Selecting the Right Coating

Know what goes in, before the finish goes on.

By Orville Brown

Choosing a coating used to be simple: Latex or oil? Gloss or flat? Interior or exterior? But as with so many things, it's not that easy anymore.

New technologies, environmental constraints, changing substrates and formulation advances have led to an unprecedented range of specialized coatings for every imaginable decorative and protective project in the general architectural market. That's good news for the finished product and the customer, but it does complicate the selection process.

One main source of help is coatings manufacturers, who are always concerned that their materials are selected and used judiciously. These manufacturers have technical support staff to answer your questions, and they are usually available to take your call.

If you want to use your own judgment to make the proper coatings selection, you can, of course, rely on your previous experience to some extent, but you also need to learn as much as you can.

One area of learning involves basic coatings chemistry and how the chemistry affects performance. Understand the basic generic types of coatings that are available, and the choices become simpler.

Christine Balderas

Classification: Binder Types

Although coating formulas employ many different types of raw materials, it is common to classify these products on the basis of one major raw material type: the binder. As the name suggests, this material physically binds the powdered pigment and other ingredients into a film, after the volatile ingredients of the solvent have evaporated.

Technical documents and other sources may also refer to binders as *resins, polymers* or *vehicles.* An example of a binder type is acrylic. In this article, and elsewhere throughout industry, we say that an acrylic is a generic type of coating.

Classifying coatings by binders, of course, still leaves a huge variety within any given generic type; features and performance properties will vary widely by brand, formulation and other factors.

Each generic type of coating will also have a wide range of product prices. It shouldn't be surprising that performance decreases (and increases) with price. Higher-priced materials usually have a higher percentage of solids content (binders and pigments) than lower-priced materials.

The descriptions that follow are generalized performance expectations for several generic types of coatings. These descriptions apply to coatings that conform to the U.S. Environmental Protect Agency's National Volatile Organic Compound Emission Standards for Architectural Coatings (40CFR59), which took effect Sept. 13, 1999.

In Southern California and other regions with more stringent VOC regulations, the VOC for some product types may be so low that certain generic binder types are no longer commercially available, or their performance has been compromised.

Vinyl Acetate Emulsions

Vinyl acetate emulsions—best known as latex paint—often referred to as PVA for polyvinyl acetate, are still the dominant waterborne vehicle for many interior architectural coatings. These products include general-purpose primers and sealers, as well as finishes in all gloss levels. PVA also commonly provides the base for block fillers used in dry, interior applications.

PVA interior finishes offer good scrubbability, stain resistance and touch-up capability. When formulated with superior materials that control application properties, PVAs also have excellent film build, flow and leveling.

PVA is seldom used as the only binder in exterior paints, but some lower-cost, lower-performing products do so. Many manufacturers commonly blend vinyl acetate emulsions with acrylic emulsions (see below) to improve the performance of interior paints or to reduce the cost of exterior finishes.

Latex describes the paint's physical form, not a generic binder type. Latex paints include PVAs, 100% acrylics and styrene acrylics.

Recent advances in PVA primers and finishes have focused on reducing their VOC to comply with stricter regulations. Many products are now available at 100 grams per liter (g/L) VOC or less.

Acrylic Emulsions

Acrylic emulsions are the premium binder for most waterborne architectural coatings. Paints that contain only these binders are typically described as *all acrylic* or *100% acrylic.*

Acrylics are unquestionably the superior material for exterior residential finishes. They offer excellent durability, chalk resistance, gloss retention and adhesion, as well as grain crack resistance on wood substrates. Like PVAs, they can be formulated for excellent film build, flow and leveling.

Acrylic coatings can also be used to protect concrete block, concrete and mortar. Paints with inferior caustic resistance to these high pH materials, such as PVA and oil-based paints, will fail prematurely—initially by losing gloss and perhaps color and, ultimately, by cracking, peeling and losing adhesion.

Although acrylic is a superior binder for interior paints of all sheens, most suppliers use PVA emulsions, not acrylics, to achieve their performance specifications for flat finishes.

Acrylics also have been the vehicle of choice for high-build elastomeric coatings, which provide good gloss, color and flexibility while resisting chalk and moisture.

When 100% Isn't Best

Despite acrylic's advantages, a 100 percent acrylic product should not necessarily be considered superior to acrylic formulations with different performance goals.

For example, acrylic emulsions are often styrene-modified in latex primers and sealers to achieve better performance than 100 percent acrylics.

Exterior primers with styrene modification offer excellent adhesion, grain crack resistance, tannin stain blocking and corrosion resistance. Specialty interior primers of this type excel at blocking many common household stains and ad-

See COATINGS on next page

COATINGS *from last page*
here to certain substrates better than other latex primers and finishes.

Other specialty acrylic emulsions employing this chemistry are used for primers and finishes for light- and medium-duty commercial maintenance on girders, bar joists, piping and other steel substrates.

Acrylics resist chemicals and corrosion like alkyds, but without their odor and flammability. They also generally dry faster than alkyds, allowing for multiple coats in a single day.

Alkyds

Solvent-borne alkyds (also known as oil-based products) have been the industry standard for interior gloss finishes for decades. Alkyds' high-gloss capability, flow and leveling, substrate wetting and adhesion with brush and roller application exceed those of acrylics.

Alkyds provide mid-level corrosion protection, making them popular choices for light-duty maintenance of beams, girders, tanks and other steel surfaces in office buildings, schools and process areas where the environment is not aggressive.

On the other hand, their high VOC content, flammability and odor make them less desirable for interior use. Alkyds are also slow to dry, tend to yellow over time, and most require solvent clean-up, making them less convenient than PVA or acrylic latex products.

Lower-VOC, solvent-borne alkyds have been developed, but even these continue to raise concerns, and ever-tightening VOC regulations may mean that alkyds' days are numbered.

Very recently, however, water-borne alkyd technology has been developed for interior trim finishes and specialty applications like stain-blocking primers and deck stains. These coatings have cost advantages over acrylics and PVAs, and may challenge on performance as well.

Polyurethanes

Single-component, solvent-borne polyurethanes are typically alkyds modified with urethane for improved abrasion resistance. Polyurethanes are good for floor and porch finishes, which require greater abrasion resistance than unmodified alkyds.

Except for their abrasion resistance, these polyurethanes have the same negatives as alkyds. For this reason, polyurethanes are also being displaced by tougher acrylic latexes and waterborne polyurethane dispersions that can stand up to foot traffic.

For salt-laden air and humidity in marine environments, as well as on boats, single-package, moisture-curing polyurethanes are very good coatings.

Acrylic Epoxies

Two-part acrylic epoxy finishes are interior waterborne coatings with performance properties that exceed those of most one-component acrylic latex paints. They are commonly used in schools, kitchens, gymnasiums and other institutions that demand greater resistance to abrasion and commercial cleaners than acrylic latex products can offer. Like acrylic emulsions, acrylic epoxies are low odor, low VOC, low flammability and fast drying.

Mike Clarke

Acrylics are your best bet for exterior residential finishes. They are durable, chalk resistant, retain gloss and adhere well. Acrylic coatings can also be used to protect concrete block, concrete and mortar.

Other Two-Part Epoxies

When an interior job demands more chemical and abrasion resistance than even an acrylic epoxy can provide, other two-component epoxy coatings usually make the grade. These higher-performance coatings may be either solvent-based or waterborne. With their odor, higher VOC and lower flashpoint, solvent-bornes may be ac-

See COATINGS on page 22