A floating floor tile installation and method of manufacturing the tile installation are provided. The floating floor tile installation contains tiles bonded together with a polymeric grout on an underlayment. The tile installation provides for a fast and economic method of installing a floating tile floor over an existing floor.
INSTALLATION COMPRISING A POLYMERIC GROUT FOR BONDING TILES TO EACH OTHER AND AN UNDERLAYMENT TO PRODUCE A FLOATING FLOOR AND METHOD OF MANUFACTURE

TECHNICAL FIELD

[0001] The present disclosure relates to a floating floor tile installation comprising tiles bonded together with polymeric grout on an underlayment. The tile installation provides for a floating floor over an existing floor. The disclosure also relates to a method of manufacturing the tile installation. The tile installation provides for a fast and economical method of manufacturing a floating floor over an existing floor.

BACKGROUND

[0002] Conventionally, floor tiles are installed by mortaring tile directly onto a wood or cement floor and then grouting the tile with a cementitious grout. In many applications, a cementitious backer-board is first applied to the floor followed by mortaring the tile to the cementitious backer-board. This conventional process of laying floor tile is time-consuming and labor intensive. As a result, conventional tile floors are expensive to install owing to high labor costs. In addition, water-based cementitious mortars and grouts can not be used with flooring and tiles that are adversely affected by moisture. For example, flooring made of water swellable materials such as particle board can not be easily used with water-based cements. In addition, certain types of colored marble tiles swell when exposed to water and would not be usable with a water-based mortar or grout.

SUMMARY

[0003] The present disclosure relates to a floating floor tile installation and a method of manufacturing the tile installation. The tile installation comprises at least two tiles bonded together with a polymeric grout on an underlayment. The present disclosure also relates to a method of manufacturing the tile installation. The method comprises placing an underlayment over an existing floor and placing at least two tiles separated by a space on the underlayment. Next an uncured polymeric grout is applied in the space between
the tiles and the uncured polymeric grout is then stuck to contour and then the polymeric grout is allowed to cure to form the tile installation.

[0004] The floating floor tile installation is simple, fast and economical compared to conventional tile installations. For example, the tile installation can be walked on within 2 to 6 hours depending upon the polymeric grout used. This is much faster than using conventional techniques which can take days before the tile can be put into service. The tile installation can be manufactured where water-based installation methods are prohibited. In addition, the tile installation can be completely waterproof. The polymeric grout of the disclosed tile installation has much higher strength and flexibility than conventional cement grout. This provides for less unwanted cracking by isolating the floating tile floor from subfloors with high load movement.

[0005] Other modes and various advantages of the present disclosure will become readily apparent by those skilled in the art from the following detailed description, where it is shown and described only in the preferred embodiments, simply by way of illustration of the best mode. As will be realized, the disclosure is capable of other and different embodiments and its several details are capable of modifications in various obvious respects, without departing from the disclosure. Accordingly, the description is to be regarded as illustrative in nature and not as restrictive in scope.

**BRIEF DESCRIPTION OF THE DRAWINGS**

[0006] Figure 1 - Picture showing particle board flooring used to simulate existing flooring in the example.

[0007] Figure 2 - Picture showing particle board covered with 4 mil LDPE flexible water proof plastic sheet as an underlayment. Picture also shows optional pressure sensitive patches used to hold the tiles in place during installation.

[0008] Figure 3 - Picture showing optional tape used to expedite clean-up after applying the polymeric grout between the tiles.

[0009] Figure 4 - Picture showing optional decorative particles (sand) applied to uncured polymeric grout.
DETAILED DESCRIPTION AND VARIOUS MODES

[0018] The tile installation comprises at least two tiles bonded with a polymeric grout and an underlayment which together form a floating floor. The underlayment can be any material that can be placed between an existing floor and a tile material. Typically, the underlayment can be a rigid material, a flexible material or an adhesive material. More typically, the underlayment is a moisture barrier. Optionally, the tiles may be bonded to the underlayment with an adhesive or an adhesive tape. Any tile material usable for flooring may be utilized in the tile installation.

[0019] The polymeric grout used to bond the tiles can be any type of curable polymeric material that can be applied between the spaces of the tiles. Typically, the polymeric grout has higher strength, as measured by pounds of flex at the yield point using ASTM C-580, than conventional grout. For example, the polymeric grout has from about 1,000 to about 3,000 pounds of flex at the yield point compared to standard grouts which have flexural strengths of about 400 to about 600 pounds of flex at the yield point. More
typically, the polymeric grout has from about 1500 to about 2500 pounds of flex and the yield point. Typically, the polymeric grout is non-porous, water-proof, mildew resistant and stain resistant.

[0020] Non-limiting examples of the underlayment include plywood, wood particle board, wood planking, cement, a foam sheet, a fiber glass sheet, plastic sheet, a metal sheet, a composite sheet and an adhesive layer. Smaller sections of underlayment can be utilized and joined together to form a larger section.


[0022] Typical composite sheets include a polymeric resin and a fibrous material. The polymeric resin typically includes polyester resin, epoxy resin, urethane resin, polysulfone resin, polyphenylsulfone resin, polyether sulfone resin, polyphalamide resin, polyphenylene sulfide resin, aromatic polyketone resin, polyamide-imide resin, polycarbonate resin, styrenic resin, ABS resin, acrylic resin, PET resin and combinations thereof.

[0023] The fibrous material utilized in the composite sheets typically includes synthetic fibers such as but not limited to fiber-glass, carbon fiber, polyethylene fiber, polypropylene fiber, nylon fiber, polyester fiber, and polyamide fiber and natural fibers such as but not limited to hemp, cotton fiber, linen fiber, wool fiber, and combinations synthetic and natural fibers thereof.

[0024] In addition to polymeric resin/fibrous material composites, cementitious material/fibrous material composites can be utilized. The cementitious materials can be any type of material containing cement in the formulation. The fibrous materials can be any of those listed above for the polymeric resin/fibrous material composites.
The underlayment may also include an adhesive material laid down on the existing floor as a layer. The adhesive material typically includes Plioseal®, epoxies and urethanes.

The floating floor tile installation contains tiles which typically include ceramic tile (Figures 5, 6, 11 and 12), porcelain tile, terra cotta tile, marble tile (Figure 15), concrete tile, slate tile (Figure 14), granite tile, wood tile, glass tile (Figures 9 and 10), metal tile, plastic tile, engineered stone tile (Figure 13) or combinations thereof.

The polymeric grout used to bond the tiles of the floating floor tile installation is not limited and includes any structural adhesive that provides sufficient strength to the tile installation. Typically, the polymeric grout provides strength as measured by pounds of flex at the yield point as measured by ASTM C-580. Typically, the polymeric grout provides about 1,000 to about 3,000 pounds of flex at the yield point, and more typically, about 1500 to about 2500 pounds of flex at the yield point. The polymeric grout is typically non-porous, water-proof, mildew resistant and stain resistant.

The polymeric grout typically contains a urethane, an epoxy, a polyester, an acrylic and combinations thereof.

The tile installation optionally contains decorative particles covering and bonded to the polymeric grout or dispersed into the polymeric grout. The decorative particles can be any type of material that can be used in flooring. The decorative particle is applied to the uncured polymeric grout and is bonded to the grout after the grout is cured. The decorative particles typically include natural materials such as sand, minerals, crushed stone, crushed shell, metal flake, titanium dioxide and natural pigments and synthetic materials such as ceramic and ceramic coated particles, crushed glass, synthetic pigments and cured resin particulates such as polyester flake, and combinations of natural and synthetic materials thereof.

The floating floor tile installation is typically manufactured by placing an underlayment over an existing floor then placing at least two tiles separated by a space on the underlayment. Next, a polymeric grout is applied into the space between tiles and the polymeric grout is optionally struck and then allowed to cure producing the tile installation as a floating floor. The tiles may be optionally placed onto the underlayment.
with a spacer to insure uniform spacing between the tiles. In addition, the tiles may be bonded to the underlayment with an adhesive or adhesive tape prior to applying the polymeric grout. Decorative particles may also be applied to the polymeric grout after applying the grout into spaces between the tiles. The particles are applied before the grout completely cures. The particles are then bonded to the polymeric grout after the grout cures. In order to expedite clean-up, the tiles may be protected with a tape or film prior to applying the polymeric grout into the space between the tiles. The tape or film is then removed before the polymeric grout cures leaving a clean finish. An alternative method to ease clean-up is to protect the tile surface with a release agent prior to applying the polymeric grout. After the polymeric grout has partially cured, excess grout may be peeled from the surface of the tile and the tile cleaned with a suitable solvent to remove the release agent. Alternatively, the release agent can be applied as a water-based coating on to the tile surface prior to applying the uncured polymer grout, then allowing the water to evaporate to provide a tack-free protective coating and the peeling off the coating with a scraper after the polymeric grout is cured.

[0031] The following examples are for illustrate purposes only and are not intended to limit the scope of the claims.

[0032] A floating tile floor installation was manufactured using a plastic sheet moisture barrier as an underlayment and a structural adhesive as a polymeric grout. First, an approximately 16 FT² section of particle board nailed to 2 x 4" studs was constructed (Figure 1). Next, the particle board was covered with a water proof plastic 4 mil LDPE sheet as a water proof underlayment. PLIOSEAL 3" rubber splice tape pressure sensitive patches were then applied to the plastic sheet to hold the tiles in place (Figure 2). Prior to placement on the underlayment, the tiles were taped with protective, removable tape to aid in clean up after the polymeric grout is applied. Next, 16 - 1 FT² glazed ceramic tiles were placed onto the underlayment with a space between the tiles using the pressure sensitive tape to hold the tile in place (Figure 3). Next, a 2-component urethane adhesive (polymeric grout) was mixed and applied between the tiles using a disposable plastic grout bag. Alternative methods of application include dispensing the polymeric grout from a cartridge using a dispensing gun or floating the polymeric grout into the space between the tiles as with cementitious grout and cleaning the tile surface.
with an appropriate solvent. (This method was used to produce the tile installations in Figures 9, 10, 11 and 12.) The 2-component urethane polymeric grout was formulated as shown in Table 1. The polymeric grout was then struck and a decorative sand (zircon sand, lake sand or silica sand) was applied to the uncured polymeric grout (Figure 4). Before the polymeric grout completely cured, the tape was removed. After 4 hours, the polymeric grout cured sufficiently to remove excess decorative sand and the tile could then be walked on (Figure 5). The decorative sand gives the appearance of cementious grout (Figure 6). The finished tile installation is strong enough to support itself in a vertical position (Figures 7 and 8). With the high strength of the finished tile system, preformed tile sections can be prepared and installed as if they were individual tiles using the method described.

Table 1. Polymer grout (2-component urethane) formulation used in the example

<table>
<thead>
<tr>
<th>Material</th>
<th>Weight %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methylene phenylene isocyanate</td>
<td>35.0</td>
</tr>
<tr>
<td>Urethane prepolymer</td>
<td>19.0-23.0</td>
</tr>
<tr>
<td>MDI Homopolymer</td>
<td>12.0-16.0</td>
</tr>
<tr>
<td>Calcium sodium aluminosilicate</td>
<td>8.0-12.0</td>
</tr>
<tr>
<td>Talc</td>
<td>8.0-12.0</td>
</tr>
<tr>
<td>Urethane prepolymer</td>
<td>3.0-7.0</td>
</tr>
<tr>
<td>Amorphous silica</td>
<td>2.0-6.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Material</th>
<th>Weight %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polyether polyol</td>
<td>39.0-43.0</td>
</tr>
<tr>
<td>Polyol</td>
<td>25.0-29.0</td>
</tr>
<tr>
<td>Talc</td>
<td>21.0-25.0</td>
</tr>
<tr>
<td>Urethane prepolymer</td>
<td>1.0-5.0</td>
</tr>
<tr>
<td>Clay</td>
<td>1.0-5.0</td>
</tr>
<tr>
<td>Amorphous silica</td>
<td>1.0-5.0</td>
</tr>
<tr>
<td>Quartz</td>
<td>0.1-0.9</td>
</tr>
</tbody>
</table>

[0033] The term "comprising" (and its grammatical variations) as used herein is used in the inclusive sense of "having" or "including" and not in the exclusive sense of "consisting only of. The term "a" and "the" as used herein are understood to encompass the plural as well as the singular.

[0034] The foregoing description illustrates and describes the present disclosure. Additionally, the disclosure shows and describes only the preferred embodiments of the disclosure, but, as mentioned above, it is to be understood that it is capable of changes or modifications within the scope of the concept as expressed herein commensurate with the
above teachings and/or skill or knowledge of the relevant art. The embodiments described hereinabove are further intended to explain best modes know of practicing the invention and to enable others skilled in the art to utilize the disclosure in such, or other, embodiments and with the various modification required by the particular applications or uses disclosed herein. Accordingly, the description is not intended to limit the invention to the form disclosed herein. Also, it is intended that the appended claims be construed to include alternative embodiments.

[0035] All publications, patents and patent applications cited in this specification are herein incorporated by reference, and for any and all purposes, as if each individual publication, patent or patent application were specifically and individually indicated to be incorporated by reference. In the case of inconsistencies, the present disclosure will prevail.
We Claim:

1. A tile installation comprising an underlayment and at least two tiles bonded with a polymeric grout to produce a floating floor.

2. The tile installation as claimed in claim 1, wherein the underlayment is a rigid material, a flexible material or an adhesive material and wherein the underlayment is optionally a moisture barrier.

3. The tile installation as claimed in claim 1, wherein the at least two tiles bonded with a polymeric grout are bonded to the underlayment with a polymeric grout, an adhesive or an adhesive tape.

4. The tile installation as claimed in claim 1, wherein the at least two tiles bonded with a polymeric grout are not bonded to the underlayment.

5. The tile installation as claimed in claim 1, wherein the polymeric grout is non-porous, water-proof, mildew resistant and stain resistant.

6. The tile installation as claimed in claim 1, wherein the polymeric grout is at least one selected from the group consisting of a urethane grout, an epoxy grout, a polyester grout or an acrylic grout.

7. The tile installation as claimed in claim 1, wherein the at least two tiles are selected from the group consisting of ceramic tiles, porcelain tile, terra cotta tile, marble tiles, concrete tile, metal tile, plastic tile, granite tile, slate tile, wood tile, glass tile, engineered stone tile and combinations thereof.

8. The tile installation as claimed in claim 1, wherein the underlayment is at least one selected from the group consisting of plywood, wood particle board, wood planking, a metal sheet, cement, a fiber glass sheet, a plastic sheet, a foam sheet, a composite sheet and combinations thereof.
9. The tile installation as claimed in claim 8, wherein the underlayment is a composite comprising a polymeric resin and a fibrous material.

10. The tile installation as claimed in claim 9, wherein the polymeric resin is at least one selected from the group consisting of polyester resin, epoxy resin, urethane resin, polysulfone resin, polyphenylsulfone resin, polyethersulfone resin, polyphthalamide resin, polyarylamide resin, polyphenylene sulfide resin, aromatic polyketone resin, polyamide-imide resin, polycarbonate resin, styrenic resin, ABS resin, acrylic resin and PET resin.

11. The tile installation as claimed in claim 9, wherein the fibrous material is at least one selected from the group consisting of synthetic fibers such as but not limited to fiberglass, carbon fiber, polyethylene fiber, polypropylene fiber, nylon fiber, polyester fiber, and polyamide fiber and natural fibers such as but not limited to hemp, cotton fiber, linen fiber, wool fiber, and combinations synthetic and natural fibers thereof.

12. The tile installation as claimed in claim 1, wherein the underlayment is a composite comprising a cement material and a fibrous material.

13. The tile installation as claimed in claim 1, further comprising a decorative particle covering and bonded to or dispersed into the polymeric grout.

14. The tile installation as claimed in claim 13, wherein the decorative particle is at least one selected from the group consisting natural materials such as sand, minerals, crushed stone, crushed shell, metal flake, titanium dioxide and natural pigments and synthetic materials such as ceramic and ceramic coated particles, crushed glass, synthetic pigments and cured resin particulates such as polyester flake, and combinations of natural and synthetic materials thereof.
15. The tile installation as claimed in claim 2, wherein the underlayment is an adhesive and the adhesive is at least one selected from the group consisting of Plioseal®, urethane adhesives and epoxy adhesives.

16. A method of manufacturing the tile installation as claimed in claim 1, comprising:
   placing an underlayment over an existing floor;
   placing at least two tiles separated by a space on the underlayment;
   applying an uncured polymeric grout in the space between at least two tiles;
   optionally striking the polymeric grout to give a desired contour and allowing the uncured polymeric grout to cure to produce the tile installation as a floating floor.

17. The method of manufacturing the tile installation as claimed in claim 16, wherein a spacer is utilized to provide the space separating the at least two tiles.

18. The method of manufacturing the tile installation as claimed in claim 16, further comprising bonding the at least two tiles to the underlayment prior to applying the polymeric grout.

19. The method of manufacturing the tile installation as claimed in claim 16, wherein the underlayment and the at least two tiles are not bonded together.

20. The method of manufacturing the tile installation as claimed in claim 16, further comprising applying a decorative particle to the uncured polymeric grout in the space between the at least two tiles wherein the decorative particle is bonded to the polymeric grout after curing.

21. The method of manufacturing the tile installation as claimed in claim 16, further comprising taping or applying a flexible film to the surface of at least two tiles prior to applying the uncured polymeric grout and removing the tape or film after the polymeric grout is applied into the space between the at least two tiles before the polymeric grout cures.
22. The method of manufacturing the tile installation as claimed in claim 16, further comprising application of a release agent to the tile surface prior to applying the uncured polymeric grout and then removing the excess partially cured polymeric grout from the surface of the tile followed by removal of the release agent after the polymeric grout is completely cured.

23. The method of manufacturing the tile installation as claimed in claim 16, further comprising of preformed tile sections manufactured according to the method in claim 16.

24. The method of manufacturing the tile installation as claimed in claim 22, wherein the release agent is a water-based coating that is allowed to dry to provide a tack free protective coating release agent.