission can damage the wood or metal framing members, the drywall attached to the opposite side of the wall cavity, wood subflooring, and any other nearby moisture-affected materials. For steam showers with masonry walls,
finishes on the other side of the shared wall can be affected: for example, paint, rubber floor base, epoxy coatings, and tile adhered with mastic.

Taken all together, the new requirements make it easier to make apples-to-apples comparisons of membranes, and with these changes, the envelope containing the steam is more robust, making steam showers a little easier to design, build, and operate successfully. While the square footage of the tiled area affected by the new requirements is small, their objective—protecting the building—is of inestimable value.

The recent changes to the methods are sure to be hailed as welcome improvements. Still, when designing steam showers, there is much left for the design professional to consider outside the Handbook’s jurisdiction: dew point, insulation requirements, and climatic conditions can affect the design, just to name a few. For these specialized design considerations, industry consensus has been clear for years; a design expert is a must. And once an appropriate specification has been crafted, care should be taken to select qualified, perhaps specialized, installation contractors; the execution and success of the design is in their hands. Literally.
Bonded Sound Reduction Membranes

Sound reduction membranes have been used under tile for years, most commonly in high rises and other multi-family buildings, to minimize the transmission of sound to units below. Completion of an ANSI standard in 2010 for sound reduction membranes (A118.13) established required membrane performance—both as a substrate for tile and in the reduction of sound transmission—and paved the way for a Handbook method to specify their use: F136 for thin-bed installation of tile on above ground concrete in dry areas.

This new method requires use of a sound reduction membrane meeting the ANSI standard, which includes requirements for the membrane’s service rating and attenuation of sound transmission. A minimum laboratory ∆ IIC rating of 10 when tested per ASTM E2179 was established.

The method additionally highlights the significantly greater sound reduction that can be achieved by specifying a suspended ceiling below the tile installation, and it requires the use of acoustical joints at the floor/wall interface and at any penetrations. The method also cautions the user that different sound reduction membranes will produce different service ratings. Accordingly, the user should consult the membrane manufacturer to make sure the specific components being considered deliver the service rating needed in addition to the needed sound attenuation.

Find it in the TCNA Handbook

New method F136 can be found on Handbook page 89.

Importantly, the method lists many of the design details that affect sound transmission such as slab thickness, slab density, ceiling height and assembly, and framing member type and arrangement, in addition to tile-related installation variables. A design professional knowl-
edgeable in the reduction of sound transmission is required to ensure the necessary system components are specified to achieve the desired in situ results. Depending on the system components chosen and actual construction, a membrane Δ IIC rating higher than 10 may be required to produce a code compliant installation or to meet specific condominium, apartment, or homeowner association rules.

New Method F136 also refers the user to the Sound Rated Floors Guide. This is a separate, informational section in the Handbook with helpful general information on:

- sound control rating systems
- laboratory and field methods for measuring sound transmission
- interpretation of test results
- variables that affect sound transmission
- building code requirements
- suggestions for improving the sound reduction performance of a floor/ceiling assembly
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