

Overview

Printability	9 / 10
Durability	10 / 10
Stiffness	1 / 10

3D Printing Properties

Available Diameter	1.75mm
Dimensional Diameter Tolerance	+/-0.10mm
Extrusion Temperature	220 - 240°C
Heated Bed	Optional
Heated Bed Temperature	45 - 60°C
Recommended Build Surfaces	M3D printbed sheet, painter's tape, glue stick, glass plate, PEI
Other Printer Requirements	Part cooling fan
Bond Strength in Z Printed Direction	75 to 100%
Bowden	No
Direct Drive	Yes
Water Smoothable	No
Alcohol Smoothable	No
Heat Gun Smoothable	Yes
Sanding Difficulty	Very Easy
Odor	None

Storage

Ambient Moisture Absorption	Low
Needs Airtight Storage	No
Needs Desiccant Crystal Storage	No

Physical Properties

Shore Hardness	90A
Yield Tensile Strength	29MPa
Ultimate Tensile Strength	53MPa
Young's Modulus E	2.3GPa
Elongation at Break	300%
Density (ISO 1183)	1.19g/cm ³
Melting (Softening) Temperature	175°C
Glass Transition Temperature	45°C
Maximum Service Temperature	72°C
Coefficient of Thermal Expansion	143µm/m-°C

Composition and Other Properties

Non-toxic	Yes
Flexible	Yes
Elastic	Yes
Soft	Yes
Composite	No
Electrically Conductive	No
UV Resistant	No
Heat Resistant	No
Chemically Resistant	No
Fatigue Resistant	Yes
Water Resistant	Yes
Oil Resistant	Yes
Impact Resistant	No
Food Safe (FDA Approved)	No

Section 1: Product and Company Identification

Product Name: Tough 3D Ink®

Chemical Name: Not available

Synonyms: Not available

Recommended Use: 3D Printing

Restrictions on Use: Do not use in 3D printers where temperatures exceed 270°C. Do not use in 3D printers without temperature runaway controls.

Supplier: M3D, LLC

Address: 11850 West Market Place Suite M

Fulton, MD 20759-2671

USA

Telephone: (301)-490-5001

E-mail: info@printm3d.com

Emergency Poison Control Hotline: 1 (800) 222-1222 (American Association of Poison Control Centers)

Section 2: Hazards Identification

Classification: In accordance with paragraph (d) of 29 CFR 1910.1200, none is needed according to classification criteria.

Physical Hazards: Not applicable

Health Hazards: Not applicable

Environmental Hazards: Not applicable

GHS Label Elements:

Signal Word: Not applicable

Hazard Statement: Not applicable

Hazard Symbol: Not applicable

Precautionary Statement:

Safety Measures and Prevention: Do not breathe dust/fume/gas/mist.

Response: Get medical attention/advice if you feel unwell.

Storage: Keep away from fire. Store indoors at ambient temperature.

Disposal: Do not dump into sewers, on the ground or into any body of water. Burn in an adequate incinerator or bury in landfill. Dispose of contents and container in accordance with local, state, national, and international regulations.

Other Hazards:

PBT and vPvB Substances: Material does not contain PBT and vPvB substances.

NFPA Ratings:

Health: 0

Fire: 1

Reactivity: 0

Hazard Scale: 0 = Minimal, 1 = Slight, 2 = Moderate, 3 = Serious, 4 = Severe

Section 3: Composition/Information on Ingredients

Substance/Mixture: Substance

Components	CAS Number	Concentration
Proprietary non-toxic thermoplastic polymer	Not disclosed	95%
Additives	Not disclosed	1-5%
Pigments and Colorants	Not disclosed	0-5%

Some information is omitted in accordance with paragraph (i) of 29 CFR 1910.1200. Chemical identity and exact percentage (concentration) of composition have been withheld as a trade secret.

Section 4: First Aid Measures

Necessary Measures:

Inhalation: This material is not likely to be hazardous by inhalation, but heating may release vapors which may be irritating. In case of inhalation of decomposition products, affected person should be moved into fresh air and kept still in a position comfortable for breathing. Get medical advice/attention if needed.

Skin Contact: It is unlikely that first aid will be required. If in contact with solid material, wash with plenty of soap and water. If in contact with molten material, submerge injured area in cold water. Do not attempt to remove material adhering to the skin. Get medical attention if irritation develops or persists.

Eye Contact: Dust may be irritating to the eyes. Immediately flush eyes with plenty of clean water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Rinse thoroughly the inner side of the eyelid. Remove contact lenses, if present and easy to do. Get medical attention if needed.

Ingestion: Not a probable route of exposure. IF SWALLOWED: Rinse mouth. Get immediate medical attention. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

Most Important Symptoms and Effects:

Acute: Molten material may cause thermal burns.

Delayed: No information on significant adverse effects.

Immediate Medical Attention and Special Treatment Needed: First aid and medical attention are not expected to be necessary if material is used under ordinary conditions and as recommended.

Note to Physicians: Treat symptomatically. Give artificial respiration if not breathing.

Antidote: None known. Treat symptomatically and supportively.

Section 5: Fire Fighting Measures

Extinguishing Media:

Suitable Extinguishing Media: Water, foam, dry extinguishing media, carbon dioxide

(CO₂)

Unsuitable Extinguishing Media: Do not use heavy, direct high pressure water streams (water jet) on molten burning material as it may scatter and spread the fire.

Special Hazards Arising from the Chemical: Thermal decomposition and burning may release corrosive and/or toxic fumes. Burning may release carbon monoxide, carbon dioxide, oxides of nitrogen and traces of hydrogen cyanide. Avoid generating dust; fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard. In the event of fire and/or explosion, do not breathe in fumes.

Special Protective Equipment and Precautions for Fire-fighters: Wear full protective fire fighting gear including self-contained breathing apparatus (SCBA) for protection against possible exposure. Remove flammable substances from surroundings immediately. Fight fire from windward. Keep unnecessary people away, isolate hazard area and deny entry. Avoid inhalation of material or combustion by-products. Stay upwind and keep out of low areas.

Section 6: Accidental Release Measures

Personal Precautions, Protective Equipment, and Emergency Procedures: Avoid dust formation and static discharge. Do not overheat material. Wear appropriate protective equipment (gloves, protective mask, apron, goggles, etc.).

Methods and Materials for Containment and Cleaning Up: Use mechanical handling equipment. Avoid dust formation. If released, clean up by vacuuming or sweeping to minimize dust exposure and collect into suitable containers for disposal. Collect the residual of filament on the floor frequently because it makes the floor slippery. Treat the material and waste in accordance with applicable laws and regulations.

Environmental Precautions: Avoid release to the environment. Do not allow material to enter waterways, drains, sewers, basements, or confined areas. Comply with all applicable regulations on spill and release reporting.

Section 7: Handling and Storage

Precautions for Safe Handling: Minimize dust generation and accumulation. Routine housekeeping should be instituted to ensure that dusts do not accumulate on surfaces. Dry powders can build static electricity charges when subjected to the friction of transfer and mixing operations. Adequate ventilation and if necessary, effective exhaust must be provided at the workplace. Keep away from fire (ignition source) and store at ambient temperature.

Handle in accordance with good occupational hygiene and safety practice. Do not eat, drink or smoke at the workplace. Wash hands after use.

Conditions for Safe Storage: None needed according to classification criteria. To ensure technical integrity of the product, store in a cool dry place, in a tightly closed container, and keep at temperatures below 50°C. Protect from water, moisture and direct sunlight, and store indoors at ambient temperature and in a well-ventilated area. Avoid heat, flames, sparks and other sources of ignition. Keep away from incompatible materials.

Incompatible Materials: Oxidizing agents, strong bases.

Specific End Use(s): 3D printing, where temperatures do not exceed 270°C and temperature runaway controls are in place.

Section 8: Exposure Controls/Personal Protection

Control Parameters:

Exposure Limits: Material contains no substances with occupational exposure limits.

Biological Limit Values: Not established

Recommended Monitoring Procedures: Not available

Derived No Effect Level (DNEL): Not available

Exposure Controls:

Appropriate Engineering Controls: Keep at temperatures below 230°C. Ensure adequate ventilation in confined areas.

Individual Protection Measures:

Eye/face Protection: Wear eye/face protection. Wear protective glasses when handling.

Skin and Body Protection: Wear suitable protective clothing to avoid direct exposure of skin to molten material.

Hand Protection: Wear the protective gloves. It is preferable to wear cotton work gloves or leather gloves when handling the melted resin.

Other: No other precautions other than clean, body-covering clothing should be needed for handling M3D filaments. Use gloves with insulation for thermal protection when exposure to the melt is localized. Workers should be protected from the possibility of contact with molten resin.

Respiratory Protection: Do not breathe dust/vapor. Wear appropriate protective equipment to avoid inhalation or contact of gas generated from high temperature molten resin.

Thermal Hazards: Molten material may cause burns.

Hygiene Measures: Keep away from foodstuffs, drinks and tobacco. Wash hands after use. Handle in accordance with good industrial hygiene and safety practice. Do not eat, drink or smoke when using this product.

Environmental Exposure Controls: Do not allow product to enter drains, water courses or soil.

Section 9: Physical and Chemical Properties

Appearance:

Physical State: Solid; filament shape (spool, string, strand)

Color: Different according to coloration (transparent, opaque)

Odor: None

Odor Threshold: Not available

pH: Not available

Melting Point: 175°C

Freezing Point: Not available

Initial Boiling Point: Not available

Boiling Range: Not available

Flash Point: Not available

Evaporation Rate: Not available

Flammability (Solid, Gas): Not available
Upper/Lower Flammability or Explosive Limits: Not available
Vapor Pressure: Negligible
Vapor Density: Not available
Relative Density (ISO 1183): 1.19g/cm³
Water Solubility: Negligible
Solubility (Other): Not available
Partition Coefficient (N-octanol/Water): Not available
Auto-ignition Temperature: > 400°C
Decomposition Temperature: > 230°C
Viscosity: Not applicable
Explosive Properties: Not available
Oxidizing Properties: Not available

Section 10: Stability and Reactivity

Reactivity: Not reactive under normal conditions.
Chemical Stability: Largely stable under normal handling conditions.
Possibility of Hazardous Reactions: No hazardous reactions are known under normal handling conditions.
Conditions to Avoid (e.g., static discharge, shock, or vibration): Do not grind, pelletize or mill the material. Avoid temperatures above 230°C, heat, flame, ignition sources, and incompatible materials.
Incompatible Materials: Avoid water which can cause degradation of material. Material can react with strong oxidizing agents and bases.
Hazardous Decomposition Products: Hazardous decomposition products may form under fire conditions: oxides of carbon, acetaldehyde. Smouldering or incomplete combustion leads to the formation of toxic gas mixtures consisting mainly of CO, CO₂ and nitrogen oxides.
Thermal Decomposition Products: May decompose upon heating to produce corrosive and/or toxic fumes. See Section 5: Fire Fighting Measures for additional information.

Section 11: Toxicological Information

Likely Routes of Exposure:

Inhalation: No hazard is expected from the normal use of this product. Dust may cause irritation of the nose, throat and upper respiratory tract.

Ingestion (Swallowing): No information on significant adverse effects.

Skin Contact: Molten material may cause burns. Contact with dust/fumes may cause irritation.

Eye Contact: Molten material may cause burns.

Symptoms Related to the Physical, Chemical and Toxicological Characteristics: Irritation, nausea, headache, shortness of breath, etc.

Immediate Effects: Molten material may cause thermal burns.

Delayed Effects: Not available

Chronic Effects: Not available

Toxicological Effects:

Acute Toxicity: Not available

Skin Corrosion/Irritation: Not available
Serious Eye Damage/Irritation: Not available
Respiratory Sensitisation: Over-exposure entails a risk of concentration-dependent inhalatory irritation.
Skin Sensitisation: Not available
Germ Cell Mutagenicity: Not available
Carcinogenicity: None of this product's components are listed by ACGIH, IARC, NTP, DFG or OSHA.
Reproductive Toxicity: Not available
STOT-Single Exposure: No target organs identified.
STOT-Repeated Exposure: No target organs identified.
Aspiration Hazard: Not available

Section 12: Ecological Information

Ecotoxicity: Toxicity is expected to be low based on insolubility of material in water.
Persistence and Degradability: Minimal degradation
Bioaccumulative Potential: Not available
Mobility in Soil: Not available
Results of PBT and vPvB Assessment: Product does not contain PBT or vPvB substances.
Other Adverse Effects: None known to date. The product is practically insoluble in water. In view of its consistency and insolubility in water, no ecological problems are to be expected if the product is properly handled. The product is not readily biodegradable.

Section 13: Disposal Considerations

Waste Treatment Methods: Do not dump into sewers, on the ground or into any body of water. Burn in an adequate incinerator or bury in landfill. Dispose of contents and container in accordance with local, state, national, and international regulations.

Section 14: Transport Information

UN Number: Not applicable
UN Proper Shipping Name: Not applicable
Transport Hazard Class(es): Not applicable
Packing Group: Not applicable
Environmental Hazards: Not available
Transport in Bulk: Not applicable
Special Precautions for User: Keep dry. Keep separated from food. Follow instructions in Section 7: Handling and Storage.
Other Information: Not dangerous cargo.

Section 15: Regulatory Information

U.S. Federal Regulations: None of this products components are listed under SARA Sections 302/304 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65), CERCLA (40 CFR 302.4), TSCA 12(b), or require an OSHA process safety plan.

SARA Section 311/312 (40 CFR 370 Subparts B and C):

Acute Health: No

Chronic Health: No

Fire: No

Pressure: No

Reactivity: No

U.S. State Regulations: None of this product's components are listed on the state lists from CA, MA, MN, NJ or PA.

Not listed under California Proposition 65

Canadian WHMIS Ingredient Disclosure List (IDL): The components of this product are either not listed on the IDL or are present below the threshold limit listed on the IDL.

Section 16: Other Information

Summary of Changes:

3/9/2018: SDS Version 1.0 Prepared

Disclaimer for Experimental Products: This Safety Data Sheet (SDS) describes a product intended for experimental or developmental use. Information in this data sheet refers to the solid material at standard temperature and pressure (STP) unless stated otherwise. All information is provided in good faith and believed to be accurate. The data provided are intended for general guidance/informational purposes only. Supplier gives no warranty whatsoever, including the warranties of fitness for a particular purpose or guarantee on performance or material conformity. Additionally, no guarantees are offered with respect to production, processability, change of attributes over long periods of time, or application-specific parameters. Along these lines, the end-user and/or buyer agrees to utilize the product totally at his/her own risk and understands that they have not been given any assurances; the purchaser shall determine the quality and suitability of the product. The end-user agrees that the manufacturer/seller will not be at risk or liable for any harm, of whatever nature, emerging out of using this data sheet. Supplier expressly disclaims any and all liability for incidental, consequential or any other damages arising out of the use or misuse of this product. No information provided shall be deemed to be a recommendation to use the product in conflict with any existing patent rights, laws, or other regulations. This data sheet may be modified, amended or discontinued at any time. This document has been prepared in accordance with the SDS requirements of the OSHA Hazard Communication Standard 29 CFR 1910.1200. Suggestions and errors can be reported to info@printm3d.com.