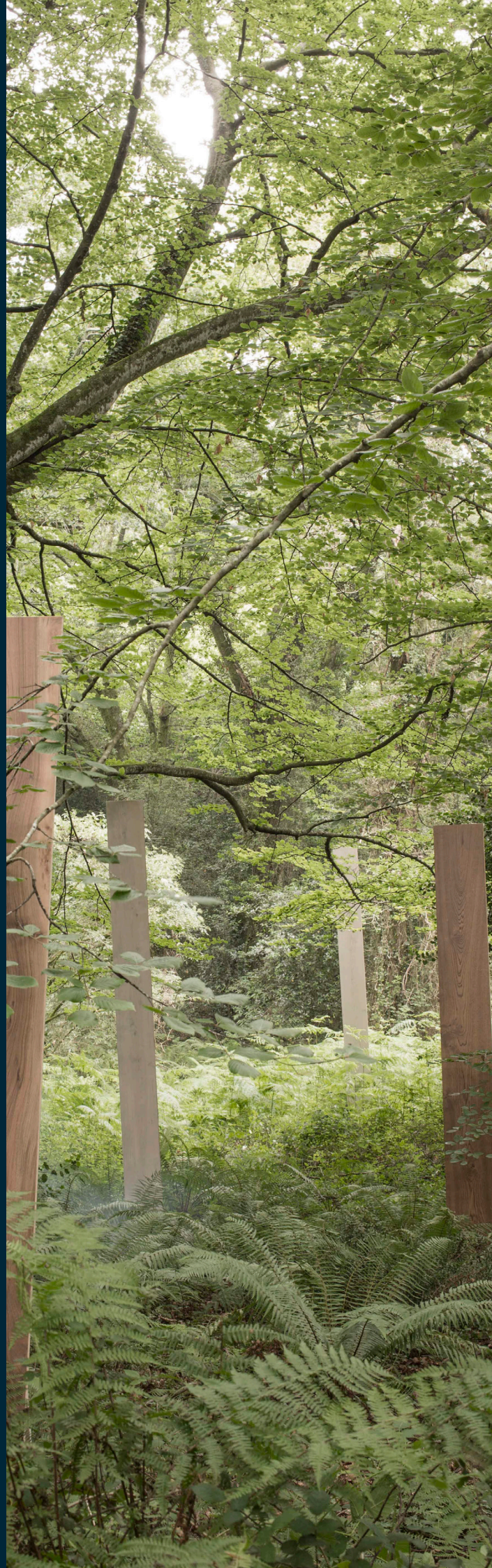


INSTALLATION GUIDE PRODUCT

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Installation information

Installation Information for GRATO Engineered European oak flooring products with 1/2" 5/8" and 3/4" thickness.

Important information before you start:

It is EXTREMELY IMPORTANT that you read and understand this information completely prior to starting, since improper installation can void the warranties.

Installer/Owner responsibility

- Goods should be brought inside the building and Inspected before installation for completeness of order.
- GRATO flooring installation shall be the last step of any construction or renovation project.
- Warranties do not cover materials damaged during transport and or with visible defects once they are installed, whereby natural characteristics of wood cause variations in wood grain, figure, character marks, texture or color and are not covered under warranties.
- Transport damages should be reported on the delivery document directly during signing for delivery when possible and when not accepted as it, returned to the transporter.
- Provisions must be made to prevent the product from sliding or falling.
- The installer assumes all responsibility for the final inspection of product quality.
- This inspection of all flooring should be done prior to installation.
- Depending on availability, deliveries may contain non-standard lengths and non-standard packaging size.
- Carefully examine flooring for quality, finish and color before installing it.
- The installer must use reasonable selectivity and hold out or cut off pieces with deficiencies, whatever the cause.
- If material is doubtful as to grade, manufacture, do not install it and contact your supplier immediately.
- The use of stain, filler or putty stick for the correction of minor defects during installation should be accepted as normal procedure.
- Even though our products are inspected many times, some grading deficiencies may occur (in up to 5% of the floor area).
- When flooring is ordered, at least 5% must be added to the actual quantity needed for cutting and grading allowance.

Tools & accessories needed

All installations*

Dust mask, broom or vacuum, chalk line & chalk, (electric power) saw, eye protection, hammer, hand saw or jamb saw, moisture meter (wood, concrete or both), square, tape measure, utility knife, pry bar.

*When installing site finished products sanding equipment may be applicable.

Pre installation & jobsite conditions

- The installer/owner is responsible for determining if the job site subfloor and job site conditions are structurally and environmentally acceptable for installation. The manufacturer declines any responsibility for floor failure resulting from or connected with subfloor, subsurface, job site damage, jobsite environmental deficiencies or deficiencies after hardwood flooring has been installed. All substrates must be dry, clean, structurally sound and flat.
- Use of appropriate products and methods for correcting subfloor voids should be accepted as a normal industry practice.
- Exterior grading should be complete with surface drainage offering a minimum drop of 6" in 10' to direct flow of water away from the structure. All gutters and downspouts should be in place.
- All outside doors and windows must be in place. All concrete, masonry, plastering and other "wet" work must be thoroughly dry. The wall coverings should be in place and the painting completed except for the final coat on the base molding. When possible, delay installation of base molding until flooring installation is complete. Basements and crawl spaces must be dry and well ventilated.
- GRATO flooring products may be installed on or above grade level.
- Crawl spaces must be a minimum of 18" from the ground to underside of joists. A ground cover of 6-8 mil polyethylene film is essential as a vapor barrier with joints lapped 8" and taped. The crawl space should have perimeter venting equal to a minimum of 1.5% of the crawl space square footage.

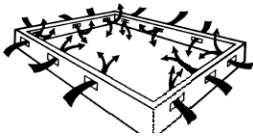
These vents should be properly located to foster cross ventilation (See Figure 1). Local regulations may prevail.

- The installation site should have a consistent room temperature of 59-75°F and humidity of 40-60% 14 days

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Figure 1



prior installation to allow for proper acclimation and there after, to allow for proper acclimation. Room humidity should never exceed 40-60%. Keep in mind that if the relative humidity drops below

30% for extended periods, the flooring could shrink and expand causing surface crack, split, bow, crook or delaminating.

- The subfloor must be checked for moisture content by an appropriate testing method. Test results must be recorded.

Note: Keep a record of all your readings for later reference and warranty enquiries. We strongly recommend you keep a record of your moisture and humidity readings (and the brand/model) of the instrumentation used prior to and after installation. These measurements will be required by the supplier and manufacturer if there are any future problems.

It is also strongly recommended to take photos of the material, while in storage at site, as well as the installation location before during and after the flooring is installed. These may also be required by the supplier and manufacturer if there are any future problems.

Storage and handling

Handle and unload with care. Store in a dry place being sure to provide at least a 4" air space under bundles which are stored upon "on-grade" flat and stable concrete floors. The flooring should not be delivered until the building has been closed in with windows and doors creating a controlled interior environment and until cement work, plastering and all other "wet" work is completed and dry. Concrete should be at least 60 days old. GRATO flooring products must be stored, in its packaging, in the environment in which it is expected to perform for at least 72 hours prior to installation. Provisions must be made to prevent the product from sliding or falling.

Subfloor preparation and recommendations for all installations

Concrete subfloors

Remove all transitions and wall-base and undercut all door casings with a hand or power jam saw using a scrap piece of flooring as a height guide. New concrete slabs require a minimum of 60 days drying time before covering them with

GRATO flooring. They must be fully cured. Concrete subfloors must be dry, smooth and flat within 3/16" in a 10' radius or 1/8" - 6'radius) and free of structural defects. Hand scrape or sand with a 20-grit # 3-1/2 open coat paper to remove loose, flaky concrete. Grinding high spots in concrete is recommended over using filling compounds. However if a filling/leveling compound is used, it must be of a Portland base compound (min. 3000 psi) with a high compressive strength. Concrete must be free of paint, oil, existing adhesives, wax, grease, dirt, sealers, and curing compounds. These may be removed chemically or mechanically, but do not use solvent based strippers under any circumstances. Residual solvents can prohibit the satisfactory bonding of flooring adhesives. It is important to ensure a proper bond between the adhesive and the concrete and the planks. GRATO products may be installed on grade, above grade, as well as below grade where moisture conditions do not exist. To ensure a long lasting bond, make sure that the perimeter of the foundation has adequate drainage and vapor barrier.

Lightweight concrete

Lightweight concrete that has a dry density of 1500kg or less per m3 (under 3000 psi) is not suitable for GRATO products. Many products have been developed as self-leveling toppings or floor underlayment. These include cellular concrete, resin-reinforced cement underlayment and gypsum-based materials. Although some of these products may have the necessary qualifications of underlayment for wood flooring installations, others do not. To test for lightweight concrete, scrape a coin or key across the surface of the subfloor. If the surface powders easily or has a dry density of 1500kg or less per m3 (under 3000 psi), do not install GRATO flooring products.

Wood subfloors

Wood subfloors need to be well nailed or secured with screws. Nails and screws need to be counter sunk. The wood subfloor needs to be structurally sound (meaning subfloors without loose boards, vinyl, tiles, or loose OSB board or plywood), flat 3/16" in a 10' radius and dry. It should not exceed 12% moisture prior to installation. If the subfloor is single layer, less than 5/8" thick, add a single cross layer for strength and stability 3/8" thick for a total 1' thickness. For glue down installations wood subfloors must be free of paint, oil, existing adhesives, wax, grease, dirt and urethane, varnish etc. Underlayment grade OSB is also a suitable subfloor. Particleboard is not an acceptable subfloor for glue down installation, but can be used as a subfloor in floating installations.

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When installing over existing wood flooring, install at right angles to the existing floor.

Subfloor moisture check

The recommended wood flooring adhesive may be used for above, on, and below grade applications. All grade level applications are susceptible to moisture and should be tested for moisture prior to installation in several locations within the installation area. Acceptable conditions for above, on, and below grade installations are:

- Less than 1.25kg (3.0 lbs.) / 90m² (1000 sq. ft.) /24 hrs. In accordance with ASTM F - 1869 (calcium chloride testing for concrete).
- Less than or equal to 75% relative humidity in accordance with ASTM F- 2170 (relative humidity testing for concrete).
- No greater than a reading of 4.5 on a Concrete Moisture Encounter (moisture meter).

(Concrete Moisture Encounter meters should only be used as a method of searching out areas that may contain excessive moisture and should not be used to determine concrete readiness).

- Wood Substrates must have a moisture reading of less than 12% when using a Tramex, Delmhorst or equivalent moisture meter.

To correct any subfloor problems concerning moisture, either wait until the subfloor dries to meet specifications or use an appropriate moisture barrier.

Subfloors other than wood or concrete

Note: Perimeter glued resilient vinyl and rubber tiles are unacceptable underlayment and must be removed. Terrazzo, tile and any other hard surfaces that are dry, structurally sound and flat, as described above, are suitable as a subfloor for installation of GRATO products. As above, the surface must be sound, tight and free of paint, oil, existing adhesives, wax, grease and dirt. Terrazzo and ceramic tile must be sanded to assure adhesion. **WARNING!** Do not sand existing resilient tile, sheet flooring, backing, or felt linings. These products may contain asbestos fibers that are not readily identifiable. Inhalation of asbestos dust can cause Asbestosis or other serious bodily harm. Check with local, state and federal laws for handling hazardous material before attempting the removal of these floors.

Installation information sealers, and curing compounds.

These may be removed chemically or mechanically, but do not use solvent based strippers under any circumstances. Residual solvents can prohibit the satisfactory bonding of flooring adhesives. It is important to ensure a proper bond between the

adhesive and the concrete and the planks. GRATO products may be installed on grade, above grade, as well as below grade where moisture conditions do not exist. To ensure a long lasting bond, make sure that the perimeter of the foundation has adequate drainage and vapor barrier.

Radiant heated subfloors and subfloor cooling.

Use of an in floor temperature sensor as well as a separate thermostat for the individual room is required.

Preparation

Remove all transitions and wall-base and undercut all door casings with a hand or power jam saw using a scrap piece of GRATO Flooring as a height guide.

Racking the floor

Whether you choose to install the floor by the glue down method or floating, start by cutting four to five planks in random lengths, differing by at least by 24". As you continue working across the floor be sure to maintain the 24" minimum between between end joints on all adjacent rows to ensure a random pattern with no detectable pattern. (See Figures 2 & 3). Never waste material; use the left over pieces from the fill cuts to start the next row or to complete a row.



Figure 2



Figure 3

Note: When installing be sure to blend the wood from several bundles to ensure a good grain and shading mixture throughout the installation. Allow for a 15mm (5/8") expansion gap all around the room. Never strike the surface with a hammer or such, as this can damage the finish.

Recommended subfloor surfaces

Glue-down

- 11/16", plywood or OSB.
- Acoustic concrete minimum 3000 psi.
- Acoustic cork underlayment.
- Ceramic, terrazzo, slate and marble.
- Concrete slabs.
- Existing solid wood flooring.

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- Preferred: 11/16" CDX grade plywood or 11/16" OSB PS2 rated: underlayment, Minimum: 5/8" CDX grade plywood.
- Vinyl, resilient tile, cork flooring.

Floating

- Concrete slabs.
- Acoustic concrete minimum 2000 psi.
- 11/16" plywood or OSB.
- Existing solid wood flooring.
- Vinyl, resilient tile, cork flooring.

Glue down installations guidelines applicable for both 3/4" and 5/8" Grato flooring

Additional tools & material needed:

Bona Kemi R851 Urethane Flooring Adhesive (non water based), adhesive or equal with recommended trowel, Moisture primer for below grade applications. Clean White Rags, Mineral Spirits/ Urethane.

Adhesive Remover, Adhesive Trowel, Straight Edge.

Step 1 – Layout the job

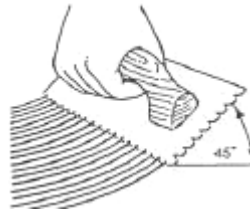
Select a starter wall. It is recommended to start on the longer wall in the room, but check for squareness and make adjustments as necessary. Where possible, lay the flooring at 90° angle to the floor joists. Measure out from the wall the width of two planks plus 3/8" this leaves a 5/8" expansion space when the last board is installed) and mark at each end of the room and snap your chalk line. Secure a straight edge to the subfloor on the chalk line. The straight edge provides a stationary point to push against so flooring doesn't move during installation. This is a critical part of the installation.

Step 2 – Spreading the adhesive

Using the recommended trowel at a 45° angle (See Figure 4) to get the correct adhesive spread rate to insure a proper and permanent bond. Improper bonding can cause loose or hollow spots. Spread adhesive from the straight edge out about 750mm (3').

Working in small sections is helpful as it will allow you to reach across the adhesive to install the flooring without putting any weight on it and will ensure proper transfer of the adhesive to the GRATO Flooring.

Note: Change the trowel every 2000 ft² to 3000 ft² due to wear down of the notches. This assures you always get the proper adhesive spread rate.



Step 3 – Install your starter row

Install the first row of starter planks with the tongue side of the plank facing the straight edge and secure into position. Once the starter row is secure, continue with the installation. Never spread more adhesive

than can be covered using the open time recommendation of the adhesive manufacturer. Never lay GRATO Flooring products further than you can comfortably reach. Place tongue into groove and press firmly into adhesive. Put weight on the glued surface for 24 hours after being glued into place using at least a 20kg weight per m². Never slide a GRATO flooring products through adhesive. Test for proper bond by occasionally lifting a board and looking for good adhesive transfer (90%), then replace it into the adhesive. Clean any adhesive off the flooring surface before it cures.

Note: Use caution when using a rubber mallet to butt material together, as it can burnish the finish and cause marring. Avoid working on top of the GRATO Flooring when installing with the glue down method.

Step 4 – Job completion, Final touches

Once the last row is installed, allow the adhesive to dry overnight or per adhesive manufacturer's instructions. Remove the straight edge and install the two rows to the starting wall. The row closest to the wall will need to have the tongue removed and may need to be scribed to maintain the 5/8" expansion space. Install the proper trim molding at the doorways for transition and along the walls to cover the expansion space. Clean your floor using a vacuum cleaner or fine sweep clean.

Floating installation guideline, applicable for both 5/8" 3/4"

Additional tools & material needed:

PVAC wood glue. Wood or plastic spacers 5/8, Moisture barrier of 30/30/30 laminated craft paper or 15lb felt paper for wood subfloors or 6-8 mil Polyethylene for concrete subfloors, (0.15mm (6-8 mil), Resilient underlayment optional), Terry Cloth towels, 6 Mil Poly Plastic Sheeting, Foam underlayment, Tapping Block & Spacers

Step 1 - Subfloor preparation:

As part of your subfloor preparation, remove any existing

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base, shoe mold, or doorway thresholds. These items can be replaced after installation, but should be replaced in such a way to allow at least $\frac{5}{8}$ " expansion space around the perimeter of the room and at all vertical obstructions. All door casings should be notched out or undercut to allow $\frac{5}{8}$ " room for expansion and to avoid difficult scribe cuts. This is easily done by placing a piece of board on the subfloor as a height guide for your hand saw. Install a moisture barrier of 30/30/30 laminated craft paper or 15lb felt paper over the wood subfloor. Use 6-8 mil polyethylene for concrete subfloors. Install the moisture barrier parallel to the direction of the flooring and allow a 3" over run at the perimeter. Make sure each run overlaps the previous run by 6" or more. If using, install resilient underlayment parallel to the moisture membrane, following manufacturer's instructions.

Note: Some resilient underlayment contain a built in moisture barrier, eliminating the need for a separate moisture barrier. Always check that the perm rating of the resilient underlayment is compatible with the substrate you are covering (For concrete 13 or less. For wood greater than or equal to .7 or less than or equal to 50.)

Step 2 - Layout the job

Once the moisture barrier and the resilient subfloor underlayment (if used) have been installed over the subfloor, the jobsite is ready for installation of the GRATO flooring. Never open the bundles until ready to start the installation process.

At the starting wall establish a $\frac{5}{8}$ " expansion space along side and end walls (Figure 5) with the use of wood spacers.



Figure 5

If the starting wall is out of square, it is recommended the first row of boards be scribed to allow for $\frac{5}{8}$ " of expansion and a straight working line.



Figure 6

Please refer to section 'large surface areas' for more information about installation in large areas.

Step 3 - Installation, side and end gluing.

The GRATO flooring must be fully side and end glued using PVAC glue. Fully apply a glue line on top of the tongue. (Figure 7).



Figure 7

Fully glue every end joint, also by application on top of the groove (or on top of the tongue). If any excess glue squeezes up to the finished surface, wipe off

using a paper towel or cloth. Install the first row using the appropriate expansion space with the groove side facing the wall (Figure 5).

The subsequent rows are installed, side and end glued, tap together with a hammer and tapping block to prevent damage to the protruding tongue (Figure 8).



Figure 8

The tapping block should be against tongue only. Use only the flat side of tapping block against tongue. Do not tap on groove side of GRATO

flooring as this will cause damage! Check for tight fit on sides and ends. Stagger 600mm (24") between end joints of adjacent board rows (see Figure 2 & 3) end joints should not repeat visually across installed floor. Never install without some end joints in the floor.

Step 4 - Installing the last row, final touches

Most often the last row does not fit in width. When this occurs, follow this simple procedure: lay a row of boards, unglued, tongue toward wall, directly on top of last installed row (Figure 9).

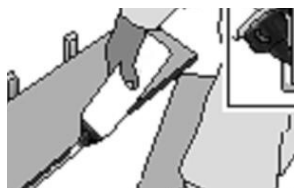


Figure 9

Take a short piece of board with the face down and the tongue side against the wall. Draw a line with a pencil along the row moving down the wall.

The resulting line gives the proper width for the last row which, when cut, can then be wedged into place using a pry bar. Make sure when the installation is complete that spacers are removed and the expansion space is covered with an appropriate molding. Always attach the trim to the wall or vertical object and never to the GRATO boards. Clean your floor using a vacuum cleaner or fine sweep

Radiant Heat Applications must meet or exceed all of the requirements in all of the previous sections

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Specifications for laying parquet on floors with air-conditioning systems (heating, cooling)

General

This section of the standard applies to underfloor heating and cooling systems, which include in the installation pipes of various materials (usually plastics) embedded in mortars of various kinds through which hot or cooling liquids are forced to pass.

Other radiant floor systems such as “radiant wire”, “radiant plates”, “radiant foil” and similar systems are excluded from the application of this standard.

Recommended parquet laying systems

The most suitable parquet laying system for underfloor heating installations is glued-down parquet, as it is the most efficient in heat transmission.

For the rest of the systems, the instructions of the manufacturer of the woodflooring should be taken into account.

General recommendations

Glue-down installation is recommended if the thickness of the parquet is greater than 15 mm.

It is recommended to use wood with a density greater than or equal to 550 kg/m³.

Moisture of the screed.

Drying protocol In cement mortar screeds in accordance with section 5.2.1, the moisture content of the screed must be less than 2%.

For anhydrite screeds complying with 5.2.2, the moisture content of the screed should be less than 0.5%.

To force the screed to dry, the radiant heating system itself may be used, following the system manufacturer's instructions for start-up, maintenance and shut-down. In the absence of these, the following protocol can be applied:

- the system is started up and the temperature is gradually increased at intervals of 2°C to 3°C per day for one week, until the normal temperature regime of the system is reached;
- maintain for another week at this temperature until complete drying of the screed;
- the system temperature is progressively reduced at

intervals of 2°C to 3°C per day until it is finally shut down.

Once the drying protocol has been completed, parquet installation work should begin within a maximum of 48 hours, as the screeds are hygroscopic and can absorb moisture again.

NOTE 1 Laying work should not commence until the screed has reached room temperature.

NOTE 2 It is recommended to combine the start-up of the heating system with intermittent ventilation of the room.

Some methods of measuring the moisture content of the mortar “in situ” are destructive or potentially dangerous to the integrity of the underfloor heating pipe system. For this reason, the measurements should be made at points where “witnesses” have previously been left where these measurements can be made without risk of damage to the system piping. These measurements should be made with a carbide hygrometer.

Screed thickness

The thickness of the screed should be the thickness necessary for proper operation. In any case, a minimum thickness of 30 mm counted above the conduction pipes of the system is recommended.

Thermal resistance of the parquet and sub-layers

The thermal resistance of the parquet and sub-layers as a whole, i.e. of all the covering or support materials above the radiant floor screed, should be a maximum of 0.17 m² °C/W (square meter degree Celsius/Watt).

Operating temperature

The power of the system should be regulated in such a way that at no time does the temperature on the surface of the parquet exceed 27 °C.

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Installation information

Before installation

The heating system should be run at 2/3 of maximum output for a minimum of 2 weeks to allow any remaining moisture to evaporate, attaining its final moisture content without causing damage. Three or four days before installation, the heating system must be reduced to a suitable temperature (about 18c/64f).

Caution: Select fastener length wisely so as to not penetrate the heating element or hydronic pipes.

After Installation

Approximately 2 days after installation is complete, gradually (over a period of 1 week) raise the temperature of the heating system to its desired operating level.

Life cycle

Surface Temperature of flooring should never exceed 81 degrees F/27 degrees C. Exceeding this temperature will void any related warranty by the flooring manufacturer. Most under-floor heating systems DO NOT have a humidification system. Add humidification as necessary to maintain humidity levels between 40%-65%.

Do

- Maintain indoor relative humidity between 40% and 65%. If this preventive measure is not kept, the GRATO can crack, split, discolor, crook, bow and delaminate.
- Use felt leg protector pads under all furniture legs.
- Replace narrow, hard furniture rollers with wide rubber ones.
- Wipe up spills immediately.
- Use a dolly, rolled over plywood when moving heavy objects.
- Apply (slip resistant) runners or area rugs on high traffic areas.
- Use (slip resistant) door mats, to keep abrasives as dirt, grit and sand off the floor.
- Protect the floor from direct sunlight.
- Move area rugs occasionally as they block sunlight and may give the appearance of discoloring under the rug.

Don't

- Allow water to stand on the floor.
- Walk on the floor with any hard and/or sharp object protruding from the sole.
- Use cleaning products that are abrasive or contain alkaline, ammonia, bleach, soap, citrus
- Let furniture stand on the floor on small hard legs.



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