

<b>METRIC</b>
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**MIL-PRF-87257B****22 April 2004****SUPERSEDING****MIL-PRF-87257A****8 December 1997**

## **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 [6.5](#)).

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

AMSC N/A

FSC 9150

Comments, suggestions, or questions on this document should be addressed to ASC/ENOS, 2530 Loop Road West, Wright-Patterson AFB OH 45433-7101 or e-mailed to <a href="mailto:Engineering.Standards@wpafb.af.mil">Engineering.Standards@wpafb.af.mil</a> . Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at <a href="http://www.dodssp.daps.mil">www.dodssp.daps.mil</a> .
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**DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.**

**MIL-PRF-87257B****2.2 Government documents****2.2.1 Specifications and standards**

The following specifications and standards 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.

**SPECIFICATIONS****FEDERAL**

TT-T-656\* - Tricresyl Phosphate

**MILITARY**

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, Aircraft, Metric, *NATO Code Number H-537*

\* Indicates document is inactive for new design

**STANDARDS****FEDERAL**

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

(Copies of these documents are available online at <http://assist.daps.dla.mil/quicksearch/> or [www.dodssp.daps.mil](http://www.dodssp.daps.mil) or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

**2.2.2 Other Government 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.

**PUBLICATIONS****U.S. ENVIRONMENTAL PROTECTION AGENCY**

Public Law 94-580 - Resource Conservation and Recovery Act of 1976

(Application for copies may be ordered online at <http://bookstore.gpo.gov/> or addressed to the Superintendent of Documents, U.S. Government Printing Office, Washington DC 20402.)

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(Copies of specifications, standards, handbooks, drawings, and publications required by manufacturers in connection with specific acquisition functions should be obtained from the acquisition activity or as directed by the contracting office.)

**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.

**AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)**

- |             |  |
|-------------|--|
| ASTM D 92   | - Flash and Fire Points by Cleveland Open Cup (DoD adopted)  |
| ASTM D 97   | - Pour Point of Petroleum Products (DoD adopted)   |
| ASTM D 130  | - Detection of Copper Corrosion from Petroleum Products by the Copper Strip Tarnish Test (DoD adopted)   |
| ASTM D 287  | - API Gravity of Crude Petroleum and Petroleum Products (Hydrometer Method) (DoD adopted)  |
| ASTM F 312  | Microscopical Sizing and Counting Particles from Aerospace Fluids on Membrane Filters  |
| ASTM D 445  | - Kinematic Viscosity of Transparent and Opaque Liquids (the Calculation of Dynamic Viscosity), (DoD adopted)  |
| ASTM D 664  | - Acid Number of Petroleum Products by Potentiometric Titration (DoD adopted)  |
| ASTM D 892  | - Foaming Characteristics of Lubricating Oils (DoD adopted)  |
| ASTM D 972  | - Evaporation Loss of Lubricating Greases and Oils (DoD adopted)   |
| ASTM D 1500 | - ASTM Color of Petroleum Products (ASTM Color Scale) (DoD adopted)  |
| ASTM D 4057 | - Manual Sampling of Petroleum and Petroleum Products (DoD adopted)  |
| ASTM D 4172 | - Wear Preventive Characteristics of Lubricating Fluid (Four-Ball Method) (DoD adopted)  |
| ASTM D 4177 | - Automatic Sampling of Petroleum and Petroleum Products (DoD adopted)   |
| ASTM D 4636 | - Corrosiveness and Oxidation Stability of Hydraulic Oils, Aircraft Turbine Engine Lubricants, and Other Highly Refined Oils (DoD adopted)   |
| ASTM D 4898 | - Insoluble Contamination of Hydraulic Fluids by Gravimetric Analysis (DoD adopted)  |
| ASTM D 5185 | - Determination of Additive Elements, Wear Metals, and Contaminants in Used Lubrication Oils and Determination of Selected Elements in Base Oils by Inductively Coupled Plasma Atomic Spectroscopy (ICP-AES) (DoD adopted) |
| ASTM D 5306 | - Linear Flame Propagation Rate of Lubricating Oils and Hydraulic Fluids   |
| ASTM D 5864 | - Determination of Aerobic Aquatic Biodegradation of Lubricants or Their Components  |

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- ASTM D 5949 - Pour Point of Petroleum Products (Automatic Pressure Pulsing Method)
- ASTM D 6304 - Determination of Water in Petroleum Products, Lubricating Oils, and Additives by Coulometric Karl Fisher Titration
- ASTM D 6793 - Determination of Isothermal Secant and Tangent Bulk Modulus

(Application for copies should be addressed to ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, Pennsylvania, USA 19428-2959. Order online at [www.astm.org](http://www.astm.org).)

## **SOCIETY OF AUTOMOTIVE ENGINEERS (SAE)**

- SAE AMS 3217/2 - Test Slabs, Acrylonitrile Butadiene (NBR-L) Low Acrylonitrile, 65-75 (DoD adopted)

(Applications for copies should be addressed to SAE, 400 Commonwealth Dr., Warrendale PA 15096-0001. Order online at <http://www.sae.org/technicalcommittees/index.htm>.)

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

## **2.4 Order of precedence**

In the event of a conflict between the text of this specification and the references cited herein, the text of this specification takes precedence. Nothing in this specification supersedes applicable laws and regulations unless a specific exemption has been obtained.

**MIL-PRF-87257B****3. REQUIREMENTS****3.1 Qualification**

The hydraulic fluids 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 [4.2](#) 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 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 cSt and 4 cSt polyalphaolefin is suggested but is not mandatory. The hydraulic fluid shall contain no admixture of resins, soaps, gums, fatty oils, or oxidized hydrocarbons.

**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 may 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](#).

**MIL-PRF-87257B****TABLE I. Properties and test methods.**

Property	Test Limits	Test Method	
		FED-STD-791	ASTM
Acid number, mg KOH/g	0.20 max		D 664
Aerobic aquatic biodegradation	Class I min		D 5864
API gravity @ 15.6°C/15.6°C	(1) (2)		D 287
Barium content, parts per million	10 max		D 5185
Color (3)	(4)		D 1500
Compatibility (5)	(6)		
Corrosiveness and oxidation stability (168 hours @ 135 ±1°C) Change in acid number, mg KOH/g Percent change in viscosity @ 40°C Metal specimen weight change, mg/cm² (7) M-50 steel Aluminum Magnesium Cadmium plated steel (8) Copper (9) Separation of insoluble materials or gumming of the fluid	0.20 max ±10 max  ±0.2 max ±0.2 max ±0.2 max ±0.2 max ±0.6 max None		D 4636
Evaporation loss (6.5 hours @ 135°C), weight percent	20 max		D 972
Flammability High temperature-high pressure spray ignition Flame propagation cm/sec Flash point, °C Fire point, °C	(10) 0.5 max 160 min 170 min	6052	D 5306 D 92 D 92
Foaming characteristics @ 24°C Foaming tendency, ml (volume at end of five-minute blowing period) Foam stability, ml (volume at end of ten-minute settling period)	65 max  Complete collapse (11)		D 892
Four-ball, use test condition A, scar diameter, mm 1 kg load 10 kg load 40 kg load	0.21 max 0.30 max 0.65 max		D 4172

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Property	Test Limits	Test Method	
		FED-STD-791	ASTM
High temperature stability <sup>(12)</sup> Percent change in viscosity @ 40°C Change in acid number, mg KOH/g Formation of precipitate or insoluble material	±5 max 0.1 max None		
Isothermal secant bulk modulus @ 40°C and 27.6 MPa (4000 psig), MPa (psi)	1379 min (200,000 min)		D 6793
Low temperature stability, 72 hours @ -54°C ±1°C	<sup>(13)</sup>	3458	
Particulate contamination <sup>(14)</sup> Particle count <sup>(15)</sup> Gravimetric analysis, mg/100 ml	See <a href="#">table II</a> 1.0 max	3012 <sup>(16)</sup>	D 4898
Pour point, °C	-60 max		D 97 or D 5949
Rubber swell, standard synthetic rubber, NBR-L, percent <sup>(17)</sup>	19.0 to 30.0	3603	
Storage stability (after 12 months)	<sup>(18)</sup>	3465	
Viscosity stability @ -54°C, mm²/sec 3 hours 72 hours	2500 max 2500 max		D 2532
Viscosity, mm²/sec @ 40°C @ 100°C @ -40°C	6.7 min 2.0 min 550 max		D 445
Water, parts per million	100 max		D 6304
Workmanship	<sup>(19)</sup>		

## NOTES:

- (1) Qualification inspection: Shall be determined, but shall not be limiting.
- (2) Conformance inspection: Shall be ±0.008 the value determined during qualification inspection.
- (3) See [4.4.6](#).
- (4) There shall be no readily discernible difference between the color of the finished fluid and the standard color.
- (5) See [4.4.3](#).
- (6) 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°C to 200°C. No formation of resinous gums, sludge, or insoluble material shall occur.

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- (7) There shall be no pitting, etching, or visible corrosion on the surface of the metals when viewed under magnification of 20 diameters.
- (8) A slight discoloration shall be permitted.
- (9) Any corrosion (discoloration) produced on the surface shall be not greater than a No. 3 of the *ASTM D 130* copper corrosion standard.
- (10) The flame shall not continue to burn when the source of ignition is removed.
- (11) A ring of small bubbles around the edge of the graduate shall be considered complete collapse.
- (12) See [4.4.4](#).
- (13) No evidence of gelling, clouding, crystallization, solidification, or separation of ingredients.
- (14) The container shall be thoroughly shaken immediately prior to withdrawing the sample. Two determinations per sample are required. Each determination shall be made on 100-ml portions of the sample.
- (15) Particle count may also be measured by the use of the optical procedure detailed in method *ASTM F 312* in lieu of a HIAC counter (Model HIAC Royco 8000A) or equivalent. See [4.4.5](#).
- (16) Hexane shall be used instead of ozone depleting solvents.
- (17) Use standard synthetic rubber NBR-L (as referenced in AMS 3217/2) within 12 months of date of manufacture. Store under 60°F. See [6.4](#).
- (18) 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.
- (19) Homogeneous and free from suspended matter, grit, or other adulteration.

**TABLE II. Particle count.**

<b>Particle size range (largest dimension), micrometers</b>	<b>Allowable number (max) each determination, automatic count</b>
5-15	10,000
15-25	1,000
25-50	150
50-100	20
Over 100	5



**MIL-PRF-87257B****4. VERIFICATION****4.1 Classification of inspection**

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

**4.2 Qualification inspection****4.2.1 Qualification inspection sample**

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, 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](#) to accompany the qualification samples.

**4.2.2 Qualification tests**

Qualification sample(s) shall be subjected to all the tests specified in section [4.4](#) and [table I](#) except particulate contamination.

**4.2.3 Retention of qualification**

In order to retain qualification of a product approved for listing on the Qualified Products List (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 that the product continues to meet any or all of the specification requirements. Requalification is required every five years.

**4.3 Conformance inspection**

Conformance inspection shall consist of testing the sample against all requirements specified in [table III](#). In the event of a particulate contamination count failure, the referee method shall be the microscopic method detailed in *ASTM F 312*. 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.

**MIL-PRF-87257B****TABLE III. Conformance tests.**

Inspection	Test Limit	Test Method	
		FED-STD-791	ASTM
Acid number, mg KOH/g	0.20 max		D 664
API Gravity	See <a href="#">table I</a>		D 287
Color of finished fluid	See <a href="#">table I</a>		D 1500
Evaporation loss (6.5 hours @135°C), weight percent	20 max		D 972
Flash point, °C	160 min		D 92
Foaming characteristics @ 24°C Foaming tendency, ml (volume at end of 5-minute blowing period) Foam stability, ml (volume at end of 10-minute settling period)	See <a href="#">table I</a> 65 max Complete collapse		D 892
Four-ball, use test condition A, scar diameter, mm 1 kg load 10 kg load 40kg load	0.21 max 0.30 max 0.65 max		D 4172
Low temperature stability, 72 hours @ -54°C ±1°C	See <a href="#">table I</a>	3458	
Particulate contamination Particle count Gravimetric analysis, mg/100 ml	See <a href="#">table II</a> 1.0 max	3012	D4898
Pour point, °C	-60 min		D 97 or D 5949
Viscosity, mm <sup>2</sup> /sec @ 40°C @ 100°C @ -40°C	6.7 min 2.0 min 550 max		D 445
Viscosity stability @ -54°C mm <sup>2</sup> /sec 3 hours	2500 max		D 2532
Water content, parts per million	100 max		D 6304

**MIL-PRF-87257B****4.4 Method of inspection and test****4.4.1 Inspection**

Inspection shall be in accordance with *Method 9601b* of *FED-STD-791*.

**4.4.2 Tests**

The hydraulic fluid properties shall be determined in accordance with the applicable methods specified in [tables I](#) and [III](#) and sections [4.4.3](#) through [4.4.6](#). Physical and chemical values apply to the average of the determinations made on the samples.

**4.4.3 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*.

**4.4.4 High-temperature stability****4.4.4.1 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  $200 \pm 2^\circ\text{C}$ .

**4.4.4.2 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 ¼-inch OD stainless steel tubing, type 304, into the fluid.
- d. Heat the fluid for 100 hours at a temperature of  $200 \pm 2^\circ\text{C}$  while maintaining a 1-liter-per-hour flow of dry nitrogen (lamp grade) on the surface of the fluid via the gas inlet tube.

Upon completion of the test, the fluid shall meet the requirements of [table I](#).

**MIL-PRF-87257B****4.4.5 Particulate contamination****4.4.5.1 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.

**4.4.5.2 Gravimetric**

A gravimetric determination shall be made in accordance with *ASTM D 4898* 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.
- 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.

**4.4.6 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 D 1500* 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 actual packaging is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity with the Military Department or Defense Agency, or within the Military Department's Systems Command. 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.

**MIL-PRF-87257B****6. NOTES****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****6.1.3.1 Chlorinated solvents**

Chlorinated solvents should not be used for cleaning hydraulic components. Residual solvent contaminates the hydraulic fluid and may lead to corrosion.

**6.1.3.2 Recommended solvents**

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/Paper/passaic.htm>.

**MIL-PRF-87257B****6.2 Acquisition requirements**

Acquisition documents should specify the following:

- a. Title, number, and date of this specification.
- b. Issue of *DoD/ISS* to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see section [2.2](#)).
- c. Quantity.
- d. *FAR Clause 52.223-3*.

**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-87257* and subsequent revisions thereto.

**6.3 Qualification**

With respect to products requiring 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 into 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. 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. The qualifying activity responsible for the QPL is AFRL/MLBT, Bldg 654, 2941 Hobson Way, Rm 136, Wright-Patterson AFB OH 45433-7750. Information pertaining to qualification of products may be obtained at (937) 255-7530, e-mail: [AFRL.MLBT.OfficeAccount@wpafb.af.mil](mailto:AFRL.MLBT.OfficeAccount@wpafb.af.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 upon which approval was originally granted. In the event that the 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 subject to immediate withdrawal from the QPL.

**6.3.2 Requests for data****6.3.2.1 Data to accompany qualification samples**

The qualifying activity will request that a Material Safety Data Sheet accompany the samples (*FED-STD-313*, Material Safety Data, Transportation Data and Disposal Data for Hazardous Materials Furnished to Government Activities, may be used as guidance). The qualifying activity will also request 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

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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 is required for each base stock used. The samples should be plainly identified by securely attached, durable tags or labels marked with the following information:

Sample for Qualification Inspection

HYDRAULIC FLUID, FIRE RESISTANT; LOW TEMPERATURE, SYNTHETIC

HYDROCARBON BASE, AIRCRAFT AND MISSILE METRIC, *NATO CODE NUMBER H-538*.

Specification MIL-PRF-87257

Name of ingredient (for ingredient material)

Name of manufacturer

Product code number

Date of manufacture

**6.3.2.2 Formulation sheets**

An example format for the formulation sheet, indicating the percent by weight and purpose of each ingredient, is as follows:

Base stock(s)                      percent  
(chemical composition, CAS number, manufacturer's name and number)

Blending fluid                      percent  
(chemical composition, CAS number, manufacturer's name and number)

Anti-wear additive                      percent  
(chemical composition, CAS number, manufacturer's name and number)

Oxidation inhibitor                      percent  
(chemical composition, CAS number, manufacturer's name and number)

Other additives                      percent  
(chemical composition, CAS number, manufacturer's name and number)

**6.4 Standard synthetic rubber samples**

Samples of the standard synthetic rubber NBR-L (see [table I](#)) should subscribe to the formulation in accordance with *SAE AMS 3217/2*. A suggested source (material) is Akron Rubber Development Laboratory (ARDL), 300 Kenmore Blvd., Akron OH 44301.

**6.5 International standardization agreements**

Certain provisions of this specification (see [1.1](#)) are the subject of international standardization agreements, *ASCC Air Standards 15/1* and *15/7* and *NATO STANAGs 1135* and *3748*. When amendment, revision, or cancellation of this specification is proposed which will modify the international agreement concerned, the preparing activity will take appropriate action through international channels, including departmental standardization offices, to change the agreement or make other appropriate accommodations.

**MIL-PRF-87257B****6.6 Contractual notes**

In addition to qualification and conformance inspection, the Air Force will perform final acceptance testing on each contract awarded. Specific requirements and instructions addressing this matter will be called out in each contract. Questions in regard to this action should be forwarded to DET 3, WR-ALC/AFTT, 2430 C Street, Bldg. 70, Area B, Wright-Patterson AFB OH 45433-7632, DSN 785-8050, e-mail: [AFPET.AFTT@wpafb.af.mil](mailto:AFPET.AFTT@wpafb.af.mil).

**6.7 Disposal actions****6.7.1 Background**

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.

**6.7.2 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 in accordance with local law and regulations promulgated by the U.S. Environmental Protection Agency under *Public Law 94-580, Resource Conservation and Recovery Act of 1976*.

**6.7.3 Handling and safety 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.

**6.7.4 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.

**6.7.5 Container disposal**

Tops from one-time-use containers will be discarded with ordinary refuse. Containers will be made as empty as possible using gravity draining, after which they are to be crushed and buried



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in a permitted sanitary landfill or incinerated with general refuse. No special decontamination procedures are required for empty containers or their lids.

**6.8 Subject term (keyword) listing**

additive, hydraulic systems

anti-wear

contamination

corrosion resistant

fire resistant

flash point

hydraulic system

lubricant

oxidation stability

pour point

shear stability

viscosity

**6.9 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 - AT

Navy - AS

Air Force - 11

**Preparing Activity:**

Air Force - 11

(Project 9150-1287)

**Review Activities:**

Army - MI

Navy - SH, OS

Air Force - 68

DLA - PS, GS

**International Interest:**

NATO (See [6.5](#))

ASCC

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at [www.dodssp.daps.mil](http://www.dodssp.daps.mil).