

METRIC

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SUPERSEDING
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Interim Amendment 1
31 January 1997

PERFORMANCE SPECIFICATION

HYDRAULIC FLUID, FIRE RESISTANT, SYNTHETIC HYDROCARBON BASE, METRIC, NATO CODE NUMBER H-537

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

1. SCOPE

1.1 Scope. This specification covers the requirements for a synthetic hydrocarbon-base hydraulic fluid for use in the temperature range of -40° to $+205^{\circ}\text{C}$. This hydraulic fluid is identified by NATO Code Number H-537 (see 6.6).

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

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Naval Air Warfare Center Aircraft Division, Code 414100B120-3, Highway 547, Lakehurst, NJ 08733-5100, by using the Standardization Document Improvement Proposal (DD Form 1426) 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.

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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 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.

DEPARTMENT OF DEFENSE

MIL-H-5606 - Hydraulic Fluid, Petroleum Base, Aircraft, Missile, and Ordnance.

MIL-H-87257 - Hydraulic Fluid, Fire Resistant; Low Temperature, Synthetic Hydrocarbon Base, Aircraft And Missile

STANDARDS

FEDERAL

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

(Unless otherwise indicated, copies of the above specifications, standards and handbooks are available from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

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 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 QUALITY CONTROL

ASQC Z1.4 - Sampling Procedures and Tables for Inspection by Attributes
(DoD Adopted)

(Applications for copies should be addressed to American Society for Quality Control, 611 East Wisconsin Avenue, Milwaukee, WI 53202.)

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AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- ASTM-D92 - Flash And Fire Points By Cleveland Open Cup, Standard Test Method for (DoD Adopted).
- ASTM-D97 - Pour Point of Petroleum Oils, Standard Test Method for (DoD Adopted).
- ASTM-D130 - Detection Of Copper Corrosion From Petroleum Products By The Copper Strip Tarnish Test, Standard Test Method for (DoD Adopted).
- ASTM-D445 - Kinematic Viscosity of Transparent and Opaque Liquids (and the Calculation of Dynamic Viscosity), Standard Test Method for (DoD Adopted).
- ASTM-D664 - Acid Number of Petroleum Products by Potentiometric Titration, Standard Test Method for (DoD Adopted).
- ASTM-D892 - Foaming Characteristics of Lubricating Oils, Standard Test Method for (DoD Adopted).
- ASTM-D1298 - Density, Relative Density (Specific Gravity), or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method, Standard Test Method for (DoD Adopted).
- ASTM-D1500 - Color of Petroleum Products (ASTM Color Scale), Standard Test Method for (DoD Adopted).
- ASTM-D1744 - Determination of Water in Liquid Petroleum Products by Karl Fischer Reagent, Standard Test Method for (DoD Adopted).
- ASTM-D4057 - Manual Sampling of Petroleum and Petroleum Products, Standard Practice for (DoD Adopted).
- ASTM-D4172 - Wear Preventive Characteristics of Lubricating Fluid (Four-Ball Method), Standard Test Method for (DoD Adopted).
- ASTM-D4177 - Automatic Sampling of Petroleum and Petroleum Products, Standard Practice for (DoD Adopted).
- ASTM-D4636 - Corrosiveness and Oxidation Stability of Hydraulic Oils, Aircraft Turbine Engine Lubricants, and Other Highly Refined Oils, Standard Test Method for
- ASTM-D4898 - Insoluble Contamination of Hydraulic Fluids by Gravimetric Analysis, Standard Test Method for (DoD Adopted).
- ASTM-D5185 - Determination of Additive Elements, Wear Metals, and Contaminants in Used Lubricating Oils and Determination of Selected Elements in Base Oils by Inductively Coupled Plasma Atomic Emission Spectrometry (ICP-AES), Standard Test Method for (DoD Adopted).
- ASTM-D5306 - Linear Flame Propagation Rate of Lubricating Oils and Hydraulic Fluids, Standard Test Method for

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ASTM-E659 - Autoignition Temperature of Liquid Chemicals, Standard Test Method for.

(Application for copies should be addressed to the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA. 19428-2959)

SOCIETY OF AUTOMOTIVE ENGINEERS
AEROSPACE MATERIAL SPECIFICATIONS (AMS)

SAE-AMS3217/2 - Test Slabs, Acrylonitrile Butadiene (NBR-L), Low Acrylonitrile, 65-75.

(Applications for copies should be addressed to Society of Automotive Engineers, 400 Commonwealth Dr., Warrendale, PA 15096.)

2.4 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 regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Qualification. The hydraulic fluid furnished under this specification shall be products that are authorized by the qualifying activity for listing on the applicable qualified products list (QPL) before contract award (see 4.2 and 6.4). Any change in the formulation of an approved product shall require requalification.

3.2 Materials. The hydraulic fluid shall consist of a synthetic hydrocarbon base stock (see 3.2.3), and additives required to meet the requirements of the finished fluid (see 3.2.4). The hydraulic fluid shall contain no admixture of resins, soaps, gums, fatty oils, or oxidized hydrocarbons.

3.2.1 Additives.

3.2.1.1 Prohibitions. Pour point depressants and viscosity index improvers are prohibited.

3.2.1.2 Oxidation inhibitors. The base oil shall contain phenolic-type oxidation inhibitors not to exceed 2.0 percent by weight.

3.2.1.3 Anti-wear agents. Anti-wear agents may be used to enable the finished oil to conform to the lubricity requirement (see table II). The finished fluid shall contain not more than 3.0 weight percent total weight of an anti-wear agent, such as tricresyl phosphate (TCP)

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conforming to TT-T-656. If TCP is used, the finished fluid shall contain not more than 0.03 weight percent of the ortho-isomer.

3.2.2 Blending fluids. Blending fluids may enhance the finished fluid's rubber swell characteristic and viscosity at -40°C (see table II). When blending fluids, such as diesters, are used, their quantity shall be not greater than 33 percent by weight.

3.2.3 Base stock. The synthetic hydrocarbon base of the hydraulic fluid, before the addition of any other ingredient, shall conform to table I when tested in accordance with table V.

TABLE I. Properties of synthetic hydrocarbon base stock.

Characteristic	Requirement
ASTM Color number	1.0, maximum
Evaporation	14.0 percent by weight, maximum
Fire point	245°C, minimum
Flash point	205°C, minimum
Neutralization number	0.10, maximum
Pour point	-55°C, maximum
Specific gravity at 15.6°C/15.6°C	Report
Viscosity at 100°C	3.5 centistokes (cSt), minimum
Viscosity at 40°C, (cSt)	Report
Viscosity at -40°C	2,600 cSt, maximum

3.2.4 Finished fluid. The finished fluid shall conform to table II when tested in accordance with table V.

TABLE II. Properties of the finished fluid.

Characteristic	Requirement
Auto-ignition temperature	345°C, minimum (min.)
Barium content	10 parts per million (ppm) (mass percent), maximum (max.)
Bulk modulus at 40°C (isothermal secant 0 to 6.9×10^4 kPa)	1.379×10^6 kPa, min.
Color of finished fluid	No difference between the fluid and the standard color.
Compatibility	Compatible with each of the fluids previously qualified under this specification. Miscible with fluids conforming to MIL-H-5606 and MIL-H-87257 from -40°C to 135°C. When mixed with the test fluids, there shall be no formation of resinous gums, sludge, or insoluble materials.

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TABLE II. Properties of the finished fluid - Continued.

Characteristic	Requirement
Concentration of red dye	One part per 10,000 parts of oil by weight, max.
Corrosiveness and oxidation stability Corrosiveness	Change in weight of steel, aluminum alloy, magnesium alloy, and cadmium-plated steel: 0.2 milligrams per square centimeter (mg/cm^2), max. Slight discoloration of cadmium is permitted. Change in weight of copper: $0.6 \text{ mg}/\text{cm}^2$, max. No pitting, etching, nor visible corrosion at a magnification of 20 diameters (20X). Any corrosion produced on the surface of the copper shall be less than No. 3 of the ASTM Copper Strip Corrosion Standard (ASTM-D130 Adjunct, available from ASTM as number 12-401300-00).
Resistance to oxidation	No evidence of separation or gumming of fluid. Change in viscosity at 40°C : 10 percent, max. Increase in neutralization number: 0.2, max.
Evaporation	20.0 percent by weight, max.
Fire point	245°C , min.
Flammability Flame propagation Wick flammability	0.30 cm/second, max. 10 cycles, min.
Flash point	205°C , min.
Foaming characteristics at 25°C (foam height in container)	At end of 5 minute blowing period: 65 ml, max. After settling 10 minutes: complete collapse <u>1</u> /
High temperature - high pressure spray ignition	The fluid shall not continue to burn when the source of ignition is removed.
High temperature stability	The change in the viscosity at 40°C shall not exceed 5 percent. The neutralization number shall not increase more than 0.1. There shall be no formation of precipitate or insoluble material.
Low temperature stability (72 hours at $-40 \pm 1^\circ\text{C}$)	No evidence of gelling, clouding, crystallization, solidification or separation of ingredients.
Lubricity, 10 ± 0.5 milliliter (ml) sample: Under a 1 kilogram (kg) load Under a 10 kg load Under a 40kg load	Maximum scar diameter: 0.21 millimeter (mm) Maximum scar diameter: 0.30 mm Maximum scar diameter: 0.65 mm
Neutralization number	0.10, max.
Pour point	-55°C , max.

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TABLE II. Properties of the finished fluid - Continued.

Characteristic	Requirement
Solid particle contamination	Filtration time: 15 minutes, max. Particle count: see table III Gravimetric analysis: 0.3 mg, max.
Specific gravity at 15.6°C/15.6°C	<u>2/</u>
Storage stability (after 12 months of storage)	The fluid shall be clear and transparent with no separation of ingredients or evidence of crystallization and shall conform to all requirements of this specification.
Swelling of synthetic rubber, NBR-L	18.0 to 30.0 percent
Viscosity at 205°C	1.0 cSt, min.
Viscosity at 100°C	3.45 cSt, min.
Viscosity at 40°C	14.0 cSt, min.
Viscosity at -40°C	2,200 cSt, max.
Water content	100 ppm, max.

- 1/ A ring of small bubbles around the edge of the container is considered a complete collapse.
- 2/ To be determined during the qualification inspection (see 4.2). During conformance inspection (see 4.3), the specific gravity of the hydraulic fluid at 15.6°C/15.6°C shall be ± 0.008 the value determined during the qualification inspection.

TABLE III. Solid particle contamination.

Particle size (largest dimension)	Maximum count per 100 ml (microscopic method)	Maximum count per 100 ml (automatic counter)
5 - 15 μm	2,500	10,000
15 - 25 μm	1,000	1,000
25 - 50 μm	250	150
50 - 100 μm	25	20
Over 100 μm	10	5

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).

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4.2 Qualification inspection. The qualification inspection performed by the qualification laboratory (see 6.4) shall consist of a review for approval of the submitted manufacturer's test report and item composition report and subjecting the qualification test sample to examination and testing to determine conformance to all of the requirements specified in section 3. The qualification test sample consists of two 1 gallon containers of the finished fluid, two quarts of the base stock without additives, two quarts of the blending fluids used, eight ounces of the anti-wear additive, one ounce of the oxidation inhibitor and one ounce each of any additional additives used in the finished fluid. In the event that the additives are supplied as concentrated solutions, an equivalent quantity of the solution is to be furnished. A separate qualification inspection is required for each base stock used. The samples are to be clearly identified (see 6.4.2).

4.2.1 Requalification. Requalification shall be required when any reformulation or change is made in source of manufacture, purity, or composition of the hydraulic fluid base stock or additives. A minor change in a qualified product's formulation may be made without requalification testing upon approval by the qualification activity (see 6.4).

4.3 Conformance inspection. The conformance inspection shall consist of tests to verify conformance to the following requirements: barium content, color of finished fluid, evaporation, fire point, flash point, foaming characteristics, low temperature stability, lubricity, neutralization number, pour point, solid particle contamination, specific gravity at 15.6°C/15.6°C, viscosity (finished fluid), water content (see tables II and V). Unless otherwise specified by the procuring activity, sampling of the hydraulic fluid shall be in accordance with 4.3.3 and 4.3.4. Inspection shall be in accordance with FED-STD-791, Method 9601.

4.3.1 Bulk lot (batch). A bulk lot (batch) is an indefinite quantity of a homogeneous mixture of material 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.

4.3.2 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 mixture of material from one isolated container; or filled with a homogeneous mixture of material manufactured in a single plant run (not exceeding 24 hours) through the same processing equipment, with no change in ingredient material.

4.3.3 Sampling for tests. Sampling for tests shall be conducted in accordance with ASTM-D4057 or ASTM-D4177. Failure of any conformance test shall result in rejection of the lot. In addition, a random sample of base oil shall be selected for each lot of the finished fluid and subjected to all the applicable conformance tests for base oil.

4.3.4 Sampling for solid particle contamination. Samples of filled and sealed containers shall be taken at periodic intervals to be representative of each day's production, in accordance with

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ASQC-Z1.4, Inspection Level S-3. The sample size and number of determinations shall be in accordance with table IV.

TABLE IV. Sample for solid particle contamination.

Container	Sample size (ml) <u>1/</u>	Number of determinations per sample
1 quart	100	1
1 gallon	200	2
5 gallon	300	3
55 gallon	600	6

1/ Each determination shall be made on a 100 ml portion of the sample. If the particle count on any individual determination exceed the limits of table III, two additional determinations on another sample from the same container may be used. The container shall be thoroughly shaken immediately prior to withdrawing each 100 ml portion for such determinations. The average of the two closer particle counts shall be considered the particle count for the sample.

4.4 Tests. The hydraulic fluid properties shall be determined in accordance with table V and 4.4.1 through 4.4.4.2 Physical and chemical values specified in section 3 apply to the 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.

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TABLE V. Test methods.

Characteristic	Test method or paragraph
ASTM Color	ASTM-D1500
Auto-ignition temperature	ASTM-E659
Barium content	ASTM-D5185
Bulk modulus	See 4.4.1
Color of finished fluid	See 4.4.2
Compatibility	See 4.4.3
Corrosiveness and oxidation stability (immersion time of 168 hours in 135°C bath):	ASTM-D4636
Evaporation (test time of 6.5 hours at 205°C)	FED-STD-791, method 350
Fire point	ASTM-D92
Flammability Flame propagation Wick flammability	ASTM-D5306 FED-STD-791, method 352 <u>1/</u>
Flash point	ASTM-D92
Foaming characteristics at 25°	ASTM-D892
High temperature - high pressure spray ignition	FED-STD-791, method 6052
High temperature stability	4.4.4
Low temperature stability (72 hours at -40 ±1°C)	FED-STD-791, method 3458
Lubricity	ASTM-D4172
Neutralization number	ASTM-D664
Pour point	ASTM-D97
Solid particle contamination Filtration time and particle count Gravimetric analysis	FED-STD-791, method 3009 ASTM-D4898 <u>2/</u>
Specific gravity at 15.6°C/15.6°C	ASTM-D1298
Storage stability (12 months of storage)	FED-STD-791, method 3465
Swelling of synthetic rubber NBR-L <u>3/</u>	FED-STD-791, method 3603
Viscosity	ASTM-D445
Water content	ASTM-D1744

1/ The sample shall not be stored in an oven, as the test method states. Perform the test twice; the results shall conform to table II both times.

2/ Use a single 0.45 micron (µm), cellulose membrane filter, and a maximum filtration time of 15 minutes. As a referee method, either FED-STD-791, method 3009, "Solid-Particle Contamination in Hydraulic Fluids," or FED-STD-791, method 3012, "Determination of Particulate Matter in Aerospace Hydraulic Fluids," using an automatic particle counter capable of measuring the limits in table III (see 6.5.3), shall be run.

3/ The test slabs shall be new (within 6 months of manufacture). This is the same material required by SAE-AMS3217/2.

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4.4.1 Bulk modulus.

4.4.1.1 Apparatus. The bulk modulus of the hydraulic fluid shall be determined using a calibrated, precision capillary pycnometer of the type shown in figure 1 (this is a modified 21 T 50 Jerguson pressure gauge). A sample pressure vessel and auxiliary equipment for this determination are shown in figures 2 and 3.

4.4.1.2 Procedure. The pycnometer volume to capillary diameter ratio shall be chosen to provide a precision of measurement for liquid density of ± 2 parts in 10,000. The pycnometer shall be charged with candidate fluid to the top of the capillary at 40°C and atmospheric pressure. Insert the pycnometer in the high-pressure pycnometer housing such that the capillary tube is visible through the window of the pressure vessel and parallel to the outside vertical surfaces of the pressure vessel. Assemble the pressure vessel containing the pycnometer, place it in a 40°C constant-temperature bath, allow equilibrium to be reached, and take a volume reading at atmospheric pressure. Since the precision of the unit depends upon visual readings, avoid errors due to parallax and distortion in the pressure vessel window and the walls of the constant-temperature bath. Increase nitrogen pressure to a new level and, after a 60 minute soak, take a third reading. For any pressure range, the secant bulk modulus is defined as follows:

$$\text{Bulk modulus} = [(V \times DP) \div (DV + DV_g)]$$

Where:

V is the original volume of the fluid,

DV is the observed volume change due to DP increase in pressure,

DP is the pressure change between the two measurements in kPa, and

DV_g is the correction factor, which considers the bulk modulus of glass in determining the true volume of the pycnometers at pressures above atmospheric. The bulk modulus of Pyrex glass is 3.28×10^7 kPa. $DV_g = [(V \times DP) \div 3.28 \times 10^7]$.

4.4.2 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" to 10,000 parts of an oil not darker than ASTM-D1500, color number 1.0 (see 6.5.2).

4.4.3 Compatibility. Samples of candidate hydraulic fluid in amounts of 20, 100 and 180 ml shall be separately mixed with samples from each of the fluids previously qualified to this specification, MIL-H-5606, and MIL-H-87257. Total volume of each mixture shall be 200 ml. The mixtures of candidate fluid and fluids previously qualified to this specification shall be agitated and then stored at 205°C for 2 hours. The mixtures of the candidate fluid and fluids qualified to MIL-H-5606 and MIL-H-87257 shall be agitated and then stored at 135°C for 2 hours. At the end of the storage time, none of the mixtures shall show any signs of sediment, turbidity, or crystallization. All mixtures shall then be stored at -40°C for 2 hours. After the -40°C storage, none of the mixtures shall show signs of sediment or crystallization; however, a slight, non-permanent turbidity is permitted.

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4.4.4 High temperature stability.

4.4.4.1 Apparatus. A 50 ml round-bottomed flask, a 75 degree angle adapter (24/40), a gas inlet tube (6 mm outside diameter (OD) Pyrex[®] tubing), and a high temperature bath capable of maintaining $205 \pm 2^\circ\text{C}$.

4.4.4.2 Procedure. Place 25 ml of candidate fluid in the flask fitted with the 75 degree angle adapter and gas inlet tube. Adjust the height of the gas inlet tube to be less than 10 mm above the level of the fluid. Place a 25.4 mm length of 6.35 mm OD type 304 stainless steel tubing in the fluid. Heat the fluid for 100 hours at $205 \pm 2^\circ\text{C}$ while maintaining a 1 liter per hour flow of dry nitrogen on the surface of the fluid via the gas inlet tube. Upon completion of the test, the fluid shall conform to table II.

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 of material 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 within the Military Department or Defense Agency, or within the 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 which may be helpful, but is not mandatory.)

6.1 Intended use. The hydraulic fluid covered by this specification is intended for use from -40° to $+205^\circ\text{C}$ in automatic pilots, shock absorbers, air compressor gear boxes, brakes, flap-control mechanisms, missile hydraulic servo-controlled systems and other hydraulic systems using synthetic sealing material. This fluid may be stored in areas ranging in temperature from -40° to $+50^\circ\text{C}$.

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6.2 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number, and date of the specification.
- b. Issue of DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.3).
- c. If sampling for the conformance inspection differs from that specified in 4.3.3 and 4.3.4
- d. Packaging requirements (see 5.1), including the type and size of containers.
- e. Quantity desired.

6.3 Subject term (Keyword) listing.

Hydraulic control systems
Polyalphaolefin

6.4 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in Qualified Products List QPL-83282 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 purchase orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from the Commander, Attn.: Code 4.3.4.1 Building 2188, Naval Air Warfare Center Aircraft Division, 22347 Cedar Point Road, Unit 6, Patuxent River, MD 20670-1161.

6.4.1 Qualification test data. To initiate the qualification process, forward a written request, including general information on the proposed candidate material, to the qualification activity (see 6.4). A written response to this will be a "letter of authorization," which will provide detailed instructions for the submission of product samples and test data. The test report from the manufacturer or a commercial laboratory, will be required to contain complete information as to the source and type of base stock and additive materials used, the composition of the finished fluid (see 6.4.1.1), and laboratory test data showing quantitative results of all the tests required by this specification, except storage stability. A separate qualification inspection is required for each base stock used and must be submitted to the qualification activity prior to submittal of the qualification test sample (see 4.2 and 6.4.2). A material safety data sheet must accompany the samples being submitted for test.

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6.4.1.1 Composition identification. An example of a form for the composition identification, indicating the percent by weight and purpose of each ingredient, is as follows:

Base stock composition	percent
Blending fluid composition	percent
Anti-wear additive (manufacturer's name and product number)	percent
Oxidation inhibitor (manufacturer's name and product number)	percent
Other additives	percent

6.4.2 Qualification inspection sample identification. Qualification inspection samples submitted to the qualification activity (see 4.2 and 6.4.2) are to be identified as follows:

- Sample for qualification inspection
- MIL-PRF-83282, "Hydraulic Fluid, Fire Resistant, Synthetic Hydrocarbon Base, Metric, NATO Code Number H-537"
- Name of ingredient (for ingredient material)
- Name of manufacturer
- Product code number
- Date of manufacture
- Submitted by (name) and (date) for qualification inspection in accordance with the requirements of MIL-PRF-83282 under authorization of (reference authorizing letter).

6.4.3 Retention of qualification. To retain qualification of products approved for listing on the Qualified Products List (QPL), the manufacturer will be requested to verify by certification to the qualifying activity that its product(s) comply with the requirements of this specification. Unless otherwise specified by the qualifying activity, the time of periodic verification by certification will be in two year intervals from the date of original qualification and will be initiated by the qualifying activity. 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.

6.4.4 Acceptance testing. The Air Force will perform final acceptance testing on each contract awarded for military use. Specific requirements and instructions addressing this matter will be detailed in each contract. Questions in regard to this action should be forwarded to the San Antonio Air Logistics Center, Attn.: SA-ALC/SFTT, 1014 Billy Mitchell Blvd., Suite 1, Kelly AFB, TX 78241-5603.

6.5 Sources of items used in testing.

6.5.1 Standard rubber samples. Samples of the standard synthetic rubber NBR-L (see table II) may be obtained from the Precision Rubber Products Corp. Aerospace Division, 1217 South 26 Place, Phoenix, AZ 85035 and from the University of Akron, Akron, OH.

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6.5.2 Oil red dye source. "Oil Red 235" is manufactured by Passaic Color and Chemical Company.

6.5.3 Automatic particle counters. The HIAC/ROYCO brand, model 8011, has been found capable of measuring the limits in table III.

6.6 International standardization agreements. Certain provisions of this specification (see 1.1) are the subject of international standardization agreement, Air Standardization Coordinating Committee (ASCC) Air Standards AIR-STD-15/7, AIR-STD-15/9, and NATO Standardization Agreements STANAG-1135 and STANAG-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 standardization channels, including departmental standardization offices, to change the agreement or make other appropriate accommodations.

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

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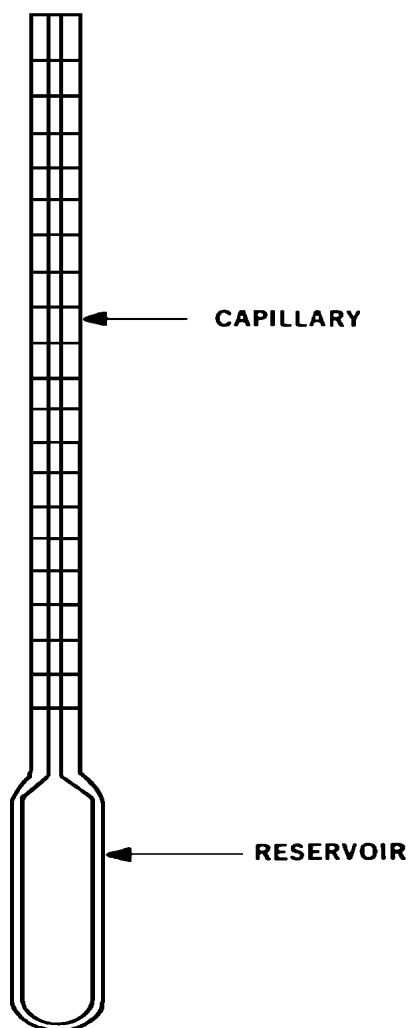


FIGURE 1. Precision capillary pycnometer.

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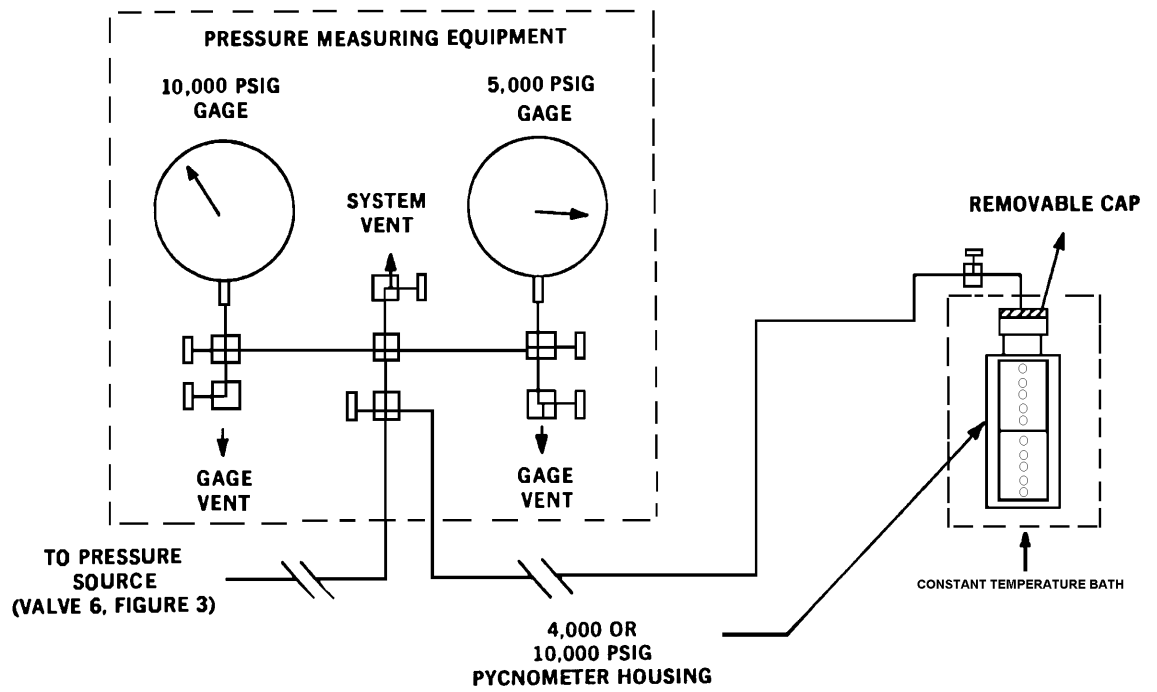
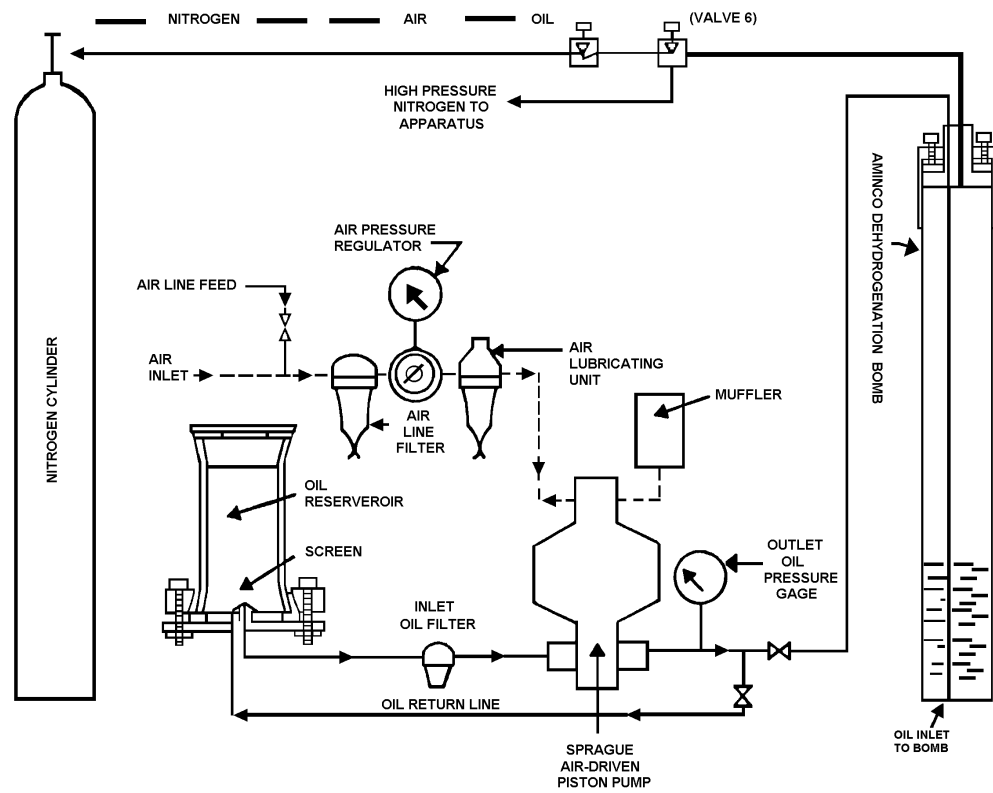


FIGURE 2. Diagram of bulk modulus equipment.

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FIGURE 3. Auxiliary equipment.

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CONCLUDING MATERIAL

Custodians:

Army - AT
Navy - AS
Air Force - 11
DLA - GS

Preparing activity:

Navy - AS
(Project 9150-1179)

Review activities:

Army - AV, MI, AR
Navy - SH
Air Force - 68

International Interest:

NATO (see 6.6)

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.
NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:

1. DOCUMENT NUMBER
MIL-PRF-83282D

2. DOCUMENT DATE (YYMMDD)
970930

3. DOCUMENT TITLE

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

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*)

7. DATE SUBMITTED
(YYMMDD)

(1) Commercial:

(2) DSN (*If Applicable*):

8. PREPARING ACTIVITY

a. NAME

**COMMANDER
NAVAL AIR WARFARE CENTER
AIRCRAFT DIVISION**

b. TELEPHONE NUMBER (*Include Area Code*)

(1) Commercial (908) 323-7488 (2) DSN 624-7488

c. ADDRESS (*Include Zip Code*)

**CODE 414100B120-3
HIGHWAY 547
LAKEHURST, NJ 08733-5100**

IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT:

**Defense Quality and Standardization Office
5203 Leesburg Pike, Suite 1403,
Falls Church, VA 22041-3466
Telephone: (703) 756-2340 DSN 289-2340**

COMMANDER
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