METRIC

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22 December 2009
SUPERSEDING
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1 July 1983

DETAIL SPECIFICATION

PROPANEDIOL, 1,2-

Reactivated after 22 December 2009 and may be used for new and existing designs and acquisitions.

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers one type of 1,2-propanediol, hereinafter referred to as propylene glycol.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of the documents cited in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Non-government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

AMERICAN CHEMICAL SOCIETY

- Reagent Chemicals

(Copies of this document are available online at http://www.acs.org/ or from American Chemical Society, 1155 Sixteenth Street NW, Washington, DC 20036.)

Comments, suggestions, or questions on this document should be addressed to Defense Supply Center Richmond, ATTN: DSCR-VEB, 8000 Jefferson Davis Highway, Richmond, VA 23297-5616, or e-mailed to STDZNMGT@dla.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST database at https://assist.daps.dla.mil/.

AMERICAN SOCIETY FOR QUALITY (ASQ)

ASQ Z1.4	- Sampling Procedures and Tables for Inspection by Attributes

(Copies of this document are available online at http://www.asq.org/ or from American Society of Quality, 600 North Plankinton Avenue, Milwaukee, WI 53203.)

ASTM INTERNATIONAL

ASTM D 92	- Standard Test Method for Flash and Fire Points by Cleveland Open Cup Tester
ASTM D 891	- Standard Test Method for Specific Gravity, Apparent, of Liquid Industrial Chemicals
ASTM D 1078	- Standard Test Method for Distillation Range of Volatile Organic Liquids
ASTM D 1193	- Standard Specification for Reagent Water
ASTM D 1209	- Standard Test Method for Color of Clear Liquids (Platinum-Cobalt Scale)
ASTM D 1613	- Standard Test Method for Acidity in Volatile Solvents and Chemical Intermediates Used in Paint, Varnish, Lacquer, and Related Products
ASTM D 4057	- Standard Practice for Manual Sampling of Petroleum and Petroleum Products
ASTM E 202	- Standard Test Methods for Analysis of Ethylene Glycols and Propylene Glycols
ASTM E 203	- Standard Test Method for Water Using Volumetric Karl Fischer Titration

(Copies of these documents are available online at http://www.astm.org/ or from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.)

2.3 Order of precedence. Unless otherwise noted herein or in the contract, in the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Chemical and physical requirements. The chemical and physical requirements of the propylene glycol shall be as specified in table I.

3.2 Workmanship. The propylene glycol shall be water white, a homogeneous liquid, free from dirt, sediment, and other suspended foreign matter when examined visually by transmitted light.

3.3 Recycled, recovered, or environmentally preferable materials. Recycled, recovered, or environmentally preferable materials should be used to the maximum extent possible, provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle costs.

TABLE I. Chemical and physical requirements.

Requirements	Limits		Test
	Min.	Max.	
Color (Pt-Co scale)	-	10	4.4.1
Specific gravity at 20 °C/20 °C	1.0375	1.0390	4.4.2
Distillation, °C			4.4.3
Initial boiling point	185	-	
Dry point	-	189	
Acidity (as acetic acid (% by wt))	-	0.003	4.4.4
Moisture (% by wt)	-	0.20	4.4.5
Ash (% by wt)	-	0.005	4.4.6
Iron (ppm)	-	0.5	4.4.7
Chlorides (ppm)	-	1.0	4.4.8
Flash point, °C	107	-	4.4.9

4. VERIFICATION

4.1 Classification of inspection. The inspection requirement specified herein is classified as conformance inspection.

4.1.1 Conformance inspection. The material shall be subjected to all the following inspections and tests for acceptance. When specified in the contract (see 6.2), the supplier shall submit a report giving the results obtained for all inspections and tests performed and certified statement that the lot meets all the requirements of this specification. Where applicable, blank determinations shall be run and corrections applied where significant. Safety apparel will be worn at all times.

4.1.1.1 Purity of reagents. Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available. Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

4.1.1.2 Purity of water. Unless otherwise indicated, references to water shall be understood to mean reagent water conforming to type II or III of ASTM D 1193.

4.1.2 Visual inspection. All samples shall be visually inspected to determine conformance to the workmanship requirements of 3.2.

4.2 Lotting. A lot shall consist of the material produced by one manufacturer in not more than a 24-hour period under essentially the same manufacturing conditions and with no change of the materials, providing the operation is continuous and submitted for inspections at the same time. In the event the process is a batch operation, each shall constitute a lot.

4.3 Sampling methods.

4.3.1 Sampling. Sampling from tank cars shall be conducted in accordance with ASTM D 4057. Sampling from smaller containers shall be conducted as follows. A random sample shall be taken from each lot in accordance with ASQ Z1.4, inspection level S-2, with the Acceptance Quality Limit (AQL) as specified in the contract (see 6.2). If there are fewer than three containers in a lot, each container shall be selected. A 500 milliliter (ml) specimen shall be removed from each container in the sample and placed in a clean, dry container. The container shall be labeled to identify the lot and container from which it was taken.

4.3.2 Test specimens. A composite specimen shall be made with equal portions from each specimen, and the composite specimen shall be tested as specified in 4.1.1. If there are fewer than three specimens, each one shall be tested as specified in 4.1.1.

4.4 Test methods.

4.4.1 Color. The color of the propylene glycol shall be determined in accordance with ASTM D 1209.

4.4.2 Specific gravity. Specific gravity shall be determined for 20 °C/20 °C in accordance with ASTM D 891, test method B.

4.4.3 Distillation. Distillation shall be conducted on the propylene glycol in accordance with ASTM D 1078 with the following exceptions:

a. Distillation shall be conducted at a pressure of 760 millimeters (mm) of mercury or corrected thereto by adding 0.043 °C for each mm under 760 mm or subtracting for every mm over 760 mm.

b. Use an ASTM partial immersion thermometer having a range of -5 °C to +300 °C.

4.4.4 Acidity. Acidity shall be determined by ASTM D 1613.

4.4.5 Moisture content. Moisture content shall be determined in accordance with ASTM E 203 except 10 to 40 grams (gm) of sample, depending on the anticipated moisture content, shall be used.

4.4.6 Ash residue. Ash residue shall be determined by measuring 50 ml of the sample in a graduate and transferring to a 125 ml platinum dish which has been ignited to constant weight, cooled in a desiccator, and tared to the nearest 0.1 milligram (mg). Record the weight of the sample. The dish shall be heated until the vapors continue to burn after the flame is withdrawn.

The combustion shall be protected from drafts and the vapors allowed to burn spontaneously until the liquid is consumed. Record the weight of the ash residue and calculate the percent ash residue using the following equation:

$$\% \text{ ash residue} = \frac{\text{weight of residue}}{\text{weight of sample}} \times 100$$

4.4.7 Iron. Iron shall be determined in accordance with ASTM E 202, sections 18 - 26.

4.4.8 Chlorides.

4.4.8.1 Standard chloride solution. Dissolve 0.458 gm of sodium chloride in distilled water and dilute to 1000 ml in a volumetric flask. Pipet 10 ml of this solution into a 100 ml volumetric flask, dilute to the mark with distilled water, and mix thoroughly. A 1.0 ml portion of the second dilution is equivalent to one ppm Cl and is used as the standard when measuring the 25 ml sample.

4.4.8.2 Procedure. Introduce 25 ml of the sample into one of two 100 ml short form Nessler tubes.

a. Into the second tube, pipet 1.0 ml of the standard chloride solution. Reserve as the standard.

b. Add 5 drops of concentrated nitric acid to each tube and dilute to the mark with distilled water.

c. Add 2 ml of 10 percent aqueous silver nitrate solution to each tube and mix thoroughly.

d. Compare the turbidity of the sample with that of the standard by reviewing down through the tubes against a dark background. If the turbidity of the sample is greater than that of the standard, the chloride content is in excess of one ppm.

4.4.9 Flash point. The flash point shall be determined in accordance with ASTM D 92, except that the fire point need not be determined.

4.4.10 Rejection criteria. Failure of any sample to meet any requirement of this specification shall be cause to reject the lot or batch.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When packaging of materiel is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or

within the military service's system commands. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. Propylene glycol covered by this specification is primarily intended for use as an antifreeze solution.

6.2 Acquisition requirements. Acquisition documents should specify the following:

a. Title, number, and date of this specification.
b. Certified analysis and/or test reports required (see 4.1.1).
c. AQL (see 4.3.1).
d. Packaging requirements (see 5.1).

6.3 Subject term (key word) listing.

Propylene
Glycol

6.4 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extent of the changes.

Custodians:
Navy - AS
Air Force - 68
DLA - GS

Preparing Activity:
DLA - GS3

(Project 6810-2009-026)

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST database at https://assist.daps.dla.mil/.