

MIL-P-87931 (USAF)
16 December 1977

MILITARY SPECIFICATION
PROPELLANT, ISOPROPYL ALCOHOL

This specification is approved for use by the Air Force Rocket Propulsion Laboratory (LKCP), Department of the Air Force, and is available for use by all Departments and Agencies of the Department of Defense

1 SCOPE

1.1 Scope This specification defines the requirements for isopropyl alcohol to be used as fuel in chemical steam generators.

2. APPLICABLE DOCUMENTS

2.1 The following documents of the issue in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein.

STANDARDS

Military

MIL-STD-129

Marking for Shipment and
Storage

(Copies of specifications, standards, drawings, and publications required by suppliers 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.

DEPARTMENT OF TRANSPORTATION

49 CFR 171-190

Code of Federal Regulations,
Title 49 - Transportation

(Application for copies should be addressed to the Superintendent of Documents, Government Printing Office, Washington 25, D.C.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS

ASTM D 891

Standard Methods of Test for
Specific Gravity of Industrial
Aromatic Hydrocarbons and
Related Materials

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to the Air Force Rocket Propulsion Laboratory, LKCP, Edwards AFB CA 93523, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

FSC 9135

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(Copies of ASTM publications may be obtained upon application to the American Society for Testing and Materials, 1916 Race Street, Philadelphia PA 19103)

3. REQUIREMENTS

3.1 Composition. The propellant shall conform to the limits of Table I when tested in accordance with the applicable test methods, unless otherwise specified (6.2)

TABLE I, REQUIREMENTS

COMPOSITION	LIMIT	TEST METHOD
Purity, percent by weight - min. - max.	87.4 87.9	4.5.2
Water, percent by weight	Remainder	4.5.2
Non-volatile matter, percent by weight (including dye) - max	0 002	4.5.3

3.2 Qualitative. The propellant shall be a homogeneous liquid free from sediment and suspended matter when examined by transmitted light.

3.3 Color. Unless otherwise specified by the procuring activity, the isopropyl alcohol shall have a purple color imparted by adding 4 grams of methyl violet crystals (Bader Reagent Grade or equivalent) per 1000 gallons of alcohol (6.2). The maximum weight of non-volatile residue allowed shall include that contributed by the methyl violet crystals.

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 purchase order, the supplier may utilize his own or any other facilities suitable for the performance of the 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 (6.2).

4.2 Classification of Tests. The inspection and testing of the propellant shall be classified as quality conformance tests.

4.3 Quality Conformance Tests. Quality conformance tests are defined as tests specified herein to assure conformance to the requirements of Table I of this specification. Quality conformance tests shall consist of the

sampling tests (4.3.1).

4.3.1 Sampling Tests.

4.3.1.1 Lot The contents of each filled shipping container shall constitute a lot.

4.3.1.2 Sample. A sample of propellant shall be taken from each lot, shall be drawn into a suitable vessel, and shall consist of not less than 600 milliliters (ml). Unless otherwise specified, the sample shall be composited into one sample when one-third portions are withdrawn from the bottom, center, and top thirds of the shipping container. When required, a one liter sample shall be forwarded to a laboratory designated by the procuring activity for subjection to the quality conformance tests specified herein (6.2)

4.4 Rejection. When any sample of propellant fails to conform to the requirements specified herein, the entire lot represented shall be rejected (6.2).

4.5 Test Methods.

4.5.1 Examination of Product. The isopropyl alcohol shall be free from sediment and suspended matter when examined by transmitted light.

4.5.2 Isopropyl Alcohol and Water Content. The isopropyl alcohol and water content shall be determined from the specific gravity of the sample.

4.5.2.1 Specific Gravity. The specific gravity of the sample at 20°/20°C shall be determined in accordance with ASTM D 891 Method C.

4.5.2.2 Calculations. Determine the alcohol content in weight percent from the following equation:

$$\text{Wt\% IPA} = 420.87 - 407.30 (\text{specific gravity}).$$

Determine the water content in weight percent from the following equation:

$$\text{Wt\% H}_2\text{O} = 100 - \text{Wt\% IPA}.$$

4.5.3 Non-volatile Residue. Evaporate 100 ml of sample down to approximately 20 ml on a hot plate. Transfer to a tared aluminum dish and dry in an oven at 105° + 5°C to constant weight. The difference between the final weight and tare weight will be reported as percent NVR.

4.6 Preparation for Delivery Inspection. The preparation, packaging, packing and marking for shipment and storage of the propellant shall be inspected to determined compliance with the requirements of section 5 of this specification.

5. PREPARATION FOR DELIVERY

5.1 Packaging. The product furnished under this specification is a hazardous material (flammable liquid) as defined and regulated by the Department of Transportation (DOT) regulations, Title 49 CFR 171-190. All packaging to be shipped

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shall comply with the requirements of this regulation. The product shall be packaged in containers and unit quantities as specified by the procuring activity (6.2 and 6.3).

5.2 Preparation of Containers Prior to filling, the contractor shall establish the condition of all containers to insure that they are free from contamination and suitable for shipment and storage. Contractor-owned containers shall be cleaned and repaired by the contractor at his own expense. Leased or Government-owned containers which the contractor finds unsuitable for filling shall be reported and subsequently cleaned and repaired in accordance with the instructions and schedule established in the contract or purchase order (6.2).

5.2.1 Cleaning and Repair Unless otherwise provided for in the contract or purchase order, all containers shall be visually inspected internally and externally for the presence of water, rust, scale, oil film, or other foreign matter, and physical damage (6.2). Any physical damage which would endanger safe transportation of the propellant shall be repaired prior to use. If evidence is found of internal contamination, the containers shall be cleaned by a suitable method to remove the contamination. Internal inspections on cargo tanks or tank cars used in exclusive continuous service need be made only upon initial entry into that service, at any required retest or overhaul, or at any time contamination is suspected.

5.2.2 Gaskets. Gaskets used to seal container openings shall be polytetrafluoroethylene, polypropylene, polyethylene, neoprene, or other material compatible with the propellant and approved for use by the procuring activity (6.2). The contractor shall assure that all gaskets are serviceable and furnish new gaskets when necessary so that a tight seal is assured.

5.3 Filling. Containers shall not be entirely filled. Sufficient space shall be left in each container to assure that no leakage or distortion of the container occurs as specified by DOT requirements.

5.4 Labeling and Marking. Each container shall be labeled and placarded in accordance with MIL-STD-129 and established DOT requirements or DOT special permit. In addition, an identification tag, precautionary label, and container color code shall be used. The flash point required by MIL-STD-129 is 62°F (16.7°C).

5.4.1 Identification Tag. Unless otherwise specified in the contract or purchase order, an identification tag impervious to climatic conditions shall be wired to the outlet port of each container and shall contain the following information. Propellant name, specification number with revision letter, type, NSN number, quantity, name of manufacturer, name of contractor (if different from manufacturer), date of manufacture, and lot identification number (6.2).

6. NOTES.

This section contains nonmandatory provisions only to assist both the contractor and buyer in the proper understanding and utilization of this specification.

6.1 Intended Use. The propellants covered by this specification are intended for use as fuel for chemical steam generators.

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6.2 Ordering Data. Purchasers should exercise any desired options offered herein, and procurement documents should specify the following:

6.2.1 Procurement Requirements:

- (a) Title, number, type and date of this specification.
- (b) Method of shipment, type and capacity of containers (5.1 and 6.3).
- (c) Quantity by weight in pounds (avoirdupois).
- (d) When other component limits are required (3.1).
- (e) When test methods are other than specified (3.1).
- (f) When inspection requirements are to be performed by other than the supplier (4.1).
- (g) When sampling is other than specified (4.3.1.2).
- (h) When disposition of rejected product is required (4.4).
- (i) When cleaning and repair schedule is required for leased or Government-owned containers (5.2).
- (j) When cleaning and repair of containers is to be other than as specified (5.2.1).
- (k) When identification tag is to be other than specified (5.4.1)
- (l) When approval of gasket material is required (5.2.2).
- (m) When the color requirement is waived (3.3).

6.2.2 Contract Data Requirements. Data conforming to Data Item Description DI-T-3733, Quality Conformance Test Reports (Fuels), is a requirement for delivery in connection with this specification. The data item will be specified for delivery on the DD Form 1423.

6.3 Containers. As of the date of this specification, the following containers are acceptable for military shipping of isopropyl alcohol: tank motor vehicles conforming to DOT regulation 49 CFR 173.19 or DOT special permits as applicable.

6.4 Highway Safety. To promote safety in the transportation of propellants in interstate commerce by motor vehicle, each product contractor or shipper should assure (and provide if necessary) that each driver possesses an MCA Chem Card - Transportation Emergency Guide No. CC-71. A complete manual of cards or the individual cards are available from the Manufacturing Chemists' Association, 1825 Connecticut Avenue, NW, Washington DC 20009.

6.5 Pollution Control. U. S. Public Laws dictate increased effort to improve air, land, and water pollution control of toxic propellant vapors, leaks, spills, and disposal during all phases of manufacture, transfer, storage, and transportation operations. The manufacturer/supplier is enjoined to approach the

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appropriate pollution control district(s) to mutually resolve all problem areas, and to develop adequate control and disposal methods for situations which are likely to develop in any of the phases

6.6 Supersession Data This specification includes the requirements of AFPID 9135-18.

Custodians

Preparing Activity

Air Force - 12

Air Force - 12

Review Activities

Civilian Agency Interests.

NASA

Air Force - 19 and 68

Project No. 9135-F080

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