vydyne ECO-315 Series **data sheet**

ECO-315 Natural, ECO-315 Black non-halogenated ignition resistant nylon

Product Description

Vydyne® ECO-315 is a non-halogenated, noncorrosive injection molding grade nylon with ignition resistant additives†. It is lubricated to facilitate machine feed and mold release. It is available in natural and black.

Vydyne ECO-315 is modified with ignition resistant additives to help users meet Underwriters Laboratories flammability rating requirements for molded parts requiring (UL) 94 V-0 classification at thicknesses down to 0.032 inches.

While ignition resistant additives reduce toughness and ductility properties when compared to general-purpose, unreinforced Nylon 66, ECO-315 has been formulated to minimize such loss of ductility. This product generally yields more ductile parts than other (UL) 94V-0 plastic materials in commercial applications.

Vydyne ECO-315 has a comparatively low specific gravity for an ignition resistant resin. Meaningful economic comparisons of molding materials must be based on cost per cubic inch, which is reduced by lowered specific gravity.

Mold shrinkage of ECO-315 is essentially equivalent to that of general purpose Nylon 66 resins, which are commonly used in many electrical/ electronic components and other parts requiring a (UL) 94V-2 flammability rating. Thus, existing tooling for 94V-2 nylon parts can usually be used to produce 94V-0 parts from Vydyne ECO-315, eliminating the delay and costs involved in re-tooling.

Typical Applications/End Uses

Typical applications include electrical connectors, terminal blocks, housings, circuit board standoffs, clips, clamps, fasteners, cable ties and many other industrial parts.

Vydyne ECO-315 Series Specifications and Regulations

Federal*

Conforms to Federal Specification LP-410a

Military*

Conforms to Military Specification MIL-M-20693B

** Superseded by ASTM D-4066*

† The expression “with ignition resistant additives” and all the UL ratings for flammability mentioned herein are not intended to reflect performance presented by these or any other materials under actual fire conditions. Each end user should determine whether potential fire hazards are associated with the finished product and whether Vydyne resin is suitable for the particular use.

Find more information or contact us at www.vydyne.com

ASCEND PERFORMANCE MATERIALS

Typical Properties for Vydyne ECO-315 Series

Test temperature 23°C unless otherwise noted

Physical Properties	Test Conditions	Dry as Molded	Conditioned 2.5% Moisture
Specific Gravity (g/cm³)	ISO 1183	**1.16**	**—**
Mold Shrinkage (%)	ISO 294-4		
2 mm - Parallel		**1.2**	**—**
2 mm - Normal		**1.4**	**—**
Water Absorption @ 23°C (%)	ISO 62		
24 Hours		**0.8**	**—**
Equilibrium at 50% RH		**1.8**	**—**
Mechanical Properties	**Test Conditions**	**Dry as Molded**	**Conditioned 2.5% Moisture**
Tensile Strength @ Yield (MPa)	ISO 527	**75**	**52**
Tensile Strength @ Break (MPa)	ISO 527	**—**	**—**
Elongation @ Yield (%)	ISO 527	**5.5**	**20**
Elongation @ Break (%)	ISO 527	**25**	**30**
Tensile Modulus (MPa)	ISO 527	**5,000**	**3,500**
Poisson's Ratio	ISO 527	**0.41**	**—**
Flexural Modulus (MPa)	ISO 178	**3,200**	**1,560**
Flexural Strength (MPa)	ISO 178	**92**	**45**
Notched Charpy Impact (KJ/M²)	ISO 179		
23°C		**5.4**	**—**
-30°C		**5.4**	**—**
Unnotched Charpy Impact (KJ/M²)	ISO 179		
23°C		**NB**	**—**
-30°C		**NB**	**—**
Notched Izod Impact (KJ/M²)	ISO 180	**6**	**—**
Thermal Properties	**Test Conditions**	**Dry as Molded**	**Conditioned 2.5% Moisture**
Melting Point (°C)	ISO 3146	**244**	**—**
Heat Deflection Temperature (°C)	ISO 75		
1.82 MPa		**65**	**—**
0.45 MPa		**225**	**—**
Vicat @ 50N (°C)	ISO 306	**216**	**—**
Coefficient of Linear Thermal Expansion	ISO 11359		
2 mm - Parallel, 23°C-55°C (10^{-5} mm/mm/°C)		**1.1**	**—**
2 mm - Normal, 23°C-55°C (10^{-5} mm/mm/°C)		**1.1**	**—**
Electrical Properties	**Test Conditions**	**Dry as Molded**	**Conditioned 2.5% Moisture**
Dielectric Strength (kV/mm) (step-by-step) 3.0 mm/1.0 mm	IEC 60243	**16.3/26.3**	**—**
Volume Resistivity (ohm-cm x 10^{15}) 3.0 mm	IEC 60093	**3**	**—**
Comparative Tracking Index (volts) 3.0 mm	IEC 60112	**> 600**	**—**

Flammability Properties for Vydyne ECO-315 Series

Flammability Properties	Test Conditions	Dry as Molded
Glow Wire Flammability Index (GWFI/°C)	IEC 60695-2-12	
0.38 mm		**960**
0.75 mm		**960**
1.5 mm		**960**
3.0 mm		**960**
Glow Wire Ignition Temperature (GWIT/°C)	IEC 60695-2-12	
0.38 mm		**875**
0.75 mm		**875**
1.5 mm		**775**
3.0 mm		**725**
Limiting Oxygen Index (%)	ASTM D-2863	**29**

Underwriters Laboratories Recognized Component Ratings

Yellow Card File Number E70062

Color: All

Parameters	Test Conditions	Thickness (mm)			
		0.38	0.75	1.5	3.0
Temperature Index (°C)	UL 746B				
Electrical		—	130	130	130
Mechanical w/Impact		—	65	85	85
Mechanical w/o Impact		—	100	100	110
Hot Wire Ignition (Rating)	UL 746A	—	—	4	3
UL94 Flammability Class (Rating)	UL Flame Test	V-0	V-0	V-0	V-0
High Amperage Arc Ignition (Rating)	UL 746A	—	—	0	0
High Volt Track Rate (Rating)	UL 746A	—	—	—	1
D495 Arc Resistance (Rating)	UL 746A	—	—	—	5
UL 746A Track Rate (CTI) (Rating)	UL 746A	—	—	—	0

Virgin and regrind up to 50% by weight have the same basic material characteristics.

All numerical flame spread ratings appearing in this data sheet are not intended to reflect hazards presented by this or any other material under actual fire conditions. Each end user should determine whether potential fire hazards are associated with the finished product and whether Vydyne resin is suitable for the particular use. Products made from Vydyne resins should not be exposed to open flames. In the case of direct exposure to open fire, Vydyne resins and products made therefrom can ignite and burn. Always store and use finished products in locations well away from open flames and sources of ignition.

Typical Molding Conditions for Vydyne ECO-315 Series

Optimal processing conditions will depend on such features as machine size, screw design, die design, and material residence time. The settings below are a guide to achieving stable processing and good part quality. It is best to use a hand-held pyrometer to measure stock melt temperature in an air shot.

Suggested Machine Conditions

Parameters	Machine Settings
Melt Temperature, °C	**255 to 270**
Cylinder Settings, °C	**235 to 270**
Mold Surface Temperature, °C	**20 to 90**
Injection Pressure, MPa	**55 to 140**
Holding Pressure, MPa	**55 to 140**
Injection Time, sec	**< 1 to 2.5**
Screw Back Pressure, MPa	**0.2 to 1.0**
Screw Speed, rpm	**60 to 120**
Cushion, mm	**3.0 to 6.4**
Clamp Pressure, tons/cm²	**0.3 to 0.7**

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Suggested Guidelines for Molding

1. Your Vydyne nylon resins arrive packaged in moisture-protected containers. If you do not open the original package prior to use, then drying is not necessary. However, if drying is necessary, we recommend that you use a dehumidified air-type dryer (desiccant bed) with a maximum air temperature of 70°C for 1 to 3 hours.

2. The recommended melt temperatures for Vydyne ignition-resistant resins are 255 to 270°C. Measure the stock in an air shot with a hand-held pyrometer. In addition to the barrel heater bands, screw back pressure and rotation speed add heat to the melt.

3. Maintain mold surface temperatures in a range of 20 to 90°C. We recommend temperatures on the high end, as the molding cycle allows, to aid in mold filling and to improve the appearance of the molded part.

4. Injection fill rates should be fast. Minimize the use of back pressure 0.2 to 1.0 MPa to yield a consistent melt and/or adequate mixing of color concentrates. Set the screw rotation speed at the minimum required to maintain the molding cycle (60 to 120 rpm).

5. Hold pressure should be set high enough to prevent screw bounce. Hold time should be set until the gate freezes.

6. Maintain your machine's shot-weight-to-barrel-size ratio at 40% to 80% of rated (polystyrene) capacity. A lower shot-to-barrel ratio results in excess residence time and polymer degradation, which can permanently embrittle the molded part. At a shot-to-barrel ratio above the recommended ratio, molding machinery is often unable to deliver a uniform melt or the desirable fast mold fill.

7. Regrind must be dry when molded. The preferred procedure is to grind and reuse immediately after molding. Regrind-to-virgin ratios of 25% or less have shown no significant property loss when properly molded. However, to ensure adequate performance of your molded part, determine acceptable levels for each application through actual part testing.

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