vydyne 22HSP series **data sheet**

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

Product Description

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 diffi cult molds where Vydyne 22HSP Series resins can reduce or eliminate the need for mold release sprays. Critical molded part dimensions should be checked against specifi cations before implementing shorter molding cycles on a routine production basis.

Typical Applications/End Uses

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.

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/cm3)	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	**4.5**	**25**
Elongation @ Break (%)	ISO 527	**25**	**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	**86**	**22**
Notched Charpy Impact (KJ/M2)	ISO 179		
23°C		**6.6**	—
-30°C		**5.3**	—
Unnotched Charpy Impact (KJ/M2)	ISO 179		
23°C		**NB**	—
-30°C		**NB**	—
Notched Izod Impact (KJ/M2)	ISO 180	**5.5**	—
Thermal Properties	**Test Conditions**	**Dry as Molded**	**Conditioned 2.5% Moisture**
Melting Point (°C) Heat	ISO 3146	**260**	—
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 (10-5 mm/mm/°C)		**1.1**	—
2 mm -Normal, 23°C-55°C (10-5 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	IEC 60243	**20**	—
mm Volume Resistivity (ohm-cm x 1015) 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
Glow Wire Flammability Index (GWFI/°C)	IEC 60695-2-12	
0.71 mm		82
1.5 mm		5
3.0 mm		82
Glow Wire Ignition Temperature (GWIT/°C)	IEC 60695-2-12	5
0.71 mm		960
1.5 mm		700
3.0 mm		700
Limiting Oxygen Index (%)	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
Temperature Index (°C)	UL 746B			
Electrical		140	140	14
Mechanical w/Impact		95	110	0
Mechanical w/o Impact		115	125	11
Hot Wire Ignition (Rating)	UL 746A	4	4	0 4 12
UL94 Flammability Class (Rating)	UL Flame Test	V-2	V-2	V-2
High Amperage Arc Ignition (Rating)	UL 746A	0	0	0
High Volt Track Rate (Rating)	UL 746A	—	—	0
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.

Suggested Machine Conditions

Parameters	Machine Settings
Melt Temperature, °C	275 to 305
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/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 dehumidifi ed 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 fi lling and to improve the appearance of the molded part.

4. Injection fi ll 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 fi ll.

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 signifi cant property loss when properly molded. However, to ensure adequate performance of your molded part, determine acceptable levels for each application through actual part testing.