1. Identification

Product Identification

Product Identifier: **SET (SET22, SET56, SETPAC10, SETPAC-EZ, SET1.7KTA)**
Recommended Use: High Strength Anchoring Adhesive – Epoxy Resin
Use Restrictions: None Known.

Company Identification

Company: Simpson Strong-Tie Company Inc.
Address: 5956 W. Las Positas Blvd.
Pleasanton, CA 94588
Phone: 1-800-999-5099
Website: www.strongtie.com
Emergency: 1-800-535-5053 (US/Canada)
1-352-323-3500 (International)

For most current SDS, please visit our website at **www.strongtie.com/sds**

2. Hazard Identification

General Information

SET Anchoring Adhesive is a two part system. The two parts of this product have been assessed according to GHS and are classified below. The final hardened material is considered nonhazardous. Some hazards apply upon grinding or cutting through hardened product.

Resin (white side) GHS Classification

Physical Hazards:	Not Classified.	
Health Hazards:	Skin Corrosion/Irritation	Category 2
	Serious Eye Damage/Irritation	Category 2A
	Sensitization, Skin	Category 1
	Germ Cell Mutagenicity	Category 2
Environmental Hazards:	Chronic Aquatic Environmental Hazard	Category 2

Signal Word: **WARNING!**
Hazard Statements: Causes skin irritation. Causes serious eye irritation. May cause an allergic skin reaction. Suspected of causing genetic defects. Toxic to aquatic life with long lasting effects.

Precautionary Statements:

Prevention: Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves/protective clothing/eye protection/face protection. Contaminated work clothing should not be allowed out of the workplace. Avoid breathing mist or vapor. Wash thoroughly after handling. Avoid release to the environment.

Response: If exposed or concerned: Call a poison center/doctor. If on skin: Wash with plenty of water. If skin irritation or rash occurs: Get medical advice/attention. Take off contaminated clothing and wash before re-use. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention. Collect Spillage.

Storage: Store locked up. Store in a well-ventilated place. Store between 45-90°F (7-32°C).

Disposal: Dispose of contents/container in accordance with local/regional/national/international regulations.

Hardener (black side) GHS Classification

Physical Hazards:	Not Classified.	
Health Hazards:	Acute Toxicity, Dermal	Category 4
	Skin Corrosion/Irritation	Category 1
	Serious Eye Damage/Irritation	Category 1
	Sensitization, Skin	Category 1
	Reproductive Toxicity (fertility)	Category 2
Environmental Hazards:	Acute Aquatic Environmental Hazard	Category 1
	Chronic Aquatic Environmental Hazard	Category 2

Signal Word: **DANGER!**

Hazard Statements: Harmful in contact with skin. Causes severe skin burns and eye damage. May cause an allergic skin reaction. Suspected of damaging fertility. May cause damage to organs(nasal cavity) through prolonged or repeated exposure. Very toxic to aquatic life. Toxic to aquatic life with long lasting effects.

Precautionary Statements:

Prevention: Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves/protective clothing/eye protection/face protection. Do not breathe mist or vapor. Wash thoroughly after handling. Contaminated work clothing must not be allowed out of the workplace. Avoid release to the environment.

Response: If exposed or concerned: Call a poison center/doctor. If swallowed: Rinse mouth. Do NOT induce vomiting. If inhaled: Remove person to fresh air and keep comfortable for breathing. If on skin: Wash with plenty of water. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a poison center/doctor. Take off contaminated clothing and wash before reuse. Collect Spillage.

Storage: Store locked up. Store in a well-ventilated place. Keep container tightly closed. Store between 45-90°F (7-32°C).

Disposal: Dispose of contents/container in accordance with local/regional/national regulations.

Hazards Not Otherwise Classified (HNOC)

The above hazards are for the uncured Resin component of SET. Upon combination with the Hardener component of SET an innocuous solid is formed which does not present any immediate hazards. Upon grinding or cutting the cured product the following hazards may apply.

Health Hazards:	Carcinogenicity	Category 1A
Hazard Statements:	May cause cancer.	
Precautionary Statements:	Do not breathe dust.	

3. Composition Information

General Information

This product is a mixture. Hazardous ingredients for each component are listed below. May include other nonhazardous ingredients. May include other trace ingredients, see Section 15.

Resin (white side)

Chemical Name	CAS Number	Weight %
Bisphenol A/Epichlorohydrin	25068-38-6	40-60
Phenol, polymer with formaldehyde, glycidyl ether	28064-14-4	40-60
Butyl Glycidyl Ether	2426-08-6	1-10
Titanium Dioxide	13463-67-1	1-10

Hardener (black side)

Chemical Name	CAS Number	Weight %
Limestone	1317-65-3	30-50
Benzyl Alcohol	100-51-6	10-20
2-Piperazin-1-ylethylamine	140-31-8	5-10
Bisphenol A	80-05-7	5-10
Furfuryl Alcohol	98-00-0	1-5
Nonylphenol	84852-15-3	1-5
Triethylenetetramine	112-24-3	1-5
Benzyldimethylamine	103-83-3	1-5
Crystalline Silica, Quartz	14808-60-7	< 1

4. First-Aid Measures

General Information

Provide general supportive measures and treat symptomatically. Symptoms may be delayed. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. If exposed or concerned: Get medical advice/attention. Wash contaminated clothing before reuse.

Routes of Exposure

Eye Contact: Immediately flush eyes with plenty of cool water for at least 15 minutes while holding the eyes open. Remove contact lenses if present and easy to do. If redness, burning, blurred vision, or swelling persists, **consult a physician.**

Skin Contact: Remove contaminated clothing and product, immediately wash affected area with soap and water. Chemical burns must be treated by a **physician.**

Ingestion: Rinse mouth immediately. Give large amounts of milk or water, if person is conscious. Only induce vomiting at the instruction of medical personnel. **Consult a physician.**

Inhalation: Remove patient to fresh air. Give oxygen or artificial respiration if needed. If patient continues to experience difficulty breathing, **consult a physician.**

Most Important Symptoms

Irritant effects. Sensitization. Symptoms include itching, burning, redness and tearing. Corrosive effects. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. May cause temporary blindness and severe eye damage. May cause allergic skin reaction.

5. Fire-Fighting Measures

Suitable Extinguishing Media: Extinguish with foam, carbon dioxide, dry powder, or water fog.

Additional Information: None known.

Hazards during Fire-Fighting: Hazardous decomposition products may occur when materials polymerize at temperatures above500°F (260°C). Irritating and toxic gases/fumes may be released during a fire. Water run-off can cause environmental damage. Do not allow run-off from fire-fighting to enter drains or water courses.

Fire-Fighting Procedures: Use standard fire-fighting procedures and consider the hazards of other involved materials. In case of fire and/or explosion do not breathe fumes. Self-contained breathing apparatus and full protective clothing must be worn. Move containers from fire area if you can do so without risk. Cool containers with flooding quantities of water until well after fire is out. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply.

6. Accidental Release Measures

Personal Precautions

Keep unnecessary personnel away. Eliminate all ignition sources (no smoking, flares, sparks, or flames in immediate area). Wear appropriate personal protective equipment. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Avoid inhalation of vapors or mists. Ensure adequate ventilation. Local authorities should be advised if significant spillages cannot be contained.

Clean-Up Methods

Small spills: Wipe up with absorbent material (e.g. cloth, fleece). Place in leak-proof containers. Seal tightly for proper disposal. Clean surface thoroughly to remove residual contamination.

Large spills: Stop the flow of material, if this is without risk. Dike far ahead of spill. Use a non-combustible material like vermiculite, sand or earth to soak up the product. Place in leak-proof containers. Seal tightly for proper disposal. Following product recovery, flush area with water. Prevent entry into waterways, sewer, basements or confined areas.

Environmental Precautions

Avoid release to the environment. Contact local authorities in case of spillage to drain/aquatic environment. Prevent further leakage or spillage if safe to do so.

7. Handling and Storage

Handling

Mechanical ventilation or local exhaust ventilation is recommended. Keep away from open flames, hot surfaces and sources of ignition. Wear appropriate personal protective equipment. When using, do not eat, drink or smoke. Avoid contact with eyes, skin, and clothing. Pregnant women should not work with this product if there is risk of exposure. Observe good industrial hygiene practices.

Storage

Store in a closed container away from incompatible materials. Keep in original container. Keep container tightly closed. Store in a dry place out of direct sunlight. Keep out of the reach of children. Store between 45-90°F (7-32°C). Keep away from heat and sources of ignition. Store in a well-ventilated place. Store locked up.

8. Exposure Controls / Personal Protection

Personal Protective Equipment

Protective Measure: Wear appropriate personal protective equipment.
Eye Protection: Wear chemical splash goggles or safety glasses with side shield.
Hand Protection: Wear chemical-resistant gloves such as: Nitrile, neoprene, butyl.
Skin and Body Protection: Wear long sleeve shirt/long pants and other clothing as required to minimize contact.
Respirator Protection: The use of a respirator is not required during normal use of this product. If grinding or cutting cured product the use of an approved respirator is recommended.
General Hygiene: Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

Engineering Controls

When using indoors good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. Ready access to running water is required. Provide eyewash station.

Exposure Limits

Component *Skin Designation	OSHA (PEL)	ACGIH (TLV)	NIOSH Pocket Guide
Triethylenetetramine * (CAS 112-24-3)	N/E	N/E	6 mg/m^3 1 ppm
Quartz** (CAS 14808-60-7)	0.3 mg/m^3(total dust) 0.1 mg/m^3 (respirable)	0.025 mg/m^3 (respirable)	0.05 mg/m^3 (respirable)
Limestone (CAS 1317-65-3)	5 mg/m^3(Respirable) 15 mg/m^3 (Total dust)	N/E	5 mg/m^3(Respirable) 10 mg/m^3 (Total dust)

Component *Skin Designation	OSHA (PEL)	ACGIH (TLV)	NIOSH Pocket Guide
Benzyl Alcohol (CAS 100-51-6)	N/E	N/E	44.2 mg/m^3 10 ppm
Furfuryl alcohol * (CAS 98-00-0)	N/E	15 ppm (STEL) 10 ppm (TWA)	40 mg/m^3 10 ppm
N-Butyl Glycidyl Ether (2426-08-6)	270 mg/m^3 50 ppm	3 ppm	30 mg/m^3 (Ceiling) 5.6 ppm (Ceiling)
Titanium Dioxide (13463-67-7)	5 mg/m^3(respirable) 15 mg/m^3(total dust)	10 mg/m^3	N/E

Additional Information

After Cure: Product forms an innocuous solid. Processing after cure (grinding or cutting) may produce dust containing compounds that present an inhalation hazard.

9. Physical and Chemical Properties

Property	Resin	Hardener
Physical State:	Liquid, Paste	Liquid, Paste
Color:	White	Black
Odor:	Sweet	Ammonia
pH:	6.9	10.6
Flammability limit – lower %:	No data	No data
Flammability limit – upper %:	No data	No data
Vapor Pressure:	Non-volatile	No data
Vapor Density:	No data	No data
Solubility:	Insoluble in water	Slightly soluble in water
Freezing/Melting Point:	No data	No data
Boiling Point:	> 500 °F (>260 °C)	No data
Flash Point:	250 °F (121 °C) Open Cup	198 °F (92.2 °C) Open Cup
Evaporation Rate:	No data	No data
Decomposition Temperature:	No data	No data
Specific Gravity:	1.21 at 72°F (22°C)	1.23 at 72°F (22°C)
VOC (after cure):	3 g/L	3 g/L
Kow:	No data	No data
Viscosity:	No data	No data

10. Stability and Reactivity

Resin (white side)

Reactivity: This product is stable and non-reactive under normal conditions.
Chemical Stability: Stable under normal storage conditions.
Condition to Avoid: High heat and open flame.
Substances to Avoid: Oxidizing agents, acids, organic bases, and amines.
Hazardous Reactions: Hazardous polymerization does not occur.
Decomposition Products: Carbon dioxide, carbon monoxide, oxides of nitrogen, and other organic compounds.

Hardener (black side)

Reactivity: This product is stable and non-reactive under normal conditions.
Chemical Stability: Stable under normal storage conditions.
Condition to Avoid: High heat and open flame.
Substances to Avoid: Strong oxidizing agents. Strong acids.
Hazardous Reactions: Hazardous polymerization does not occur.
Decomposition Products: Carbon dioxide, carbon monoxide, oxides of nitrogen, and other organic compounds.

11. Toxicological Information

Likely Routes of Exposure

Ingestion: Ingestion may cause irritation to the gastrointestinal tract.

Inhalation: This material is a viscous liquid to semi-solid which does not easily form vapors. Inhalation of processing dust may irritate the respiratory tract.

Skin contact: Harmful in contact with skin. Causes severe skin burns. Causes skin irritation. May cause an allergic skin reaction.

Eye contact: Causes serious eye irritation. Causes eye burns.

Information on Toxicological Effects

Acute toxicity: Occupational exposure to the substance or mixture may cause adverse effects.

Product	Species	Test Result
SET Resin (CAS mixture)		
Acute, *Dermal*, LC50	Rabbit	>2000 mg/kg
Acute, *Oral*, LD50	Rat	>5000 mg/kg
SET Hardener (CAS mixture)		
Acute, *Oral*, LD50	Rat	>5000 mg/kg

Skin corrosion/irritation: Causes skin irritation. Causes severe skin burns.

Eye damage/eye irritation: Causes serious eye irritation/ damage.

Respiratory sensitization: No data available.

Skin sensitization: May cause an allergic skin reaction.

Germ cell mutagenicity: Contains a component that is suspected of causing genetic defects.

Carcinogenicity: May cause cancer. Both the resin and hardener components of this product contain components that are listed carcinogens. Quartz and Titanium Dioxide are considered carcinogens only in their inhalable form. Due to the nature of this product inhalation is highly unlikely. Exposure to respirable Quartz and Titanium Dioxide is likely only when grinding or cutting cured product, ensure good work practice and use of personal protective equipment as needed to control exposure.

IARC Monographs. Overall Evaluation of Carcinogenicity

Quartz (14808-60-7) 1 Carcinogenic to humans.

Titanium Dioxide (13463-67-7) 2B Possibly Carcinogenic to humans.

NTP Report on Carcinogens

Quartz (14808-60-7) Known to be Human Carcinogen

Reproductive toxicity: Suspected of damaging fertility.

Aspiration hazard: No data available.

Specific target organ toxicity:

Single exposure No data available.

Repeated exposure May cause damage to organs (nasal cavity) through prolonged or repeated exposure.

Further Information

Toxicological, ecotoxicological, physical, and chemical properties may not have been fully investigated. Hazard data above is estimated based on best available information. Some workers with pre-existing medical conditions such as: asthma, allergies, or impaired pulmonary and/or liver functions, or who may be particularly susceptible to this material, may be affected by exposure to this material.

12. Ecological Information

General Information

Information given is based on data on the components and the ecotoxicology of similar products. Very toxic to aquatic life. Toxic to aquatic life with long lasting effects. Avoid release to the environment.

Supporting Data

Component	Species	Test Result
SET Resin (CAS mixture)		
Aquatic Acute, Algae, EC50	Algae	>1000 mg/l, 72 hours
Aquatic Acute, Crustacea, EC50	Daphnia Magna	324.87 mg/l, 48 hours
Aquatic Acute, Fish, LC50	Fish	707.11 mg/l, 96 hours

Component	Species	Test Result
2-Piperazin-1-ylethylamine (140-31-8)		
Aquatic, Fish, LC50	Fathead Minnow	1950-2460 mg/l, 96 hours
Benzyl alcohol (CAS 100-51-6)		
Aquatic, Fish, LC50	Bluegill	10 mg/l, 96 hours
Nonylphenol (CAS 84852-15-3)		
Aquatic, Crustacea, EC50	Clam	0.0379 mg/l, 48 hours
Aquatic, Fish, LC50	Winter Flounder	0.017 mg/l, 96 hours
Bisphenol A (CAS 80-05-7)		
Aquatic, Crustacea, EC50	Daphnia	9.2-11.4 mg/l, 48 hours
Aquatic, Fish, LC50	Fathead Minnow	3.6-5.4 mg/l, 96 hours
Furfuryl Alcohol (98-00-0)		
Aquatic, Fish, LC50	Fathead Minnow	32 mg/l, 96 hours
benzyldimethylamine (CAS 103-83-3)		
Aquatic, Fish, LC50	Fathead Minnow	35.8-39.9 mg/l, 96 hours

Persistence and degradability: This product is not expected to be readily biodegradable.

Bioaccumulative potential: No data available for this product.

Partition coefficient n-octanol / water (log Kow)

Butyl glycidyl ether (2426-08-6)	0.63
Benzyl alcohol (CAS 100-51-6)	1.1
Bisphenol A (CAS 80-05-7)	3.32
Nonylphenol (CAS 84852-15-3)	5.71

Mobility in soil: This product is non-volatile.

Further Information

No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this product.

13. Disposal Consideration

Waste Disposal of Substance: Do not allow this material to drain into sewers/water supplies. Do not contaminate ponds, waterways or ditches with chemical or used container. Dispose of contents/container in accordance with local/regional/national/international regulations.

Container Disposal: Empty containers or liners may retain some product residues; follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. Transportation Information

Resin (white side)

UN number: UN3082

UN proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (Bisphenol-A-Epichlorohydrin), 9, III, Marine Pollutant

Precautions: Marine Pollutant

Required Labels: 9

ERG Code (IATA): 9L

EmS (IMDG): F-A, S-F

Hardener (black side)

UN number: UN2735

UN proper shipping name: AMINES, LIQUID, CORROSIVE, N.O.S. (Aminoethylpiperazine, Nonylphenol), 8, III, Marine Pollutant

Precautions: Marine Pollutant

Required Labels: 8

ERG Code (IATA): 8L

EmS (IMDG): F-A, S-B

Additional Information

Special precautions for user Read safety instructions, SDS and emergency procedures before handling.
Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code
This substance/mixture is not intended to be transported in bulk

This information does not cover all specific regulatory or operational requirements of this product. The classifications for transportation may vary by container volume or different regional or national regulations.

15. Regulatory Information

United States

Federal Regulations: This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D): Not regulated.
US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050): Not listed.
CERCLA Hazardous Substance List (40 CFR 302.4):
Bisphenol A (CAS 80-05-7) LISTED

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard Categories:	Immediate	Delayed	Fire	Pressure	Reactivity
Resin	Yes	Yes	No	No	No
Hardener	Yes	Yes	No	No	No

SARA 302 Extremely hazardous substance: No
SARA 311/312 Hazardous chemical: Yes
SARA 313 (TRI reporting):

Chemical Name	CAS Number	% by weight
Bisphenol A	80-05-7	5-10

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List
Bisphenol A (CAS 80-05-7)

US. California Proposition 65: WARNING: This product contains a chemical known to the State of California to cause cancer, birth defects, or reproductive harm.

Component	Regulation	% In Blend (approx.)	Remark
Quartz (14808-60-7)	ACGIH	< 1	Carcinogenic
Carbon Black (1333-86-4)	ACGIH	< 0.1	Carcinogenic
Titanium dioxide (CAS 13463-67-7)	ACGIH	1-10	Carcinogenic

US State Right-To-Know Lists

Chemical	Massachusetts RTK	New Jersey Work and Community RTK Act	Pennsylvania Worker and Community RTK Law	Rhode Island RTK
2-Piperazin-1-ylethylamine (CAS 140-31-8)	Listed		Listed	
Benzyl Alcohol (100-51-6)	Listed		Listed	
Bisphenol A (CAS 80-05-7)	Listed	Listed	Listed	Listed
Furfuryl alcohol (CAS 98-00-0)	Listed		Listed	
Limestone (CAS 1317-65-3)	Listed		Listed	
Nonylphenol (CAS 25154-52-3)	Listed		Listed	

Quartz (14808-60-7)	Listed		Listed	
Triethylenetetramine (CAS 112-24-3)	Listed		Listed	
Butyl glycidyl ether (CAS 2426-08-6)	Listed		Listed	
Titanium dioxide (CAS 1317-80-2)	Listed		Listed	

Canada

This product has been classified according to the hazard criteria of the CPR and the SDS contains all of the information required by the CPR.

WHMIS Classification

	
Class E: Corrosive	**Class D-2A:** Material Causing other toxic effects

International

International Inventories

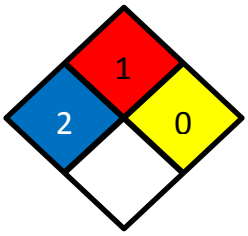
Country or Region	Inventory	On Inventory? (Yes/No)
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL) / Non-Domestic Substances List (NDSL)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

16. Other Information

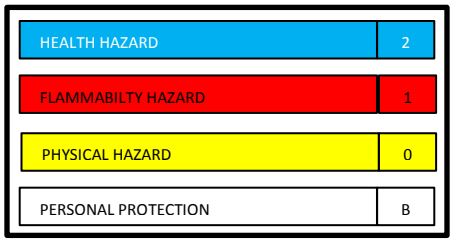
Date Prepared or Revised: September 2014
Supersedes: August 2012

Additional Resin (white side) Classifications

NFPA Ratings

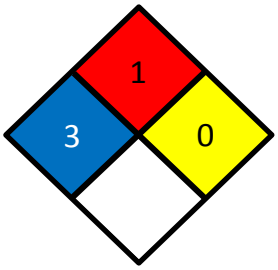


HMIS Rating



Additional Hardener (black side) Classifications

NFPA Ratings



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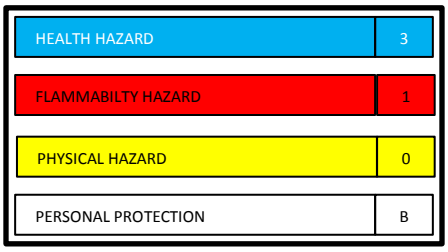

Abbreviations

ACGIH:	American Conference of Governmental Industrial Hygienists
CAS No.:	Chemical Abstract Service Registry Number
CERCLA:	Comprehensive Environmental Response, Compensation and Liability Act (U.S. EPA)
CPR:	Controlled Product Regulations (Canada)
DOT:	Department of Transportation (U.S.)
EPA:	Environmental Protection Agency (U.S.)
GHS:	Globally Harmonized System of Classification and Labeling of Chemicals
HEPA:	High-Efficiency Particulate Air
HMIS:	Hazardous Materials Identification System
IARC:	International Agency for Research on Cancer
IATA:	International Air Transport Association
IMDG:	International Maritime Dangerous Goods code
LPP:	Limité Permisible Ponderado (Chile)
NIOSH:	National Institute of Occupational Safety and Health (U.S.)
NFPA:	National Fire Protection Association (US)
NTP:	National Toxicology Program (US)
OSHA:	Occupational Safety and Health Administration (U.S.)
PEL:	Permissible Exposure Limit
SARA:	Superfund Amendments and Reauthorization Act (U.S. EPA)
SDS:	Safety Data Sheet
STEL:	Short Term Exposure Limit (15 minute Time Weighted Average)
STOT:	Specific Target Organ Toxicity (GHS Classification)
TLV:	Threshold Limit Value
TSCA:	Toxic Substances Control Act (U.S.)
TWA:	Time Weighted Average (exposure for 8-hour workday)
U.S.:	United States
VOC:	Volatile Organic Compounds
WHMIS:	Canadian Workplace Hazardous Materials Information System

Disclaimer

This Safety Data Sheet (SDS) is prepared by Simpson Strong-Tie Co. in compliance with the requirements of OSHA 29 CFR Part 1910.1200. The information it contains is offered in good faith as accurate as of the date of this SDS. This SDS is provided solely for the purpose of conveying health, safety, and environmental information. No warranty, expressed or implied, is given. Health and Safety precautions may not be adequate for all individuals and/or situations. It is the user's obligation to evaluate and use this product safely and to comply with all applicable laws and regulations.

Internal

FOR INTERNAL USE ONLY

SET Resin:
XCOM3B – 50% Cartridge

SET Hardener:
XCOM3A – 50% Cartridge
XCORR – 50% Cartridge