



3D Industrie

Additive Manufacturing
by Maria & Johannes Lutz



MSDS PA12 FILSHAPER

Nylon is an extreme rigid and hard material. Its tensile strength surpasses other plastic materials. Our Nylon has a very low moisture absorption. But Nylon should be dried before processing at ~ 80°C for 2-3 hours.

IDENTIFICATION OF THE SUBSTANCE/MIXTURE

Chemical name of the product	Polyamide (PA-12)
Recommended use	Material for printing in FDM technology
Chemical type	Amorphous thermoplastic polymer
Nominal diameter	1.75 mm

PHYSICAL AND MECHANICAL ATTRIBUTES

Density	~ 1.01 g/cm ³
Hardness	~ 75 Shore D
Tensile modulus	~ 1,440 MPa
Flexural modulus	~ 1,180 MPa
Stress at yield	~ 43 MPa
Strain at yield	~ 5%
Stress at break	~ 50 MPa
Strain at break	~ 200%
Charpy notched impact	~ 11 kJ/m ² @ 23°C
Drying	~ 4-6 h @ 80°C
Processing temperature	~ 230-270°C

CLASSIFICATION OF THE SUBSTANCE OR MIXTURE

Classification according to EC regulation 1272/2008 (CLP) or Directive 67/548/EEC or 1999/45/EC. Not a hazardous substance or mixture according to Regulation (EC) No. 1272/2008. This mixture is not classified as dangerous according to Directive 1999/45/EC.

LABEL ELEMENTS

The product is put on the market on a form that encapsulates component(s) in a polymer. To our knowledge, product on this form shouldn't have any significant risk for health by inhalation, ingestion or contact with skin or for the environment., According to European classification and labelling regulation for hazardous substances and preparations, the product is not subjected to labelling although one/several component(s) is/are classified as hazardous.

OTHER HAZARDS

Potential health effects:	Acute exposure: Contact with the product, when handled at high temperatures, can cause serious burns. Skin contact: Risk of skin sensitization.
Physical and chemical hazards:	Thermal decomposition giving toxic and corrosive products.
Other:	Results of PBT and vPvB assessment : No data available.

COMPOSITION / INFORMATION ON INGREDIENTS

Mixtures	
Chemical characterization:	Polyamide 12 (various grades)
Presence of additives:	Presence of stabilizers preventing thermo-oxidation and photo-oxidation by sunlight (effects of weather) Possible presence of : Carbon black

FIRST AID MEASURES

Inhalation:	Inhalation of vapours due to thermal decomposition : Move to fresh air. Oxygen or artificial respiration if needed. In case of persistent problems: Consult a physician.
Skin contact:	In case of skin contact Wash off immediately with soap and plenty of water. On contact with hot product : Cool skin rapidly with cold water after contact with molten polymer. In case of adhesion, do not try to remove the product. Treat the affected areas as thermal burns. Consult physician.
Eye contact:	Dusts: Wash well-open eyes immediately, abundantly and thoroughly with water. Remove particles remaining under the eyelids. If irritation persists, consult an ophthalmologist. On contact with hot product: Cool eyes rapidly with cold water after contact with molten polymer. Consult an ophthalmologist immediately.
Ingestion	In case of problems : Consult a doctor.
Protection of first-aiders:	In case of insufficient ventilation, wear suitable respiratory equipment.
Most important symptoms and effects, both acute and delayed	
Dust:	Skin irritation, eye irritations and redness
Indication of any immediate medical attention and special treatment needed	
No data available.	

FIREFIGHTING MEASURES

Extinguishing media	Suitable extinguishing media: Water fog, foam, carbon dioxide (CO ₂). Extinguishing media which must not be used for safety reasons: Full water jet
Special hazards arising from the substance or mixture	300 – 350 °C: possible formation of: Monomer and oligomer (white fumes) Thermal decomposition giving toxic and corrosive products : Carbon monoxide, Ammonia, Amino derivatives Temperature exceeding 500°C : Formation of toxic products through combustion: Carbon oxides, Hydrogen cyanide (hydrocyanic acid), (traces)
Advice for firefighters	Special protective equipment for firefighters: Ensure a system for the rapid emptying of containers. In case of fire nearby, remove the bags. In the event of fire, wear self-contained breathing apparatus.

ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	Avoid contact with skin and eyes and inhalation of dust. Wear a dust mask and safety glasses/goggles if necessary. In case of insufficient ventilation, wear suitable respiratory equipment.
Environmental precautions	Do not release into the environment. Do not let product enter drains.
Methods and material for containment and cleaning up	Recovery: Recover the product. Sweep up to prevent slipping hazard. Rinse with water. Recover waste water for processing later. Elimination: Destroy the product by incineration (in accordance with local and national regulations).

HANDLING AND STORAGE

Technical measures/Precautions:

Storage and handling precautions applicable to products: Solid (pellets).

Ensure ventilation of work areas and extraction of dust or vapours likely to be given off during conversion operations (product handled when hot). Provide showers, eye-baths Provide water supplies near the point of use.

Safe handling advice:

At all stages of the operation, do not exceed the temperature at which decomposition into toxic and corrosive products will occur. Remove all sources of ignition. Avoid accumulation of static charges during transfers in metallic systems. Avoid the formation and deposition of dust. In case of dust formation, wear a dust mask. Keep well away from naked flames.

Hygiene measures:

Avoid contact with skin and eyes and inhalation of dust. Product handled when hot : Avoid inhalation of vapours. When using do not eat, drink or smoke. Wash hands after handling. Remove contaminated clothing and protective equipment before entering eating areas.

Conditions for safe storage, including any incompatibilities

Store away from moisture and heat to maintain the technical properties of the product. Remove all sources of ignition. Provide earthing and safe electrical equipment.

Do not store above: 60 °C

Incompatible products

None known.

Packaging material:

Recommended: Triplex bags (polyethylene – aluminium – polyethylene), Triplex bags (paper, aluminium, polyethylene)

EXPOSURE CONTROLS/PERSONAL PROTECTION

	Value type	Value (mg/m ³)	Remarks
EH40 WEL	STEL	7	
EH40 WEL	TWA	03.05.15	
ACGIH (US)	TWA	3	Inhalable fraction

Derived No Effect Level (DNEL): This information is not required.

Predicted No Effect Concentration: This information is not required.

Occupational exposure controls	
General protective measures:	Ensure ventilation of work areas and extraction of dust or vapours likely to be given off during conversion operations (product handled when hot).
Respiratory protection	Product handled when hot : In case of insufficient ventilation, wear suitable respiratory equipment. In the case of hazardous fumes, wear self contained breathing apparatus.
Hand protection:	Gloves (product handled in molten state).
Eye/face protection	Safety glasses/goggles (product handled in molten state) –Wear face-shield and protective clothing in case of problems during processing.
Skin and body protection:	Boots (product handled in molten state).

PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties			
Appearance:		Vapour pressure:	Not applicable
Physical state (20°C):	solid	Vapour density:	Not applicable
Form:	granules	Relative density:	No data available
Colour:	Colourless or Mass coloured	Bulk density:	550 – 650 kg/m ³
Odour:	none	Water solubility:	insoluble at 20°C
Olfactory threshold:	Not relevant	Partition coefficient:	n-octanol/water: No data available

Information on basic physical and chemical properties			
pH:	Not applicable	Auto-ignition temperature	420 – 450°C (Standard ASTM D 1929-77 (B))
Melting point/range:	174 – 178°C	Decomposition temperature:	> 350°C
Boiling point/boiling range:	Not applicable (decomposes on heating)	Viscosity, dynamic:	Not applicable
Flash point:	Not applicable	Explosive properties:	
Evaporation rate:	Not applicable	Explosivity:	Not relevant (due to the chemical structure)
Flammability (solid, gas):	No data available.	Oxidizing properties:	Not relevant (due to the chemical structure)

OTHER INFORMATION

Solubility in other solvents: Soluble in: Formic acid (concentrate), Sulphuric acid (concentrate), Metacresol , phenol , Benzyl Alcohol.

STABILITY AND REACTIVITY

Reactivity & Chemical stability	The product is stable under normal handling and storage conditions.
Possibility of hazardous reactions	None under normal conditions of use.
Conditions to avoid	Temperatures above 60 °C Heat, flames and sparks. Exposure to moisture. (to maintain the technical properties of the product).
Incompatible materials	Strong acids and oxidizing agents
Hazardous decomposition products	Thermal decomposition: Decomposition temperature: > 350°C 300 – 350°C: possible formation of: Monomer and oligomer (white fumes) Thermal decomposition giving toxic and corrosive products : Carbon monoxide, Ammonia, Amino derivatives Temperature exceeding 500°C : Formation of toxic products through combustion:

INFORMATION ON TOXICOLOGICAL EFFECTS

All available data on this product and/or the components quoted in section 3 and/or the analogue substances/metabolites have been taken into account for the hazard assessment.

Ingestion	According to its composition, can be considered as : Slightly harmful by ingestion.
Dermal	According to its composition, can be considered as : Slightly harmful in contact with skin.
Skin contact:	According to its composition, can be considered as : Slightly or not irritating to skin In man: Contact with the product, when handled at high temperatures, can cause serious burns. At high temperature, products of thermal decomposition can be irritating to skin.
Eye contact:	According to its composition, can be considered as : Slightly or not irritating to eyes. In man: Contact with the product, when handled at high temperatures, can cause serious burns. At high temperature, products of thermal decomposition can be irritating to eyes.
Inhalation:	No data available. Skin contact: In man : No reported cases of cutaneous sensitization in man
CMR effects	Polymer: No particular problems for man Specific target organ toxicity : Single exposure : Inhalation: In man : At high temperature, products of thermal decomposition can be irritating to respiratory system.
Repeated exposure	According to its composition : The substance or mixture is not classified as specific target organ toxicant, repeated exposure.
Aspiration hazard	Not relevant.

ECOLOGICAL INFORMATION

Fish:	No data available.
Aquatic invertebrates:	No data available.
Aquatic plants:	No data available.
Microorganisms:	No data available.

Persistence and degradability	Biodegradation (In water): Inert polymer, not biodegradable on the basis of its structure
Bioaccumulative potential	No data available
Mobility in soil	No data available
Other adverse effects	None known

DISPOSAL CONSIDERATIONS

Waste treatment methods

Disposal of product: Do not dispose of waste into sewer. Recycle if possible. Destroy the product by incineration (in accordance with local and national regulations).

Disposal of packaging

Do not release into the environment. Recycle if possible. Destroy packaging by incineration at an approved waste disposal site (in accordance with local and national regulations).

TRANSPORT INFORMATION

Not classified as hazardous according to transport regulations.

REGULATORY INFORMATION

REACH/ EU EINECS List	In compliance with and/or on the list
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OTHER INFORMATION

Product should be handled in accordance with good industrial hygiene, safety practice and all regulations. The information is being provided solely as a guideline for the safe handling, use, consumption, processing, storage, transportation, disposal and release of the Materials. The information may not be sufficient for such purposes, as it is based on producer's knowledge at the time of creating the document, the user should not place any reliance on the information provided.