

Product Information

# VESTAMID® NRG 2101 YE

## FOR GAS PIPES AND FITTINGS



**VESTAMID® NRG 2101 YE** is a high molecular grade PA 12 material developed by Evonik.

Its superior performance characteristics make it an ideal choice for expanding the use of thermoplastic piping systems at higher operating pressures and larger diameters to replace metallic piping systems in a safe and cost effective manner.

Besides extending the operating pressure limits of thermoplastic piping systems, VESTAMID® NRG 2101 YE offers many of the same benefits, and in most instances more superior performance, as conventional PE piping systems.

- Tough and durable
- Corrosion resistant
- Resistant to heavy hydrocarbons
- High resistance to Slow Crack Growth and Rapid Crack Propagation
- Increased installation efficiencies
- Worry free performance

These characteristics make the VESTAMID® NRG 2101 yellow material an ideal choice when selecting appropriate thermoplastic piping materials in extending your gas distribution infrastructure.

We recommend a processing temperature between 230°C (446°F) and 260°C (500°F) - in some cases up to 280°C (536°F) - during the injection molding and extrusion process.

The mold temperature should be within a range of 60°C (140°F) to 100°C (212°F). Drying at 80°C (176°F) for 2 hours to 4 hours before processing is recommended.

Polyamide 12 is a high performance thermo-plastic polymer with increased performance characteristics that translates into safe operations over the life of the installed pipe- line. It has a considerable record of safe and proven experience in many demanding applications, including fuel lines in passenger cars, air brake tubing in trucks and off-shore applications.

Inside the original and undamaged packaging, the product has a shelf life of at least 2 years when stored in dry rooms at temperatures not exceeding 30°C.

**Key Features**

**Industrial Sector**

Sustainable, Industry and Engineering, Energy, Oil and Gas

**Sustainability**

Sustainable electricity

**Processing**

Injection molding, Extrusion

**Delivery form**

Pellets, Granules

**Resistance to**

Heat (thermal stability), Hydrolysis / hot water, UV / light / weathering, Fatigue resistance, Oil / fuels

**Electrical**

Insulating

**Additives**

Unfilled

LCA-values	dry	Unit	Test Standard
LCA name of certificate	<a href="#">VESTAMID® L Compound low</a>	-	ISO 14040, 14044
LCA certifier	<a href="#">TÜV Rheinland</a>	-	ISO 14040, 14044
Blue water consumption	<b>25.7</b>	kg	ISO 14040, 14044
Global Warming Potential incl. bio. C incl. LUC	<b>6.1</b>	kg CO <sub>2</sub> eq./kg	ISO 14040, 14044
Global Warming Potential excl. bio. C incl. LUC	<b>6.1</b>	kg CO <sub>2</sub> eq./kg	ISO 14040, 14044
Land use (ReCiPe 2016)	<b>0.1</b>	Annual crop eq. y	ISO 14040, 14044
GWP savings as compared to 2023 reference	<b>-2.5</b>	kg CO <sub>2</sub> eq./kg	ISO 14040, 14044

Mechanical properties ISO	dry / cond	Unit	Test Standard
Tensile modulus	<b>1300 / -</b>	MPa	ISO 527
Tensile strength	<b>40 / -</b>	MPa	ISO 527
Yield stress	<b>40 / -</b>	MPa	ISO 527
Yield strain	<b>12 / -</b>	%	ISO 527
Stress at 50% strain	<b>36 / -</b>	MPa	ISO 527
Stress at break	<b>48 / -</b>	MPa	ISO 527
Nominal strain at break, tB	<b>175 / -</b>	%	ISO 527
Typical for the mat. nom. strain at br., tB	<b>&gt;220<sup>[n]</sup></b>	%	ISO 527
Charpy impact strength, +23°C	<b>N / -</b>	kJ/m <sup>2</sup>	ISO 179/1eU
Charpy impact strength, -30°C	<b>N / -</b>	kJ/m <sup>2</sup>	ISO 179/1eU

Charpy impact strength, -40°C	<b>N / -</b>	kJ/m <sup>2</sup>	ISO 179/1eU
Charpy notched impact strength, +23°C	<b>45 / -</b>	kJ/m <sup>2</sup>	ISO 179/1eA
Type of failure	<b>P(C) / -</b>	-	-
Charpy notched impact strength, 0°C	<b>25 / -</b>	kJ/m <sup>2</sup>	ISO 179/1eA
Type of failure	<b>C / -</b>	-	-
Charpy notched impact strength, -30°C	<b>18 / -</b>	kJ/m <sup>2</sup>	ISO 179/1eA
Type of failure	<b>C / -</b>	-	-
Charpy notched impact strength, -40°C	<b>9 / -</b>	kJ/m <sup>2</sup>	ISO 179/1eA
Type of failure	<b>C / -</b>	-	-
Flexural modulus, 23°C	<b>1250 / -</b>	MPa	ISO 178
Flexural stress at conv. deflection, 23°C	<b>43 / -</b>	MPa	ISO 178
Flexural strength, 23°C	<b>53 / -</b>	MPa	ISO 178
Flexural strain at flexural strength, 23°C	<b>7 / -</b>	%	ISO 178
Flexural stress at break, 23°C	<b>N / -</b>	MPa	ISO 178
Flexural strain at break, 23°C	<b>N / -</b>	%	ISO 178

n: specimen milled from pipe wall

<b>Thermal properties</b>	<b>dry / cond</b>	<b>Unit</b>	<b>Test Standard</b>
Melting temperature	<b>177 / *</b>	°C	ISO 11357-1/-3
Glass transition temperature, DSC	<b>36 / *</b>	°C	ISO 11357-1/-2
Temp. of deflection under load A, 1.80 MPa	<b>45 / *</b>	°C	ISO 75-1/-2
Temp. of deflection under load B, 0.45 MPa	<b>145 / *</b>	°C	ISO 75-1/-2
Vicat softening temperature A, 10 N, 50 K/h	<b>170 / *</b>	°C	ISO 306
Vicat softening temperature B, 50 N, 50 K/h	<b>150 / *</b>	°C	ISO 306
Coeff. of linear therm. expansion, 23°C to 55 °C, parallel	<b>144 / *</b>	E-6/K	ISO 11359-1/-2
Melting Temperature	<b>177</b>	°C	ASTM D 3418

Physical properties	dry / cond	Unit	Test Standard
Density	1020 / -	kg/m <sup>3</sup>	ISO 1183
Water absorption	1.6 / *	%	Sim. to ISO 62
Humidity absorption	0.9 / *	%	Sim. to ISO 62
Shore D hardness	73 <sup>[b]</sup> / -	-	ISO 7619-1
Ball indentation hardness	76 / -	MPa	ISO 2039-1
Density	1020	kg/m <sup>3</sup>	ASTM D 792

b: 3 seconds

Electrical properties	dry / cond	Unit	Test Standard
Volume resistivity, V	>1E13 / -	Ohm*m	IEC 62631-3-1
Surface resistivity, C, circular electrodes	>1E15 / -	Ohm per square	IEC 62631-3-2
Relative permittivity, 50Hz	3.6 / -	-	IEC 62631-2-1
Relative permittivity, 100Hz	3.5 / -	-	IEC 62631-2-1
Relative permittivity, 1MHz	2.9 / -	-	IEC 62631-2-1
Dissipation factor, 1MHz	225 / -	E-4	IEC 62631-2-1
Dielectric strength, AC, S20/S20, t. 1 mm	42 / -	kV/mm	IEC 60243-1

Rheological properties	dry / cond	Unit	Test Standard
Melt volume-flow rate, MVR	3 / *	cm <sup>3</sup> /10min	ISO 1133
Temperature	235 / *	°C	-
Load	10 / *	kg	-
Molding shrinkage, parallel	0.5 / *	%	ISO 294-4, 2577
Molding shrinkage, normal	1.6 / *	%	ISO 294-4, 2577
Mold temperature	60 / *	°C	-
Melt temperature	260 / *	°C	-

Test specimen production	dry	Unit	Test Standard
Injection Molding, melt temperature	260	°C	ISO 294

## VESTAMID® NRG

Injection Molding, mold temperature	<b>60</b>	°C	ISO 294
Injection Molding, injection velocity	<b>200</b>	mm/s	ISO 294

### Characteristics

#### Applications

Tube and hose

#### Processing

Profile extrusion, Pipe/Tube extrusion

#### Special Characteristics

Halogen-free, Phosphorus-free, High impact strength, Semi-crystalline, Environmental stress crack resistance, Light-stabilized, U.V. stabilized, High heat resistant, High viscosity

#### Features

Weldable, High melt strength

#### Color

Yellow

#### Additives

Heat stabilizer

#### Delivery form

Spherical pellets

#### Chemical Resistance

Solvent resistance, Grease resistance, Oil resistance, Ozone resistance, Aging resistance, Fuel resistance, General chemical resistance