SECTION 1 CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Material Name: 60A TPU MakeShaper White Filament
Use: Used for 3D Printing and Modeling
Company Identification: MakeShaper Inc.
P.O. BOX 192
Sanford North Carolina 27331

Emergency Telephone Number: 1-919-770-7984 or 1-919-770-6019
General Information Telephone Number: 1-919-776-6925
Email Address:
Revision Date: 3/6/2017

SECTION 2 HAZARDS IDENTIFICATION

Classification of the Substance or Mixture:
The product is not classified as hazardous according to the Globally Harmonized System (GHS).

Classification According to Regulation (EC) NO. 1272/2008:
The product is not classified according to the CLP regulation.

Classification System:
The product does not have to be labelled due to the calculation procedure of the “General Classification guidelines for preparations of the EU” in the latest version.

Label Elements
GHS Label Elements: Void
Hazard Pictograms: Void
Signal Word: Void
Hazard Statements: Void

Potential Health Effects
Skin Contact: No known acute effects of this product resulting from skin contact at room temperature. No unusual dermatitus hazard from routine handling
Eye Contact: Dust may cause mechanical irritation to eye.
Inhalation: Inhalation of dust may cause shortness of breath, tightness of the chest, a sore throat and cough. Low hazard for usual industrial or commercial handling.
Ingestion: No harmful effects have been reported upon ingestion. Ingestion is not an applicable route of entry for intended use.

Primary Routes of Exposure
For Hot Material: Skin contact. Eye contact. Inhalation.

Test Organs: Not applicable
Carcinogenicity: Not listed by NTP, IARC, ACGIH, or OSHA as a carcinogen.

SECTION 3 COMPOSITION / INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Component / Substance</th>
<th>CAS No.</th>
<th>Concentration [%]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polyurethane Polyester Elastomer</td>
<td>26375-23-5</td>
<td>&lt;75</td>
</tr>
<tr>
<td>Titanium Dioxide</td>
<td>13463-67-7</td>
<td>&lt;25</td>
</tr>
<tr>
<td>Colorant</td>
<td>Proprietary</td>
<td>&lt;5</td>
</tr>
</tbody>
</table>

SECTION 4 FIRST AID MEASURES

First Aid Procedures
Inhalation: Remove individual to fresh air and keep calm. In the event of symptoms, consult a physician and show this data sheet.

Eye Contact: Flush eye(s) for 15 minutes or more; if irritation persists, consult a physician (preferably an eye specialist) and show SDS

Skin Contact: After contact with molten product, cool rapidly with cold water. Do not pull solidified product away from skin. Consult a physician immediately.

Ingestion: Rinse out mouth and then drink plenty of water. Do not induce vomiting. If symptoms persist consult doctor.

General Advice: Remove contaminated clothing.
SECTION 5  FIRE FIGHTING MEASURES


Hazardous Decomposition Products: None with proper storage and handling.

Extinguishing Media: Water spray, Foam, Dry chemical powder

Extinguishing Media Which Must Not be Used for Safety Reasons: Carbon dioxide

Lack of cooling capacity may permit re-ignition.

Special Protective Equipment for Fire-Fighters: As in any fire, wear self-contained breathing apparatus pressure-demand, (MSHA/NIOSH approved or equivalent) and full protective gear.

OSHA Flammable Class: N/A

SECTION 6  ACCIDENTAL RELEASE MEASURES

Spill / Leak Procedures

Small Spills: Use personal protective equipment. If molten, allow material to cool and place into an appropriate marked container for disposal. Sweep up and shovel into suitable containers for disposal. Dust deposits should not be allowed to accumulate on surfaces, as these may form an explosive mixture as they are released into the atmosphere in sufficient concentrations. Avoid dispersal of dust in the air (e.g., cleaning dust from surfaces with compressed air).

SECTION 7  HANDLING AND STORAGE

Handling Requirements:

Handling/Storage Precautions
Handle in accordance with good industrial hygiene and safety practices. Wash thoroughly after handling. Avoid breathing dust. Containers should be kept tightly closed to prevent contamination. Material is hygroscopic and may absorb small amounts of atmospheric moisture. Minimize dust generation and accumulation. Routine housekeeping should be instituted to ensure that dust does not accumulate on surfaces. Solid particulate can generate electrical charging during operations such as unloading from containers and pneumatic transfer. Provide adequate precautions, such as electrical grounding and bonding, where conductive equipment is involved.

Storage Requirements:

Storage Period: Not Established
Storage Temperature Maximum: 30 °C (86 °F)
Substances to Avoid: None known.
Protect from heat

SECTION 8  EXPOSURE CONTROLS / PERSONAL PROTECTION

Personal Protective Equipment (PPE)

Hygiene Measures: No smoking, eating or drinking allowed when using this product. Wash hands before breaks and at end of work shifts.

Hand Protection: Necessary for handling melted resin. Wear heat resistant gloves when handling molten material. Skin Protection: No special skin protection requirements during normal handling and use.

Respiratory Protection: In the absence of sufficient general dilution or local exhaust ventilation a NIOSH approved air-supplied respirator may be needed during die cleaning, high temperature processing, purging or when thermal decomposition is suspected.

Eye Protection: Safety glasses with side-shields

Protective Clothing: Impermeable protective clothing is recommended

Engineering Controls: Good general (mechanical) ventilation should be sufficient to control airborne levels.

Additional Protective Measures: Employees should wash their hands and face before eating, drinking, or using tobacco products. Educate and train employees in the safe use and handling of this product. Purgings should be collected as small flat thin shapes or thin strands to allow for rapid cooling.

Polyurethane Polyester Elastomer (26375-23-5)

Exposure Limits: Thermoplastic Polyurethane (TPU) is generally non-hazardous under ambient conditions. The following exposure limits do not apply to the product in its supplied form; however, when the product is heated (i.e., during processing or thermal decomposition conditions), there is a potential for the release of 4,4’-diphenylmethane diisocyanate (MDI) vapors. Diphenylmethane Disocyanate (MDI) (101-68-8) US. ACGIH Threshold Limit Values
SAFETY DATA SHEET

TITANIUM DIOXIDE (13463-67-7)

USA OSHA (TWA5)/PEL): 15 mg/m³ total dust
ACGIH (TWA/TLV): 10 mg/m³

Respiratory Protection: In case of insufficient ventilation, wear suitable respiratory equipment.
Ventilation: Ensure adequate ventilation, especially in confined areas. Extraction to remove dust at its source.
Skin and Body Protection: Long sleeved clothing, protective gloves.
Eye/face Protection: Wear safety glasses with side shields (or goggles).
General Hygiene Considerations: Handle in accordance with good industrial hygiene and safety practice.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Physical State</th>
<th>Water Solubility</th>
<th>Boiling Point</th>
<th>Melting Point</th>
<th>pH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form: Solid</td>
<td>Insoluble</td>
<td>N/A</td>
<td>&gt; 100 °C</td>
<td>N/A</td>
</tr>
<tr>
<td>Color: White</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Odor: Faint Odor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vapor Pressure: N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flash Point: 250 °C (482 °F)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specific Gravity: 1.03 - 1.10 g/cm³</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Auto-Ignition Temp: &gt;210 °C (&gt;410 °F)</td>
<td></td>
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</tr>
</tbody>
</table>

SECTION 10 CHEMICAL STABILITY AND REACTIVITY INFORMATION

Flammability: Yes
Flash Point: 250 °C (482 °F)
Auto-Ignition Temperature: >210 °C (>410 °F)
Reactivity: No dangerous reaction known under conditions of normal use.
Stability: Stable at normal temperatures and pressure.
Dust Explosion: Possible if powder exists.
Explosion data for powder (<145 mesh)
Lower explosion limit 45 g/m³
Minimum ignition energy 3.6 mJ
Maximum explosion pressure 7 × 10⁵ Pa
Maximum pressure increase rate 3.2 × 10⁷ Pa/S

Hazardous Decomposition:
By Fire and Thermal Decomposition: Carbon Dioxide; hydrogen cyanide; 4,4'-Diphenylmethane Diisocyanate (MDI); Aldehydes, Carbon monoxide, Amines, Nitrites, Nitrogen oxides (NOx), Hydrocarbons

Hazardous Polymerization: Hazardous polymerization does not occur.

SECTION 11 TOXICOLOGICAL INFORMATION

Polyurethane Polyester Elastomer (26375-23-5)

Likely Routes of Exposure: Inhalation Skin Contact Eye Contact
Health Effects and Symptoms
Acute: Contact with heated material can cause thermal burns. Causes a slipping hazard if spilled. Vapors released from thermal decomposition may cause eye irritation with symptoms of burning and tearing, as well as respiratory tract irritation.

In the event of material decomposition due to exceeding the decomposition temperature of this product, release of MDI may occur.

Acute Inhalation:
The following effects reflect the potential health hazards associated with overexposure to MDI. Disocyanate vapors or mist at concentrations above the TLV or PEL can irritate (burning sensation) the mucous membranes in the respiratory tract (nose, throat, lungs) causing runny nose, sore throat, coughing, chest discomfort, shortness of breath and reduced lung function (breathing obstruction). Persons with a preexisting, nonspecific bronchial hyperreactivity can respond to concentrations below the TLV or PEL with similar symptoms as well as asthma attack or asthma-like symptoms. Exposure well above the TLV or PEL may lead to bronchitis, bronchial spasm and pulmonary edema (fluid in lungs). Chemical or hypersensitivity pneumonitis, with flu-like symptoms (e.g., fever, chills), has also been reported. These symptoms can be delayed up to several hours after exposure. These effects are usually reversible.

Chronic Inhalation:
As a result of previous repeated overexposures or a single large dose, certain individuals may develop sensitization to disocyanates (asthma or asthma-like symptoms) that may cause them to react to a later exposure to disocyanates at levels well below the TLV or PEL. These symptoms, which can include chest tightness, wheezing, cough, shortness of breath or asthmatic attack, could be immediate or delayed up to several hours after exposure. Extreme asthmatic reactions can be life threatening. Similar to many non-specific asthmatic responses, there are reports that once sensitized an individual can experience these symptoms upon exposure to dust, cold air or other...
TITANIUM DIOXIDE (13463-67-7)

Information on likely routes of exposure

Product Information: Information in this section is a summary of the conclusions of the chemical safety assessment conducted under REACH.

Inhalation: As a nuisance dust, prolonged exposures above recommended levels may cause adverse effects on the lung.

Eye Contact: Not an expected route of exposure.

Skin Contact: Titanium dioxide does not penetrate either intact or abraded human skin.

Ingestion: Not an expected route of exposure.

Titanium dioxide (13463-67-7)
Oral LD50: > 5000 mg/kg (Rat)
Inhalation LC50: > 6.82 mg/L (Rat) 4 h

Aluminum hydroxide (21645-51-2)
Oral LD50: > 5000 mg/kg (Rat)

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Skin corrosion/irritation: Titanium dioxide was not classifiable as a skin corrosive or irritant based on in vivo test results for titanium dioxide submitted in the European Union (REACH) joint submission registration dossier for the substance.

Serious eye damage/eye irritation: Titanium dioxide was not classifiable as an eye irritant based on in vivo test results for titanium dioxide submitted in the European Union (REACH) joint submission registration dossier for the substance.

Sensitization: No information available.

Germ Cell Mutagenicity: Titanium dioxide was negative when tested in vitro in bacterial reverse mutation assays and in mammalian cell gene mutation and clastogenicity assays as well as when tested in vivo.

Carcinogenicity: Titanium dioxide is listed by IARC as possibly carcinogenic to humans (Group 2B). This listing is based on inadequate evidence of carcinogenicity in humans and sufficient evidence in experimental animals. In lifetime inhalation studies of rats, airborne respirable-size titanium dioxide particles have been shown to cause lung tumors at concentrations associated with substantial particle lung burdens and consequential pulmonary overload and inflammation. However, other laboratory animals such as mice and hamsters did not develop lung tumors under similar testing with titanium dioxide. Furthermore, human epidemiology studies do not suggest an association between occupational exposure to titanium dioxide and risk for cancer.

Titanium dioxide (13463-67-7)
ACGIH: NO
IARC: Group 2B
NTP: NO
OSHA: NO

Reproductive Toxicity: Titanium dioxide was not classifiable as a reproductive hazard based on in vivo test results for titanium dioxide submitted in the European Union (REACH) joint submission registration dossier for the substance.

STOT - single exposure: No information available.
STOT - repeated exposure: Repeated inhalation exposures in rats to poorly soluble dusts such as titanium dioxide lead to a pattern of pulmonary effects including inflammation and fibrosis that are not observed in other rodent species, nonhuman primates, or humans under similar conditions.

Therefore, titanium dioxide is not classifiable for repeated exposure.

Aspiration Hazard: Not applicable.

Numerical measures of toxicity

Unknown acute toxicity: No information available.

SECTION 12 ECOLOGICAL INFORMATION

Polyurethane Polyester Elastomer (26375-23-5)

No data available for this product.
The components in this product are either non-hazardous or do not have any ecotoxicity data associated with them.

TITANIUM DIOXIDE (13463-67-7)

Ecotoxicity: Titanium dioxide is of low acute aquatic toxicity.
Persistence and degradability: Not readily biodegradable.
Bioaccumulation: Material does not bioaccumulate.
Mobility: Titanium dioxide is persistent and does not bioaccumulate.
Other adverse effects: No information available.

SECTION 13 DISPOSAL CONSIDERATIONS

General Information:
Dispose of spilled or waste product in accordance with all local, state, and federal regulations.
Disposal Methods:
In accordance with local authority regulations, take to special waste incineration plant

Contaminated Packaging:
If empty contaminated containers are recycled or disposed of, the receiver must be informed about possible hazards.

SECTION 14 TRANSPORTATION INFORMATION

<table>
<thead>
<tr>
<th>Sea Transport</th>
<th>Air Transport</th>
<th>DOT (Department of Transportation)</th>
<th>CANADA Transport of Dangerous Goods</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMDG:</td>
<td>ICAO/IATA:</td>
<td>CFR Road:</td>
<td>TDG Road:</td>
</tr>
<tr>
<td>Not Regulated</td>
<td>Not Regulated</td>
<td>Not Regulated</td>
<td>Not Regulated</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CFR Rail:</td>
<td>TDG Rail:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not Regulated</td>
<td>Not Regulated</td>
</tr>
</tbody>
</table>

SECTION 15 REGULATORY INFORMATION

**United States**

- **SARA Section 311/312:** Fire: No
  Chronic: Delayed
- **SARA Section 313:** This material does contain chemical components with known CAS numbers that exceed the threshold reporting levels established by Section 313.
- **SARA Sections:** SARA EHS
  No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.
  This material does not contain any components with a Section 304 EHS RQ.
- **Notification Status:** TSCA
  Notification : Yes
- **California Proposition 65 Statement:** Notification : No
  This product does not contain any substance(s) which are defined by the state of California to cause cancer, birth defects, or other reproductive effects.

**Canada**

- **Canada:** WHMIS CLASSIFICATION
  Void
- **Notification Status:** Canadian Environmental Protection Act
  DSL
  Notification : Yes
  All intentional ingredients are listed on the DSL (Domestic Substance List) or have been notified pursuant to the NSN regulations.

SECTION 16 OTHER INFORMATION

**Labeling According to EU Directive Regulation (EC) NO. 1272/2008:**
- **R&S Phrases:** Not Required
- **Hazard Symbol:** Not Required
- **Issue Date:** 3/6/2017
- **NFPA Ratings:**
  - Health: 1
  - Flammability: 1
SAFETY DATA SHEET

Reactivity: 0

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