

## General Technical Considerations :

In order to provide the best result, it is important to understand the basic film forming process of the coatings and the problems that may arise.

All our coatings contain water and a solvent which keeps the polymer particles soft . This solvent is called a coalescing solvent or coalescent. Ideally, as the coating starts to dry, the water and coalescent release from the coating and the soft polymer particles are forced into each other. The process is called coalescence and proper coalescence of the coating film is vital if high gloss, adhesion, and long term durability is to be obtained. When the process of coalescence is fully completed, the coating film is said to be cured. This may take a week from the time of application to occur. The primer is an exception. It penetrates into the cement tile and gains adhesion by forming a physical bond, not chemical, with the tile. The following coat will then chemically bond with the primer. Some tiles however become almost non-porous during the manufacturing process and it is necessary treat them like metal surfaces. With these tiles and metal surfaces, it is necessary for the primer to "key" to the surface by forming a chemical bond. It takes about 24 hours to ensure maximum adhesion occurs, before the next coat is applied.

There are many factors which can affect the film forming process.

Dry time, temperature, humidity, film thickness, number of coats applied, number of coats in one day and wind are the most common.

**Dry Time:** Because the coating may feel touch dry does not mean that it has formed a complete film. In order for the film to be completely formed, all coalescent and water, not just from the surface, must be released from the coating. This is why we recommend a recoat time of 2 hours even though the coating may appear to be "dry" within 15 - 20 minutes. If the second coat is applied too quickly, it can redisperse part of the first coat and reduce the film build. The effect may be a lower level of gloss, initially becoming higher as the first coat starts to through dry, resulting in a patchy finish which may turn powdery.

**Temperature:** We set an air temperature range of 14°C - 32°C for cement roofing tiles.

Below 14°C, release of water will become too slow for complete film formation. This can result in reduced gloss, adhesion and poor long term durability. Above 32°C the surface will start to dry too quickly to release all the water and coalescent. The solvent will leach out of the film but the water will be entrapped resulting in poor adhesion to the substrate. As the coating gets hotter, the water, converting to water vapour will force itself out of the film and may cause blistering. Film formation will also be poor and this again can result in poor gloss and long term durability.

Temperature of the tile surface is also very important. If the surface temperature drops below 10°C, it becomes too low for complete film formation even if the coating feels dry. This will lead to greatly reduced durability. Conversely, if the surface temperature becomes too hot the coating will most likely cook before it has a chance to form any film, again leading to greatly reduced durability.

With metal roof surfaces, although the stated air temperature range is the same for cement tiles, the surface temperature will rise at a much faster rate so the application time is reduced. As with cement tiles, the metal roof surface should not get too hot or the coating may cook or blister.

As a rule of thumb for all surfaces, **"If the roof is too hot to touch, it is too hot to paint"**.

**Humidity:** Humidity can also have a serious impact on film formation. As mentioned, it is very important that the water and coalescent release at about the same rate to achieve complete film formation. Under high humidity conditions, although the coating film remains open, the high water vapour content in the air will prevent water vapour from escaping from the film. The coalescent will release and the polymer particles will start to harden. Eventually the coating will dry but film formation will be very poor, resulting in low gloss, adhesion and durability. It is also why we strongly recommend the coating does not get applied within four hours of rain as the poorly formed film may wash off.

On the other hand, low humidity will allow the water vapour to escape from the film too quickly. This will cause the surface of the coating film to skin over too rapidly for correct coalescent and water release and entrap both the coalescent and water in the film. The coalescent will leach out of the film but the remaining water, subject to water vapour transmission rate, remains entrapped. Again the polymer particles start to harden, resulting in similar problems to those experienced under high humidity conditions.

**Film Thickness:** Film thickness is another critical factor in complete film formation.

A popular misconception is that "one heavy coat will work as well as two light coats." In fact, the opposite is correct. The thinner the coat the more chance the film has of releasing coalescent and water from all sections of the film, not just the surface. If the coating is applied too thickly, the surface will start to form a film but the middle and bottom of the coating will still contain both coalescent and water. As with high temperatures, the coalescent will leach out of the film but the water will remain entrapped. If a further thick coat is applied, it will redisperse the surface of the first coat and again skin over on the surface. In effect there will now be a thin surface of fully formed film but now a much larger amount of entrapped coalescent and water. Again the coalescent will leach out of the film and over a period of time the water will release as vapour. The overall result will be a very poor coating system which lacks adhesion, hiding power, gloss and long term durability. We recommend up to 200 micron (0.2 mm) dry film thickness for a 3 coat system. This will give optimum balance of hiding power, resistance to ultra violet light attack, long term durability and gloss. Generally, if the recommended usage guidelines for our products as stated in the Product Data Sheets, are followed, the correct dry film build for each coat applied will be obtained. It is possible to produce single coat high film-build coatings but these are very specialised.

**Number Of Coats In One Day:** We recommend 2 coats applied in one day as ideal for maximum film formation and film properties. Obviously this needs to be balanced with commercial considerations.

**Wind:** Wind speed can be a benefit particularly on cooler days. The wind will help drive the coalescent and water from the film and in this case will assist proper film formation.

High wind speed however can be a problem on hot days, drying out the film surface too quickly and resulting in similar concerns experienced with low humidity conditions.

These are not the only factors which can influence the film forming process. However if the recommendations discussed in our Product Data Sheets and Recommended Coating Application Procedures for Various Roof Tiles and Metal Surfaces are followed, we are confident that you will achieve the best result available with current technology.

The Manufacturer offers these recommendations and comments in good faith on the basis that they are used as a guideline only.