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**WOOD FLOORING INSTALLATION GUIDELINES**

- **SOLID 3” WIDTH OR GREATER - TROWEL/COVERAGE**
  - N/A
  - 3/16” x 3/16” x 3/16” (35 sq. ft. per gallon)

- **ENGINEERED**
  - N/A
  - 3/16” x 1/4” x 1/2” (65 sq. ft. per gallon)

- **ENGINEERED - MOISTURE & SOUND CONTROL - TROWEL/COVERAGE**
  - N/A
  - 3/16” x 1/4” x 1/2” (65 sq. ft. per gallon)

- **ENGINEERED - MOISTURE & SOUND CONTROL - TROWEL/COVERAGE**
  - N/A
  - 3/16” x 1/4” x 1/2” (65 sq. ft. per gallon)

- **SOLID & BAMBOO UP TO 5/8” (ADHESIVE, MOISTURE & SOUND CONTROL) - TROWEL/COVERAGE**
  - N/A
  - 3/16” x 1/4” x 1/2” (65 sq. ft. per gallon)

- **SOLID & BAMBOO UP TO 5/8” (ADHESIVE, MOISTURE & SOUND CONTROL) - TROWEL/COVERAGE**
  - N/A
  - 3/16” x 1/4” x 1/2” (65 sq. ft. per gallon)

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  - N/A
  - 3/16” x 1/4” x 1/2” (65 sq. ft. per gallon)
**SUBFLOOR PREPARATION**

All substrates must be clean, dry, structurally sound, properly cured and free of dust, dirt, oil, paint, old adhesives, wax, sealers and curing agents. When installing Titebond Premium or Titebond Ultimate adhesives, the substrate must be clean, free of dust, and moisture levels below 12%. Use of lightweight concrete or plywood subfloors require the use of Titebond Concrete primer or equivalent prior to application of adhesive.

**MOISTURE CONTROL SYSTEM INSTALLATION**

Titebond recommends the use of a moisture control system, like Titebond 731 ST or 331 PLUS, for concrete subfloors. Use of Titebond 531 or 331 PLUS over lightweight concrete and all gypsum-based materials requires the use of Titebond Concrete primer or equivalent prior to application of adhesive. Remove all existing base, also measuring and curing thresholds prior to the installation. Ventilation fans should be used to circulate air across the surface of the substrate after it has been applied to the subfloor to facilitate the drying process. This will help prevent a common time concern.

**WOOD FLOORING INSTALLATION**

Once the adhesive has cured, the wood flooring may be installed immediately into the wet adhesive. To reduce shipping, secure the first starter row with Titebond Tape (adhesive only method). Remaining planks must be placed firmly into adhesive. Panels which are not full size should be trimmed on adjacent planks. Allow the adhesive to remain in place for at least 24 hours. Wait at least one day before finishing the installation.

Adhesive installation of each Titebond product varies based on the adhesive technology. We recommend you review our website at Titebond.com for complete wood-flooring installation instructions using each adhesive. The chart below provides a general guide.

---

### TROUBLESHOOTING

1. **Buckling**

   - **Problem:** Wood flooring boards look as if they are raised at the end.
   - **Cause:** Inadequate spacing of cleats or staples, or incorrect adhesive type.
   - **Solution:** Reduce the growth that occurs after installation, and reduce the moisture content before installation.

2. **Crowning**

   - **Problem:** Excessively high moisture levels, severe humidity, extreme humidity, or use of wrong trowel or adhesive.
   - **Solution:** Allow the adhesive to cure and the floor to vent.

3. **Curving**

   - **Problem:** Floor boards are curved so much that they cannot be placed into the adhesive.
   - **Solution:** De-lamination occurred on the job site.

4. **Cupping**

   - **Problem:** Cupping had previously occurred, and flooring was sanded before the installation.
   - **Solution:** The floor is probably permanently damaged and the edges that are sanded may be sanded off. Floors may also cup due to rapid drying, and it is recommended that humidification be used.

5. **Endlifting**

   - **Problem:** Wood flooring boards look as if they are raised at the end.
   - **Cause:** Inadequate adhesive use, spacing or nailing, or incorrect adhesive type.
   - **Solution:** Increase the moisture content before installation.

6. **Gaping**

   - **Problem:** Spaces that appear between individual boards.
   - **Cause:** Filling/flattening compounds are used, and have a compressive strength in equal or greater than 350 psi when cured. Use of adhesive over lightweight concrete and all gypsum-based materials requires the use of Titebond Concrete primer or equivalent prior to application of adhesive.

7. **Moisture**

   - **Problem:** Floors are extremely sensitive to moisture. The floor is probably permanently damaged and the edges that are sanded may be sanded off. Floors may also cup due to rapid drying, and it is recommended that humidification be used.

8. **Squeaky / Loose Floors**

   - **Problem:** Wood flooring boards look as if they are raised at the end.
   - **Cause:** Inadequate adhesive use, spacing or nailing, or incorrect adhesive type.
   - **Solution:** Allow the adhesive to cure and the floor to vent.

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### WOOD FLOORING INSTALLATION

<table>
<thead>
<tr>
<th>INSTALLATION METHOD</th>
<th>323</th>
<th>801</th>
<th>811</th>
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</table>
1. GAPS

Problem - Spaces that appear between individual boards.

Causes:
- Trowel adhesion is too loose
- Wood is installed while it is still wet
- Cuts are created to adjust to a space

Solution - Trowel adhesion; let wood acclimate

2. CROWNING

Problem - Crown occurs when the center of the piece of flooring rises above the edges. This can be a temporary condition, and if the crowning is slight, the floor may remain well-adapted. This condition usually occurs when the floor is made of a single layer of wood, where the moisture content of the floor is not uniform. The problem can be caused by the floor being made of a single layer of wood, where the moisture content of the floor is not uniform.

Causes:
- Excessive moisture, flooding or extreme humidity fluctuations
- Uneven subfloor, or incorrect subfloor material
- Poor installation practices

Solution - Ensure the subfloor is properly prepared and installed, and that the moisture content of the floor is uniform.

3. SLOPE

Problem - Slope occurs in the direction in which the floor is being placed. This can be caused by the floor being made of a single layer of wood, where the moisture content of the floor is not uniform.

Causes:
- Use of wrong trowel
- Use of wrong adhesive
- Use of wrong base or subfloor material

Solution - Use the correct trowel, adhesive, base or subfloor material.

4. CURVING

Problem - Curving occurs when the floor is being placed in the direction in which the floor is being placed. This can be caused by the floor being made of a single layer of wood, where the moisture content of the floor is not uniform.

Causes:
- Use of wrong trowel
- Use of wrong adhesive
- Use of wrong base or subfloor material

Solution - Use the correct trowel, adhesive, base or subfloor material.

5. BUCKLING

Problem - Buckling occurs when the floor is being placed in the direction in which the floor is being placed. This can be caused by the floor being made of a single layer of wood, where the moisture content of the floor is not uniform.

Causes:
- Use of wrong trowel
- Use of wrong adhesive
- Use of wrong base or subfloor material

Solution - Use the correct trowel, adhesive, base or subfloor material.

6. SLOW DRYING ADHESIVE

Problem - Slow drying adhesive can be a problem with the floor being placed in the direction in which the floor is being placed. This can be caused by the floor being made of a single layer of wood, where the moisture content of the floor is not uniform.

Causes:
- Moisture-related problems
- Incorrect adhesive or base material

Solution - Use the correct adhesive or base material.

7. DELAMINATION

Problem - Delamination occurs when the floor is being placed in the direction in which the floor is being placed. This can be caused by the floor being made of a single layer of wood, where the moisture content of the floor is not uniform.

Causes:
- Moisture-related problems
- Incorrect adhesive or base material

Solution - Use the correct adhesive or base material.

8. SQUEAKY / LOOSE FLOORS

Problem - Squeaky or loose floors can be a problem with the floor being placed in the direction in which the floor is being placed. This can be caused by the floor being made of a single layer of wood, where the moisture content of the floor is not uniform.

Causes:
- Moisture-related problems
- Incorrect adhesive or base material

Solution - Use the correct adhesive or base material.

TROUBLESHOOTING

1. SANDING

Problem - Sanding is recommended for a few areas of the floor have not firmed up as well as expected. It is also recommended for the floor to be sanded in order to eliminate any sounds.

Causes:
- Moisture-related problems
- Incorrect adhesive or base material

Solution - Use the correct adhesive or base material.

2. VACUUMING

Problem - Vacuuming is recommended for a few areas of the floor have not firmed up as well as expected. It is also recommended for the floor to be vacuumed in order to eliminate any sounds.

Causes:
- Moisture-related problems
- Incorrect adhesive or base material

Solution - Use the correct adhesive or base material.

3. MOISTURE CONTROL SYSTEM INSTALLATION

Problem - Titebond recommends the use of a moisture control system, like Titebond 531 or 531 PLUS, for concrete subfloors. Use of Titebond compounds. If filling/flattening compounds are used, they must be Portland-based cementitious material and have a compressive strength greater than 350 psi when cured.

Causes:
- Moisture-related problems
- Incorrect adhesive or base material

Solution - Use the correct adhesive or base material.

4. FILLING

Problem - Filling occurs when the floor is being placed in the direction in which the floor is being placed. This can be caused by the floor being made of a single layer of wood, where the moisture content of the floor is not uniform.

Causes:
- Moisture-related problems
- Incorrect adhesive or base material

Solution - Use the correct adhesive or base material.

5. BLEEDING

Problem - Bleeding occurs when the floor is being placed in the direction in which the floor is being placed. This can be caused by the floor being made of a single layer of wood, where the moisture content of the floor is not uniform.

Causes:
- Moisture-related problems
- Incorrect adhesive or base material

Solution - Use the correct adhesive or base material.

6. Popping

Problem - Popping occurs when the floor is being placed in the direction in which the floor is being placed. This can be caused by the floor being made of a single layer of wood, where the moisture content of the floor is not uniform.

Causes:
- Moisture-related problems
- Incorrect adhesive or base material

Solution - Use the correct adhesive or base material.

7. MOISTURE PREPARATION

Problem - Moisture preparation is recommended for a few areas of the floor have not firmed up as well as expected. It is also recommended for the floor to be vacuumed in order to eliminate any sounds.

Causes:
- Moisture-related problems
- Incorrect adhesive or base material

Solution - Use the correct adhesive or base material.

8. SQUARE / ROUGH FLOORS

Problem - Square or rough floors can be a problem with the floor being placed in the direction in which the floor is being placed. This can be caused by the floor being made of a single layer of wood, where the moisture content of the floor is not uniform.

Causes:
- Moisture-related problems
- Incorrect adhesive or base material

Solution - Use the correct adhesive or base material.

9. INSTALLATION METHOD

Problem - Installation method is recommended for a few areas of the floor have not firmed up as well as expected. It is also recommended for the floor to be vacuumed in order to eliminate any sounds.

Causes:
- Moisture-related problems
- Incorrect adhesive or base material

Solution - Use the correct adhesive or base material.

10. ADHESIVE TYPING

Problem - Adhesive typing is recommended for a few areas of the floor have not firmed up as well as expected. It is also recommended for the floor to be vacuumed in order to eliminate any sounds.

Causes:
- Moisture-related problems
- Incorrect adhesive or base material

Solution - Use the correct adhesive or base material.

11. Curing

Problem - Curing is recommended for a few areas of the floor have not firmed up as well as expected. It is also recommended for the floor to be vacuumed in order to eliminate any sounds.

Causes:
- Moisture-related problems
- Incorrect adhesive or base material

Solution - Use the correct adhesive or base material.

12. CHECKS

Problem - Checks are recommended for a few areas of the floor have not firmed up as well as expected. It is also recommended for the floor to be vacuumed in order to eliminate any sounds.

Causes:
- Moisture-related problems
- Incorrect adhesive or base material

Solution - Use the correct adhesive or base material.

13. SPACING

Problem - Spacing is recommended for a few areas of the floor have not firmed up as well as expected. It is also recommended for the floor to be vacuumed in order to eliminate any sounds.

Causes:
- Moisture-related problems
- Incorrect adhesive or base material

Solution - Use the correct adhesive or base material.

14. PRESSURE

Problem - Pressure is recommended for a few areas of the floor have not firmed up as well as expected. It is also recommended for the floor to be vacuumed in order to eliminate any sounds.

Causes:
- Moisture-related problems
- Incorrect adhesive or base material

Solution - Use the correct adhesive or base material.

15. VENTILATION

Problem - Ventilation is recommended for a few areas of the floor have not firmed up as well as expected. It is also recommended for the floor to be vacuumed in order to eliminate any sounds.

Causes:
- Moisture-related problems
- Incorrect adhesive or base material

Solution - Use the correct adhesive or base material.

16. DRYING

Problem - Drying is recommended for a few areas of the floor have not firmed up as well as expected. It is also recommended for the floor to be vacuumed in order to eliminate any sounds.

Causes:
- Moisture-related problems
- Incorrect adhesive or base material

Solution - Use the correct adhesive or base material.

17. CLEANING

Problem - Cleaning is recommended for a few areas of the floor have not firmed up as well as expected. It is also recommended for the floor to be vacuumed in order to eliminate any sounds.

Causes:
- Moisture-related problems
- Incorrect adhesive or base material

Solution - Use the correct adhesive or base material.

18. SEALING

Problem - Sealing is recommended for a few areas of the floor have not firmed up as well as expected. It is also recommended for the floor to be vacuumed in order to eliminate any sounds.

Causes:
- Moisture-related problems
- Incorrect adhesive or base material

Solution - Use the correct adhesive or base material.

19. SANDING

Problem - Sanding is recommended for a few areas of the floor have not firmed up as well as expected. It is also recommended for the floor to be vacuumed in order to eliminate any sounds.

Causes:
- Moisture-related problems
- Incorrect adhesive or base material

Solution - Use the correct adhesive or base material.

20. TROWLING

Problem - Trowling is recommended for a few areas of the floor have not firmed up as well as expected. It is also recommended for the floor to be vacuumed in order to eliminate any sounds.

Causes:
- Moisture-related problems
- Incorrect adhesive or base material

Solution - Use the correct adhesive or base material.

21. OILING

Problem - Oiling is recommended for a few areas of the floor have not firmed up as well as expected. It is also recommended for the floor to be vacuumed in order to eliminate any sounds.

Causes:
- Moisture-related problems
- Incorrect adhesive or base material

Solution - Use the correct adhesive or base material.

22. VACUUMING

Problem - Vacuuming is recommended for a few areas of the floor have not firmed up as well as expected. It is also recommended for the floor to be vacuumed in order to eliminate any sounds.

Causes:
- Moisture-related problems
- Incorrect adhesive or base material

Solution - Use the correct adhesive or base material.

23. CHECKING

Problem - Checking is recommended for a few areas of the floor have not firmed up as well as expected. It is also recommended for the floor to be vacuumed in order to eliminate any sounds.

Causes:
- Moisture-related problems
- Incorrect adhesive or base material

Solution - Use the correct adhesive or base material.

24. PRESSURE TESTING

Problem - Pressure testing is recommended for a few areas of the floor have not firmed up as well as expected. It is also recommended for the floor to be vacuumed in order to eliminate any sounds.

Causes:
- Moisture-related problems
- Incorrect adhesive or base material

Solution - Use the correct adhesive or base material.

25. DRYING

Problem - Drying is recommended for a few areas of the floor have not firmed up as well as expected. It is also recommended for the floor to be vacuumed in order to eliminate any sounds.

Causes:
- Moisture-related problems
- Incorrect adhesive or base material

Solution - Use the correct adhesive or base material.
1. SQUEAKING

**Problem:** Squeaking, popping or other noises in flooring.

**Cause:** Excessive moisture, flooding or extreme humidity fluctuations if the room is not properly ventilated.

**Solution:** Ensure that the subfloor is dry and use humidifiers or dehumidifiers to control humidity levels. Fix any structural issues that may be causing the problem, such as improper installation or settlement.

2. CROWNING

**Problem:** Crowned flooring may be a temporary condition, and if the moisture level is reduced, the floor may return to flat.

**Solution:** Allow the wood to acclimate before installation and provide good ventilation during and after the installation.

3. DELAMINATION

**Problem:** Delamination is when the outermost layer of the flooring separates from the subfloor in these areas, and in that case the problem is likely a result of a continuous source of moisture being introduced above or below the floor.

**Solution:** Use of wrong trowel or too much adhesive can cause additional moisture. After installation, a continuous source of moisture may also result in delamination of the flooring, or cracking or peeling of the surface finish.

4. CURING

**Problem:** Fast curing can cause problems, especially if the floor is installed over a non-porous surface like vinyl, where moisture is absorbed into or moves through both the flooring and the subfloor.

**Solution:** Use of wrong trowel or too much adhesive can cause additional moisture. After installation, a continuous source of moisture may also result in delamination of the flooring, or cracking or peeling of the surface finish.

5. ENDLIFTING

**Problem:** Wood flooring parting from the subfloor due to extreme expansion and contraction between the flooring and the subfloor.

**Solution:** Make sure that the subfloor is flat and even before installation. Use of wrong trowel or too much adhesive can cause additional moisture. After installation, a continuous source of moisture may also result in delamination of the flooring, or cracking or peeling of the surface finish.

6. SLOW DRYING ADHESIVE

**Problem:** Adhesives that have not been stored properly in a warm, dry environment may take longer to dry.

**Solution:** Allow the recommended flash time for the adhesive to pass before applying the floor system. If the problems are related to excessive moisture, once the excessive moisture is removed, the flooring can return to its original condition.

7. DELAMINATION

**Problem:** Delamination is when the outermost layer of the flooring separates from the subfloor in these areas, and in that case the problem is likely a result of a continuous source of moisture being introduced above or below the floor.

**Solution:** Use of wrong trowel or too much adhesive can cause additional moisture. After installation, a continuous source of moisture may also result in delamination of the flooring, or cracking or peeling of the surface finish.

8. SQUEAKY/LOOSE FLOORS

**Problem:** Squeaking, popping or other noises in flooring.

**Solution:** Fix any structural issues that may be causing the problem, such as improper installation or settlement. If the subfloor is not flat, it may need to be adjusted or replaced. Use of wrong trowel or too much adhesive can cause additional moisture. After installation, a continuous source of moisture may also result in delamination of the flooring, or cracking or peeling of the surface finish.

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### 1. Squeaky Squeaky Squeaky

<table>
<thead>
<tr>
<th>Problem</th>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Squeaking, popping</td>
<td>Excessive moisture, flooding or extreme humidity fluctuations</td>
<td>Ensure that the subfloor is dry and use humidifiers or dehumidifiers to control humidity levels. Fix any structural issues that may be causing the problem, such as improper installation or settlement.</td>
</tr>
</tbody>
</table>

### 2. Crowned Flooring

<table>
<thead>
<tr>
<th>Problem</th>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crowned flooring</td>
<td>Excessive moisture, flooding or extreme humidity fluctuations</td>
<td>Ensure that the subfloor is dry and use humidifiers or dehumidifiers to control humidity levels. Fix any structural issues that may be causing the problem, such as improper installation or settlement.</td>
</tr>
</tbody>
</table>

### 3. Delamination

<table>
<thead>
<tr>
<th>Problem</th>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delamination</td>
<td>Excessive moisture, flooding or extreme humidity fluctuations</td>
<td>Ensure that the subfloor is dry and use humidifiers or dehumidifiers to control humidity levels. Fix any structural issues that may be causing the problem, such as improper installation or settlement.</td>
</tr>
</tbody>
</table>

### 4. Slowly Drying Adhesive

<table>
<thead>
<tr>
<th>Problem</th>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slowly drying adhesive</td>
<td>Improper storage of adhesives in a warm, dry environment</td>
<td>Allow the recommended flash time for the adhesive to pass before applying the floor system. If the problems are related to excessive moisture, once the excessive moisture is removed, the flooring can return to its original condition.</td>
</tr>
</tbody>
</table>

### 5. Endlifiting

<table>
<thead>
<tr>
<th>Problem</th>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endlifiting</td>
<td>Improper installation, settlement</td>
<td>Ensure that the subfloor is flat and even before installation. Use of wrong trowel or too much adhesive can cause additional moisture. After installation, a continuous source of moisture may also result in delamination of the flooring, or cracking or peeling of the surface finish.</td>
</tr>
</tbody>
</table>

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### Wood Flooring Installation

1. **Prior to installation:**
   - Use of Titebond Conform Primer or Concrete Primer is recommended for concrete subfloors.

2. **Installation:**
   - Use of Titebond for concrete subfloors is recommended.

3. **Post-installation:**
   - Use of Titebond Moisture Control System is recommended.

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### Moisture Control System Installation

Titebond recommends the use of a moisture control system, like Titebond 531 or 531 PLUS, for concrete subfloors. Use of Titebond 531 or 531 PLUS over lightweight concrete and all gypsum-based materials requires the use of Titebond Concrete Primer or equivalent primer prior to application of adhesive.
<table>
<thead>
<tr>
<th>Engineered, Parquet, Solid (5/8&quot; or less) &amp; Bamboo</th>
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</tr>
</thead>
<tbody>
<tr>
<td>3/16&quot; x 3/16&quot; x 3/16&quot; Square-notch</td>
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<tr>
<td>(35 sq. ft. per gallon)</td>
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</tr>
<tr>
<td>1/8&quot; x 1/8&quot; x 1/8&quot; Square-notch</td>
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<tr>
<td>1/4&quot; x 1/4&quot; V-notch (saw tooth)</td>
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<tr>
<td>(30 sq. ft. per gallon)</td>
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**APPLICATION RECOMMENDATIONS**

- **231 SELECT**
  - Engineered, Parquet, Solid (5/8" or less) & Bamboo
- **801 PREFERRED**
  - Engineered, Parquet, Solid (5/8" or less) & Bamboo
- **811 ADVANTAGE**
  - Engineered, Parquet, Solid (5/8" or less) & Bamboo
- **821 STEP**
  - Engineered, Parquet, Solid (5/8" or less) & Bamboo
- **771 STEP**
  - Engineered, Parquet, Solid (5/8" or less) & Bamboo
- **991 PROVANTAGE**
  - Engineered, Parquet, Solid (5/8" or less) & Bamboo

**EFFECTIVE APPLICATIONS**

- **SOLID 3" WIDTH OR GREATER**
  - Trowel/Coverage
  - N/A

- **ALL PARQUETS MEASURING LESS THAN 3/4" THICKNESS**
  - Trowel/Coverage
  - N/A

- **ENGINEERED (ADHESIVE, MOISTURE & SOUND CONTROL)**
  - Trowel/Coverage
  - N/A

- **SOLID & BAMBOO UP TO 5/8"**
  - (ADHESIVE, MOISTURE & SOUND CONTROL)
  - Trowel/Coverage
  - N/A

**COVERAGES**

- **Trowel**
- **Trowel (per tooth)**
- **Sprearred**