Tough PLA

Safety Data Sheet

According to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations
SDS ID: UM00009
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SECTION 1: Identification

1.1. Identification

Product form	:	Mixture
Trade name	:	Tough PLA (Green, Black, White, Blue, Red, Yellow, Gray)

1.2. Recommended use and restrictions on use

Use of the substance/mixture	:	3D-Printer filament
Restrictions on use	:	This product must not be used in applications other than those identified above, without first seeking advice of the supplier

1.3. Supplier

Supplier

UltiMaker
Watermolenweg 2
Geldermalsen, 4191 PN - The Netherlands
T +31 (0) 88 383 4000 (9 AM - 5 PM CET)
Product-Compliance@Ultimaker.com

1.4. Emergency telephone number

Emergency number	:	+31 (0) 88 383 4000 (during office hours: 9 AM - 5 PM CET)

SECTION 2: Hazard(s) identification

2.1. Classification of the substance or mixture

GHS US classification

Not classified

2.2. GHS Label elements, including precautionary statements

GHS US labeling

No labeling applicable

2.3. Other hazards which do not result in classification

Other hazards not contributing to the classification	:	Risk of thermal burns on contact with molten product.

2.4. Unknown acute toxicity (GHS US)

Not applicable

SECTION 3: Composition/Information on ingredients

3.1. Substances

Not applicable

3.2. Mixtures

Comments : Polylactic acid
Acrylic polymer

Name	Product identifier	Conc. (% w/w)
Polylactic acid	CAS-No.: 9051-89-2	> 70
Carbon black (Additive)	CAS-No.: 1333-86-4	0.01 – 2
Titanium dioxide (Additive)	CAS-No.: 13463-67-7	0.01 – 1

Full text of hazard classes and H-statements : see section 16

SECTION 4: First-aid measures

4.1. Description of first aid measures

First-aid measures general : If you feel unwell, seek medical advice (show the label where possible).

First-aid measures after skin contact : Take off contaminated clothing. Wash skin with plenty of water and soap. In case of contact with molten product, cool rapidly with water and seek immediate medical attention. Do not attempt to remove molten product from skin because skin will tear easily. Burns caused by molten material must be treated clinically.

First-aid measures after eye contact : Rinse eyes with water as a precaution. In the event of contact with molten product: Immediately flush eyes thoroughly with water for at least 15 minutes. Get immediate medical advice/attention.

4.2. Most important symptoms and effects (acute and delayed)

Symptoms/effects : No acute and delayed symptoms and effects are observed.

Symptoms/effects after skin contact : Risk of thermal burns on contact with molten product.

4.3. Immediate medical attention and special treatment, if necessary

Treat symptomatically.

SECTION 5: Fire-fighting measures

5.1. Suitable (and unsuitable) extinguishing media

Suitable extinguishing media : Use extinguishing media appropriate for surrounding fire: Water spray, Dry powder, Foam, Carbon dioxide.

Unsuitable extinguishing media : Do not use a solid water stream as it may scatter and spread fire.

5.2. Specific hazards arising from the chemical

Explosion hazard	:	Material can accumulate some static charge during transfer. Prevent build-up of electrostatic charges (e.g, by grounding).
Hazardous decomposition products in case of fire	:	Under fire conditions, hazardous fumes will be present: Carbon dioxide, Carbon monoxide, Aldehydes.

5.3. Special protective equipment and precautions for fire-fighters

Precautionary measures fire	:	Do not allow run-off from fire-fighting to enter drains or water courses.
Protection during firefighting	:	Do not attempt to take action without suitable protective equipment. Self-contained breathing apparatus. Complete protective clothing.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

6.1.1. For non-emergency personnel

Protective equipment	:	Wear recommended personal protective equipment. Refer to section 8.2. Remove contaminated clothing and shoes.
Emergency procedures	:	None in particular. In molten state: Do not breathe vapors. Ventilate spillage area. Avoid contact with skin, eyes and clothing.

6.1.2. For emergency responders

No additional information available

6.2. Environmental precautions

No additional information available

6.3. Methods and material for containment and cleaning up

Methods for cleaning up	:	Sweep up and put in a closed container for disposal. If melted: allow liquid to solidify before taking it up.

6.4. Reference to other sections

For further information refer to section 8: "Exposure controls/personal protection". For disposal of residues refer to section 13: Disposal considerations" ".

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling	:	Ensure good ventilation of the work station. In molten state: Do not breathe vapors. Avoid contact with skin, eyes and clothing. Wear personal protective equipment.

7.2. Conditions for safe storage, including any incompatibilities

Storage conditions	:	To guarantee the quality and properties of the product: Store in a well-ventilated place. Store in original container. Keep container tightly closed to avoid moisture absorption and contamination.

Incompatible materials	:	Oxidising agents. Strong bases.
Storage temperature	:	-4 – 86 °F (Relative air humidity: <50%)
Heat-ignition	:	Keep away from heat, sparks and flames. Keep out of direct sunlight.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Tough PLA (Green, Black, White, Blue, Red, Yellow, Gray)
No additional information available

Polylactic acid (9051-89-2)
No additional information available

Titanium dioxide (13463-67-7)	
USA - ACGIH - Occupational Exposure Limits	
Local name	Titanium dioxide
ACGIH TWA (mg/m³)	10 mg/m³
Remark (ACGIH)	TLV® Basis: LRT irr. Notations: A4 (Not classifiable as a Human Carcinogen)
ACGIH chemical category	Not Classifiable as a Human Carcinogen
Regulatory reference	ACGIH 2020
USA - OSHA - Occupational Exposure Limits	
Local name	Titanium dioxide (Total dust)
OSHA PEL (TWA) (mg/m³)	15 mg/m³
Regulatory reference (US-OSHA)	OSHA Annotated Table Z-1
USA - IDLH - Occupational Exposure Limits	
US IDLH (mg/m³)	5000 mg/m³
USA - NIOSH - Occupational Exposure Limits	
NIOSH REL (TWA) (mg/m³)	2.4 mg/m³ (CIB 63-fine) 0.3 mg/m³ (CIB 63-ultrafine, including engineered nanoscale)

Carbon black (1333-86-4)	
USA - ACGIH - Occupational Exposure Limits	
Local name	Carbon black
ACGIH TWA (mg/m³)	3 mg/m³ (I - Inhalable particulate matter)
Remark (ACGIH)	TLV® Basis: Bronchitis. Notations: A3 (Confirmed Animal Carcinogen with Unknown Relevance to Humans)
Regulatory reference	ACGIH 2023

Carbon black (1333-86-4)	
USA - OSHA - Occupational Exposure Limits	
Local name	Carbon black
OSHA PEL (TWA) (mg/m³)	3.5 mg/m³
Regulatory reference (US-OSHA)	OSHA Annotated Table Z-1

8.2. Appropriate engineering controls

Appropriate engineering controls : Use process enclosures, local exhaust ventilation or other engineering controls to keep airborne levels below specified exposure limits. If user operations generate dust, fumes or mist, use ventilation to keep exposure to airborne particles below the exposure limit. Ventilation conditions (1 printer): Provide a good standard of general ventilation, not less than 2 air changes per hour (assumes a room volume of: 30 m³).

Environmental exposure controls : Avoid release to the environment.

8.3. Individual protection measures/Personal protective equipment

Hand protection:

None under normal conditions. Use insulated gloves when handling this material hot

Type	Material	Permeation	Thickness (mm)	Penetration
In molten state: Chemically resistant protective gloves, Heat-resistant	Nitrile rubber (NBR)	6 (> 480 minutes)	>0.35	

Eye protection:

None under normal use. In molten state: Wear eye protection

Type	Use	Characteristics
Safety glasses with side shields	In molten state	

Skin and body protection:

None under normal use. In molten state: Wear suitable protective clothing

Type

Long sleeved protective clothing

Respiratory protection:

None under normal use. In molten state: In case of insufficient ventilation, wear suitable respiratory equipment

Thermal hazard protection:

Risk of thermal burns on contact with molten product. Hazardous vapors may be released. In molten state: Use respiratory protection/heat resistant gloves.

Other information:

Handle in accordance with good industrial hygiene and safety procedures. Do not eat, drink or smoke when using this product. Wash hands immediately after handling the product. Take off contaminated clothing and wash before reuse.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	:	Solid
Appearance	:	Filament.
Color	:	Various colours
Odor	:	Slight
Odor threshold	:	No data available
pH	:	No data available
Melting point	:	> 284 °F
Freezing point	:	Not applicable
Boiling point	:	No data available
Flash point	:	No data available
Relative evaporation rate (butyl acetate=1)	:	No data available
Flammability (solid, gas)	:	Non flammable.
Vapor pressure	:	No data available
Relative vapor density at 20°C	:	No data available
Particle size distribution	:	Not applicable
Relative density	:	No data available
Density	:	1.22 g/cm³
Solubility	:	Water: Negligible
Partition coefficient n-octanol/water (Log Pow)	:	No data available
Auto-ignition temperature	:	> 662 °F
Decomposition temperature	:	No data available
Viscosity, kinematic	:	Not applicable
Viscosity, dynamic	:	No data available
Explosion limits	:	Not applicable
Explosive properties	:	No data available
Oxidizing properties	:	No data available

9.2. Other information

No additional information available

SECTION 10: Stability and reactivity

10.1. Reactivity

The product is non-reactive under normal conditions of use, storage and transport.

10.2. Chemical stability

Stable under normal conditions.

10.3. Possibility of hazardous reactions

No dangerous reactions known under normal conditions of use.

10.4. Conditions to avoid

None under recommended storage and handling conditions (see section 7). Do not expose to temperatures above 446 °F.

10.5. Incompatible materials

Oxidising agents. Strong bases.

10.6. Hazardous decomposition products

Under normal conditions of storage and use, hazardous decomposition products should not be produced. Under fire conditions, hazardous fumes will be present: Carbon dioxide, Carbon monoxide, Aldehydes.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity (oral) : Not classified

Acute toxicity (dermal) : Not classified

Acute toxicity (inhalation) : Not classified

Skin corrosion/irritation : Not classified

Serious eye damage/irritation : Not classified

Respiratory or skin sensitization : Not classified

Germ cell mutagenicity : Not classified

Carcinogenicity : The filament product itself (mixture) is not carcinogenic

Titanium dioxide (13463-67-7)	
IARC group	2B - Possibly carcinogenic to humans, only for airborne, unbound particles of respirable size
In OSHA Hazard Communication Carcinogen list	Yes

Carbon black (1333-86-4)	
IARC group	2B - Possibly carcinogenic to humans, only for airborne, unbound particles of respirable size

Reproductive toxicity : Not classified

STOT-single exposure : Not classified

STOT-repeated exposure : Not classified

Aspiration hazard : Not classified

Viscosity, kinematic : Not applicable

Symptoms/effects : No acute and delayed symptoms and effects are observed.

Symptoms/effects after skin contact : Risk of thermal burns on contact with molten product.

SECTION 12: Ecological information

12.1. Toxicity

Ecology - general : The product is not considered harmful to aquatic organisms or to cause long-term adverse effects in the environment.

Titanium dioxide (13463-67-7)	
LC50 fish 1	> 1000 mg/l

12.2. Persistence and degradability

Tough PLA (Green, Black, White, Blue, Red, Yellow, Gray)	
Persistence and degradability	Biodegradable.

Polylactic acid (9051-89-2)	
Biodegradation	Not biodegradable

12.3. Bioaccumulative potential

No additional information available

12.4. Mobility in soil

No additional information available

12.5. Other adverse effects

No additional information available

SECTION 13: Disposal considerations

13.1. Disposal methods

Regional waste regulation : Dispose of in accordance with relevant local regulations.

Product/Packaging disposal recommendations : Empty containers should be taken for recycling, recovery or waste in accordance with local regulation.

SECTION 14: Transport information

In accordance with DOT / TDG / IMDG / IATA

DOT	TDG	IMDG	IATA
14.1. UN number			
Not regulated for transport			
14.2. Proper Shipping Name			
Not applicable	Not applicable	Not applicable	Not applicable

DOT	TDG	IMDG	IATA
14.3. Transport hazard class(es)			
Not applicable	Not applicable	Not applicable	Not applicable
14.4. Packing group			
Not applicable	Not applicable	Not applicable	Not applicable
14.5. Environmental hazards			
Not applicable	Not applicable	Not applicable	Not applicable
No supplementary information available			

14.6. Special precautions for user

DOT

No data available

TDG

No data available

IMDG

No data available

IATA

No data available

14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable

SECTION 15: Regulatory information

15.1. US Federal regulations

All components of this product are present and listed as Active on the United States Environmental Protection Agency Toxic Substances Control Act (TSCA) inventory

This product or mixture is not known to contain a toxic chemical or chemicals in excess of the applicable de minimis concentration as specified in 40 CFR §372.38(a) subject to the reporting requirements of section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

15.2. International regulations

Titanium dioxide (13463-67-7)

Listed on IARC (International Agency for Research on Cancer)

Carbon black (1333-86-4)

Listed on IARC (International Agency for Research on Cancer)

15.3. US State regulations

Tough PLA (Green, Black, White, Blue, Red, Yellow, Gray)	
U.S. - California - Proposition 65 - Other information	For product containing Carbon Black: California Proposition 65 lists Carbon Black (airborne, unbound particles of respirable size) as a substance known to the State of California to cause cancer. Some UltiMaker filaments contain low concentrations of Carbon Black, which is homogeneously bound in the polymer matrix. Given the Carbon Black is bound and concentrations are low, the risk of exposure to 'airborne, unbound particles of respirable size' during printing is considered negligible. In case 3D-prints undergo post-processing that causes dust formation, UltiMaker recommends to re-assess whether those activities may lead to significant exposure under those particular conditions and apply appropriate measures when necessary. Appropriate measures in such cases may include additional ventilation, air extraction or (face) masks, depending on the level of potential exposure. For products containing Titanium Dioxide: California Proposition 65 lists Titanium Dioxide (airborne, unbound particles of respirable size) as a substance known to the state California to cause cancer. Some Ultimaker filaments contain low concentrations of Titanium Dioxide, which is homogeneously bound in the polymer matrix. Given the Titanium Dioxide is bound and concentrations are low, the risk of exposure to 'airborne, unbound particles of respirable size' during printing is considered negligible. In case 3D-prints undergo post-processing that causes dust formation, UltiMaker recommends to re-assess whether those activities may lead to significant exposure under those particular conditions and apply appropriate measures when necessary. Appropriate measures in such cases may include additional ventilation, air extraction or (face) masks, depending on the level of potential exposure.

Titanium dioxide (13463-67-7)					
U.S. - California - Proposition 65 - Carcinogens List	U.S. - California - Proposition 65 - Developmental Toxicity	U.S. - California - Proposition 65 - Reproductive Toxicity - Female	U.S. - California - Proposition 65 - Reproductive Toxicity - Male	No significant risk level (NSRL)	Maximum allowable dose level (MADL)
Yes	No	No	No		

Carbon black (1333-86-4)					
U.S. - California - Proposition 65 - Carcinogens List	U.S. - California - Proposition 65 - Developmental Toxicity	U.S. - California - Proposition 65 - Reproductive Toxicity - Female	U.S. - California - Proposition 65 - Reproductive Toxicity - Male	No significant risk level (NSRL)	Maximum allowable dose level (MADL)
Yes	No	No	No		

SECTION 16: Other information

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Training advice : Ensure staff are informed of and trained on the nature of exposure and basic actions to minimise exposure.

Abbreviations and acronyms	
CAS-No.	Chemical Abstract Service number
CAS	Chemical Abstract Service number
DOT	Department of Transport
ED	Endocrine disrupting properties
EN	European Standard
GHS	Globally Harmonized System of Classification and Labelling of Chemicals
IATA	International Air Transport Association
IMDG	International Maritime Dangerous Goods
TDG	Transportation of Dangerous Goods

Indication of changes:
Not applicable.

SDS US (GHS HazCom 2012) - RHDHV

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.