

SFL-12

Version number: 1.0

Date of compilation: 2025-12-08

SECTION 1: Identification

1.1 Product identifier

Trade name **SFL-12**

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

Relevant identified uses electrical

1.3 Details of the supplier of the safety data sheet

TCLAD
1600 Orrin Road
Prescott Wisconsin 54021
United States

Phone: 715 262 8206

1.4 Emergency telephone number

Emergency contacts

CHEMTREC Tel: 1-800-424-9300
This number is only available during the following
office hours: Mon-Fri 09:00 AM - 05:00 PM

SECTION 2: Hazard(s) identification

2.1 Classification of the substance or mixture

Classification according to OSHA "Hazard Communication Standard" (29 CFR 1910.1200)
This mixture does not meet the criteria for classification.

2.2 Label elements

Labelling according to OSHA "Hazard Communication Standard" (29 CFR 1910.1200)

- Signal word not required
- Pictograms not required

2.3 Other hazards

There is no additional information.

Hazards not otherwise classified

May be harmful in contact with skin (GHS category 5: acutely toxic - dermal).

Results of PBT and vPvB assessment

Does not contain a PBT-/vPvB-substance at a concentration of $\geq 0.1\%$.

Endocrine disrupting properties

Does not contain an endocrine disruptor (ED) in a concentration of $\geq 0.1\%$.

SECTION 3: Composition/information on ingredients

3.1 Substances

Not relevant (mixture)

3.2 Mixtures

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Description of the mixture

Name of substance	Identifier	Wt%	Classification acc. to GHS	Pictograms
copper	CAS No 7440-50-8	1 – 99	cD / OSHA003	
aluminium	CAS No 7429-90-5	0 – 98		
aluminum nitride	CAS No 24304-00-5	2 – 5	cD / OSHA003	
epoxy resin		0.3 – 1		

Remarks

For full text of abbreviations: see SECTION 16

SECTION 4: First-aid measures**4.1 Description of first-aid measures**

General notes

Do not leave affected person unattended. Remove victim out of the danger area. Keep affected person warm, still and covered. Take off immediately all contaminated clothing. In all cases of doubt, or when symptoms persist, seek medical advice. In case of unconsciousness place person in the recovery position. Never give anything by mouth.

Following inhalation

If breathing is irregular or stopped, immediately seek medical assistance and start first aid actions. Provide fresh air.

Following skin contact

Brush off loose particles from skin. Rinse skin with water/shower.

Following eye contact

Remove contact lenses, if present and easy to do. Continue rinsing. Irrigate copiously with clean, fresh water for at least 10 minutes, holding the eyelids apart.

Following ingestion

Rinse mouth with water (only if the person is conscious). Do NOT induce vomiting.

4.2 Most important symptoms and effects, both acute and delayed

Symptoms and effects are not known to date.

4.3 Indication of any immediate medical attention and special treatment needed

none

SECTION 5: Fire-fighting measures**5.1 Extinguishing media**

Suitable extinguishing media

Water, Foam, D-Powder

Unsuitable extinguishing media

Water jet

5.2 Special hazards arising from the substance or mixture

Deposited combustible dust has considerable explosion potential.

5.3 Advice for firefighters

In case of fire and/or explosion do not breathe fumes. Coordinate firefighting measures to the fire surroundings. Do not allow firefighting water to enter drains or water courses. Collect contaminated firefighting water separately. Fight fire with normal precautions from a reasonable distance.

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SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

For non-emergency personnel

Remove persons to safety.

For emergency responders

Wear breathing apparatus if exposed to vapors/dust/aerosols/gases.

6.2 Environmental precautions

Keep away from drains, surface and ground water. Retain contaminated washing water and dispose of it.

6.3 Methods and material for containment and cleaning up

Advice on how to contain a spill

Covering of drains, Take up mechanically

Advice on how to clean up a spill

Take up mechanically.

Other information relating to spills and releases

Place in appropriate containers for disposal. Ventilate affected area.

6.4 Reference to other sections

Personal protective equipment: see section 8. Incompatible materials: see section 10. Disposal considerations: see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Recommendations

- Measures to prevent fire as well as aerosol and dust generation

Use local and general ventilation. Take precautionary measures against static discharge. Use only in well-ventilated areas. Ground/bond container and receiving equipment.

- Specific notes/details

Dust deposits may accumulate on all deposition surfaces in a technical room. The product in the delivered form is not dust explosion capable; the enrichment of fine dust however leads to the danger of dust explosion.

Advice on general occupational hygiene

Wash hands after use. Do not eat, drink or smoke in work areas. Remove contaminated clothing and protective equipment before entering eating areas. Never keep food or drink in the vicinity of chemicals. Never place chemicals in containers that are normally used for food or drink. Keep away from food, drink and animal feedingstuffs.

7.2 Conditions for safe storage, including any incompatibilities

Managing of associated risks

- Explosive atmospheres

Removal of dust deposits.

- Ventilation requirements

Use local and general ventilation.

7.3 Specific end use(s)

See section 16 for a general overview.

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SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Occupational exposure limit values (Workplace Exposure Limits)											
Country	Name of agent	CAS No	Identifier	TWA [ppm]	TWA [mg/m³]	STEL [ppm]	STEL [mg/m³]	Ceiling-C [ppm]	Ceiling-C [mg/m³]	Notation	Source
US	particulate not otherwise regulated		REL							appx-D	NIOSH REL
US	particulates not otherwise classified (PNOC)		PEL		15					dust	29 CFR 1910.1000
US	particulates not otherwise classified (PNOC)		PEL	1,765						partml, dust	29 CFR 1910.1000
US	particulates not otherwise classified (PNOC)		PEL	529.5						partml, r, dust	29 CFR 1910.1000
US	particulates not otherwise classified (PNOC)		PEL		5					r	29 CFR 1910.1000
US	Particulates not otherwise regulated		PEL (CA)		10					dust	Cal/OSH A PEL
US	Particulates not otherwise regulated		PEL (CA)		5					r	Cal/OSH A PEL
US	aluminium, insoluble compounds	24304-00-5	TLV®		1					r	ACGIH® 2025
US	aluminium	7429-90-5	REL		10 (10 h)						NIOSH REL
US	aluminium	7429-90-5	PEL (CA)		10					dust	Cal/OSH A PEL
US	aluminium	7429-90-5	PEL		15					dust	29 CFR 1910.1000
US	aluminium	7429-90-5	PEL (CA)		5					fume_weld	Cal/OSH A PEL
US	aluminium	7429-90-5	REL		5 (10 h)					fume_weld	NIOSH REL
US	aluminium	7429-90-5	PEL (CA)		5					pyro_p	Cal/OSH A PEL
US	aluminium	7429-90-5	REL		5 (10 h)					pyro_p	NIOSH REL
US	aluminium	7429-90-5	PEL (CA)		5					r	Cal/OSH A PEL
US	aluminium	7429-90-5	REL		5 (10 h)					r	NIOSH REL
US	aluminium	7429-90-5	TLV®		1					r	ACGIH® 2025
US	aluminium	7429-90-5	PEL		5					r	29 CFR

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Occupational exposure limit values (Workplace Exposure Limits)

Country	Name of agent	CAS No	Identifier	TWA [ppm]	TWA [mg/m³]	STEL [ppm]	STEL [mg/m³]	Ceiling-C [ppm]	Ceiling-C [mg/m³]	Notation	Source
											1910.10 00
US	copper	7440-50-8	REL		1 (10 h)					dm	NIOSH REL
US	copper	7440-50-8	TLV®		1					dm	ACGIH® 2025
US	copper	7440-50-8	PEL		1					dm	29 CFR 1910.10 00
US	copper	7440-50-8	PEL (CA)		0.1					fume	Cal/OSH A PEL
US	copper	7440-50-8	REL		0.1 (10 h)					fume	NIOSH REL
US	copper	7440-50-8	TLV®		0.2					fume	ACGIH® 2025
US	copper	7440-50-8	PEL		0.1					fume	29 CFR 1910.10 00

Notation

appx-D	see Appendix D - Substances with No Established RELs
Ceiling-C	ceiling value is a limit value above which exposure should not occur
dm	as dusts and mists
dust	as dust
fume	as fume
fume_weld	as welding fumes
partml	particles/ml
pyro_p	as pyrophoric powder
r	respirable fraction
STEL	short-term exposure limit: a limit value above which exposure should not occur and which is related to a 15-minute period (unless otherwise specified)
TWA	time-weighted average (long-term exposure limit): measured or calculated in relation to a reference period of 8 hours time-weighted average (unless otherwise specified)

Relevant DNELs of components

Name of substance	CAS No	Endpoint	Threshold level	Protection goal, route of exposure	Used in	Exposure time
copper	7440-50-8	DNEL	1 mg/m³	human, inhalatory	worker (industry)	chronic - local effects
copper	7440-50-8	DNEL	1 mg/m³	human, inhalatory	worker (industry)	acute - local effects
copper	7440-50-8	DNEL	137 mg/kg bw/day	human, dermal	worker (industry)	chronic - systemic effects
copper	7440-50-8	DNEL	273 mg/kg bw/day	human, dermal	worker (industry)	acute - systemic effects
aluminum nitride	24304-00-5	DNEL	0.47 mg/m³	human, inhalatory	worker (industry)	chronic - systemic effects
aluminum nitride	24304-00-5	DNEL	0.034 mg/m³	human, inhalatory	worker (industry)	chronic - local effects

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Relevant PNECs of components						
Name of substance	CAS No	Endpoint	Threshold level	Organism	Environmental compartment	Exposure time
copper	7440-50-8	PNEC	6.3 µg/l	aquatic organisms	freshwater	short-term (single instance)
copper	7440-50-8	PNEC	5.2 µg/l	aquatic organisms	marine water	short-term (single instance)
copper	7440-50-8	PNEC	230 µg/l	aquatic organisms	sewage treatment plant (STP)	short-term (single instance)
copper	7440-50-8	PNEC	87 mg/kg	aquatic organisms	freshwater sediment	short-term (single instance)
copper	7440-50-8	PNEC	676 mg/kg	aquatic organisms	marine sediment	short-term (single instance)
copper	7440-50-8	PNEC	65 mg/kg	terrestrial organisms	soil	short-term (single instance)
aluminum nitride	24304-00-5	PNEC	1.98 µg/l	aquatic organisms	freshwater	short-term (single instance)
aluminum nitride	24304-00-5	PNEC	0.2 µg/l	aquatic organisms	marine water	short-term (single instance)
aluminum nitride	24304-00-5	PNEC	1 mg/l	aquatic organisms	sewage treatment plant (STP)	short-term (single instance)

8.2 Exposure controls

Appropriate engineering controls

General ventilation.

Individual protection measures (personal protective equipment)

Eye/face protection

Wear eye/face protection.

Skin protection

- Hand protection

Wear protective gloves.

- Other protection measures

Take recovery periods for skin regeneration. Preventive skin protection (barrier creams/ointments) is recommended. Wash hands thoroughly after handling.

Respiratory protection

Particulate filter device (EN 143).

Environmental exposure controls

Use appropriate container to avoid environmental contamination. Keep away from drains, surface and ground water.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Physical state	solid
Color	metallic
Odor	characteristic

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Melting point/freezing point	660.6 °C
Boiling point or initial boiling point and boiling range	not determined
Flammability	non-combustible
Lower and upper explosion limit	not relevant (solid)
Flash point	not applicable
Auto-ignition temperature	≥400 °C
Decomposition temperature	not relevant
pH (value)	not applicable
Kinematic viscosity	not relevant
Solubility(ies)	not determined

Partition coefficient

Partition coefficient n-octanol/water (log value)	this information is not available
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Vapor pressure	not determined
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Density and/or relative density

Density	not determined
Relative vapour density	not relevant (solid)

Particle characteristics	no data available
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9.2 Other information

Information with regard to physical hazard classes	hazard classes acc. to GHS (physical hazards): not relevant
Other safety characteristics	there is no additional information

SECTION 10: Stability and reactivity

10.1 Reactivity

Concerning incompatibility: see below "Conditions to avoid" and "Incompatible materials".

10.2 Chemical stability

The material is stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.

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10.3 Possibility of hazardous reactions

No known hazardous reactions.

10.4 Conditions to avoid

There are no specific conditions known which have to be avoided.

Hints to prevent fire or explosion

The product in the delivered form is not dust explosion capable; the enrichment of fine dust however leads to the danger of dust explosion.

10.5 Incompatible materials

There is no additional information.

10.6 Hazardous decomposition products

Reasonably anticipated hazardous decomposition products produced as a result of use, storage, spill and heating are not known. Hazardous combustion products: see section 5.

SECTION 11: Toxicological information**11.1 Information on toxicological effects**

Test data are not available for the complete mixture.

Classification procedure

The method for classification of the mixture is based on ingredients of the mixture (additivity formula).

Classification according to OSHA "Hazard Communication Standard" (29 CFR 1910.1200)

This mixture does not meet the criteria for classification.

Acute toxicity

Shall not be classified as acutely toxic.

GHS of the United Nations, annex 4: May be harmful in contact with skin.

Acute toxicity estimate (ATE) of components

Name of substance	CAS No	Exposure route	ATE
copper	7440-50-8	dermal	>2,000 mg/kg
aluminum nitride	24304-00-5	oral	3,470 mg/kg

Skin corrosion/irritation

Shall not be classified as corrosive/irritant to skin.

Serious eye damage/eye irritation

Shall not be classified as seriously damaging to the eye or eye irritant.

Respiratory or skin sensitization

Shall not be classified as a respiratory or skin sensitizer.

Germ cell mutagenicity

Shall not be classified as germ cell mutagenic.

Carcinogenicity

Shall not be classified as carcinogenic.

Reproductive toxicity

Shall not be classified as a reproductive toxicant.

Specific target organ toxicity - single exposure

Shall not be classified as a specific target organ toxicant (single exposure).

Specific target organ toxicity - repeated exposure

Shall not be classified as a specific target organ toxicant (repeated exposure).

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Aspiration hazard
Shall not be classified as presenting an aspiration hazard.

SECTION 12: Ecological information**12.1 Toxicity**

Shall not be classified as hazardous to the aquatic environment.

12.2 Persistence and degradability

Data are not available.

12.3 Bioaccumulative potential

Data are not available.

12.4 Mobility in soil

Data are not available.

12.5 Results of PBT and vPvB assessment

Does not contain a PBT-/vPvB-substance at a concentration of $\geq 0.1\%$.

12.6 Endocrine disrupting properties

Does not contain an endocrine disruptor (ED) in a concentration of $\geq 0.1\%$.

12.7 Other adverse effects

Data are not available.

SECTION 13: Disposal considerations**13.1 Waste treatment methods**

Sewage disposal-relevant information

Do not empty into drains. Avoid accidental release to the environment. Refer to special instructions/safety data sheets.

Waste treatment of containers/packages

Completely emptied packages can be recycled. Handle contaminated packages in the same way as the substance itself.

Remarks

Please consider the relevant national or regional provisions. Waste shall be separated into the categories that can be handled separately by the local or national waste management facilities.

SECTION 14: Transport information**14.1 UN number**

not subject to transport regulations

14.2 UN proper shipping name

not relevant

14.3 Transport hazard class(es)

none

14.4 Packing group

not assigned

14.5 Environmental hazards

non-environmentally hazardous acc. to the dangerous goods regulations

14.6 Special precautions for user

There is no additional information.

14.7 Transport in bulk according to IMO instruments

The cargo is not intended to be carried in bulk.

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Information for each of the UN Model Regulations

Transport of dangerous goods by road or rail (49 CFR US DOT) - Additional information

Not subject to transport regulations.

International Maritime Dangerous Goods Code (IMDG) - Additional information

Not subject to IMDG.

International Civil Aviation Organization (ICAO-IATA/DGR) - Additional information

Not subject to ICAO-IATA.

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations specific for the product in question

National regulations (United States)

Superfund Amendment and Reauthorization Act (SARA TITLE III)

- The List of Extremely Hazardous Substances and Their Threshold Planning Quantities (EPCRA Section 302, 304)

none of the ingredients are listed

- Specific Toxic Chemical Listings (EPCRA Section 313)

Toxics Release Inventory: Specific Toxic Chemical Listings

Name of substance	CAS No	Remarks	Effective date
aluminium	7429-90-5	fume or dust	1987-01-01
copper	7440-50-8		1987-01-01

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)

- List of Hazardous Substances and Reportable Quantities (CERCLA section 102a) (40 CFR 302.4)

Name of substance	CAS No	Remarks	Statutory code	Final RQ pounds (Kg)
copper	7440-50-8	[4]	2	5000 (2270)

Legend

2 "2" indicates that the source is section 307(a) of the Clean Water Act

[4] No reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is larger than 100 micrometers (0.004 inches).

Clean Air Act

none of the ingredients are listed

Right to Know Hazardous Substance List

- Cleaning Product Right to Know Act Substance List (CA-RTK)

Name of substance	CAS No	Functionality	Authoritative Lists
copper	7440-50-8		CWA 303(c) CWA 303(d) OEHHH RELs
aluminium	7429-90-5		ATSDR Neurotoxics CA MCLs CWA 303(d)

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- Toxic or Hazardous Substance List (MA-TURA)

Name of substance	CAS No	DEP CODE	PBT / HHS / LHS	PBT / HHS Threshold	De Minimis Concentration Threshold
aluminium	7429-90-5				1.0 %
copper	7440-50-8				1.0 %
copper		1015			1.0 %

- Hazardous Substances List (MN-ERTK)

Name of substance	CAS No	References	Remarks
aluminium	7429-90-5	A	
aluminium	7429-90-5	A	fume
aluminium	7429-90-5	A	dust
copper	7440-50-8	A, O	dust mist
copper	7440-50-8	A, O	fume

Legend

- A American Conference of Governmental Industrial Hygienists (ACGIH), "Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices for 1992-93", available from ACGIH
- dust If the substance poses an airborne particulate exposure hazard, the substance is followed by the word "dust."
- fume Small solid particles formed by the condensation of vapors of solid materials.
- O Occupational Safety and Health Administration (OSHA), Safety and Health Standards, Code of Federal Regulations, title 29, part 1910, subpart Z, "Toxic and Hazardous Substances, 1990." General information: Minnesota Department of Labor and Industry, Occupational Safety and Health Division

- Hazardous Substance List (NJ-RTK)

Name of substance	CAS No	Remarks	Classifications
aluminium	7429-90-5		F3 R1
copper	7440-50-8		

Legend

- F3 Flammable - Third Degree
- R1 Reactive - First Degree

- Hazardous Substance List (Chapter 323) (PA-RTK)

Name acc. to inventory	CAS No	Classification
ALUMINUM	7429-90-5	E

Legend

- E Environmental hazard

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- Hazardous Substance List (RI-RTK)

Name of substance	CAS No	References
aluminium	7429-90-5	T, F
copper	7440-50-8	T

Legend

F Flammability (NFPA®)

T Toxicity (ACGIH®)

California Environmental Protection Agency (Cal/EPA): Proposition 65 - Safe Drinking Water and Toxic Enforcement Act of 1987

none of the ingredients are listed

Industry or sector specific available guidance(s)

NPCA-HMIS® III

Hazardous Materials Identification System. American Coatings Association.

Category	Rating	Description
Chronic	/	none
Health	0	no significant risk to health
Flammability	0	material that will not burn under typical fire conditions
Physical hazard	0	material that is normally stable, even under fire conditions, and will not react with water, polymerize, decompose, condense, or self-react. Non-explosive
Personal protection	-	

NFPA® 704

National Fire Protection Association: Standard System for the Identification of the Hazards of Materials for Emergency Response (United States).

Category	Degree of hazard	Description
Flammability	0	material that will not burn under typical fire conditions
Health	0	material that, under emergency conditions, would offer no hazard beyond that of ordinary combustible material
Instability	0	material that is normally stable, even under fire conditions
Special hazard		

15.2 Chemical Safety Assessment

Chemical safety assessments for substances in this mixture were not carried out.

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SECTION 16: Other information, including date of preparation or last revision

Abbreviations and acronyms

Abbr.	Descriptions of used abbreviations
29 CFR 1910.1000	29 CFR 1910.1000, Tables Z-1, Z-2, Z-3 - Occupational Safety and Health Standards: Toxic and Hazardous Substances (permissible exposure limits)
49 CFR US DOT	49 CFR U.S. Department of Transportation
ACGIH®	American Conference of Governmental Industrial Hygienists
ACGIH® 2025	From ACGIH®, 2025 TLVs® and BEIs® Book. Copyright 2025. Reprinted with permission. Information on the proper use of the TLVs® and BEIs®: http://www.acgih.org/tlv-bei-guidelines/policies-procedures-presentations/tlv-bei-position-statement
ATE	Acute Toxicity Estimate
Cal/OSHA PEL	California Division of Occupational Safety and Health (Cal/OSHA): Permissible Exposure Limits (PELs)
CAS	Chemical Abstracts Service (service that maintains the most comprehensive list of chemical substances)
cD	Combustible dust
Ceiling-C	Ceiling value
DEP CODE	Department of Environmental Protection Code
DGR	Dangerous Goods Regulations (see IATA/DGR)
DNEL	Derived No-Effect Level
ED	Endocrine disruptor
GHS	"Globally Harmonized System of Classification and Labelling of Chemicals" developed by the United Nations
HHS	Higher hazard substance
IATA	International Air Transport Association
IATA/DGR	Dangerous Goods Regulations (DGR) for the air transport (IATA)
ICAO	International Civil Aviation Organization
IMDG	International Maritime Dangerous Goods Code
LHS	Lower hazard substance
NFPA®	National Fire Protection Association (United States)
NIOSH REL	National Institute for Occupational Safety and Health (NIOSH): Recommended Exposure Limits (RELs)
NPCA-HMIS® III	National Paint and Coatings Association: Hazardous Materials Identification System - HMIS® III, Third Edition
OSHA	Occupational Safety and Health Administration (United States)
PBT	Persistent, Bioaccumulative and Toxic
PEL	Permissible exposure limit
PNEC	Predicted No-Effect Concentration
ppm	Parts per million
RTECS	Registry of Toxic Effects of Chemical Substances (database of NIOSH with toxicological information)
STEL	Short-term exposure limit
TLV®	Threshold Limit Values
TWA	Time-weighted average

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Abbr.	Descriptions of used abbreviations
vPvB	Very Persistent and very Bioaccumulative

Key literature references and sources for data

OSHA Hazard Communication Standard (HCS), 29 CFR 1910.1200.

Transport of dangerous goods by road or rail (49 CFR US DOT). International Maritime Dangerous Goods Code (IMDG). Dangerous Goods Regulations (DGR) for the air transport (IATA).

Classification procedure

Physical and chemical properties: The classification is based on the tested mixture and/or formulator knowledge.

Health hazards, Environmental hazards: The method for classification of the mixture is based on ingredients of the mixture (additivity formula).

List of relevant phrases (code and full text as stated in section 2 and 3)

Code	Text
OSHA003	May form combustible dust concentrations in air.

Disclaimer

This information is based upon the present state of our knowledge. This SDS has been compiled and is solely intended for this product.