vydyne M344 Series **data sheet**

M344 White, M344 Black ignition resistant nylon†

Product Description

Vydyne® M344 resins are ignition resistant Nylon 66 resins with UL 94V-0 and UL 94-5VA flammability rating. Available in off-white or black. Lubricated for machine feed and easy mold release. Vydyne M344 resins are modified with halogenated and other ignition resistant additives to provide users a product that meets Underwriter Laboratories (UL) 94V-0 flammability classification down to thicknesses of 0.017 inches and 94-5VA down to 0.080 inches in thickness.

Ignition resistant additives generally reduce toughness and ductility when compared to general purpose, unreinforced 66 type nylon; however, Vydyne M344 resin has been formulated to minimize such loss in ductility. Vydyne M344 generally yields more ductile parts than many other nylon and non-nylon (UL) 94V-0 plastic materials in many commercial applications.

Vydyne M344 have a comparatively low specific gravity for an improved 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 Vydyne M344 resins are 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 or 94-5VA parts from Vydyne M344, eliminating the delay and costs involved in retooling.

Typical Applications/End Uses

The combination of flammability characteristics, engineering thermoplastic properties, and retention of electrical and physical properties when exposed to heat in service make Vydyne M344 resins ideal for applications in the appliance and electrical/electronic industries. Typical applications include connectors, terminal blocks, housings, circuit board standoffs, clips, clamps, fasteners, switch components, and many other industrial parts.

Vydyne M344 Series Specifications and Regulations

ASTM

Conforms to ASTM D-4066 PA 0111

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** Superseded by ASTM D-4066*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

Typical Properties for Vydyne M344 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	**1.27**	**—**
Mold Shrinkage (%)	ISO 294-4		
2 mm - Parallel		**1.3**	**—**
2 mm - Normal		**1.8**	**—**
Water Absorption @ 23°C (%)	ISO 62		
24 Hours		**0.9**	**—**
Equilibrium at 50% RH		**2.0**	**—**
Mechanical Properties	**Test Conditions**	**Dry as Molded**	**Conditioned 2.5% Moisture**
Tensile Strength @ Yield (MPa)	ISO 527	**60**	**40**
Tensile Strength @ Break (MPa)	ISO 527	**—**	**—**
Elongation @ Yield (%)	ISO 527	**5.2**	**25**
Elongation @ Break (%)	ISO 527	**60**	**75**
Tensile Modulus (MPa)	ISO 527	**3,500**	**2,300**
Poisson's Ratio	ISO 527	**0.41**	**—**
Flexural Modulus (MPa)	ISO 178	**3,000**	**1,400**
Flexural Strength (MPa)	ISO 178	**90**	**43**
Notched Charpy Impact (KJ/M²)	ISO 179		
23°C		**5.5**	**—**
-30°C		**5.2**	**—**
Unnotched Charpy Impact (KJ/M²)	ISO 179		
23°C		**NB**	**—**
-30°C		**NB**	**—**
Notched Izod Impact (KJ/M²)	ISO 180	**5**	**—**
Thermal Properties	**Test Conditions**	**Dry as Molded**	**Conditioned 2.5% Moisture**
Melting Point (°C)	ISO 3146	**250**	**—**
Heat Deflection Temperature (°C)	ISO 75		
1.82 MPa		**65**	**—**
0.45 MPa		**186**	**—**
Vicat @ 50N (°C)	ISO 306	**219**	**—**
Coefficient of Linear Thermal Expansion	ISO 11359		
2 mm - Parallel, 23°C-55°C (10^{-5} mm/mm/°C)		**—**	**—**
2 mm - Normal, 23°C-55°C (10^{-5} mm/mm/°C)		**—**	**—**
Electrical Properties	**Test Conditions**	**Dry as Molded**	**Conditioned 2.5% Moisture**
Dielectric Strength (kV/mm) (step-by-step) 3.0 mm	IEC 60243	**13**	**—**
Volume Resistivity (ohm-cm x 10^{15}) 3.0 mm	IEC 60093	**3**	**—**
Comparative Tracking Index (volts) 3.0 mm	IEC 60112	**250-399**	**—**

Flammability Properties for Vydyne M344 Series

Flammability Properties	Test Conditions	Dry as Molded
Glow Wire Flammability Index (GWFI/°C)	IEC 60695-2-12	
0.71 mm		**960**
1.5 mm		**960**
3.0 mm		**960**
Glow Wire Ignition Temperature (GWIT/°C)	IEC 60695-2-12	
0.71 mm		**700**
1.5 mm		**700**
3.0 mm		**725**
Limiting Oxygen Index (%)	ASTM D-2863	**30**

Underwriters Laboratories Recognized Component Ratings

Yellow Card File Number E70062

Color: All

Parameters	Test Conditions	Thickness (mm)				
		0.43	0.71	1.5	2.0	3.0
Temperature Index (°C)	UL 746B					
Electrical		**65**	**130**	**130**	**130**	**130**
Mechanical w/Impact		**65**	**65**	**95**	**95**	**95**
Mechanical w/o Impact		**65**	**95**	**95**	**95**	**95**
Hot Wire Ignition (Rating)	UL 746A	**—**	**0**	**0**	**0**	**0**
UL94 Flammability Class (Rating)	UL Flame Test	**V-0**	**V-0**	**V-0**	**V-0, 5VA**	**V-0, 5VA**
High Amperage Arc Ignition (Rating)	UL 746A	**—**	**0**	**0**	**0**	**0**
High Volt Track Rate (Rating)	UL 746A	**—**	**—**	**—**	**—**	**1**
D495 Arc Resistance (Rating)	UL 746A	**—**	**—**	**—**	**—**	**6**
UL 746A Track Rate (CTI) (Rating)	UL 746A	**—**	**—**	**—**	**—**	**1**

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 M344 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

Melt Temperature, °C 255 to 270

Parameters	Machine Settings
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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