Product name: **Liqcreate Tough-X**

1. SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND THE COMPANY/UNDERTAKING

1.1 Product identifier

Product name	Liqcreate Tough-X
Product description	Photopolymer Resin for 3D-printing (SLA, DLP & LCD)
Alternative names	Liqcreate Tough-X resin, Tough-X, Tough-X engineering resin, Liqcreate Tough resin
UFI	UFI: RARY-W0VG-A007-U7C2

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified use	Photopolymer is monomer based on acrylic esters for SLA, DLP and/or LCD 3D printers with UV-light systems.
Uses advised against	-

1.3 Details of the supplier of the safety data sheet

Liqcreate
Texasdreef 7
3565 CL Utrecht
The Netherlands
Tel.: +31 (0) 850 605849
info@liqcreate.com

1.4 Emergency Telephone number

Emergency telephone number: 112
(General emergency telephone number EU)

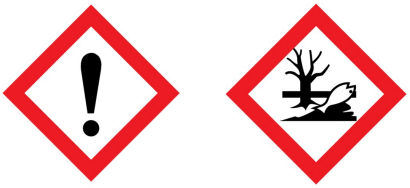
2. SECTION 2: HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

According to Regulation (EG) No. 1272/2008 [CLP].

Skin irrit. Cat 2	H315
Eye irrit. Cat 2	H319
Skin sens. Cat. 1	H317
Aquatic chronic Cat. 2	H411

2.2 Label elements



Signal word	Warning
Hazerd statement(s)	H315: Causes skin irritation. H317: May cause an allergic skin reaction. H319: Causes serious eye irritation. H411: Toxic to aquatic life with long-lasting effects.
Precautionary statement(s)	P280: Wear protective gloves/protective clothing/eye protection/face protection. P261: Avoid breathing dust/fumes/gas/mist/vapours/spray. P264: Wash thoroughly after handling. P272: Contaminated work clothing should not be allowed out of the workplace. P273: Avoid release to the environment. P302+P352: IF ON SKIN: Wash with plenty of water.

P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do – continue rinsing.
P333+P313: If skin irritation or a rash occurs: Get medical advice/attention.
P337+P313: If eye irritation persists get medical advice/attention.
P362: Take off contaminated clothing.
P363: Wash contaminated clothing before reuse.
P391: Collect spillage.
P501: Dispose of contents/container in accordance with local/regional/national/international regulation.

2.3 Other hazards

Not classified as PBT or vPvB.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

This product is a mixture.

3.2 Mixtures

Substances in the product which may present a health or environmental hazard, or which have been assigned occupational exposure limits, are detailed below.

According to Regulation (EG) Nr. 1272/2008 [CLP].

Hazardous ingredient(s)	%W/W	EINECS No.	Hazard Class and Category Code(s)	Hazard statement Code(s)
Glycol Methacrylate	20 - 60	212-782-2	Skin irrit. Cat. 2 Skin sens. Cat. 1 Eye irrit. Cat. 2	H315 H317 H319
Isobornyl Acrylaat	≤24	227-561-6	STOT single Cat. 3 Skin irrit. Cat. 2 Eye irrit. Cat 2 Skin sens. Cat. 1B Aquatic acute Cat. 1 Aquatic chronic Cat. 1	H335 H315 H319 H317 H400 H410
Phosphine Oxide	≤3,0	278-355-8	Skin sens. Cat. 1 Repr. Cat. 2 (fer.) Aquatic chronic Cat. 2	H317 H361f H411
Diisodecyl Phenyl Ester	<0,5	247-098-3	Skin sens. Cat. 1 Aquatic chronic Cat. 3	H317 H412

For full text of H phrases see section 16.

SECTION 4: FIRST AID MEASURES

4.1 Description of first aid measures

Inhalation — IF INHALED: Move into fresh air and keep at rest. Get medical attention if any discomfort continues.

Skin Contact — IF ON SKIN (or hair): Remove contaminated clothing immediately and wash skin with soap and water. Get medical attention promptly if irritation or other symptoms occur after washing.

Eye Contact	IF IN EYES: Continue to rinse for at least 15 minutes under running water with eyelids held open. Get medical attention if any discomfort continues.
Ingestion	Do not induce vomiting. Never induce vomiting or give anything by mouth if the victim is unconscious or having convulsions. Immediately rinse mouth and drink plenty of water. Keep person under observation. If person becomes uncomfortable get medical attention.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2) and/or in section 11. Further important symptoms and effects are so far not known.

4.3 Indication of the immediate medical attention and special treatment needed

Note to physician

Treatment: Treat according to symptoms (decontamination, vital functions), no known specific antidote.

SECTION 5: FIRE-FIGHTING MEASURES

5.1 Extinguishing media

Suitable Extinguishing Media	Water spray, dry powder, CO2.
Unsuitable Extinguishing Media	Water jet.

5.2 Special hazards arising from the substance or mixture

Hazards during fire-fighting: Harmful vapours
Evolution of fumes/fog

High temperatures may cause spontaneous polymerizing reaction generating heat/pressure. Closed containers may rupture or explode during a runaway polymerization. Use a water spray or fog to reduce temperature of containers.

5.3 Advice for fire-fighters

Protective equipment: Wear a self-contained breathing apparatus and full protective clothing.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Use protective gloves, goggles and suitable protective clothing. In case of inadequate ventilation, use respiratory protection. Maximize ventilation after accidental release.

6.2 Environmental precautions

Contain contaminated water / firefighting water. Do not discharge into drains/surface waters/groundwater. Avoid release to the environment.

6.3 Methods and material for containment and cleaning up

Remove sources of ignition. Absorb with sand or other inert absorbent. Spillage may be stored as chemical waste in approved area. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

See section 8, 13.

SECTION 7: HANDLING AND STORAGE

7.1 Precautions for safe handling

Keep away from heat, sparks and open flame. Use mechanical ventilation in case of handling which causes formation of vapours. Handle and open container with care. Wear full protective clothing for prolonged exposure and/or high concentrations. Take precautionary measures against static discharges.

7.2 Conditions for safe storage, including any incompatibilities

Protect from light, including direct sunrays. Container may be filled for only 90%. Keep containers tightly closed, separate from oxidizing agents. Store in original container in a dry, cool and well-ventilated place. Store at temperatures between 5°C and 30°C. Do not expose to temperatures above 50°C for more than 24 hours. High temperatures may cause spontaneous polymerization.

7.3 Specific end use(s)

None.

Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Substance	EC No.
Glycol Methacylate (100%)	212-782-2

DNEL (100% component)	Oral	Inhalation	Dermal
Worker – Long Term – Systemic effects	1	4,9 mg/m3	1,3 mg/kg

PNEC (100% component)	
Aquatic Compartment	10 mg/l (Fresh water) 0,482 mg/l (Sea water) 3,79 mg/kg dry weight (sediment)
Terrestrial Compartment	0,476 mg/kg dry weight

1 Toxicity: DNEL not established

Substance	EC No.
Isobornyl Acrylaat (100%)	227-561-6

DNEL (100% component)	Oral	Inhalation	Dermal
Worker – Long Term – Systemic effects	1	1	1,39 mg/kg

PNEC (100% component)	
Aquatic Compartment	0,92 mg/l (Fresh water) 0,092 mg/l (Sea water) 0,145 mg/kg dry weight (sediment)
Terrestrial Compartment	0,0285 mg/kg dry weight

1 Toxicity: DNEL not established

Substance	EC No.
Phosphine Oxide (100%)	278-355-8

DNEL (100% component)	Oral	Inhalation	Dermal
Worker – Long Term – Systemic effects	1	3,5 mg/m3	1,0 mg/kg

PNEC (100% component)	
Aquatic Compartment	0,00353 mg/l (Fresh water) 0,000353 mg/l (Sea water) 0,29 mg/kg dry weight (sediment)
Terrestrial Compartment	0,0557 mg/kg dry weight

1 Toxicity: DNEL not established

Substance	EC No.
Diisodecyl Phenyl Ester (100%)	247-098-3

DNEL (100% component)	Oral	Inhalation	Dermal
Worker – Long Term – Systemic effects	1	70,5 mg/m3	50 mg/kg

PNEC (100% component)	
Aquatic Compartment	Not applicable
Terrestrial Compartment	Not applicable

1 Toxicity: DNEL not established

8.2 Exposure controls

Appropriate engineering controls

Do not eat, drink or smoke at the work place. Provide adequate ventilation, including appropriate local extraction, to ensure that the defined occupational exposure limit is not exceeded.

Individual protection measures, such as personal protective equipment (PPE)

Eye/face protection	Wear eye/face protection. Wear approved chemical safety goggles where eyes exposure must be provided. High-efficiency particulate respirator with full face-piece.
Skin protection	Wear suitable gloves. Butyl and nitrile rubber gloves offer short-term protection. Later surgical gloves offer little protection. Gloves should be stored correctly and changed regularly, especially if excessive exposure has occurred.
Respiratory protection	Wear suitable respiratory protective equipment if engineering controls are insufficient, or not present, and exposure to levels above the DNEL is ikely. A suitable mask with filter type A (EN141 or EN405) may be appropriate.
Other	Keep working clothes separately. Take off contaminated clothing immediately. Wash soiled clothing before reuse. Keep away from food, drinks and animal feed. Wash hands thoroughly after handling.

Environmental exposure controls

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided. Ensure effective control measures when working within the boundaries as specified in section 6.2 of each GES.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Appearance	Viscous liquid - Black, different colors possible
Odour	Ester like
pH	Not applicable
Melting point	Not applicable
Boiling point	> 200°C
Flash point	> 150°C
Flammable Limits (lower) (%v/v)	Not applicable
Vapour pressure	-
Solubility (Water)	Not soluble
Solubility	Good solubility with most organic solvents
Auto ignition temperature	380°C
Explosive properties	Not applicable
Oxidising properties	Not applicable
Relative density	1.1-1.2 (water = 1)
Viscosity	0.8-1.0 Pa•s

9.2 Other information

None

SECTION 10: STABILITY AND REACTIVITY

10.1 Reactivity
See part 10.2.

10.2 Chemical stability
Stable under normal temperature conditions. Stable if stored and handles as prescribed/indicated.

10.3 Possibility of hazardous reactions
Hazardous polymerization. May polymerize.

10.4 Conditions to avoid
Avoid heat, flames and other sources of ignition. Avoid contact with free radical initiators. Avoid contact with isocyanates and oxidizing agents. Avoid contact with vinyl polymerization initiators. Avoid exposure to high temperatures, direct sunlight or ultra violet (UV) radiation.

10.5 Incompatible materials
Avoid contact with radical forming initiators, peroxides, strong alkalies or reactive metals to prevent exothermic polymerization.

10.6 Hazardous Decomposition Product(s)
With regard to possible decomposition products refer to Section 5.Oxides of carbon.

SECTION 11: TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects)
Stable Acute toxicity:

Glycol Methacrylate (100%)

LD50 acute oral rat	>5000 mg/kg
LD50 acute dermal rabbit	>5000 mg/kg
Skin irritation (rabbit, 24 h, Draize)	Non-irritating
Eye irritation (rabbit, Draize)	Irritating
Inhalation/skin sensitisation (guinea pig, GPMT)	Sensitizing
Aspiration Hazard	No aspiration hazard expected
Chronic toxicity (animal studies)	> 100 mg/kg
Reproductive toxicity (animal studies)	No suspicion of a toxic effect on reproduction

Isobornyl Acrylaat (100%)

LD50 acute dermal rat:	> 2000 mg/kg
Skin irritation (rabbit, 24 h, Draize)	> 2000 mg/kg
Eye irritation (rabbit, Draize)	Irritating
Skin sensitation mouse LLNA (OESO 429)	Irritating
Aspiration Hazard	Not classified based on available data
Chronic toxicity (animal studies)	Not classified based on available data
Reproductive toxicity (animal studies)	Not classified based on available data

Phosphine Oxide (100%)

LD50 acute dermal rat:	> 2000 mg/kg
Skin irritation (rabbit, 24 h, Draize)	Non-irritant
Eye irritation (rabbit, Draize)	Non-irritant
Skin sensitation mouse LLNA (OESO 429)	Sensitizing
Aspiration Hazard	No aspiration hazard expected
Chronic toxicity (animal studies)	May cause damage after repeated ingestion of high doses
Reproductive toxicity (animal studies)	Suggest a fertility impairing effect

Diisodecyl Phenyl Ester (100%)

LD50 acute oral rat	>5000 mg/kg
LD50 acute dermal rabbit	>2000 mg/kg
Skin irritation (rabbit, 24 h, Draize)	Not classified based on available data
Eye irritation (rabbit, Draize)	Not classified based on available data
Inhalation/skin sensitisation (guinea pig, GPMT)	May cause an allergic skin reaction
Aspiration Hazard	Not classified based on available data
Reproductive toxicity (animal studies)	Not classified based on available data

SECTION 12: ECOLOGICAL INFORMATION

12.1 Toxicity

Glycol Methacrylate(100%)

Toxicity to fish (mg/l)	LL50 (96 h) (Oncorhynchus mykiss) (OESO 203)	>100
Aquatic invertebrates (mg/l)	NOEC (21 d) (Daphnia magna) (OESO 202)	24,1
	EC50 (48 h) (Daphnia magna) (OESO 202)	380
Aquatic plants (mg/l)	EC50 (72 h) (Selenastrum capricornutum) (OESO 201)	836
	NOEC (72 h) (Selenastrum capricornutum) (OESO 201)	400
Microorganisms (mg/l)	EC50 (16 h) (Pseudomonas fluorescens) (DEV L8)	>3000

Isobornyl Acrylaat (100%)

Toxicity to fish (mg/l)	LC50 (96 h) (Danio rerio) (OESO 203)	0,704
Aquatic invertebrates (mg/l)	NOEC (21 d) (Daphnia magna) (OESO 202)	0,092
Aquatic plants (mg/l)	EC50 (72 h) (Pseudokirchnerella subcapitata) (OESO 201)	1,98

Phosphine Oxide (100%)

Toxicity to fish (mg/l)	LC50 (96 h) (Brachydanio rerio) (OESO 203)	>90
Aquatic invertebrates (mg/l)	EC50 (48 h) (Daphnia magna) (OECD 202)	>1175
Aquatic plants (mg/l)	EC50 (72 h) (Desmodesmus subspicatus) (OECD 201)	>260
Microorganisms (mg/l)	EC50 (3 h) (Activated sludge) (DEC L8)	>100

Diisodecyl Phenyl Ester (100%)

Harmfu to aquatic life with long lasting effects.

Aquatic plants (mg/l)	EC50 (72 h) (Selenastrum capricornutum) (OESO 201)	45
	NOEC (72 h) (Selenastrum capricornutum) (OESO 201)	>100

12.2 Persistence and degradability

Glycol Methacrylate (100%)
Easy biodegradable.
Elimination information:
84% DOC reduction (28 d) (OESO 301 D)

Isobornyl Acrylaat (100%)
No data available

Phosphine Oxide (100%)
Poorly biodegradable. Not readily biodegradable (by OECD criteria)
Elimination information:
< 20% BOD of the ThOD (28 d) (OECD 301 F) (activated sludge)

Diisodecyl Phenyl Ester (100%)
Biodegradable.

12.3 Bioaccumulative potential

Glycol Methacrylate (100%)
Accumulation in organisms is not to be expected.

Isobornyl Acrylaat (100%)
No data available

Phosphine Oxide (100%)
Does not significantly accumulate in organisms
Bioconcentration factor: 23 – 55 (56 d), Cyprinus carpio (measured): does not significantly accumulate in organisms.

Diisodecyl Phenyl Ester (100%)
Partition coefficient, n-octanol/water (log Pow): 8,52 - 12,31

12.4 Mobility in soil

Glycol Methacrylate (100%)
The substance will not evaporate into the atmosphere from the water surface. Adsorption to solid soil phase is not expected.

Isobornyl Acrylaat (100%)
No data available

Phosphine Oxide (100%)
The substance will not evaporate into the atmosphere from the water surface. Adsorption to solid soil phase is not expected.

Diisodecyl Phenyl Ester (100%)
No further relevant information available.

12.5 Results of PBT and vPvB assessment

Glycol Methacrylate (100%)
PBT: no
vPvB: no

Isobornyl Acrylaat (100%)
PBT: no
vPvB: no

Phosphine Oxide (100%)
PBT: no
vPvB: no

Diisodecyl Phenyl Ester (100%)
No data available

12.6 Other adverse effects

Glycol Methacrylate (100%)
Do not allow to enter soil, waterways or waste water channels.

Isobornyl Acrylaat (100%)
Toxic to aquatic life with long lasting effects.

Phosphine Oxide (100%)
Not applicable.

Diisodecyl Phenyl Ester (100%)
No data available.

SECTION 13: DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Do not discharge into drains/surface waters/groundwater. Dispose of in accordance with national, state and local regulations. Incinerate under approved controlled conditions, using incinerators for the disposal for organic chemicals. Decontaminate empty drums before recycling. Handle uncleaned containers like the product itself.

SECTION 14: TRANSPORT INFORMATION

Additional information

Products are transported by Liqcreate in sizes ≤5L or ≤5kg. The environmentally hazardous substance mark is not required when transported in sizes of ≤5L or ≤5kg. The marine pollutant mark is not required when transported in sizes of ≤5L or ≤5kg. More information about Special Provisions: see Section 14.6 'Further information'.

14.1 UN-Nummer

ADR/RID: 3082 IMDG: 3082 IATA: 3082

14.2 UN Proper Shipping Name

ADR/RID: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.
IMDG: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.
IATA: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.

14.3 Transport hazard class(es)

ADR/RID: 9 IMDG: 9 IATA: 9

14.4 Packing group

ADR/RID: III IMDG: III IATA: III

14.5 Environmental hazards

ADR/RID: yes IMDG Marine pollutant: yes IATA: yes

14.6 Special precautions for user

Further information

EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

Exception - Special Provisions
ADR/RID: Special Provisions 274, 335, 601, 375.
NOT RESTRICTED as per Special Provisions 375. The provided packagings meet the general provisions of 4.1.1.1, 4.1.1.2 and 4.1.1.4 to 4.1.1.8.

IMDG: Special Provisions 274, 335, 969.
NOT RESTRICTED as per 2.10.2.7. The provided packagings meet the general provisions of 4.1.1.1, 4.1.1.2 and 4.1.1.4 to 4.1.1.8.

IATA: Special Provisions A97, A158, A197.
NOT RESTRICTED as per Special Provisions A197.The provided packagings meet the general provisions of 5.0.2.4.1, 5.0.2.6.1.1 and 5.0.2.8.

SECTION 15: REGULATORY INFORMATION

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

If information other than the information in relation to safety, health and environmental regulations / legislation what is mentioned elsewhere in this Safety Data Sheet is required, please use the information listed in Section 1 to inquire whether that specific information is available. Related information about the separate components in the mixture can be accessed the same way.

15.2 Chemical Safety Assessment

A Chemical Safety Assessment has been carried out for Diisodecyl Phenyl Ester (100%).

SECTION 16: OTHER INFORMATION

This Safety Data Sheet was prepared in accordance with EC Regulation (EC) No. 453/2010.

The information provided in this Material Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of publication. The information given is designed only as guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process unless specified in the text.

LEGEND

Note: Not all of the following are necessarily contained in this Safety Data Sheet:

IOELV:	Indicative Occupational Exposure Limit Value.
WEL:	Workplace Exposure Limit.
Sen:	Capable of causing respiratory sensitization.
Carc:	Capable of causing cancer and/or heritable genetic damage.
COM:	The company aims to control exposure in its workplace to this limit.
LTEL:	Long Term Exposure Limit.
STEL:	Short Term Exposure Limit.
TWA:	Time Weighted Average.
STOT SE:	Specific Target Organ Toxicity – Single Exposure.
Repr.:	Reproductive toxicity.
Aquatisch acute/chronic:	Hazardous to the aquatic environment.

Full text of H/P/R phrases
H315: Causes skin irritation.
H317: May cause an allergic skin reaction.
H319: Causes serious eye irritation.
H335: May cause respiratory irritation.
H361f: Suspected of damaging fertility.
H400: Very toxic to aquatic life.
H410: Very toxic to aquatic life with long-lasting effects.
H411: Toxic to aquatic life with long-lasting effects.
H412: Hamful to aquatic life with long lasting effects.
H413: May cause long-lasting harmful effects to aquatic life.

P261: Avoid breathing vapours.
P264: Wash thoroughly after handling.
P272: Contaminated work clothing should not be allowed out of the workplace.
P273: Avoid release to the environment.
P280: Wear protective gloves/protective clothing/eye protection/face protection.
P302 + P352: IF ON SKIN: Wash with plenty of soap and water.
P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do – continue rinsing.
P333 + P313: If skin irritation or rash occurs: Get medical advice/attention.
P337+P313: If eye irritation persists get medical advice/attention.
P362: Take off contaminated clothing.
P363: Wash contaminated clothing before reuse.
P362 + P364: Take off contaminated clothing and wash it before reuse.
P391: Collect spillage.
P501: Dispose of contents/container to hazardous waste in accordance with local, state or national legislation. Incinerate under approved controlled conditions, using incinerators suitable for the disposal of flammable organics.

Further information

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Liqcreate / ALT Group BV and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.liqcreate.com for additional terms and conditions of sale. For further information please contact info@liqcreate.com.

This is the end of SDS 01-04-2020 TX V03 UK