



TECHNICAL BULLETIN – TB097

WEATHER EFFECTS ON ARDEX PRODUCTS

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INTRODUCTION

This Technical Bulletin outlines weather-related product issues reported to the ARDEX Technical Services Department and observations made by the ARDEX Research & Development team. These concerns will be examined, and solutions will be provided to obtain optimal product performance.

Ambient temperatures and humidity, both at the high and low ends of the range, can affect the successful curing of freshly laid tile adhesives, membranes, and floor-leveling cement. To achieve optimal results, users of these products need to adjust their normal procedures to account for these material properties.

In winter, the combination of cold temperatures and increased humidity produces one set of conditions that impede curing. At the same time, hot and dry conditions in summer can result in too rapid curing.

See also ARDEX Technical Bulletin TB257, which deals specifically with membranes.

COLD WEATHER & WINTER EFFECTS

THE PROBLEMS

Cold temperatures and reduced evaporation rates can have the following effects on products:

Cementitious Products Slow Curing

1. Tile adhesives, grouts, and flooring cement based on Portland or Aluminate cement have slowed rates of reaction that reduce the initial hardness and subsequent final cure when the temperature drops below 10°C. At temperatures below 5°C, the reactions can halt altogether. Below 0°C, the water in the material freezes, which can damage the materials if partially cured due to the formation of ice crystals.

Efflorescence in grout

2. Due to increased water residence times and slowed evaporation, efflorescence can also increase in cement-based materials such as grouts. Efflorescence is a deposit of water-soluble salts from the cementitious components drawn out by the water, which are then deposited at the surface when the water evaporates. Premature sealing can exacerbate this effect.

Epoxy Slow Curing

3. A chemical reaction between two components cures epoxy-based grouts, adhesives, membranes, and sealers, and this reaction is slowed or halted by cold conditions. The viscosity of the resins can also increase, making effective mixing difficult. Water-based epoxies can display increased drying times and apparent stickiness due to decreased water evaporation rates.



Mastic Adhesive and Membrane Slow Curing

4. Water-based membranes and mastic adhesives can show decreased drying rates due to the slow evaporation of the water carrier. They can also become thicker in cold conditions.

Freezing of Mastic Adhesives and Additives

5. Mastic tile adhesives and latex additives can freeze, which both makes the products unable to be laid but may also cause the polymer/water suspensions to be damaged, rendering the product unusable.

THE SOLUTIONS

There are several simple procedures that can be observed to avoid cold weather situations.

Do's

1. Materials should not be stored in the open or buildings likely to drop below 0°C.
2. Where the work area is indoors, portable heating or air conditioning should raise the surface or ambient temperature to at least 10°C. Even if the materials are kept at the correct temperatures, they will quickly reach the substrate's temperature when applied.
3. Use rapid set adhesives to reduce cure times.
4. Where the product datasheet allows reduced water additions, use the lowest level consistent with the quoted minimum and workability.
5. During the installation, factor increased drying times between each step in the job.
6. Increase the ventilation by using fans, which will raise the rate of evaporation. This is useful for slow-drying membranes and mastic materials. However, the air must not be supplied by a heater, as this can cause cracking. A heater should only be used on floor levellers after the material has hard-cured.
7. If the daytime temperature is acceptable but may drop significantly at night, only use products until around midday to allow the material to form an initial set before the onset of cold temperatures at night.

Don'ts

1. Work outside or indoors when the temperature cannot be controlled if it is below 5°C, and where possible, minimize working below 10°C.
2. Do not use water heated above about 30°C for mixing.

Note: The pot life and working times will be reduced for materials in artificially heated conditions or when heated water is used for mixing.

HOT WEATHER & SUMMER EFFECTS

THE PROBLEMS

At the opposite end of the temperature spectrum is the hot weather that occurs from late spring to mid-autumn. Depending on the area, it could be humid or very dry. The problems that can occur are basically the opposite of those in winter.

Cementitious Products Premature Curing



1. The maximum recommended temperature for the use of cementitious materials is 35°C and summer temperatures can easily exceed this.
2. Cementitious-based materials cure faster in hot weather due to the increased reaction rate of the components. This means that flow or working times of levellers will be reduced, and tile adhesives will have shorter open times before skinning.

Application to Hot Substrates

3. Dark coloured surfaces exposed to direct sun on a hot day can reach 50 to 80°C. This can be a significant problem for dark-coloured cement substrates and tiles. Concrete substrates can act as heat sinks and hold high temperatures after the air temperature has fallen.

Rapid Evaporation and Poor Bonding

Increased evaporation means water can be removed from the laid materials before curing reactions can complete, resulting in weak bonds. Highly dried-out substrates can also draw water in. This can be a significant consideration when rendering concrete structures such as pools that can act as heat sinks. Liquid-containing products can skin at the interface with the substrate, preventing penetration into the substrate and reducing bonding strengths.

Epoxy Premature Curing & Slumping

4. Epoxy products can cure very rapidly at increased temperatures, especially where a large amount of material has been mixed and generates its own heat of reaction, significantly reducing pot life. These materials can also become less viscous and slump when applied on vertical surfaces.

Blistering of Membranes

5. Liquid membranes can skin rapidly and prevent the underlying moisture from escaping. If the substrate is impervious, blistering or poor adhesion may result.

THE SOLUTIONS

Do's

1. Mixing of materials needs to be done quickly, and power mixing is recommended.
2. Where the materials are being used indoors, it is recommended that air conditioning be turned on if it is available. Externally, only work in the cooler morning or late afternoon hours and do not lay materials in areas exposed to direct sun after 11 a.m.
3. Store all materials out of the direct sun and in a cool place. Air-conditioned shipping containers can be used for large jobs in remote areas where bulk materials need to be stored and used. Even if the materials are kept at the correct temperatures, they will come to the temperature of the substrate very quickly when applied to it.
4. Use the maximum amount of water permitted for mixing as recommended on the product datasheets.
5. Use cool water drawn from pipes or taps where the water lines are not exposed to the sun. Water chilled by ice can be used, but the ice must be melted, and the temperature should not be below 10°C.
6. Mix small batches of material and only work on an area that can be covered before the initial cure or skinning occurs.
7. Rendered surfaces can be lightly sprayed with water or covered with damp cloth.
8. Correctly prime the surface to minimize excessive absorption of moisture.



9. Grout lines can be kept damp to promote better curing, but this is restricted to light spraying or damp cloth and *does not* mean ponded water.

Don'ts

1. Hand mixing is completely unsuitable for bagged materials such as flooring cements and full bags of tile adhesives.
2. Overwatering materials during mixing reduces the product strength and can lead to weak surface layers and other problems.
3. Water or extra liquid in two-part products must not be added to mixed material. Thinning down mixed material that is curing is not an acceptable practice.
4. Don't apply renders to bonding bridges that have already set.
5. Don't rework or attempt to lay tiles on skinned adhesives.

AMBIENT CONDITIONS – HIGH HUMIDITY

Moist Concrete Subfloors

- In cold and humid conditions, the evaporation of moisture from subfloors made of concrete slabs and screeds is retarded, potentially creating problems for some types of membranes, tile adhesives and vinyl, and other impervious coverings. The solutions to this situation include, where possible, running the air conditioning to dry out the air above the subfloor and draw the moisture out, using a moisture barrier membrane, or allowing the subfloor to dry with time.

Timber Subfloors

- Timber subfloors can shrink in extended dry weather and expand in moist conditions. This can create appreciable stresses when covering systems applied onto the subfloor. Air conditioning can produce a difference in the humidity between the room and beneath the floor, which can dry the top of the floor and produce cupping. Conversely, excessive moisture on the base of the timber can also result in deformations. The ventilation of the sub-floor needs to be good to allow some equilibration. Where possible, floor layers should avoid installation at times of continued low humidity or high humidity.

Air Conditioning

- Air conditioning in buildings, especially in the tropics, can cause moisture in the sub-floors to rise and produce problems for impermeable floor coverings. Where possible, air conditioning should be operated during topping installations, and a moisture barrier system should be used to protect the coverings. A common source of problems is floors laid when there is no air conditioning working, and it is switched on after the floor is laid, drawing the moisture up.

Rained on Membranes

- When rain is possible, external liquid-applied membranes that are uncured or curing should be protected from the rain to avoid damage.
- Moisture cure polyurethane membranes are sensitive to atmospheric or subfloor moisture and should not be laid on damp substrates.

SUMMARY

- All water-based products should not be used when the temperature is 5-10°C.



- Cement-based products should not be used at temperatures below 5°C.
- The maximum recommended temperature for cement-based adhesives or levellers, liquid membranes, and epoxy-based materials is 35°C.

For further advice on particular conditions, sites, or applications, contact ARDEX Technical Services at 1800-224-070 (free call) or the relevant ARDEX Sales Representative for the product in your state.

IMPORTANT

This Technical Bulletin provides guideline information only and is not intended to be interpreted as a general specification for the application/installation of the products described. Since each project potentially differs in exposure/condition, specific recommendations may vary from the information contained herein. For recommendations for specific applications/installations, contact your nearest Ardex Australia Office.

DISCLAIMER

The information presented in this Technical Bulletin is to the best of our knowledge true and accurate. No warranty is implied or given as to its completeness or accuracy in describing the performance or suitability of a product for a particular application. Users are asked to check that the literature in their possession is the latest issue.

REASON FOR REVISION-ISSUER

Change of slogan and address

DOCUMENT REVIEW REQUIRED

36 months or whenever third-party suppliers change their recommendations.

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