

## POLYMER INNOVATIONS

### BINDERS & PASTES for MULTILAYER CERAMICS

#### The Only Water-Based, Non-Toxic Tape Casting Binder System that Matches Existing Solvent Processes

Polymer Innovations supplies new water soluble and conventional solvent-based tape casting binder systems. The innovative water based system is binder and surfactant in one, allowing manufacturers to achieve tape properties that until now were only possible in solvent systems.



In combination with these systems, Polymer Innovations also provides compatible paste systems and paste vehicles. These can be customized to composition, for piezo or for your current tape or fuel cell application (based on proprietary materials or ready to use compositions).

Polymer Innovations can also supply termination pastes and paste binders. A very successful product is the VT-series BME termination binder, fully compatible with the burn-out of copper containing systems.



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## POLYMER INNOVATIONS

### Innovations in Water-Based, Non-Toxic Tape Casting Binder Systems

Product	Comments	Product	Comments
<i>Basic Water Based Binder System and Additives:</i>		<i>Dispersing Agents</i>	
WB4101	Water based binder with basic defoamer, wetting agents and other additives. Binder also acts as ceramic dispersant and therefore typically 25-50% of the total binder should be included in the grinding stage.		<i>Note: Normally the best dispersant for WB4101 is actually WB4101 since it is similar in nature to popular ammonium polyacrylate dispersants. The use of the popular ammonium polyacrylate dispersants will result in much lower tape strength. Below are compatible dispersants for specific applications.</i>
<i>Defoamers</i>			
WT001	Non-silicone mild defoamer also helps wet out surface area of powders.	DS003	Very low silicone content polycarboxylic acid polymeric dispersant. Improves wetting to siPET casting film.
DF001	Modified silicone copolymer especially effective when combined with WT001 but with some powders can cause crater or fish eye defects.	DS004	Phosphoric ester salt of polymeric dispersant.
DF002	Non-silicone mild defoamer most commonly used.	DS005	Strong polymeric dispersant
<i>Plasticizers</i>		<i>Wetting Agents</i>	
PL001	Neutral pH standard type plasticizer to help flexibility and ability to laminate the tapes. Will cause some increase in viscosity.	WT001	Non-silicone, wets surface of powders. Does not increase siPET wetting. Acts as mild defoamer.
PL002	High pH plasticizer, similar to PL001 but more reactive with binder. Also increases binder dispersion power if included in stage 1. Due to high pH can make dried tape more susceptible to water attack.	WT005	Modified silicone helpful in preventing pinholes, craters and mud cracking.
PL005	Very high pH plasticizer, similar to PL002 but even more reactive with binder. Strong reactivity can help manage certain difficult powders. Due to high pH can make dried tape more susceptible to water attack.	WT006	Water compatible acrylic leveling agent. Helpful in eliminating pinholes and craters.
PL006	Neutral pH plasticizer which tends to quickly make the tape very soft with high elongation especially when used with PL002.	WT007	Modified silicone helpful in preventing pinholes, craters and mud cracking. May increase foam and reduce ability to laminate.
<i>Release agents</i>		BR010	Modified silicone additive increases wetting to siPET film and powder. Allows for easier release from siPET.
BR008	Added to second stage will help tapes release from steel belt casting surfaces. Should avoid premixing with the binder as it can cause temporary binder precipitation.	<i>PVB Solvent Based Additives</i>	
BR009	When used in combination with the BR008 can help increase steel belt release and tape strength.	MW1010	Solid resin additive helpful for increasing viscosity stability and ability to tack tape for certain more reactive ceramics - especially containing boron. If ineffective try MW1020.
BR010	Modified silicone additive increases wetting to siPET film and also makes release from siPET even easier.	MW1020	Liquid additive helpful for increasing viscosity stability and ability to tack tape for certain more reactive ceramics - especially containing boron. If ineffective try MW1010.
BR012	Probably the best steel belt release agent for most powders. It yields a tough tape which is easy to release from steel belt casting surfaces.	<i>Vehicles</i>	
<i>Additives to allow thicker casting (Useful when casting greater than 50 microns depending on the ceramic).</i>		VS- series	Available in a variety of drying rates and tack levels. Compatible with printing on most ceramic tapes and fired substrates. Supplied in constant solids high and low viscosity end members. Thinners also included.
TK004	Typically used about .4% TK004 and TK005 together. These additives work to stabilize thick sections of tape during drying to allow thicker casts. They prevent cracking and ceramic settling. They can also stabilize small bubbles which may require more rigorous defoaming or defoaming additives.	VT-series	For production of termination pastes including non-oxygen (BME) firing systems. Modifying additives also available.
TK005	See TK004.	<i>Custom Thick Film Pastes</i>	
			Inner electrode, thick film screen printing, precious metal, cutline, polymer thick film, adhesives, or with customer supplied filler.