

# vydyne 22HSP series data sheet

22HSP Natural, 22HSP Black heat stabilized, general purpose

## Product Description

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**Vydyne® 22HSP is a heat-stabilized molding-grade Nylon 66 resin available in natural color and black.** It is lubricated for improved machine feed and mold release and is intended for use in applications requiring fast molding cycles and outstanding mold release performance. The stabilization package has been formulated to provide improved retention of physical and electrical properties, compared to non-heat-stabilized grades during long term exposure to high temperatures.

**Vydyne 22HSP Series** offers a well-balanced combination of engineering properties characterized by high strength, rigidity, good toughness in use, high melting point, good surface lubricity, and abrasion resistance. In addition, it is resistant to many chemicals and solvents, including gasoline, and machine and motor oils.

Internally and externally lubricated for improved machine feed and exceptional mold release. Vydyne 22HSP Series are intended for use in high-productivity applications. In many applications, the molding cycle can be reduced because parts may be removed from the cavity at higher temperatures. In difficult molds where Vydyne 22HSP Series resins can reduce or eliminate the need for mold release sprays. Critical molded part dimensions should be checked against specifications before implementing shorter molding cycles on a routine production basis.

## Typical Applications/End Uses

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Typical end uses include terminal blocks, bearings and bearing cages, bushings, washers, control cams, electrical connectors, clips, fasteners, switch components, valves and general automotive and industrial parts which require stability to heat at higher temperatures.



## Vydyne 22HSP Series Specifications and Regulations

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### **ASTM**

Conforms to ASTM D-4066 PA 0121

### **Federal\***

Conforms to Federal Specification LP-410a

### **Military\***

Conforms to Military Specification MIL-M-20693B

*\* Superseded by ASTM D-4066*

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



# Typical Properties for Vydyne 22HSP 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	1.14	—
Mold Shrinkage (%)	ISO 294-4		
2 mm - Parallel		1.4	—
2 mm - Normal		1.6	—
Water Absorption @ 23°C (%)	ISO 62		
24 Hours		1.1	—
Equilibrium at 50% RH		2.4	—
Mechanical Properties	Test Conditions	Dry as Molded	Conditioned 2.5% Moisture
Tensile Strength @ Yield (MPa)	ISO 527	83	66
Tensile Strength @ Break (MPa)	ISO 527	—	—
Elongation @ Yield (%)	ISO 527	10	25
Elongation @ Break (%)	ISO 527	40	105
Tensile Modulus (MPa)	ISO 527	3,000	1,400
Poisson's Ratio	ISO 527	0.41	—
Flexural Modulus (MPa)	ISO 178	2,900	1,350
Flexural Strength (MPa)	ISO 178	35	22
Notched Charpy Impact (KJ/M <sup>2</sup> )	ISO 179		
23°C		6.6	—
-30°C		5.3	—
Unnotched Charpy Impact (KJ/M <sup>2</sup> )	ISO 179		
23°C		NB	—
-30°C		NB	—
Notched Izod Impact (KJ/M <sup>2</sup> )	ISO 180	5.5	—
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		70	—
0.45 MPa		200	—
Vicat @ 50N (°C)	ISO 306	236	—
Coefficient of Linear Thermal Expansion	ISO 11359		
2 mm -Parallel, 23°C-55°C (10 <sup>-5</sup> mm/mm/°C)		1.1	—
2 mm -Normal, 23°C-55°C (10 <sup>-5</sup> mm/mm/°C)		1.2	—
Electrical Properties	Test Conditions	Dry as Molded	Conditioned 2.5% Moisture
Dielectric Strength (kV/mm) (step-by-step) 3.0 mm	IEC 60243	20	—
Volume Resistivity (ohm-cm x 10 <sup>15</sup> ) 3.0 mm	IEC 60093	4	—
Comparative Tracking Index (volts) 3.0 mm	IEC 60112	400-599	—

# Flammability Properties for Vydyne 22HSP

Flammability Properties	Test Conditions	Dry as Molded
<b>Glow Wire Flammability Index (GWFI/°C)</b>	IEC 60695-2-12	
0.71 mm		825
1.5 mm		825
3.0 mm		960
<b>Glow Wire Ignition Temperature (GWIT/°C)</b>	IEC 60695-2-12	
0.71 mm		700
1.5 mm		700
3.0 mm		700
<b>Limiting Oxygen Index (%)</b>	ASTM D-2863	—

## Typical Molding Conditions for Vydyne 22HSP 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.

## Underwriters Laboratories Recognized Component Ratings

Yellow Card File Number E70062

Color: All

Parameters	Test Conditions	Thickness (mm)		
		0.71	1.5	3.0
<b>Temperature Index (°C)</b>	UL 746B			
Electrical		140	140	140
Mechanical w/Impact		95	110	110
Mechanical w/o Impact		115	125	125
<b>Hot Wire Ignition (Rating)</b>	UL 746A	4	4	4
<b>UL94 Flammability Class (Rating)</b>	UL Flame Test	V-2	V-2	V-2
<b>High Amperage Arc Ignition (Rating)</b>	UL 746A	0	0	0
<b>High Volt Track Rate (Rating)</b>	UL 746A	—	—	0
<b>D495 Arc Resistance (Rating)</b>	UL 746A	—	—	6
<b>UL 746A Track Rate (CTI) (Rating)</b>	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.

## Suggested Machine Conditions

Melt Temperature, °C 275 to 305

Parameters	Machine Settings
Cylinder Settings °C	270 to 310
Mold Surface Temperature, °C	15 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	50 to 150
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 or 1 to 3 hours.

2. The recommended melt temperatures for Vydyne general-purpose resins are 275 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 15 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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