

INCH-POUND

MIL-H-5606G
9 September 1994SUPERSEDING
MIL-H-5606F
6 December 1990**MILITARY SPECIFICATION****HYDRAULIC FLUID, PETROLEUM BASE; AIRCRAFT, MISSILE AND ORDNANCE**

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

1. SCOPE

1.1 Scope. This specification describes the characteristics and provides the requirements for a petroleum base hydraulic fluid for use in the -54°C to $+135^{\circ}\text{C}$ temperature range (see 6.1). This fluid is identified by military symbol OHA and NATO Code No. H-515 (see 6.5).

2. APPLICABLE DOCUMENTS**2.1 Government documents**

2.1.1 Specifications and standards. The following specifications and standards form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the *Department of Defense Index of Specifications and Standards (DoDISS)* and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATIONS**FEDERAL**

TT-T-656	Tricresyl Phosphate
PPP-C-96	Can, Metal, 28 Gage and Lighter
PPP-D-729	Drums, Shipping and Storage, Steel, 55 Gallon
PPP-P-420	Plugs and Flanges (for Drum Closure)
PPP-P-704	Pail, Metal: (Shipping, Steel, 1 through 12 Gallon)

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: ASC/ENOSD, 2335 Seventh Street, Suite 6, Wright-Patterson AFB OH 45433-7809 by using the self-addressed Standardization Document Improvement Proposal appearing at the end of this document, or by letter.

AMSC N/A

FSC 9150

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

MIL-H-5606G**STANDARDS****FEDERAL**

FED-STD-313	Material Safety Data, Transportation Data and Disposal Data for Hazardous Materials Furnished to Government Activities
FED-STD-791	Lubricants, Liquid Fuels, and Related Products; Methods of Testing

MILITARY

MIL-STD-290	Packaging of Petroleum and Related Products
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(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Department of Defense Single Stock Point, Standardization Documents Order Desk, Bldg 4D, 700 Robbins Avenue, Philadelphia PA 19111-5094.)

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 the documents which are DOD adopted are those listed in the issue of the *DoDISS* cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the *DoDISS* are the issues of the documents cited in the solicitation (see 6.2).

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ANSI/ASTM D93	Standard Test Method for Flash Point by Pensky-Martens Closed Tester (DoD adopted)
ANSI/ASTM D97	Standard Test Method for Pour Point of Petroleum Oils (DoD adopted)
ANSI/ASTM D130	Standard Method for Detection of Copper Corrosion from Petroleum Products by the Copper Strip Tarnish Test (DoD adopted)
ANSI/ASTM D287	Standard Test Method for API Gravity of Crude Petroleum and Petroleum Products (Hydrometer Method) (DoD adopted)
ASTM F312	Microscopical Sizing and Counting Particles from Aerospace Fluids on Membrane Filters
ANSI/ASTM D445	Standard Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (and the Calculation of Dynamic Viscosity) (DoD adopted)
ANSI/ASTM D664	Standard Test Method for Acid Number of Petroleum Products (DoD adopted)
ASTM D892	Standard Test Method for Foaming Characteristics of Lubricating Oils (DoD adopted)

ANSI/ASTM D972	Standard Test Method for Evaporation Loss of Lubricating Greases and Oils (DoD adopted)
ANSI/ASTM D1500	Standard Test Method for ASTM Color of Petroleum Products (ASTM Color Scale) (DoD adopted)
ANSI/ASTM D1744	Standard Test Method for Water in Liquid Petroleum Products by Karl Fischer Reagent (DoD adopted)
ANSI/ASTM D4057	Standard Practice for Manual Sampling of Petroleum and Petroleum Products
ANSI/ASTM D4172	Standard Test Method for Wear Preventive Characteristics of Lubricating Fluid (Four-Ball Method)
ANSI/ASTM D4636	Standard Test Method for Corrosiveness and Oxidation Stability of Hydraulic Oils, Aircraft Turbine Engine Lubricants, and Other Highly Refined Oils
ANSI/ASTM D4898	Insoluble Contamination of Hydraulic Fluids by Gravimetric Analysis, Standard Test for

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

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE)

SAE AMS 3217/2	Test Slabs, Acrylonitrile Butadiene (NBR-L), Low Acrylonitrile (DoD adopted)
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(Application for copies should be addressed to SAE, Inc., 400 Commonwealth Drive, Warrendale PA 15096-0001.)

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also may be available in or through libraries or other informational services.)

2.3 Order of precedence. 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 regulation unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Qualification. The hydraulic fluid furnished under this specification shall be products which are authorized by the Qualifying Activity for listing on the applicable Qualified Products List (QPL) at the time of award of contract (see 4.3 and 6.3). Changes shall not be permitted in the formulation of an approved product unless specific written approval of the Qualifying Activity is obtained.

3.2 Materials. The fluid shall consist of petroleum products with additive materials to improve the low-temperature flow and viscosity-temperature characteristics, resistance to oxidation, and anti-wear properties of the finished product.

3.2.1 Additives. There shall be no restriction on the types of materials used as additives in the fluid except for those specified in sections 3 and 4 and those imposed by technical requirements of this specification. Pour point depressants may be used.

3.2.2 Viscosity/temperature coefficient improvers. Polymeric materials may be added to the base petroleum oil in quantities not to exceed 20 percent by weight of active ingredient in order to adjust the viscosity of the finished fluid to the values specified in 3.3.

3.2.3 Oxidation inhibitors. Oxidation inhibitors shall be added to the base oil in quantities not to exceed 2 percent by weight.

3.2.4 Anti-wear agent. The hydraulic fluid shall contain 0.5 ± 0.1 percent of weight of an anti-wear agent, such as tricresyl phosphate, that conforms to *TT-T-656*, or equivalent. When tricresyl phosphate is used, it shall contain no more than 1 percent of the ortho-isomer.

3.3 Properties of petroleum base stock. The properties of the petroleum base stock used in formulating the finished fluid shall be as designated in table I when tested as specified in 4.5.3.

3.4 Properties of finished fluid. The properties of the finished fluid shall be as specified in table II, 3.5, and 3.6, when tested as specified in 4.5.3.

TABLE I. Properties of petroleum base stock.

<u>Property</u>	<u>Limits</u>
Pour point (max)	-60°C
Flash point (min)	82°C
Acid or base no. (max)	0.10
Color, ASTM standard (max)	No. 1
Specific gravity at 15.6°C/15.6°C (60.0°F/60.0°F)	Report ¹

¹ Samples of base stock submitted for acceptance tests shall not vary by more than ± 0.008 from the specific gravity of the original sample submitted for qualification tests.

TABLE II. Properties of finished fluid.

Property	Test Limits	Paragraph
Viscosity in centistokes at 100°C (min)	4.90	4.5.3
Viscosity in centistokes at 40°C (min)	13.2	4.5.3
Viscosity in centistokes at -40°C (max)	600	4.5.3
Viscosity in centistokes at -54°C (max)	2500	4.5.3
Pour point (max)	-60°C	4.5.3
Flash point (min)	82°C	4.5.3
Acid or base no. (max)	0.20	4.5.3
Rubber swell, standard synthetic rubber L, percent	19.0 to 30.0	4.5.3
Evaporation loss, percent, (max)	20	4.5.3
Copper strip corrosion, ASTM standard, (max)	No. 2e	4.5.7
Water, parts per million total, (max)	100	4.5.3
Steel-on-steel wear (average wear scar), mm in diameter, (max)	1.0	4.5.3

3.5 Performance

3.5.1 Corrosiveness and oxidation stability

3.5.1.1 Corrosiveness. When tested as specified in section 4 at a temperature of 135°C \pm 1°C, the change in weight of steel, aluminum alloy, magnesium alloy, and cadmium-plated steel, all of which when subjected to the action of the hydraulic fluid, shall be not greater than \pm 0.2 mg per square cm of surface. The change in weight of copper under the same conditions shall be no greater than \pm 0.6 mg per square cm of surface. There shall be no pitting, etching, nor visible corrosion on the surface of the metals when viewed under magnification of 20 diameters. Any corrosion (discoloration) produced on the surface of the copper shall be no greater than No. 3 of the ASTM copper corrosion standards (method D130). A slight discoloration of the cadmium shall be permitted.

3.5.1.2 Resistance to oxidation. When tested as specified in section 4 at a temperature of 135°C \pm 1°C, the fluid shall not have changed more than -5 or +20 percent from the original viscosity in centistokes at 40°C after the oxidation-corrosion test. The acid or base number shall not have increased by more than 0.20 over the acid or base number of the original sample. There shall be no evidence of separation of insoluble materials nor gumming of the fluid.

3.5.2 Low temperature stability. When tested as specified in section 4 for 72 hours at a temperature of -54°C \pm 1°C, the fluid shall show no evidence of gelling, crystallization, solidification, or separation of ingredients. Turbidity shall be not greater than that shown by the turbidity standard.

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3.5.3 Shear stability. When tested as specified in section 4, the percent viscosity decrease of the hydraulic fluid, measured in centistokes at 40°C, shall be no greater than the percentage viscosity decrease of the shear stability reference fluid, nor shall the acid or base number have increased by more than 0.20 over the original acid or base number.

3.5.4 Solid particle contaminants. Samples shall be taken for particle count and tested in a clean, dust-free atmosphere. When tested as specified in section 4, the number of solid contaminant particles per 100 ml of the fluid shall not exceed the number specified in table III.

3.5.4.1 Gravimetric method. The sample for solid particle contamination shall not exceed 0.3 mg/100 ml, when tested as specified in section 4, by using two single-membrane filters.

TABLE III. Solid particle contaminants.

Particle Size Range (largest dimension) <u>micrometers</u>	Allowable Number (max) each Determination <u>automatic count</u>
5-15	10,000
16-25	1,000
26-50	150
51-100	20
Over 100	5

3.5.5 Filtration time. The filtering time through a single-membrane filter for each determination in accordance with *FED-STD-791*, method No. 3009, shall be 15 minutes maximum at 25°C \pm 5°C.

3.5.6 Foaming characteristics. The foaming characteristics of the hydraulic fluid shall not exceed the limits indicated in table IV when tested as specified in 4.5.3.

TABLE IV. Foaming characteristics of hydraulic fluid.

Foaming Tendency		Foam Stability
<u>Test Temperature</u>	<u>Foam Volume, ml, at End of Five-minute Blowing Period</u>	<u>Foam Volume, ml, at End of Ten-minute Settling Period</u>
24°C	65 ml (max)	Complete collapse ¹

¹ A ring of small bubbles around the edge of the graduate shall be considered complete collapse.

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3.5.7 Storage stability. The fully blended product shall show no separation of ingredients nor evidence of crystallization. The fully blended product shall be clear and transparent when examined visually, and conform to the requirements of section 3 after 12 months' storage as specified in 4.5.3.

3.5.8 Color. The fluid shall contain red dye in concentration not greater than 1 part of dye per 10,000 parts of oil by weight. There shall be no readily discernible difference in the color of the finished fluid and the standard color when tested as set forth in 4.5.4.

3.5.9 Toxicity. The hydraulic fluid shall have no adverse effect on the health of personnel when used for its intended purpose. The fluid shall contain no components which produce noxious vapors in such concentrations as to be an irritant to personnel during formulation or use under conditions of adequate ventilation. Exercise caution to avoid prolonged contact with the skin and observe Occupational Safety and Health Administration (OSHA) guidelines. Questions pertaining to the toxic effects shall be referred to the appropriate departmental medical service who will act as an advisor to the Procuring Activity (see 4.3).

3.6 Workmanship. The workmanship shall be in accordance with high-grade commercial practice covering this type of material. The finished fluid shall be homogeneous and free from suspended matter, grit, or other adulteration.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements (examinations and tests) as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use 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 ensure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items must meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility to ensure all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements; however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

4.2 Classification of inspection. The examination and testing of the hydraulic fluid shall be classified as follows:

- a. Qualification inspection (see 4.3)
- b. Quality conformance inspection (see 4.4)

MIL-H-5606G**4.3 Qualification inspection**

4.3.1 Qualification sample. Qualification samples shall consist of a 1-gallon container of hydraulic fluid, 1-quart petroleum-base stock before the addition of additive agents, 1 gram red dye, 4 ounces of the additive used to improve the viscosity-temperature coefficient, 4 ounces anti-wear agent, 2 ounces pour depressant (if used), and 1-ounce compound used to improve the oxidation stability. In the event additives are supplied as concentrated solutions, an equivalent quantity of the solution shall be furnished.

4.3.2 Qualification tests. Qualification sample(s) shall be subject to all the tests specified under 4.5, methods of inspection. All tests shall be conducted in a clean room environment.

4.3.3 Data to accompany qualification samples. The samples shall be accompanied by a Material Safety Data Sheet per *FED-STD-313* and a test report from the manufacturer or a commercial laboratory that contains complete information about the source and type of base stock and additive materials used, the formulation and composition of the finished fluid, and laboratory data that show quantitative results of all the tests required by this specification except storage stability. Separate qualification inspection shall be required for each base stock used. The samples shall be plainly identified by securely attached, durable tags or labels marked with the following information:

Sample for Qualification Inspection

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Specification MIL-H-5606

Name of ingredient (for ingredient material)

Name of manufacturer

Product code number

Date of manufacture.

4.3.4 Formulation sheet. An example of a satisfactory form for the formulation sheet, indicating the weight percentage and nature of each ingredient, is as follows:

Petroleum oil base stock (composition)	percentage
Viscosity index improver (manufacturer's name and number)	percentage
Anti-wear additive (manufacturer's name and number)	percentage
Oxidation inhibitor (manufacturer's name and number)	percentage
Pour point depressant (manufacturer's name and number)	percentage.

4.3.5 Retention of qualification. In order to retain qualification of a product approved for listing on the QPL, the manufacturer shall verify, by certification, to the Qualifying Activity that the manufacturer's product complies with the requirements of this specification. The time of periodic verification by certification shall be in two-year intervals from the date of original qualification. The Government reserves the right to re-examine the qualified product whenever deemed necessary to determine the product continues to meet any or all of the specification requirements.

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4.4 Quality conformance inspection. The quality conformance inspection shall consist of sampling plans A, B, C, and D. Quality conformance inspection shall consist of examination of the sample of filled containers (see 4.5.8), determination of the solid particle contamination count (see 4.5.6), and testing the sample against all requirements specified in section 3, except for corrosiveness and stability (oxidation, shear, and storage) and swelling of synthetic rubber. In the event of a solid particle contamination count failure, the referee method shall be the microscopic method *ASTM F312*. Samples shall be labelled completely with information that identifies the purposes of the sample, name of product, specification number, lot and batch number, date of sampling, and contract number.

4.4.1 Inspection lots

4.4.1.1 Bulk lot. A bulk lot (batch) is an indefinite quantity of a homogeneous material mixture (see 3.2) offered for acceptance in a single, isolated container or manufactured in a single-plant run (not to exceed 24 hours), through the same processing equipment, with no change in ingredient material.

4.4.1.2 Packaged lot. A packaged lot is an indefinite number of 55-gallon drums or smaller unit containers of identical size and type, offered for acceptance, and filled with a homogeneous material mixture (see 3.2) from one isolated container or filled with a homogeneous material mixture manufactured in a single-plant run (not to exceed 24 hours), through the same processing equipment, with no change in ingredient material.

4.4.2 Sampling plan A. A 1-gallon bulk lot (see 4.4.1.1) shall be selected in accordance with *ASTM D4057* and subjected to inspection and tests specified in 4.5. If the sample fails any of the quality conformance tests, the inspection lot shall be rejected.

4.4.3 Sampling plan B. A random sample of filled unit containers and a sample of shipping containers fully prepared for delivery shall be selected from each packaged lot (see 4.4.1.2) of fluid in accordance with table V. The samples shall be subject to the inspections specified in 4.5. If any sample fails, the lot shall be rejected.

TABLE V. Sampling plan.

Lot Size	Sample Size
1-4	all 5 7 11 16 19
5-50	
51-90	
91-150	
151-280	
281-500	
501-12,000	
(Acceptance number is zero, [c = 0].)	

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4.4.4 Sampling plan C. A sample of base stock (see 3.3) shall be selected in accordance with *ASTM D4057* for each lot of the finished fluid (see 3.4) and subjected to all the applicable quality conformance tests for base stock (see 3.3 and 4.5.3).

4.4.5 Sampling plan D. Samples of filled and sealed containers shall be taken at such periodic intervals as to be representative of each day's operation. The number of samples taken each day shall be in accordance with table V. The sample size and number of determinations shall be as specified in table VI. If the particle count on any individual determination is considered excessive, two additional determinations on another sample from the same container may be used. Shake the container thoroughly for approximately 1 minute immediately prior to withdrawing each 100-ml portion for all determinations. The arithmetic average of the two closer particle counts shall be considered the particle count for the sample.

TABLE VI. Sample for particle contamination.

<u>Container</u>	<u>Sample Size (ml)¹</u>	<u>Determinations per Sample</u>
8 ounce	100	1
1 quart	100	1
1 gallon	200	2
5 gallon	300	3
10 gallon	300	3
55 gallon	600	6

¹ Each determination shall be made on 100-ml portions of the sample.

4.5 Methods of inspection

4.5.1 Inspection. Inspection shall be in accordance with method 9601 of *FED-STD-791* and 4.5.8 of this specification.

4.5.2 Fluid. The fluid shall conform to the requirements for base stock (see 3.3) and additive materials (see 3.2.1) and finished fluids (see 3.4) shall be determined by appropriate examination and testing in accordance with 4.5.3.

4.5.3 Physical and chemical values. Tests shall be performed in accordance with the applicable methods specified in table VII and 4.5.3 through 4.5.7. Physical and chemical values specified in section 3 apply to the arithmetic average of the determinations made on the samples for those values which fall within any stated repeatability or reproducibility limits of the applicable test method.

TABLE VII. Test methods for hydraulic fluid properties.

<u>Characteristic</u>	<i>FED-STD-791</i> <u>Test Method</u>	<u>ASTM</u>
Specific gravity		D287
Viscosity		D445
Pour point		D97
Flash point		D93
Acid or base no.		D664
Color		D1500
Corrosiveness and oxidation stability		¹ D4636
Low temperature stability	3459	
Swelling of synthetic rubber	3603	
Evaporation		² D972
Solid particle size	³ 3009	
Filtration time	⁴ 3009	
Foaming characteristics		D892
Water		D1744
Storage stability	3465	
Steel-on-steel wear		⁵ D4172
Gravimetric		⁶ D4898

¹ Test shall be run for 168 hours at 135°C. Use heptane or acetone to clean coupons. Use Alternate Procedure 2.

² Test shall be run for 6 hours at 71°C.

³ Particle contamination shall be measured by the use of automatic particle counters. Directions in the manual for the respective instrument shall be followed.

⁴ Filtration time shall be measured using a single membrane filter.

⁵ Condition B.

⁶ Use 0.45 micron filters.

4.5.4 Color of finished fluid. The color of the hydraulic fluid shall be compared with a standard sample prepared by adding 1 part dye from the Passaic Color and Chemical Company, 28 Patterson Street, Patterson NJ, identified by color index designation, Solvent Red No. 27, or equivalent, to 10,000 parts of an oil not darker than *ASTM D1500*, standard No. 1.

4.5.5 Shear stability. The following procedures shall be followed:

a. Subject the fluid to sonic oscillation. (A 250W, 10 KHz magnetostrictive oscillator model DF-101 supplied by the Raytheon Corporation, or its equivalent, may be used. Follow the directions in the manual for respective instruments).

b. Run the control fluid and the test fluid consecutively in the same apparatus and under the same test conditions for 30 minutes at 0°C. The equipment is to be such that the viscosity decrease of the reference fluid (see 6.4), at 40°C is approximately 15 percent. Use 30 ml of fluid for this test.

4.5.6 Copper strip corrosion. The following procedures shall be followed:

- a. Prepare three copper strips in accordance with *ASTM D130*.
- b. Fill test tubes or other suitable containers with 90 ml of hydraulic fluid and individually immerse the copper strips into the test tubes.
- c. Immerse each test tube, which will be equipped with an air condenser, in a constant temperature bath capable of maintaining the fluid temperature at $135 \pm 1^\circ\text{C}$. After 72 hours at this test temperature, remove the strips from the fluid, rinse them in sulfur-free acetone, and compare the results with the ASTM copper strip corrosion standards.

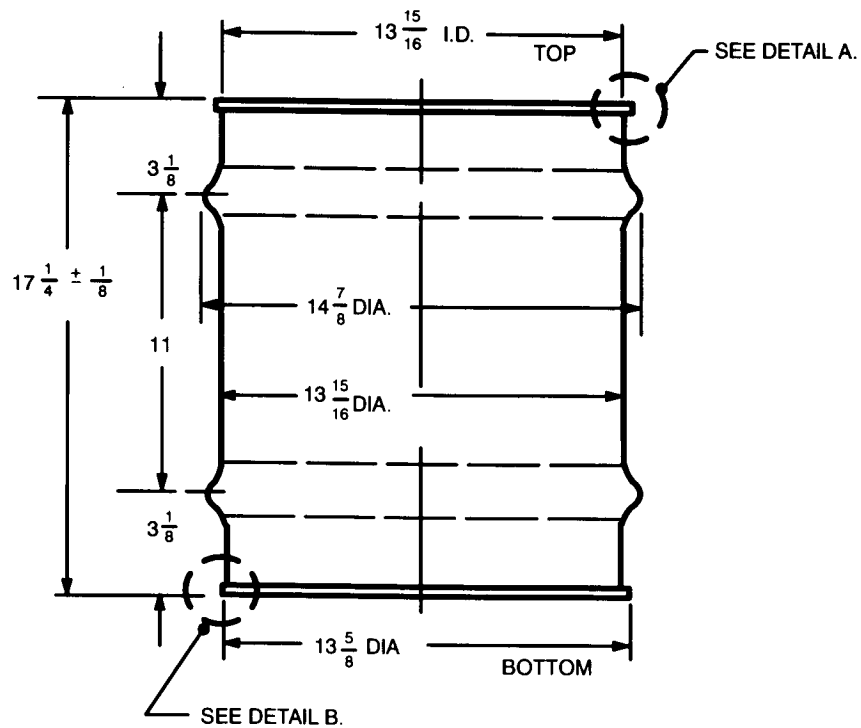
4.5.7 Examination of filled containers. Each filled container and shipping container sample shall be examined for construction defects of the container and closure, evidence of leakage, and net content. Any container in the sample that has one or more defects or is under the required fill shall be rejected, and if the number of defective containers in any sample exceeds the acceptance number for the appropriate sampling plan of table V, the lot represented by the sample shall be rejected. Rejected lots may be resubmitted for acceptance inspection provided the contractor has removed or repaired all nonconforming containers.

5. PACKAGING

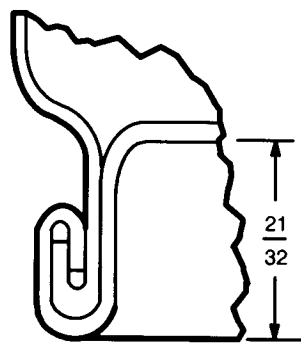
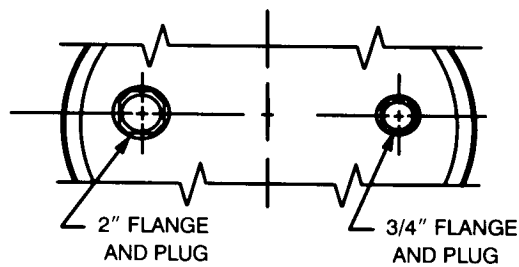
5.1 Preservation and packaging. Preservation and packaging of the hydraulic fluid shall be in accordance with *MIL-STD-290*. The fluid shall be furnished in 8-ounce, 1-quart, and 1-gallon cans; 10-gallon metal pails; and 55-gallon drums which conform to *PPP-D-729*, as specified (see 6.2). The 8-ounce, 1-quart, and 1-gallon cans shall conform to *PPP-C-96*, type I. The 10-gallon metal pails shall conform to *PPP-P-704*, type I, class 8, except all dimensions shall be in accordance with figure 1. Plugs and flanges shall be in accordance with *PPP-P-420*:

	<u>Type</u>	<u>Class</u>
0.75-inch flange	I	B
0.75-inch plug	I	D
2.00-inch flange	I	A
2.00-inch plug	I	C.

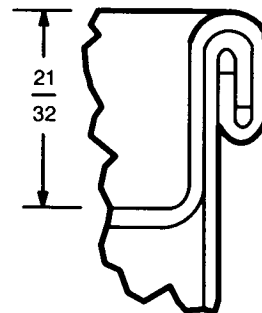
The interior of the pail shall be smoothly and continuously covered to a minimum thickness of 0.001 inch with two, well-cured coats of an epoxy-phenolic container coating resin. The coating resin shall be compatible with this specification and shall neither release particles nor flake off during normal use of pail, including minor denting and creasing of drum surfaces from external impact. The gasket material used shall be compatible with this specification and shall not have any adverse effect on the hydraulic fluid. Just prior to filling, all containers shall be thoroughly cleaned, rinsed with clean filtered fluid, and examined to ensure absolute absence of loose-solder, dirt, fibers, lint, metal particles, seaming compound, corrosion products, water, or other foreign contaminants.



DIMENSIONS IN INCHES
 MATERIAL: STEEL
 FRACTIONS: $\pm 1/16$



DETAIL B



DETAIL A

Figure 1. 10-gallon pail.

5.2 Marking. The marking of all containers shall be in accordance with *MIL-STD-290*, and any special marking required in the contract or purchase order (see 6.2). The unit containers shall also be marked with the following information:

WARNING: This fluid may contain tricresyl phosphate (TCP) which may be absorbed through the skin and produce paralysis if taken internally. Appropriate protective measures should be taken to avoid such exposures. Decontaminate containers before reuse.

6. NOTES

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

6.1 Intended use. The hydraulic fluid covered by this specification is intended for use in automatic pilots, shock absorbers, brakes, flap-control mechanisms, missile hydraulic servo-controlled systems, and other hydraulic systems which use synthetic sealing material.

6.1.1 Storage conditions. Prior to use in the intended equipment, the product may be stored under conditions of covered or uncovered storage in geographic areas which range in temperatures from -57°C to $+49^{\circ}\text{C}$.

6.1.2 Interchangeability. This fluid is completely compatible with *MIL-H-6083*, *MIL-H-46170*, *MIL-H-87257*, and *MIL-H-83282* hydraulic fluids. It may be interchangeable with these fluids for some applications. The selection of the fluids to be used depends on the requirements of the operational system.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of this specification.
- b. Type and size of containers (see 5.1).
- c. Issue of *DoDISS* to be cited in the solicitation and, if required, the specific issue of individual documents referenced (see 2.1 and 2.2).
- d. Quantity.
- e. Selection of applicable levels of packaging and packing with requirements in detail (see 5.1).
- f. Special marking (see 5.2).
- g. Toxicological data requirements (3.5.9).

6.2.1 Basis of purchase. The fluid covered by this specification should be purchased by volume, the unit being a U.S. gallon of 231 cubic inches at 15.6°C .

6.2.2 List of qualified products. Products considered acceptable under this specification are listed in QPL-5606 and subsequent revisions thereto.

6.3 Qualification. With respect to products which require qualification, awards will be made only for such products as have, prior to the time set for opening of bids, been tested and approved for inclusion in the applicable QPL, whether or not such products have actually been so listed by that date. The attention of the suppliers is called to this requirement, and manufacturers are urged to arrange to have the products they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. The activity responsible for the

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QPL is WL/MLSE, Bldg 652, 2179 Twelfth St Ste 1, Wright-Patterson AFB OH 45433-7718. Information pertaining to qualification of products may be obtained from that activity.

6.3.1 Qualification information. It is understood that the material furnished under this specification subsequent to final approval shall be of the same composition and shall be equal to products upon which approval was originally granted. In the event the fluid furnished under contract is found to deviate from the composition of the approved product, or the product fails to perform satisfactorily, approval of such a product will be subjected to immediate withdrawal from the QPL at the discretion of the Qualifying Agency.

6.4 Samples

6.4.1 Reference fluid. The sample (1 pint) of shear stability reference fluid for the test specified in 4.5.5 may be obtained from WL/MLSE, Bldg 652, 2179 Twelfth St Ste 1, Wright-Patterson AFB OH 45433-7718.

6.4.2 Synthetic rubber. Samples of standard synthetic rubber NBR-L shall subscribe to the formulation in accordance with *SAE AMS 3217/2*. A suggested source (material) is Wynn's Precision Rubber Products Corporation, Hartmann Drive, Lebanon TN 37087.

6.5 International agreements. The provisions of 1.1 of this specification are the subject of international standardization agreements (*ASCC 15/1*, *STANAG 1135*, and *STANAG 3748*). When amendment, revision, or cancellation of this specification is proposed, the departmental custodians will inform their respective Departmental Standardization Office (DepSO) so appropriate action may be taken with respect to the international agreement concerned.

6.6 Disposal actions

6.6.1 Background. The product may contain 0.5 ± 0.1 percent by weight of an anti-wear agent, such as TCP, that conforms to *TT-T-656*, or equivalent. When used, TCP shall contain no more than 1 percent of the ortho-isomer. Tricresyl phosphate, which may be absorbed through the skin, can produce paralysis if taken internally. Accumulated waste liquids shall have the exterior of the outer pack marked as containing TCP to help disposal facilities manage the product according to regulations promulgated by the US Environmental Protection Agency under *Public Law 94-580, Resource Conservation and Recovery Act of 1976*.

6.6.2 Handling and safety precautions. Personnel shall wear appropriate impervious clothing when handling the product to prevent repeated or prolonged skin contact. Local appraisal is required for exact health and safety implications and to prescribe precise application of protective clothing. If skin or clothing becomes moistened with the product, personnel shall promptly wash with soap or mild detergent and water. Respirators are not required unless there is an inhalation exposure to mists. Personnel shall wear protective clothing when using the product and when cleaning up spills.

6.6.3 Disposal

6.6.3.1 Background. The accumulated waste fluid shall be disposed of through a waste oil recovery program unless prohibited by local law. Otherwise, the product shall be disposed of in accordance to local law and regulations promulgated by the U.S. Environmental Protection Agency under *Public Law 94-580, Resource Conservation and Recovery Act of 1976*.

6.6.3.2 Depot-type operations. (Also see 6.6.3.1.) Additionally, the used product, which has been drained from the hydraulic systems, shall be combined with unused but contaminated fluid from partially full containers and then recycled.

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6.6.3.3 Container disposal. Depending upon local regulations, tops from one-time-use containers may be discarded with ordinary refuse. Containers should be made as empty as possible using gravity draining, after which they are to be crushed and buried in a permitted sanitary landfill or incinerated with general refuse. No special decontamination procedures are required for empty containers or their lids.

6.7 Subject term (key word) listing.

additive
anti-wear
corrosive
flash point
oxidation
pour point
shear stability
viscosity

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

Custodians:

Army – ME
Navy – AS
Air Force – II

Preparing activity:

Air Force – II

(Project 9150-0814)

Review activities:

Army – MI, SM, AR
Navy – SA, SH, OS
Air Force – 68
DLA – GS

User:

DS

International interest:

(See section 6.)

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

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I RECOMMEND A CHANGE:

1. DOCUMENT NUMBER
MIL-H-5606G

2. DOCUMENT DATE (YYMMDD)
940909

3. DOCUMENT TITLE

HYDRAULIC FLUID, PETROLEUM BASE; AIRCRAFT, MISSILE AND ORDNANCE

4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME (Last, First, Middle Initial)

b. ORGANIZATION

c. ADDRESS (Include Zip Code)

d. TELEPHONE (Include Area Code)
(1) Commercial

7. DATE SUBMITTED
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(2) DSN
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8. PREPARING ACTIVITY

A. NAME
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B. TELEPHONE (Include Area Code)
(1) Commercial (513) 255-6281 (2) DSN (If applicable) 785-6281

C. ADDRESS (Include Zip Code)
2335 SEVENTH STREET, BLDG 125, SUITE 6
WRIGHT-PATTERSON AFB OH 45433-7809

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