



BYNEL™ 50E109

Adhesive Resin

General Information

Product Description Dow™ BYNEL™ 50E109 Adhesive Resin is an anhydride-modified, polypropylene resin. It is available in pellet form for use in conventional extrusion and coextrusion equipment designed to process polypropylene(PP) and polyethylene (PE) resins.

Status

Material Status Developmental: Active

Typical Characteristics

Composition Medium% By Weight Maleic Anhydride
Graft levels are defined as:
Low < 0.2%; Medium 0.2-0.5%; High 0.5-1.0%; Ultra high > 1.0%

Characteristics / Benefits Physical properties of BYNEL™ 50E109 Adhesive Resin are typical of polypropylene resins with similar density and melt flow rate values.

Applications BYNEL™ 50E109 Adhesive Resin is most often used in coextrusion with PP, EVOH, and polyamide.

Typical Properties

Physical	Nominal Values	Test Method(s)	
*Density ()	0.908 g/cm ³	ASTM D792	ISO 1183
*Melt Flow Index (230°C / 2.16 kg)	3.1 g/10 min	ASTM D1238	ISO 1133
Thermal	Nominal Values	Test Method(s)	
*Melting Point(DSC)	125 °C (257 °F)	Dow Method	
Vicat Softening Point ()	88 °C (190.4 °F)	ASTM D1525	ISO 306

Adhesive Evaluation The performance of any adhesive resin should be evaluated within the context of the application. The adhesive is designed to bond materials that would not ordinarily adhere to each other. In most cases, peel strength is used as a measure of performance. Although this is a convenient test, peel strength is affected not only by adhesion, but also by peel angle, separation rate, temperature, and tensile and modulus properties of the materials, and often by the time elapsed since the formation of the bond. Post-treatment of the multi-layer structure, such as heat sealing, thermoforming or orientation can also affect peel strength.

If peel strength is used as a measure of adhesive performance, it is imperative that peel strength be evaluated not only at the time of manufacture, but throughout the life of the product and under all the various conditions to which the structure will be exposed. Only then can the performance of the adhesive be related to peel strength.

Processing Information

***Maximum Processing Temperature** 260 °C (500 °F)

General Processing Information The temperature profiles shown below are for initial evaluations. These profiles are designed to provide adequate exposure time of the adhesive resin to elevated temperatures. Exposure to elevated temperatures activates the anhydride, which improves the bonding capability of the adhesive resin. Regardless of the profile used, the adhesive resin should be exposed to temperatures above 210C (410F) for several minutes prior to contact with the other molten resins in coextrusion in order to ensure adequate performance of the adhesive resin
In coextrusions with thermally sensitive resins such as EVOH or EVA, we suggest



that the maximum melt temperature be limited to 235C (455F) to guard against overheating the EVOH or EVA. If adhesion results are adequate, we suggest evaluating even lower melt temperatures such as 210 - 220C (410 - 428F).

For coextrusion with polyamides or other thermally stable resins, the melt temperature can be higher. We suggest a maximum melt temperature of 260C (500F). This should provide acceptable bond strengths and film quality under almost all coextrusion conditions. If adhesion results are adequate, melt temperatures can be lowered. While it is possible to extrude this resin as high as 300C (572F), such high extrusion temperatures, particularly when coupled with long residence times, may result in some film imperfections. In certain streamlined extrusion operations, where residence times are short, it may be possible to use temperatures higher than 260C (500F).

Variation of these suggested temperature profiles may be appropriate depending upon the screw configuration, potential extruder horsepower limitations, potential back pressure limitations, and the need to match rheology and/or the stability of the other resins in the coextrusion. Film quality will also depend upon the residence time of the adhesive resin in the system. Dead spots may result in localized overheating and should be avoided by ensuring the flow path for the adhesive is as streamlined as possible.

We suggest using any standard polyolefin working screw when extruding this resin. Excessively deep flights should be avoided as they might result in poor melting of the adhesive resin. It is also important to properly size the extruder for the output desired. Running large extruders at very low RPMs should be avoided.

If the coextrusion process is stopped for short periods of time, the screw in the adhesive extruder should be kept turning at a low RPM level. For a permanent shutdown, this resin should be purged out using an available polyethylene resin run at the same extrusion temperature used during the extrusion process of the adhesive resin. Making frequent changes in screw speed during the shutdown process and subsequent start-up will help remove the previous material from the system more effectively. Sometimes upon start-up of the adhesive resin, excessive amounts of gel may be observed. This may be due to the natural ability of the adhesive resin to act as a purging compound. In this case, continued extrusion will eventually clear up the problem.

CoExtrusion w/ EVOH Processing Information

Feed Zone	160 °C (320 °F)
Second Zone	210 °C (410 °F)
Third Zone	235 °C (455 °F)
Fourth Zone	235 °C (455 °F)
Fifth Zone	235 °C (455 °F)
Adapter Zone	235 °C (455 °F)
Die Zone	235 °C (455 °F)

Nominal Values Proposed Extruder Set Temperatures

CoExtrusion w/ Nylon Processing Information

Feed Zone	160 °C (320 °F)
Second Zone	235 °C (455 °F)
Third Zone	260 °C (500 °F)
Fourth Zone	260 °C (500 °F)
Fifth Zone	260 °C (500 °F)
Adapter Zone	260 °C (500 °F)
Die Zone	260 °C (500 °F)

Nominal Values Proposed Extruder Set Temperatures



FDA Status Information

Dow™ BYNEL™ 50E109 Adhesive Resin:

When used unmodified for food contact applications, the product will comply with the following U.S. Food and Drug Administration Food Additive Regulations:

U.S. FDA 21 CFR 175.105(c)(5)

U.S. FDA 21 CFR 177.1520

~ Any base resin complies as a notified food contact substance as a result of a premarket notification or is covered under 21 CFR § 177.1520(c)(6). An additive in this formulation causes this material to be limited to use as the adhesive component in multilaminate structures, or as the sealant layer in flexible packaging, in contact with food at temperatures not exceeding 49 °C (120 °F).

The information and certifications provided herein are based on data we believe to be reliable, to the best of our knowledge. The information and certifications apply only to the specific material designated herein as sold by Dow and do not apply to use in any process or in combination with any other material. They are provided at the request of and without charge to our customers. Accordingly, Dow cannot guarantee or warrant such certifications or information and assumes no liability for their use.

