

Product Information


 Selar® PA


For more information, e-mail us at: packaging@dupont.com

DuPont™ Selar® PA 2072 amorphous nylon resin blends with EVOH

Description

DuPont has developed a special grade of Selar® PA, known as 2072, which is specially designed for blending with EVOH. Selar® PA 2072 can be tumble-blended with most grades of ethylene vinyl alcohol copolymers to form blends that combine the excellent barrier properties of EVOH with the thermoforming properties, processing flexibility, and moisture insensitivity of Selar® PA. In addition, Selar® PA 2072 provides better adhesion in blends with EVOH than other grades of amorphous nylon, and this may allow converters to employ less expensive adhesives.

Properties

Barrier

Selar® PA 2072 can be blended with EVOH (up to 40 wt% addition) without compromising the oxygen barrier properties of EVOH, especially at high humidity.

Thermoformability

Selar® PA 2072, when added to EVOH, allows EVOH to be solid phase pressure formed to deep draws with very uniform barrier layer thickness after forming.

Optical Properties

In general, Selar® PA 2072 produces significantly fewer gel particles versus other amorphous nylons when blended and processed with EVOH. Selar® PA 2072 may also lower the processing temperature of the amorphous nylon/EVOH blends by as much as 20°C (36°F).

Because amorphous nylon is incompatible with EVOH, blends of Selar® PA 2072 with EVOH may exhibit somewhat increased haze.

Melt Blend Uniformity

Blends containing more than about 40 wt% Selar® PA 2072 are not recommended as this may produce structures that display flow abnormalities and/or poorer barrier.

Adhesion

Selar® PA 2072 provides significantly better adhesion to EVOH blends than do other grades of amorphous nylon, and this may allow converters to employ less expensive adhesive resins in tie layers.

Recommended adhesives available from DuPont are Bynel® 4000, 4100 or 4200 Series for bonding to PE; Bynel® 5000 Series for bonding to polypropylene; and Bynel® 2100 Series for bonding to polyesters.

Contact your DuPont representative for further information.

General Processing Information

Drying

Selar® PA 2072 resin is shipped dry (< 0.20% moisture) in moisture-proof packages and can be used as received. However, Selar® PA 2072 resin does absorb moisture and should be re-dried if the bags have been opened and exposed to relative humidities of greater than 50% for 8 hr or more. Typical drying temperatures are in the range of 79-96°C (175-205°F).

Selar® PA 2072 blends with EVOH may be used if the moisture content is less than 0.25%. If drying becomes necessary, a dehumidified hopper dryer may be used or dehumidified or vacuum ovens. The time required to properly dry the blends depends on the amount of moisture and the drying temperature. If the moisture content is 0.5% or less, the blends can be dried adequately in 3-4 hr at 80-90°C (175-195°F).

Because excessive drying time or high drying temperature will contribute to color formation and gel in EVOH resins, Selar® PA 2072 blends with EVOH should not be dried longer than 24 hr or at a temperature higher than the recommended ranges listed above. Material that does not dry under the stated conditions should not be used.

Pellet Blending

Blends of Selar® PA 2072 with EVOH can be made by pellet blending prior to processing. Mixing should be done immediately before processing, in on-line mixers or in off-line mixers or shakers, provided the resin is not exposed to high humidities for greater than 8 hr.

Screw Design

Selar® PA 2072 and blends of Selar® PA 2072 with EVOH may be processed using a typical polyolefin screw with L/D ratios of 20/1 to 30/1. Follow the EVOH manufacturer's guidelines when processing Selar® PA 2072-EVOH blends. Chrome plating helps reduce polymer buildup on the screw.

Extrusion Temperatures

When processing Selar® PA 2072-EVOH blends, do not exceed the maximum temperature recommended by the EVOH supplier. The lower limit of the melt temperature range should be 220°C (430°F).

If the melt temperature is too low, the viscosity of the blend will be too high, may require excessive drive power, and may risk polymer "freeze-offs." The clarity of the product may also be affected. Care should be taken to ensure that massive adapters or head gates are adequately heated before introducing nylon resins.

The temperature profile shown in Table 1 is typical of a four zone extruder. Variation of the suggested temperature profile may be appropriate, depending on screw configuration, potential power limitations, and the need to match melt viscosities. To minimize polymer degradation, do not exceed the EVOH manufacturer's recommended maximum melt temperature.

Table 1 — Temperature Profiles for Mono- and Co-extruded Structures

Rear Zone	195°C (380°F)
Second Zone	225°C (440°F)
Forward Zone	220°C (430°F)
Adapter	220°C (430°F)
Die	220°C (430°F)

Regrind

Clean trim from solid phase thermoforming processes using Selar® PA 2072 blends with EVOH may be reprocessed as a regrind layer. The trim should be protected from moisture or properly dried before extrusion. Process regrind layers according to the EVOH manufacturer's recommendations.

Purging

Purging the system should be done with HDPE, LDPE, or PP, not nylon. The screw speed sequence should follow an alternately high and low schedule at 1- to 2-min intervals for at least five cycles. If necessary, let the system "soak" at low rpm for 10 min before cycling the screw speeds again. The purge-soak routine should be repeated as needed (see the suggested sequence in Table 2). The purge temperature profile should be 210°C (410°F) or greater at the rear barrel zone, with the rest of the sections at the run or operating temperature. Maintain adapter and dies at relatively high temperatures to reduce the viscosity of the resin on the "walls" of internal flow passages and to promote flow. The high temperature must be

selected to avoid degradation, evident by yellowness or gels.

Table 2 — Screw Speed Sequence for Purging

Stage	Screw, rpm	Time, min	
Purge	10	1	
	10	1	
	20	1	
	70	1	
	20	1	
	80	1	
	10	1	
	70	1	
	30	1	
	90	1	
	Soak*	20	10
	Purge*	70	1
		20	3
90		4	
20		2	
70		3	
10		4	
80		2	
30		3	
100		4	
10		2	
Soak*		20	10
Total Time-58 min			
*if necessary			

Shutdown Procedure

Shutdown should follow a transition to a polyolefin like HDPE, LDPE, or PP and follow the above purging procedure.

Safety and Regulatory Information

Safety

At ambient temperatures, handling Selar® PA 2072 barrier resin and blends of Selar® PA 2072 with EVOH presents little hazard. The resins have a low toxicity by ingestion and are neither a skin irritant nor a skin sensitizer. The blends should not be heated above 250°C (482°F). When overheated, decompositions with fume evolution may occur. As with most plastics, use local ventilation to avoid exposure to fumes that may irritate the eyes, nose, throat, and upper respiratory tract. Take care to protect the hands and other exposed parts of the body when working with molten polymer. If molten polymer contacts the skin, cool the affected area with cold water or ice. Do not attempt to peel the solidified polymer from the skin. Obtain medical attention for thermal burn. Loose pellets should be swept up promptly to prevent falls.

Disposal of scrap presents no special problems and can be by landfill or incineration in a properly operated incinerator. Disposal should comply with local, state, and federal regulations. For more detailed information on the safe handling and disposal of Selar® PA 2072 resins, a Material Safety Data Sheet can be obtained from the Regional Office serving you. The same information can be obtained about EVOH from the corresponding supplier.

The safety hazards common to all thermoplastic extrusion operations apply to Selar® PA 2072 and Selar® PA 2072 blends and require standard, industry-accepted safety practice. DuPont places a very high priority on safety and believes all personal injuries can and should be prevented.

The following protective measures should be considered:

- Use gloves and other protective clothing when handling hot polymer or operating machinery.
- Wear approved safety glasses.
- Use adequate ventilation.

- Use accepted engineering designs and process controls.
- Promptly clean up any resin pellet spills.

FDA

All grades of Selar® PA comply with FDA regulation 21 CFR 177.1500 (a)(12) regarding food contact. Selar® PA can be used with all types of food, except those with more than 8% alcohol. There is no FDA limitation on the temperature of the food or the thickness of the Selar® PA in contact with the food.

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.

Copyright 1995-2005 E.I. du Pont de Nemours and Company. All rights reserved. The DuPont Oval logo, DuPont®, The miracles of science®, and all products with a ™ or ® are trademarks or registered trademarks of E.I. du Pont de Nemours and Company or its affiliates.