VESTAMID[®]

Product Information VESTAMID® X7293

HIGH VISCOSITY, PLASTICIZED, IMPACT MODIFIED, HEAT- AND LIGHT-STABILIZED POLYAMIDE 12 COMPOUND

VESTAMID® X7293 NC is a plasticized polyamide 12 compound with heat and light stabilizer for the extrusion of flexible tubing and hose, especially for automotive applications according to DIN 73378, (PA 12-HIPHL, Type 1), ISO/DIN 7628-1 (PA 12-HIPEHL, Type 1) and SAE J844.

VESTAMID® X7293 NC is distinguished by an easy processing as well as by a high impact strength at low temperatures.

Properties of compounds based on PA 12 vary little with changing humidity due to low moisture absorption. Parts made of this semicrystalline material are characterized by exceptional impact strength, low coefficient of friction and good chemical resistance.

VESTAMID® X7293 NC is supplied as cylindrical granules, ready for processing, in moisture-proof bags.

Pigmentation may affect values.

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.

The results shown have been generated from a low number of production lots. Therefore, they are preliminary and not yet the result of a statistical evaluation. Therefore they must not be used to establish specifications.

For information about processing of VESTAMID[®], please follow the general commendations about "<u>Processing of VESTAMID[®]</u> compounds".

FOR FURTHER INFORMATION PLEASE CONTACT US AT <u>EVONIK-HP@EVONIK.COM</u> OR VISIT OUR PRODUCT AT <u>WWW.VESTAMID.COM</u>

Key Features

Industrial Sector Automotive and Mobility, Sustainable, Industry and Engineering

Sustainability Sustainable electricity

Processing Injection molding, Extrusion

Delivery form Pellets, Granules Resistance to Heat (thermal stability), UV / light / weathering, Oil / fuels

Electrical Insulating

Conformity Automotive

Additives Lubricant, Unfilled

LCA-valuesdryUnitTest StandardLCA name of certificate\VESTAMID® L Compound medium-SO 14040, 14044LCA certifierTÜV Rheinland-SO 14040, 14044Blue water consumption25.9kgSO 14040, 14044Global Warming Potential incl. bio. C incl. LUC5.8kg CO2 eq./kgSO 14040, 14044Global Warming Potential excl. bio. C incl. LUC5.7kg CO2 eq./kgSO 14040, 14044Land use (ReCiPe 2016)0.3Annual crop eq./kgSO 14040, 14044GWP savings incl. bio. C. as compared to classical production2.6kg CO2 eq./kgSO 14040, 14044				
LCA certifier TÜV Rheinland - ISO 14040, 14044 Blue water consumption 25.9 kg ISO 14040, 14044 Global Warming Potential incl. bio. C incl. LUC 5.8 kg CO ₂ eq./kg ISO 14040, 14044 Global Warming Potential excl. bio. C incl. LUC 5.7 kg CO ₂ eq./kg ISO 14040, 14044 Land use (ReCiPe 2016) 0.3 Annual crop eq. y ISO 14040, 14044	LCA-values	dry	Unit	Test Standard
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Mechanical properties ISO	dry / cond	Unit	Test Standard
Tensile modulus	390 / -	MPa	ISO 527
Tensile strength	25 / -	MPa	ISO 527
Yield stress	25 / -	MPa	ISO 527
Yield strain	36 / -	%	ISO 527
Stress at 50% strain	26 / -	MPa	ISO 527
Stress at break	41 / -	MPa	ISO 527
Nominal strain at break, ɛtB	235 / -	%	ISO 527
Charpy impact strength, +23°C	N / -	kJ/m²	ISO 179/1eU
Charpy impact strength, 0°C	N / -	kJ/m²	ISO 179/1eU
Charpy impact strength, -20°C	N / -	kJ/m²	ISO 179/1eU
Charpy impact strength, -30°C	N / -	kJ/m²	ISO 179/1eU
Charpy notched impact strength, +23°C	130 / -	kJ/m²	ISO 179/1eA
Type of failure	P/-	-	-
Charpy notched impact strength, -30°C	7 / -	kJ/m²	ISO 179/1eA
Type of failure	c / -	-	-
Flexural modulus, 23°C	400 / -	MPa	ISO 178
Flexural stress at conv. deflection, 23°C	14 / -	MPa	ISO 178



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Flexural strength, 23°C	22 / -	MPa	ISO 178
Flexural strain at flexural strength, 23°C	9 / -	%	ISO 178
Flexural stress at break, 23°C	N / -	MPa	ISO 178
Flexural strain at break, 23°C	N / -	%	ISO 178
Thermal properties	dry / cond	Unit	Test Standard
Melting temperature	172 / *	°C	ISO 11357-1/-3
Glass transition temperature, DSC	8 / *	°C	ISO 11357-1/-2
Temp. of deflection under load A, 1.80 MPa	45 / *	°C	ISO 75-1/-2
Temp. of deflection under load B, 0.45 MPa	100 / *	°C	ISO 75-1/-2
Vicat softening temperature A, 10 N, 50 K/h	167 / *	°C	ISO 306
Vicat softening temperature B, 50 N, 50 K/h	130 / *	°C	ISO 306
Coeff. of linear therm. expansion, 23°C to 55 °C, parallel	180 / *	E-6/K	ISO 11359-1/-2
Coeff. of linear therm. expansion, 23°C to 55 °C, normal	180 / *	E-6/K	ISO 11359-1/-2
Melting Temperature	172	°C	ASTM D 3418
Disasterile constant	dry / cond	Unit	Test Standard
Physical properties			
Physical properties Density	1020 / -	kg/m³	ISO 1183
		kg/m³ %	ISO 1183 Sim. to ISO 62
Density	1020 / -		
Density Humidity absorption	1020 / - 0.7 / *	%	Sim. to ISO 62
Density Humidity absorption	1020 / - 0.7 / *	%	Sim. to ISO 62
Density Humidity absorption Density	1020 / - 0.7 / * 1020	% kg/m³	Sim. to ISO 62 ASTM D 792
Density Humidity absorption Density Burning Behav.	1020 / - 0.7 / * 1020 dry / cond	% kg/m ³ Unit	Sim. to ISO 62 ASTM D 792 Test Standard
Density Humidity absorption Density Burning Behav. Burning behav. at 1.5 mm nom. thickn.	1020 / - 0.7 / * 1020 dry / cond HB / *	% kg/m ³ Unit class	Sim. to ISO 62 ASTM D 792 Test Standard
Density Humidity absorption Density Burning Behav. Burning behav. at 1.5 mm nom. thickn. Thickness tested	1020 / - 0.7 / * 1020 dry / cond HB / * 1.6 / *	% kg/m ³ Unit class mm	Sim. to ISO 62 ASTM D 792 Test Standard IEC 60695-11-10 -
Density Humidity absorption Density Burning Behav. Burning behav. at 1.5 mm nom. thickn. Thickness tested Burnin behav. at thickness h	1020 / - 0.7 / * 1020 dry / cond HB / * 1.6 / * HB / *	% kg/m ³ Unit class mm class	Sim. to ISO 62 ASTM D 792 Test Standard IEC 60695-11-10 -
Density Humidity absorption Density Burning Behav. Burning behav. at 1.5 mm nom. thickn. Thickness tested Burnin behav. at thickness h	1020 / - 0.7 / * 1020 dry / cond HB / * 1.6 / * HB / *	% kg/m ³ Unit class mm class	Sim. to ISO 62 ASTM D 792 Test Standard IEC 60695-11-10 -
Density Humidity absorption Density Burning Behav. Burning behav. at 1.5 mm nom. thickn. Thickness tested Burnin behav. at thickness h Thickness tested	1020 / - 0.7 / * 1020 dry / cond HB / * 1.6 / * HB / * 3.2 / *	% kg/m ³ Unit class mm class mm	Sim. to ISO 62 ASTM D 792 Test Standard IEC 60695-11-10 - IEC 60695-11-10 -



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Relative permittivity, 100Hz	11 / -	-	IEC 62631-2-1
Relative permittivity, 1MHz	4.6 / -	-	IEC 62631-2-1
Dissipation factor, 100Hz	2000 / -	E-4	IEC 62631-2-1
Dissipation factor, 1MHz	1900 / -	E-4	IEC 62631-2-1
Dielectric strength, AC, S20/P50	30 / -	kV/mm	Sim. to IEC 60243-1
CTI, test solution A, 50 drops value	600 / -	-	IEC 60112
Assessment of the insulation group	I	-	DIN EN 60664-1
Rheological properties	dry / cond	Unit	Test Standard
Melt volume-flow rate, MVR	26 / *	cm³/10min	ISO 1133
Temperature	220 / *	°C	-
Load	10 / *	kg	-
Molding shrinkage, parallel	0.7 / *	%	ISO 294-4, 2577
Molding shrinkage, normal	1.4 / *	%	ISO 294-4, 2577
Mold temperature	60 / *	°C	-
Melt temperature	240 / *	°C	-
Pipes Properties	dry / cond	Unit	Test Standard
Cold impact resistance, breaks of 10, -40°C, 454g	0 / *	-	SAE J844
Tube dimension, OD x WT	6 x 1	mm	SAE J844
Pretreatment	2h boiling water	-	SAE J844
Cold impact resistance, breaks of 10, -40°C, 454g	0 / *	-	SAE J844
Tube dimension, OD x WT	6 x 1	mm	SAE J844
Pretreatment	24h 110°C	-	SAE J844
Burst hoop stress, 23°C, H2O	24.5 / *	MPa	DIN 53758, historica
Burst hoop stress, 100°C, in Oil	10.5 / *	MPa	DIN 53758, historica



Properties of 3D printed parts acc. ISO	dry / cond	Unit	Test Standard
Charpy impact strength flat X, -20°C	N / -	kJ/m²	ISO 179/1eU
Test specimen production	dry	Unit	Test Standard
Injection Molding, melt temperature	220	°C	ISO 294
Injection Molding, mold temperature	60	°C	ISO 294
Injection Molding, injection velocity	200	mm/s	ISO 294
Injection Molding, pressure at hold	70	MPa	ISO 294

Characteristics

Applications Tube and hose

Processing Profile extrusion, Pipe/Tube extrusion

Special Characteristics High impact strength, Light-stabilized, High heat resistant

Features Low coefficient of friction

Color Natural color

Additives Plasticizer, Impact restistant, Light stabilizer, Heat stabilizer

Chemical Resistance General chemical resistance

Chemical Media Resistance

Acids

- ✓ Acetic Acid (5% by mass) (23°C)
- ✓ Citric Acid solution (10% by mass) (23°C)

Bases

- ✓ Sodium Hydroxide solution (35% by mass) (23°C)
- ✓ Sodium Hydroxide solution (1% by mass) (23°C)
- ✓ Ammonium Hydroxide solution (10% by mass) (23°C)

Alcohols

- ✓ Isopropyl alcohol (23°C)
- ✓ Methanol (23°C)
- ✓ Ethanol (23°C)

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Hydrocarbons

- ✓ n-Hexane (23°C)
- ✓ Toluene (23°C)
- ✓ iso-Octane (23°C)

Ketones

✓ Acetone (23°C)

Ethers

✓ Diethyl ether (23°C)

Mineral oils

✓ SAE 10W40 multigrade motor oil (23°C)

✓ Insulating Oil (23°C)

Standard Fuels

- ✓ ISO 1817 Liquid 1 (60°C)
- ✓ ISO 1817 Liquid 2 (60°C)
- ✓ ISO 1817 Liquid 3 (60°C)
- ✓ ISO 1817 Liquid 4 (60°C)
- ✓ Standard fuel without alcohol (pref. ISO 1817 Liquid C) (23°C)
- ✓ Standard fuel with alcohol (pref. ISO 1817 Liquid 4) (23°C)
- ✓ Diesel fuel (pref. ISO 1817 Liquid F) (23°C)
- ✓ Diesel fuel (pref. ISO 1817 Liquid F) (90°C)
- ✓ Diesel EN 590 (100°C)

Salt solutions

- ✓ Sodium Chloride solution (10% by mass) (23°C)
- ✓ Sodium Carbonate solution (20% by mass) (23°C)
- ✓ Sodium Carbonate solution (2% by mass) (23°C)
- ✓ Zinc Chloride solution (50% by mass) (23°C)

Other

- ✓ Ethyl Acetate (23°C)
- Hydrogen peroxide (23°C)
- ✓ DOT No. 4 Brake fluid (120°C)
- ✓ Water (23°C)



Rheological calculation properties	dry	Unit	Test Standard
Min. mold temperature	30	°C	-
Max. mold temperature	100	°C	-
Min. melt temperature	200	°C	-
Max. melt temperature	240	°C	-

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