

# VINNEX® RESINS FOR PAPER COATING

## Improved Processing and Performance of Biopolyesters in Paper Coating

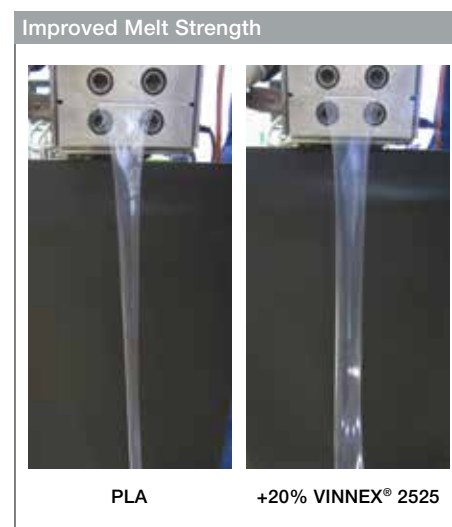
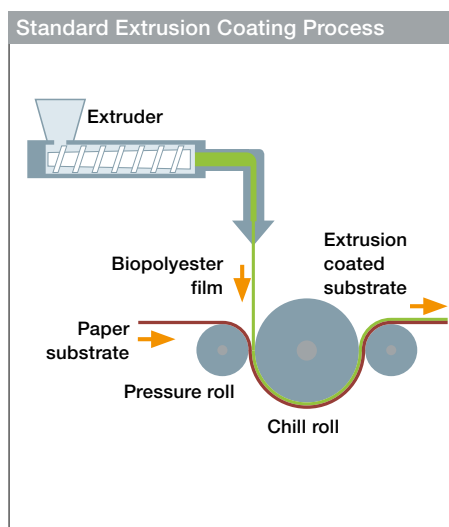
Extrusion coating is a versatile coating technique used for the economic application of various plastics onto substrates, such as paper. Conventional paper coating utilizes low-density polyethylene (LDPE), but LDPE has several drawbacks: use of non-renewable resources, lack of biodegradability and difficulties in recycling. In contrast, biopolyesters such as polylactic acid (PLA) are biobased, maintain biodegradability and do not interfere with the paper recycling process.

With VINNEX®, WACKER offers polyvinyl acetate (PVAc) based resins that can considerably improve the mechanical properties and the processing performance of biopolyesters in the extrusion coating of paper, making them better substitutes for conventional LDPE.

### Improved Processing Performance through Reduced Necking

Conventional PLA has a relatively low melt strength which can cause problems during extrusion paper coating. Necking causes uneven distribution of the film on the substrate material.

Adding VINNEX® 2525 increases the melt strength resulting in significantly reduced necking during extrusion coating. In cases where both improved necking and heat-sealing properties are desired, VINNEX® 2523 is the right choice.



Product Recommendations and Properties												
Product	Necking	Heat sealing	Tack	Composition	Form	Tg [°C]	Density [kg/m³]	Bulk density [kg/m³]	MFR melt index [cm³/ 10 min]	Use level [%]	Food contact¹	
VINNEX® 2522	–	●●	●●	PVAc	Beads	42	1,180	550–800	21.9²	5–10	Yes	
VINNEX® 2523	●	●	●	PVAc	Micro-Pellets	43	1,180	700–850	7.0³	10–20	Yes	
VINNEX® 2525	●●	–	–	PVAc	Micro-Pellets	44	1,180	700–850	15.4⁴	10–20	Yes	

- Strong positive effects
- Positive effects
- No effect

¹ Suitable for food contact according to the EU regulations for Food Contact and FDA (US Food and Drug Administration, §175.105, §175.300, §176.170 and §176.180)

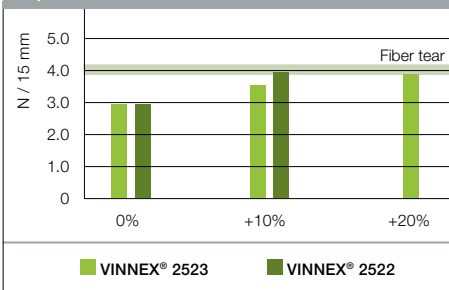
² MFR melt index measured at 130 °C / 2.16 kg / 2 mm

³ MFR melt index measured at 150 °C / 2.16 kg / 2 mm

⁴ MFR melt index measured at 150 °C / 21.6 kg / 2 mm

Note: These figures are intended as a guide and should not be used in preparing specifications.

**Improved Heat-Sealing to Paper Substrates**



The seal bond strength of PLA and PLA/VINNEX® resin films to paper was determined after heat sealing at 120 °C.

**Improved Heat Sealability**

Sealing of conventional PLA films is difficult and leads to a weak seal bond strength. This can cause severe problems in applications where seal bond strength is crucial, such as paper cups. For acceptable seal bond strength, the sealing temperature must be much higher than that for conventional LDPE. However, higher temperatures and longer sealing times are often not possible or else significantly reducing throughput in standard equipment. VINNEX® 2522 is ideal for improving heat-sealing properties. If necking is also a concern, we recommend VINNEX® 2523.

**Improved Tack for Better Adhesion to Paper Substrates**

Conventional PLA has relatively low tack and consequently does not adhere well to substrate surfaces. This leads to lower throughput and difficulties during extrusion coating.

**Improved Tack for Better Adhesion to Paper Substrates**



PLA/VINNEX® resin film was welded to a paper substrate at 120 °C. Strong adhesion is observed when sealed materials are pulled apart (fiber tear).

Adding VINNEX® resins can significantly increase the tack of the coating, thereby enabling a smooth, fast production process. Where tack is the major concern, we recommend using VINNEX® 2522. VINNEX® 2523 may also be used to improve the tack.

**Biodegradability of Biopolyesters Can be Maintained**

Various blends of biopolyesters with WACKER's polyvinyl acetate resins have already passed the industrial composting test (ISO 14855 or EN 13432). As with every bioplastic compound, biodegradation largely depends on the formulation and has to be determined case by case. For more detailed information, please contact our technical service.

**All Grades Can be Used in Food Contact Applications**

VINNEX® 2522, VINNEX® 2523 and VINNEX® 2525 can be used in food contact applications according to EU regulations for Food Contact and the US Food and Drug administration (§175.105, §175.300, §176.170 and §176.180).

**At a Glance: Advantages of VINNEX® Resins for Paper Coating**

- VINNEX® resins are ideal modifiers and processing aids for extrusion paper coating applications with biopolyesters, such as PLA and PLA/PBAT blends
- VINNEX® 2525 is ideal for improving melt strength and reducing necking during extrusion coating
- VINNEX® 2522 is ideal for improving heat sealability on standard LDPE equipment
- VINNEX® 2522 is equally adept at improving tack and leads to better adhesion to the paper substrate
- VINNEX® 2523 is the ideal choice if necking, heat sealability and tack need to be improved at the same time
- Biodegradability of biopolyesters can be maintained
- All three grades can be used in food contact applications (EU and FDA)



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