DuPont Packaging & Industrial Polymers

DuPont™ Appeel® 53021

Appeel® resins Product Data Sheet

Description

Product Description	DuPont™ Appeel® 53021 is a modified ethylene vinyl acetate copolymer resin designed to function as a sealing layer for lidding applications. It is most often suggested to provide strong peelable seals to polypropylene, and moderate seals to polystyrene, polyester, PVC and is available in pellet form for use in conventional extrusion or coextrusion equipment designed to process polyethylene resins.

Restrictions

Material Status	• Developmental: Active
Availability	• Asia, Australia, Pacific Rim

Typical Characteristics

Uses	• Lidding Sealant
Applications	- Low temperature heat seal. Appeel® 53021 offers low temperature heat seals with adequate seal strength at 90oC. - Heat sealability to various materials including PE, PP, PS, and Rigid PVC. Appeel® 53021 can also be sealed to paper, paperboard, woven fabrics, non-woven fabrics, wood and photographic papers. - Appeel® 53021 allows a peelable seal from most plastic materials excluding PE. - High transparency. - Appeel® 53021 conforms to Code #20 of the Ministry of Health and Welfare Japan. - Appeel® 53021 is used as a heat seal layer in lidding material for injection molded and vacuum molded plastic containers, especially HIPS and PS used in the packaging of yogurts, jams, butter and other food items. Typical structures for this lidding would be: OPP/PE/ Appeel® 53021 PET/PE/ Appeel® 53021 Over lacquer/Print/Foil/PE/ Appeel® 53021 Paper/PE/Foil/PE/ Appeel® 53021 Appeel® 53021 can also be used as a sealant in general flexible packaging. It provides low temperature seals for snacks and confectionery.

Typical Properties

Physical	Nominal Values	Test Method(s)	
* Density ()	0.97 g/cm³	ASTM D792	ISO 1183
* Melt Flow Rate (190°C/2.16kg)	32 g/10 min	ASTM D1238	IS0 1133
Thermal	**Nominal Values**	**Test Method(s)**	
* Melting Point (DSC)	81°C (178°F)	ASTM D3418	ISO 3146

Vicat Softening Point ()	49°C (120°F)	ASTM D1525	ISO 306

Heat Seal Evaluation

The performance of any sealant resin should be evaluated within the context of the application. The sealant is designed to bond to particular substrate(s). Many variables can affect seal strength, including the physical properties of the substrate being sealed to, thickness, flange or surface design, heat seal temperature, dwell time and pressure. The condition and type of the sealing equipment used, such as roller sealers versus platen seal mechanisms can make a significant difference.

In most cases sealant peel strength is used as a measure of performance. Although this is a convenient test, peel strength is affected not only by substrate adhesion but also by peel angle, separation rate, ambient temperature, tensile and modulus properties of the materials, and often by the time elapsed since the formation of the bond.

If sealant peel strength is used as a measure of sealant performance, it is imperative that peel strength be evaluated not only at the time of initial heat sealing the lid to the substrate, but throughout the life of the product and under all the conditions to which the sealant will be exposed. Only then does peel strength provide a reliable indication of adhesive performance in the specific application.

Processing Information

General

*	Maximum Processing Temperature	235°C (455°F)

General Processing Information

f the process is stopped for short periods of time, the screw for the Appeel® extruder should be kept turning at a low rpm to keep material flowing.

After processing Appeel®, purge the material out using a polyethylene resin, preferably with a lower melt flow rate than the Appeel® resin in use.
The "Disco Purge Method" is suggested as the preferred purging method, as this method usually results in a more effective purging process. Information on the Disco Purge Method can be obtained via your DuPont Sales Representative.

Never shut down the extrusion system with Appeel® in the extruder and die. Properly purge out the Appeel® with a polyethylene, and shut down the line with polyethylene or polypropylene in the system.

Transitioning from LDPE to Appeel® 53021
1) Switch from conventional LDPE to higher MFR LDPE, approximately 20 dg/min, and change temperature profile to that recommended below.
2) After temperature gets to set temperature, put Appeel® 52009 into extruder.
3) After melt web becomes clear then commence production.

Transitioning from Appeel® 53021 to LDPE
1) Switch from Appeel® 53021 to LDPE, with MFR in the range of 2 to 5 dg/min
2) When LDPE is completely purged into the system, then slowly increase temperatures to 260C, purge some more, and then slowly increase to standard PE processing temperatures.

Extrusion Coating/Lamination Processing	Nominal Values

Extrusion Coating / Lamination Processing

Extrusion Coating: The melt temperature of Appeel® 53021 should be maintained in the 185 - 235ºC range in extrusion coating processes. Selection of a specific melt temperature will depend on screw configuration, potential power limitations, and the need to match melt viscosities. However, melt temperatures above 238C (460F) should be avoided because of possible thermal degradation of the resin.

If the process is stopped for short periods of time, the Appeel® 53021 resin extruder should be kept turning at low rpm. For a permanent shutdown, the Appeel® 53021 resin should be purged out using an available polyethylene resin run at the same extrusion temperature used for the Appeel® 53021 resin. Never raise temperature over 235ºC until Appeel® 53021 resin is completely purged out.
Appeel® 53021 requires relatively low processing temperatures and cooling the bottom of hopper due to its low Vicat point and higher comonomer level.

Following is an example for suggested temperature profile on the high side of the

	processing range. Lower temperatures in the final metering zone, adapter and die are suggested if compatible with the process and application.
Feed Zone	135°C (275°F)
Second Zone	185°C (365°F)
Third Zone	210°C (410°F)
Fourth Zone	210°C (410°F)
Fifth Zone	210°C (410°F)
Adapter Zone	210°C (410°F)
Die Zone	210°C (410°F)

FDA Status Information	APPEEL® 53021 Lidding Resin complies with Food and Drug Administration Regulation 21 CFR 177.1350(a)(1) - Ethylene vinyl acetate copolymers, subject to the limitations and requirements therein, subject to the finished food contact article meeting the extractive limitations under the intended conditions of use, as shown in paragraph (b)(1) of the Regulation. APPEEL® 53021 Lidding Resin may be used in contact with food types I, II, IV-B, VI-A, VI-B, VI-C, VII-B and VIII identified in Table 1 of 21 CFR 176.170(c) under Conditions of Use A through H* with no thickness limitation. APPEEL® 53021 Lidding Resin may also be used for food types III, IV-A, VII-A, and IX under conditions of use B through H* provided the thickness of the final article is less than 1.2 mils (30 microns). *http://www.fda.gov/food/ingredientspackaginglabeling/packagingfcs/foodtypesconditionsofuse/ucm109358.htm 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	Appeel® 53021 complies with Japan Hygienic Olefin and Styrene Plastics Association and MITI no. 20 Food regulation in Japan. For information on regulatory compliance outside of 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

Asia Pacific

DuPont China Holding Co., Ltd.
Shanghai Branch
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Europe / Middle East / Africa

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