

DuPont™ Bynel® 40E529

Bynel® resins Product Data Sheet

Description

Product Description BYNEL® Series 4000 resins are anhydride-modified, high-density polyethylene resins. 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 4000 grades are typical of high density polyethylene resins with similar density and melt index values.

Applications BYNEL Series 4000 resins are excellent moisture barriers and have a good hydrocarbon resistance. This unique combination of properties makes them useful in a variety of coextrusion applications. HDPE/EVOH tubing and HDPE/Polyamide bottles for agricultural chemicals are just two examples.

BYNEL 4000 series resins are most often used in coextrusion with EVA, EVOH, polyamide and PE.

Typical Properties

Physical	Nominal Values	Test Method(s)	
* Density (g/cm³)	0.94 g/cm³	ASTM D792	ISO 1183
* Melt Flow Rate (190°C/2.16kg)	3.5 g/10 min	ASTM D1238	ISO 1133

Thermal	Nominal Values	Test Method(s)	
* Melting Point (DSC)	135°C (275°F)	ASTM D3418	ISO 3146
Freezing Point (DSC)	117°C (243°F)	ASTM D3418	ISO 3146
Vicat Softening Point (°C)	119°C (246°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 260°C (500°F)

General Processing Information

The temperature profiles shown below are for initial evaluations of BYNEL adhesive resins in the 4000 series. 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 BYNEL 4000 series resins as high as 300 (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 BYNEL 4000 series resins. 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.

For producing monolayer adhesive films with BYNEL 4000 adhesive resins, extrusion conditions commonly used for converting high density polyethylene into films can be employed.

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 adhesive 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

Nominal Values

CoExtrusion w/EVOH Processing Information

Proposed Extruder Set Temperatures

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)

CoExtrusion w/Nylon Processing

Nominal Values

CoExtrusion w/Nylon Processing Information	Proposed Extruder Set Temperatures
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)

FDA Status Information

BYNEL® 40E529 Adhesive Resin complies with Food and Drug Administration Regulation 21 CFR 175.105 - - Adhesives. This Regulation describes adhesives that may be used as components of articles intended for use in packaging, transporting, or holding food, subject to the limitations and requirements therein.

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 DuPont 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, DuPont cannot guarantee or warrant such certifications or information and assumes no liability for their use.

Regulatory Information

For information on regulatory compliance outside the U.S., consult your local DuPont representative.

Safety & Handling

For information on appropriate Handling & Storage of this polymeric resin, please refer to the Material Safety Data Sheet..

A Product Safety Bulletin, Material Safety Data Sheet, and/or more detailed information on extrusion processing and/or compounding of this polymeric resin for specific applications are available from your DuPont Packaging and Industrial Polymers representative.

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
Chestnut Run Plaza – Bldg. 730
974 Centre Road
Wilmington, Delaware
19805 U.S.A.

Asia Pacific

DuPont China Holding Co., Ltd.
Shanghai Branch
399 Keyuan Road, Bldg. 11
Zhangjiang Hi-Tech Park
Pudong New District, Shanghai

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

Toll-Free (USA): 1-800-628-6208
Telephone: 1-302-774-1000
Fax: 1-302-355-4013

P.R. China (Postcode: 201203)
Telephone +86 21 3862 2888
Fax +86-21-3862-2889

Fax +41 22 717 55 00

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

<http://bynel.dupont.com>

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 08/07/2010 04:48:16 PM and supersedes all previous versions.