



MATERIAL SAFETY DATA SHEET

PRODUCT NAME: TYFO® SW-1	COMPONENT A	PAGE: 1 of 7
MSDS NUMBER: SW1-A-002	DATE: April 19, 2013	SUPERSEDES: April 6, 2010

SECTION I: MATERIAL AND MANUFACTURER IDENTIFICATION

MANUFACTURER:
FYFE CO. LLC
8380 Miralani Drive
San Diego, CA 92126

EMERGENCY TELEPHONE NUMBER:
800-424-9300 or 703-527-3887
INFORMATION TELEPHONE NUMBER:
858-642-0694

PRODUCTION IDENTIFICATION: TYFO® SW-1, Component A
CHEMICAL FAMILY: Epoxy Resin Mixture

SECTION II: COMPOSITION / INGREDIENTS

This document is prepared pursuant to the OSHA Hazard Communication Standard (29 CFR 1910.1200).

MATERIAL OR COMPONENT	CAS NUMBER	% BY WEIGHT	OSHA(PEL)	ACGIH(TLV)
BIS A EPOXY RESIN	25068-38-6	0-80%	N/E	N/E
HYDROCARBON	68477-31-6	0-10%	N/E	N/E
GLYCIDYL DILUENT AROMATIC	2426-.08-6	0-10%	25ppm	25 ppm
TITANIUM DIOXIDE	13463-67-7	0-10%	5 mg/m3	5 mg/m3
COLLOIDAL SILICA	67762-90-7	0-10%	N/E	N/E

N/E = NOT ESTABLISHED

SECTION III: HAZARD IDENTIFICATION

EMERGENCY OVERVIEW:

APPEARANCE AND ODOR: Gray, viscous liquid with slight odor.

STATEMENTS OF HAZARD:

CAUTION ! MAY CAUSE SKIN AND EYE IRRITATION AND SKIN SENSITIZATION.
CONTACT AT ELEVATED TEMPERATURES CAN RESULT IN THERMAL BURNS.

PRIMARY ROUTES OF EXPOSURE:

EYES--YES SKIN CONTACT--YES INHALATION--NO INGESTION--NO

HMIS RATING:

HEALTH--2 FLAMMABILITY--1 REACTIVITY--0 SPECIAL--NONE

POTENTIAL HEALTH EFFECTS:

EYES: Product may cause severe irritation.

SKIN CONTACT: Prolonged contact may cause skin irritation with local redness. Repeated contact may cause skin irritation with local redness.

SKIN ABSORPTION: Prolonged skin contact is unlikely to result in absorption of harmful amounts.

INHALATION: At room temperature, exposure to vapor is minimal due to low volatility. Vapor from heated material, mist or aerosols may cause respiratory irritation. High vapor concentrations may produce CNS depression.

INGESTION: Not expected to be a relevant route of exposure. Product may be slightly toxic if ingested.

ASPIRATION HAZARD: Based on physical properties, not likely to be an aspiration hazard.

CHRONIC: Repeated exposure may cause skin sensitization, skin irritation, and dermatitis. Pre-existing eye, skin, and respiratory disorders may be aggravated by exposure of this product.

CANCER INFORMATION: Many studies have been conducted to assess the potential carcinogenicity of diglycidyl ether of bisphenol A (DGEBA). Indeed, the most recent review of the available data by the International Agency for Research on Cancer (IARC) has concluded that DGEBA is not classified as a carcinogen. Although some weak evidence of carcinogenicity has been reported in animals, when all of the data are considered, the weight of evidence does not show that DGEBA is carcinogenic.

OTHER: Dust from machining the cured product may cause mechanical irritation of eyes, skin, nose, throat and upper respiratory tract.

EXPOSURE LIMITS FOR CURED PRODUCT DUST:	OSHA(PEL) 15 mg/m ³ (Total) 5 mg/ m ³ (Respirable)	ACGIH(TLV) 10 mg/m ³ (Total) 3 mg/ m ³ (Respirable)
--	--	---

SECTION IV: FIRST AID MEASURES

EYES: Flush eyes thoroughly with water for several minutes. Remove contact lenses after the initial 1-2 minutes and continue flushing for several additional minutes. If effects occur, consult a physician, preferably an ophthalmologist. Suitable emergency eye wash facility should be available in work area. .

SKIN CONTACT: Remove material from skin immediately by washing with soap and plenty of water. Remove contaminated clothing and shoes while washing. Seek medical attention if irritation persists. Wash clothing before reuse. Discard items which cannot be decontaminated. Safety shower should be located in immediate work area.

INHALATION: If inhaled, remove to fresh air, if breathing has stopped, administer artificial respiration, preferably mouth-to-mouth. If breathing is difficult, qualified personnel may administer oxygen. Seek medical attention.

INGESTION: Do not induce vomiting. If vomiting occurs spontaneously, keep head below hips to prevent aspiration of liquid into the lungs. Seek medical attention.

SECTION V: FIRE FIGHTING MEASURES

FLASH POINT/METHOD OF DETERMINATION: >200°F / SETAFLASH

AUTO-IGNITION TEMP: Not available **LIMITS OF FLAMMABILITY: LEL:** Not available **UEL:** Not available

MEANS OF EXTINCTION: Water fog or fine spray. Dry chemical fire extinguishers. Carbon dioxide fire extinguishers. Foam. Alcohol resistant foams (ATC type) are preferred. General purpose synthetic foams (including AFFF) or protein foams may function, but will be less effective. Water fog, applied gently may be used as a blanket for fire extinguishment.

EXTINGUISHING MEDIA TO AVOID: Do not use direct water stream. May spread fire.

SPECIAL FIRE FIGHTING PROCEDURES AND PRECAUTIONS: Do not enter confined fire space without full bunker gear (helmet with face shield, bunker coats, gloves and rubber boots), including a positive pressure NIOSH approved self-contained breathing apparatus. Cool fire exposed containers with water.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Containers exposed to intense heat from fires should be cooled with water to prevent vapor pressure buildup which could result in container rupture. \

ADVICE FOR FIREFIGHTERS

FIRE FIGHTING PROCEDURES: Keep people away. Isolate fire and deny unnecessary entry. Use water spray to cool fire exposed containers and fire affected zone until fire is out and danger of reignition has passed. Fight fire from protected location or safe distance. Consider the use of unmanned hose holders or monitor nozzles. Immediately withdraw all personnel from the area in case of rising sound from venting safety device or discoloration of the container. Do not use direct water stream. May spread fire. Move container from fire area if this is possible without hazard. Burning liquids may be moved by flushing with water to protect personnel and minimize property damage. Water fog, applied

gently may be used as a blanket for fire extinguishment. Contain fire water run-off if possible. Fire water run-off, if not contained, may cause environmental damage. Review the "Accidental Release Measures" and the "Ecological Information" sections of this MSDS.

SPECIAL PROTECTIVE EQUIPMENT FOR FIREFIGHTERS: Wear positive-pressure self-contained breathing apparatus (SCBA) and protective firefighting clothing (includes firefighting helmet, coat, trousers, boots, and gloves). Avoid contact with this material during firefighting operations. If contact is likely, change to full chemical resistant fire fighting clothing with self-contained breathing apparatus. If this is not available, wear full chemical resistant clothing with self-contained breathing apparatus and fight fire from a remote location. For protective equipment in post-fire or non-fire clean-up situations, refer to the relevant sections.

SECTION VI: ACCIDENTAL RELEASE MEASURES

PROCEDURES IN CASE OF ACCIDENTAL RELEASE OF LEAKAGE: Isolate area. Keep unnecessary and unprotected personnel from entering the area. Use appropriate safety equipment. For additional information, refer to Section 8, Exposure Controls and Personal Protection. Refer to Section 7, Handling, for additional precautionary measures.

METHODS AND MATERIALS FOR CONTAINMENT AND CLEANING UP: Contain spilled material if possible. Absorb with materials such as: Sand. Polypropylene fiber products. Polyethylene fiber products. Remove residual with soap and hot water. Collect in suitable and properly labeled containers. Residual can be removed with solvent. Solvents are not recommended for clean-up unless the recommended exposure guidelines and safe handling practices for the specific solvent are followed. Consult appropriate solvent Safety Data Sheet for handling information and exposure guidelines. See Section 13, Disposal Considerations, for additional information.

SECTION VII: HANDLING AND STORAGE

General Handling: Avoid prolonged or repeated contact with skin. Avoid contact with eyes, skin, and clothing. Wash thoroughly after handling. Avoid use of electric band heaters. Failures of electric band heaters have been reported to cause drums of liquid epoxy resin to explode and catch fire. Application of a direct flame to a container of liquid epoxy resin can also cause explosion and/or fire.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE: Store in a cool, dry place with adequate ventilation. Store in closed containers. Keep sealed from dirt and moisture. Keep away from open flames and high temperatures.

SECTION VIII: EXPOSURE CONTROLS/PERSONAL PROTECTION

EYE/FACE PROTECTION: Use safety glasses (with side shields) or appropriate goggles.

SKIN PROTECTION: Use protective clothing chemically resistant to this material. Selection of specific items such as face shield, boots, apron, or full body suit will depend on the task.

HAND PROTECTION: Use gloves chemically resistant to this material. Examples of preferred glove barrier materials include: Butyl rubber. Ethyl vinyl alcohol laminate ("EVAL"). Nitrile/butadiene rubber ("nitrile" or "NBR"). Neoprene. Polyvinyl chloride ("PVC" or "vinyl"). **NOTICE:** The selection of a specific glove for a particular application and duration of use in a workplace should also take into account all relevant workplace factors such as, but not limited to: Other chemicals which may be handled, physical requirements (cut/puncture protection, dexterity, thermal protection), potential body reactions to glove materials, as well as the instructions/specifications provided by the glove supplier.

RESPIRATORY PROTECTION: Respiratory protection should be worn when there is a potential to exceed the exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, wear respiratory protection when adverse effects, such as respiratory irritation or discomfort have been experienced, or where indicated by your risk assessment process. For most conditions, no respiratory protection should be needed; however, if material is heated or sprayed, use an approved air-purifying respirator. The following should be effective types of air-purifying respirators: Organic vapor cartridge with a particulate pre-filter.

INGESTION: Use good personal hygiene. Do not consume or store food in the work area. Wash hands before smoking or eating.

VENTILATION: Use local exhaust ventilation, or other engineering controls to maintain airborne levels below exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, general ventilation should be sufficient for most operations.

SECTION IX: PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AND ODOR	Gray liquid, slight odor
BOILING POINT (°F/°C)	N/AV
FREEZING POINT (°F/°C)	N/AV
SPECIFIC GRAVITY (WATER=1)	1.13
pH OF UNDILUTED PRODUCT	N/AV
VAPOR PRESSURE (MM Hg. @ 20C)	<10
VAPOR DENSITY (AIR-1)	>Air
VISCOSITY	N/AV
PERCENT (%) VOC	0.1%
SOLUBILITY IN WATER	Negligible
ODOR THRESHOLD	N/AV
EVAPORATION RATE	N/AV
WATER/OIL DISTRIBUTION	N/AV

N/AV= Not available

SECTION X: STABILITY AND REACTIVITY

STABILITY: Stable under normal handling and storage conditions.

INCOMPATIBLE MATERIALS: Avoid contact with strong oxidizing agents, strong Lewis or mineral acids and strong mineral and organic bases especially primary and secondary aliphatic amines.

POSSIBILITY OF HAZARDOUS REACTIONS: Polymerization will not occur by itself. Masses of more than one pound (0.5 kg) of product plus an aliphatic amine will cause irreversible polymerization with heat build-up.

CONDITIONS TO AVOID: Avoid short term exposures to temperatures above 300 °C (572 °F). Avoid prolonged exposure to temperatures above 250 °C (482 °F). Potentially violent decomposition can occur above 350 °C (662 °F). Generation of gas during decomposition can cause pressure in closed systems. Pressure build-up can be rapid.

INCOMPATIBLE MATERIALS: Avoid contact with oxidizing materials. Avoid contact with: Acids. Bases. Avoid unintended contact with amines.

HAZARDOUS DECOMPOSITION PRODUCTS: Decomposition products depend upon temperature, air supply and the presence of other materials. Gases are released during decomposition. Uncontrolled exothermic reaction of epoxy resins release phenolics, carbon monoxide, and water.

SECTION XI: TOXICOLOGICAL INFORMATION

EFFECTS OF OVEREXPOSURE

INHALATION:	May cause irritation on the respiratory tract.
LC(50) INHAL.:	N/AV
EYES:	May be severely irritating to the eyes
SKIN CONTACT	May be irritating to the skin. In some individuals it may cause sensitization.
SKIN ABSORPTION:	No information available.
INGESTION:	Not expected to be a relevant route of entry. May be slightly toxic if ingested.
LD(50) ORAL:	<u>CAS. NO.</u>
	1: 11.4 g/kg (rat)
	2: 1000-2050 mg/kg (rat)
	3: 2622 mg/kg (rat)
CHRONIC:	Product does not contain chemicals considered to be carcinogenic by NTP, IARC, or OHSA.

This product contains residual (<5ppm) quantities of epichlorohydrin (ECH) (CAS NO. 106-89-8). It is very unlikely that normal work practices with this product could result in measurable ECH concentrations in the workplace atmosphere. Nevertheless, you should be aware that ECH has been reported to produce cancer in laboratory animals and to produce

mutagenic changes in bacteria and cultured human cells. It has been classified by IARC as a probable human carcinogen. It has been classified as an anticipated human carcinogen by NTP.

This product contains silicon dioxide and titanium dioxide as fillers, which are bound in the resin matrix, hence effects of any exposure to inhalation as nuisance dust is unlikely. These items are listed on the SARA TITLE III Section 313 inventory.

OTHER:**Repeated Doses Toxicity**

Except for skin sensitization, repeated exposures to low molecular weight epoxy resins of this type are not anticipated to cause any significant adverse effects.

Chronic Toxicity and Carcinogenicity

Many studies have been conducted to assess the potential carcinogenicity of diglycidyl ether of bisphenol A (DGEbPA). Indeed, the most recent review of the available data by the International Agency for Research on Cancer (IARC) has concluded that DGEbPA is not classified as a carcinogen. Although some weak evidence of carcinogenicity has been reported in animals, when all of the data are considered, the weight of evidence does not show that DGEbPA is carcinogenic.

Developmental Toxicity

Resins based on the diglycidyl ether of bisphenol A (DGEbPA) did not cause birth defects or other adverse effects on the fetus when pregnant rabbits were exposed by skin contact, the most likely route of exposure, or when pregnant rats or rabbits were exposed orally.

Reproductive Toxicity

In animal studies, did not interfere with reproduction.

Genetic Toxicology

In vitro genetic toxicity studies were negative in some cases and positive in other cases. Animal genetic toxicity studies were negative.

SECTION XII: ECOLOGICAL INFORMATION**Bisphenol A (CAS 25068-38-6)****Toxicity**

Material is moderately toxic to aquatic organisms on an acute basis (LC50/EC50 between 1 and 10 mg/L in the most sensitive species tested).

Fish Acute & Prolonged Toxicity

LC50, *Oncorhynchus mykiss* (rainbow trout), semi-static test, 96 h: 2 mg/l

Aquatic Invertebrate Acute Toxicity

EC50, *Daphnia magna* (Water flea), static test, 48 h, immobilization: 1.8 mg/l

Aquatic Plant Toxicity

ErC50, *Scenedesmus capricornutum* (fresh water algae), static test, Growth rate inhibition, 72 h: 11 mg/l

Toxicity to Micro-organisms

IC50; Bacteria, 18 h: > 42.6 mg/l

Aquatic Invertebrates Chronic Toxicity Value

Daphnia magna (Water flea), semi-static test, 21 d, number of offspring, NOEC: 0.3 mg/l

Persistence and Degradability

Based on stringent OECD test guidelines, this material cannot be considered as readily biodegradable; however, these results do not necessarily mean that the material is not biodegradable under environmental conditions.

Bioaccumulative potential

Bioaccumulation: Bioconcentration potential is moderate

Mobility in soil: Potential for mobility in soil is low (Koc between 500 and 2000)., Given its very low Henry's constant, volatilization from natural bodies of water or moist soil is not expected to be an important fate process.

SECTION XIII: DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHODS: Material for disposal should be placed in appropriate sealed containers to avoid potential human and environmental exposure. It is the responsibility of the generator to comply with all federal, state,

provincial and local laws and regulations. We recommend that you contact an appropriate waste disposal contractor and environmental agency for relevant laws and regulations. Under the US, Resource Conservation and Recovery Act (RCRA), it is the responsibility of the user of the product to determine at the time of disposal, whether the product meets relevant waste classification and to assure proper disposal.

SECTION XIV: TRANSPORTATION INFORMATION

DOT Non-Bulk

NOT REGULATED

DOT Bulk

NOT REGULATED

IMDG

Proper Shipping Name: Environmentally hazardous substance, liquid, n.o.s. (Epoxy resin)

Hazard Class: CLASS 9 **ID Number:** UN 3082 **Packing Group:** PG III

EMS Number: F-A,S-F

Marine pollutant.: Yes

ICAO/IATA

Proper Shipping Name: Environmentally hazardous substance, liquid, n.o.s. (Epoxy resin)

Hazard Class: CLASS 9 **ID Number:** UN3082 **Packing Group:** PG III

Cargo Packing Instruction: 964

Passenger Packing Instruction: 964

Additional Information

MARINE POLLUTANT

SECTION XV: REGULATORY INFORMATION

ALL MATERIALS OF COMPONENTS OF THIS PRODUCT ARE EITHER LISTED OR ARE NOT REQUIRED TO BE LISTED IN THE EPA /TSCA INVENTORY.

California Proposition 65 (Safe Drinking Water and Toxic Enforcement Act of 1986)

WARNING ! THE STATE OF CALIFORNIA HAS DETERMINED THAT THE FOLLOWING LISTED MATERIAL OR COMPONENT CHEMICALS IN THIS PRODUCT MAY CAUSE CANCER, BIRTH DEFECTS OF OTHER REPRODUCTIVE HARM: Epichlorohydrin (CAS # 106-89-8), known to cause cancer, trace amount. Phenyl Glycidyl Ether (CAS # 122-60-1), known to cause cancer, trace amount.

WHMIS (CANADA): CLASSIFICATION: Class D, Division 2, Subdivision B, Toxic

TITLE III SECTION 302:

No reportable materials.

TITLE III SECTION 311/312:

Health hazard: Immediate Health Hazard

Physical hazard: Fire

TITLE III SECTION 313:

No reportable materials.

SECTION XVI: OTHER INFORMATION

SPECIAL PRECAUTIONS: Empty containers will retain some of the product residue. When handling or disposing of them, follow all label warnings, other instructions and waste disposal procedures.

EXPLANATION AND DISCLAIMER: Wherever such words or phrases as "hazardous," "toxic," "carcinogen," etc. appear herein, they are used as defined or described under state employee right-to-know laws, Federal OSHA laws or the direct sources for these laws such as the International Agency for Research on Cancer (ISRC), the National Toxicology Program (NTP), etc. The use of such words or phrases should not be taken to mean that we deem or imply any substance or exposure to be toxic, hazardous or otherwise harmful. ANY EXPOSURE CAN ONLY BE UNDERSTOOD

WITHIN THE ENTIRE CONTEXT OF ITS OCCURRENCE, WHICH INCLUDES SUCH FACTORS AS THE SUBSTANCE'S CHARACTERISTICS AS DEFINED IN THE MSDS, AMOUNT AND DURATION OF EXPOSURES, OTHER CHEMICALS PRESENT AND PREEXISTING INDIVIDUAL DIFFERENCES IN RESPONSE TO THE EXPOSURE.

The data provided is based on the information received from our raw material suppliers and other sources believed to be reliable. THIS DATA DOES NOT CONSTITUTE A GUARANTEE (EXPRESSED OR IMPLIED), WARRANTY (INCLUDING WARRANTY WITHOUT LIMITATION, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE) OR REPRESENTATION (INCLUDING FREEDOM FROM PATENT LIABILITY) BY US WITH RESPECT TO THE DATA, THE PRODUCT DESCRIBED OR ITS USE FOR ANY SPECIFIC PURPOSE, EVEN IF THAT PURPOSE IS KNOWN TO US. WE DISCLAIM LIABILITY FOR DAMAGE OR INJURY INCURRING DIRECTLY OR INDIRECTLY FROM THE USE OF THIS PRODUCT.

APPROVED AND AUTHORIZED BY: *Edward R. Fyle*