

# ACTEGA Kelstar Technical Bulletin

## UV Coating Degree of Cure

As the use of ultraviolet (UV) cured coatings increases in the Graphic Arts, so does the need to understand and monitor the degree of cure and properties of the product to achieve and maintain optimum performance.

Under-curing or over-curing a UV coating can and will affect such performance properties as inter-coat adhesion, gloss, rub & abrasion resistance, flexibility, slide angle (COF), chemical resistance and much more.

The Solvent Rub Test is often used to test degree of cure. An aggressive solvent, such as methyl ethyl ketone (MEK) is used to solubilize a cured UV film. UV coatings are crosslinking systems. Their resistance to solubilization is significantly improved over most conventional chemistries, and the UV material will increase in solvent resistance as the material polymerizes, or cures. Solvent rub has been adopted as a quick line test, and can be used effectively to determine degree of cure, provided its limitations are understood and accepted.

The number of solvent rubs or resistance is specific to a particular coating formulation for a predetermined set of conditions. Essentially, specifically the number of rubs achieved (test result) for a given coating will change if any of a number of conditions change, including film thick-ness, UV lamp wattage, line speed or substrate. For example, a thicker film, when cured will yield a higher number of rubs. Also, substrates which inherently have poor resistance to the solvent, will give lower numbers of rubs.

It must be understood that the solvent rub test should not be used to compare different coating formulas for degree of cure. Each UV coating has its own characteristic resistance to MEK that will deviate from the standard number of solvent rubs if the coating is not thoroughly cured. Different formulations can have widely varying rub results and still be properly cured. If solvent or chemical resistance is a specific requirement, then a formula with higher rub numbers is needed, and test results indicating this result are meaningful.

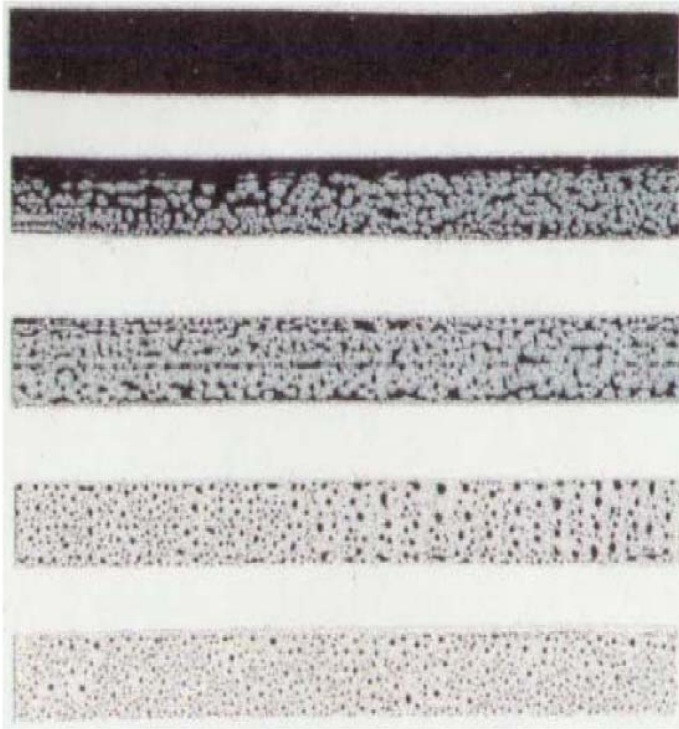
The marker pen is often used to determine degree of cure. In reality, this test is used to measure the marker reticulation pattern or the bloom of surface-active agents such as silicone. Coatings can be formulated with or without surface-active agents. If a coating is designed to have the silicone come to the surface when the coating is cured, then the test results will indicate whether or not the silicone has moved and the coating is performing as intended. Because some formulations will have silicone "bloom" with similar results when properly or improperly cured, it is important to verify the results with other tests.

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For coatings containing silicone ONLY  
Directions for Use

Utilizing a black Sanford Magic Marker, pull the marker across the surface of the cured sample over a non-image area of the coated signature. All sheets should be evaluated immediately after exposure.



1) Severely under exposed

2) Borderline cure

3) Optimal cure

4) Acceptable cure with possible low  
COF properties

5) Over exposed will cause poor  
scratch adhesion and severe sheet curl

For support in understanding the use of these and other cure tests with ACTEGA Kelstar UV coatings, please contact your local ACTEGA Kelstar representative.

**Contact ACTEGA Kelstar** at 856 829 6300 or [info.actega.kelstar@altana.com](mailto:info.actega.kelstar@altana.com) for additional information or technical assistance.