



21X SERIES DATA SHEET

21X NATURAL, 21X BLACK

GENERAL PURPOSE NYLON

Product Description

Vydyne 21X is a general purpose Nylon 6,6 resin available in natural color and black. It is designed principally for injection molding fabrication. This resin offers a well balanced combination of engineering properties characterized by high strength, rigidity, good toughness, high melt point, good surface lubricity, abrasion resistance, and resistance to many chemicals, solvents, gasoline, and machine and motor oils.

Vydyne 21X Series permit production of molded parts with good initial color plus good property and color retention when using regrinds. This resin is recognized by Underwriters Laboratories and conforms to the requirements of many industrial, federal, and military specifications for premium quality general purpose Nylon 6,6 resins.

Vydyne 21X Series are externally lubricated for improved machine feed and mold release. This formulation is designed to provide easy release of parts from molds using standard molding conditions.

Typical Applications/End Uses

Vydyne 21X Series have been used in many molding applications such as terminal blocks, bearings, bushings, cams, electrical connectors and housings, electrical cable ties/tie straps and many other hardware and general industrial parts.

Vydyne® 21X 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

FDA Complies with 21 CFR 177-1500

** Superseded by ASTM D-4066.*



Typical Properties for Vydyne® 21X Series

PROPERTIES ¹	TEST METHOD ²	TEST TEMP	UNITS	DRY AS MOLDED ³	CONDITIONED ⁴ (2.5% MOISTURE)
PHYSICAL					
Specific Gravity	ISO 1183	23°C	–	1.14	
Mold Shrinkage, Flow Direction	ASTM D-955	23°C	%	1.5-2.0	
Water Absorption @ 24 hours Saturation	ASTM D-570	23°C	%	1.3	
			%	8.0	
MECHANICAL					
Tensile Modulus, Secant	ASTM D-638	23°C	MPa	2,960	1,310
Tensile Strength @ Yield	ISO 527	23°C	MPa	83	
Tensile Elongation @ Yield	ISO 527	23°C	%	11	
Tensile Elongation @ Break ⁵	ISO 527	23°C	%	35	
Flexural Modulus, Secant	ISO 178	23°C	MPa	2,860	1,310
Flexural Strength	ASTM D-790	23°C	MPa	90	41
Notched Izod Impact ⁵ 4.0 mm	ISO 180	23°C	kJ/m ²	5.3	
		40°C	kJ/m ²	2.0	
THERMAL					
Deflection Temperature Under Load Unannealed @ 1.8 MPa	ISO 75		°C	64	
Melting Point	ISO 3146		°C	260	
ELECTRICAL					
Volume Resistivity	ASTM D-257	23°C	ohm-cm	6.0x10 ¹⁵	2.0x10 ¹³
Dielectric Strength Short Time Step-By-Step	ASTM D-149	23°C	kV/mm	23	22
				21	19
Dielectric Constant	ASTM D-150	23°C		3.7	6.0
				3.6	6.0
				3.1	3.5
Dissipation Factor	ASTM D-150	23°C		0.02	0.04
				0.02	0.04
				0.03	0.08
IGNITION CHARACTERISTIC⁶					
Limiting Oxygen Index	ASTM D-2863		%O ₂	30	31

(1) Typical properties; not to be construed as specifications. Fabrication conditions, part design, additives, processing aids, finishing materials, and use conditions can all affect the integrity, performance, and regulatory status of finished goods.
 (2) All data taken on unannealed injection molded test specimens per ISO 294/ASTM D-1897.
 (3) Samples sealed in moisture barrier packages immediately after molding.
 (4) Equilibrium moisture at 50% relative humidity and 23°C (73°F). Conditioned per ISO 291 and/or ASTM D-618.
 (5) Toughness properties may be slightly reduced with Vydyne 21X Black.

(6) All numerical flame spread ratings appearing in this data 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 the 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 other sources of ignition.



Suggested Guidelines for Molding

1. Storage

Vydyne nylon resins are hygroscopic and should be stored under cool, dry conditions in their original factory sealed packaging until ready for use.

2. Material Drying

A dehumidified air (desiccant bed)-type dryer is recommended with a maximum air temperature of 160°F (71°C) and a residence time of 1-3 hours.

3. Melt Temperature

Recommended melt temperatures are 520-560°F (271-293°C). The melt temperature must be measured from an air shot using a hand-held pyrometer, since in addition to the barrel heaters, screw back pressure and screw rotation add additional heat to the melt.

4. Barrel-to-shot Ratio

A barrel-to-shot ratio of 40 to 80% of the machine's rated capacity in polystyrene is recommended. A lower barrel-to-shot ratio results in excess residence time and polymer degradation causing permanent embrittlement of the molded part. A higher barrel-to-shot ratio makes it more difficult for the molding machine to deliver a uniform melt or achieve high fill speeds.

5. Injection Rates and Screw Speed

Injection rates should be as fast as possible without causing excessive shear to the material, resulting in material degradation. The use of back pressure should be minimized between 25 and 150 psi. (1.72-10.34 bar) to yield a consistent melt and/or adequate mixing

of color concentrates. Screw rotation speed should be controlled at the minimum required to maintain the molding cycle, with the optimum range between 50 and 150 rpm.

6. Mold Temperature

Mold surface temperatures should be controlled in a range between 100 and 200°F (38-93°C). Temperatures on the high end are recommended as the molding cycle allows assisting in mold filling and improving molded part performance.

7. Use of Regrind

Regrind must be dried before use. The suggested procedure is to grind and reuse the reground material immediately after molding. Regrind ratios of 25% or less have shown no significant property loss when properly molded. However, acceptable levels for each application should be determined by actual performance of the finished parts.

8. Molding Equipment & Tooling

Standard screw-type injection molding machines with a general purpose injection screw design are recommended.

9. Start-up and Shutdown Procedures

To facilitate machine start-up after extended shutdown, the cylinder and any hot runner blocks or manifold should be purged of nylon prior to shutdown with a material that flows at a lower process temperature. Do not shut down a machine with nylon resin remaining in the barrel. General purpose crystal polystyrene, natural polyethylene, or clear acrylic regrind is recommended.

For more information or to place an order in the US, please call our Customer Service Center at 1-888-927-2363.

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