

MIL-P-83800 (USAF)  
31 July 1974

## MILITARY SPECIFICATION

### PROPYLENE GLYCOL, INDUSTRIAL GRADE

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

#### 1. SCOPE

1.1 This specification covers one industrial grade and type propylene glycol, 1, 2-Propanediol.

#### 2. APPLICABLE DOCUMENTS

2.1 The following specifications and standards of the issue in effect on date of invitation for bids form a part of this specification to the extent specified herein.

#### SPECIFICATIONS

##### FEDERAL

PPP-D-729 - Drums, Metal, 55 Gallon (for shipment of Noncorrosive Material).

##### MILITARY

MIL-P-15011 - Pallets, Material Handling, Wood, Post Construction, 4-Way Entry.

#### STANDARDS

##### FEDERAL

FED-STD-141 Distillation of Volatile Petroleum Solvents, Liquid Stores and Aromatic Hydrocarbons.

FED-STD-791 Lubricants, Liquid Fuel and Related Products; Methods of Testing.

FSC 6810

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**MILITARY**

- MIL-STD-129 - Marking for Shipment and Storage.
- MIL-STD-147 - Palletized and Containerized Unit Loads, 40" x 48" 4-Way (Partial Pallet Skids, Runners, or Pallet-Type Base.

(Copies of specifications, standards, publications and drawings required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

**2.2. Other Publications.** The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

**AMERICAN SOCIETY FOR TESTING AND MATERIALS\***

**ASTM STANDARDS**

- D1193-66 - Specification for Reagent Water.
- D1209-62 - Method of Test for Color of Clear Liquids. (Platinum-Cobalt Scale).
- D92-66 - Test for Flash and Fire Points by the Cleveland Open Cup Method.
- D941-55 - Method of Test for Density and Specific Gravity of Liquids by Lipkin Bicapillary Pycnometer.
- D1078-63 - Method of Test for Distillation Range of Volatile Organic Fluids.
- D1613 - Method of Test for Acidity in Volatile Solvents and Chemical Intermediates Used in Paint, Varnish, Lacquer and Related Products.
- D1744-64 - Method of Test for Water in Liquid Petroleum Products by Karl Fischer Reagent.
- E202-67 - Standard Methods for Analysis of Ethylene Glycols and Propylene Glycols.
- E203-64 - Method of Test for Water Using Karl Fischer Reagent.

**U.S. PHARMACOPEIA XVIII Chloride in Reagents**

\*(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.)

(Technical society and technical association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

**3. REQUIREMENTS**

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

TABLE I - CHEMICAL AND PHYSICAL REQUIREMENTS

<u>Requirements</u>	<u>Limits</u>	<u>Test</u>
Specific gravity 20 <sup>o</sup> / 20 <sup>o</sup> C	1.0375 to 1.0390	4.3.1
Distillation, <sup>o</sup> C		4.3.2
IBP	185 min	
Dry Point	189 max	
Acidity, % by wt as acetic acid	0.003 max	4.3.3
Water, % by wt	0.2 max	4.3.4
Ash, % by wt	0.005 max	4.3.5
Color, PT-CO	10 max	4.3.6
Iron, PPM	0.5 max	4.3.7
Chlorides, PPM	1.0 max	4.3.8
Pounds per Gallon, 20 <sup>o</sup> C	8.64±0.1	4.3.9
Flash Point, <sup>o</sup> F, C.O.C.	225 min	4.3.10
Suspended Matter	Substantially Free	4.3.11

#### 4. QUALITY ASSURANCE PROVISIONS

**4.1 Responsibility for inspection.** Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order the supplier may utilize his own or any other facilities suitable for the performance of inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

**4.1.1 Lot.** 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 materials, providing the operation is continuous and submitted for inspection at the same time. In the event the process is a batch operation, each batch shall constitute a lot.

#### 4.2 Sampling.

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4.2.1 Sampling shall be conducted in accordance with Table II. Agitate the contents of each container to be sampled. A one quart representative sample shall be taken from each container, and these shall be combined together to form a composite sample for analysis. Each composite sample shall be placed in a separate, clean, dry container labeled to identify the lot and containers from which it was taken. The total composited sample from each lot shall be no less than 1 gallon.

TABLE II - SAMPLING FOR TEST

Number of containers in lot or batch	Number of sample containers
2 - 25	2
26 - 150	3
151 - 1,200	5
1,201-7,000	8
7,001-20,000	10
over 20,000	20

4.2.2 Inspection procedure. Each composite sample shall be tested separately as specified in 4.3.

4.3 Tests. Water in accordance with ASTM D1193-66 and reagent grade chemicals shall be used for testing. Blanks shall be run and corrections applied when significant. Tests shall be conducted as follows:

4.3.1 Specific gravity. Specific gravity of the material shall be determined for 20/20°C according to Federal Test Method Standard 791 Test Method No 402.2 (ASTM D941-55).

4.3.2 Distillation. Distillation shall be conducted according to Federal Test Method Standard No 141 Test Method N 4301 (ASTM D 1078), except that distillation shall be conducted at a pressure of 760 millimeter (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.

4.3.3 Acidity. Acidity shall be determined by ASTM D1613.

4.3.4 Water Content. Water content shall be determined in accordance with Federal Test Method Standard No 791, Test Method No 3253 (ASTM D1744-64) or (ASTM E203-64) except 10 to 40 grams (gm) (9 to 35 ml) of sample, depending on the anticipated moisture content, shall be used.

**4.3.5 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). 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. The dish shall then be ignited to a dull red heat, allowed to cool in a desiccator, and weighed to the nearest 0.1 mg. The ash residue per 100 ml shall be calculated as follows:

$$\text{gm ash per 100 ml} = \text{gm residue} \times 2$$

**4.3.6 Color.** Color shall be determined in accordance with ASTM D1209-62.

**4.3.7 Iron.** Iron shall be determined according to ASTM E202-67, Sec 15-22.

**4.3.8 Chlorides.** Chlorides shall be determined according to the U.S. PHARMACOPEIA, VOL XVIII Chloride in Reagents.

**4.3.9 Pounds per Gallon, 20°C.** If specific gravity at 20°C is within acceptable limits (4.3.1), then pounds per gallon @20°C can be calculated as follows:

$$\begin{array}{rcl} \text{Specific gravity of} & \times & \text{Wt of 1 US Gal H}_2\text{O} & = & \text{Lbs/gal @20}^\circ\text{C} \\ \text{propylene glycol @ 20}^\circ\text{C} & & \text{at 20}^\circ\text{C (8.32162 lbs)} & & \text{Propylene glycol} \end{array}$$

One US gallon of propylene glycol must weigh 8.64 ± 0.01 lbs.

**4.3.10 Flash point.** The flash point of the material shall be determined according to Federal Test Method Standard No 791 Test Method No 1103.6 (ASTM D92-66), except that the fire point need not be determined.

**4.3.11 Suspended matter.** Place 500 ml of the sample in a clean, clear glass, 1000 ml flask, stoppered with a ground-glass stopper. Let flask stand for two hrs, then invert the flask one time. Immediately, hold the flask against a well-lighted, white background and visually observe for suspended matter. The sample shall be substantially free of suspended matter.

## 5. PREPARATION FOR DELIVERY

**5.1 Packing.** Packing shall be level A, B, or C, as specified (see 6.2). The container used shall be compatible with propylene glycol and shall not rust nor show any interior deterioration during normal use and storage. The contracting activity shall identify any unique container requirements not covered by this specification. Containers shall have a capacity of 55 gallons. Closures shall have cap seals applied.

**5.1.1 Level A.** Propylene glycol shall be packed in drums conforming to PPP-D-729, type I.

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5.1.2 Level B. Propylene glycol shall be packed in drums conforming to PPP-D-729, type II.

5.1.3 Level C. Propylene glycol shall be packed in accordance with contractor's best commercial practice. Containers shall be in compliance with Uniform Freight Classification rules or with National Motor Freight Classification rules.

5.2 Palletization. When specified in contract or order (see 6.2), drums shall be palletized in accordance with MIL-STD-147. Pallets shall conform to MIL-P-15011.

5.3 Marking. In addition to any special marking required by the contract or order, drums shall be marked in accordance with MIL-STD 129.

5.3.1 All containers shall be marked with the following additional information:

PROPYLENE GLYCOL  
1, 2-PROPANEDIOL  
FOR F-111 AIRCRAFT ENVIRONMENTAL CONTROL SYSTEM  
DO NOT TAKE INTERNALLY

## 6. NOTES

6.1 Intended Use. The propylene glycol covered by this specification is intended for use as an aircraft antifreeze mixture for the F-111 aircraft's environmental control system.

6.2 Ordering Data. Procurements should specify the following:

- (a) Title, number and date of this specification.
- (b) Level of packing required (see 5.1).
- (c) When palletization is required (see 5.2).
- (d) Special markings required on the metal containers and shipping containers. (see 5.3)

6.3 The propylene glycol should be purchased by volume, the unit being one US gallon of 231 cubic inches at 20.0°C (68.0°F). The weight per gallon will be approximately 8.64 ± 0.01 pounds.

Custodian:  
Air Force - 68

Preparing Activity:  
Air Force - 68

Review Activities:  
Air Force - 11, 80

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