

SEMI C86-0415

GUIDE FOR ETHYLENE GLYCOL

This Standard was technically approved by the Liquid Chemicals Global Technical Committee. This edition was approved for publication by the global Audits and Reviews Subcommittee on November 11, 2014. Available at www.semiviews.org and www.semi.org in April 2015.

1 Purpose

1.1 The purpose of this Document is to provide a Guide for ethylene glycol for which a need has been identified.

2 Scope

2.1 The scope of this Document covers grades of ethylene glycol which are used in the semiconductor industry.

NOTICE: SEMI Standards and Safety Guidelines do not purport to address all safety issues associated with their use. It is the responsibility of the users of the Documents to establish appropriate safety and health practices, and determine the applicability of regulatory or other limitations prior to use.

3 Limitations

3.1 None.

4 Referenced Standards and Documents

4.1 *SEMI Standards and Safety Guidelines*

SEMI C1 — Guide for the Analysis of Liquid Chemical

NOTICE: Unless otherwise indicated, all documents cited shall be the latest published versions.

5 Terminology

5.1 *Abbreviations and Acronyms*

5.1.1 *EG* — ethylene glycol (IUPAC: Ethane-1,2-diol)

6 Properties

Table 1 Properties of Ethylene Glycol

Molecular Formula	C ₂ H ₆ O ₂ or OH-CH ₂ -CH ₂ -OH
Molecular Weight	62.07 g/mol
CAS Number	107-21-1
Density	1.11 g/cm ³
Boiling Point	197°C (1013 hPa)
Melting Point	-16°C
Solubility in Water	Completely soluble
Flashpoint	111°C
Appearance	Colorless, viscous liquid with a sweet taste

7 Suggested Values

7.1 The suggested values for ethylene glycol for Tier A and B are listed in Table 3.

8 Grade 1 Procedures

8.1 This section does not apply to this chemical.

9 Grade 2 Procedures

9.1 This section does not apply to this chemical.

10 Grade 3 Procedures

10.1 This section does not apply to this chemical.

11 Grade 4 Procedures

11.1 This section does not apply to this chemical.

12 Tier A Procedures

12.1 Standardized test methods are being developed for all parameters at the purity level indicated. Until standardized test methods are published, test methodology shall be determined by user and producer. The Liquid Chemicals Global Technical Committee considers a method to be valid only if method validation according to SEMI C1 has been demonstrated.

12.2 Assay

12.2.1 Analyze the sample by gas chromatography (see SEMI C1, 'Assay by Wide Bore Column Gas Chromatography'). The parameters cited have given satisfactory results.

12.2.2 Column: 50 meter $\times$ 320 micron I.D. fused silica capillary coated with 100% dimethyl polysiloxane which has been surface bounded.

12.2.3 Column temperature: 80°C isothermal for 3 minutes, then programmed to 260°C at 20°C/min., then isothermal for 5 minutes.

Table 2 Chromatography Conditions

Injector Temperature	250°C
Detector Temperature	280°C
Sample Size	0.5 μ L split ratio 1/50
Carrier Gas	Nitrogen
Detector	Flame ionization detector (hydrogen)
Approximate Retention Time (min)	
Ethylene Glycol	7.6 min

12.3 Color

12.3.1 Dilute 2.0 mL of Pt-Co stock solution (APHA 500, see SEMI C1) to 100 mL with DI water. Compare this standard (APHA 10) with 100 mL of sample in Nessler tubes. View vertically over a white background. The sample must be no darker than the standard.

12.4 Water

12.4.1 Analysis performed by coulometric Karl Fisher titration with the use of the appropriate anodic and cathodic coulometric reagents.

12.4.2 Prior to start the analysis, verify the cleanliness of the cell and prevent any exposure of the system to the humidity of the air.

12.4.3 Weigh accurately the sample volume (1.5 $\pm$ 0.001 g) using an analytical balance.

12.4.4 Inject the sample through the septum and start the automatic titration till the equilibrium end-point.