



TECHNICAL BULLETIN – TB097

WEATHER EFFECTS ON ARDEX PRODUCTS

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INTRODUCTION & SCOPE

This Bulletin covers weather-related product issues that have been reported to the ARDEX Technical Services Department. It also covers observations made by the ARDEX Research & Development Department. These concerns will be evaluated, with potential solutions provided.

Ambient temperature and humidity can affect the curing of tile adhesives, waterproofing membranes, and levelling compounds. Users of these products often need to adjust application procedures to account for these effects.

The combination of cold temperatures and increased humidity in winter impedes curing. The combination of extremely hot and dry conditions in summer can result in curing being too fast.

Refer to 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 100C. At temperatures below 50C, the reactions can halt altogether. Below 00C, 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. Efflorescence can increase in cement-based materials such as grouts due to increased water residence times due to slowed evaporation. Efflorescence is a deposit of water-soluble salts from underlying cementitious components. The salts are drawn out by water and then deposited at the surface when the water evaporates. Premature sealing can exacerbate this effect.

Epoxy Slow Curing

3. Epoxy-based grouts, adhesives, membranes, and sealers are cured by a chemical reaction between two components, 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.

Premixed Adhesive and Membrane Slow-Curing

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



Freezing of Mastic Adhesives and Additives

5. Premixed tile adhesives and latex additives can freeze which means the products are not able to be laid but may also cause the polymer/water suspensions to be damaged, rendering the product unusable.

THE SOLUTIONS

Several simple procedures can be used in cold weather situations.

Recommended

1. Materials should not be stored in the open or in buildings likely to drop below 0°C
2. If 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 equilibrate to the substrate's temperature when applied.
3. Use rapid set adhesives to reduce cure times.
4. Use the lowest allowable water level that allows workability.
5. Increased drying times should be factored in between each step in the job.
6. Increase ventilation with fans, which will raise the evaporation rate. This is useful for slow-drying membranes and premixed materials. A heater must not supply the air, as this can cause cracking, and 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, the application should only be until around midday to allow the material to form an initial set before the onset of cold temperatures at night.

Not Recommended

1. Working outside or indoors when the temperature is 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

Hot weather can also be a problem. Under these conditions, it is possible to have either humid or very dry conditions. The issues that can occur are basically the opposite of those in winter.

Cementitious Products Premature Curing

1. The maximum recommended temperature for 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 the 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 when products are applied to dark-coloured cement and mortar substrates. Concrete substrates can act as heat sinks and hold high temperatures after the air temperature has fallen.

Rapid Evaporation and Poor Bonding

4. Increased evaporation means water can evaporate from products before curing reactions have occurred. Highly dried-out substrates can also draw water in. This can be a significant consideration in rendering concrete structures such as pools, which can act as heat sinks. Liquid-containing products can skin at the interface with the substrate, preventing penetration into the substrate, thus reducing bond strengths.

Epoxy Premature Curing & Slumping

5. Epoxy products cure rapidly at increased temperatures, especially where a large amount of material has been mixed. They tend to generate their own heat of reaction (exotherm), significantly reducing pot life. These materials can also become less viscous and slump when applied to vertical surfaces.

Blistering of Membranes

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

THE SOLUTIONS

Recommended

1. Mixing of materials needs to be done quickly. Power mixing is recommended.
2. If materials are being used indoors, air conditioning (if available) should be turned on. If working externally, it is recommended that you work in the cooler morning or late afternoon hours. It is also recommended that materials are not installed in areas exposed to direct sun after 11 a.m.
3. All materials should be stored 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 based on 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 only small amounts of material and work only 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 a damp cloth.
8. Correctly prime the surface to minimise excessive absorption of moisture.
9. Grout lines can be kept damp to promote better curing, but this is restricted to light spraying or a damp cloth and *does not* mean ponded water.

Not Recommended

1. Hand mixing is completely unsuitable for bagged materials such as flooring cements and full bags of tile adhesives.
2. Overwatering of products 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. It is not acceptable practice to thin down mixed material that is curing.
4. Do not apply mortars to bonding bridges that have already been set.
5. Do not 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. This potentially creates problems for some membranes, tile adhesives, vinyl adhesives, and other impervious coverings. The solutions to this situation include running the air conditioning to dry out the air above the subfloor, 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 be avoided when installations have 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. Air conditioning should be operated during topping installations, and a moisture barrier system should be used to protect the underside of floor coverings. A common source of problems is when floors are laid when there is no air conditioning working, and it is switched on after the floor is laid. This will draw the moisture up.

Rained on Membranes

- When rain is possible, uncured or curing external liquid-applied membranes should be protected from the rain to avoid damage.



- Moisture-curing 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 below 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.

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

Content review, change of company slogan and address

DOCUMENT REVIEW REQUIRED

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

Australia: 1300 788 780

New Zealand: 643 384 3029

Web: www.ardexaustralia.com

email: technical.services@ardexaustralia.com

Address: 2 Buda Way, Kempas Creek NSW 2178