Chapter 2

Basic practices

Topics

2.1 Job site conditions  8
2.2 Moisture testing   8
2.3 Substrates       10
2.4 Existing flooring and adhesive residue  12
2.5 Radiant heat subfloors  12
2.1 Job site conditions

- Before job testing, the building envelope must be sealed and weather tight (walls, roofing, windows, doorways etc.).
- The installation of floor covering must not begin until work of all other trades has been completed.
- Building HVAC must be up and running and in permanent operation prior to installation. A minimum temperature of 68°F (20°C) must be maintained for at least 72 hours before, during, and 72 hours after installation.
- The installation area and Altro materials must be maintained and installed at a minimum of 68°F (20°C) and a maximum of 85°F (29°C). Slab temperature should be between 65°F (18°C) and 80°F (27°C). Relative humidity level extremes should also be avoided.
- All materials and subfloors must be fully acclimated to installation temperature.
- The areas of installation must be adequately lighted to allow for proper inspection of the flooring and subfloor. This is especially critical when flash coving.
- Area of installation must not be within 5 degrees of dew point. Please reference the enclosed dew point chart. Low relative humidity (dry air) must exist and be maintained during the application of adhesive. Installations must not take place when the substrate of the area of installation is within 5 degrees of dew point.
- Moisture tests must be taken to ensure the subfloor is sufficiently dry for the installation of the Altro floor covering. Please see 2.2 Moisture testing on page 8.
- Prior to starting the installation please advise the general contractor and/or end user about the subfloor moisture requirements, all applicable job site, and site storage requirements that will be needed at time of installation.
- Remember if you cover a subfloor, underlayment or other surface with floor covering, you have, in essence, approved it.
- All traffic must remain off finished floors for 24 hours before light traffic, 48 hours before light rolling loads, and 72 hours before heavy loads are allowed.

2.2 Moisture testing

Moisture testing is an essential part of determining the suitability of a concrete slab to receive a resilient floor covering. Moisture testing must be performed on all concrete slabs, regardless of their age or grade level, including areas where resilient flooring has already been installed. Moisture testing should be conducted with the area or building at service conditions, (i.e., fully enclosed, weather-tight, and with the permanent HVAC in operation). In general, moisture testing should be conducted on concrete surfaces that exhibit the final prepared stage before the installation of the flooring material and before installation of smoothing or leveling compounds.

**Dew points and humidity**

Dew point is the temperature at which the humidity in the air begins to condense in and on a surface. Floor coverings and adhesives should not be installed any time the air temperature or concrete surface temperature is within five degrees of dew point. See the chart on the next page for a breakdown of dew points in different conditions.

**Procedure to determining a dew point**

- Test and read the air temperature in the room.
- Test and read the relative humidity in the room.
- Test and read the concrete surface temperature.
- Find the air temperature on the accompanying dew point chart. (Left hand side, up and down the chart.)
- Find the relative humidity on the dew point chart. (Top of chart, across.)
- Intersect the air temperature (sideways movement) with the relative humidity (downward movement) on the dew point chart.
- Obtain the figure at this intersection.
- Compare this figure with the concrete surface temperature.
- If these figures are within five degrees of each other, floor covering should not be installed.
### Dew point temperature in Fahrenheit

<table>
<thead>
<tr>
<th>Air temp (F)</th>
<th>10%</th>
<th>20%</th>
<th>30%</th>
<th>40%</th>
<th>50%</th>
<th>60%</th>
<th>70%</th>
<th>80%</th>
<th>90%</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>5</td>
<td>8</td>
<td>14</td>
<td>18</td>
<td>24</td>
<td>28</td>
<td>31</td>
<td>34</td>
<td>37</td>
<td>40</td>
</tr>
<tr>
<td>45</td>
<td>5</td>
<td>9</td>
<td>16</td>
<td>23</td>
<td>28</td>
<td>32</td>
<td>36</td>
<td>39</td>
<td>42</td>
<td>45</td>
</tr>
<tr>
<td>50</td>
<td>6</td>
<td>13</td>
<td>21</td>
<td>27</td>
<td>33</td>
<td>36</td>
<td>40</td>
<td>44</td>
<td>47</td>
<td>50</td>
</tr>
<tr>
<td>55</td>
<td>8</td>
<td>16</td>
<td>25</td>
<td>31</td>
<td>36</td>
<td>41</td>
<td>45</td>
<td>49</td>
<td>52</td>
<td>55</td>
</tr>
<tr>
<td>60</td>
<td>9</td>
<td>20</td>
<td>29</td>
<td>35</td>
<td>41</td>
<td>46</td>
<td>50</td>
<td>54</td>
<td>57</td>
<td>60</td>
</tr>
<tr>
<td>65</td>
<td>10</td>
<td>24</td>
<td>33</td>
<td>40</td>
<td>46</td>
<td>51</td>
<td>55</td>
<td>58</td>
<td>62</td>
<td>65</td>
</tr>
<tr>
<td>70</td>
<td>13</td>
<td>28</td>
<td>37</td>
<td>45</td>
<td>50</td>
<td>55</td>
<td>60</td>
<td>64</td>
<td>67</td>
<td>70</td>
</tr>
<tr>
<td>75</td>
<td>17</td>
<td>31</td>
<td>42</td>
<td>49</td>
<td>55</td>
<td>60</td>
<td>64</td>
<td>68</td>
<td>72</td>
<td>75</td>
</tr>
<tr>
<td>80</td>
<td>20</td>
<td>35</td>
<td>46</td>
<td>53</td>
<td>60</td>
<td>65</td>
<td>69</td>
<td>73</td>
<td>77</td>
<td>80</td>
</tr>
<tr>
<td>85</td>
<td>24</td>
<td>40</td>
<td>50</td>
<td>58</td>
<td>64</td>
<td>69</td>
<td>74</td>
<td>78</td>
<td>82</td>
<td>85</td>
</tr>
<tr>
<td>90</td>
<td>27</td>
<td>43</td>
<td>54</td>
<td>62</td>
<td>69</td>
<td>74</td>
<td>79</td>
<td>83</td>
<td>87</td>
<td>90</td>
</tr>
<tr>
<td>95</td>
<td>30</td>
<td>48</td>
<td>59</td>
<td>67</td>
<td>73</td>
<td>79</td>
<td>84</td>
<td>88</td>
<td>92</td>
<td>95</td>
</tr>
<tr>
<td>100</td>
<td>34</td>
<td>52</td>
<td>62</td>
<td>71</td>
<td>78</td>
<td>83</td>
<td>88</td>
<td>93</td>
<td>97</td>
<td>100</td>
</tr>
</tbody>
</table>

### Additional tests

- **Mat Moisture Tests and Electric Moisture Meters** can be used to detect the presence of moisture, however these test methods do not replace the required testing. When electric meter and/or mat moisture tests indicate no moisture and that the subfloor may be dry, it is necessary to conduct additional tests to ensure the subfloor is ready for installation.

**NOTE:** Altro requires that moisture testing be done per ASTM F2170 and results be within warranted levels. A secondary test of ASTM F1869 can also be done. Results are to be below 8 lbs.

The reason for both tests to be done is that the **Relative Humidity** test tells us how much water is within the concrete (this is the important number and information) and then the Calcium Chloride test tells us how much and how fast this quantity of relative humidity is then evaporating out the top ½” to 3/4” inch of the concrete.

- **ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Slab Using in-situ Probes:** This test method covers the quantitative determination of percent relative humidity in concrete slabs for field or laboratory test. Conduct one test for every 1,000 square feet (minimum 3 tests) to ensure concrete does not exceed the recommended RH for the flooring product and the adhesive being used.

- **ASTM F2170 - Equal to and not exceeding 90% RH for adhesives** Altrofix 30, Ecofix 20E and Ecofix 25E, <95% RH for Ecofix 65 spray and EcoFix 35 spray adhesive.

- **ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.** This test method covers the quantitative determination of the rate of moisture vapor emitted from below-grade, on-grade, and above-grade (suspended) bare concrete floors. Equal to and not exceeding 8 lbs. / 24 hours / 1000 square feet for all adhesives.

  - To employ F1869, the surface of the concrete must be porous. Hard machine troweled concrete or concrete surfaces with extraneous substances on the surface such as residual adhesive, sealers, curing compounds, etc. must be mechanically removed prior to testing.

  - For moisture readings exceeding the RH limitations and/or exceeding 8 lbs. / 24 hours / 1000 square feet, a dehumidification system shall be utilized until moisture readings when retested are within warranted levels. For excessive readings, the application of a high-quality moisture mitigation system may also be employed. Any warranties and/or guarantees for the performance of the mitigation system are the responsibility of that products manufacturer, not Altro.

### Additional tests

- **Dew point temperature in Fahrenheit**

- **Prevent moisture intrusion.** All on-grade and below-grade concrete slabs must have an effective moisture vapor barrier that meet the current requirements of ASTM E1745.

- **Document and record with all appropriate parties all tests taken for moisture, pH and any other tests taken.**

- **Alkalinity Testing - Maximum pH of 9.9 for Altrofix 30, Ecofix 20E and Ecofix 25E adhesives, maximum pH of <11 for Ecofix 65 spray and Ecofix 35 spray adhesive.**

  - As a concrete surface reacts with carbon dioxide in air, the pH of the surface gradually is reduced to about 8.5 through a process called carbonation. A concrete slab that is carbonated and ready to receive a flooring adhesive should have a pH of about 8.5. This means the surface of the concrete has had minimal moisture vapor movement. The higher the concrete surface pH the greater this higher pH is an indicator that moisture has recently passed through the concrete and must be tested for.

- **NOTE:** Altro requires that moisture testing be done per ASTM F2170 and results be within warranted levels. A secondary test of ASTM F1869 can also be done. Results are to be below 8 lbs.

- **Additional tests.** Mat Moisture Tests and Electric Moisture Meters can be used to detect the presence of moisture, however these test methods do not replace the required testing. When electric meter and/or mat moisture tests indicate no moisture and that the subfloor may be dry, it is necessary to conduct additional tests to ensure the subfloor is ready for installation.

### Relative humidity

<table>
<thead>
<tr>
<th>Relative humidity</th>
<th>10%</th>
<th>20%</th>
<th>30%</th>
<th>40%</th>
<th>50%</th>
<th>60%</th>
<th>70%</th>
<th>80%</th>
<th>90%</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>5</td>
<td>8</td>
<td>14</td>
<td>18</td>
<td>24</td>
<td>28</td>
<td>31</td>
<td>34</td>
<td>37</td>
<td>40</td>
</tr>
<tr>
<td>45</td>
<td>5</td>
<td>9</td>
<td>16</td>
<td>23</td>
<td>28</td>
<td>32</td>
<td>36</td>
<td>39</td>
<td>42</td>
<td>45</td>
</tr>
<tr>
<td>50</td>
<td>6</td>
<td>13</td>
<td>21</td>
<td>27</td>
<td>33</td>
<td>36</td>
<td>40</td>
<td>44</td>
<td>47</td>
<td>50</td>
</tr>
<tr>
<td>55</td>
<td>8</td>
<td>16</td>
<td>25</td>
<td>31</td>
<td>36</td>
<td>41</td>
<td>45</td>
<td>49</td>
<td>52</td>
<td>55</td>
</tr>
<tr>
<td>60</td>
<td>9</td>
<td>20</td>
<td>29</td>
<td>35</td>
<td>41</td>
<td>46</td>
<td>50</td>
<td>54</td>
<td>57</td>
<td>60</td>
</tr>
<tr>
<td>65</td>
<td>10</td>
<td>24</td>
<td>33</td>
<td>40</td>
<td>46</td>
<td>51</td>
<td>55</td>
<td>58</td>
<td>62</td>
<td>65</td>
</tr>
<tr>
<td>70</td>
<td>13</td>
<td>28</td>
<td>37</td>
<td>45</td>
<td>50</td>
<td>55</td>
<td>60</td>
<td>64</td>
<td>67</td>
<td>70</td>
</tr>
<tr>
<td>75</td>
<td>17</td>
<td>31</td>
<td>42</td>
<td>49</td>
<td>55</td>
<td>60</td>
<td>64</td>
<td>68</td>
<td>72</td>
<td>75</td>
</tr>
<tr>
<td>80</td>
<td>20</td>
<td>35</td>
<td>46</td>
<td>53</td>
<td>60</td>
<td>65</td>
<td>69</td>
<td>73</td>
<td>77</td>
<td>80</td>
</tr>
<tr>
<td>85</td>
<td>24</td>
<td>40</td>
<td>50</td>
<td>58</td>
<td>64</td>
<td>69</td>
<td>74</td>
<td>78</td>
<td>82</td>
<td>85</td>
</tr>
<tr>
<td>90</td>
<td>27</td>
<td>43</td>
<td>54</td>
<td>62</td>
<td>69</td>
<td>74</td>
<td>79</td>
<td>83</td>
<td>87</td>
<td>90</td>
</tr>
<tr>
<td>95</td>
<td>30</td>
<td>48</td>
<td>59</td>
<td>67</td>
<td>73</td>
<td>79</td>
<td>84</td>
<td>88</td>
<td>92</td>
<td>95</td>
</tr>
<tr>
<td>100</td>
<td>34</td>
<td>52</td>
<td>62</td>
<td>71</td>
<td>78</td>
<td>83</td>
<td>88</td>
<td>93</td>
<td>97</td>
<td>100</td>
</tr>
</tbody>
</table>
Notes

enough to install flooring, it is at this time that testing per ASTM F1869 and F2170 is to be done.

• Mat Moisture Test:
  1. Double face tape 3’ x 3’ (0.9m x 0.9m) pieces of polyethylene to the subfloor (approximately 50’ or 15m apart) for a minimum of 72 hours.
  2. Remove the polyethylene after 72 hours and if there is any evidence of moisture allow additional time for the subfloor to dry before testing further. Do not install flooring.

• Electric moisture meters are also useful in detecting the presence of moisture; consult with the particular meter manufacturer for meter calibration and reading.

• Wood subfloors must not exceed 8% moisture content when measured with a Delmhorst Wood Moisture Tester.

• If test results exceed the allowed limit for the adhesive and floor, the installation must not proceed until the problem is corrected. Altro does not warrant any particular product or procedure for remediation of high moisture content. There are several companies that manufacture products suitable for moisture remediation. We suggest you refer to ASTM F710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring and ASTM F3010 “Standard Practice for Two-Component Resin Based Membrane-Forming Moisture Mitigation Systems for Use Under Resilient Floor Coverings”.

ASTM F2420 (Withdrawn Standard) - Standard Test Method for Determining Relative Humidity on the Surface of Concrete Floor Slabs Using Relative Humidity Probe Measurement an Insulated Hood. This test method covers the quantitative determination of the percent of relative humidity evaporating out the top surface of the concrete, it does not correlate to internal RH (F2170 testing) nor does it correlate to F1869 CC testing.

NOTE: Although the preceding moisture testing information and recommendations are widely accepted within the resilient floor covering industry, there is currently no known exact amount of lbs of moisture vapor emission, or exact % of RH to know exactly when a floor covering, adhesive, or coating system will fail.

2.3 Substrates

Suitable substrates may include:

• APA certified plywood
• Poplar
• Birch plywood
• Concrete
• Metal
• Existing flooring
• Epoxy

Unsuitable substrates may include:

• Particleboard
• Chipboard
• Construction grade plywood
• Flakeboard
• OSB
• Treated plywood
• Stripwood

Wood subfloors

Wood underlayments for Altro flooring must:

• be structurally sound.
• be designed for resilient flooring underlayment purposes.
• have panels smooth enough so that texture or graining will not telegraph through.
• resist dents and punctures from concentrated loads.
• be free of any substance that may stain vinyl such as marking inks, paints, solvents, adhesives, asphalt, dye, etc.
• be of uniform density, porosity and thickness.
• be installed in strict accordance with the board manufacturers recommendations.

• Wood floors should be double layer construction with a minimum total thickness of 1”. The subfloor must be rigid, free from movement, and have at least 18” of well-ventilated air space below.
• Wood subfloors must not exceed 8% moisture content when measured with a Delmhorst Wood Moisture Tester.
• Crawl spaces shall be insulated and protected by a vapor barrier.
• Do not install Altro floor covering over wood floors built on wooden sleepers directly in contact with any concrete or earth.
Wood underlayments must meet local and national building codes. Trade associations, such as the APA - The Engineered Wood Association offer structural guidelines for meeting various code requirements.

Certain underlayment panels may cause staining. Consult the underlayment panel manufacturer for specific panel recommendations, panel warranties, and application instructions.

Do not install over particle board, chip board, OSB, Masonite™ or Luan type panels unless specifically warranted by the manufacturer for use as an underlayment.

Regardless of the type and manufacturer of the underlayment panel used, any failures in the performance of the underlayment or floor covering due to the underlayment is the responsibility of the underlayment manufacturer, and/or the underlayment installer.

Concrete subfloors

All concrete new or existing must meet the requirements of the current edition of ASTM F710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring and ACI 302.2R-06 Guide for concrete slabs that receive moisture sensitive flooring materials. Please consult www.astm.org and www.concrete.org for the most current editions of these guidelines.

All on and below grade concrete subfloors require a confirmed permanently effective vapor retarder that meets the current requirements of ASTM E1745 The Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.

Moisture testing must be performed and documented on all concrete regardless of the grade level and age, per ASTM F2170 and ASTM 1869. Results are not to exceed the RH, CC, and pH recommendations for the adhesive and flooring to be used.

Concrete floors must be smooth, rigid, permanently dry, and clean. Floors must be free of all foreign materials, including dust, sealers, paint, grease, oils, solvents, curing and hardening compounds, asphalt, old adhesive residue, and any other contaminants.

Spray paints, permanent markers and other indelible ink markers must not be used on the concrete subfloor as they could bleed through, telegraphing up to the surface and permanently staining the flooring material. If these contaminants are present on the substrate, they must be mechanically removed prior to installation of the flooring.

Caution, certain floor sweeping compounds may contain waxes, oils, and/or other substances that can adversely effect the adhesive bond, check with the sweeping compound manufacturer for assurances of suitability and non-contamination.

The surfaces of the concrete shall be flat to within the equivalent of 3/16” in 10 ft, per ASTM F710.

Concrete must have a minimum compressive strength of 3500 psi.

Lightweight concrete (less than 115 lbs per cubic foot) may be unsuitable for covering with resilient flooring.

Gypsum based substrates and underlayments may be unsuitable.

Control joints and expansion joints

There are two types of joints in concrete. The first type is called a control joint and is saw cut into fresh concrete to “control joint” the slab during the curing process.

An alternative would be to install a joint cover strip when there is a potential of control joints showing through the finished flooring.

The second, and most difficult type of joint, is an actual “expansion joint.” Most flooring manufacturers do not recommend bridging these joints with their material.

Altro does not recommend that flooring products be installed over joints designed for continued movement we recommend the use of appropriate expansion joint cover.

Metal subfloors

Suitable metal substrates may include:

- Clean, rigid steel
- Primed steel
- Steel diamond plate
- Galvanized steel
- Lead
- Metal subfloors must be clean, rigid, and free from all rust, oil, grease, coatings and all other contaminants.
- Diamond Plate will require a smoothing and leveling compound be used; please consult with your local underlayment/patch company for appropriate product recommendations and statement of product suitability.
- In certain circumstances lead as a subfloor may be too soft for the intended use.
- Cleaning/preparation may consist of sanding,
grinding, cleaning with TSP (trisodium phosphate), and priming with red oxide primer such as Rust-OLEUM®.

- Joints can be filled and made smooth using AltroFix 30/31 two-part polyurethane adhesive when the finished flooring is to be installed with the same two-part polyurethane adhesive.
- In some instances (such as certain coolers and freezers), when metal panels are prone to movement, Altro Everlay "A" sheet underlayment will be used to allow the installation of finished flooring.
- Final determination of the suitability rests with the flooring contractor.

2.4 Existing flooring and adhesive residue

- Altro recommends removal of all existing flooring whenever possible; however in certain circumstances it may be possible to install over an existing floor. Please consult the following information as well as with your local Altro distributor.
- Altro floor covering may be installed over existing flooring surfaces such as terrazzo, epoxy, ceramic tile, quarry tile, metal floors, and in certain cases resilient floors and VCT, provided they are dry, well bonded, sound, smooth, and free of waxes, polishes and/or any other foreign materials.
- When going over existing flooring, moisture testing must be performed per applicable ASTM standards. Partial removal of the existing flooring may be required to facilitate moisture testing.
- Do not install over cushion-backed, heavily embossed, or multiple layers of flooring. Installations over existing resilient flooring will be more susceptible to indentation, and there is the possibility that the existing flooring will telegraph through.
- The responsibility of determining if the existing floor is a suitable subfloor rests solely with the installer and flooring contractor. If there is any doubt, the existing floor should be removed.
- Caution must always be exercised when removing old flooring or adhesive residues as they may contain asbestos or harbor mold and mildew. Consult with your local authorities regarding to laws pertaining to removal. Also consult RFCI’s Recommended Work Practices for the Removal of Resilient Floor Coverings at the Resilient Floor Covering Institute website at: www.rfci.com.
- Do not install resilient flooring directly over residual adhesive or paint. All adhesive and paint must be mechanically removed to a thin well-bonded residue.
- Only use mechanical means to remove old residual adhesive, i.e. bead blasting or scarifying. Liquid removers are unsuitable. Follow all local, state, and federal laws regarding removal and preparation.

2.5 Radiant heat subfloors

Altro flooring and underfloor heating

In the past, Altro used to recommend a maximum figure for underfloor heating of 85°F (30°C) without any reported problems. However, due to the concerns of flooring manufacturers that some underfloor heating systems could operate at up to 95°F (35°C), Altro recommends that the following guidelines be followed.

- Before any floor covering is installed, the heating system should be commissioned to ensure it is functioning correctly, and to ensure the substrate and screed is dry and in a stable state to receive the flooring. When the subfloor/screed containing the heating system has been laid, cured and dried, prior to installing the flooring, it should be heated very slowly to its operating temperature and maintained for several days before cooling down to room temperature, but not below 60°F (15°C).
- Ensure that the underfloor heating is switched off 48 hours prior to the floor covering installation commencing and remains off for at least 48 hours after the installation is complete.
- The temperature of the heating system should be increased gradually over a number of days, by only a few degrees per day, until the desired room temperature is reached. The temperature at the underside of the floor covering, i.e. the adhesive line, should never exceed the maximum of 80°F (27°C).
- During the period of decommissioning and shutting down of the underfloor heating system, an alternative heating source should be provided, if required, to ensure that the area of installation is kept at a constant temperature between 65°F (18°C) - 80°F (27°C).

Failure to follow these guidelines can result in the floor covering debonding, joints opening, and on some occasions discoloring. All of which can occur within a long or short period of time.

Altro adhesive-free flooring and underfloor heating

Altro adhesive-free flooring can be installed over underfloor heating which has been installed in accordance to Altro’s recommended guidelines and switched off for a period of 48 hours prior to commencement of installation. Upon completion of the flooring installation, the underfloor heating is switched on and gradually increased in temperature over a number of days by 5 degrees per day until the desired temperature is reached. The temperature should not exceed maximum of 80°F (27°C) at the underside of the floor covering.

If the heating has not been commissioned, upon completion of the flooring installation the underfloor heating should be switched on and gradually increased in temperature over a number of days by 5 degrees per day until the desired temperature is reached. The temperature again should not exceed the of 80°F (27°C) at the underside of the floor covering.