

METRIC

MIL-PRF-87257C

30 June 2017

SUPERSEDING

MIL-PRF-87257B

22 April 2004

PERFORMANCE SPECIFICATION

HYDRAULIC FLUID, FIRE RESISTANT, LOW TEMPERATURE, SYNTHETIC HYDROCARBON BASE, AIRCRAFT AND MISSILE

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 synthetic hydrocarbon base hydraulic fluid for use in the -54 °C to +200 °C temperature range in aircraft and missile hydraulic systems. This hydraulic fluid is identified by NATO Code No. H-538 (see [6.7](#)).

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 documents cited in sections 3 and 4 of this specification, whether or not they are listed.

Comments, suggestions, or questions on this document should be addressed to AFPET/PTPS, 2430 C Street, Building 70, Area B, Wright-Patterson AFB, OH 45433-7631 or e-mailed to AFPET.PTPS@us.af.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at <https://assist.dla.mil>.

AMSC N/A

FSC 9150

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2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks 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.

FEDERAL SPECIFICATIONS

TT-T-656* - Tricresyl Phosphate

FEDERAL STANDARDS

FED-STD-791 - Testing Method of Lubricants, Liquid Fuels, and Related Products

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-PRF-680 - Degreasing Solvent

MIL-PRF-5606* - Hydraulic Fluid, Petroleum Base; Aircraft, Missile, and Ordnance, NATO Code Number H-515

MIL-PRF-6083 - Hydraulic Fluid, Petroleum Base, for Preservation and Operation, NATO Code Number C-635

MIL-PRF-46170 - Hydraulic Fluid, Rust Inhibited, Fire Resistant, Synthetic Hydrocarbon Base, NATO Code Number H-544

MIL-PRF-83282 - Hydraulic Fluid, Fire Resistant, Synthetic Hydrocarbon Base, Metric, NATO Code Number H-537

* Indicates document is inactive for new design

(Copies of these documents are available online at <http://quicksearch.dla.mil>.)

2.2.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications 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.

DEFENSE STANDARDIZATION PROGRAM OFFICE

SD-6 - Provisions Governing Qualification

(Copies of this document are available online at <http://quicksearch.dla.mil>.)

2.3 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.

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ASTM INTERNATIONAL

- ASTM D92 - Standard Test Method for Flash and Fire Points by Cleveland Open Cup Tester
- ASTM D97 - Standard Test Method for Pour Point of Petroleum Products
- ASTM D130 - Standard Test Method for Corrosiveness to Copper from Petroleum Products by Copper Strip Test
- ASTM D445 - Standard Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (and Calculation of Dynamic Viscosity)
- ASTM D664 - Standard Test Method for Acid Number of Petroleum Products by Potentiometric Titration
- ASTM D892 - Standard Test Method for Foaming Characteristics of Lubricating Oils
- ASTM D972 - Standard Test Method for Evaporation Loss of Lubricating Greases and Oils
- ASTM D1500 - Standard Test Method for ASTM Color of Petroleum Products (ASTM Color Scale)
- ASTM D1298 - Standard Test Method for Density, Relative Density, or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method
- ASTM D4052 - Standard Test Method for Density, Relative Density, and API Gravity of Liquids by Digital Density Meter
- ASTM D4172 - Standard Test Method for Wear Preventive Characteristics of Lubricating Fluid (Four-Ball Method)
- ASTM D4289 - Standard Test Method for Elastomer Compatibility of Lubricating Greases and Fluids
- ASTM D4636 - Standard Test Method for Corrosiveness and Oxidation Stability of Hydraulic Oils, Aircraft Turbine Engine Lubricants, and Other Highly Refined Oils
- ASTM D4898 - Standard Test Method for Insoluble Contamination of Hydraulic Fluids by Gravimetric Analysis
- ASTM D5185 - Standard Test Method for Multielement Determination of Used and Unused Lubricating Oils and Base Oils by Inductively Coupled Plasma Atomic Emission Spectrometry (ICP-AES)
- ASTM D5306 - Standard Test Method for Linear Flame Propagation rate of Lubricating Oils and Hydraulic Fluids
- ASTM D5949 - Standard Test Method for Pour Point of Petroleum Products (Automatic Pressure Pulsing Method)

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- ASTM D6304 - Standard Test Method for Determination of Water in Petroleum Products, Lubricating Oils, and Additives by Coulometric Karl Fischer Titration
- ASTM D6793 - Standard Test Method for Determination of Isothermal Secant and Tangent Bulk Modulus

(Copies of these documents are available from <http://www.astm.org/>.)

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

- ISO 11171 - Hydraulic Fluid Power – Calibration of Automatic Particle Counters for Liquids
- ISO 11500 - Hydraulic Fluid Power – Determination of the Particulate Contamination Level of a Liquid Sample by Automatic Particle Counting Using the Light-extinction Principle

(Copies of this document are available from <http://www.iso.org/>.)

SAE INTERNATIONAL

- SAE AS4059 - Aerospace Fluid Power – Contamination Classification for Hydraulic Fluid
- SAE AMS3400 - Fluid, Reference for Testing Polyalphaolefin (PAO) Resistant Material

(Copies of this document are available from <http://www.sae.org/>.)

2.4 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 Qualification. The hydraulic fluid furnished under this specification shall be product that is authorized by the qualifying activity for listing on the applicable qualified products list before contract award (see [4.2](#) and [6.3](#)).

3.1.1 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 materials used in formulating this hydraulic fluid shall consist of synthetic hydrocarbon base and shall contain additives as specified in [3.2.1](#). A base oil mixture of 2 mm²/sec and 4 mm²/sec polyalphaolefin is suggested, but is not mandatory. The hydraulic fluid shall contain no admixture of resins, soaps, gums, fatty oils, or oxidized hydrocarbons.

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3.2.1 Additives. There shall be no restriction on the types of materials used as additives in the fluid except for those listed and those imposed by technical requirements of this specification. No pour point depressant materials or viscosity index improvers shall be used.

3.2.1.1 Oxidation inhibitors. Oxidation inhibitors of the phenolic type shall not exceed a concentration of 2.0 percent by weight.

3.2.1.2 Anti-wear agent. Anti-wear agents, such as tricresyl phosphate (TCP) conforming to TT-T-656, shall be blended in sufficient quantity, not to exceed 3.0 weight percent, to permit the finished oil to meet four-ball requirements specified in [Table I](#). If TCP is used, the finished fluid shall contain less than 0.03 weight percent of the ortho-isomer.

3.2.1.3 Blending fluid. Blending fluids, such as diesters, shall be blended in a concentration not to exceed 35 percent by weight of the finished fluid but in sufficient quantity to meet the rubber swell, as specified in [Table I](#), and viscosity requirement at -54 °C as specified in [Table I](#).

3.2.1.4 Color. The fluid shall contain red dye in concentration not greater than 1 part of dye per 10,000 parts of oil by weight.

3.3 Finished fluid. The properties of the finished fluid shall be as specified in [Table I](#), [Table II](#), and [4.4.2](#).

4. VERIFICATION

4.1 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. Qualification inspection (see [4.2](#)).
- b. Conformance inspection (see [4.3](#)).

4.2 Qualification inspection conditions. Unless otherwise specified, all inspections shall be performed in accordance with (IAW) the test conditions specified in [4.4](#) and [Table I](#) except particulate contamination.

4.2.1 The general outline of the qualification process (see [6.3](#)) is described in the SD-6.

4.2.2 Qualification sample(s). Qualification samples shall consist of a 1-gallon container of hydraulic fluid. The following may also be requested at the option of the qualifying agent: 1 quart of the base stock before addition of additive agents, 1 ounce red dye, 1 quart of blending fluid, 4 ounces anti-wear agent, and 1 ounce of any other additive used in the formulation. In the event additives are supplied as concentrated solutions, an equivalent quantity of the solution shall be furnished. The qualifying activity will request data as noted in [6.3.2](#) prior to authorizing submission of the qualification sample(s).

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4.2.3 Retention of qualification. In order to retain qualification of approval for listing on the Qualified Products List (QPL), the manufacturer shall verify (by certification (DD Form 1718) to the Qualifying Activity) that the manufacturer's product complies with the requirements of this specification. The manufacturer shall also provide a recent Certificate of Analysis (COA) to include all conformance inspection requirements (see [4.3](#)). The time of periodic verification by certification shall be in two and one half year intervals from the date of original qualification. The Government reserves the right to re-examine the qualified product whenever deemed necessary to determine if the product continues to meet any or all of the specification requirements.

4.2.4 Requalification. Requalification shall be required every five years or when any change is made in the source of manufacture, purity, or composition of the fluid's base stock or additives. A minor change in the fluid formulation might not need requalification testing, but only after notification to, and approval by the qualifying activity (see [6.3](#)). The documentation required for requalification shall include product formulation, safety data sheet (SDS) for each component and final product, and a COA showing compliance to the qualification requirements, and a one gallon re-qualification sample from a recent production run. The SDS should not be older than 5 years. The qualifying activity may, at its discretion, waive complete requalification or may require only partial requalification testing to determine the significance and acceptability of the proposed formulation change.

4.3 Conformance inspection. Conformance inspection shall consist of testing the sample against all requirements specified in [Table I](#). Samples shall be labeled completely with information identifying the purposes of the sample, name of product, specification number, lot and batch number, date of manufacture, date of sampling, and contract number.

4.4 Method of inspection. Unless otherwise specified, inspection testing shall be performed IAW [4.4.1](#) and the contractual requirements (see [6.2](#)).

4.4.1 Tests. The hydraulic fluid properties shall be determined in accordance with the applicable methods specified in [Table I](#) and sections [4.4.2](#) through [4.4.5](#). Physical and chemical values apply to the average of the determinations made on the samples.

4.4.2 Compatibility. Samples of candidate fluid in amounts of 20-mL, 100-mL, and 180-mL shall be mixed with samples from each of the fluids previously approved under this specification. Total volume of each mixture shall be 200-mL. Mixtures shall be prepared in 250-mL stoppered flasks. The flasks shall be thoroughly agitated and then stored in an oven at 200 °C for 2 hours. At the end of this time, none of the mixtures shall show any sign of sediment, turbidity, or crystallization. The samples shall then be stored at -54 °C for a period of 2 hours. Slight turbidity after this time, which later disappears, will be permitted in the samples. Compatibility tests described herein shall also be conducted with representative fluids qualified to MIL-PRF-5606 and MIL-PRF-83282.

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TABLE I. Properties and Test Methods.

Property	Qualification	Conformance	Min	Max	Requirement	Test Method	
						FED-STD-791	ASTM (ISO)
Acid number, mg KOH/g	X	X		0.20			D664
Relative Density @ 15.6°C/15.6°C	X	X	(1) (2)				D4052, D1298
Barium content, mg/kg	X			10			D5185
Color	X	X	(3)		4.4.5		D1500
Compatibility	X		(4)		4.4.2		
Corrosiveness and oxidation stability (168 hours @ 135 °C ± 1 °C)	X						D4636
Change in acid number, mg KOH/g				0.20			
Percent change in viscosity @ 40 °C			-10	10			
Metal specimen weight change, mg/cm ² (5)							
M-50 steel			-0.2	0.2			
Aluminum			-0.2	0.2			
Magnesium			-0.2	0.2			
Cadmium plated steel (6)			-0.2	0.2			
Copper (7)			-0.6	0.6			
Separation of insoluble materials or gumming of the fluid				None			
Evaporation loss (6.5 hours @ 135 °C), weight percent	X	X		20			D972
High temperature-high pressure spray ignition	X		(8)			6052	
Flame propagation cm/sec	X			0.5			D5306
Flash point, °C	X	X	160				D92
Fire point, °C	X		170				D92
Foaming characteristics @ 24 °C	X	X					D892
Foaming tendency, mL (volume at end of five-minute blowing period)				65			
Foam stability, mL (volume at end of ten-minute settling period)				0 (9)			

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TABLE I. Properties and Test Methods - Continued.

Property	Qualification	Conformance	Min	Max	Requirement	Test Method	
						FED-STD-791	ASTM (ISO)
Four-ball, use test condition A, scar diameter, mm							D4172
1 kg load	X			0.21			
10 kg load	X			0.30			
40 kg load	X			0.65			
High temperature stability	X				4.4.3		
Percent change in viscosity @ 40 °C			-5	5			
Change in acid number, mg KOH/g				0.1			
Formation of precipitate or insoluble material				None			
Isothermal secant bulk modulus @ 40 °C and 27.6 MPa (4000 psig), MPa (psi)	X		1379 (200000)				D6793
Low temperature stability, 72 hours @ -54 °C ±1 °C	X	X		(10)		3458	
Particulate contamination							
Particle count, AS4059 Contamination Class (11)		X		5 (12)	4.4.4.1	3012 (13)	(11500)
Gravimetric analysis, mg/100 mL		X		1.0	4.4.4.2		D4898
Pour point, °C	X	X		-60			D97, D5949
Rubber swell, standard synthetic rubber, NBR-L, percent change in volume (14)	X		19.0	30.0			D4289 (15)
Storage stability (after 12 months)	X			(16)		3465	
Viscosity stability @ -54 °C, mm ² /sec							D2532
3 hours	X	X		2500			
72 hours	X			2500			
Viscosity, mm ² /sec							D445
@ 40 °C	X	X	6.7				
@ 100 °C	X	X	2.0				
@ -40 °C	X	X		550			
Water, mg/kg	X	X		100			D6304
Workmanship	X	X		(17)			

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TABLE I. Properties and Test Methods - Continued.

Notes:

1. Qualification inspection: Shall be determined, but shall not be limiting.
2. Conformance inspection: Shall be ± 0.008 of the value determined during qualification inspection.
3. There shall be no readily discernible difference between the color of the finished fluid and the standard color.
4. Compatible in all concentrations with each of the fluids approved under this specification. Shall be miscible with MIL-PRF-5606, MIL-PRF-6083, MIL-PRF-46170, and MIL-PRF-83282 fluids in all proportions from $-54\text{ }^{\circ}\text{C}$ to $200\text{ }^{\circ}\text{C}$. No formation of resinous gums, sludge, or insoluble material shall occur.
5. There shall be no pitting, etching, or visible corrosion on the surface of the metals when viewed under magnification of 20 diameters.
6. A slight discoloration shall be permitted.
7. Any corrosion (discoloration) produced on the surface shall be not greater than a No. 3 of the ASTM D130 copper corrosion standard.
8. The flame shall not continue to burn when the source of ignition is removed.
9. A ring of small bubbles around the edge of the graduate shall be considered complete collapse.
10. No evidence of gelling, clouding, crystallization, solidification, or separation of ingredients.
11. The container shall be thoroughly shaken immediately prior to withdrawing the sample. A determination shall be made on 100-mL portion of the sample.
12. See [Table II](#) for particle count per size range.
13. Hexane shall be used instead of ozone depleting solvents.
14. The test shall be run at $70\text{ }^{\circ}\text{C}$ for 168 hours.
15. When checking elastomers for conformance to the specifications as noted in D4289 annex "Physical Property Data for Reference Elastomers" use SAE AMS3400 as the reference fluid.
16. The fully blended product shall be clear and transparent, with no separation of ingredients or evidence of crystallization, and shall conform to all requirements of this specification.
17. Homogeneous and free from suspended matter, grit, or other adulteration.

4.4.3 High-temperature stability.

4.4.3.1 Apparatus. Thermal stability characteristics of the hydraulic fluid shall be determined using the following test apparatus: a 50-mL, round-bottom flask or a test tube (25 mm x 50 cm) with standard taper 24/40 (Ace Glass Inc., Vineland, NJ 08360 or equivalent); a 75° angle adapter with standard taper 24/40 (Ace Glass 5040-10 or equivalent); gas inlet tube, 6 mm OD (Ace Glass 8700-37 or equivalent); and a high-temperature bath capable of maintaining a temperature of $200\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$.

4.4.3.2 Procedure. The following procedures shall be followed for determining high-temperature stability:

- a. Place 25 mL of candidate fluid in a flask or test tube fitted with a 75° angle adapter and gas inlet tube.
- b. Adjust the height of the glass inlet tube to within 1.0 cm above the level of the fluid.
- c. Place a 2.5-cm length of $\frac{1}{4}$ -inch OD stainless steel tubing, type 304, into the fluid.

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d. Heat the fluid for 100 hours at a temperature of $200\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ while maintaining a 1-liter-per hour flow of dry nitrogen (lamp grade) on the surface of the fluid via the gas inlet tube.

4.4.3.3 Evaluation. Upon completion of the test, the fluid shall meet the requirements of Table I.

4.4.4 Particulate contamination.

4.4.4.1 Particle count. Particle count shall be measured by the use of an automatic particle counter employing the light interruption principle. The automatic counter shall count particles to the limits specified in [Table II](#). The operating directions in the manual for the respective instrument shall be used.

TABLE II. Particle Count, AS4059 Contamination Level 5.

Particle size range NAS 1638 (ISO 11171), micrometers	Maximum number of particles per 100 mL
DIFFERENTIAL	
5-15 (6-14 _(c))	8000
16-25 (15-21 _(c))	1425
26-50 (22-38 _(c))	253
51-100 (39-70 _(c))	45
Over 100 (Over 70 _(c))	8
CUMULATIVE	
>5 (>6 _(c))	9731
>15 (>14 _(c))	1731
>25 (>21 _(c))	306
>50 (>38 _(c))	53
>100 (>70 _(c))	8

4.4.4.2 Gravimetric. A gravimetric determination shall be made IAW ASTM D4898 with the following additional requirements:

- a. Exposure of the filter to open air shall be minimized. While in the petri dish, the lid shall remain on at all times.
- b. Select two white, 0.45-micron, polypropylene membrane filters (such as Pall-Gelman, GH-Polypro). Place each filter in a clean petri dish, cover, and put both dishes in a desiccator for at least 15 minutes.
- c. Remove petri dishes containing filters from the desiccator. Take a filter from its petri dish, pass it through an ionizer for 10 seconds, and then weigh it. After weighing, immediately return the filter to its petri dish. Repeat with the second filter.

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d. After filtering and drying on a filtration apparatus, dry the filters in their covered petri dishes for 15 minutes in a 75 °C oven. Do not use other drying methods. Remove closed petri dish from the oven; allow filters to equilibrate to ambient room conditions in a desiccator for 15 minutes before weighing.

4.4.5 Color of finished fluid. The color of the hydraulic fluid shall be compared with a standard sample prepared by adding 1 part of dye “Oil red 235” (see [6.1.4](#)) to 10,000 parts of an oil not darker than ASTM D1500 color number 1.0.

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. The hydraulic fluid covered by this specification is intended for use from -54 °C to +200 °C in automatic pilots, shock absorbers, brakes, flap-control mechanisms, missile hydraulic servo-controlled systems, and other hydraulic systems using 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 ranging in temperatures from -57 °C to +49 °C (-70 °F to +120 °F).

6.1.2 Interchangeability. This fluid is completely compatible with MIL-PRF-5606, MIL-PRF-6083, MIL-PRF-46170, and MIL-PRF-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.

6.1.3 Cleaning agents. Chlorinated solvents should not be used for cleaning hydraulic components. Residual solvent contaminates the hydraulic fluid and may lead to corrosion. The recommended solvents are MIL-PRF-680, Type II, A-A-59601, Type II, or other petroleum distillate type solvents.

6.1.4 Oil red dye source. “Oil red 235” is manufactured by Passaic Color and Chemical Company. For more information, see <http://www.royceintl.com>.

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6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of this specification.
- b. Type and size of containers.
- c. Quantity.
- d. Packaging requirements (see [5.1](#)).
- e. When a variation of the quality conformance tests to be performed on a sample is required (see [4.4.1](#)).

6.3 Qualification. With respect to products requiring qualification, contract awards will be made only for such products that are, at the time of award of contract, qualified for inclusion in the QPL No. 87257 whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that 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. Information pertaining to qualification of products may be obtained from AFPET/PTPS, 2430 C Street, Building 70, Area B, Wright-Patterson AFB OH 45433-7631. An online listing of products qualified to this specification may be found in the Qualified Products Database (QPD) at <https://assist.dla.mil>.

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

6.3.2 Qualification process. Clarification information concerning submitting a test sample to the Air Force Petroleum Office for qualification to MIL-PRF-87257 follows.

6.3.2.1 Requesting qualification/re-qualification. At the initiation of the qualification process, prospective suppliers forward a written request for such action to the qualifying activity, Air Force Petroleum Office, AFPET/PTPS, 2430 C Street, Building 70, Area B, Wright-Patterson AFB, OH 45433-7631. This request should contain general information on the proposed candidate material. The qualifying activity will reply in writing outlining the required information to be submitted, the governing regulations for qualified products, and the cost of testing. The information to be submitted includes:

- a. Letter stating the company will adhere to the appropriate provisions of the SD-6.
- b. Complete formulation of the candidate product, including chemical composition in weight percent, the manufacturer and trade name, the purity, and use of each component.
- c. Safety Data Sheet (SDS) for each component and final product. The SDS should not be older than 5 years.
- d. Certified laboratory test data from the manufacturer, a commercial laboratory, or combination thereof showing quantitative results of all tests required by this specification.
- e. Verification that the System for Award Management (SAM) (CAGE Codes for the corporate office and each plant) is current. This can be viewed at <https://sam.gov/>.

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- f. Identification of the manufacturing site of the specific batch of test sample to be submitted.

6.3.2.2 Proceed authorization notification. Upon successful review of the submitted information, the Air Force Petroleum Office will issue authorization to ship the qualification sample(s) for testing.

6.3.3 Qualification samples. Upon receiving authorization from the Air Force Petroleum Office, qualification sample(s) may be shipped to the qualification activity, as detailed in the authorization letter. Sample(s) will be accompanied by an SDS and a copy of the authorization letter. Each sample will be plainly identified by securely attached durable tags or labels marked with the following information:

- a. QUALIFICATION SAMPLE
- b. Hydraulic Fluid, Fire Resistant; Low Temperature, Synthetic Hydrocarbon Base, Aircraft and Missile
- c. MIL-PRF-87257
- d. Name of Manufacturer
- e. Product Code Number
- f. Batch Number
- g. Date of Manufacture

6.4 Definitions.

6.4.1 Bulk lot. A bulk lot (batch) is an indefinite quantity of a homogeneous material mixture offered for acceptance in a single, isolated container or manufactured in a single-plant run (not exceeding 24 hours) through the same processing equipment, with no change in ingredient material (see [6.3.3](#)).

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

6.5 Shelf-life. This specification covers items where the assignment of a Federal shelf-life code is a consideration. Specific shelf-life requirements should be specified in the contract or purchase order, and should include, as a minimum, shelf-life code, shelf-life package markings IAW MIL-STD-129 or FED-STD-123, preparation of a materiel quality storage standard for type II (extendible) shelf-life items, and a minimum of 85 percent shelf-life remaining at time of receipt by the Government. These and other requirements, if necessary, are in DoDM 4140.27, Volume 1, Shelf-Life Management Program: Program Administration; and Volume 2, Shelf-Life Management Program: Materiel Quality Control Storage Standards. The shelf-life codes are in the Federal Logistics Information System Total Item Record. Additive information for shelf-life management may be obtained from DoDM 4140.27 Volumes 1 and 2, or the designated shelf-life Points of Contact (POC). The POC should be contacted in the following order: (1) the Inventory Control Points that manage the item and (2) the DoD Service and Agency administrators for the

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DoD Shelf-Life Program. Appropriate POCs for the DoD Shelf-Life Program can be contacted through the DoD Shelf-Life Management website: <https://www.shelflife.dla.mil/>.

6.6 Subject term (key word) listing.

Additive, hydraulic systems
 Anti-wear
 Contamination
 Corrosion resistant
 Fire resistant
 Flash point
 Hydraulic system
 Lubricant
 Oxidation stability
 Polyalphaolefin
 Pour point
 Shear stability
 Tricresyl Phosphate
 Viscosity

6.7 International standardization agreement implementation. This specification implements:

- a. ASIC Air Standard ACS (FG) 4023 "Hydraulic Fluid, Petroleum (H-515) and Polyalphaolefin (H-537 and H-538)"
- b. ASIC Air Standard ACS (FG) 4024 "Interchangeability Chart of Standardised Aviation Fuels, Lubricants, and Associated Products"
- c. NATO STANAG 1135 "Interchangeability of Fuels, Lubricants and Associated Products Used by the Armed Forces of the North Atlantic Treaty Nations"
- d. NATO STANAG/AFLP-3748 "Hydraulic Fluid, Petroleum (H-515), Polyalphaolefin (H-537, H-538) and Phosphate Ester Fluids (H-522, H-523, H-524)"

When amendment, revision, or cancellation of this specification is proposed, the preparing activity must coordinate the action with the U.S. National Point of Contact for the international standardization agreement, as identified in the ASSIST database at <https://assist.dla.mil>.

6.8 Background (safety). The product may contain up to 3 percent by weight of an anti-wear agent, such as Tricresyl phosphate (TCP), conforming to TT-T-656, or equivalent. When used, TCP should contain no more than 1 percent of the ortho-isomer. TCP, which may be absorbed through the skin, can produce paralysis if taken internally. Accumulated waste liquids should 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. Historical practice directed that unit containers be marked with the following warning:

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.

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6.8.1 Handling precautions. Personnel handling the product will wear appropriate impervious clothing 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 will promptly wash with soap or mild detergent and water. Respirators are not required unless there is an inhalation exposure to mists. Personnel will wear protective clothing when using the product and when cleaning up spills.

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

6.8.3 Depot-type operations. The used product which has been drained from the hydraulic systems will be combined with unused, but contaminated, fluid from partially full containers and then recycled.

6.8.4 Container disposal. Containers will 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.

6.9 Conversion of metric units. Units of measure have been converted to the International System of Units (Metric) IAW ASTM E380. If test results are obtained in units other than Metric or there is a requirement to report dual units, ASTM E380 or ASTM D1250 Volume XI/XII should be used to convert the units.

6.10 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:

Army – AT
Navy – AS
Air Force – 68

Preparing activity:

Air Force – 68
(Project 9150-2017-001)

Review activities:

Army – AV, MD1
Navy – SH
Air Force – 11
DLA – GS, PS

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 using the ASSIST Online database at <https://assist.dla.mil>.