

CFI CERAMIC-I STUDY GUIDE

The CFI TILE Study Guide for Installation Knowledge

The CFI Team shares the proven methods of tile installation that work for thousands of installers worldwide. We also invite you to share with us methods that work for you. Techniques that are demonstrated have proven to provide the customer with the highest degree of customer satisfaction.

The CFI Study Guide is widely used throughout the Industry as a "tool" for understanding the requirements of a successful tile installation. Manufacturers and the Tile Council of America offer written guidelines. The Ceramic Tile Education Foundation provides extensive training to increase your knowledge and skills. By acquainting yourself with the CFI Study Guide and Terms, the written test that is administered at the close of the event is not difficult. The Study Guide provides the answers to the test.

OSHA and EPA Information

1. **OSHA** - Occupational Safety Health Administration
2. **OSHA** - Office of the Federal Government
3. **OSHA #3165** (white-blue) "Employee's Right to Know" - Employees must be trained to install ALL products handled. Note: New poster #3165 (white-blue) replaces the #2203-yellow.
4. **HAZCOM** -Hazardous Communications Plan
 - (a) Keep Safety the #1 Priority
 - (b) Plan lists training procedures for company employees
 - (c) States location of MSDS Sheets
 - (d) Identifies all products company uses and chemical inventory
5. **FINES**
 - (a) Maximum first time fine is \$7,000.00
 - (b) Maximum-next offense is \$70,000.00
6. **FINES** issued for items such as:
 - (a) No HazCom Plan
 - (b) No Kneepads
 - (c) No First-Aid Kit
 - (d) No Ventilation
 - (e) Defective tools
 - (f) Improperly labeled or unmarked containers
 - (g) Ground wire removed from electrical cords
 - (h) No MSDS sheets (Material Safety Data Sheets)Power tools are to be grounded with a ground-fault circuit interrupter
7. **MSDS-MATERIAL SAFETY DATA SHEET lists:** (Request MSDS at time of purchase)
 - (a) Manufacturer and product
 - (b) Physical data (volatile, boiling point, etc.)
 - (c) Fire and explosion hazard data -how to extinguish fire, etc.
 - (d) Hazardous Ingredients
8. **CHEMICALS** can only be transferred by ONE person to another properly labeled container.
9. **HEALTH HAZARD DATA listed on MSDS** (exposure limits, first aid) includes the following.
 - (a) Reactive data (stability - what not to mix with product)
 - (b) Special handling precautions
 - (c) Special protective equipment and procedures - gloves/ventilation
 - (d) Spill and leak procedures
10. **ASBESTOS** should always be covered or encapsulated -Testing is only way to properly identify
11. **FIRST AID KIT**- Contents of kit must be undisturbed with a letter signed by a physician
12. Always be aware of the location of the **First-Aid Kit and the MSDS Sheets.**
13. To avoid tripping, hoses and power cords should be placed **along walls and away from traffic.**
14. **Be aware of silica dust and prevent airborne particles** by wetting the surface and removing with a Hepa vacuum.
15. **Silica** is found in lead-based paints and in tile, masonry materials and mortars.
16. The **disposal of waste water** is always done according to local regulations.
17. **EPA** – Environmental Protection Agency of the federal government

CFI

1. CFI is the industry organization that **represents the professional flooring installers** and promotes them to the industry and consumers.
2. CFI installers are expected to perform successful installations **EVERY time.**

- CFI Ceramic Installers are **required to pass oral, written and hands-on tests.**
- CFI promotes **pride and professionalism.**
- CFI has trained over **40,000 installers nationwide.**
- CFI logo – **PRIDE** – Professionalism, Responsibility, Integrity, Dependability and Education.
- CFI “**People Skills**” are described as professional ability to satisfy the customer and to communicate in an intelligent and informative manner.
- The ultimate goal of the CFI installers is **CUSTOMER SATISFACTION!**

RULES

- ASTM:** American Standard Testing and Materials (Standard)
- ANSI:** American National Standards Institute (Standard)
- CTEF:** Ceramic Tile Education Foundation
- TCNA:** Tile Council of North America
- EPA:** Environmental Protection Agency
- OSHA:** Occupational Safety Health Administration

TOOLS and SUPPLIES

- Tile nippers** are used for inside curves and straight cuts.
- The tool used to drill holes through masonry or concrete is called a **carbide drill bit.**
- Cement backer board** is used to cover wood subfloors and eliminates the wire mesh and mortar coat. It is a rigid sheet, usually 3 feet x 5 feet and ¼-inch or ½-inch thick.
- The **mixing paddle** for a power drill is used to mix bonding mortar and grout.
- Wet diamond, dry diamond, carborundum, and rod saw are all **types of blades.**
- The tool used to locate straight lines is called **chalk or dry line.**
- The tool used to cut circles or irregular curves in tile is called a **rod saw.**

MEASURING AND ESTIMATING

- The best installation starts at the **time of the sale.** Installers are to receive a detailed diagram.
- Tile is sold by the **full box.**
- Length times the width **equals the square footage** of the area.
- The type of tile, subfloor type, movement areas, door and appliance clearance and areas to cover are included in the **detailed diagram.**
- Installation problems are definitely minimized when the installer receives a **detailed diagram.**
- The door is expected to clear **two tiles.**
- In a larger room, the installation begins by **snapping a chalk line in the center of the area in both directions.**
- All floor layouts must incorporate **movement joints.**
- The **3-4-5 rule** is used to check if the lines are square.

SAFETY

- The form that lists items such as the physical data, fire explosion hazard data and hazardous ingredients is called the Material Safety Data Sheet – **MSDS.**
- If the installers are not qualified to address an **asbestos** situation, they should cover or encapsulate the surface.
- OSHA** is the Occupational Safety and Health Administration.
- Installers should always be aware of the location of the **first-aid kit.**
- Power equipment** should only be operated by persons authorized to use the machines.
- To avoid tripping,** hoses and power cords should be placed along walls and away from traffic.
- It is recommended that tile setters **wear gloves.**
- Tools and extension cords are to be **grounded** by 3-prong plugs.
- When working with wet saws, it is recommended that installers should keep **hands safe and wear eye protection.**
- The **disposal of waste water** is always done by according to local regulations.
- Be aware of **silica dust and prevent airborne particles** by wetting and removing with a HEPA vacuum.
- Silica** is found in tile, masonry materials and mortars and in lead-based paints.
- Power tools are to be **grounded** with a ground fault circuit interrupter.
- When lifting heavy objects, it is important to follow **safe lifting procedures.**

TILE SPECIFICS

1. The wear surface of the tile is called **glaze**.
2. Glazed tile is composed of two parts, called the **bisque and the glaze**.
3. **Marble, granite and slate** are taken from the earth, can be natural and mined from the earth.
4. Marble, granite and slate are taken from the earth and can be **inconsistent in appearance**.
5. The strength and wear resistance of the glaze is determined by its **hardness**.
6. Difference between **glazed and unglazed tiles** is that unglazed tiles are generally thicker and denser; superior strength for commercial use.
7. **Non-vitreous tiles** are suited for indoor use only because they absorb their weight in water by 7% or more.
8. Ceramic tile is known as **glazed and unglazed**.
9. The **strongest tiles** are known as impervious and absorb between 0 and 0.5% of their weight in water
10. **P. E. I** (Porcelain Enamel Institute) is the wear rating of the tile.
11. **Quarry tiles** are generally slip resistant and denser than other tiles.
12. **Mosaic tiles** are small and usually less than 6-inches.
13. **Impervious tile** has a water absorption of 0.5% or less.

INSTALLATION FACTS TO KNOW

1. **ALWAYS follow the manufacturer's installation instructions.**
2. **Wood expands and contracts** when its moisture content changes
3. **Backer boards** replace the mortar beds and separates the tile from much of the structure's movement to protect the installation.
4. **Backer board installations** will usually fail as the result of an insufficient amount of mortar underneath.
5. **Lippage** is the height difference between tiles that are adjacent to each other.
6. Deflection means to **bend, flex or bow**.
7. Most installations limit joist spacing to **16-inches on center**.
8. In place of latex or acrylic caulks, use a **flexible sealant**, such as 100% silicone or urethane.

THE SUBSTRATE - SUBFLOOR

1. The **substrate** is known as the surface over which tile is installed.
2. Poured in place concrete is known as a **substrate**.
3. The performance of a properly installed thin-set tile installation is dependent upon the durability and **dimensional stability of the substrate**.
4. A **cold or construction joint** is when concrete is poured at different times and sections are joined together
5. **CBU** is the abbreviation for Cement Backer Units.
6. New, poured concrete can be tiled over according to industry recommendations in **28 days**.
7. **Wood products are dimensionally unstable** because wood possesses tremendous **movement** characteristics
8. Wood based panels such as particle board, composition (veneer) panels, non-veneer panels (CDX, OSB, etc.), lauan and softwood plywood are **NOT recommended as backing materials** for direct bonding of tile.
9. **1/8-inch spacing** is required at all end and edge joints of plywood subflooring for expansion, according to the APA Engineered Wood Association
10. **Stress cracks** continue to open and close with seasonal changes
11. Non-asbestos cushioned or perimeter installed **sheet vinyl goodsshould be removed**.
12. Unsuitable substrates should be **covered or replaced**.
13. The amount of **deflection** in the floor is to be minimized to prevent failures where bending occurs
14. A measure of acidity or alkalinity is **pH**.
15. A **pH under 9** is usually recommended for tile and grout to minimize efflorescence.
16. A **calcium chloride test** measures the vapor emission rate **from** a concrete slab over a 24-hour period, but it takes 60-72-hours to conduct. The emission rate is generally **3-pounds per 1,000 square feet in 24-hours**.
17. The **In-Situ test** measures the relative humidity of the slab to assess the moisture contained **in** the concrete that can potentially be emitted at the surface.
18. All methods require the subfloor to be at least **19/32" or 5/8" thick**.
19. If the substrate is porous, **damp mopping** will increase the bond strength of the cement mortar to the substrate, as long as the substrate remains damp when the mortar is troweled.
20. In a concrete floor, **expansion joints** continue to open and close with seasonal changes.
21. Leave a minimum **1/8-inch** accommodation movement around all perimeter abutments and horizontal to vertical abutments.

22. Structural wood panels with edges that interlock with other panels are known as **tongue and groove** and should have 1/8-inch expansion built into the system.

MORTAR and ADHESIVE

1. Today, most tile installations are done by using **thin-bed methods**.
2. **Thin-bed installation** is so common that newer buildings no longer accommodate the thickness of a mortar-bed installation.
3. Reduced mortar performance and open time are the result of **mixing too little or too much**.
4. One of the most common causes of tile failures is the **lack of mortar coverage**.
5. Joist spacing, tile size and type, underlayment type and subfloor thickness all **affect tile performance**.
6. Dry-set mortar is suitable for use over a variety of surfaces and can be used in one layer as thin as **3/32-inch**, which is the **MINIMUM** allowed.
7. Latex-portland cement mortar compared to dry set cement is **more flexible**.
8. If chemical resistance, high-bond strength and high-impact resistance are required, use an **epoxy mortar**.
9. Remove **mortar** from joint area before grouting, leaving **2/3's of the depth** of the tile available for grouting.
10. **Back buttering** is the term used for applying adhesive to the back of tiles that have large lugs or grooves.
11. **Organic adhesive shrinks** as it dries more than mortar and because of drying issues, can only be used on tiles that are no larger than 6x6 inches for floors and 12x12 inches for walls.
12. Latex additive mixed with dry set mortar instead of water and used when tiling over a non-porous subfloor is called a **bond coat strengthener**.
13. When latex additive is mixed with dry set mortar instead of water, the mortar is **stronger**.
14. **Dry-set Portland-based cement mortar** - standard term for cement-based mortar that does not contain polymers or latex.

MEMBRANES

1. An **uncoupling membrane** is a plastic sheet which is bonded to the substrate to accommodate movement.
2. A plastic membrane that provides air space between the tile and substrate to allow movement between the two is called the **uncoupling membrane**.
3. **Uncoupling membranes** are plastic sheet goods that are sold in a roll or as individual sheets and used throughout the entire installation.
4. A **crack isolation membrane** is a thin, flexible material adhered to concrete substrates and poured underlayments to prevent cracks in the substrate from telegraphing through the tile.
5. A thin, flexible liquid material, applied to a substrate to minimize moisture/fracturing damage to the tile and grout and applied with a trowel, roller or sprayer is known as a **waterproofing or anti-fracture membrane**.

GROUT

1. A **bad grout** can ruin a perfect installation.
2. When **mixing thin set and grout**, it is important to follow the recommended mixing speed and slake time.
3. When mixing grout, use **lower** speeds. Mixing too fast or too long produces weaker grout if the air is trapped.
4. Minimizing the amount of water used will make the **grout stronger**.
5. When grouting, use the **recommended joint sizes** stated by the manufacturer.
6. After the **thin-set has cured**, the tile is ready to grout.
7. **Portland cement** is the base for most grouts.
8. **Epoxy grouts** provide high-bond strength and impact resistance.
9. **Epoxy grout is used** where chemical resistance is of high importance and provides a high-bond strength and impact resistance also.
10. If the grout becomes too stiff, remix it by hand, but **do not add liquid**.
11. Do not pack the grout into the **movement joints**.
12. Grout must be **firm in the joints** before beginning to rough wash.
13. Fill visible movement joints with a compressible material, but do not use **grout**.
14. Before the **final wash**, allow the grout film to dry to a haze.
15. **Restrict the traffic** in freshly, grouted areas for 24-hours and no heavy traffic for 72 hours.

BONDING

1. To ensure proper mortar coverage of the tile and setting material check by **lifting a tile and inspecting it**.
2. If tile is bonded directly to concrete over a crack without a crack isolation membrane, **it will most likely crack**.
3. Tile installation may fail because the **incorrect bonding material** was used and/or by improper coverage of the correct bonding material.
4. If the mortar sets up too quickly, the bond strength will be **much weaker**.

CERAMIC VOCABULARY

- Acclimate:** become conditioned to the surrounding environment. Dried plywood and OSB absorb moisture as they acclimate to the environment.
- Acid:** pH lower than 7
- ANSI Standards:** American National Standards Institute – describe till installation requirements and product performance requirements
- Asbestos:** fibrous material that can be harmful when airborne (in older vinyl tiles and adhesives)
- ASTM:** American Society for Testing and Materials
- Back butter:** Spreading a bond coat to the back of tile to improve coverage and transfer
- Backer board:** Rigid, sheet product, such as 3 feet x 5 feet and ¼-inch or ½-inch thick
- Balanced cuts:** refers to a mirror image from front to back and side to side in a patterned installation
- Beating block:** wooden block used to imbed tiles – method is called beating in
- Bed:** to provide support for
- Bisque:** clay that has been fired
- Bond-breaker tape:** thin strip of material installed in a shallow movement joint that sealants will not bond to
- Bond coat:** Material that attaches the tile to the substrate
- Bond-coat strengthener:** latex additive mixed with mortar instead of water, used when tiling over a non-porous subfloor
- Breaking strength:** amount of force required to break a tile
- Bullnose:** a trim tile with a convex radius on one side
- Calcium chloride test:** Measures the vapor emission rate. Recommended at a rate of 3lbs per 1,000 square feet in 24-hours. High vapor emission rate can create an alkaline situation which can break down some membranes and adhesives. A pH of up to, but not exceeding 9 is the highest number acceptable.
- Caulk:** to fill a joint with a flexible sealant or compressible filler
- CBU:** a type of cement backer board
- Cement board:** Type of backerboard, also called CBU.
- Cement grout:** cementitious mixture of Portland cement, sand or other ingredients and water to produce a water resistant, material used to fill the joints between the tiles.
- Ceramic Adhesive:** Usually referred to as mastic is for bonding tile to a surface
- Ceramic tile:** ceramic surfacing unit, glazed or unglazed; does not include tiles made of natural stone
- Change in-plane:** a section where two planes intersect, such as in a corner
- Clean wash:** the final washing process after grouting; the finish wash
- Co-efficient of friction (COF):** numeric indicator of how slip-resistant a tile is in wet or dry conditions
- Cold joint:** the intersection between the end of one concrete pour and the beginning of a new pour
- Compressible filler:** flexible sealant
- Compressive strength:** ability to resist being crushed by weight
- Control joint:** a saw-cut joint in concrete to control cracking in the concrete
- Crack isolation membrane:** thin and flexible material adhered to concrete substrates and poured underlayments to prevent substrate cracks from telegraphing through to the tile.
- Crazing:** cracking which occurs in fired, glazed or other critical tensile stresses
- CTEF:** Ceramic Tile Education Foundation
- CTI:** Ceramic Tile Institute
- Damp cure:** create humid condition for fresh grout by misting and covering it
- Deflection:** variation in the position or shape of a structure due to effects of loads or volume change; to bend, flex or bow
- Direct-bond method:** installation method where the tile is applied to an existing surface
- Directional troweling:** comb all notches of a bonding material in the same direction to form parallel, uniform ridges of mortar.
- Dry cut (scraper or grind):** Removal or scarification of materials without using water
- Dry-set mortar:** cement-based setting material for thin-bed installations
- Dusting:** application of dry Portland cement to a wet floor or deck mortar surface
- Efflorescence:** residue deposited on surface of a material (usually the grout joints) by the crystallization of soluble salts
- EGP mortar:** cement-based mortar designed to bond to wood. ANSI A118.11
- Embed:** to set inside of, encapsulate or enclose
- Embossed:** decoration on the wear surface
- Epoxy grout:** two-part adhesive system using epoxy resin and epoxy hardener used to fill grout joints

Epoxy mortar: often contains silica filler formulated for industrial and commercial installations where chemical resistance is of importance.

Epoxy resin: an epoxy composition used as a chemical resistant setting adhesive or resistant grout

Expansion joint: joint through the tile, mortar and reinforcing wire down to the substrate

Feather-in: create a more gradual transition by forming a slope

Final wash: clean wash

Firing: ceramic manufacturing step of using a kiln or furnace to develop desired properties through heat

Flatness: amount of surface variation from being straight across

Flexible sealant: material such as 100% silicone or urethane installed in movement joints in place of grout

Float strip: strip of wood about ¼" thick and 1 ¼" wide used as a guide to align mortar surfaces

Floating: method of using a straightedge to align mortar with float strips or screeds.

Foam backer rod: synthetic "rope" to which sealants do not bond

Freeze thaw stability: ability of tile to withstand freezing and thawing without cracking (32-degrees F)

Glaze: a coating applied to ceramic products, but it is not a ceramic coating

Grade: a predetermined degree of slope that a finished floor should have

Grout: material used to fill the spaces between the tiles

GFCI: ground fault circuit interrupter – stops an electric current when it detects a surge or short in the current

Grout joint: space between the tiles

Hard screed: a mortar screed that has become firm

HEPA: High Efficiency Particulate Air, type of vacuum attachment used to trap dust

Impervious tile: has water absorption of 0.5% or less

In-plane: on or within the same level, such as a flat floor

In-Situ Test: Measures the relative humidity of the slab to assess the moisture contained in the concrete that can potentially be emitted at the surface.

Irritant: material that causing itching or other discomfort until it is removed

Joist: structural unit of a wood floor system to which the subfloor panels are fastened that measure from the center of one joist to the center of the next adjacent joist.

Key-in: force mortar contact by firmly flat troweling

L-Strip: metal strip shaped like the letter "L," used as the termination of a tile installation, particularly if the tile is higher than the adjacent floor to protect the edge of the tile

Latex Portland cement grout: combines Portland cement grout with a special latex additive to make a less rigid, less permeable grout than regular Portland cement grout

Layout lines: lines chalked in a substrate to guide setting tile accurately

Lippage: condition exists where the edge of one tile is higher than the edge of the adjacent tile

Litmus test: determines the acidity (pH) of a liquid, such as a cleaner or a solid, such as grout or concrete

Load: weight that a floor or floor system must support

Mastic: tile adhesive made from organic substances used in thin-bed tile installation

Membrane: flexible sheet used for multiple purposes including tile underlayment, waterproofing and crack isolation.

Mexican Paver Tile: used mainly on floors, the handmade tiles vary in color, texture and appearance. A terracotta-like tile coated with various types of sealers to provide a wearing surface.

MIA: Marble Institute of America

Modified mortar: Latex/polymer modified portland cement mortar

Mortar bed: Layer of mortar on which tile is set. The final coat of mortar on a wall, floor or ceiling is called a mortar bed.

Mosaic tile: Formed by either dust-pressed or plastic method, usually with a facial area of less than 6 square inches. Made of porcelain or natural clay composition, in plain or with an abrasive mixture throughout.

Movement joint: space left open or filled with a compressible material to allow movement to occur in the floor without affecting the surrounding materials

Mud: a slang term for thick-bed mortar

Neat Cement: Portland cement mixed with water to a desired creamy consistency.

Non-vitreous tile: has water absorption of more than 7% to 20%

NTCA: National Tile Contractors Association

NTMA: National Terrazzo and Mosaic Association

Off-set: staggered

Open time: period of time during which the bond coat retains its ability to adhere to the tile and bond the tile to the substrate

Organic adhesive: prepared organic material, ready to use with no further addition of liquid or powder, which cures or sets by evaporation.

OSB: Oriented Strand Board, wood panel made of rectangular wood strands or chips that are pressed and bonded together and arranged in cross-oriented layers.

Paper and wire: tar paper and wire mesh or metal lath used as backing for tile installation

pH: measure of acidity or alkalinity – having a pH of about 7

Plastic mat test: method of determining if a concrete substrate is releasing moisture vapor

Plumb: perpendicular to a true level

Polymer: plastic

Porosity: amount of empty space within a material – amount of water that a material can absorb

Pourable underlayment: tile substrate that is mixed and poured in place

PSI: pounds per square inch

Quarry tile: unglazed tile that is usually six inches or more in surface area and ½” to ¾” thick.

Reducer: trim unit used to shorten the radius of a bullnose or a cove to another radius or to a square

Re-emulsify: soften, break down or dissolve

Relative humidity probe: gauge placed beneath surface of concrete to detect the amount of moisture within concrete

Rodding: method of using a straightedge to align mortar with the float strips or screeds. This technique also is called floating, dragging or pulling.

Rough-wash: the first washing process when grouting

Roughing-in: act of preparing a surface by applying tar paper and metal lath (or wire mesh); sometimes called wiring.

Saltillo tile: Adobe-type tile made of clay and other natural raw materials, molded and allowed to dry – not a fired clay product.

Sand- Portland cement grout: on-the-job mixture of Portland cement, fine graded sand, lime and water.

Sanded grout: grout used in joints that re 1/8-inch to about ½-inch

Screed or screed strip: strips of wood, metal, mortar or other material used as guides on which a straightedge is worked to obtain a true mortar surface.

Sealant: an elastomeric material used to fill and seal expansion and control joints to prevent the passage of moisture and allows horizontal and lateral movement at the joints.

Setting bed: layer of mortar on which the tile is set.

Silica: found in many construction materials such as concrete, masonry and tile.

Silicone grout: engineered elastomeric grout system for interior use

Slake: brief time allowed for mixtures of mortar, thinset mortar or grout to stand after the ingredients are thoroughly combined and before the final mixing occurs. Slaking allows the mixture to mix to penetrate lumps in the dry components, making it easier to complete the mixing procedure.

Slot cut: describes tile that is cut to fit around pipes or switch boxes, usually in shape of an “H” or the letter “L.”

Slump: to sag

Soft joint: space between two hard materials, such as between two rows of tile, that is filled with a compressible material to allow movement

Spacers: cross, tee-shaped and y-shaped used in installation to separate tile installed on floors.

Split “L” cut: an improper “L” cut made by splitting a tile instead of cutting it

Straight joint: style of installation which features all joints in alignment.

Straightedge: straight piece of wood or metal used to rod mortar and to align tile

Striking joints: process of removing excess grout from the joints by wiping them with a sponge or cloth or by scraping them with a curved instrument

Stoned: use of a carborundum stone to smooth rough edges caused by cutting

Studs: vertical framing members that support the walls

Subfloor: an unfinished floor (plywood or boards) laid over joists on which an underlayment or substrate is installed

Substrate: underlayment for ceramic tile

TCNA: Tile Council of North America

Tent: to buckle or form a tent shape

Thermal expansion: the condition when tile size increases because its temperature increases

Thick-bed mortar: thick layer of mortar (more than ½-inch) used for leveling

Thin-bed method: tile installation with thin-bed bonding materials and without using a mortar bed

Thin-set mortar: cement-based bonding materials applied approximately 1/8-inch thick for thin-bed tile installation

3-4-5 Triangle: triangle with sides in proportion of 3-4-5 producing one 90 degree corner. Plotting a 3-4-5 triangle is a method to establish a pair of square reference lines on a large surface to determine if the installation site is square and to create a grid of layout lines for tile setting.

Tie wire: 8-gauge galvanized wire used for a variety of purposes in construction work

Tile: a ceramic surfacing unit made from clay or a mixture of clay and other ceramic materials.

Tile nipper: special pliers to nibble away little bites of ceramic tile to create small, irregular or curved cuts.

Tooling: forming grout joints by rubbing by using a sponge or other material

Tongue and groove (T&G) exterior glue plywood: a structural wood water-resistant panel that has edges that interlock with other panels

Tongue and groove (T&G): edge on a wood panel, such as plywood, that allows panels to interlock

Uncoupling membrane: Plastic sheet membrane thicker than a flat membrane used to limit the transfer of stresses from substrate to tile and to limit the transfer of stresses; installed over a wood floor for tile installation.

Unglazed tile: hard, dense tile of uniform composition throughout, deriving color and texture from the materials of which the body is made

Unsanded grout: Grout that is used for joints 1/8-inch and smaller

Urethane membrane: crack isolation and waterproofing membrane formed by the application of a rubber-like material that dries in place

Vapor-retardant membrane: – asphalt-saturated paper-like material or plastic behind backer board on walls to prevent moisture from migrating into the wall cavity

Vertical broken joint: ceramic tile installation featuring each vertical row offset one half its length

Vitreous tile: has water absorption of more than 0.5%, but not more than 3%

Waterproofing membrane: covering applied to a substrate before tiling to protect the substrate and framing from damage by water; applied below mortar beds or directly beneath the thin-set tiles.

Wedging: amount the tile is out of square; deviation of corners from being exactly 90-degree angles

Wet areas: tile surfaces that are soaked, saturated or subjected to moisture or liquids

Wet-cut (wet-grind): Use of water when cutting or grinding for the purpose of minimizing dust