

CHAPTER

24

GENERAL
INSTALLATION
GUIDELINES FOR
PORCELAIN TILE

General Installation Guidelines

Mannington Porcelain Tile



CAUTION: Beware that it does not matter what the grade level is or the time the concrete has been in place – all concrete underfloors should be tested for moisture before installing resilient flooring products. (See Moisture Testing on page 24.5.)

Four Key Considerations When Installing Tile

Substrate Selection and Preparation

Substrate needs to be clean, smooth, dry and structurally sound.

- Clean: subfloor must be free of all construction debris, dust, dirt and surface contaminants.
- Smooth: subfloor maximum tolerance of 1/4" flatness variation in 10 foot area.
- Dry: subfloor must be dry to receive setting material.
- Structurally Sound: free of deflection or movement. Create a solid subfloor.

Select Proper Materials

- Choose best tile size, style and construction for optimum performance
- Thin set mortars must meet or exceed ANSI 108.4/108.5 – latex modified thinset
- Use crack isolation membranes for concrete substrates if necessary
- Grout composition and color: refer to ANSI A 108.1
- For countertop application, use epoxy grout
- On floors, use sanded Portland cement grout
- On walls, use non-sanded Portland cement grout

Tile Setting Techniques

- Create a homogenous thin set consistency
- Apply 100% mortar coverage on floor tile
- Balanced tile layout – for straight, true and square tile lines
- Tile cutting equipment must produce clean cuts. Mannington recommends using a wet saw blade designed for porcelain tile.

Proper Grouting Techniques

- Clean grout joints of excess mortar – minimum 2/3 tile deep
- Grout must be evenly and consistently packed into tile joints
- Grout must be smoothed and thoroughly cleaned to a haze-free finish

Storage & Handling

It is important to store all flooring products in a dry, temperature-controlled interior area. Optimum minimum storage temperatures are between 65°F and 100°F. If it is impossible to provide this temperature range, you must provide storage capable of bringing the flooring products and any installation-related products to room temperature (minimum 65°F) for at least 48 hours before installation. Furthermore, the relative humidity of the storage area must be controlled and maintained between 30% and 70%.

- Porcelain tile will be shipped on Euro-pallets: 47.25" in length by 31.5" in width. Due to the variety of product sizes, the height of each pallet will range from 20" to 37" and pallet weight will vary from 1400 lbs. to 2800 lbs. Protect cartons from damage.

Flooring products can be heavy and bulky. Be good to yourself and always use proper lifting techniques when handling these products. Whenever possible make use of material-handling equipment such as dollies or material carts. Never lift more than you can safely handle; get assistance. Flooring products can be damaged by rough handling before installation. Exercise care when handling and transporting these products.

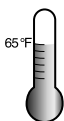
Before starting the job, always check the flooring materials to ensure they are the correct pattern, style, and color. Also make sure that the size and amount of the products are sufficient to complete the installation. Inspect the materials closely before installation for any visible defects. Mannington Flooring products are manufactured to high-quality standards and are carefully inspected before leaving our facility. Occasionally, however, defects are not detected. If you notice a visible defect in the flooring product, stop the installation and contact your local Mannington Distributor for assistance.



NOTE: Mannington Floors will not pay labor charges on claims filed for materials installed with obvious visible defects.

Jobsite Conditions

The environment where flooring products are installed is critically important with regards to successful installation and continued performance of the flooring products. **Mannington Flooring products are intended to be installed in interior locations only (except some porcelain tiles).** These interior locations must meet climatic and structural requirements as well.



Temperature Requirements

Do not install flooring products until the work area can be temperature-controlled. We recommend that the work area be maintained at a minimum temperature of 65°F and a maximum temperature of 100°F for 48 hours before, during, and after the installation. This requirement can seldom be fulfilled with temporary space heaters. A permanent heat or cooling source must be operational before proceeding with the installation of any flooring product. For the entire life of the floor, the temperature should never fall below 55°F. If this minimum temperature cannot be maintained, the performance of the flooring products and

adhesives can be adversely affected. Ideally the jobsite relative humidity will be maintained in the 40% to 50% range.

You may install all Mannington flooring products over **radiant-heated flooring systems** provided the surface temperature of the system does not exceed 90°F. Before installing flooring products over newly constructed radiant heating systems, operate the system at maximum capacity to force any residual moisture from the cementitious topping of the radiant heating system. Then set the thermostat to a comfortable room temperature for the installation.

For the smoothest job and best results, always condition flooring, adhesives, and installation accessories to the jobsite temperature before beginning the installation.

Structural Requirements

The structural integrity of the jobsite is critical for a satisfactory flooring installation. The type and method of construction, grade level, and flooring system components all impact the installation of flooring products. Many times local building codes establish only minimum requirements for flooring systems. These minimum requirements may not provide sufficient rigidity for successful installation and continued performance of flooring products. Hardwood, laminate, and porcelain flooring products require that the subfloor system is free of deflection.

Structural flooring systems are either constructed of concrete (or cement-like materials) or wood. The following description of each of these structural flooring constructions should provide flooring installers with enough information to make intelligent decisions regarding the suitability of these systems with flooring installation. For more comprehensive information, contact the manufacturer of the particular flooring system. The American Concrete Institute (MI, 248-848-3700) and the American Plywood Association (WA, 253-565-6600) can provide details for their respective products.

Subfloor/Underfloor Recommendations & Preparation

Concrete Underfloors

The concrete mixture must meet or exceed local building code specifications. For concrete slabs that are on- or below-grade it is important to check if they are constructed so that ground water vapor cannot penetrate.

Suspended, above-grade concrete floors often require extended drying time to lose initial moisture. Suspended, preformed concrete plank construction requires a minimum of 1½" concrete topping. This type of construction may also require extended drying time. Curing and drying time will vary depending on the type of concrete mix and the environment in which it is placed. New concrete slabs require a minimum of 6 weeks' drying time before covering them with a resilient flooring product.

Lightweight Concrete

Lightweight concrete having a dry density of 100 lbs or less per cubic foot is unsuitable for resilient flooring installations. Many products have been developed as self-leveling toppings or floor underlayments. These include

cellular concrete, resin-reinforced cementitious underlayments, and gypsum-based materials. Although some of these products may have the necessary qualifications of underlayment for flooring installations, others do not.



NOTE: All recommendations and guarantees regarding the suitability and performance of these products are the responsibility of the material manufacturer or the installation contractor.

Preparing Concrete Underfloors

Remove all curing agents, parting agents, or surface hardeners by grinding before installing flooring products. Also remove all paint, varnish, or other surface contaminants. You may remove these either chemically or mechanically, but do not use solvent-based strippers under any circumstances. Residual solvents will prohibit satisfactory bond of flooring adhesives. Be careful to maintain any physical expansion joints in the concrete underfloor. These joints were placed to permit expansion and movement of the slab. Use transition moldings manufactured specifically for this purpose to maintain the functionality of the expansion joint. **Fill and level all other cold joints, cracks, or depressions with Mannington MVP-2023, or a quality cementitious patching compound.**



NOTE: We do not recommend and cannot be held responsible for any failures related to the use of plaster-type patching compounds when used on any grade level of concrete underfloors.

The concrete underfloor should always be smooth and dry before starting installation. It should be structurally sound and show no evidence of scaling or dusting. The surface should exhibit no sign of alkaline salts.



Moisture Testing

Test all concrete subfloors for moisture before starting the installation. An efficient, practical method for testing the presence of moisture is a mat moisture test. Tape a 3' x 3' piece of heavy-gauge polyethylene sheeting onto the concrete floor as shown, in areas likely to be wet, with a quality duct tape. Make certain all edges of the sheet are securely taped so no air can penetrate. On large sites, it is a good idea to test in several areas. Leave the sheet in place for at least 24 hours, then remove the sheet and inspect the slab for evidence of moisture. If the covered area is darker in color, the concrete appears wet, or you see a moisture haze on the polysheet, do not install a porcelain floor over it. The concrete must be given additional drying time. Retest after two weeks. If the job is a large one, several moisture tests should be done on different areas of the slab to assure a successful installation. If the concrete continues to show evidence of excessive moisture, corrective measures must be taken by the concrete contractor.



The mat moisture test is only a qualitative test to determine if moisture is present. If the concrete must be tested in a quantitative method to determine the amount of moisture, use a calcium chloride test. Calcium chloride test kits are available from installation and/or sundry supply houses. Follow the ASTM test 1869 specifications for conducting the test and for submitting the samples for evaluation.



Calcium Chloride Test Kit



NOTE: Moisture tests can only indicate conditions at the time of the test. Neither Mannington nor the flooring contractor can be responsible if moisture levels change in the future.



NOTE: An alternative moisture testing method is the ASTM test F2170 for in situ relative humidity.

RFCI Stand Alone Statement Regarding Mold and Mildew

Issues concerning mold and mildew are gaining increased attention from both residential and commercial property owners, as well as the public at large. In virtually all situations, if there is a mold issue, there is an excessive moisture issue. In order to prevent, control, or remediate mold and mildew, one must first identify, evaluate and eliminate the source of excessive moisture.

Prior to removing an existing floor following the RFCI Recommended Work Practices for Removal of Resilient Coverings (unless state or local law requires other measures) or installing a new floor, if there are visible indications of mold or mildew or the presence of a strong musty odor in the area where the flooring is to be removed or installed, the source of the problem should be identified and corrected before proceeding with the flooring work. Visible signs of mold or mildew, such as discoloration, can indicate the presence of mold or mildew on the subfloor, on the underlayment, on the back of the flooring and sometimes on the floor surface. If mold or mildew is discovered during the removal or installation of flooring, all flooring work should stop until the mold or mildew problem (and any related moisture problem) has been addressed. Before installing the new flooring, make sure the underlayment and/or subfloor is allowed to thoroughly dry and that any residual effect of excessive moisture, mold or structural damage has been corrected.

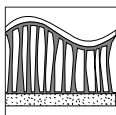
To deal with mold and mildew issues, you should refer to the U.S. Environmental Protection Agency (EPA) guidelines that address mold and mildew. Depending on the mold or mildew condition present, those remediation options range from cleanup measures using gloves and biocide to hiring a professional mold and mildew remediation contractor to address the condition. Remediation measure may require structural repairs such as replacing underlayment and/or subfloor contaminated with mold or mildew as a result of prolonged exposure to moisture.

The EPA mold guidelines are contained in two publications: “A Brief Guide To Mold, Moisture and Your Home” (EPA 402-K-02-003) and “Mold Remediation in Schools and Commercial Buildings” (EPA 402-K-01-001). Appendix B of the “Mold Remediation in Schools and Commercial Buildings” publication describes potential health effects from exposure to mold, such as allergic and asthma reactions and irritation to eyes, skin, nose and throat. These publications can be located on the EPA’s website at www.epa.gov/iaq/molds/.

pH

Alkali Testing

In addition to moisture testing, you may also want to test concrete for alkalinity. It is quite possible during curing, especially on newly poured slabs, that alkali salts were carried to the surface by moisture. These alkali salt deposits may adversely affect the adhesive bond and may discolor resilient sheet flooring. You can test for alkalinity of the concrete with a special pH testing paper or by placing several drops of a 3% solution of phenolphthalein solution on the concrete surface. If the drops turn red or if you discover a pH reading of 10 or higher, you must neutralize the alkalinity before beginning the installation by mopping the surface with a solution of 1 part muriatic acid to 10 parts water. Thoroughly rinse the concrete with clean water, allow it to dry, and then retest to ensure that you have neutralized the alkalinity.



Bond Testing

If you suspect the concrete contains a surface contaminant such as curing or parting compounds, or shows evidence of any other type of surface treatment, conduct a bond test. Adhere a 3' x 3' piece of the exact floor covering material you will use on the job to the concrete with the appropriate adhesive. Conduct several bond tests on larger installations. After 72 hours remove the test material from the concrete. If the adhesive has set-up and sufficient force was required to remove the test piece, you may consider the concrete suitable for installation.

Residual Adhesive

Completely remove all residual adhesives on a previously covered concrete underfloor or cover them with a cementitious underlayment intended for this purpose. Never use solvent-based adhesive removers. Complete removal of all residual solvent is very difficult. Any remaining on the surface of the concrete will prohibit satisfactory bond of the new adhesives. Complete removal of asphalt cutback or asphalt emulsion adhesive from a concrete underfloor is nearly impossible. Wet-scrape these adhesives from the concrete. Then cover the concrete with a minimum of 1/8" of a trowelable or self-leveling cementitious underlayment intended for this purpose. Mannington MVP 2023 may be used to cover residual adhesive stainants on concrete underfloors.

Wood Subfloors

All wood subfloor systems should be suspended at least 18" above the ground with adequate cross-ventilation. Cover the ground surface of crawl spaces with a suitable vapor barrier. All wood subfloors must be structurally sound, dry, and in compliance with local building codes.



CAUTION: Wood subfloors directly fastened to concrete, or built using sleeper construction, either with on- or below-grade concrete subfloors, are not satisfactory for the installation of porcelain floor coverings. This non-ventilated construction practice will result in deterioration of the wood subfloor system and may cause problems such as underlayment joint telegraphing. Mannington will accept no claims regarding performance of our resilient products installed over this subfloor construction.

Wood subfloors should be of double layer construction at least 1" in total thickness, solidly fastened to appropriately spaced floor joists.

Double Plywood Subfloors

Double-layered plywood subfloors should have a first layer at least $\frac{5}{8}$ " thick and a second layer at least $\frac{3}{8}$ " thick, with staggered panels and overlapping joints. Install the long dimension of these panels perpendicular to the floor joists. Panels that carry the American Plywood Association (APA) performance rating of Sturd-I-Floor were designed as combination subfloor/underlayment panels. Field experience, however, has determined these panels are rarely satisfactory for direct installation of most flooring products. In most instances, construction traffic and weather exposure damage the Sturd-I-Floor surface before the finished flooring can be installed. If you encounter this situation, Mannington recommends installing $\frac{1}{4}$ " underlayment panels.

Stripwood Underfloors

Stripwood, plank, or any board-type subfloors are not acceptable underfloors for the direct installation of resilient floor coverings. Even if these stripwood floors are completely smooth, future expansion and contraction of the structure may result in board joint telegraphing through the finished flooring. If the stripwood is 3" or less in width and is tongue-and-groove, use $\frac{1}{4}$ " underlayment to eliminate the potential for board joint telegraphing. If the stripwood construction is wider than 3" or not tongue-and-groove, then use $\frac{1}{2}$ " or thicker underlayment. Stripwood flooring is never suitable for a direct porcelain tile installation.

Recommended Work Practices for Removal of Resilient Floor Coverings



ASBESTOS WARNING: Do not sand, dry sweep, dry scrape, drill, saw, beadblast, or mechanically chip or pulverize existing resilient flooring, backing, lining felt, paint, asphaltic "cutback" adhesives, or other adhesives. These products may contain asbestos fibers or crystalline silica. Avoid creating dust. Inhalation of such dust is a cancer and respiratory tract hazard. Smoking by individuals exposed to asbestos fibers greatly increases the risk of serious bodily harm. Unless positively certain that the product is a non-asbestos-containing material, you must presume it contains asbestos. Regulations may require that the material be tested to determine asbestos content. The Resilient Floor Covering Institute (RFCI) document "Recommended Work Practices for Removal of Resilient Floor Coverings" should be consulted for a defined set of instructions addressed to the task of removing all resilient floor covering structures.

Formulas For Estimating Quantities Needed

Formula For Estimating Square Footage

Formula	Example
$L' \times W' = \text{SF of area being tiled}$	Room measures 18' x 16' = 288 SF of area
Add 10-13% for waste	288 SF x 1.10 = 316.8 SF
SF of area (including waste) /	316.8 / 16.14† = 19.63 cartons
SF in Full Box†† = Full & partial number of cartons needed	
Round up to the next full box =	Round up = 20 cartons
Total of full cartons needed	
Number of full cartons x SF in a box =	20 x 16.14† = 322.8 total SF
Total SF to verify total SF needed	(actual needed was 316.8)

Formula For Trim (Bullnose)

Formula*	Example
Linear feet of area x 12 = linear inches	Area needing trim measures 14 LF 14 x 12 = 168 linear inches
Linear inches / length of trim = Number of trim pieces needed	Length of trim pieces are 8" 168" / 8" = 21 pieces needed

Formula For Steps and Risers (Combined)

Formula*	Example
Width of steps x number of	Width of steps measures 42", steps = linear feet No. of steps is 12
Linear feet needed	42" x 12 = 504 LF needed

Formula For Cement Backer Board

Formula*	Example
SF of area / SF of board = Number	Area measures 288 SF, SF of board is 15 SF of sheets needed
	288 / 15 = 19.2 sheets (round up to 20)

Formula For Measuring For Door Clearance

Lay two tiles on floor (one on top of another), door should clear the height of the tiles.

*Percentage of waste not calculated – consult your installer.

† This number will vary based on the size of the tile and the size of the room.

†† This number is used for demonstration purposes only.

The amount of square feet per box will vary based on the selected tile.

Notes