

## DuPont™ Bynel® 30E753

## Bynel® resins Product Data Sheet

## Description

## Product Description

BYNEL® Series 3000 resins are anhydride-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

- Developmental: Active

## Typical Characteristics

## Characteristics / Benefits

Physical properties of BYNEL Series 3000 resins are typical of EVA resins with similar density and melt index values.

## Applications

BYNEL 30E753 is specifically designed to provide high adhesion to both metals and polyolefins when converted into film form and used as a thermal lamination film. It has a low coefficient of friction for easy film handling and provides strong bonds that fail cohesively.

BYNEL 3000 series resins adhere to a wide variety of materials. They are most often used to adhere to PE, ionomers, EVA and polyamide.

## Typical Properties

## Physical

## Nominal Values

## Test Method(s)

Density ( )

0.938 g/cm<sup>3</sup>

ASTM D792

ISO 1183

Melt Flow Rate (190°C/2.16kg)

2.1 g/10 min

ASTM D1238

ISO 1133

## Thermal

## Nominal Values

## Test Method(s)

Melting Point (DSC)

92°C (198°F)

ASTM D3418

ISO 3146

Freezing Point (DSC)

89°C (192°F)

ASTM D3418

Vicat Softening Point ( )

65°C (149°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 30E753 extruded as a monofilm or in coextrusion with PE. If this resin is to be utilized in coextrusion as an adhesive with Nylon or EVOH, please consult with your technical representative for a recommended processing guideline.

Because the BYNEL 3000 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 3000 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 3000 adhesive resins, extrusion conditions commonly used for converting ethylene vinyl acetate resins into films can be employed.

When extruding BYNEL 3000 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 (320F - 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.

### Blown Film Processing

#### Nominal Values

Blown Film Processing Information	Proposed Extruder Set Temperatures
Feed Zone	135°C (275°F)
Second Zone	160°C (320°F)
Third Zone	185°C (365°F)
Fourth Zone	185°C (365°F)
Fifth Zone	185°C (365°F)

Adapter Zone	185°C (365°F)
Die Zone	185°C (365°F)

#### FDA Status Information

BYNEL 30E753 resin conforms with the Code of Federal Regulations, Title 21, Paragraph 175.105, covering the use of adhesive interlayers in composite packages for food use. This regulation describes adhesives which may be safely used as components of articles intended for use in packaging, transporting or holding food. This regulation requires that either (1) the adhesive is separated from the food by a functional barrier, or (2) the quantity of adhesive which contacts fatty or aqueous foods does not exceed the trace amounts at the seams or edges. Customers should satisfy themselves that the food contact material is serving as a functional barrier to the adhesive.

#### 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 235C (455F), 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

DuPont operates in more than 70 countries. For help finding a local representative, please contact one of the following regional customer contact centers:

##### Americas

DuPont Company, BMP26-2215  
Lancaster Pike & Route 141  
Wilmington, DE 19805 U.S.A.  
Telephone +1 302-774-1161  
Toll-free (USA) 800-628-6208, ext. 6  
Fax +1 302-355-4056

DuPont do Brasil, S.A.  
Alameda Itapecuru, 506  
06454-080 Barueri, SP Brasil  
Telephone +55 11 4166 8000  
Fax +55 11 4166 8736

##### Asia Pacific

DuPont China Holding Co., Ltd.  
Shanghai Branch  
399 Keyuan Road, Bldg. 11  
Zhangjiang Hi-Tech Park  
Pudong New District, Shanghai  
P.R. China (Postcode: 201203)  
Telephone +86 21 3862 2888  
Fax +86-21-3862-2889

##### Europe / Middle East / Africa

DuPont de Nemours Int'l. S.A.  
2,Chemin du Pavillon Box 50  
CH-1218 Le Grand Saconnex  
Geneva, Switzerland  
Telephone +41 22 717 51 11  
Fax +41 22 717 55 00

*The data listed here fall within the normal range of properties, but they should not be used to establish specification limits nor used alone as the basis of design. The DuPont Company assumes no obligations or liability for any advice furnished or for any results obtained with respect to this information. All such advice is given and accepted at the buyer's risk. The disclosure of information herein is not a licence to operate under, or a recommendation to infringe, any patent of DuPont or others. Since DuPont cannot anticipate all variations in actual end-use conditions, DuPont makes no warranties and assumes no liability in connection with any use of this information.*

*CAUTION: Do not use DuPont materials in medical applications involving implantations in the human body or contact with internal body fluids or tissues unless the material has been provided from DuPont under a written contract that is consistent with DuPont policy regarding medical applications and expressly acknowledges the contemplated use. For further information, please contact your DuPont representative. You may also request a copy of DuPont POLICY Regarding Medical Applications H-50103-3 and DuPont CAUTION Regarding Medical Applications H-50102-3.*

*Copyright © 2009 DuPont. The DuPont Oval Logo, DuPont™, The miracles of science™, and trademarks designated with "®" are registered trademarks or trademarks of E.I. du Pont de Nemours and Company or its affiliates. All rights reserved.*

*This data sheet is effective as of 01/08/2010 4:44PM and supersedes all previous versions.*