



MATERIAL SAFETY DATA SHEET

Prepared to U.S. OSHA, CMA, ANSI and Canadian WHMIS Standards

PART I *What is the material and what do I need to know in an emergency?*

1. PRODUCT IDENTIFICATION

TRADE NAME (AS LABELED): **DYNALENE EG™ and DYNALENE EGV™**

CHEMICAL NAME/CLASS: Heat Transfer Fluids
SYNONYMS: Inhibited Ethylene Glycol

DISTRIBUTOR'S NAME: **Dynalene Heat Transfer Fluids**
ADDRESS: 5250 West Coplay Road
Whitehall, PA 18052

EMERGENCY PHONE: 1-800-424-9300 (CHEMTREC)
BUSINESS PHONE: +1-610-262-3681

DATE OF PREPARATION: August 29, 2004
DATE OF REVISION: January 7, 2008

2. COMPOSITION and INFORMATION ON INGREDIENTS

| CHEMICAL NAME | CAS # | % v/v | EXPOSURE LIMITS IN AIR | | | | | |
|--------------------|----------|---------|---|--|-------------------|--------------------------|-------------------|-------------------|
| | | | ACGIH | | OSHA | | | OTHER |
| | | | TLV | STEL | PEL | STEL | IDLH | |
| | | | mg/m ³ | mg/m ³ | mg/m ³ | mg/m ³ | mg/m ³ | mg/m ³ |
| Ethylene Glycol | 107-21-1 | >95 | NE | Aerosol: 100 C, A4 (Not Classifiable as a Human Carcinogen) | NE | 125 C (Vacated 1989 PEL) | NE | DFG MAK: 10 ppm |
| Inhibitor Solution | | Balance | None of the ingredients in the Inhibitor Solution contribute any significant, additional hazard to these products. All pertinent hazard information has been provided in this Material Safety Data Sheet, per the requirements of the Federal OSHA Hazard Communication Standard (29 CFR 1910.1200) and State equivalent standards. | | | | | |

NE = Not Established

C = Ceiling Level See Section 16 for Definitions of Terms Used.

NOTE: All WHMIS required information is included. It is located in appropriate sections based on the ANSI Z400.1-1993 format.

3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: These products are clear, blue, syrupy liquids with a faint, chemical odor. Vapors and mists from these products may be irritating if inhaled. The solutions can be irritating to contaminated skin or eyes. These products may cause reproductive effects, based on animal tests. These products must be substantially preheated before ignition can occur. If involved in a fire, this liquid will release toxic gases (i.e. carbon monoxide and carbon dioxide). These products are not reactive. Emergency responders must wear proper personal protective equipment and have adequate fire protection for the situation to which they are responding.

SYMPTOMS OF OVER-EXPOSURE BY ROUTE OF EXPOSURE:

The most significant routes of exposure to these products are by inhalation of the vapors and contact with the skin and eyes.

INHALATION: Inhalation of the mists or vapors of these products can be irritating to the nose, throat, mucous membranes, and other tissues of the respiratory system. Ethylene Glycol is the main component of these products. Vapor concentrations of Ethylene Glycol are normally too low at room temperature (due to the low vapor pressure) to cause significant toxic effects from vapor alone. Exposure to vapor and mists is possible, at elevated temperatures, and adverse effects have been reported from exposure to mists of Ethylene Glycol in these circumstances.

Inhalation of this substance in concentrations of 56 ppm or greater are generally not tolerated for long due to throat irritation. Concentrations of about 80 ppm are intolerable, with a burning sensation along the throat and a burning cough. Drowsiness has also been observed in excessively exposed workers, but irritation was not reported during these instances of over-exposure.

Human exposure data indicate that chronic exposure to low levels of Ethylene Glycol vapors (12 ppm, 22 hours/day for 28 days) produce mild throat irritation, slight headaches, and low backaches in exposed individuals. Other potential health effects observed after chronic Ethylene Glycol exposure include attacks of unconsciousness and visual disturbances (nystagmus).

CONTACT WITH SKIN or EYES: This liquid may cause local redness or irritation of the skin. Repeated or prolonged exposure may lead to dermatitis. Contact with the eyes will cause redness, irritation, tearing, and possibly burning.




SKIN ABSORPTION: Based on clinical tests on animals, skin absorption is a potential route of over-exposure for Ethylene Glycol (the main component of these products). Ethylene glycol can be absorbed through skin damaged by eczema. Symptoms of such exposure can include symptoms described for "Contact with Skin and Eyes".

INGESTION: Ingestion of these products, while not likely to occur in an industrial setting, may cause irritation of the mouth and throat, gastric upset and nausea and vomiting. Ingestion of Ethylene Glycol (the main component of these products) can also cause drunkenness, dizziness, stupor, convulsions and coma (symptoms of depression of the central nervous system). Death could result from respiratory arrest or cardiovascular collapse. In humans, a dose of 100 ml of Ethylene Glycol may cause death. If the victim survives, kidney failure may develop within the next several days. In some instances, vision disturbances have been reported.

INJECTION: Though not an expected route of occupational exposure for these products, injection (via punctures or lacerations in the skin) may cause local reddening, tissue swelling and discomfort. Depending on the dose of injection, symptoms described for "Inhalation" or "Ingestion" may be experienced.

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in **Lay Terms**. Symptoms associated with over-exposure to these products are as follows:

ACUTE: Inhalation of the mists or vapors of these products can be irritating to the nose, throat, mucous membranes, and other tissues of the respiratory system. These products may be irritating to contaminated skin or eyes. Though not anticipated to be a significant route of over-exposure, ingestion of these products may be harmful or fatal.

| HAZARDOUS MATERIAL INFORMATION SYSTEM | | | |
|--|---------------|---|---|
| HEALTH | | (BLUE) | 1 |
| FLAMMABILITY | | (RED) | 1 |
| REACTIVITY | | (YELLOW) | 0 |
| PROTECTIVE EQUIPMENT | | | |
| EYES | RESPIRATORY | HANDS | BODY |
|  | SEE SECTION 8 |  |  |
| For routine industrial applications | | | |

3. HAZARD IDENTIFICATION (Continued)

CHRONIC: Prolonged or repeated skin exposures can lead to dermatitis (dry, chapped skin). Chronic over-exposure to low doses of Ethylene Glycol (the main component of these products) may cause mild throat irritation, slight headaches, and low backaches, unconsciousness and visual disturbances. Based on animal tests, Ethylene Glycol may cause reproductive effects. Refer to Section 11 (Toxicological Information) for additional information.

TARGET ORGANS: Skin, eyes, respiratory system, central nervous system, kidneys.

PART II

What should I do if a hazardous situation occurs?

4. FIRST-AID MEASURES

SKIN EXPOSURE: If these products contaminate the skin, immediately begin decontamination with running water. Remove exposed or contaminated clothing, taking care not to contaminate eyes. The minimum recommended flushing time is 15 minutes. Contaminated individual must seek immediate medical attention, especially if irritation or redness develops.

EYE EXPOSURE: If these products enter the eyes, open victim's eyes while under gentle running water. Use sufficient force to open eyelids. Have victim "roll" eyes. Minimum flushing is for 15 minutes. Contaminated individual must seek immediate medical attention, especially if symptoms persist.

INHALATION: If vapors or mists of these products are inhaled, remove victim to fresh air. If necessary, use artificial respiration to support vital functions. Remove or cover gross contamination to avoid exposure to rescuers.

INGESTION: If these products are swallowed, CALL PHYSICIAN OR POISON CONTROL CENTER FOR MOST CURRENT INFORMATION. If professional advice is not available, do not induce vomiting. Victim should drink milk, egg whites, or large quantities of water. If medical care will be delayed several hours, give the patient three or four 1-ounce oral "shots" of 86-proof or higher whiskey before or during transport to the hospital. Never induce vomiting or give diluents (milk or water) to someone who is unconscious, having convulsions, or who cannot swallow.

Contaminated individual must be taken for medical attention. Rescuers should be taken for medical attention, if necessary. Take copy of label and MSDS to physician or health professional with victim. Physicians should refer to Section 11 (Toxicology Information) for further information on treatment protocol.

NOTE TO PHYSICIANS: This product contains ethylene glycol. Ethanol decreases the metabolism of ethylene glycol to toxic metabolites. Ethanol should be administered as soon as possible in cases of severe poisoning since the elimination half-life of ethylene glycol is 3 hours. If medical care will be delayed several hours, give the patient three to four 1-ounce "shots" of 86-proof or higher whiskey before or during transport to the hospital. Hemodialysis effectively removes ethylene glycol and its metabolites from the body. Effects of acute ethylene glycol poisoning appear in three fairly distinct stages. The initial stage occurs shortly after exposure, lasts 6-12 hours, and is characterized by central nervous system effects (transient exhilaration, nausea, vomiting, and in severe cases, coma, convulsions, and possible death). The second stage lasts from 12-36 hours after exposure and is initiated by the onset of coma. This phase is characterized by tachypnea, tachycardia, mild hypotension, cyanosis, and in severe cases, pulmonary edema, bronchopneumonia, cardiac enlargement, and congestive failure. The final stage occurs 24-72 hours post-exposure and is characterized by renal failure, ranging from a mild increase in blood urea nitrogen and creatinine followed by recovery, to complete anuria with acute tubular necrosis that can lead to death. Oxaluria glycol intoxication is severe metabolic acidosis. Preexisting disorders of the following organs (or organ systems) may be aggravated by exposure to this material: lung (for example, asthma-like conditions), liver, kidney, central nervous system. Exposure to this material may aggravate any preexisting condition sensitive to a decrease in available oxygen, such as chronic lung disease, coronary artery disease, or anemias.

5. FIRE-FIGHTING MEASURES

The following information is available for Ethylene Glycol, the main component of these products.

FLASH POINT, °C (method): 111°C (232°F), Closed Cup
115°C (240°F), Open Cup

AUTOIGNITION TEMPERATURE, °C: 398°C (748 °F)

FLAMMABLE LIMITS (in air by volume, %): Lower (LEL): 3.2%
Upper (UEL): 15.3%

The following information is available for these products.

FIRE EXTINGUISHING MATERIALS:

Water Spray: YES (cooling only)

Carbon Dioxide: YES

Foam: YES

Dry Chemical: YES

Other: Any "ABC" Class

Halon: YES

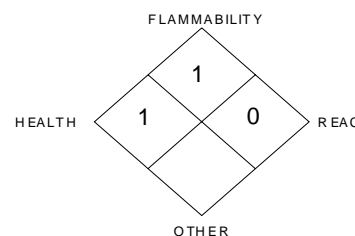
UNUSUAL FIRE AND EXPLOSION HAZARDS: These products must be substantially pre-heated before ignition can occur. When involved in a fire, this material may decompose and produce irritating vapors and toxic gases (e.g., carbon oxides).

Explosion Sensitivity to Mechanical Impact: Not sensitive.

Explosion Sensitivity to Static Discharge: Not sensitive.

SPECIAL FIRE-FIGHTING PROCEDURES: Incipient fire responders should wear eye protection. Structural fire fighters must wear Self-Contained Breathing Apparatus and full protective equipment. Move fire-exposed containers if it can be done without risk to firefighters. If possible, prevent run-off water from entering storm drains, bodies of water, or other environmentally areas. Decontaminate fire-response equipment with soap and water solution if necessary.

NFPA RATING



6. ACCIDENTAL RELEASE MEASURES

SPILL AND LEAK RESPONSE: Uncontrolled releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment should be used. In case of an uncontrolled release, clear the affected area, protect people, and respond with trained personnel.

In the event of a non-incident release (e.g., leaking 55-gallon drum), the minimum Personal Protective Equipment should be **Level C: triple-gloves (rubber gloves and Nitrile gloves, over latex gloves), chemically resistant suit and boots, hard-hat, and air-purifying respirator with an organic vapor cartridge and particulate filter. Level B, which includes a Self-Contained Breathing Apparatus, must be worn when oxygen levels are below 19.5% or unknown.** Absorb spilled liquid with polypads or other suitable absorbent materials. Decontaminate the area thoroughly. If necessary, decontaminate spill response equipment with soap and water solution. Place all spill residues in a suitable container and seal. Dispose of in accordance with Federal, State, and local hazardous waste disposal regulations (see Section 13, Disposal Considerations).

PART III

How can I prevent hazardous situations from occurring?

7. HANDLING and STORAGE

WORK PRACTICES AND HYGIENE PRACTICES: As with all chemicals, avoid getting these products ON YOU or IN YOU. Wash thoroughly after handling these products. Do not eat or drink while handling these materials. Use in a well-ventilated location. Use ventilation and other engineering controls to minimize potential exposure to the aerosol, sprays and vapors of these products. Removed contaminated clothing immediately.

7. HANDLING and STORAGE (Continued)

STORAGE AND HANDLING PRACTICES: All employees who handle this material should be trained to handle it safely. Use in a well-ventilated location. Open drums and other containers of these products slowly, on a stable surface. Drums and other containers of these products should be properly labeled. Empty drums and containers may contain residual amounts of these products, therefore, empty containers should be handled with care. Due to the potential for exposure to Ethylene Glycol vapors, do not cut, weld or solder any empty container, which has contained these products. Move drums of these products carefully, with the appropriate drum-handling equipment.

Store drums and other containers in a cool; dry location, away from direct sunlight, or sources of intense heat. Storage areas should be made of fire-resistant materials. Keep containers away from incompatible chemicals (See Section 10, Stability and Reactivity). Where appropriate, store drums and other containers of these products in diked areas, or in other forms of secondary containment. Keep drums and other containers tightly closed when not in use. Inspect all incoming containers before storage, to ensure containers are properly labeled and not damaged.

NOTE: Sudden release of hot organic chemical vapors or mists from process equipment operating at elevated temperatures and pressures, or sudden ingress of air into vacuum ignition equipment, may result in ignitions without the presence of an obvious ignition source. Published "Autoignition" temperature values cannot be treated as safe operating temperatures in chemical processes without analysis of the actual process conditions. Any use of this product in elevated temperature processes should be thoroughly evaluated to establish and maintain safe-operating conditions.

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: Follow practices indicated in Section 6 (Accidental Release Measures). Make certain application equipment is locked and tagged-out safely, if necessary. Decontaminate equipment using soapy water before maintenance begins.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation to ensure exposure levels are maintained below the limits provided in Section 2 (Composition and Information on Ingredients). General methods include mechanical (local exhaust) ventilation, process or personnel enclosure and control of process conditions. Local exhaust ventilation may be necessary when this material is heated or a mist created. Supply sufficient replacement air to make up for air removed by exhaust system. Prudent practice is to ensure eyewash/safety shower stations are available near areas where this product is used.

RESPIRATORY PROTECTION: None needed for normal circumstances of use. Maintain airborne contaminant concentrations below exposure limits listed in Section 2 (Composition and Information on Ingredients). If respiratory protection is needed, use only protection authorized in 29 CFR 1910.134, or applicable State regulations. Use supplied air respiratory protection if oxygen levels are below 19.5% or are unknown.

EYE PROTECTION: Splash goggles or safety glasses.

HAND PROTECTION: Wear butyl rubber, natural rubber, neoprene, Nitrile rubber, polyethylene, polyvinylchloride, Teflon™, Viton™, or Saranex™ gloves for routine industrial use. Use triple gloves for spill response, as stated in Section 6 (Accidental Release Measures) of this MSDS.

BODY PROTECTION: Use body protection appropriate for task.

PERSONAL PROTECTIVE EQUIPMENT LEVEL: C

9. PHYSICAL and CHEMICAL PROPERTIES

Unless otherwise indicated, the following information is available for Ethylene Glycol, the main component of these products.

RELATIVE VAPOR DENSITY (air = 1): 2.14

SPECIFIC GRAVITY (water = 1): 1.115

SOLUBILITY IN WATER: Soluble.

VAPOR PRESSURE, mm Hg @ 20 °C: 0.06

ODOR THRESHOLD: Various reports: 0.8 ppm; 25 ppm

EVAPORATION RATE (n-BuAc=1): Not available.

FREEZING/MELTING POINT or RANGE: -13°C (9°F) (Product)

BOILING POINT: >197°C (>387°F)

pH: Approximately 8 (Product)

9. PHYSICAL and CHEMICAL PROPERTIES (Continued)

The following information is available for these products.

APPEARANCE AND COLOR: These products are clear, blue, syrupy liquids with a faint, chemical odor. Alternate colors are available, pending customer preferences.

HOW TO DETECT THIS SUBSTANCE (warning properties): The appearance is a distinguishing characteristic of these products.

10. STABILITY and REACTIVITY

STABILITY: Stable.

DECOMPOSITION PRODUCTS: Mainly carbon dioxide and carbon monoxide.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Strong oxidizers, strong acids, or strong bases.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Avoid contact with heat, strong acids, strong alkalies, and strong oxidizing agents.

PART IV

Is there any other useful information about this material?

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA: Additional toxicology information for components greater listed in Section 2 (Composition and Information on Ingredients) in concentration is provided below.

ETHYLENE GLYCOL:

Eye effects-Rat 12 mg/m³/3 days
Skin-Rabbit, adult 555 mg open; Mild irritation
Eye effects-Rabbit, adult 500 mg/24 hours Mild irritation effects
Eye effects-Rabbit, adult 100 mg/1 hours; Mild irritation effects
Eye effects-Rabbit, adult 12 mg/m³/3 days
Eye effects-Rabbit, adult 1440 mg/6 hours
DNA Inhibition-Human: lymphocyte: 320 mmol/L
Mutation in Mammalian Somatic Cells-Mouse: lymphocyte: 100 mmol/L
Oral-Mouse TDLo: 84 g/kg (female 1-21 Days post): Reproductive effects
Oral-Rat TDLo: 8580 mg/kg (female 6-15 Days post): Teratogenic effects
Oral-Child TDLo: 5500 mg/kg: Central nervous system, Pulmonary system, Kidney effects

ETHYLENE GLYCOL (Continued):

Oral-Human LCLO: 786 mg/kg
Oral-Human LCLO: 398 mg/kg: Central nervous system, Gastrointestinal tract effects
Inhalation-Human TCLo: 10,000 mg/m³
Unreported-Man LCLO: 1637 mg/kg
Oral-Rat LD₅₀: 4700 mg/kg
Intraperitoneal-Rat LD₅₀: 5010 mg/kg
Subcutaneous-Rat LD₅₀: 2800 mg/kg
Intravenous-Rat LD₅₀: 3260 mg/kg
Intramuscular-Rat LCLO: 3300 mg/kg
Oral-Mouse LD₅₀: 7500 mg/kg
Intraperitoneal-Mouse LD₅₀: 5614 mg/kg
Subcutaneous-Mouse LCLO: 2700 mg/kg

SUSPECTED CANCER AGENT: The ingredients of these products are not listed on the following lists: FEDERAL OSHA Z LIST, NTP, IARC or CAL/OSHA, and therefore are not considered to be, nor suspected to be, cancer-causing agents by these agencies. Ethylene Glycol, the main component of these products, is listed, as follows: ACGIH-A4 (Not Classifiable as a Human Carcinogen).

IRRITANCY OF PRODUCT: These products may cause irritation to contaminated tissues.

SENSITIZATION TO THE PRODUCT: Two cases of sensitization to Ethylene Glycol (the main component of these products) have been reported in people occupationally exposed to this substance in the polishing and cutting of glass lenses; however, Ethylene is not currently classified as a known skin or respiratory sensitizer.

REPRODUCTIVE TOXICITY INFORMATION: Listed below is information concerning the effects of these products and their components on the human reproductive system.

11. TOXICOLOGICAL INFORMATION (Continued)

Mutagenicity: The components of these products are not reported to cause mutagenic effects in humans: The following information is for Ethylene Glycol, the main component of these products: Ethylene Glycol was not mutagenic to bacteria, but was mutagenic in studies with isolated mammalian cells. Ethylene Glycol did not cause an increase in dominant lethal mutations in offspring of male rats fed 1000 mg/kg/day for approximately 14 weeks prior to mating.

Embryotoxicity: These products are not reported to produce embryotoxic effects in humans. The following information is for Ethylene Glycol, the main component of these products: Embryotoxicity (for example, decreased birth weight and survival) was observed in offspring of mice given 1% Ethylene Glycol in their drinking water over 14 weeks, but not in offspring of rats fed 1000 mg/kg/day, over 3 generations. Parental toxicity was not significant in these studies. Embryotoxicity was seen when mice were fed Ethylene Glycol in doses of 750-3000 mg/kg/day for several days during pregnancy. In a similar study with rats, embryotoxicity was seen at doses of 2500-5000 mg/kg/day but not at 1250 mg/kg/day. Maternal toxicity was not significant in these studies. Birth weight and length were decreased in offspring of rats fed 1078 or 1595 mg/kg/day for 10 days during pregnancy.

Teratogenicity: These products are not reported to cause teratogenic effects in humans. The following information is for Ethylene Glycol, the main component of these products: Malformations were seen in offspring of mice fed Ethylene glycol in doses of 750-3000 mg/kg/day and rats fed 1250-5000 mg/kg/day for several days during pregnancy. Maternal toxicity was not significant in these studies. Malformations were not seen in offspring of rats fed up to 1000 mg/kg/day for several days during pregnancy. In another study, rats were fed 253-1595 mg/kg/day for 10 days during pregnancy. Doses of 1078 and 1595 mg/kg were teratogenic (e.g., fissure in wall of abdomen, brain located outside the skull, harelip, rib malformations).

Reproductive Toxicity: These products are not reported to cause reproductive effects in humans. The following information is for Ethylene Glycol, the main component of these products: No effects on fertility were observed when male and female rats were fed up to 1000 mg/kg/day over 3 generations.

*A **mutagen** is a chemical, which causes permanent changes to genetic material (DNA) such that the changes will propagate through generational lines. An **embryotoxin** is a chemical, which causes damage to a developing embryo (i.e. within the first eight weeks of pregnancy in humans), but the damage does not propagate across generational lines. A **teratogen** is a chemical, which causes damage to a developing fetus, but the damage does not propagate across generational lines. A **reproductive toxin** is any substance, which interferes in any way with the reproductive process.*

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Depending on the duration of contact and the route of over-exposure, the following medical conditions may be aggravated: skin, eye, kidney, and respiratory disorders.

RECOMMENDATIONS TO PHYSICIANS: The following recommendations are pertinent to ingestion exposures: These products contain Ethylene Glycol. Ethanol decreases the metabolism of Ethylene Glycol and its metabolites. Ethanol should be administered as soon as possible in cases of severe poisoning, since the elimination half-life of Ethylene Glycol is three hours. If medical care will be delayed several hours, give the patient three or four 1-ounce oral "shots" of 86-proof or higher whiskey before or during transport to the hospital. Hemodialysis effectively removes Ethylene Glycol and its metabolites from the body. The following treatment protocol is from "The Toxicology of Commercial Chemical Products" (5th Edition, 1984):

- Gastric lavage with water; syrup of ipecac may be a safe way to empty the stomach if promptly given after ingestion.
- Supportive measures against central nervous system depression, including the administration of oxygen and artificial respiration, if needed.
- Because convulsions have been described during the comatose state, analeptic drugs should probably be avoided. If convulsions become intense and persistent, the intravenous administration of diazepam or a short-acting barbiturate drug may become necessary.
- Try to distinguish between convulsive seizures and muscle spasms due to hypocalcemia. If in doubt, parenteral calcium therapy is recommended.
- If hypotension becomes severe, vasoconstrictor drugs may be required to support the blood pressure, but avoid infusing large volumes of fluid.
- Early in the course of intoxication, it is recommended that a brisk flow of urine be established to promote the excretion of Ethylene Glycol and its metabolites. Both mannitol and furosemide have been used, even in the early oliguric phase.

BIOLOGICAL EXPOSURE INDICES: Currently, there are no Biological Indices (BEIs) associated with the components of these products.

12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

ENVIRONMENTAL STABILITY: The components of these products will be degraded over time into other inorganic and organic compounds. The following information is available for the components of these products:

ETHYLENE GLYCOL: The bioconcentration factor of Ethylene Glycol in fish was reported to be 10 after 3 days of exposure; this suggests that it will not bioconcentrate in fish. Biological Oxygen Demand = 0.47 g oxygen/ g ethylene glycol; Chemical Oxygen Demand = 1.29 g oxygen/ g ethylene glycol.

EFFECT OF MATERIAL ON PLANTS or ANIMALS: These products may be harmful to contaminated plant and animal life (especially if large quantities are released). Refer to Section 11 (Toxicological Information) for specific information regarding effects of the product's components on test animals.

EFFECT OF CHEMICAL ON AQUATIC LIFE: These products may be harmful to aquatic life if large quantities are released into bodies of water. The following aquatic toxicity data are available for the components of these products.

ETHYLENE GLYCOL:

LD₅₀ (*Carassius auratus*, goldfish) = 5000 mg/L/ 24 hours modified ASTM D 1345

LC₅₀ (*Poecilia reticulata*, guppies) = 49300 ppm/ 7 days

LC₅₀ (rainbow trout) = 18,500 mg/L/ 96 hours

LC₅₀ (rainbow trout) = 41000 mg/L/ 96 hours/ 20EC

LC₅₀ (*Crangon crangon*, brown shrimp) = 100 mg/L/ 48 hours/ aerated salt water

LC₅₀ (*Carassius auratus*, goldfish) = 5000 mg/L/ 24 hours/ 20EC/ static conditions

Toxicity threshold, cell multiplication test (*Pseudomonas putida*, bacteria) = 10,000 mg/L

ETHYLENE GLYCOL (Continued):

Toxicity threshold, cell multiplication test (*Entosiphon sulcatum*, protozoan) = 10,000 mg/L

Toxicity threshold, cell multiplication test (*Uronema parduzi* Chatton-Lwoff, protozoan) = 10,000 mg/L

Toxicity threshold, cell multiplication test (*Chorella pyrenoidasa*, algae) = 180,000 mg/L; toxic

Toxicity threshold, cell multiplication test (*Microcystis aeruginosa*, algae) = 2,000 mg/L

Toxicity threshold, cell multiplication test (*Scenedesmus quadricauda*, green algae) = 10,000 mg/L

13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate Federal, State, and local regulations. These products, if unaltered by use, may be disposed of by treatment at a permitted facility or as advised by your local hazardous waste regulatory authority.

EPA WASTE NUMBER: Not applicable to wastes consisting only to wastes of these products.

14. TRANSPORTATION INFORMATION

THIS MATERIAL IS NOT HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION.

PROPER SHIPPING NAME:

Ethylene Glycol

HAZARD CLASS NUMBER and DESCRIPTION:

N.O.S. (Ethylene Glycol), 9, NA 3082, PG III

UN IDENTIFICATION NUMBER:

NA3082

PACKING GROUP:

III

DOT LABEL (S) REQUIRED:

Other Regulated Substances, 9

NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (1996): 171

MARINE POLLUTANT: No components of these products are classified as a Marine Pollutant, as per Appendix B to 49 CFR 172.101.

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: THIS MATERIAL IS NOT CONSIDERED AS DANGEROUS GOODS.

15. REGULATORY INFORMATION

SARA REPORTING REQUIREMENTS: The components of these products are subject to the reporting requirements of Sections 302, 304 and 313 of Title III of the Superfund Amendments and Reauthorization Act, as follows.

| COMPOUND | SECTION 302 | SECTION 304 | SECTION 313 |
|-----------------|-------------|-------------|-------------|
| ETHYLENE GLYCOL | NO | YES | YES |

SARA THRESHOLD PLANNING QUANTITY: Not applicable.

TSCA INVENTORY STATUS: The components of these products are listed on the TSCA Inventory.

CERCLA REPORTABLE QUANTITY (RQ): Ethylene Glycol is a Clean Air Act Section 112(b) Hazardous Air Pollutant; it has a 1 pound Reportable Quantity until this value is adjusted.

OTHER FEDERAL REGULATIONS: Not applicable.

STATE REGULATORY INFORMATION: Components of these products are covered under specific State regulations, as denoted below:

Alaska - Designated Toxic and Hazardous

Substance: Ethylene Glycol

California - Permissible Exposure Limits for

Chemical Contaminants: Ethylene Glycol

Florida – Substance List: Ethylene Glycol

Illinois – Toxic Substance List: Ethylene Glycol

Kansas – Section 302/313 List: Ethylene Glycol

Massachusetts – Substance List: Ethylene Glycol

Michigan – Critical Materials Register: NO

Minnesota – List of Hazardous Substances: Ethylene Glycol

Missouri – Employer Information/Toxic

Substance List: Ethylene Glycol

New Jersey – Right to know Hazardous

Substance List: Ethylene Glycol

North Dakota – List of Hazardous Chemicals,

Reportable Quantities: NO

Pennsylvania – Hazardous Substance List: Ethylene Glycol

Rhode Island – Hazardous Substance List: NO

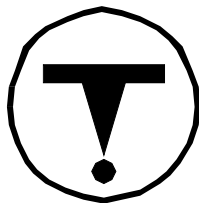
West Virginia – Hazardous Substance List: NO

Wisconsin – Toxic and Hazardous Substances: NO

CALIFORNIA PROPOSITION 65: 1,4-Dioxane, Ethylene Oxide, Acetaldehyde, and Toluene are on the California Proposition 65 lists. The products contain these chemicals in trace amounts (well below 0.1% in concentration). **WARNING:** These products contain chemicals known to the State of California to cause cancer, birth defects, and other reproductive harm.

LABELING (Precautionary Statements): **CAUTION!** MAY CAUSE SKIN AND EYE IRRITATION. HARMFUL OR FATAL IF SWALLOWED. CAN CAUSE CENTRAL NERVOUS SYSTEM AND KIDNEY EFFECTS. MAY CAUSE REPRODUCTIVE EFFECTS, BASED ON ANIMAL TESTS. Avoid breathing vapors, mists or sprays. Do not taste or swallow. Avoid prolonged contact with skin. Do not get on skin or in eyes. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling. Wear gloves, safety goggles, and appropriate body protection when using this product. **FIRST AID:** In case of contact, immediately flush skin or eyes for at least 15 minutes. If inhaled, move to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If swallowed, do not induce vomiting. If medical care will be delayed several hours, give the patient three or four 1-ounce oral "shots" of 86-proof or higher whiskey before or during transport to the hospital. Get medical attention. **IN CASE OF FIRE:** Use water fog, foam, and dry chemical of CO₂. **IN CASE OF SPILL:** Absorb with inert material and place in suitable container. Flush area with soapy water. Refer to MSDS for additional information.

WHMIS SYMBOLS: **D2A/D2B:** Materials Causing Other Toxic Effects



16. OTHER INFORMATION

PREPARED BY:

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Date of Printing:

January 7, 2008

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| The information contained herein is based on data considered accurate. However, no warranty is expressed or implied regarding the accuracy of these data or the results to be obtained from the use thereof. Dynalene Heat Transfer Fluid assumes no responsibility for injury to the vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, Dynalene Heat Transfer Fluid assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in his use of the material. |
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DEFINITIONS OF TERMS

A large number of abbreviations and acronyms appear on a MSDS. Some of these, which are commonly used, include the following:

CAS #: This is the Chemical Abstract Service Number which uniquely identifies each constituent. It is used for computer-related searching.

EXPOSURE LIMITS IN AIR

ACGIH - American Conference of Governmental Industrial Hygienists, a professional association which establishes exposure limits.

TLV - Threshold Limit Value - an airborne concentration of a substance, which represents conditions under which it is generally believed that nearly all workers, may be repeatedly exposed without adverse effect. The duration must be considered, including the 8-hour **Time Weighted Average (TWA)**, the 15-minute **Short Term Exposure Limit**, and the instantaneous **Ceiling Level**. Skin adsorption effects must also be considered.

OSHA - U.S. Occupational Safety and Health Administration.

PEL - Permissible Exposure Limit - this exposure value means exactly the same as a TLV, except that it is enforceable by OSHA. The OSHA Permissible Exposure Limits are based in the 1989 PELs and the June, 1993 Air Contaminants Rule (Federal Register: 58: 35338-35351 and 58: 40191). Both the current PELs and the vacated PELs are indicated. The phrase, "Vacated 1989 PEL", is placed next to the PEL which was vacated by Court Order.

IDLH - Immediately Dangerous to Life and Health - This level represents a concentration from which one can escape within 30-minutes without suffering escape-preventing or permanent injury. **The**

DFG - MAK is the Republic of Germany's Maximum Exposure Level, similar to the U.S. PEL. **NIOSH** is the National Institute of Occupational Safety and Health, which is the research arm of the U.S. Occupational Safety and Health Administration (**OSHA**). NIOSH issue exposure guidelines called **Recommended Exposure Levels (RELs)**. When no exposure guidelines are established, an entry of **NE** is made for reference.

FLAMMABILITY LIMITS IN AIR

Much of the information related to fire and explosion is derived from the **National Fire Protection Association (NFPA)**. **LEL** - the lowest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source. **UEL** - the highest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source.

TOXICOLOGICAL INFORMATION

Possible health hazards as derived from human data, animal studies, or from the results of studies with similar compounds is presented. Definitions of some terms used in this section are: **LD₅₀** - Lethal Dose (solids & liquids) which kills 50% of the exposed animals; **LC₅₀** - Lethal Concentration (gases) which kills 50% of the exposed animals; **ppm** concentration expressed in parts of material per million parts of air or water; **mg/m³** concentration expressed in weight of substance per volume of air; **mg/kg** quantity of material, by weight, administered to a test subject, based on their body weight in kg. Data from several sources are used to evaluate the cancer-causing potential of the material. The sources are: **IARC** - the International Agency for Research on Cancer; **NTP** - the National Toxicology Program, **RTECS** - the Registry of Toxic Effects of Chemical Substances, **OSHA** and **CAL/OSHA**. IARC and NTP rate chemicals on a scale of decreasing potential to cause human cancer with rankings from 1 to 4. Subrankings (2A, 2B, etc.) are also used. Other measures of toxicity include **TDLo**, the lowest dose to cause a symptom and **TCLo** the lowest concentration to cause a symptom; **TDo**, **LCLO**, and **LDo**, or **TC**, **TCo**, **LCLo**, and **LCo**, the lowest dose (or concentration) to cause death. **BEI** - Biological Exposure Indices, represent the levels of determinants which are most likely to be observed in specimens collected from a healthy worker who has been exposed to chemicals to the same extent as a worker with inhalation exposure to the TLV.

REGULATORY INFORMATION

This section explains the impact of various laws and regulations on the material. **EPA** is the U.S. Environmental Protection Agency. **WHMIS** is the Canadian Workplace Hazardous Materials Information System. **DOT** and **TC** are the U.S. Department of Transportation and Transport Canada, respectively. The following laws are pertinent to the information presented in the MSDS: **Superfund Amendments and Reauthorization Act (SARA)**; the **Toxic Substance Control Act (TSCA)**; Marine Pollutant status according to the **DOT**; California's Safe Drinking Water Act (**Proposition 65**); the **Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund)**. This section also includes information on the precautionary warnings, which appear, on the material's package label.