SELVOL™
POLYVINYL ALCOHOL

Polyvinyl Alcohol Barrier Coatings for Silicone Coated Release Base Paper

Selvol Polyvinyl Alcohol (PHOV) as a surface size provides excellent holdout properties for silicone coated release base paper. Due to its superior film forming capabilities, super and fully hydrolyzed grades of polyvinyl alcohol are recommended to impart the necessary sheet Gurley density, Cobb-Unger holdout, and water resistance properties required for this application. In addition, PVOH is inert to silicone curing systems and dries to a transparent film.

Among the many requirements for release base paper which is to be silicone coated, "good hold" from the silicone coating ranks as one of the more important. Silicone coatings, whether solvent, 100% solids, or emulsion based, are very effective as release coats when applied as thin films. However, due to their relative expense and need for a continuous coating without pinholes, the silicone coating must remain on the surface rather than be absorbed into the base sheet. To prevent silicone absorption, surface application of a barrier coat is often utilized and Selvol PVOH is among the best barrier coats available for a variety of reasons.

The performance benefits of Selvol PVOH are related to its excellent film forming capabilities and solvent resistance properties. As a film former, PVOH helps seal the sheet surface, closing off pores and decreasing sheet porosity. Low porosity, high density paper is generally required for good silicone holdout. In addition, Selvol PVOH has excellent organic solvent and water resistance properties. And finally, Selvol is chemically inert to the catalyst systems used for curing silicone coatings, has excellent adhesion to both cellulose and silicone through hydroxyl hydrogen bonding, and is transparent after drying on the sheet surface.

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RECOMMENDED PVOH GRADES FOR SILICONE BASE SHEET

Super hydrolyzed (99.3+% hydrolysis) and fully hydrolyzed (98.0 - 98.8% hydrolysis) grades are recommended for holdouts of all silicone coating types. These grades provide the best characteristics for silicone coating as follows:

- good solvent holdout
- good water resistance
- low to no foaming
- excellent film forming characteristics

The actual grade selected will depend on the viscosity requirement for the application equipment used to apply the Selvol PVOH.

Grade	Hydrolysis, %	4% Solution Viscosity (cPs)
Selvol PVOH 125	99.3+	28.0-32.0
Selvol PVOH 325	98.0-98.8	28.0-32.0
Selvol PVOH 310	98.0-98.8	9.0-11.0
Selvol PVOH 107	98.0-98.8	5.5-6.5

BASE SHEET LINER REQUIREMENTS

PVOH, as a clear surface size barrier coat, can find utility in two of the important liner types, Glassine and Super Calendered Kraft (SCK) papers. Some typical requirements for Glassine and the SCK liner types include:

	Glassine	SCK
Gurley Density sec./100cc	> 20,000	> 12,500
Unger Absorption	0.5 - 0.9 g/m² absorbed	0.7 - 1.0 g/m² absorbed
Cobb Absorption	< 25 g/m²	< 25 g/m²
Transparency	45 - 55%	40 - 44%

GURLEY DENSITY

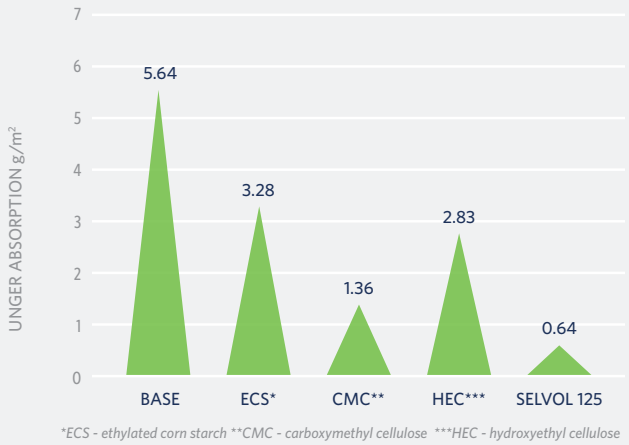
Gurley density (or decreased sheet porosity) is the result of proper fiber selection and controlled fiber refining, followed by sheet densification in the wet press and calendar stack. A surface size application of PVOH reduces the sheet porosity (or increases the sheet density) even further by closing the sheet pores. Selvol PVOH reduces the sheet porosity better than other water soluble binder types as shown in Figure 1, above right.

FIGURE 1: Gurley Density After Super Calendering

UNGER-COBB ABSORPTION

The Unger-Cobb test is an indirect method of measuring the holdout of a potential silicone coating by substituting castor oil for silicone. In this test, the lower the absorption, the better the holdout. PVOH provides the best holdout due to its excellent oil and solvent barrier properties coupled with its film forming characteristics. Figure 2, below, demonstrates the superior Unger absorption of Selvol PVOH as compared to other water soluble binder types.

FIGURE 2: Unger Absorption After Super Calendering



COBB-WATER ABSORPTION

Water resistance is another important attribute for silicone coated base paper. Good water holdout translates to good holdout for silicone emulsions. In addition, water resistance is important to prevent calendaring pick for glassine papers which are often remoisturized off the paper machine prior to supercalendering. Figure 3, below, demonstrates the Cobb-Water resistance of Selvol PVOH versus other water soluble types. The water resistance of PVOH can be improved further with the use of a crosslinker.

CROSSLINKING ADDITIVES

Crosslinking aids such as glyoxal can be added to the Selvol PVOH formulation to improve the water resistance. Crosslinking will prevent picking of the PVOH surface size on the supercalendar rolls when remoisturizing the sheet at levels of 15 to 20% required for densification of glassine papers. Glyoxal addition levels of 2 to 6% dry on dry PVOH is recommended.

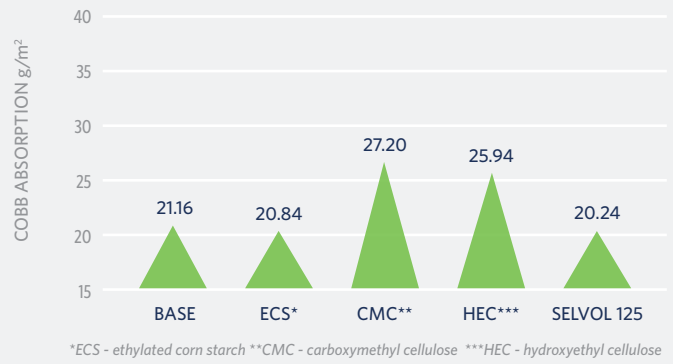
OTHER IMPORTANT PVOH CHARACTERISTICS

PVOH dries as a transparent, tough film with good tensile strength properties. These attributes are important for high-speed labeling applications where sheet transparency is required for photocell detection and tensile strength is required to prevent web breaks. In addition, PVOH is inert to the metal catalysts used in the silicone cure systems. Therefore, it does not interfere with final release properties.

METHOD OF APPLICATION

PVOH can be applied to the sheet surface in a number of ways including rod application, metering size press and conventional size press. These methods allow the wet PVOH layer to remain on the sheet surface where the dried film can provide the silicone barrier properties. Typically, a PVOH coat weight of 0.5 to 2.5 g/m^2 will be sufficient to achieve the end use properties required for good silicone holdout.

FIGURE 3: Cobb-Water Absorption



*ECS - ethylated corn starch **CMC - carboxymethyl cellulose ***HEC - hydroxyethyl cellulose

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