

# vydyne R533 Series data sheet

R533, R533H, R533H Black glass reinforced nylon

## Product Description

**The Vydyne® R533 Series of 33% glass fiber reinforced nylons are available in natural, black, and heat stabilized versions.** They are general purpose, injection molding grades, which are lubricated for good machine feed, flow, and mold release.

**Vydyne R533 Series** resins are members of a wide range of glass reinforced resins supplied by Solutia. Other glass fiber loadings available include 13% and 43%.

**Vydyne R533 Series** resins have tensile strength and modulus properties just below aluminum and zinc and can replace these metals in numerous applications due to an excellent balance of properties. Reduction in production costs, energy consumption, and part weight are key advantages of Vydyne glass reinforced Nylon 66 resins over aluminum and/or zinc die-cast parts.

**Vydyne R533 Series** is a heat stabilized grade, formulated to minimize the oxidative and thermal degradation of the nylon polymer when exposed to elevated temperatures for extended periods of time. Vydyne R533H provides improved retention of physical properties under exposure to long-term heat. The continuous operating use temperature is 275°F and short-term peak temperatures as high as 475°F.

## Typical Applications/End Uses

Vydyne R533 Series of resins have been used for many under-the-hood automotive applications, motor housings for power tools, and garden appliances. These resins have also been used in miscellaneous brackets, gears, and clips, which require high rigidity and strength.

Find more information or contact us at [www.vydyne.com](http://www.vydyne.com)



## Vydyne R533 Series Specifications and Regulations

### ASTM

Conforms to ASTM D-4066 PA0111

### Federal\*

Conforms to Federal Specification LP-410a

### Military\*

Conforms to Military Specification MIL-M-20693B

\* Superseded by ASTM D-4066



# Typical Properties for Vydyne R533 Series

Test temperature 23°C unless otherwise noted

Physical Properties	Test Conditions	Dry as Molded	Conditioned 2.5% Moisture
Specific Gravity (g/cm <sup>3</sup> )	ISO 1183	1.4	—
Mold Shrinkage (%)	ISO 294-4		
2 mm - Parallel		0.4	—
2 mm - Normal		0.9	—
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	—	—
Tensile Strength @ Break (MPa)	ISO 527	204	148
Elongation @ Yield (%)	ISO 527	—	—
Elongation @ Break (%)	ISO 527	3	5
Tensile Modulus (MPa)	ISO 527	10,200	7,900
Poisson's Ratio	ISO 527	0.4	—
Flexural Modulus (MPa)	ISO 178	9,700	6,500
Flexural Strength (MPa)	ISO 178	290	205
Notched Charpy Impact (KJ/M <sup>2</sup> )	ISO 179		
23°C		12.3	—
-30°C		12.7	—
Unnotched Charpy Impact (KJ/M <sup>2</sup> )	ISO 179		
23°C		67	—
-30°C		56	—
Notched Izod Impact (KJ/M <sup>2</sup> )	ISO 180	12	—
Thermal Properties	Test Conditions	Dry as Molded	Conditioned 2.5% Moisture
Melting Point (°C)	ISO 3146	260	—
Heat Deflection Temperature (°C)	ISO 75		
1.82 MPa		253	—
0.45 MPa		258	—
Vicat @ 50N (°C)	ISO 306	253	—
Coefficient of Linear Thermal Expansion	ISO 11359		
2 mm - Parallel, 23°C-55°C (10 <sup>-5</sup> mm/mm/°C)		0.2	—
2 mm - Normal, 23°C-55°C (10 <sup>-5</sup> mm/mm/°C)		0.82	—
Electrical Properties	Test Conditions	Dry as Molded	Conditioned 2.5% Moisture
Dielectric Strength (kV/mm) (step-by-step) 3.0 mm	IEC 60243	16	—
Volume Resistivity (ohm-cm x 10 <sup>15</sup> ) 3.0 mm	IEC 60093	3	—
Comparative Tracking Index (volts) 3.0 mm	IEC 60112	400-599	—

## Flammability Properties for Vydyne R533 Series

Flammability Properties	Test Conditions	Dry as Molded
<b>Glow Wire Flammability Index (°C)</b>	IEC 60695-2-12	
0.71 mm		—
1.5 mm		—
3.0 mm		—
<b>Glow Wire Ignition Temperature (°C)</b>	IEC 60695-2-12	
0.71 mm		—
1.5 mm		—
3.0 mm		—
<b>Limiting Oxygen Index (%)</b>	ASTM D-2863	28

## Underwriters Laboratories Recognized Component Ratings

Yellow Card File Number E70062

Color: All

Parameters	Test Conditions	Thickness (mm)		
		0.75	1.5	3.0
<b>Temperature Index (°C)</b>	UL 746B			
Electrical		140	140	140
Mechanical w/Impact		125	125	125
Mechanical w/o Impact		140	140	140
<b>Hot Wire Ignition (Rating)</b>	UL 746A	4	3	4
<b>UL94 Flammability Class (Rating)</b>	UL Flame Test	HB	HB	HB
<b>High Amperage Arc Ignition (Rating)</b>	UL 746A	0	0	0
<b>High Volt Track Rate (Rating)</b>	UL 746A	—	—	1
<b>D495 Arc Resistance (Rating)</b>	UL 746A	—	—	6
<b>UL 746A Track Rate (CTI) (Rating)</b>	UL 746A	—	—	2

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 R533 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 285 to 305

Parameters	Machine Settings
Cylinder Settings °C	280 to 310
Mold Surface Temperature, °C	65 to 95
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/cm <sup>2</sup>	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 glass reinforced resins are 285 to 305°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 65 to 95°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 (50 to 150 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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