

By Donato Pompo

CTC, CMR, CSI, CDT, MBA

CHOOSING SUBSTRATES

and Installation Systems for Ceramic Tile and Stone Tile

Installations are only as good as the substrate to which they are applied, the method of installation, and the quality of installation products used. The substrate is the foundation of the installation. When this foundation is unsuitable for whatever reason, the products applied are automatically in jeopardy. Thankfully, remedies exist for correcting substrate problems, but it is important to first evaluate the substrate and take any corrective action as part of the substrate preparation process.

SUBSTRATE QUALITY AND SUITABILITY

Concrete substrates are an excellent because they are stable, are not significantly affected by exposure to moisture, and don't promote the growth of mold. There are wall and floor applications where the conventional mortar bed is best and other floor applications where a cementitious self-leveling underlayment would be preferred. Poured gypsum underlayments can be used for tiling in dry floor areas with proper preparation or in areas with limited water exposure if used with a waterproof membrane.

Wood is a questionable substrate for direct tile attachment and unacceptable for exterior areas or any interior wet areas. Wood may cause excessive movement when it expands from exposure to moisture compounded by temperature variations, and will warp as it dries, creating more movement. Wood can be used as a tile substrate in dry interior areas where the deflection in the floor is not excessive for ceramic tile or stone, and conforms with the International Residential Code (IRC) or Commercial Residential Code (CRC). Using wood for an underlayment does limit the chance of achieving a flat surface, let alone a level or sloping one. Quality plywood underlayment boards that are installed correctly with the proper ANSI A118.11 thin-sets can provide a suitable floor for dry interior applications.

Backer boards come in many configurations from cementitious to foam, to the new generation of water resistant gypsum, and some hybrids of the aforementioned materials. Some are limited to wall use or interior dry applications, and others are suitable for interior wet areas or exterior wall applications.

Gypsum backer board is suitable for interior dry wall applications. Mold flourishes in wet environments, and gypsum wallboard is a potential food source in those conditions. Water-

resistant gypsum wallboard (green board) can no longer be used as substrates in shower areas. New generation gypsum boards such as the Coated Glass Mat Water-Resistant Gypsum Backer Board and the Fiber-Reinforced Water-Resistant Gypsum Backer Board are suitable for shower walls and other applications.

Steel substrates are suitable for many applications if properly prepared and used with a suitable bonding epoxy.

Tile-over-tile, vinyl and other coatings can be a suitable substrate if the existing material is structurally sound and properly prepared, which typically requires mechanically scarifying the surface and using special modified thin-sets. The new installation will only be as good as the bond of the existing material to its substrate. Scarifying some surfaces can be hazardous if inhaled.

Floor preparation for tile involves understanding the characteristics and limitations of the finished product, as well as evaluating the substrate and installation system to ensure they are suitable for the intended application and use. Any substrate problems need to be corrected with a legitimate remedy meeting industry standards. Industry associations such as Tile Council of North America (TCNA), Ceramic Tile Institute of America (CTIOA), Marble Institute of America (MIA), and the National Tile Contractors Association (NTCA) can provide information and some guidelines. Installation systems manufacturers can provide system specifications and warranties. Industry consultants can assess project needs and develop project specifications.

INSTALLATION SYSTEMS

Considering all of the choices, the limited resources for training, and the risk and liability of making a mistake, installers are wise to use one of the installation systems available from any of the major manufacturers of installation products for ceramic tile and stone.

Architects asked for single source installation systems as quality assurance to avoid failures. These systems ensure product compatibility and installation guidelines for each component provided by a single manufacturer. Generally these systems also provide added warranties and are better performing products.

For tile installations a single source system would include the crack isolation or waterproof membrane, if used, the thin-set for bonding the tile to its substrate, and the grout to fill the joints. The

system could also include the mortar bed, underlayment or backer board. If the manufacturer produces sound control or heating assemblies they, too, may be included within the installation system.

Manufacturers of these systems usually offer 5-Year to Lifetime warranties. Many include both labor and material guarantees. When a material manufacturer can limit exposure to failures and increase product use with a system offering, then they are willing to encourage the consumer with their warranty. Beware: these warranties are not "no-fault insurance." The warranties only guarantee the performance and compatibility of the products as long as they are installed correctly and per industry standards.

Installers should take the time to research and learn industry standards. As a forensic investigator, I have yet to investigate a tile failure and find that the installation was completed per industry standards. Typically there are many industry infringements that result in compounding factors that lead to the failure. The best way to avoid installation failures is to follow industry standards and manufacturers' instructions.

In truth, if a single source installation system was not used, but you used different, but correct, quality products from different manufacturers, and installed them correctly per industry standards, the result should be a successful installation.

Consider first the different tile products to choose from, including ceramic, stone, glass, metal, wood, resin, resin-back, back-mounted, and who knows what else. Consider also the different applications such as interior versus exterior, wet versus dry, cold versus hot climatic conditions, large format tiles or moisture-sensitive stones, or conditions requiring chemical resistant or other specialty product. Add to that the many different tile setting products including rapid, non-modified, modified, epoxy, modified epoxy, furan, non-sag, medium bed, full contact, mastic, self-leveling, among others, and all of the different substrates mentioned above that have to be considered. The best solution for the installer might be to go to their installation product manufacturer of choice and ask for the best installation system, with a labor and material warranty, which would be best for their tile and application. When installers give their clients a choice on whether they want a labor and material warranty with their tile installation, they generally do, and are willing to pay for the added assurance and security. It then adds more value and profit, and minimizes risk for the installer. It is a win-win situation.

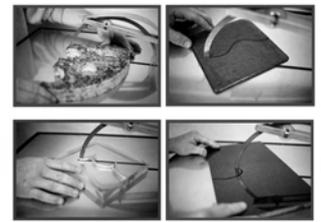
QUALITY ASSURANCE AND CONTROL

In addition to having the right installation product system, the key to a successful tile installation is to have clear and concise installation specifications with job-specific quality assurance and quality control plans. First, the right ceramic tile or stone for the respective application must be selected to ensure its suitability. Considerations must be made for:

- Resistance: slip, abrasion (wear), and absorption (stain);
- Freeze-thaw stability for cold climates;
- Durability: compressive strength or specific gravity and density;
- Maintenance: moisture and chemical sensitivity and surface texture.

The most overlooked part of an installation is to have a Quality Control Plan. One should not leave quality control accountability to the installer, as is normally the case, but rather designate an independent inspector or owner representative to implement the quality control plan. Too often inexperienced or unmotivated installers are left unsupervised, which leads to mistakes and failures. Good supervision provides quality on-the-job training for apprentice installers, which grooms them to become part of the industry's future skilled labor pool.

THE PERFECT TILE SAW!



Endless Length	Cut Tile, Glass & Stone
Unlimited Width	Easily Manageable
Inside Curves	Heavy Duty
Outside Curves	6cm Capacity
No Water Pump	Quiet and Clean
Self Contained	Made in the USA

Cut Straight Lines and Intricate Curves!
 Easy To Make Perfect Installations!
 The Same 10" Blade Cuts All Materials!
 Ceramic, Porcelain And Stone up to 2" Thick!
 Lightweight, Clean And Portable!
 Bring Your Saw Right To The Work Area!
 Special Glass Blade Available!
 Cuts Any Glass Tile Like No Other Saw!

NO LIMITS!

THE REVOLUTION XT



For More Information Visit:
www.geminisaw.com

Gemini Saw Company, Inc.
 3300 Kashiwa Street - Torrance, CA - (310) 891-0288

CRACK ISOLATION • WATERPROOFING • SOUND ABATEMENT • MOISTURE/VAPOR CONTROL

NAC WE'RE STILL THE ONE.

You know us best for inventing self-adhering crack isolation membranes, but did you know our #1 architecturally specified, #1 lab and field tested, #1 contractor/owner preferred membranes do more than isolate cracks? Learn why we're renowned for solutions to protect tile, stone & wood floors from substrate movement and so much more!

- Moisture/Vapor Resistance
- Mold Growth Prevention
- Floor-to-Floor Noise Reduction
- Anti-Fracture/Crack Isolation
- Substrate Waterproofing

800.633.4NAC
www.NACproducts.com



NATIONAL APPLIED CONSTRUCTION PRODUCTS, INC.

Sheet Membranes

Waterproofing • Crack Isolation Sound Isolation

NobleSeal® TS

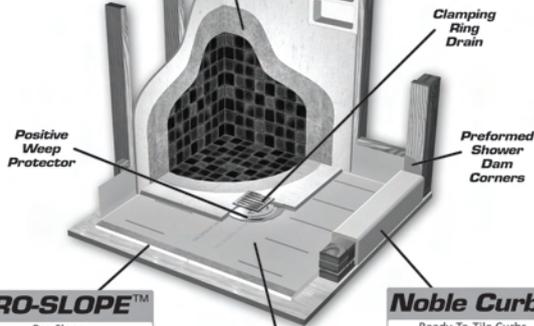
Thin-Set Waterproofing & Crack Isolation

- Moisture/Vapor Barrier
- For Floors & Walls
- UPC Listed (File #4339)
- Ideal for Steam Rooms & Showers

Noble Niches

Ready-To-Tile Niches

- Install in Minutes
- Waterproof
- Adds Insulation Value
- Custom Sizes Available



PRO-SLOPE™

Pre-Slope

- Creates Code Required Slope in Minutes
- Easy to Install

Chloraloy®

Shower Pan Liner

- Absolute Waterproofing
- Easy To Install - No Cure Time
- Meets ASTM D 4068, UPC & IPC Requirements



800.878.5788 • www.noblecompany.com

CONCLUSION

Use of ceramic tile and stone has grown substantially over the years and despite the current housing slowdown it will continue to grow. The tile industry needs the combination of more training and more installers to supply the demand for qualified installers, which will lead to more successful installations and minimize failures. There are organizations that offer hands-on training such as Ceramic Tile Education Foundation (CTEF), National Tile Contractors Association (NTCA), Ceramic Tile Institute of America (CTIOA), Ceramic Tile And Stone Consultants (CTaSC), and some union organizations throughout the country. Quality installation specifications, proper substrate preparations, proper installation products, and good workmanship are key to lasting installations. ♦

Donato Pompo, CTC, CMR, CSI, CDT, MBA, is the founder of Ceramic Tile and Stone Consultants (CTaSC), and possesses over 25 years of experience in the ceramic tile and stone industry. He investigates tile and stone failures, provides quality control services for products and installation methods, writes specifications, and develops and offers online and hands-on training programs. Donato is the past chairman of the Ceramic Tile Institute of America technical committee, he is a member of the Marble Institute of America (MIA), he is a committee member of the ANSI and TCNA Handbook committees who set the industry standards, and he has experience as an installer and as a manufacturer of installation products for ceramic tile and stone. He is a Certified Microbial Remediator (CMR). Donato@CTaSC.com ; www.CTaSC.com

Ceramic Tile Installation Inspection Course

November 12-16, 2007 in Pendleton, SC

Learn about...

- Tilework evaluation
- Industry standards for ceramic tile and installation
- Applications on various substrates and use of products such as grout, adhesives, and other materials
- Product and field testing (Including a tour of TCNA's Product Performance Testing Lab) and
- Report writing and documentation

Train Your Staff to Investigate Field

CTEF draws on the extensive resources of the Tile Council of North America (TCNA) to provide students maximum exposure to the very latest in ceramic tile manufacturing, testing and installation know-how. **Learn from those who know.**



Learn why...

Register online at

www.tileschool.org



Ceramic Tile Education Foundation
864-222-2131 Fax: 864-222-1299