

For Customer Use Only

California Hardcoating Company

Technical Bulletin

Perma-New™ V-17, UV-absorbing, UV-curable Hardcoating

Chemistry, appearance, and solids:

Perma-New™ V-17 is a proprietary UV-absorbing, UV-curable resin formulation in organic solvents. The coatings are colorless to pale amber liquids containing 49% solids (i.e., polymerizable and non-volatile materials, not including solvents).

Typical uses:

Sheets, lenses, visors, and molded or fabricated products, especially transparent plastics; or as a protective coating over any rigid surface such as plastic, polished metal, wood or painted/varnished surfaces, especially when UV protection (absorption) is needed.

Abrasion resistance:

At target thickness of 8 to 12 microns on polycarbonate, when fully cured, it will resist 5 double rubs under medium thumb pressure with #0000 steel wool, with only a few dozen scratches. On harder plastics it resists scratches better, because of the support of the rigid substrate.

Adhesion:

100% using crosshatched tape adhesion test with 3M "Magic" brand scotch tape, on either acrylic or polycarbonate, without the use of a primer. Other plastics, glass, metal, etc., may require a primer or pretreatment.

Packaging:

- 5 gallon, high-density polyethylene rectangular tight head "Jerrican" container.
- 55 gallon, high density polyethylene tight head drum.

Health and fire hazards: Consult the MSDS (Material Safety Data Sheet).

Thickness, application conditions / methods and curing conditions:

Typical coating thickness: 8 - 12 microns. Humidity-tolerant during coating / curing to at least 65% RH. Air temperature in coating area can be any ambient indoor temperature. May be applied by dip, spray coating, spin coating, flow coating, etc. Supplied as a suitable mixture for spray coating. May be diluted with typical solvents (alcohols, esters, glycol-ethers, or ketones) if desired. For flow coating, we suggest using an 80:20 mixture of isopropanol and 2-methoxypropanol for dilution to about 30% solids, and to replace evaporation. Cures under UV light, preferably with a broad-spectrum, medium pressure mercury-vapor lamp, such as a Fusion Systems "H" bulb. Cure for at least three to five times the cure time needed for tack-free surface cure. Typical UV radiation dose needed is 1 Joule/cm².

Storage conditions:

If kept from UV or strong visible light, Perma-New™ V-17 will be stable in the original container for at least one year at ambient room temperature (below 100°F/38°C), and typically much longer.

Filtration:

The coating application, drying and curing areas should be supplied with Class 100 filtered air. The coating liquid should be continuously recycled through filters. For optics-critical applications, micron rating of the filters should be 1 micron absolute (i.e., membrane-type filter media). These should be supplemented with nominal or "depth" filtration either by selecting a combination membrane-depth filter, or preferably placing a nominal 1-micron polypropylene wound filter in a recycle loop, and the membrane filter (preferably a depth-type) in the branch that supplies the coating head/dispenser. For less-critical applications, the wound filter by itself will suffice.

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The coating liquid recirculation pump should be highly chemical-resistant, such as stainless steel, teflon and/or polypropylene. Pumps with closely-spaced, wetted surfaces sliding against each other, such as gear pumps or progressive-cavity pumps, will cause premature coating gelation/cure and “freeze-up” of the pump head. Diaphragm or peristaltic pumps are recommended. Chemical-resistant flexible tubing is needed for peristaltic pumping. Silicone tubing is not recommended. Tygon brand chemical-resistant polyurethane tubing formulation R-3603 has performed well in very short-term use, but is not recommended long-term. Formulation R-1000 is softer, and designed for peristaltic pump use, but has not been tested. Neoprene and EPDM are likely to be more resistant. Polypropylene or stainless steel is suitable for other tubing, fittings, filter housings, etc. Teflon is best for diaphragms, gaskets and valves in diaphragm pumps. A “Santoprene” diaphragm with EPDM valves works well, especially if the pump is rinsed with alcohol between uses. Do not use brass, copper, mild steel or iron in contact with the bulk coating liquid.

Chemical and heat resistance:

Perma-New™ V-17, when completely cured, is resistant to most solvents, including alcohols, esters, ketones, aromatics (benzene, etc.), aliphatics (gasoline, etc.), and mild aqueous solutions. However, it will be attacked by hot and/or strong bases, and may depolymerize and char above about 400°F (204°C).

General notes:

The following are critical to the success of the coating operation:

- 1) The substrate should be coated immediately after being injection-molded, if applicable. Otherwise it must be thoroughly cleaned, preferably in multiple, well-filtered ultrasonic baths, or using high-pressure sprays. Cleaning of large parts or sheets may be accomplished by hand wiping with low-particulate cleanroom -- using a degreasing solvent such as hexane or heptane followed by dry isopropyl alcohol and a de-stat blow-off, for best results. Static charge-neutralizing blowers should be used throughout the coating area, starting from the opening of the mold, removal of the substrates from cleaning baths, or removal of sheet masking paper or film.
- 2) The coating must be recirculated and filtered to 1 micron absolute (1 micron nominal, recirculating, for less-critical applications) to remove continuously-accumulating dirt, lint, and other foreign matter.
- 3) The critical coating zone, from the molding or cleaning/drying area to the point that the coating is cured must be kept supplied with clean, HEPA-filtered air (High-Efficiency Air Particle filter, class 100 nominal). It is far better to supply freshly-filtered air directly over the critical coating areas, than to try to keep the air in the whole room clean!
- 4) The equipment should be kept clean and intrusion of personnel into the critical coating application zone should be minimized or, if possible, eliminated.

Please call, email or fax to discuss any additional technical questions.

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