

Selvol™ 165SF Poly(vinyl alcohol): Addition to Wet End For Sheet Physical Strength

Polyvinyl Alcohol Technical Bulletin



Selvol 165SF poly(vinyl alcohol) (PVOH), when added as a dry powder to the wet end of a paper furnish, can provide significant wet- and dry-strength paper properties.

Selvol 165SF PVOH is a super-hydrolyzed, very high molecular-weight grade of PVOH which has been ground to a fine particle size (see Typical Properties chart). This grade of PVOH can be added directly to the furnish after refining and provide strength properties through hydrogen bonding with the cellulosic fiber matrix.

Figures 1 through 4 (see back page) illustrate the strength potential of Selvol 165SF poly(vinyl alcohol) at various addition levels in a 60 gram/m² basis weight sheet having an unrefined furnish of 25% softwood / 75% hardwood fibers containing 6% and 15% ash, respectively.

Mechanism for Strength Improvement

Selvol 165SF poly(vinyl alcohol) is supplied as a fine particle size granule which swells in water and is retained by mechanical entrapment in the fiber matrix during sheet formation. The PVOH dissolves in the early stages of drying, then re-solidifies upon further drying. Strength is obtained through hydrogen bonding between the hydroxyls of the PVOH backbone and the hydroxyls of the cellulose. Wet strength under ambient temperature conditions is also achieved due to the highly crystalline nature of this grade of PVOH.

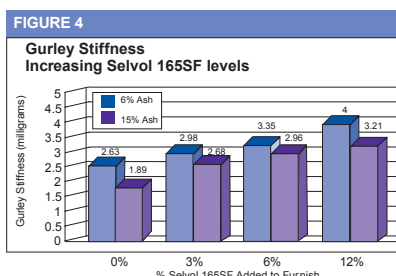
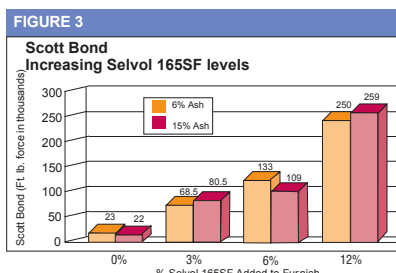
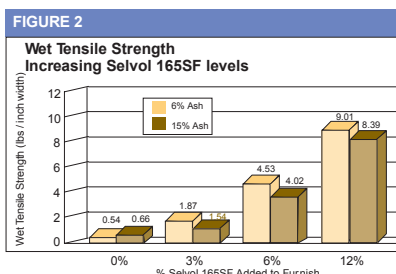
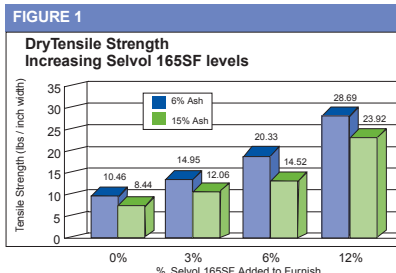
Typical Properties of Selvol 165SF PVOH

Hydrolysis	99.3% +
4% solution viscosity	62-72 cps
pH	5.5 - 7.5
Volatiles	5% max
VOC's	1% max
Ash	1.2% max
Particle Size	99% through 120 mesh screen

Other Benefits Of Selvol 165SF PVOH Wet End Addition

- Wet and dry strength continue to increase with higher levels of product addition.
- Paper is completely repulpable at 150 °F without the need for pH adjustment.
- The product has potential applications as a ply bond aid for cylinder board, multi-ply board and paper.

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Method of Addition

Add Selvol 165SF PVOH dry powder directly to the fiber furnish after refining. Or, slurry in water and add to the stock at a convenient location prior to sheet formation.

The particles should mix with the furnish or in the water slurry for a minimum of 60 minutes at temperatures <120 °F. This time and temperature allows the particles to swell, an important feature for subsequent strength development.

Selvol 165SF PVOH is retained in the sheet through fiber mechanical entrapment. Because the polymer is nonionic, retention aids are ineffective as a retention mechanism.

Sheet Conditions for Strength Development

In order for the PVOH to properly develop sheet strength, sheet moisture should be at a minimum of 70% when entering the main section dryer cans. Sheet moisture helps to soften or plasticize the PVOH allowing it to flow when heated.

Processing Aids

Due to the adhesive-like nature of the swollen PVOH particles, a release agent is recommended to prevent the PVOH particles from sticking to dryer can surfaces. The release agent can be applied to the sheet surface at the wet press or sprayed onto the sheet prior to entering the dryer section. Approximately 3 milligrams/ft² of as received release agent is required depending on PVOH quantity and water hardness. The release agent can be obtained from Sequa Chemical or Buckman.

FDA Status

Poly(vinyl alcohol) is used in many food contact applications including food packaging adhesives and coatings for paper and paperboard. For more information on the FDA status of Selvol 165SF PVOH please contact our Product Information Center at +1 281-280-3460.

Patent Status

The use of Selvol 165SF PVOH as a wet-end strength additive is covered under Patent No. 5,328,567 assigned to Custom Papers Group, Inc.

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