

Diethylene Glycol
Product Guide

MEGlobal



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INTRODUCTION

Precautions

Carefully review our current Material Safety Data Sheets.

About MEGlobal

MEGlobal™ is a world leader in the manufacture and marketing of merchant monoethylene glycol (MEG) and diethylene glycol (DEG), collectively known as EG. Established in July 2004, the company is a joint venture between The Dow Chemical Company and Petrochemical Industries Company of Kuwait and is headquartered in London, England. MEGlobal produces about 1.0 million metric tons per year of EG, and markets in excess of 2.5 million metric tons of EG per year. With approximately 200 employees worldwide, MEGlobal serves customers around the world.

MEGlobal is committed to being the preferred and low-cost supplier of MEG and DEG for customers worldwide.

Doing Business With Us

In addition to our corporate offices in London, England, and our production facilities, we operate commercial service locations in the Hong Kong, Switzerland and US. Our knowledgeable, local professionals are native to the regions they work in, so they speak your language, know your culture, and understand your needs.

World-class technical service and support are available through our highly trained sales representatives.

Service

For solutions to problems or answers to questions, take advantage of MEGlobal's technical service and support, available through our trained sales representatives. Your order of diethylene glycol will be processed expertly and quickly when you place a call to one of our many helpful customer service representatives (see page 29)

Products and Applications

MEGlobal's advanced manufacturing process is based on more than 70 years of experience, and is characterized by seamless integration, catalyst efficiency, and local access to feedstock. With our total approach to continuous

improvement in Quality and Quality Systems, we fully meet the stringent ISO 9001 series of standards, allowing us to deliver the high-quality products you require.

Optimum performance demands a quality product, and that is what we deliver. Our vast distribution system of plants, terminals, tankers, barges, tankcars, and trucks helps to ensure delivery of ethylene glycol and diethylene glycol when and where you need it.

Our MEG can be used for applications that require chemical intermediates for resins, solvent couplers, freezing point depression, solvents, humectants, and chemical intermediates. These applications are vital to the manufacture of a wide range of products, including resins; deicing fluids; heat transfer fluids; automotive antifreeze and coolants; water-based adhesives, latex paints, and asphalt emulsions; electrolytic capacitors; textile fibers; paper; and leather.

The characteristics of our DEG products supplement our MEG portfolio, augmenting our capabilities to include applications that require hygroscopicity, lubricants, and low volatility. Products that capitalize on these and other DEG properties include plasticizers; glass- and cement-grinding aids; printing ink; drywall joint compound; thermoplastic polyurethanes; and emulsifiers.

For more information on our MEG Products, please refer to our MEGlobal Ethylene Glycol Product Guide.



Diethylene Glycol – The Versatile Performer

Diethylene Glycol:

$\text{HOCH}_2\text{CH}_2\text{OCH}_2\text{CH}_2\text{OH}$

CAS Registry Number:

111-46-6

Synonyms:

DEG

Dihydroxyethyl ether

2,2'-Dihydroxyethyl ether

Glycol ethyl ether

Diglycol

Ethylene diglycol

3-Oxapentane-1,5-diol

2,2' -Oxydiethanol

Bis(beta-hydroxyethyl)ether

Bis(2-hydroxyethyl)ether

2-(2-hydroxyethoxy)ethanol

3-Oxapentamethylene-1,5-diol

Diethylene glycol is a colorless, low-volatility, low-viscosity, hygroscopic liquid. Under normal conditions, diethylene glycol has no detectable odor; however, under high vapor concentrations, a slightly sweet odor may be detected. It is completely miscible with water and many organic liquids.

The hydroxyl groups on glycols undergo alcohol chemistry, thus providing opportunities for production of a wide variety of derivatives. Hydroxyls can be converted to aldehydes, alkyl halides, amines, azides, carboxylic acids, ethers, mercaptans, nitrate esters, nitriles, nitrite esters, organic esters, peroxides, phosphate esters and sulfate esters.

Because of its higher molecular weight, diethylene glycol is considerably less volatile than ethylene glycol and differs sufficiently in that it has specialized uses. The reactivity and solubility of diethylene glycol provide the basis for many applications. The end uses for diethylene glycol are numerous (see Table 1.)

Table 1: Applications

Properties/Characteristics	Applications/Uses
Hygroscopicity	<ul style="list-style-type: none"> • Gas dehydration • Plasticizer for paper, composition cork, glues, adhesives, bookbinding and coatings
Lubricant	<ul style="list-style-type: none"> • Glass-grinding aids • Fiber-finish component • Cement-grinding aids • Mold release agent
Solvent Coupler	<ul style="list-style-type: none"> • Stabilizer for soluble oil dispersions • Compatibilizer for dye and printing ink components
Solvent	<ul style="list-style-type: none"> • Aromatic and paraffinic hydrocarbon separations • Printing ink/paint pigments/dyes
Low Volatility	<ul style="list-style-type: none"> • Binder for foundry sand-molding
Freezing Point Depression	<ul style="list-style-type: none"> • Latex paint antifreeze • Antifreeze • Deicing fluids • Heat transfer fluids • Drywall joint compound • Belt wetting agent
Chemical Intermediate	<ul style="list-style-type: none"> • Unsaturated polyester resin • Plasticizer intermediate for nitrocellulose lacquers, enamels and adhesives • Polyester polyols for urethane foam • Thermoplastic polyurethanes • Emulsifiers • Lubricants • Morpholine

Responsible Care

MEGlobal embraces and advocates Responsible Care®, a voluntary industry-wide commitment to safely handle our chemicals from inception in the laboratory to ultimate disposal. We take this commitment very seriously since it focuses on continuous improvement in not only employee health and safety, but also a cleaner environment for our employees, customers, and the public.

Additionally, our Environmental, Health and Safety policies require, as a minimum, full compliance with all applicable laws and regulations.

Our employees are held to a rigid set of health and safety requirements. They are expected to commit to employee health and safety (EH&S) as MEGlobal's number-one priority; to work to achieve zero personal-safety incidents and leak-free facilities; and to proactively identify and resolve EH&S issues. This kind of serious accountability helps us ensure the highest possible level of EH&S throughout the company.

MEGlobal products are easy to store and handle. Of course we provide current Material Safety Data Sheets that contain complete safety information for all of our products, but we also supply vital health, safety and environmental information through presentations, literature, and access to a wide variety of other reference materials and information resources to give our customers the comprehensive knowledge they need to concentrate on process safety, emergency response and other areas vital to their health and safety and to the environment.

Our Product Stewardship philosophy gives us a means to assess information on the potential health and environmental impacts of our products, helping us to take whatever steps are necessary to protect our employees, customers, the public and the environment.



Responsible Care® is a registered trademark of the Canadian Chemical Producers' Association

Non-supported Applications of MEGlobal Diethylene Glycol Products

The following list identifies end-use applications that are NOT supported by MEGlobal for ethylene glycol products, monoethylene glycol (MEG) and diethylene glycol (DEG) marketed by MEGlobal (“MEGlobal Ethylene Glycol Products”). These limitations include applications in which the use of MEGlobal Ethylene Glycol Products is restricted by law, applications in which the use of MEGlobal Ethylene Glycol Products may raise unacceptable risks, and other applications which MEGlobal has decided not to pursue for business reasons, including minimizing unnecessary risk and liabilities to the company. MEGlobal does not knowingly market MEGlobal Ethylene Glycol Products into these non-supported applications, requests its distributors to refuse sales of MEGlobal Ethylene Glycol Products into these non-supported applications, and alerts its customers about the special risks associated with some of these non-supported applications. The following list of applications not supported by MEGlobal does not imply any MEGlobal warranty or MEGlobal support of uses in applications not covered by this list. This list is not all-inclusive, and MEGlobal reserves the right to modify the same at any time.

- The use of MEGlobal Ethylene Glycol Products (MEG, DEG) in the production of tobacco and in the manufacture of tobacco products (including but not limited to additives, humectants, filters, inks, and paper) is not supported by MEGlobal.
- The use of MEGlobal Ethylene Glycol Products (MEG, DEG) for the generation of artificial smoke/theatrical fogs/mist is not supported by MEGlobal. This includes applications such as artificial/e-cigarettes.
- The use of MEGlobal Ethylene Glycol Products (MEG, DEG) as ingredient in fuel for warming foods (Sterno™-like application) or in fuel for heating an enclosed space where human exposure is possible is not supported by MEGlobal.
- The use of MEGlobal Ethylene Glycol Products (MEG, DEG) in fire extinguishing sprinkler systems is not supported by MEGlobal.
- The use of MEGlobal Ethylene Glycol Products (MEG, DEG) in the manufacture of munitions is not supported by MEGlobal.
- The use of MEGlobal Ethylene Glycol Products (MEG, DEG) in the production of deicers for use on roadways, sidewalks and in aircraft lavatories is not supported by MEGlobal.
- The use of MEGlobal Ethylene Glycol Products (MEG, DEG) as a component of heat transfer fluids in systems where the heat transfer fluids could infiltrate (i.e., via an exchanger leak, backflow prevention failure, or other means) a potable water system is not supported by MEGlobal.
- The use of MEGlobal Ethylene Glycol Products (MEG, DEG) as a non-reacted component in a formulation for direct internal or external human /animal contact, including but not limited to ingestion, inhalation, and skin contact and in medical / veterinary devices and medical / veterinary applications is not supported by MEGlobal. (Examples of some such applications are uses as a direct component in foods, beverages, pharmaceuticals, cosmetics, or personal care products).
- The use of MEGlobal Ethylene Glycol Products (MEG, DEG) for consumer or hospital usage for deodorizing or air “purifying” purposes by spraying as an aerosol is not supported by MEGlobal.

- The use of MEGlobal Ethylene Glycol Products (MEG, DEG) as a non-reacted component in adhesives, plasticizers, and softening agents for packaging that has direct contact with food or beverage is not supported by MEGlobal.
- The use of MEGlobal Ethylene Glycol Products (MEG, DEG) as a non-reacted component in the formulation of glues, pastes, ice/heat packs or other items where the potential for significant human contact and/or ingestion exists (including but not limited to children’s school glue/paste or arts/craft glue/paste) is not supported by MEGlobal.
- The use of MEGlobal Ethylene Glycol Products (MEG, DEG) as a fluid for pressure testing piping is not supported by MEGlobal.
- The use of MEGlobal Ethylene Glycol Products (MEG, DEG) as a non-reacted component in the production of freezer gel packs used in lunch boxes, thermal food carriers or other related applications which allows for the possibility glycol to be exposed to food products or available for ingestion is not supported by MEGlobal.
- The use of MEGlobal Ethylene Glycol Products (MEG and DEG) for use in the treatment of wood rot and fungus in marine applications is not supported by MEGlobal.

To enter into new applications beyond the traditional standard industrial use applications supported by MEGlobal, contact your MEGlobal representative to review the specific application. MEGlobal has a risk assessment process whereby the application will be reviewed and a determination will be made as to whether the application meets MEGlobal’s requirements and can therefore be supported by MEGlobal. Because use conditions and applicable laws may differ from one location to another and may change with time, when an application is supported by MEGlobal, MEGlobal does not warrant and is not responsible for the use in such applications.

NO WARRANTIES ARE GIVEN; ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND ALL OTHER EXPRESS OR IMPLIED REPRESENTATIONS AND WARRANTIES PROVIDED BY STATUTE OR COMMON LAW ARE EXPRESSLY EXCLUDED.

Further, any violation of or failure to comply with the information contained in MEGlobal’s Material Safety Data Sheet, Product Label, Product Information Guide, product literature or other product safety information is a misuse of MEGlobal Ethylene Glycol Products. These documents can be obtained by contacting your MEGlobal representative or MEGlobal’s Customer Information Group.

MEGlobal can not specify all circumstances in which MEGlobal Ethylene Glycol Products may be used in applications not supported by MEGlobal. Accordingly, you are strongly encouraged to immediately contact the MEGlobal Customer Information Group if you become aware that MEGlobal Ethylene Glycol Products may be or have been used in any such non-supported application.

PROPERTIES

Table 2: Physical Properties of Diethylene Glycol

	Scientific	Common
Autoignition Temperature	229°C @ 1013.25 hPa	444°F @ 760mm Hg
Critical Pressure	4,605 kPa	34,540.3 mm Hg
Critical Specific Volume	0.312 L/gmol	5.00 ft ³ /lbmol
Critical Temperature	406.85°C	764.33°F
Dielectric Constant	31.69	31.69
Electrical Conductivity at 20°C	0.42 x 10 ⁻⁶ mhos/cm	0.0042 micromhos/cm
Evaporation Rate (Butyl Acetate = 1)	<0.001	<0.001
Flammable Limits in Air, Upper	12.3%(V)	12.3%(V)
Flammable Limits in Air, Lower	2.0%(V)	2.0%(V)
Flash Point, Closed Cup	138°C @ 1013.25 hPa	280°F @ 760 mm Hg
Heat of Combustion at 25°C	-2,154.82 kJ/gmol	-8,730.4 Btu/lb
Heat of Vaporization at 1 atm	57.9 kJ/gmol	234.4 Btu/lb
Molecular Weight	106.12 g/mol	106.12 g/mol
Normal Boiling Point	244.9°C @ 1013.25 hPa	473°F @ 760 mm Hg
BP/ P (750 to 770 mm Hg)	0.052°C/mm Hg	
Normal Freezing Point	-6.5°C	20.3°F
Onset of Initial Decomposition	240°C	464°F
Refractive Index, n _D , at 20°C	1.4472	1.4472
Solubility in Water at 20°C	100.0 wt%	100.0 wt%
Solubility of Water in Diethylene Glycol at 20°C	100.0 wt%	100.0 wt%
Specific Gravity (20/20°C)	1.1182	1.1182
Specific Gravity/ T(10 to 40°C)	0.00073/°C	0.00073/°C
Surface Tension at 25°C	44.8 mN/m	44.8 dynes/cm
Vapor Density (air = 1)	3.65	3.65
Vapor Pressure at 25°C	0.008 hPa	0.006 mm Hg
Dynamic Viscosity at 20°C	35.7 mPa s	35.7 cP

Note: These properties are laboratory results on pure compounds or typical of the product, but should not be confused with, or regarded as, specifications.

Table 3: Solubilities of Various Materials in Diethylene Glycol*
Solubility, g/100 mL of Diethylene Glycol at 25°C

Acetone	Completely Soluble	Lard Oil	Insoluble
Animal Glue (Dry)	Very Slightly Soluble	Linseed Oil	Insoluble
Benzene	45.5	Methanol	Completely Soluble
Carbon Tetrachloride	35.5	Methyl Orange	4.2
Castor Oil	0.1	Monoethanolamine	Miscible
Cellulose Acetate	Insoluble	Nitrocellulose	Soluble
Chlorobenzene	112.0	Olive Oil	Insoluble
Coconut Oil	Insoluble	o-Dichlorobenzene	93.6
Cottonseed Oil	Insoluble	Paraffin Oil	Insoluble
Dextrin (10% water)	Miscible	Perchloroethylene	12.0
Dextrin	Slightly Soluble	Phenol	Miscible
Dibutyl Phthalate	11.8	Pine Oil	Miscible
Dichloroethyl Ether	Soluble	Rosin	<2.0
Diethanolamine	Miscible	Shellac	Very Slightly Soluble
Ethyl Ether	19.5	Soya Bean Oil	Insoluble
Ethylene Glycol Distearate	Very Slightly Soluble	Sperm Oil	Insoluble
Gum Damar	Slightly Soluble	Tall Oil	3.1
Heptane	0.03	Toluene	20.7
Hydrogen Chloride at 60°C	27.83	Tung Oil	Insoluble
Hydrous Wool Fat	Slightly Soluble	Turkey Red Oil	6.3
Kauri Gum	Slightly Soluble	Urea	24.0

* Some data reprinted by permission from *Glycols*, copyright 1952, by Reinhold Publishing Corporation, New York City

Table 4: Diethylene Glycol Compatibility with Elastomeric Materials

Material	Temperature		
	25°C (77°F)	80°C (176°F)	160°C (320°F)
Adiprene™ L-100	Good	Poor	Poor
Black Rubber 3773	Good	Poor	Poor
Buna N (or Buna 25)	Good	Good	
Buna S	Good	Fair	Poor
Butyl Rubber	Good	Good	
Compressed Asbestos	Good	Good	Fair
EPDM	Good	Good	Good
EPR Rubber	Good	Good	Good
Hycar™ D-24	Good	Fair	
Hypalon™	Good	Poor	Poor
Kalrez™	Good	Good	Good
Natural Rubber Gum	Good	Poor	Poor
Neoprene 7797	Good	Fair	
Red Rubber Number 107	Good	Poor	Poor
Saraloy™ 300	Good	Poor	Poor
Silicone No. 65	Good	Good	
Thiokol™ 3060	Good	Poor	Poor
Viton™ A	Good	Good	Poor

Table 5: Constant Boiling Mixtures

Components			Azeotrope					
	Specific Gravity at 20/20°C	Boiling Point at 760 mm Hg, °C	Boiling Point at 760 mm Hg, °C	Composition, % by Wt at 20°C			Relative Volume of Layers at 20°C, %	Specific Gravity at 20/20°C of Azeotrope or Layers
Diethylene Glycol	1.1184	244.8	None					
Benzene	0.8804	80.1						
Diethylene Glycol (5 mm Hg)	1.1184	116.4 ^(a)	Azeo ^(a)	40	3	84	U 55	
Benzyl Ether				60	97	16	L 45	
Diethylene Glycol (10 mm Hg)	1.1184	129 ^(a)	None					
Butyl CARBITOL™ Solvent	0.9536	109 ^(a)						
Diethylene Glycol	1.1184	244.8	None					
CARBITOL™ Solvent	0.9898	202.8						
Diethylene Glycol (2 mm Hg)	1.1184	102 ^(a)	87 ^(a)	43				Homo
Ethoxytriglycol	1.0208	98 ^(a)		57				
Diethylene Glycol (10 mm Hg)	1.1184	129 ^(a)	114 ^(a)				U 70	Heter
2-Ethylhexyl Ether	0.8121	135 ^(a)		(C)	(C)	(C)	L 30	
Diethylene Glycol (50 mm Hg)	1.1184	163 ^(a)	129.9 ^(a)	15.5	0.2	99.6	U 89.0	U 0.795
Hexyl Ether	0.7942	137 ^(a)		84.5	99.8	0.4	L 11.0	L 1.117
Diethylene Glycol	1.1184	244.8	None					
Methyl CARBITOL™ Solvent	1.0211	193.6						
Diethylene Glycol (4 mm Hg)	1.1184	113 ^(a)	Azeo ^(a)	23	1	80	U 72	
Phenyl Ether	1.0677 ^(b)	100 ^(a)		77	99	20	L 28	
Diethylene Glycol (3 mm Hg)	1.1184	108 ^(a)	None ^(a)					
Triethylene Glycol	1.1255	135.3 ^(a)						
Diethylene Glycol	1.1184	244.8	None	30.0				
Water	1.0000	100		70.0				
Diethylene Glycol (10 mm Hg)	1.1184	129 ^(a)	None ^(a)					
Water	1.0000	11 ^(a)						

(a) At the pressure investigated;

(b) At 30/20°C;

(c) Data not available.

Figure 1: Freezing Points of Aqueous Diethylene Glycol Solutions

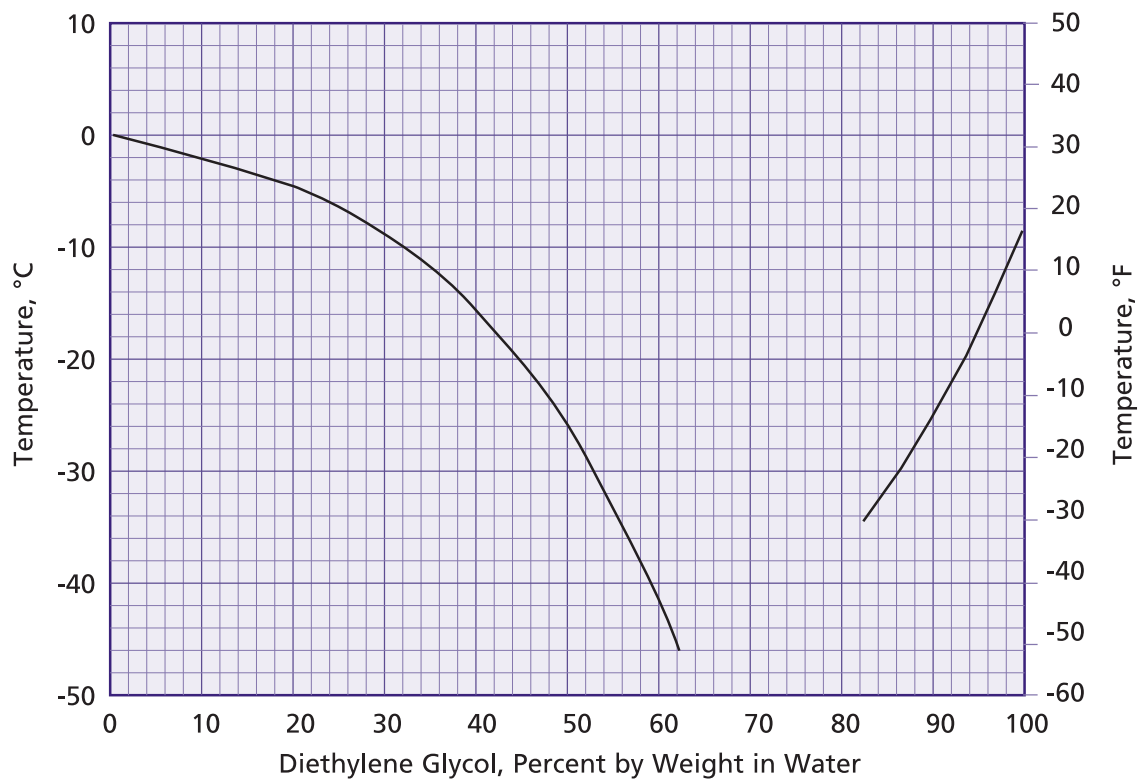
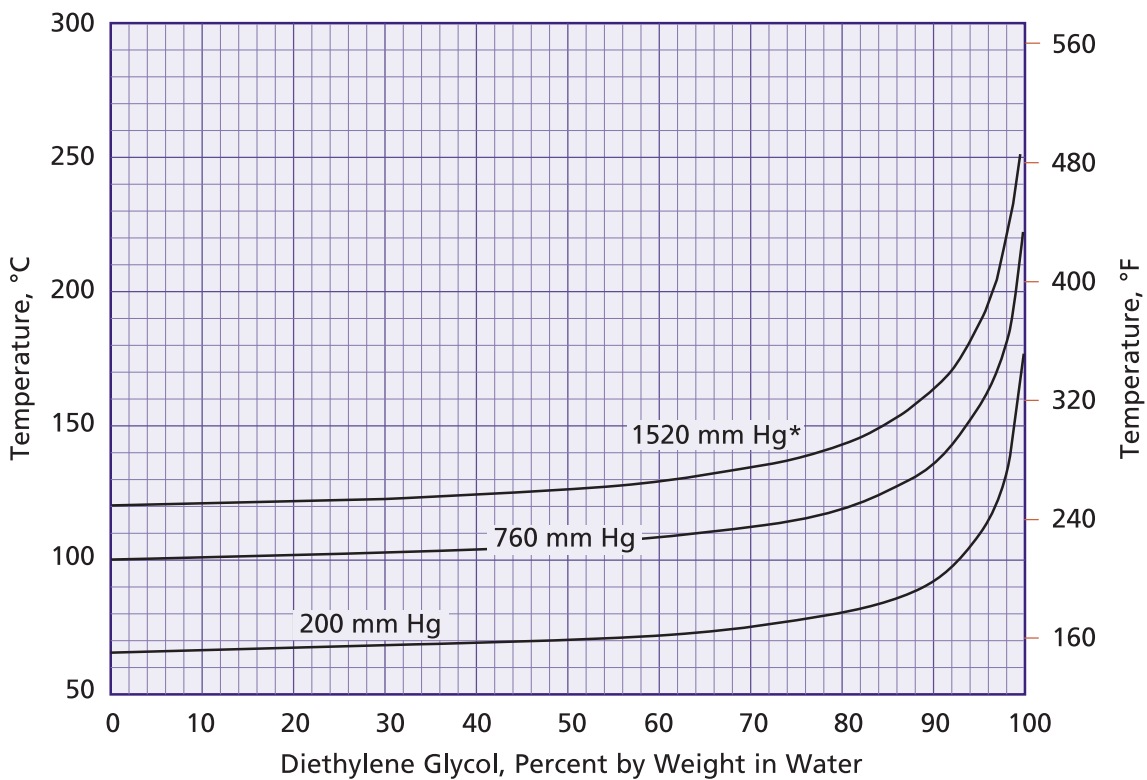
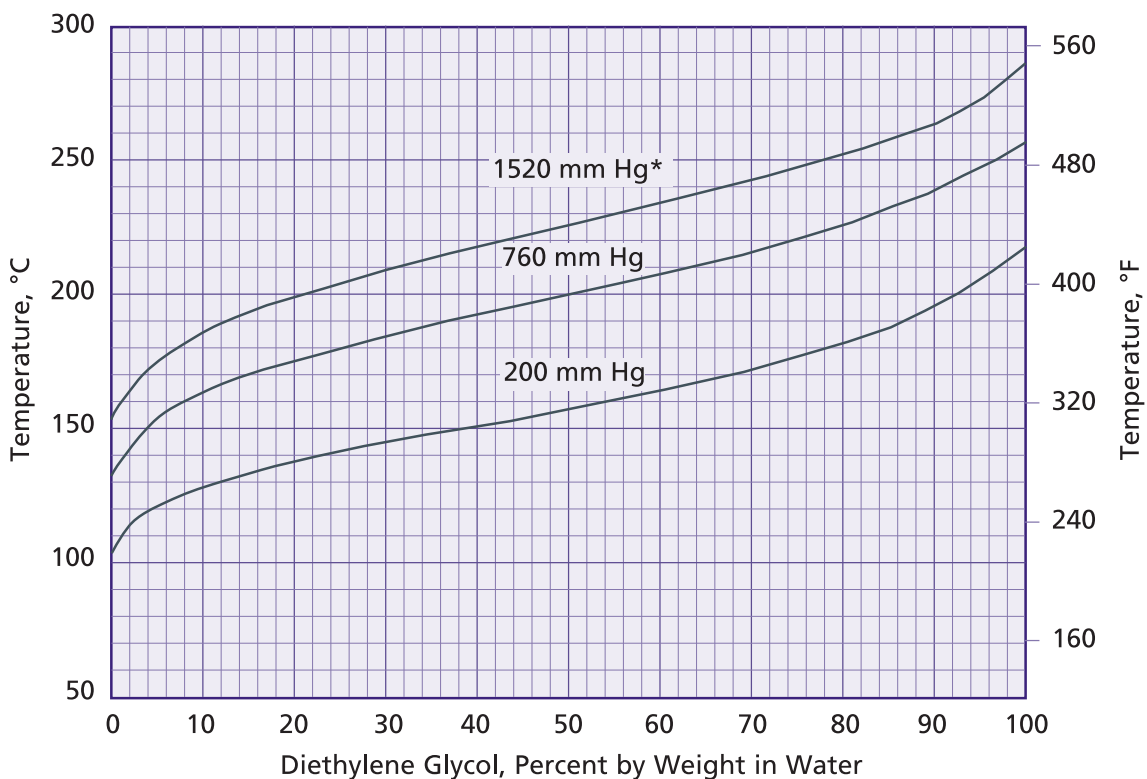


Figure 2: Boiling Points vs. Composition of Aqueous Diethylene Glycol Solutions at Various Pressures



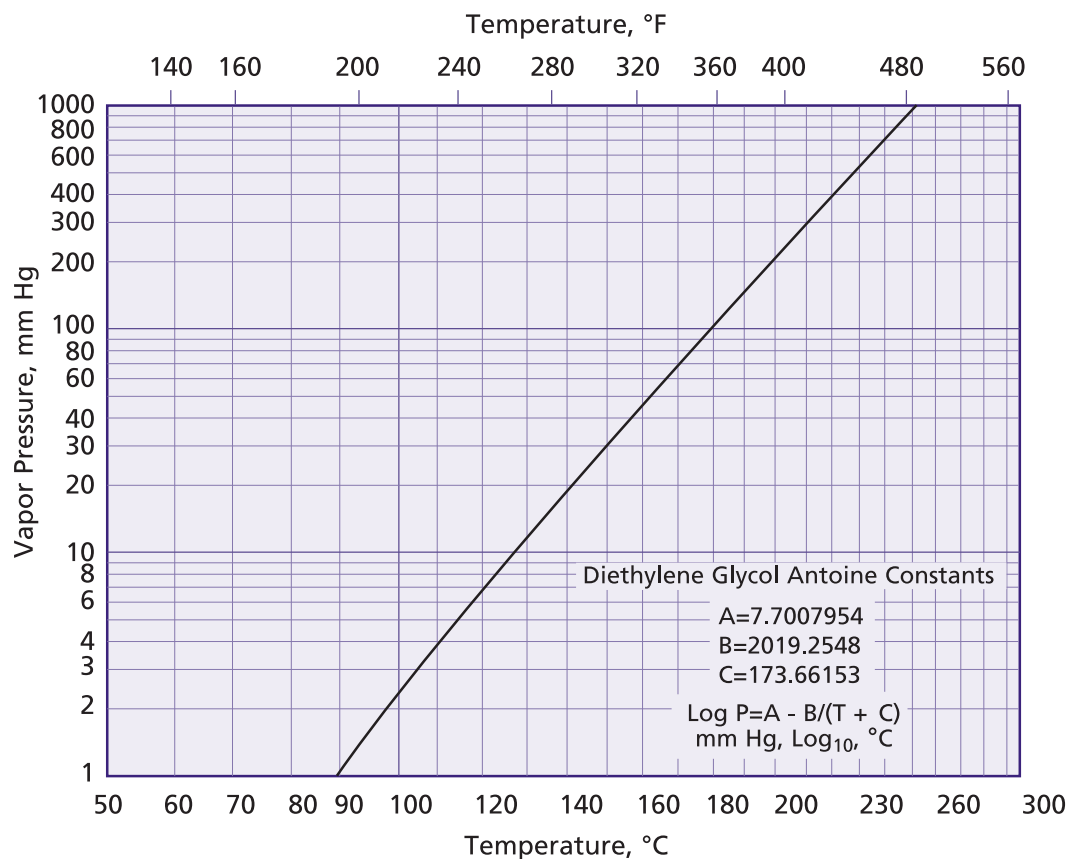
*2 atmospheres absolute, 1 atmosphere gauge

Figure 3: Condensation Temperatures vs. Composition of Aqueous Diethylene Glycol Solutions at Various Pressures



*2 atmospheres absolute, 1 atmosphere gauge

Figure 4: Vapor Pressures of Diethylene Glycol at Various Temperatures



Diethylene Glycol Antoine Constants for Calculating Vapor Pressure

3-Constant Equation

$$A = 7.7007954$$

$$B = 2019.2548$$

$$C = 173.66153$$

$$\text{Log}_{10}(P) = A - \frac{B}{(T + C)}$$

Range = 10 to 250°C

P = mm Hg

T = °C

5-Constant Equation

$$A = 116.21594$$

$$B = 13273.461$$

$$C = 0.0$$

$$D = -12.665825$$

$$E = 5.9330303 \times 10^{-29}$$

$$N = 10$$

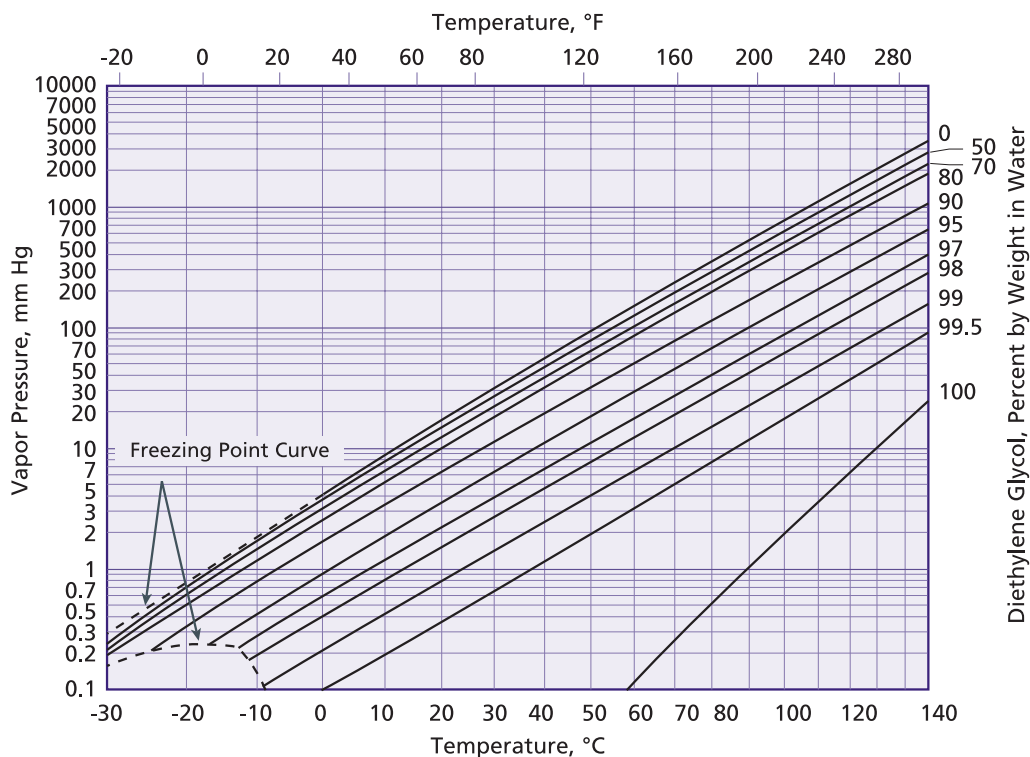
$$\ln(P) = A - \frac{B}{(T + C)} + D(\ln(T)) + ET^N$$

Range = 283 to 523°K

P = Pa

T = Kelvin

Figure 5: Vapor Pressures of Aqueous Diethylene Glycol Solutions at Various Temperatures



Diethylene Glycol Antoine Constants for Calculating Vapor Pressure

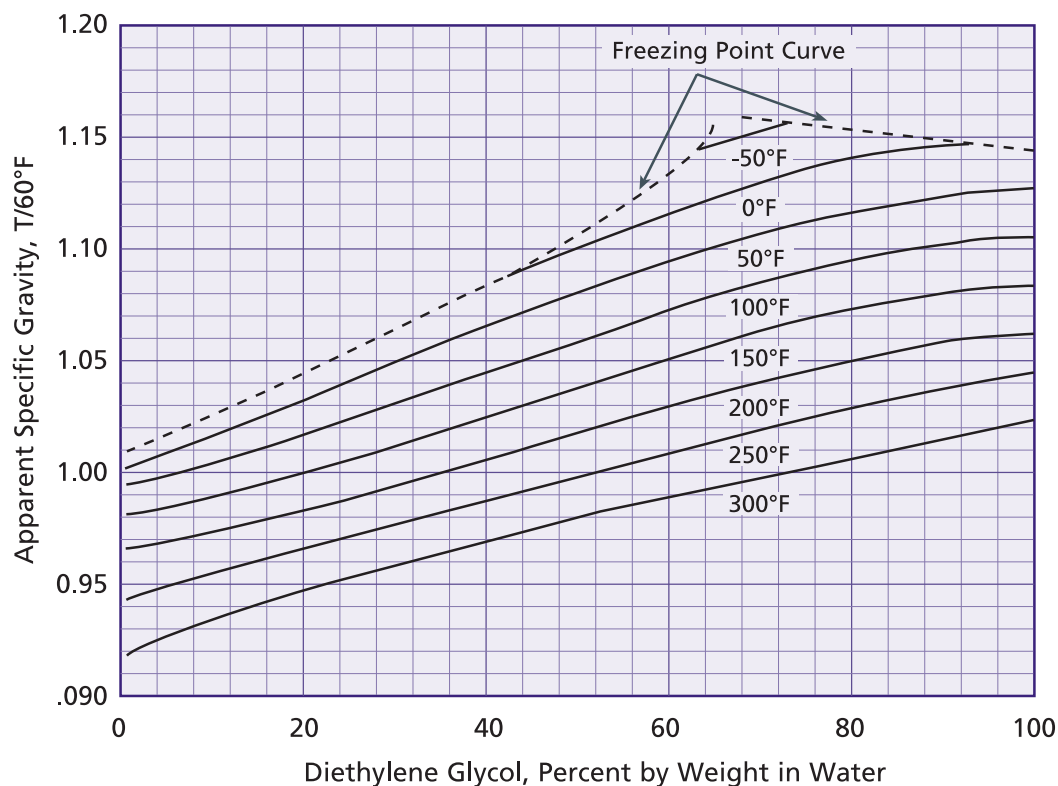
3-Constant Equation

$$\log_{10}(P) = A - \frac{B}{(T + C)}$$

P = mm Hg, T = °C

DEG, Wt%	A	B	C
0	7.959199	1663.545	227.575
50	7.849221	1646.755	226.918
70	7.720100	1632.771	226.643
80	7.605747	1630.455	227.213
90	7.411919	1649.970	229.847
95	7.246397	1699.218	233.944
97	7.234579	1813.670	243.670
98	7.299095	1951.128	254.593
99	7.626717	2329.389	281.281
99.5	8.405776	3045.472	325.327
100	7.700795	2019.255	173.622

Figure 6: Specific Gravities of Aqueous Diethylene Glycol Solutions

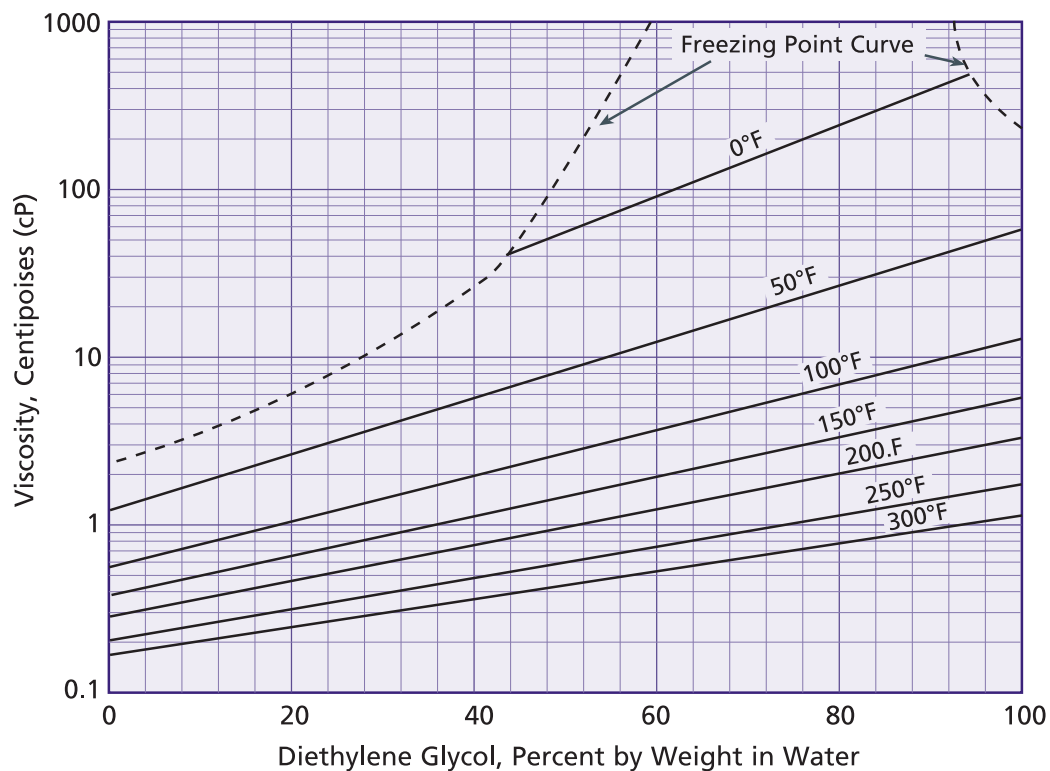


Specific Gravity at T/60°F = A + Bx + Cx² + Dx³

x = Weight % Diethylene Glycol

T, °F	A	B	C	D
-50	0.9425	4.6965E ⁻³	-2.4525E ⁻⁵	0.0
0	1.0243	1.0989E ⁻³	1.5571E ⁻⁵	-1.4375E ⁻⁷
50	1.0003	1.5391E ⁻³	5.0834E ⁻⁶	-7.9514E ⁻⁸
100	0.9937	9.3622E ⁻⁴	1.2942E ⁻⁵	-1.1238E ⁻⁷
150	0.9805	7.2146E ⁻⁴	1.4022E ⁻⁵	-1.0949E ⁻⁷
200	0.9653	6.3159E ⁻⁴	1.2845E ⁻⁵	-9.4444E ⁻⁸
250	0.9425	1.0286E ⁻³	3.0120E ⁻⁶	-3.3681E ⁻⁸
300	0.9168	1.6114E ⁻³	-1.0211E ⁻⁵	4.5860E ⁻⁸

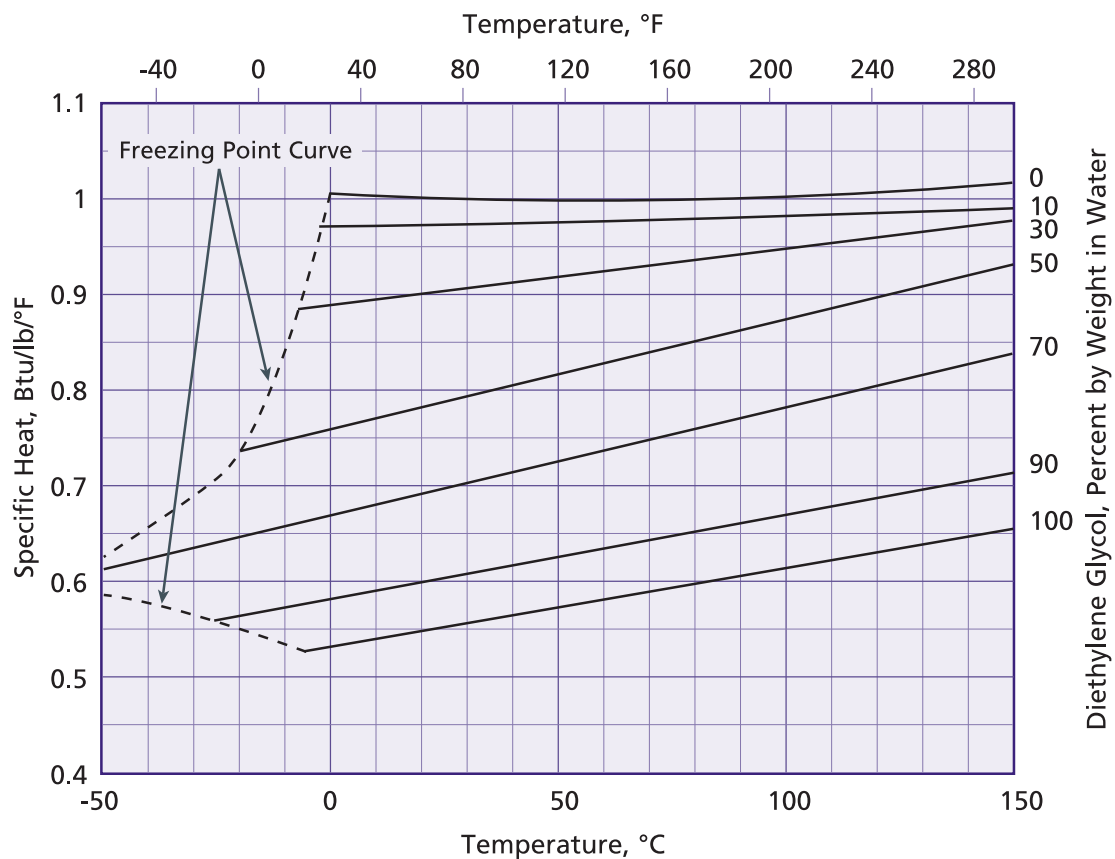
Figure 7: Viscosities of Aqueous Diethylene Glycol Solutions



Viscosity, Centipoises (cP) = $A \times 10^{Bx}$
 x = Weight % Diethylene Glycol

T, °F	A	B
50	1.18800	1.6907E ⁻²
100	0.57407	1.3693E ⁻²
150	0.37471	1.1817E ⁻²
200	0.27736	1.0474E ⁻²
250	0.21936	9.4432E ⁻³
300	0.18051	8.6163E ⁻³

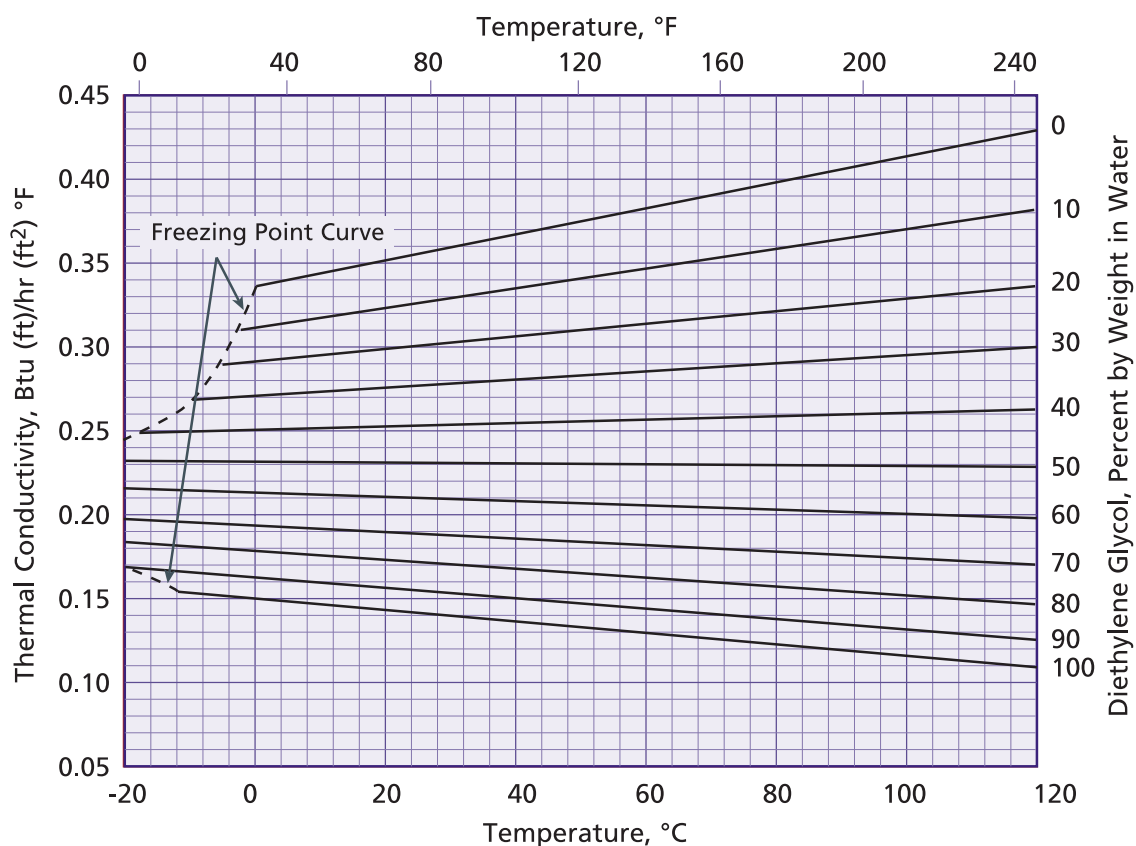
Figure 8: Specific Heats of Aqueous Diethylene Glycol Solutions



Specific Heat = A + BT
T = Temperature, °C

DEG, Wt%	A	B
10	0.97005	1.3337E ⁻⁴
30	0.88588	5.9290E ⁻⁴
50	0.76730	1.1530E ⁻³
70	0.67050	1.1569E ⁻³
90	0.58960	8.7088E ⁻⁴
100	0.53375	8.1244E ⁻⁴

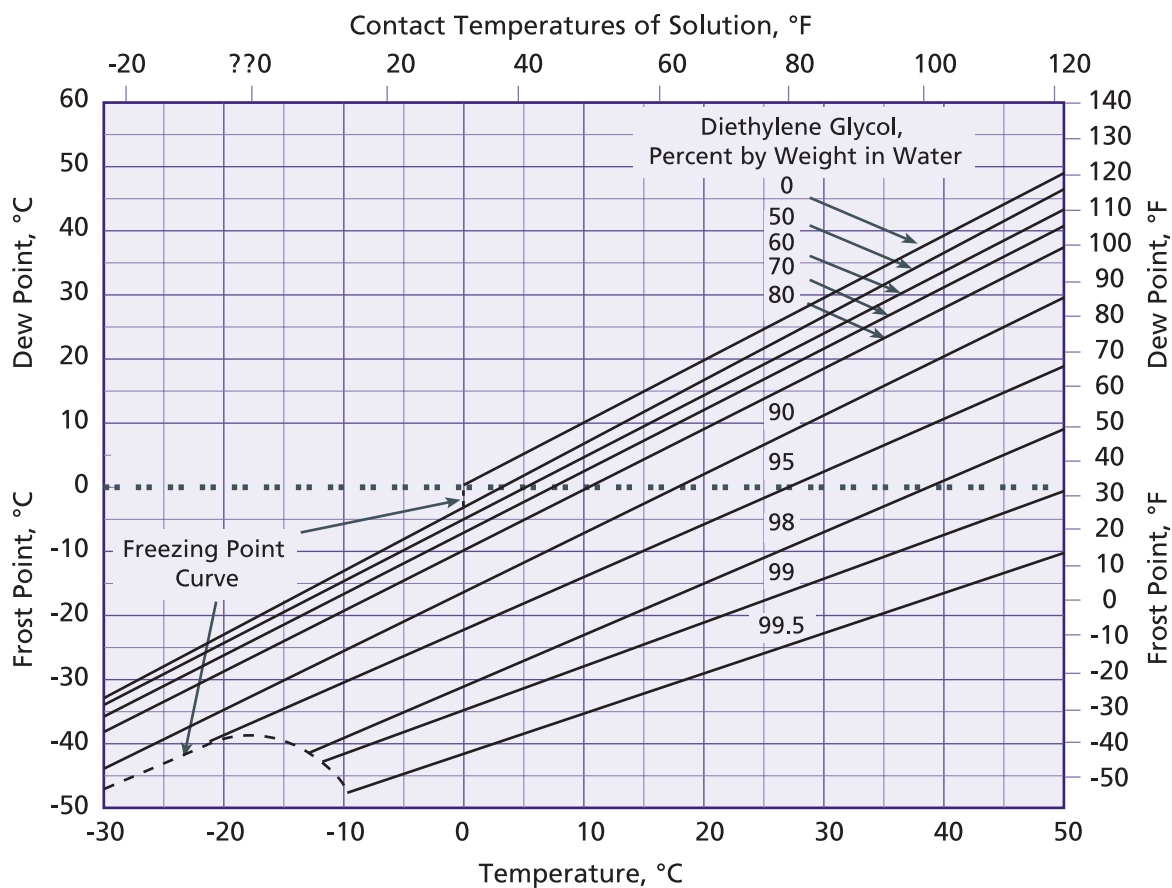
Figure 9: Thermal Conductivities of Aqueous Diethylene Glycol Solutions



Thermal Conductivity = A + BT
T = Temperature

DEG, Wt%	A	B
0	0.33767	7.6667E ⁻⁴
10	0.31233	5.8333E ⁻⁴
20	0.29200	4.0000E ⁻⁴
30	0.27133	2.3333E ⁻⁴
40	0.25100	1.0000E ⁻⁴
50	0.23133	-1.6667E ⁻⁵
60	0.21233	-1.1667E ⁻⁴
70	0.19500	-2.0000E ⁻⁴
80	0.17933	-2.6667E ⁻⁴
90	0.16433	-3.1667E ⁻⁴
100	0.15100	-3.5000E ⁻⁴

Figure 10: Dew Points of Aqueous Diethylene Glycol Solutions at Various Contact Temperatures



Dew or Frost Point = A + BT
T = Temperature, °C

DEG, Wt%	A	B
0	0.0000	0.99202
50	-3.1257	1.00710
60	-5.0603	0.97853
70	-7.1426	0.96426
80	-10.127	0.95719
90	-16.857	0.93572
95	-22.731	0.82862
98	-31.334	0.80003
99	-35.064	0.69450
99.5-41.845	0.62866	

Figure 11: Comparative Hygroscopicities of Various Glycols at 70°F (21°C)

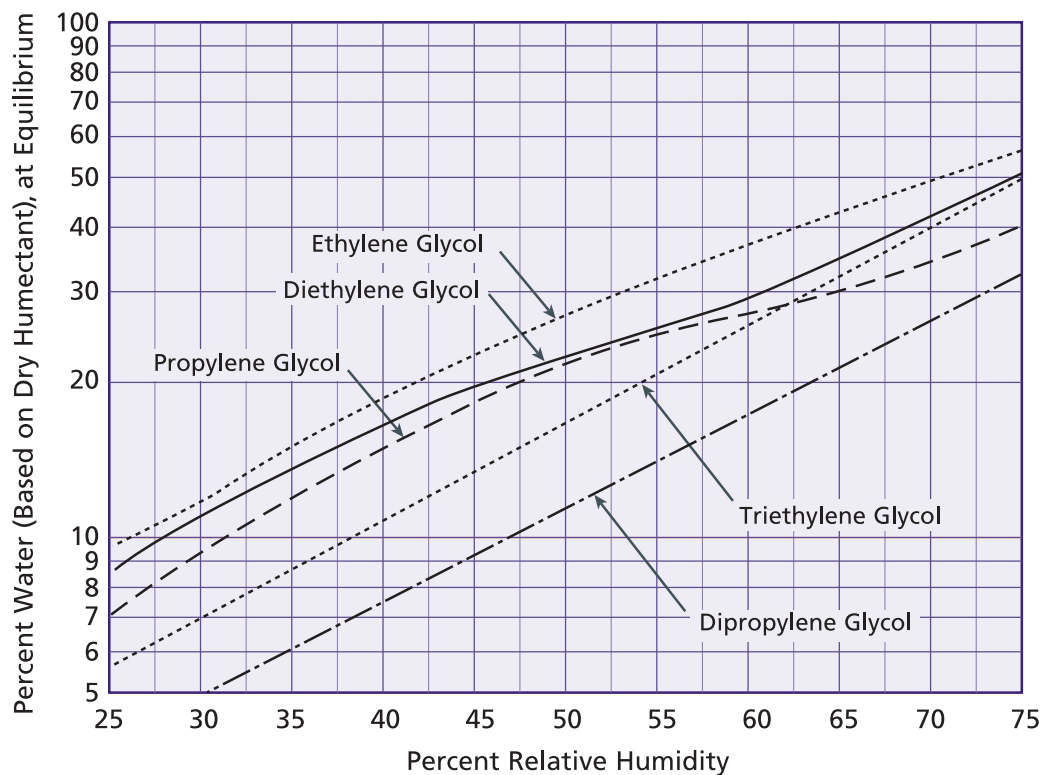
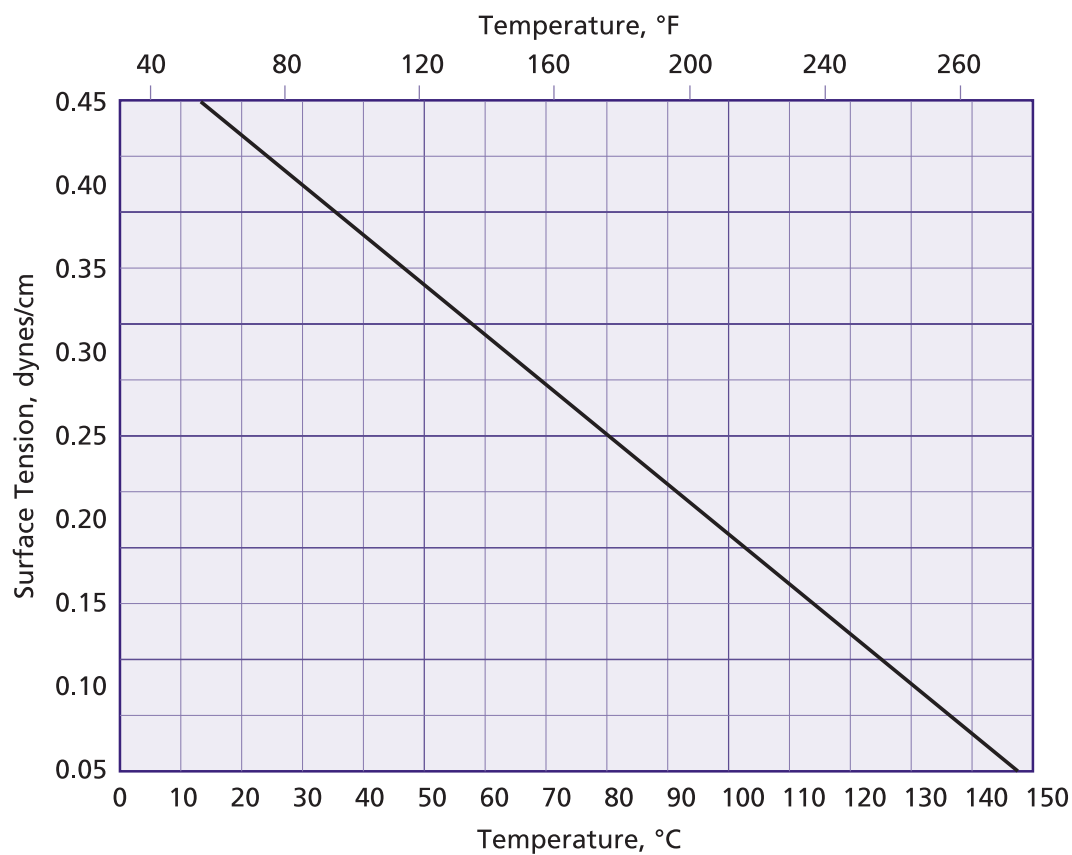


Figure 12: Surface Tensions of Pure Diethylene Glycol



$$\text{Surface Tension, dynes/cm} = 46.97 - 0.088T$$

T = Temperature, °C

Figure 13: Surface Tensions of Aqueous Diethylene Glycol Solutions at 77°F (25°C)

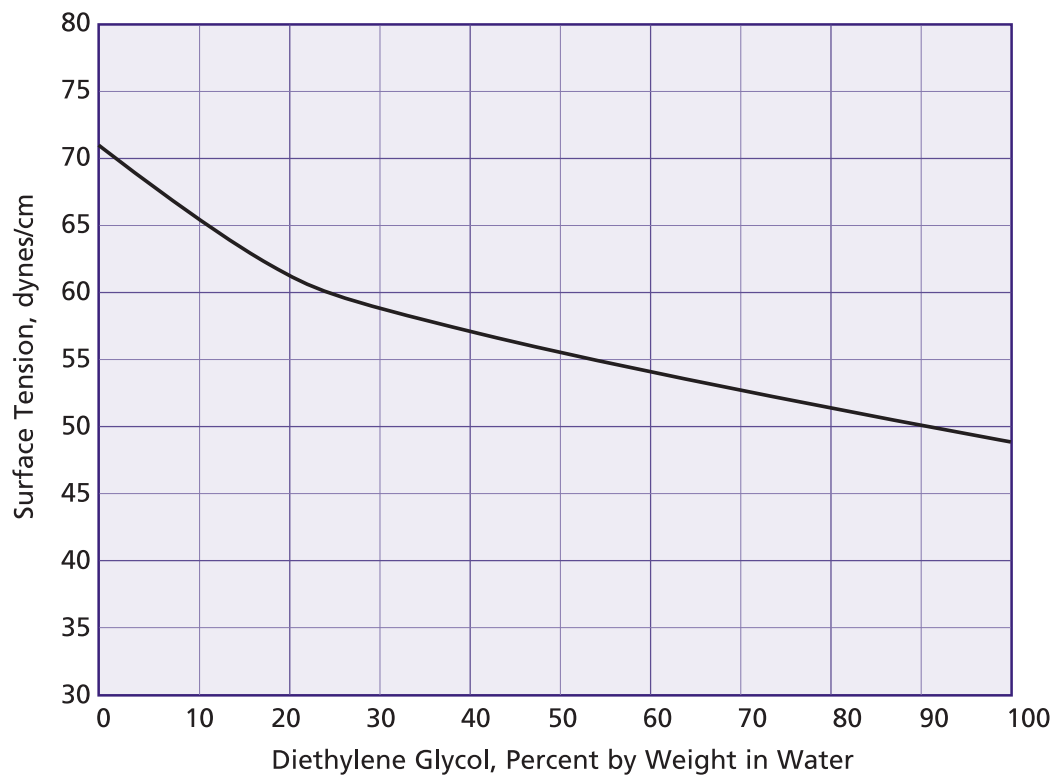
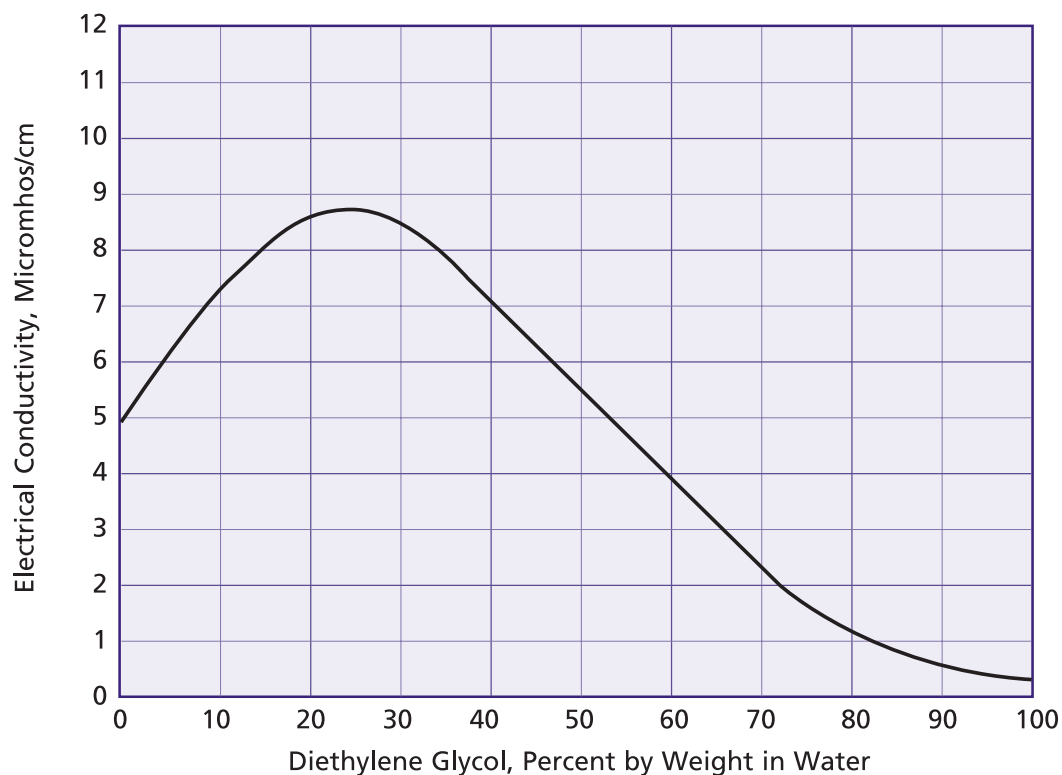
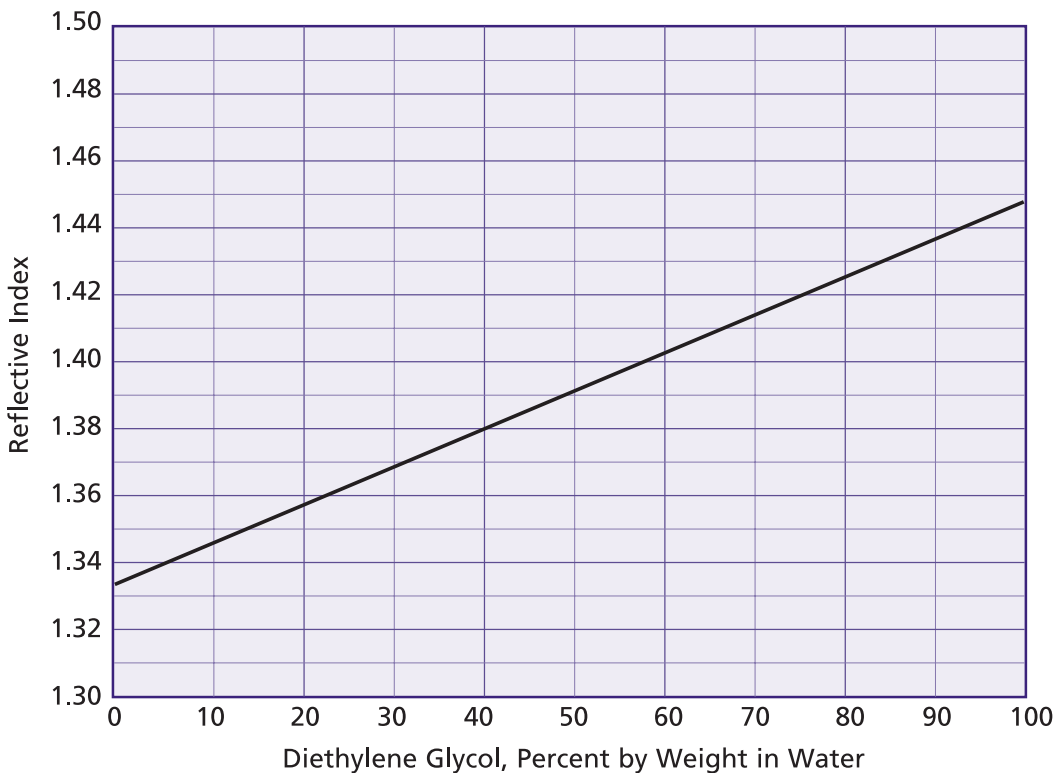


Figure 14: Electrical Conductivities of Aqueous Diethylene Glycol Solutions



Note: The quality of water used for dilution can significantly affect the electrical conductivity.

Figure 15: Refractive Indices of Aqueous Diethylene Glycol Solutions at 77°F (25°C)



Refractive Index, 77°F (25°C) = $1.3326 + 0.0011572x$
 x = Weight % Diethylene Glycol

Health Effects

Diethylene glycol can be harmful or fatal if misused. See our current Material Safety Data Sheet for current exposure limits, health, first aid and toxicology information.

Environmental Information

See our current Material Safety Data Sheet for toxicity information.

Biodegradation

For information concerning the biodegradability of diethylene glycol, please refer to the latest Material Safety Data Sheet.

Storage and Handling

This information is offered as a guide in planning bulk storage facilities for glycols. Glycols are generally considered to be stable, non-corrosive chemicals with high flash points. Under ordinary conditions, all of these chemicals can be stored in mild steel vessels. For long-term storage, or if trace iron contamination and the development of color are objectionable in any of the glycols, a storage vessel lined with a baked-phenolic resin, an air-drying epoxy-phenolic resin or a vinyl resin, or a stainless steel or aluminum tank is suggested. Zinc or galvanized iron is not recommended and copper or copper alloys may cause product discoloration.

It is not general practice to use an inert gas in the vapor space of glycol storage tanks because all chemicals in this family have high boiling points and the vapors in the tanks are relatively non-flammable. However, if extremely low water content is required, consistent with a long storage period, a nitrogen blanket can be used on all storage tanks to protect product quality, specifically, the moisture content. If steel tanks are used for storage, the tank should be sand blasted and maintained under a nitrogen blanket. Blanketing with nitrogen will also minimize low-level oxidation. The inert gas minimizes air oxidation to maintain product within acidity specifications. Increased acidity enhances iron pickup from steel vessels. Alternatively, a desiccant unit can be installed on the tank vent line to dry incoming air.

If above-ground outside storage is planned, it may be necessary to install provisions for heating tanks and lines. Many glycols have a moderately high freezing point or become relatively viscous at severe winter temperatures. However, excessive temperatures can cause undesirable degradation of glycols. Automatic controls are suggested to limit the temperature of the contents to 120°F (49°C).

In cold climates, it is generally desirable to make provisions for draining the pump and the transfer lines if they are outside the building. If this is not feasible, it may be necessary to insulate and steam trace or otherwise heat the transfer lines to prevent freezing of the product. Care must be taken in such an application because continued exposure of glycols to high temperatures (greater than 120°F [49°C]) will result in product degradation. Transfer piping of mild steel is generally used.

Shipping Data for Diethylene Glycol

Weight per Gallon at 20°C	9.31 lb
Coefficient of Expansions at 55°C	0.00067
Flash Point, Pensky-Martens Closed Cup	310°F

Net Contents and Type of Container

1-Gallon Tin Can	9.0 lb
5-Gallon DOT 17E, Pail	47 lb
55-Gallon DOT 17E, Drum	520 lb

Diethylene glycol is not regulated by the U.S. Department of Transportation, therefore, it does not have a DOT shipping name, hazard classification, DOT warning label, or identification number.

Product Safety

When considering the use of diethylene glycol in a particular application, review and understand our current Material Safety Data Sheet for the necessary safety and environmental health information. For Material Safety Data Sheets and other product safety information on MEGlobal products, contact the MEGlobal sales office nearest you. Before handling any products mentioned in this booklet, you should obtain the available product safety information from the suppliers of those products and take the necessary steps to comply with all precautions regarding the use of diethylene glycol.

No chemical should be used as or in a food, drug, medical device or cosmetic, or in a product process in which it may come in contact with a food, drug, medical device or cosmetic until the user has determined the suitability of the use. Because use conditions and applicable laws may differ from one location to another and may change with time, Customer is responsible for determining whether products and the information in this document are appropriate for Customer's use and for ensuring that Customer's workplace and disposal practices are in compliance with applicable laws and other governmental enactments.

MEGlobal requests that Customer read, understand and comply with the information contained in this publication and the current Material Data Safety Sheet(s). Customer should furnish the information in this publication to its employees, contractors, and customers, or any other users of the product(s), and request that they do the same.

Emergency Service

MEGlobal, through The Dow Chemical Company, maintains an around-the-clock emergency service for its products. The Chemical Manufacturers Association (CHEMTREC), Transportation Canada (CANUTEC), and the Chemical Emergency Agency service maintain an around-the-clock emergency service for all chemical products.

Location	MEGlobal Products	All Chemical Products
Mainland United States and Puerto Rico	Phone Dow HELP: +1 800-822-4357 (toll-free)	Phone CHEMTREC: +1 800-424-9300 (toll-free)
Alaska and Hawaii	Phone Mainland United States: +1 304-744-3487 (collect)	Phone CHEMTREC: +1 800-424-9300 (toll-free)
Canada	Phone Dow: +1 514-640-6400 (collect)	Phone CANUTEC: +1 613-996-6666 (collect)
Continental Europe, Middle East, North and Central Africa	Phone BIG (Geel-Belgium): +32 14-58-45-45	Phone CHEMTREC (United States): +1 703-527-3887 (collect)
United Kingdom and Ireland	Phone National Chemical Emergency Center (Culham-UK): +44 1865-407-333	Phone CHEMTREC (United States): +1 703-527-3887 (collect)
Latin America, Asia/Pacific, South Africa and any other location, worldwide	Phone United States: +1 304-744-3487 (collect)	Phone CHEMTREC (United States): +1 703-527-3887 (collect)
If you are at sea	Radio U.S. Coast Guard, who can directly contact Dow HELP +1 800-822-4357 (toll-free) or CHEMTREC +1 800-424-9300 (toll-free)	



DO NOT WAIT. Phone if in doubt. You will be referred to a specialist for advice.

Sales Office

For additional information, contact our customer service center:

Customer Service

Geographical Area	Phone
Argentina	+54 11-4319-0328
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Chile	
Paraguay	
Peru	
Uruguay	
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Brazil	+55 11-5188-9681
Venezuela	+52 55-5201-4874
Colombia	
Mexico	+52 55-5201-4720
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