



DuPont™ Elvax®

EVA resins

Applications

Elvax® resins with low vinyl acetate content, typically 9 to 15 percent, are well suited for compounding into primary insulation of UL listed, type XHHW building wire, which is rated for 90°C [194°F], 600-V service.

Compounds based on Elvax® resins with medium vinyl acetate content, typically 15 to 18 percent, are used as semicon conductor shields and as insulation and jacketing of type GXL automotive primary wire and in UL and CSA-listed (150°C [302°F]) motor lead wire. Compounds based on these resins are also UL-listed (125°C [257°F]) for appliance wire insulation.

Elvax® resins with high vinyl acetate content-typically 25 to 40 percent-can be compounded to provide extremely tough, heat resistant jackets for automotive ignition and low-smoke cables.

Elvax® resins in the range 28 to 40% vinyl acetate can be used as strippable semicon insulation shields.

Table 1.
Application Guide for Elvax® Resins

Elvax® Grade	Primary Insulation; Type XHHW Building Wire 90°C (194°F)	Semicon Conductor Shields	Insulation/Jacketing Type GXL Automotive Primary Wire	Motor Lead Wire 150°C (302°F)	Heat Resistant Jackets for Auto Ignition Cables	Heat Resistant Jackets for Low-Smoke Cables	Semicon Insulation Shields
750	●						
760Q	●						
770	●						
650Q	●	●					
660	●	●					
670	●	●					
550	●	●	●	●			
560	●	●	●	●			
450		●	●	●			
460		●	●	●			
470		●	●	●			
350					●	●	
360					●	●	
240					●	●	●
250					●	●	●

260					●	●	●
265					●	●	●
150					●	●	●
40W					●	●	●
40L-03					●	●	●
40L-08					●	●	●

Description

Elvax® resins are a family of ethylene/vinyl acetate copolymers that are useful in a wide range of wire and cable applications due to their combination of excellent mechanical, thermal and low-smoke properties.

The grades of Elvax® available for wire and cable applications range in vinyl acetate content from 9 to 40 percent and in melt index from 0.3 to 52. Higher melt index grades of Elvax® are available, but typically not used in wire and cable applications because of the need for high mechanical performance.

These versatile resins offer excellent stress crack resistance and maintain their flexibility over a broad temperature range of - 60°C to 150°C [-76°F to 302°F], without the need for plasticizers.

In addition, Elvax® resins can be compounded into a wide array of colors and can be stabilized to provide ultraviolet resistance, without sacrificing their inherent toughness.

General Guidelines for Wire and Cable Use

Grade Selection

Grade selection among the grades of Elvax® ethylene/vinyl acetate copolymer resin is dictated by the properties required and the processing equipment used. For general guidance, chemical resistance and flexibility improve with increasing vinyl acetate content; however, high vinyl acetate polymers (greater than 30 percent) are somewhat more difficult to process because they can become soft and sticky. Higher melt index polymers extrude easier but have lower physical properties.

To aid in grade selection, Table 2 lists the vinyl acetate content and melt index for each grade of Elvax® and Table 3 summarizes typical properties.

Processing

Compounds based on Elvax® resins can normally be processed in conventional thermoplastic or rubber extrusion equipment. For detailed processing information, contact your DuPont Representative.

Safe Handling

At temperatures above 220°C (425°F), Elvax® resins can evolve low concentrations of fumes. It is recommended that adequate ventilation be provided. For more information on the safe handling and disposal of Elvax®, refer to the DuPont bulletin H-24228-1, "Elvax^(R) Resins - Safety in Handling and Use."

Packaging

Elvax® resins are packaged in 50-lb (22.7-kg) polyethylene bags and 1,100-lb (500-kg) boxes. Selected grades are also available in bulk hopper cars; contact your DuPont Representative for more information.

U.S. Freight Classifications

For all rail shipments, Elvax® is classified as "Plastics, Synthetic, OTL, NOIBN;" for truck shipments as "Plastics, Materials, Granules;" and for express shipments as "Plastics, Synthetic."

Coloring

Elvax® can be color compounded with pigments to obtain a wide array of transparent colors, tints and unique effects in addition to the more traditional opaque colors.

Table 2.
General Characteristics of Elvax®

Elvax® Grade	% Vinyl Acetate	Melt Index
750	9.0	7.0
760Q	9.3	2.0
770	9.5	0.8
650Q	12.0	8.0
660	12.0	2.5
670	12.0	0.3
550	15.0	8.0
560	15.0	2.5
450	18.0	8.0
460	18.0	2.5
470	18.0	0.7
350	25.0	19
360	25.0	2.0
240	28.0	43
250	28.0	25
260	28.0	6.0
265	28.0	3.0
150	32.0	43
40W	40.0	52
40L-03	40.0	3.0
40L-08	40.0	6.0

Table 3.
Typical Properties of Elvax®

Property	ASTM Method	Elvax® Grades				
		150	240	250	260	265

Density at 23°C kg/m ³ [lb/ft ³]	D-1505	957 (59.7)	951 (59.4)	951 (59.4)	955 (59.6)	955 (59.6)
Tensile Strength Mpa (psi)	D-1708*	6.9-8.3 (1,000-1,200)	9.7 (1,400)	11 (1,600)	24 (3,500)	29 (4,200)
Elongation at Break %	D-1708*	900-1,100	800-1,000	800-1,000	800-1,000	800-1,000
Tensile Modulus Mpa (psi)	D-1708*	10.0 (1,400)	18 (2,600)	19 (2,800)	26 (3,800)	28 (4,100)
Hardness, Shore A-2 Durometer, 10 sec	D-2240	65	73	75	80	83
Softening Point Ring and Ball °C (°F)	E-28	110 (230)	110 (230)	127 (260)	154 (310)	171 (340)
Cloud point in Paraffin Wax** °C (°F)		102 (215)	66 (150)	66 (150)	66 (150)	66 (150)

*Samples die cut from pressed films; gauge dimensions 2.23 cm x 0.47 cm x 0.13 cm (0.876 in. x 0.187 in. x 0.050 in.); crosshead speed 5.1 cm (2 in.)/min. elongation based on sample length of 1.91 cm (0.75 in.).

**Ten percent Elvax® in fully refined paraffin wax, 146 AMP.

Table 3.
Typical Properties of Elvax® (continued)

Property	ASTM Method	Elvax® Grades					
		350	360	450	460	470	550
Density at 23°C kg/m ³ [lb/ft ³]	D-1505	948 (59.2)	590 (59.3)	940 (58.7)	941 (58.7)	940 (58.7)	935 (58.4)
Tensile Strength Mpa (psi)	D-1708*	14 (2,000)	26 (3,800)	18 (2,550)	23 (3,300)	26 (3,800)	18 (2,600)
Elongation at Break %	D-1708*	800-1,000	800-1,000	600-900	600-900	600-900	800-1,000
Tensile Modulus Mpa (psi)	D-1708*	25 (3,600)	35 (5,100)	51 (7,400)	52 (7,500)	63 (9,100)	64 (9,300)
Hardness, Shore A-2 Durometer, 10 sec	D-2240	80	85	90	90	92	93
Softening Point Ring and Ball °C (°F)	E-28	132 (270)	188 (370)	150 (302)	199 (390)	223 (434)	150 (302)
Cloud point in Paraffin Wax** °C (°F)		66 (150)	66 (150)	66 (150)	66 (150)	84 (184)	71 (160)

*Samples die cut from pressed films; gauge dimensions 2.23 cm x 0.47 cm x 0.13 cm (0.876 in. x 0.187 in. x 0.050 in.); crosshead

speed 5.1 cm (2 in.)/min. elongation based on sample length of 1.91 cm (0.75 in.).

**Ten percent Elvax® in fully refined paraffin wax, 146 AMP.

Table 3.
Typical Properties of Elvax® (continued)

Property	ASTM Method	Elvax® Grades						
		560	650Q	660	670	750	760Q	770
Density at 23°C kg/m ³ [lb/ft ³]	D-1505	940 (58.7)	933 (58.2)	940 (58.7)	940 (58.7)	930 (58.1)	930 (58.1)	930 (58.1)
Tensile Strength Mpa (psi)	D-1708*	22 (3,200)	17 (2,500)	21 (3,000)	26 (3,800)	15 (2,200)	21 (3,000)	22 (3,200)
Elongation at Break %	D-1708*	800-900	750-850	750-850	750-850	600-750	600-750	600-750
Tensile Modulus Mpa (psi)	D-1708*	74 (10,700)	85 (12,300)	91 (13,200)	100 (14,500)	110 (16,000)	140 (20,000)	160 (23,200)
Hardness, Shore A-2 Durometer, 10 sec	D-2240	93	94	94	94	95	96	96
Softening Point Ring and Ball °C (°F)	E-28	188 (370)	150 (302)	193 (380)	233 (452)	153 (307)	167 (332)	227 (440)
Cloud point in Paraffin Wax** °C (°F)		71 (160)	78 (172)	78 (172)	79 (174)	86 (186)	86 (186)	84 (183)

*Samples die cut from pressed films; gauge dimensions 2.23 cm x 0.47 cm x 0.13 cm (0.876 in. x 0.187 in. x 0.050 in.); crosshead speed 5.1 cm (2 in.)/min. elongation based on sample length of 1.91 cm (0.75 in.).

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CAUTION: Do not use in medical applications involving permanent implantation in the human body. For other medical applications, see "DuPont Medical Caution Statement", H-50102.