Ceramic Tile: Historic and Current Uses

•The use of Ceramic Tile can be traced back thousands of years, predating written history.

•It is believed that the Moors brought Ceramic Tile to Europe following the conquest of Spain.

•Ceramic Tile first arrived in the U.S. in the mid-17th Century.

Types of Applications and Uses

•Ceramic tile is durable and fireproof and makes an excellent roof covering.

•It is effective when used in areas that are exposed to water, such as: bathrooms, kitchens, entryways, outdoor decks, lobbies, malls, ski lodges, exterior domes, etc.

•It can have a range of textures that provide added slip resistance, or a smooth surface to allow for easier maintenance.

•Because of its hygienic qualities, Ceramic Tile is extensively used in food-preparation areas such as restaurants, bakeries, meat packing facilities, dairies, etc.

Statistics of Use, Growth, and Potential

•In 2014, almost 2.46 billion square feet (sq. ft.) of Ceramic Tile were consumed in the USA. About 30.4 percent of this tile was manufactured in the U.S. and about 69.6 percent was imported.

•The USA's per capita consumption is 8.4 sq. ft., Spain's is 25 sq. ft.; Italy's is 19 sq. ft.; Brazil's is 45 sq. ft.; and China's is 34 sq. ft.

Industry Standards

•TCNA (Tile Council of North America) is a trade organization representing North American manufacturers of ceramic tile, tile installation materials, tile equipment, raw materials and other tile related products.

•ASTM (American Society for Testing and Materials) develops and publishes voluntary consensus technical standards and testing for a wide range of materials, products, systems, and services.

•ANSI (American National Standards Institute) facilitates voluntary national consensus standards for ceramic tile manufacturing and ceramic tile installation systems.

•ISO (International Organization for Standardization) is an international standard setting body composed of representatives from various national standards organizations.

Ceramic Tile Types as a Function of Absorption

•Rule of Thumb: The less absorbent the tile, the more dense the tile.

•Rule of Thumb: The denser the tile, the more durable, stain resistant, and resistant to cold weather the tile.

•Rule of Thumb: Ceramic Tile is normally considered "freeze-thaw stable" if its body's absorption rate is 3% or less.

So it has to be either a vitreous or an impervious tile. (See definitions below.) The only way to be certain that a tile is freeze-thaw stable is to perform ASTM. C --1026 freeze-thaw test.

•Non-vitreous tile has more than 7% water absorption.

•Semi-vitreous tile has more than 3% absorption but no more than 7% absorption.

•Vitreous tile has more than 0.5% absorption, but no more than 3% absorption.

•Impervious Tile has 0.5% or less absorption. All Porcelain Tiles and Glass Tiles are in this category.

Ceramic Tile Body Types

•Red Body: Normally refers to a dense, vitreous clay body, but can be a more porous body tile or even an impervious body tile.

•Porcelain Body: A composition of ultra purified, highly ground kaolin clays with silica and feldspar additives that provide an impervious body.

•White Body Floor Tile: Normally refers to a dense vitreous clay body, but can be a more porous body or a porcelain body tile.

•White Body Wall Tile: Normally composed of talc and clay raw materials. It has a very porous, non-vitreous ceramic body with up to 20% absorption.

Unglazed Tile

•Is also referred to as through-bodied tile. From top to bottom, it is all one type of clay material.

•Is normally more susceptible to staining. The less absorbing the tile, the more stain resistant.

•Is normally more slip resistant. Generally, the more texture on the surface of the tile the more slip resistant it is. Unglazed Tile is frequently used as flooring in wet applications, such as shower floors.

•Does not show a contrasting color from its surface to its body when chipped, since it is the same material throughout.

•Types of unglazed tile include: porcelain, quarry tile, unglazed mosaics, Mexican Pavers, Terra Cotta Pavers, concrete tile, glass tile, porcelain stone composite, metal, and encaustic tile.

Glazed Tile

•A clay-bodied tile with a surface that has a coating (called a glaze) applied to it. The glaze is made of a ceramic frit material and is glass-like after being applied to the tile and heated during the manufacturing process.

•Normally very stain resistant because its surface is considered impervious, although it can stain due to micro pores or fractures in its surface.

•Usually less slip resistant than unglazed tile, although the glazed surface can be made very slip resistant by adding a heavy texture during the manufacturing process.

•Normally more susceptible to chipping than unglazed tile.

•Colored Body or Through Color Ceramic Tile -Is a glazed ceramic tile that is manufactured by adding pigments into the porcelain clay mixture prior to glazing so that the body of the tile will match the color of the glaze surface to be later applied. This provides the distinct advantage that if the glaze surface is chipped or worn, the color of the body beneath closely resembles the color of the glazed surface and therefore makes such damage less noticeable.

•Much more design flexible than unglazed tile because it provides much greater range of colors, textures and styles.

•Moh's Scale of Hardness is a scale of relative scratching hardness where the glaze or the body of the tile are scratched with successively harder minerals labeled from 1 to 10 until the mineral scratches the tile. The higher the mineral number that scratches the tile, the harder the material.

•PEI Rating-rates the ability of glazed Ceramic Tile to resist surface abrasion.

Ceramic Tile Uses

•Floor Tile is typically considered any type of tile in sizes greater than 3 x 3 inch (75 mm x 75 mm) facially and normally greater than¼ inch (6.35 mm) thick.

•Large Format Tile - nominal sizes greater than 15" x 15" which make rooms seem much more spacious.

•Large Thin Tile Panels - Porcelain tile panels as large as 5' x 10' (1524 mm x 3048 mm) and less than¼" (6 mm) thick. Specialized tools, equipment, and training are required for installing these types of tiles.

•Mosaics are typically no larger than 3 x 3 inches (75 mm x 75 mm) facially and are normally less than 3/8 inch (9.5 mm) thick.

•Paver Tile is a glazed or unglazed porcelain or natural clay floor tile, formed by the dust-pressed method and having a facial area of 16 square inches (103.2 sq. cm) or more.

•Quarry Tile typically refers to a 6 x 6 inch (152 mm x 152 mm) unglazed extruded tile.

•Wall Tile usually refers to a non-vitreous white talc body glazed tile that typically comes in the sizes of 4 ¼ x 4 ¼ (108 mm x 108 mm), 6 x 6 inches (152 mm x 152 mm) or large format.

•Trim is a transition or termination piece of tile.

•Accents, Decos and Liners are primarily used to enhance a tile

installation and give it a custom look.

•Liners are commonly used in kitchens since they are more narrow and rectangular.

•Decos (decorative tile) are normally tiles with designs on them that are sometimes hand-painted.

•Accents include trim, liners, or decos and are used to customize an installation.

Coefficient of Friction

•The higher the tile surface coefficient of friction the more slop resistant it will be. Industry standards recommend minimum dynamic coefficient of friction (DCOF) for tiles in interior wet areas. Per ANSI A137.1 it is recommended that the minimum tile surface DCOF is 0.42 or greater per the DCOF AcuTest for level interior floor spaces subject to being wet.

Quarrying

•Clay is quarried out of the ground. Selecting the right raw clay and minerals from the Earth and refining them are important steps in preparation for manufacturing Ceramic Tile.

Forming

•Hand Molded Method: Tile is shaped by hand, using a wet clay mixture.

•Extrusion Method: Tile is shaped by a machine called an extruder that mechanically forces the wet clay through a nozzle, called a die that creates the shape.

•Dust Press Method: Tile is shaped by ram pressing the clay into a mold with very high pressure.

•Double Loaded Porcelain or Double Charge Process: Two layers of porcelain clay powder are pressed together and then fired.

•Double Pressed Porcelain: A method where the die cavity is filled with one formulation and pressed, and then a second powder or liquid is applied, and the tile is pressed a second time.

Firing

•Kiln Fired: Most Ceramic Tile is kiln fired. After the tile is shaped into the desired form, it is put into a type of oven and cooked at a temperature as high as 2,200 degrees F (1204.4 degrees Celsius) or more.

•Sun Baked: A primitive approach to hardening clay is to bake it in the sun.

•Beehive Kilns: These are older kilns where tile is stacked inside the kiln.

•Tunnel Kilns: Tiles are placed on kiln carts and are transported through the kiln.

•Roller Hearth Kilns: Through an automated process, tiles travel over rollers through a kiln that can be as long as a football field.

•Monocottura Process: With this process, glaze is applied to the tile before it is fired, so both the tile and glaze are fired together.

•Bicottura Process: This is a method for producing tile by firing it twice. The first firing is for the body, and the second is for fusing the glaze onto the body.

Glazing

•Glaze Types: Glazes can be applied to tile bodies in liquid form or as a dry powder depending upon the effect and outcome desired.

•Waterfall Glazes: These are applied to tiles that are set on automated belts and run under a waterfall of liquid glaze.

•Silk Screen Glazing: This is just like silk-screening a t-shirt. Liquid glaze is applied to create a design on the surface of the tile.

•Spray and Brush Glazing: Using air sprayers and unique brushes for hand-painting the glaze onto the tile.

•Layered Glazing: Today's technologies allow multiple applications and layers of glazes.

•Roto Color method, which is a silicone roller with a design etched with a laser.

•Digital ink jet method: Produces a realistic look such as stone, wood, and fabric. This is where a ceramic paste is applied with a digital inkjet device and then covered with a clear or colored glaze.

Sorting

•Sizing: There are quality control tolerance standards for size variation established by ANSI 137.1

•Rectified Tile: For more precise sizing, some tile manufacturers actually grind the edges of the calibrated tiles to be more consistent in its facial dimensional sizing from piece to piece.

•Color Shading: Color variation is inherent in the manufacturing of tile. The color shading can vary from manufacturing run to manufacturing run, and within the same manufacturing run. To make the consumer aware of the extent of color or shade variation within a manufacturing run of tile, some manufacturers label their tile series accordingly using the CTDA Color/Shade Variation Guide.

•Human Touch: Shading is so difficult to differentiate that technology to fully replace human intervention in the sorting process has not yet been developed.

•Rule of Thumb: The more size variation a Ceramic Tile has, the wider its grout joint should be to compensate for it.

•Rule of Thumb: Always randomly pull tile from multiple boxes during a tile installation to help ensure a consistent blending throughout the installation.

Mounting Mosaics

•Mounting: In order to make the installation process of smaller tiles easier and faster, the manufacturers generally provide them mounted on 12 x 12 inch (30.5 cm x 30.5 cm) sheets.

•Back Mounted: The bottom side of the tile is mounted onto perforated paper or nylon webbing.

•Face Mounted: Another method of mounting is to apply paper or clear Mylar to the top side of the tile. This allows for 95% bonding (tile to adhesive).

•Dot Mounted: Smaller size tiles can also be attached at the edges. This allows for 95% bonding.

Packaging

•Packaging Tile: Ceramic Tile is normally packaged and labeled in an automated process. In fact, many modern plants stack the pallets and store the pallets with automated robotic equipment.

The Foundation (Substrate)

•Surface Preparation: The surface to which the Ceramic Tile will be attached must be structurally stable, so that the tiles will not be subjected to excessive movement.

•Slopes: In commercial kitchens, exterior patios, showers, and all horizontal surfaces in any wet area must be sloped towards the drain, so water can be controlled and easily travel to those drains. It must be sloped at least 1/4" per foot.

•Flatness of Floor or Wall: According to industry standards, the substrate cannot vary in flatness more than ¼ inch (6.3 mm) within 10 feet (305 cm) from the required plane, with no more than 1/16 inch (1.6 mm) variation in 12 inches {30.5 cm) when measured from the high points in the surface. For tiles with at least an edge 15inches {38 cm) in length, maximum allowable variation is 1/8 inch (3.2 mm) in 10 feet (305 cm) from the required plane, with no more than 1/16 inch (1.6 mm) variation in 24 inches (61 cm) when measured from the high points in the surface.

•lippage is where the edge of one tile is higher or lower than the edge of the tile next to it. Industry standards require a limited amount of lippage based on the type and size of the tile, and the width of the grout joint.

•Structural Stability and Deflection: For a concrete floor or wood raised floors to be structurally stable, they cannot have excessive deflection or any structural cracks. Only a qualified engineer can determine if a floor is structurally sound.

Concrete Substrate Cracks

•Structural cracks are cracks that go all the way through the concrete, and one side of the crack is higher or lower than the other side.

•Shrinkage cracks are cracks that don't go all the way through the concrete. They will expand and contract horizontally as climatic conditions change.

Types of Surfaces (Substrates) for Attaching Ceramic Tile

•Ceramic Tile can be bonded to metal, wood, vinyl, concrete, fiberglass, and other Ceramic Tile if:

- You have the correct products that will bond to both the Ceramic Tile and the substrate.
- The substrate is structurally sound, clean, and free of contaminates.
- The substrate is recommended for that particular application.

•Concrete is always the best substrate for attaching Ceramic Tile because it is normally the most structurally stable.

•Backer Boards (underlayments) are the next best substrate for attaching Ceramic Tile and are normally attached to plywood flooring or over wall studs.

•Wood can be a suitable substrate for attaching Ceramic Tile. It is only good for dry interior installations and is NEVER good for exterior installations.

•Metal: Its surface has to be specially prepared, it has to be structurally sound, and you have to use special adhesives, called epoxies, to bond to it.

•Vinyl has to be well attached to its substrate, because if it comes off, so will the tile. The vinyl's surface has to be specially prepared to remove any coatings.

•Ceramic Tile has to be well attached to its substrate, because if it comes off, so will the tile. The tile's surface has to be scarified to remove any coatings.

Tile Installation Layout

•First Step to a tile installation is the layout of the tile to make sure the final installation will be symmetrical and aesthetically pleasing. Not all rooms are perfectly square, nor will all tiles fit a room without some partial tile cuts.

By laying the tile out in advance gives the installer an opportunity to make adjustments in the tile installation to minimize potential irregularities.

•3-4-5 Triangle Method -to square or center the tile to the room to establish the tile layout, the 3-4-5 triangle method should be used.

- First establish the center point of the room or a desired focal point of the room.
- Draw a 4-foot (1219 mm) line in one direction parallel to a reference wall or to a desired visual orientation of the room.
- From one end of the 4' line draw a 3' (914 mm) line perpendicular to the 4' line. If your lines were drawn correctly, then the distance between the open ends of the 3' line to the 4' line is 5 feet (1524), which is the hypotenuse of the triangle that was created. This gives the installer a point of reference for controlling the tile layout.

Mortar Beds

•Mortar Bed Method: This is the best Ceramic Tile installation method in terms of stability and adjustability during the installation. Mortar (mud) is a mixture of sand and cement for floors, and sand, cement and lime for wall applications.

•Pre-float Mortar Bed: The mortar is applied and cured, and the tile is attached later.

•Wet Mix Mortar: The mortar is applied in a fairly wet mix so it can be troweled onto the wall or floor.

•Dry Pack Mortar: This is a very dry mix of mortar that looks more like wet sand than a cement mixture. It is used only on floors.

•Bonded Mortar Bed Method: Either the Dry Pack Mortar or the Wet Mortar methods have the mortar bed bonded directly to the concrete substrate.

•Non-Bonded Mortar Bed Method: Either the Dry Pack Mortar or the Wet Mortar methods have the mortar bed with wire reinforcement isolated from the concrete substrate over a cleavage membrane.

•Wet (Fresh) Set Mortar Installation: The tile is attached to the mortar bed when it is freshly installed and still wet. This installation method helps compensate for the variation in tile thickness for ungauged tiles.

Thin-set Method and Thin-set Adhesives

•Thin-set Method: A method of attaching a Ceramic Tile to some surface with some type of an adhesive that cannot be any thinner than 3/32" (2.38 mm) and no thicker than¼ inch or 6.4 mm AND a common type of cement adhesive used for attaching tile to the substrate.

•Thin-set Dry Set Mortar (ANSI A118.1, ISO CP1) is a sand and cement mixture that contains special chemicals that will not allow the tile to readily pull the moisture out of it.

•Latex Modified Thin-sets (ANSI A118.4, ISO CP2): Liquid latex is mixed with thin-set mortar to increase its adhering performance.

•Polymer Modified Thin-sets (ANSI A118.4, ISO CP2): Also referred to as multi-purpose thin-sets, these are similar to thin-set dry set mortar, but polymer additives are added to the powder mix, improving its performance.

•Improved Modified Thin-sets (ANSI A118.15, ISO CP2): The same as the above modified mortars except the improved modified thin-sets provide higher performance in bond strength and in other properties.

•Thin-set Dry Set Mortars for Large and Heavy Tile (LHT Mortars): Replaces what was known as Medium Bed Mortars. These mortars are designed as direct bond adhesives and are not intended to be used in truing or leveling underlying substrates or the work of others.

•Thin-set Mortar Coverage -The amount of square feet that a pound of thin-set mortar powder will provide can vary more or less from 1/2 sf per pound to over 2 sf per pound. Thin-set coverage will vary depending on the type of tile being insta lied and the size notched trowel being used.

•Thin-set Mortar Mixing-Thin-set mortars must be mixed per the manufacturers' directions. Adding too much water can lead to problems.

•Mastic (ANSI A136.1, ISO D1 or D2}: Also referred to as adhesive or glue, mastic is a premixed creamy latex material used primarily to bond to drywall.

•Epoxy Adhesive (ANSI A118.3, 118.8, ISO Rl}: To use, mix part "A" hardener with part "B" resin to start a chemical reaction. Very high performing.

Membranes -Waterproofing and Vapor Membranes

•Waterproofing: Ceramic Tile installations are not waterproof unless a waterproof membrane is included. Wet areas should always have some type of a waterproof membrane.

•Sheet Membrane can be a shower pan membrane made of a certain type of polyvinyl chloride, or chlorinated polyethylene, which comes as a sheet on a roll. It can also be a sheet membrane with scrim imbedded into the membrane surface that allows tile to be bonded directly to it.

•Liquid Applied Membrane (ANSI A118.10): Normally, this is a latex- or asphalt-based liquid that is applied with a paint roller and sometimes requires an embedded fabric.

•Trowel Applied Membrane (ANSI A118.10): Normally, this is a cement-based or a urethane-based material that, when troweled on with uniform thickness and cured, will provide a watertight membrane.

•Primary Membrane: This is used as a waterproofing membrane on roofs or on exterior deck applications. It is applied first, and then one of the other types of membranes is added as secondary protection.

•Vapor Barrier: Vapor barrier membranes are always required on all exterior wall applications and on interior wet area applications such as showers and bathtubs.

•Vapor Retarder: A vapor retarder membrane installed behind the wall assembly of Steam Shower/Rooms must have a vapor retarder with a water vapor permeance rating of 0.1 perm or less when tested per ASTM E96 Procedure A, tested at 50%relative humidity.

•Vapor Retardant: This is a sheet-type material that goes in the ground under the concrete substrate to prevent moisture in the ground from traveling up through the concrete substrate and then up through the floor surface.

Membranes: Crack Isolation, Heating Systems, and Sound Control

•Crack Isolation Membrane (ANSI A118.12): Will isolate shrinkage cracks that are usually no more than 1/8" (3.2 mm) wide, as long as the movement in the crack is horizontal. It will not protect against structural cracks that move vertically.

•Sheet Membrane: This is a sheet membrane with scrim imbedded into the membrane surface that allows tile to be bonded directly to it. It is then bonded to the substrate with an adhesive, or it can be a peel and stick type membrane that comes with an adhesive on its back.

•Liquid Applied Membrane: Normally, this is latex or asphalt based liquid that is applied with an embedded fabric.

•Trowel Applied Membrane: Normally, this is a cement- based or a urethane-based material that, when troweled on with uniform thickness and cured, will provide a crack isolation membrane.

•Uncoupling Membrane: A plastic membrane system geometrically configured to provide air space between the tile and the substrate.

•Cleavage Membrane {also referred to as a Slip-Sheet): On mortar bed installations, a method called the nonbonded method can provide protection against cracks in the concrete substrate.

•Floor Heating: There are heating systems that can be incorporated into Ceramic Tile installations.

•Sound Control: The two types of ratings that must be achieved are an STC (Sound Transmissions Class) and an IIC (Impact Insulation Class).

Movement Joints

•Movement Joints: All Ceramic Tile installations must have movement joints designed into the installation. Movement joints allow sections of the tile and its substrate to move separately from each other. The movement joint also mitigates movement within the tile assembly to avoid the tile from cracking or debonding.

•Soft Joint: This refers to an expansion joint that is filled with a special flexible caulking that is normally 100% Silicone, Urethane, or Polysulfied. All perimeters of floors, walls and columns should have a soft joint.

•Tile Council of North America Handbook for Ceramic Tile Installation (TCA handbook) has recommended instructions for Movement (expansion) Joints called EJ 171-09.

•Interior floors or walls should have expansion joints placed at a minimum of every 20 to 25 feet (6.1 m to 7.62 m) in both directions. Interior wet areas or areas subject to direct lighting require more frequent placement of movement joints.

•Exterior floors or walls should have expansion joints placed at a minimum of every 8 to 12 feet (2.44 m to 3.66 m) in both directions.

Grouting

•Grouting: Filling the joints between tiles. The grout helps support the edge of the tile and bonds the tiles together. Normally, cement grout is used.

•Grout width is primarily determined by how consistent the sizing is between each tile. Tiles that vary in size need wider grout joints in order to keep the grout joint lines looking straight. The grout

joint width should be at least 3 x the actual variation of the tiles facial dimensions in order to minimize lippage and to allow the grout joint to appear straight and true.

•Grout Color: It is always recommended to use a blending grout color that is close to the color of your Ceramic Tile so the grout won't accentuate the irregularities in the tile or the installation.

•Grout Color Shading: Just as Ceramic Tile has color shading differences from run to run, colored grout can have color differences from batch to batch.

•Grout samples: Sometimes the grout comes out consistent and relatively close to the grout samples, but more often than not, the cement grout used on the job will vary in color from the samples.

Grout Types

•Grout Types -The most common grout type is a cement- based grout. It comes as a powder, and you normally add water to it.

•Unsanded Grout (Also Called Non-Sanded Grout): It can only be used in grout joints that are 1/8" (3.2 mm) or less wide, or the grout joint will tend to crack.

•Sanded Grout: It can only be used in grout joints that are 1/8" (3.2 mm) or more wide.

•Latex Modified Grout: This is a cement grout into which you add liquid latex admix rather than adding water.

•Polymer Modified Grout: This is a cement grout into which powder polymers have been added.

•Premixed Grout: A hybrid grout that comes in a pail and can be used right out of the pail without mixing.

•Epoxy Grout: This is an epoxy-based grout. It is very stain resistant and can make grout much easier to maintain.

•Stain Resistant Grout: Some grouts are made more stain resistant than others. Grout can be made more stain resistant by sealing them with penetrating sealers.

Tools:

•Cutting Tools:. There are wet saws and dry cutting diamond blade saws for cutting tile. There are hole saw bits for cutting holes in tiles. There are tile scoring boards and tile nippers for cutting tiles.

•Trowel Tools: There are various notched trowels for applying the adhesive. There are margin trowels for mixing and applying adhesives. There are rubber floats for grouting. There are trowels to apply and finish mortar beds.

•Measuring Tools: There are tape measures. There are levels for measuring the slope or flatness of surfaces. There are spacers for adjusting the width of grout joints. Chalk lines are used to set layout measurements for installing the tile.

•Mortar and Mixing Tools: There are thin-set paddles for mixing. There are mortar straight edges to screed off the mortar beds to make them flat and even. There are squares for making sure the walls are square to each other.

Maintenance

•The more textured the surface of a Ceramic Tile is, the more slip resistant it will be. Unfortunately, this also means that more dirt will cling to it, requiring more frequent cleaning, and more effort to clean the floor.

•If the tiles are not properly maintained and cleaned regularly, then the tiles' slip resistance will diminish.

Sealers

•Sealers are necessary for very porous Ceramic Tile and porous grout to help make it more stain resistant and easier to maintain.

•Surface Sealers tend to give the tile a wet look that darkens its color and gives the tile's surface a shine.

•Penetrating Sealers give a more natural look and make the tile more stain resistant and easier to maintain.

•Enhancers are penetrating sealers that give the tile more of a wet look that can enhance its color.

•Sealers do NOT make the Ceramic Tile installation waterproof. You need a waterproof membrane to make an installation waterproof.

•Sealers are Bond Breakers. Ceramic Tile will not adhere to surfaces that have a sealer on them.

Cleaning Methods

•Normally, all you need to clean Ceramic Tile and grout is a neutral based cleaner or detergent.

•Use a scrub brush with an extended handle and a detergent diluted with water on a regular basis. Scrub the floor, and then use a wet and dry vacuum to pick up the dirty water. Then rinse the floor with clean water and then pick it up with a wet and dry vacuum.

•NO ACID: Some people believe that acid can do more good than harm, but actually it is the other way around. Acid can etch the surface of the tile, and it can burn stains into the tile so they can never be removed. Also, acid does NOT remove grease.

Ceramic Tile Selection

•Intelligent Merchandising: The process of combining information and visual aides to facilitate visualization. Intelligent merchandising helps customers to make decisions.

•Determining suitability: Collect manufacturer's brochures and data sheets and have this information readily available when dealing with a customer. Study this information and you will be able to quote it to your customers.

•Manufacturer's Recommendation: Always make sure you base your recommendation of a particular Ceramic Tile on the manufacturer's recommendation. Remember, the manufacturers are the ones who tested the tile, and they understand the tile's limitations.

•Qualifying. The first step is to determine what your customer wants to do and why, selecting the right ceramic tile to achieve their desired end result.

•Ask open-ended questions: (questions that can't be answered with a simple yes or no), and listen carefully. It goes without saying that you need to be professional, courteous, friendly, and you must show that you sincerely care.

Qualifying Questions to Ask

•Asking the right qualifying questions will save you and your customer time, give you credibility as a consultant in the eyes of the customer, will lead to more sales, and will ensure you end up with a satisfied customer.

•How large is the area you are considering tiling? This gives you a good, quick idea how large a potential sale you are looking at.

•How many rooms are you going to tile? Many times they come in asking about the bathroom but fail to mention the big kitchen or patio, etc.

•Is it indoors or outdoors? What are the climatic conditions during the year? If tile will be installed outdoors and exposed to freezing conditions, this will limit the selection because not all tiles can be used in exterior applications. Also, they'll need a slip-resistant tile for exterior floor applications.

•Is it going to be in an area that can get wet? If so, does it need to be slip resistant? Does it need waterproofing?

•How much foot traffic do you expect to get? This will tell you how durable the tile must be.

•What type of lighting do you have in the room? Lighting will affect how the tile will look with respect to color and design.

•Always give your customer as many choices as possible, but help them narrow it down by clarifying the differences and trade-offs in both performance and cost.

Tile Patterns

•Sizes and Shapes -Ceramic tile comes in all sorts of sizes and shapes such as different sizes and configurations of hexagons and octagons. They can also be installed in various patterns to give different visual effects.

•Versailles Pattern -This is a popular modular pattern which provides 4 or more different sizes that are off-set from each other and are blended together.

•Staggered Patterns: More of a traditional pattern of off- setting the square or rectangle tiles from each other. ½ offsets can be done with tiles 18" or less. 1/3 off-set is recommended for tiles over 18" on any side.

•Herringbone Pattern: More of a traditional pattern where rectangular tiles are installed 90 degrees to each other.

•Basket weave Pattern: More of a traditional pattern where groups of two rectangular tiles are installed perpendicular to each group of tiles.

Giving your Customers a Choice

•The good … Better… BEST… Approach: show the low- price options (good) as well as the medium- (Better) and high-price (BEST) options. Explain to them why these choices are different, and show

them the trade-offs and features and benefits of their products, so you can accurately educate your customers.

•Rule of Thumb: 68 percent of the time, when a customer is given a choice with value, they will upgrade.

LEED

•Leadership in Energy and Environmental Design (LEED) - The LEED Green Building Rating System is an independent certification program that provides voluntary guidelines for developing high-performance, sustainable buildings.

•Ceramic tile is one of the most sustainable, if not the most sustainable product in the floor covering industry. It is in your best interest to learn as much as you can about LEED standards and how the products you sell can qualify for LEED credits.

Porcelain Tile

•Porcelain Tile is made from very dense clay; thus porcelain tile is a type of ceramic tile. It is similar to China dinnerware, so it is very durable, stain resistant, and wear resistant.

•Not all Porcelains are created equal. Lower priced products normally were not manufactured using the highest quality equipment or processes.

•Porcelain tile is defined as an impervious tile with water absorption of 0.5% or less as measured by the ASTM C373 test method.

•PTCA (Porcelain Tile Certification Agency): Any manufacturer can "prove" their product meets ANSI A137 .1 Specifications for absorption and can therefore be called a porcelain tile by performing the PTCA test on their tiles.

Color/Shade Variation Guide

•The ANSI A137.1-5.4.2 Aesthetic Classification and Shade Variations and the CTDA Color/Shade Variation Guide use graphic representations of each variation range, so showrooms can easily categorize and label their Ceramic Tile products by the degree of variation in color, texture, and appearance.

•V0-Very Uniform Appearance: Pieces of the same shade value are very uniform and smooth in texture. They can be measured for small color differences and are in compliance with the color uniformity requirements.

•V1 -Uniform Appearance: Differences among pieces from the same production run are minimal.

•V2 -Slight Variation: Clearly distinguishable differences in texture and/or pattern within similar colors.

•V3 -Moderate Variation: While the colors and/or texture present on a single piece of tile will be indicative of the colors and/or texture to be expected on the other tiles, the amount of colors and/or texture may vary significantly.

•V4-Substantial Variation: Random color and/or texture differences from tile to tile, so that one tile may have totally different colors and/or texture from that on other tiles.

Benefits of Ceramic Tile

•Ceramic Tile is a good investment because it will add value to your home.

•Ceramic Tile requires much less maintenance than other types of surfaces, and it provides a very sanitary surface and hygienic environment when properly maintained.

•Ceramic Tile is fireproof. Have you ever noticed that the only thing left standing after a house is burned in a fire is the fireplace and the Ceramic Tile showers?

•Ceramic Tile is passive solar efficient, reducing the need for heating and cooling expenses.

•Ceramic Tile is durable and, if installed correctly, will last the life of the home.

•Ceramic Tile will give a very rich and prestigious look, allowing many options for creating any type of design you can imagine.

Issues to be Aware of

•Slip Resistance: Tile can be slippery when wet. If it is not cleaned regularly and properly, then it can become more slippery.

•Acid Sensitive: In particular, some glossy glazed tile can be susceptible to acid etching. This leaves stains that cannot be removed.

•Staining/Sealing: The more porous the Ceramic Tile surface, the more susceptible the tile is to staining.

•Chipping: Any tile can chip if a hard enough or sharp enough object falls on it. Some tiles are more chip-resistant than others. Normally, a more dense unglazed body tile or one with a hard glaze is the most chip resistant.

More issues to be Aware of

•The substrate to which the Ceramic Tile will be attached has to be structurally stable, clean, and free of contaminates.

•You must have a waterproof membrane (ANSI 118.10} if you want protection against water.

•You must have a crack isolation membrane (ANSI 118.12) if you want protection against cracks.

•You must have movement joints (TCNA EJ171 A-H} designed into the floor, or there will be cracking problems even if you have a crack isolation membrane.

•If you want a heated floor, then it should be designed into the installation system.

•If you want to minimize the transmission of sound, then you need a sound control system designed into the installation.

•Make sure you qualify the installer, and look at work he has done previously. Not everyone is as detail-oriented or is as conscientious as we would want them to be.

•Maintenance: Ceramic Tile is easy to maintain, but not self-cleaning. Don't let your customers leave the store with their Ceramic Tile order until they know how to protect and maintain their new investment.