MIROTONE

Technical Bulletin

Temperature, Relative Humidity & Dew Point and their effects on PU Coatings

Ambient and Substrate Temperature

Based on first-hand experience, we all understand that ambient and substrate temperature can affect cure rate that directly alters application characteristics. Typically, colder temperatures delay cure and increase viscosity, inversely warmer temperatures accelerate drying rates and decrease viscosity.

During summer months, it is not uncommon to have a 10°C temperature change from morning to afternoon. This can produce inconsistent results in the final appearance such as lap lines and a variance in the gloss finish. Adjustments to your application technique, Part B and reducer may be required as the day progresses to compensate for quicker set times and lower viscosity.

Relative Humidity and Dew Point

Two Pack Polyurethane coatings are sensitive to moisture. Two Pack Polyurethane coatings are capable of being applied up to a maximum of 75% RH as long as the dew point is not reached. When there is excess moisture in the air, moisture can form on the surface of the coating film that will reduce the clarity of the finish.

We all know that early water contact with an uncured resin will contaminate the surface causing a variety of surface defects. As the relative humidity (moisture vapour) in the air increases, the potential for condensing as a liquid increases as the dew point is approached.

So what is Dew Point and how does it affect your project?

What is Dew Point

The air around us always has some water vapour present in it. Warm air can hold a greater quantity of water vapour than cold air.

Dew Point is defined as the temperature at which the saturation moisture content (100% RH) of air is reached. It is calculated on a combination of ambient air temperature and relative humidity.

As long as the air temperature remains above the Dew Point, the air is unsaturated; i.e. it is capable of holding additional water vapour.

If the air cools or comes in contact with a colder substrate, then the overloaded air gives up some of its excess moisture. The Dew Point is reached; condensation then converts moisture vapour

into a liquid water. We see this most mornings when the temperature has fallen and objects such as a car becomes cold enough for water to condense on it.

For Two Pack Polyurethane coatings this can manifest its self as a milky haze or streaks.

During painting the solvents are also evaporating from the applied coating which causes the surface temperature to fall. The effect is similar to sweat cooling the skin. If the Dew Point temperature is close to the actual air temperature, then the evaporation of solvent can (and often does) cause moisture to condense on the coating. This is why many coating manufacturers specify the air temperature must be at least 3°C above the Dew Point temperature.

Simply put, the Dew Point is equal to the temperature at which condensation begins to form, depending upon the amount of moisture (humidity) in the immediate, surrounding atmosphere. When condensation forms, it will do so on the surface.

Table of Average Temperatures & Relative Humidity / Dew Point (Brisbane)

Brisbane	Temperature	Relative Humidity	Dew Point
Annual average Winter	**16 ˚C**	**66 ˚C**	**10 ˚C**
Annual average Summer	**25 ˚C**	**56 ˚C**	**16 ˚C**
Annual average lowest	**9.5 ˚C**	**71 ˚C**	**4 ˚C**
Annual average highest	**29.4 ˚C**	**44 ˚C**	**15 ˚C**

Given Brisbane's average temperatures and humidity, conditions for Two Pack Polyurethane application are excellent. That's not to say painting multicomponent coatings (in particular Two Pack Polyurethane coatings) isn't challenging when applying at the top and bottom of the temperature and relative humidity scale.

It is recommended that an applicator monitor the temperature (surface and ambient), relative humidity and Dew Point of the of their surroundings. Having an understanding of these values enables the applicator to minimise the chance of surface defects such as poor uniformity in gloss, steaking, discolouration, adhesion problems and water marks.

Dew Point Calculator http://www.dpcalc.org/

www.mirotone.com