Paint Problems: Water and Weather

Managers' paint selection decisions must take into account long- and short-term weather conditions

— By Colin Penny

Despite impressive advances in recent years, paint formulating remains something of an art. One of the problems presented to any formulator, no matter how skilled, is the ever-present problem of water in the atmosphere. Whether in the form of rain or humidity, water creates serious problems. In many cases, the selection and application of the correct paint is as important as the formulation.

Water invading exterior building materials such as wood, masonry or metal, can destroy each of them in time. Humidity can be an equally pernicious adversary by promoting the growth of mildew and algae.

The stock advice for exterior painting is to select a primer carefully. Not doing so has undermined many exterior paint applications because when the primer fails, the finish coat inevitably will fail, no matter how good or expensive it is.

Humidity

In many parts of the country, high humidity can be as insidious to paint as water damage from rain. Humidity is the best friend of mildew and algae. A less-recognized failure associated with humidity is grain cracking in wood. Variations in humidity cause alternate swelling and shrinking of wood grain.

Humidity also can be a problem on interior surfaces, where mildew often develops in restrooms and kitchens. Again, the solution in such cases is to avoid solvent-based products in favor of latex-based paints. Most latex-based interior paints, however, are not generally formulated to resist mildew. The answer, therefore, is to use exterior mildew-resistant paint on these interior surfaces

Humidity can have a dramatic impact on the application of exterior paints. Most latex paint manufacturers recommend not applying their products when the temperature is below 50 degrees, but this caveat is not as simple as it sounds.

Latex-based paints use water as the solvent. During drying, water evaporates from the film, leaving what should be a tough, durable coating. The evaporation of water depends on ambient temperature and humidity. Lower temperatures slow down evaporation, but higher humidity reduces the evaporation rate.

Dew is created by falling temperatures following a humid day. As temperatures drop, the amount of water the air can hold decreases, and this is the relative humidity (RH). When the saturation point is reached, this is the dewpoint, and the air is at 100 percent RH. Any further drop in temperature causes dew on exposed surfaces.

If crews apply latex paint to an exterior surface when the RH is high, evaporation from the film slows. If the dewpoint is reached, a paint film actually can take up water. Painters have applied latex paint to an exterior surface, only to return the next day to find that it all has run off of the surface. Condensation diluted the latex paint, which literally ran off the surface.

A manufacturer who advises not to apply paint at temperatures below 50 degrees is trying to avoid problems with dewpoint.

It is acceptable to apply latex paint at 40 degrees if temperatures are rising. If the forecast at 9 a.m. indicates a possible high for the day of 65 degrees or so, and it is currently 40 degrees, it is safe to apply latex paint because on a rising temperature, humidity will fall, facilitating the evaporation of water from the film.

Once the paint film is cured, it is impervious to the dew that might occur during the ensuing few hours. But when temperatures begin to fall, the paint applicator needs to be on the alert. If the temperature at 3 p.m. is 50 degrees but falling and the forecast calls for an overnight low of 40 degrees or lower, then it is time to stop painting. To compound matters further, in coastal areas with higher humidity levels, painters must be even more diligent than those in areas of low humidity.

Seasonal issues

Seasonal changes also bear on the situation. Spring and fall tend to have much wider daily temperature swings than summer or winter. It is not unusual to have temperature variances of 30-40 degrees in spring and fall, which frequently leaves a smaller window for the safe application of latex paints.

While it might seem redundant, it is always wise to consult the local weather forecast before painting. Rare is the painter who has not experienced a sudden rain shower that washed away the last three hours of work.

Managers also should be aware that below-freezing temperatures can cause significant and permanent damage to the film. During the complex process of drying, water evaporates and particles of acrylic resin squeeze together to form the film with the pigments. If the still-wet film freezes, this coalescence cannot occur. Then, as the temperature rises, water will evaporate from the film, leaving random particles of uncoalesced resin. Without a continuous film, dried paint literally washes away during rains.

Solvent matters

Solvent-based paints are not immune from the vagaries of the weather and might be subject to the dewpoint effect in a somewhat less obvious way. Condensation on freshly applied solvent-based paints often is manifested by flat or dull spots that show up in the film several days later. Under such circumstances, the painter usually blames the product, not application conditions.

Solvent-based paints generally are not vulnerable to low temperatures, other than the drying time is increased. But these products become thicker at lower temperatures, making application more difficult. Before applying paint at low temperatures, put the paint container in a bucket of warm water, which will keep the paint in a workable condition and permit normal application.

As for paint applications during hot weather, it is advisable to follow the sun. In other words, paint on the wall surface that has been exposed to sunlight but is no longer in direct sunlight. On a wall surface that has been exposed to the sun and is still hot, it is recommended that the surface be sprayed with water and allowed to dry for 30 minutes before applying latex-based paints.

Colin Penny is president of Coatings Technology, Inc., a consulting firm in Hampton, Va.

Paint for All Seasons

Matching paint types to seasons and weather conditions is a challenge for managers, specifiers and paint crews. Compounding the choice is a variety of substrates that must be painted. Here’s a primer on key considerations in the decision-making process:

Solvent-based paints

Winter. Generally, solvent-based paints are safer to use than latex, particularly in northern parts of the country. Lower temperatures will slow drying times. Painters can improve application by warming the paint in a container of warm water. Pay attention to dewpoint.

Spring and Fall. Pay particular attention to the dewpoint to avoid moisture condensation on the undried film.

Summer. Paint “behind the sun,” but avoid painting especially hot surfaces — particularly metal — in order to avoid blistering that can

be caused by the excessive surface temperatures.

Latex-based paints
Winter. Some northern areas preclude the use of latex-based paints because of cool temperatures. Otherwise, pay close attention to the predicted low temperature.

Spring and Fall. Pay attention to the dewpoint and overnight low temperatures. Do not paint late in the day or on a falling temperature below 50 degrees.

Summer. Conditions favor the use of latex paints. Paint “behind the sun.” On hot surfaces, spray water on the surface, and allow at least 30 minutes for it to dry before application. The surface does not have to be perfectly dry.

— *Colin Penny*

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