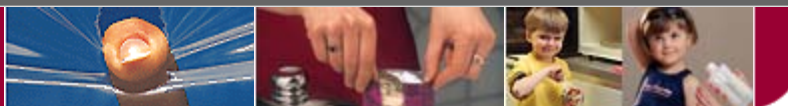


Product Information

Bynel® resins



[Click to print.](#)
For more information, e-mail us at: packaging@dupont.com

DuPont™ Bynel® — More Choices, More Options, More Answers

Bynel® adhesive resins are a unique family of thermoplastic polymers designed to bond a wide variety of substrates in a variety of processes. The Bynel® family of adhesives is the result of years of development effort by a dedicated technical organization relying upon DuPont world renown capabilities in adhesion science and polymer modification.

Bynel® adhesive resins are coextrudable, uniting resins with different properties into a single structure. The use of Bynel® adhesive resins is also an environmentally friendly solution to your adhesion problem. These 100% solids adhesives eliminate the need for solvents and the energy intensive processes required to dry solvent- and aqueous-based adhesives. They can also be extruded as adhesive films and thermally laminated between solid substrates.

Products Designed to Meet Your Needs

The Bynel® product line covers a wide range of chemistries and rheology.

- Products based on ethylene vinyl acetate, polyethylene, polypropylene, acid copolymers, and ethylene/acrylate copolymers.
- Bynel® adhesive resins are "functionalized" with reactive monomers that covalently or ionically bond to various substrates.
- Bynel® adhesive resins have a wide range of physical properties.
- DuPont provides superior technical support to help select the optimal grade for your particular application.
- Bynel® manufacturing facilities have received ISO 9002 certification.

Bynel® Adhesive Resins: Understanding the Product Line

Bynel® adhesive resins are organized into series. Each series is distinguished by two descriptors: the base resin type and the chemical functionality. Grades within a series are typically compatible with one another. A summary description of each series including key applications is provided under Series Characteristics. The Selector Guide contains a summary of specific product data on each grade including a generalized performance ranking to a number of common substrates in coextrusion.

Selecting the Right Grade for Your Application

Many performance criteria must be considered when selecting the right grade of adhesive resin for your application. DuPont technical support is readily available to assist you.

Considerations include:

- Bond Strength Requirements – What substrates are being bonded together, and what level of bond strength is needed?
- Processing Requirements – What process is used to apply the adhesive resin, what is the rheology of other polymers, and what melt strength and thermal stability is needed during processing?
- End-Use Requirements and Conditions – What downstream processing will take place, is regulatory compliance needed, and are physical properties such as toughness, stiffness or clarity of the adhesive polymer important to the total structure?

Using This Guide

These guidelines will provide a starting point in selecting one or more adhesive resins for your application. Do not hesitate to contact a DuPont representative for further assistance.

1. Identify the substrates to be bonded together. Use the Selector Guide to identify Bynel® grades that give the appropriate bonding performance. If EVOH is one of the substrates, refer to the Selector Guide to determine if your process type is L or S.
2. Does the adhesive need to comply with FDA regulations? The Selector Guide lists the FDA compliance for each grade. If other regulatory compliances are required, contact your DuPont representative.
3. Consider your maximum processing temperatures. Refer to the temperature limits listed in the Series Characteristics at the back of this guide.
4. Will the structure be thermoformed or subjected to heat treatment such as pasteurization or retort? Check Melting and Vicat Softening Points on the Selector Guide.
5. Select an adhesive that has rheology appropriate for your process. The Selector Guide lists the Melt Index (MI) or Melt Flow Rate (MFR) of each grade.
6. Contact your DuPont representative to discuss other property requirements such as moisture barrier, stiffness, clarity, or DuPont experience with similar applications.

Adhesive Evaluation

The performance of any adhesive resin should be evaluated within the context of the application. The adhesive resin is designed to bond substrates 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, tensile and modulus properties of the substrates, and often by the time elapsed since the formation of the bond. Post-treatment of a multilayer structure, such as heat sealing, thermoforming or orientation can also affect peel strength.

If peel strength is used as a measure of adhesive resin 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 performance of the adhesive resin be related to peel strength.

Series Characteristics

Series 1100

Grades in the 1100 series are primarily acid-modified EVA resins. These resins can be coextruded with a variety of different polymers including PP and PS. They are also useful for applications requiring direct coating onto PVDC-coated films. In addition, these resins can be blended with ionomers to provide peelable heat seal resins for lidding applications. Grades can be blended with each other to provide viscosity modification. Due to the EVA component in the 1100 series resins, it is suggested that extrusion temperatures not exceed 238°C (460°F).

Series 2000

Grades in the 2000 series are acid-modified ethylene acrylate polymers. These resins provide adhesion to polyamide, PE copolymers, and ionomers. They are useful for coating onto paper and foil and particularly in applications requiring low-temperature lamination of metallized and printed films. Films made from series 2000 grades can also be thermally laminated to metal substrates. Series 2000 resins are relatively stable in extrusion and can be processed at temperatures as high as 300°C (572°F).

Series 2100

Grades in the 2100 series are anhydride-modified ethylene acrylate copolymers. These resins provide adhesion to polyolefins, ionomers, polyamides, EVOH, polyesters, and polycarbonate. Grades can be blended with each other to provide viscosity modification. Series 2100 resins are relatively stable in extrusion and can be processed at temperatures as high as 300°C (572°F).

Series 3000

Grades in the 3000 series are anhydride-modified EVA copolymers. These resins bond to polyamides, ionomers, and polyolefins. Due to the EVA component in the 3000 series resins, it is suggested that extruder temperatures not exceed 238°C (460°F).

Series 3100

Grades in the 3100 series are acid- and acrylate-modified EVA resins. These resins are similar to the 1100 series resins, although they generally provide a higher degree of bond strength. Series 3100 resins provide adhesion to a variety of polymers in coextrusion including ionomers, polyolefins, polyamides, polyesters, and PVDC. They are also useful in coating onto PVDC-coated films and can be thermally laminated to a variety of substrates. Due to the EVA component in the 3100 series resins, it is suggested that extruder temperatures not exceed 238°C (460°F).

Series 3800

Grades in the 3800 series are anhydride-modified EVA copolymers. These resins differ from those of the 3000 and 3900 series in that they generally have a higher level of vinyl acetate in the EVA component. They provide adhesion to both ethylene- and propylene-based polyolefins, ionomers, polyamides, EVOH, polyesters, polycarbonate, and styrenics. Bynel® 3859 and 3810 are designed to provide a high degree of adhesion on opaque sheet applications where EVOH is simultaneously bonded to PS and PE. These two grades also result in sheet that is easy to cut and trim relative to other extrudable adhesive resins for PS. Bynel® 3860 and 3861 are good choices for structures that require a high degree of clarity. These resins are also useful in applications where EVOH is coated onto PP film. Due to the EVA component in the 3800 series resins, it is suggested that extruder temperatures not exceed 238°C (460°F).

Series 3900

Grades in the 3900 series are anhydride-modified EVA resins. These resins are similar to the resins in the 3000 series, although they often show an improved level of bonding to polyamides and EVOH. They also bond to polyolefins and ionomers. Grades can be blended with each other to provide viscosity modification. Due to the EVA component in the 3900 series resins, it is suggested that extruder temperatures not exceed 238°C (460°F).

Series 4000

Grades in the 4000 series are anhydride-modified HDPE resins. These resins provide adhesion to polyamides and ethylene polymers in coextrusion. Series 4000 resins also provide superior adhesion to EVOH in coextrusion blow molding applications. These grades are characterized by their relatively low moisture vapor transmission rates. Series 4000 resins are relatively stable in extrusion and can be extruded at temperatures as high as 300°C (572°F).

Series 4100

Grades in the 4100 series are anhydride-modified LLDPE resins. These resins provide adhesion to ethylene polymers, polyamides, and EVOH. 4100 series resins are useful where the high melting point of LLDPE component provides a degree of thermal resistance in the end-use application. Series 4100 resins are relatively stable in extrusion and can be extruded at temperatures as high as 300°C (572°F).

Series 4200

Grades in the 4200 series are anhydride-modified LDPE resins. These resins provide adhesion to ethylene polymers, polyamides, and EVOH. Bynel® 4206 and 4208 provide good bonds to ionomers. They are relatively easy to process compared to other anhydride-modified polyolefins. Bynel® 4288 is an exceptional adhesive for bonding to EVOH in coextrusion coating and laminating applications. Series 4200 resins are relatively stable in extrusion and can be processed at temperatures as high as 300°C (572°F).

Series 5000

Grades in the 5000 series are anhydride-modified PP resins. These resins provide adhesion to PP, polyamide, and EVOH in coextrusion applications. Series 5000 resins have relatively low moisture transmission rates, are relatively stable in extrusion, and can be processed at temperatures as high as 300°C (572°F).

Because DuPont cannot anticipate or control the many different conditions under which this information and/or product may be used, it does not guarantee the applicability or the accuracy of this information or the suitability of its products in any given situation. Users of DuPont products should make their own tests to determine the suitability of each such product for their particular purposes. The data listed herein falls within the normal range of product properties but they should not be used to establish specification limits or used alone as the basis of design.

Disclosure of this information is not a license to operate or a recommendation to infringe a patent of DuPont or others.