DuPont Packaging & Industrial Polymers

DuPont™ Bynel® 1124

Bynel® resins Product Data Sheet

Description

Product Description	BYNEL® Series 1100 resins are modified ethylene vinyl acetate polymers. They are available in pellet form for use in conventional extrusion and coextrusion equipment designed to process polyethylene (PE) resins.

Restrictions

Material Status	• Commercial: Active

Typical Characteristics

Characteristics / Benefits	Physical properties of BYNEL Series 1100 resins are typical of EVA resins with similar density and melt index values.
Applications	BYNEL 1100 series resins adhere to a wide variety of materials. They are most often used to adhere to PE, ionomers, EVA, and in some cases PVC, PS. HIPS, and PP.

Typical Properties

Physical	Nominal Values	Test Method(s)	
Density ()	0.95 g/cm³	ASTM D792	ISO 1183
Melt Flow Rate (190°C/2.16kg)	25 g/10 min	ASTM D1238	ISO 1133
Thermal	**Nominal Values**	**Test Method(s)**	
Melting Point (DSC)	70°C (158°F)	ASTM D3418	ISO 3146
Freezing Point (DSC)	51°C (124°F)	ASTM D3418	
Vicat Softening Point ()	49°C (120°F)	ASTM D1525	ISO 306

Additional

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

General

Maximum Processing Temperature	235°C (455°F)
General Processing Information	The temperature profile shown below is for initial evaluations of BYNEL adhesive resins in the 1100 series. Because the BYNEL 1100 Series resins have low softening points, it is a good idea to run the rear of the extruder as cool as possible, then build quickly to the melt temperature. Water cooling of the screw and/or hopper feed throat may help avoid bridging problems. We suggest that the maximum melt temperature be limited to 235C (455F) to guard against overheating the EVA. If adhesion results are adequate, we suggest evaluating even lower melt temperatures. Variation of these suggested temperature profiles may be appropriate depending upon the screw configuration, potential extruder horsepower limitations, potential back pressure limitations, the need to match rheologies 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 a standard polyolefin screw when extruding BYNEL 1100 series resins. Excessively deep flights should be avoided as they might result in poor melting of the adhesive resin. Excessively high shear screws should also be avoided to minimize gel and degradation formation. It is also important to properly size the extruder for the output desired. Running large extruders at very low RPMs should be avoided. For producing monolayer adhesive films with BYNEL 1100 adhesive resins, extrusion conditions commonly used for converting ethylene vinyl acetate resins into films can be employed. When extruding BYNEL 1100 series resins as an exposed outer surface in a multi-layer coextrusion, problems related to the tackiness and high coefficient of friction of these products may be evident. In this case, it is suggested that the extrusion temperature be lowered to 160C - 185C (320 - 365F) or less. Addition of slip and silica-based antiblock packages may also be appropriate to prevent blocking and improve film handling, although these additive packages may modify the resin's bonding characteristics. 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, the BYNEL adhesion 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. Materials of construction used in the processing of this resin should be corrosion resistant. Stainless steels of the types 316, 15-5PH, and 17-4PH are excellent, as is quality chrome or nickel plating. Type 410 stainless steel is satisfactory, but needs to be tempered at a minimum temperature of 600°C (1112°F) to avoid hydrogen-assisted stress corrosion cracking. Alloy steels such as 4140 are borderline in performance. Carbon steels are not satisfactory. While stainless steels can provide adequate corrosion protection, in some cases severe purging difficulties have been encountered. Nickel plating has been satisfactory, but experiments have shown that chrome surfaces have the least adhesion to acid based polymers. In recent years, the quality of chrome plating has been deteriorating due to environmental pressures, and the corrosion protection has not always been adequate. Chrome over top of stainless steel seems to provide the best combination for corrosion protection and ease of purging.

Extrusion Coating/Lamination Processing	Nominal Values

Extrusion Processing Information	Suggest extruder temperature set profile
Feed Zone	135°C (275°F)
Second Zone	160°C (320°F)
Third Zone	185°C (365°F)
Fourth Zone	210°C (410°F)
Fifth Zone	235°C (455°F)
Adapter Zone	235°C (455°F)
Die Zone	235°C (455°F)

FDA Status Information	BYNEL 1124 resin conforms with the Code of Federal Regulations, Title 21, Paragraph 177.1350, covering their uses in direct contact with food, subject to the extractive limitations of the finished goods contact articles as described in the regulation.
Regulatory Information	For information on regulatory compliance outside of the U.S., consult your local DuPont representative.
Safety & Handling	As with any hot material, care should be taken to protect the hands and other exposed parts of the body when working with molten polymer. At temperatures above 238C (460F), these resins can evolve low concentrations of fumes. When resins are overheated, more extensive decomposition may occur. Because fumes produced during exposure to high temperatures may be combustible, exposure of overheated resin to atmospheric oxygen should be avoided if possible. Adequate local ventilation should be provided to remove the fumes from the work area. Disposal of scrap material presents no special problems, and may be accomplished by landfill or by incineration by a properly operated incinerator. Disposal should comply with local, state, and federal regulations. Resin pellets can be a slipping hazard. Loose pellets should be swept up promptly to prevent falls. For more detailed information on the safe handling and disposal of these resins, a Product Safety Bulletin and OSHA Material Safety Data Sheets can be obtained from the Regional Office serving you.

Read and Understand the Material Safety Data Sheet (MSDS) before using this product

Regional Centres

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