Installing NOFMA-Certified Solid Wood Flooring Directly To A Slab Using A Wood Flooring Adhesive

The following recommendations and instructions apply to "on grade" and "above grade" slab construction. "Below grade" application of solid wood flooring is not recommended.

OVERVIEW

Historically, NOFMA has not recommended glue-down application of wood flooring to a concrete slab. The basis for this position has been that NOFMA standards for wood flooring manufacture assume the flooring will be installed on wood based subflooring systems with mechanical wood fasteners, nails, cleats, staples, etc. Today, building homes on concrete slabs is the normal construction technique in many areas of the country.

In recent years, advancements in adhesive technology and moisture retarders have made it possible to successfully glue solid wood flooring to concrete slabs in situations other than parquet applications. A concrete slab does not behave the same way as a traditional wood system, particularly with respect to nailing. In addition, a slab can be a potential moisture source and adversely affect the performance of the flooring in dramatic fashion. As such, glue-down applications require the installer to take additional steps to ensure success. Still, some wood flooring manufacturers may not approve of direct glue down application of their solid wood products. As such you should always follow the instructions and limitations published by the manufacturer. When in doubt, NOFMA recommends checking with the manufacturer prior to installation.

SUITABLE WOOD FLOORING PRODUCTS

NOFMA-certified solid wood flooring is manufactured to NOFMA's precise specifications for moisture content, configuration, stated grade, and average length. Some of these factors will affect how solid wood flooring performs in a glue-down application. As such, these instructions apply **only** to NOFMA-certified products. Furthermore, because glue-down applications are intrinsically not the same as traditional applications using wood fasteners, the installing contractor should expect some pieces of NOFMA-certified solid wood flooring to be unacceptable for glue-down due to bow, crook, or lack of flatness. Those pieces should be retained and utilized in a traditional wood fastener installation.

These installation recommendations address solid strip and plank flooring up to five inches in width. NOFMA does not recommend gluing down solid wood flooring that is wider than five inches.

ESTABLISHING CUSTOMER EXPECTATIONS

Informing and educating the consumer about proper expectations will result in a more satisfied customer. The customer should expect adhesive applied solid wood floors to perform similarly to nail down floors in regard to expansion and shrinkage and related cupping and gaps, etc. The following additional issues might be expected in an acceptable adhesive application:

- Occasional minor gaps to 3/64" wide resulting from crooked pieces may be present at installation
- Occasional slight seasonal cupping of wider widths (3-5") is acceptable

The traditional nail down application for installing NOFMA-certified flooring is successful for all flooring pieces, including those pieces with significant bow, crook, and twist. Even the exceptional piece can be used if modified by cutting. As such, NOFMA standards for manufacture allow for such characteristics. Further, moisture changes that affect flooring after manufacture can result in pieces that are not straight or pieces that had been slightly crooked at manufacture to become more crooked. These pieces may make up a significant percentage of the product at the jobsite and are not considered defective pieces.

However, the nature of an adhesive application is that "wet" adhesive will not hold or position boards with bow, crook, or twist in the same manner that mechanical fasteners will. For this reason, pieces that are not sufficiently straight or flat may not be suitable for the direct glue-down method of installation. As previously mentioned, the installing contractor should expect some solid wood flooring pieces to be unusable in a glue-down application. Those pieces should be retained for later use in a traditional nail down installation.

Directions For Installation

Always read and follow the instructions provided by both the flooring manufacturer and the adhesive manufacturer.

Because the solid wood flooring will be in contact with the concrete slab, a potential moisture source, attention to detail cannot be emphasized enough. Proper handling and storage, jobsite conditions, and installation technique are all critical to providing a properly performing floor. Follow the manufacturers' directions precisely. TAKE NO SHORTCUTS.

HANDLING AND STORAGE

All flooring should be acclimated to the expected average area environmental condition before installation begins. When seasonal or dry environmental conditions prevent acclimation to an expected higher average moisture content, field expansion gaps should be provided during installation. When seasonal site environmental conditions prevent proper acclimation to an expected lower average moisture content, drying by dehumidification may be necessary prior to installation. KNOW YOUR WOOD SPECIES. The proper size and frequency of field expansion gaps are dependant on the wood species and average moisture content at installation. Adjust as necessary.

JOB SITE CONDITIONS

A near occupied environment should be established for at least five days before any moisture tests are performed. These environmental conditions associated with occupancy must be maintained throughout testing, installation of flooring, and post installation until actual occupancy.

SLAB REQUIREMENTS

The slab must:

- **Be properly designed and placed**– The slab should be at least four inches thick and it should have a vapor retarder beneath it. It should also have a minimum compressive strength of 2500 psi.
- **Be clean**– all foreign materials such as oil, asphalt, sealers, paint, loose materials, plaster/drywall compound, etc., which can interfere with adhesion or flatness must be removed.
- **Be flat**– maximum allowed variation is $^{3}/_{16}$" in 10 feet. All variation must be gradual.
- **Be smooth**– with a steel trowel or light broom finish. The slab surface should not flake or dust.

- **Be dry**– slabs less than 60 days old are generally too wet for wood flooring installation. As a general condition use the poly film test, or rubber mat test, to check for excessive moisture. Water droplets, clouding of the poly film, or a darkened area under the rubber mat shows excessive moisture is present. Any further test(s) for moisture should be in accordance with the adhesive/wood manufacturer's instructions.

Operations such as bead blasting or scarifying the slab may be required by the adhesive manufacturer, check the manufacturer's instructions.

Test the slab for alkalinity with phenolphthalein, litmus paper, or PH meter. Excessive alkalinity as defined by the adhesive manufacturer can affect the performance of the adhesive.

Do not begin installation until proper conditions have been met and all inadequacies have been remediated. Where the potential for high moisture conditions exists, use a vapor retarder compatible with the adhesive system. Even in optimum conditions with the unexpected occurrence of temporary high moisture or unusual environmental conditions this type of retarder should be considered as a safeguard to ensure good performance of the wood flooring.

INSTALLATION PROCEDURES

Maximum flooring width is five inches. Wood flooring that is wider than five inches will have more pronounced dimensional changes with changes in moisture content and therefore is not recommended for use in a glue-down system. There is no maximum length limit for individual pieces.

Maximum flooring thickness is 3/4".

Layout: Typical flooring direction is parallel with the longest dimension of the room/space. Proper layout should accommodate irregularities in squareness of room dimensions. When excessive conditions are found that are not square, flat, etc., all involved parties should share in the decision for remediation.

Establish a starting/working line and attach a sacrificial starter row securely to the slab precisely along this line. Choose only straight product for this starting row.

Follow adhesive manufacturer's instructions for applying adhesive. This will include trowel size, environmental condition, trowelling technique, flash time, working time, etc. If the adhesive manufacturer's environmental requirements differ from those described in this Technical Publication, NOFMA recommends following the more stringent of the two requirements.

Select only straight boards (boards without bow, crook, twist) for the first five to eight runs/rows and the final five to eight runs.

Additional "in-the-field" boards should be sufficiently flat and straight. Boards that will "hand rack" (rack together without attachment), so that any out of plane boards are positioned flat by the adjacent boards, are generally acceptable. The rack should include four or more runs. Typically, boards with excessive crook of more than 3/64" in 48" and or excessive bow or twist should not be installed. Boards that cause the rack to lift, hump, or result in excessive gapping, should not be installed by this method.

Slightly crooked boards resulting in the occasional edge gap up to 3/64" wide are acceptable. The gaps should not be a prominent recurring feature and will generally be properly filled during finishing.

Applying tape across multiple runs to maintain board position after wet-lay installation may be necessary. Check with adhesive manufacturer for tape selection and frequency recommendations. Strapping areas together is

generally not recommended as the angle relief along the edge of NOFMA configured flooring can direct an upward pressure and lift boards.

Periodically (every 4-5 runs) check for adhesive coverage and bond by removing an installed piece. Coverage should be 95% or greater on the back of the board and the adhesive should be equally distributed between the board and the slab.

When installation has been completed to the wall line, remove the sacrificial run and install the final section. Be sure to maintain continuous tongue and groove engagement and leave a 3/4" expansion gap at all wall lines.

Follow the adhesive manufacturer's instructions for rolling, tape removal, when general traffic can walk on the flooring, and when finishing can proceed. Typically, finishing should be delayed for one to three weeks to allow more complete in-place acclimation of the flooring.

It is critical that the proper environment continues to be maintained through finishing and until normal occupancy.

GLUING WOOD ON WOOD

A corollary to this directive for gluing wood flooring to a slab is the possibility of installing wood flooring directly to a wood subfloor with a full-spread, troweled adhesive. Because wood flooring adhesives are stronger than the wood fiber units, damage to the subflooring can be expected when boards must be removed.

Therefore, applications over a plywood on slab system or a conventionally framed subfloor and wood joist system should carry the following cautions:

- Repair of individual board(s) will likely result in damage to the subflooring.
- As the area to be repaired increases, significant subflooring damage can result.
- Complete replacement of the wood flooring will likely result in the need to replace a significant number of subfloor panels and/or necessitate modification to the primary framing to maintain platform integrity, particularly at wall lines.

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