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METRIC
MIL-DTL-32353
1 June 2010

DETAIL SPECIFICATION

HYDRAULIC & LUBRICATING OIL, SYNTHETIC HYDROCARBON BASE

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

1. SCOPE

1.1 Scope. This specification covers a single classification of synthetic steam turbine, hydraulic, and gear lubricating oil, moderate service, for use in main and auxiliary turbines, gears, air compressors, and certain hydraulic equipment, as well as for general mechanical lubrication, on non-nuclear ships. Due to its synthetic basestock, this oil could offer improved performance in certain applications currently utilizing MIL-PRF-17331 (2190 TEP) where long-term operational life and/or oxidative stability is desired, such as in High Pressure Air Compressors (HPACs).

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4, or 5 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, 4, or 5 of this specification, whether or not they are listed.

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 STANDARDS

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

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-PRF-17331 - Lubricating Oil, Steam Turbine and Gear, Moderate Service

MIL-PRF-17672 - Hydraulic Fluid, Petroleum, Inhibited

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

Comments, suggestions, or questions on this document should be addressed to: Commander, Naval Sea Systems Command, ATTN: SEA 05S, 1333 Isaac Hull Avenue, SE, Stop 5160, Washington Navy Yard DC 20376-5160 or emailed to CommandStandards@navy.mil, with the subject line "Document Comment". Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at https://assist.daps.dla.mil.

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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.

NAVAL SEA SYSTEMS COMMAND (NAVSEA) PUBLICATIONS

S9510-AB-ATM-010 - Nuclear-Powered Submarine Atmosphere Control Manual

(Copies of the chapter titled "Material Control Program" are available from Commander, Naval Sea Systems Command, ATTN: SEA 05Z4, 1333 Isaac Hull Ave. SE Stop 5122, Washington Navy Yard, DC 20376-5122 or online at https://smcl.dt.navy.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.

AMERICAN SOCIETY FOR QUALITY

ANSI/ASQ Z1.4 - Sampling Procedures and Tables for Inspection by Attributes - T004

(Copies of this document are available from the ASQ, P.O. Box 3066, Milwaukee, WI 53201-3066, by calling (800) 248-1946, or online at www.asq.org.)

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 the Copper Strip Test

ASTM D287 - Standard Test Method for API Gravity of Crude Petroleum and Petroleum Products (Hydrometer Method)

ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension

ASTM D445 - Standard Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (and Calculation of Dynamic Viscosity)

ASTM D471 - Standard Test Method for Rubber Property – Effect of Liquids

ASTM D664 - Standard Test Method for Acid Number of Petroleum Products by Potentiometric Titration

ASTM D665 - Standard Test Method for Rust-Preventing Characteristics of Inhibited Mineral Oil in the Presence of Water

ASTM D892 - Standard Test Method for Foaming Characteristics of Lubricating Oils

ASTM D974 - Standard Test Method for Acid and Base Number by Color-Indicator Titration

ASTM D1298 - Standard Test Method for Density, Relative Density (Specific Gravity), or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method

ASTM D1401 - Standard Test Method for Water Separability of Petroleum Oils and Synthetic Fluids

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ASTM D2270	-	Standard Practice for Calculating Viscosity Index From Kinematic Viscosity at 40 and 100°C
ASTM D2272	-	Standard Test Method for Oxidation Stability of Steam Turbine Oils by Rotating Pressure Vessel
ASTM D2619	-	Standard Test Method for Hydrolytic Stability of Hydraulic Fluids (Beverage Bottle Method)
ASTM D3427	-	Standard Test Method for Air Release Properties of Petroleum Oils
ASTM D4052	-	Standard Test Method for Density, Relative Density, and API Gravity of Liquids by Digital Density Meter
ASTM D4057	-	Standard Practice for Manual Sampling of Petroleum and Petroleum Products
ASTM D4172	-	Standard Test Method for Wear Preventative Characteristics of Lubricating Fluid (Four-Ball Method)
ASTM D4177	-	Standard Practice for Automatic Sampling of Petroleum and Petroleum Products
ASTM D4310	-	Standard Test Method for Determination of Sludging and Corrosion Tendencies of Inhibited Mineral Oils
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 D4927	-	Standard Test Methods for Elemental Analysis of Lubricant and Additive Components—Barium, Calcium, Phosphorus, Sulfur, and Zinc by Wavelength-Dispersive X-Ray Fluorescence Spectroscopy
ASTM D4951	-	Standard Test Method for Determination of Additive Elements in Lubricating Oils by Inductively Coupled Plasma Atomic Emission Spectrometry
ASTM D5182	-	Standard Test Method for Evaluating the Scuffing Load Capacity of Oils (FZG Visual Method)
ASTM D5949	-	Standard Test Method for Pour Point of Petroleum Products (Automatic Pressure Pulsing Method)
ASTM D5950	-	Standard Test Method for Pour Point of Petroleum Products (Automatic Tilt Method)
ASTM D6304	-	Standard Test Method for Determination of Water in Petroleum Products, Lubricating Oils, and Additives by Coulometric Karl Fischer Titration
ASTM D6443	-	Test Method for Determination of Calcium, Chlorine, Copper, Magnesium, Phosphorus, Sulfur, and Zinc in Unused Lubricating Oils and Additives by Wavelength Dispersive X-ray Fluorescence Spectrometry (Mathematical Correction Procedure)
ASTM E29	-	Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

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(Copies of these documents are available from ASTM International, 100 Barr Harbor Dr., P.O. Box C700, West Conshohocken, PA 19428-2959 or online at www.astm.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 fluid furnished under this specification shall be products that are authorized by the qualifying activity for listing on the applicable qualified products list before contract award (see 4.2 and 6.2).

3.1.1 Re-qualification. The continued qualification of products shall be verified every 5 years by submission of a signed statement by the fluid supplier attesting that no formulation changes have been made in the qualified product. Any changes in the formulation of the product submitted for qualification testing must be approved by NAVSEA. Minor changes, such as an increase in pour point additive or a change in base fluid materials, shall require notification: however, the extent of supporting test data required is at the discretion of NAVSEA (see 6.3).

3.2 Authorization. Naval non-nuclear ship platforms consuming this product shall have technical concurrence from the NAVSEA Technical Warrant Holder prior to installing the oil covered by this specification into shipboard systems.

3.3 General. For purposes of determining conformance with each requirement, an observed value or calculated value shall be rounded off to the nearest unit in the last right-hand place of figures used in expressing the limiting value, in accordance with the rounding off procedure of ASTM E29.

3.4 Material. The fluid shall be a stable, homogeneous blend of polyalphaolefin (PAO) synthetic hydrocarbon basestocks and additive agents as needed to meet the requirements of this specification. Additive components as contained in the sample tested and granted qualification approval shall not be changed without approval of the qualifying activity.

3.4.1 Tri-cresyl phosphate (TCP). If TCP is used as an anti-wear additive, not more than 1.0 percent of the additive shall be the ortho isomer (see 6.7.2).

3.5 Off-gassing. The fluid shall be certified for and assigned a usage category of either “Limited” or “Permitted” in accordance with NAVSEA S9510-AB-ATM-010 chapter titled “Material Control Program” (see 4.5 and 6.5).

3.6 Prohibitions.

3.6.1 Ozone depleting substances (ODS). The use of ODS in the composition of the fluid under this specification directly or referenced in any federal test method is hereto prohibited. Environmentally safe and non-ODS alternative solvents shall be substituted in test methods for any previously specified ODS such as 1,1,1-trichloroethane, trichlorofluoroethane, perchloroethane or other chlorofluorocarbons (CFC). A dehydrated mixture of primary alcohol such as ethanol or isopropyl alcohol and non-aromatic hydrocarbon solvent resulting in a minimum flash point of 60 °C (140 °F) plus adequate solvent action shall be used as an alternative for any ODS.

3.6.2 2,6-di-tert-butylphenol (DTBP). DTBP (Chemical Abstract Service Number 128-39-2) shall not be intentionally added to the oil (see table I and 4.6).

3.6.3 Chlorine. Chlorine or chlorine-based additives shall not be intentionally added to the oil (see table I).

3.6.4 Sulfur. Sulfur or sulfur-based additives shall not be intentionally added to the oil (see table I).

3.6.5 Zinc. Zinc or zinc-based additives shall not be intentionally added to the oil (see table I).

3.7 Toxicity. When evaluated in accordance with 4.7, the fluid shall have no adverse effect on the health of personnel when used for its intended purpose and shall not cause any environmental problems during waste disposal (see 4.7 and 6.6).

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3.8 Performance requirements.

3.8.1 Oil compatibility. The fluid shall be compatible with reference oils furnished by the Government (see 4.8). The reference oils to be provided will be oils from the Qualified Products List (QPL) associated with this specification as well as oils from the QPLs associated with MIL-PRF-17331 and MIL-PRF-17672. For contact information on obtaining reference oils, see 6.3.

3.8.2 Homogeneity. Additive agents, when used, shall remain uniformly distributed throughout the oil at all temperatures above the pour point and up to 163 °C (325 °F). If the oil is cooled below its pour point, it shall regain its homogeneity at temperatures of 6 °C (10 °F) above its pour point and shall retain that homogeneity up to 163 °C (325 °F) (see 4.9).

3.8.3 Chemical and physical requirements. The fluid shall conform to the chemical and physical requirements as specified in table I.

3.8.4 Appearance. The fluid shall be free of haze or cloudiness (see 4.10).

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. Qualification tests shall be conducted at a laboratory deemed satisfactory by NAVSEA. Qualification inspection shall consist of all of the tests as specified in section 3 and table I. A minimum sample size of 30 gallons is required for this testing.

4.2.1 Requalification. Requalification may be required in the event any change in composition or formulation, or ingredients occurs (see 3.1.1).

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TABLE I. Chemical and physical requirements and test methods.

Characteristics	Requirement	Test method (ASTM or other)
DTBP, ppm max.	10	See 4.6
Chlorine, ppm max.	50	D6443
Zinc, ppm max.	10	D4927, D6443, D4951
Acid number, mg KOH/g oil max.	0.50	D974, D664
Corrosion (in presence of synthetic seawater)	None	D665 (1)
Copper strip corrosion @ 100 °C, max.	1	D130
Oil compatibility	Pass	See 4.8
Appearance	Free of haziness or cloudiness	See 4.10
Water, ppm max.	100	D6304
Density, g/mL	0.83-0.85	D287, D1298, D4052
Air release time, minutes at 50 °C max.	15	D3427
Flash point, °C (°F) min.	266 (510)	D92
Pour point, °C (°F) max.	-40 (-40)	D97, D5950, D5949
Viscosity, cSt.		D445
Centistokes at 4.4 °C (40 °F), max.	800	
Centistokes at 40 °C (104 °F)	77-97	
Centistokes at 100 °C (212 °F), min.	11.0	
Viscosity index, min.	130	D2270
Emulsion test, after 30 minutes settling time		D1401 (2)
Oil layer/water layer/emulsion, max.	41/-/3	
Oxidation test, after 1000 hours:		D4310
Total sludge, mg max.	50	
Total iron, mg max.	10	(3)
Total copper, mg max.	10	
Acid number, mg KOH/g max.	1.2	D974, D664 (4)
Oxidation by rotating pressure vessel, minutes min.	2000	D2272
Scuffing load capacity (FZG), failure load stage	Load stage 9	D5182
Four ball wear test, scar diameter, mm max.	0.75	D4172
Homogeneity, separation	None	See 4.9
Solid particle contamination, mg/100ml max.	2.5 (5)	D4898

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TABLE I. Chemical and physical requirements and test methods - Continued.

Characteristics	Requirement	Test method (ASTM or other)
Foaming characteristics:		D892(6)
After blowing/after 10 minutes		
Sequence 1, mL max.	65/0	
Sequence 2, mL max.	65/0	
Sequence 3, mL max.	65/0	
Corrosion-oxidation stability (72 hours @ 175 °C)		D4636 (7)
Change in viscosity @ 40 °C, % max.	10.0	
Change in total acid number, mg KOH/g max.	0.30	
Evaporation loss, % max.	1.0	
Sludge determination, mg max.	25.0	
Metal coupon weight change, mg/cm^2 max.		
Copper	±0.4	
Aluminum	±0.2	
Steel	±0.2	
Magnesium	±0.2	
Cadmium	±0.2	
Hydrolytic stability		D2619
Cu strip weight change, mg/cm^2 max.	0.2	
Cu strip appearance, max.	1	
Fluid viscosity change, % max.	5	
Fluid TAN change, mg KOH/g max.	0.3	
Water TAN change, mg KOH/g max.	10	
Insolubles, wt. % max.	0.1	
Elastomer compatibility		FTM 3604 (8)
NBR-L (168 hours @ 70 °C)		
Hardness change, max.	10	
Volume change, % max.	-2 to +15	
Tensile change, % max.	30	
Elongation, % max.	30	
FKM (72 hours @ 175 °C)		FTM 3432 (8)
Hardness change	10	
Volume change, % max.	-2 to +15	
Tensile change, % max.	30	
Elongation, % max.	30	

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TABLE I. Chemical and physical requirements and test methods - Continued.

Characteristics	Requirement	Test method (ASTM or other)
AWC polyurethane (72 hours @ 70 °C)		D471, D412
Hardness change	10	
Volume change, % max.	-2 to +15	
Tensile change, % max.	30	
Elongation, % max.	30	

NOTES:

1. Prior to the test, the oil shall be water-washed as follows: 300 grams of the oil to be tested shall be stirred with 50 grams of distilled water for 30 minutes at 90 °C (194 °F) using the beaker and stirrer as specified in ASTM D665. After 30 minutes stirring, the mixture shall be transferred to a separatory funnel and left to separate; then the water layer shall be drawn off and the oil submitted to the synthetic seawater corrosion test (Procedure B). The test shall be run for 24 hours.
2. Distilled water and stirring temperature of 54 °C (130 °F) shall be used. Discrete water droplets entrained in the oil layer and clinging to the wall of the cylinder may be added to the water layer volume at the rate of 0.1 mL per droplet. The results shall be recorded using the format of oil layer/water layer/emulsion layer (time in minutes). There is no requirement for water layer. The emulsion limit applies to any of the three types of emulsions defined in the test method. If more than one emulsion type is present, the 3 mL maximum limit applies to the combined volume of the different emulsion types.
3. Determine total iron content using the procedure and calculations described in sections titled Procedure for Determination of Sludge Weight and Procedure for Determination of Copper in Oil, Water, and Sludge for Procedure A, except substitute iron in place of copper where appropriate.
4. The test method used to determine acid number after the 1000-hour oxidation test shall be the same test method used to determine acid number before undergoing the oxidation test.
5. Test sample in accordance with ASTM D4898 using 0.8 micrometer pore diameter membrane filters.
6. Option A shall not be used on oils tested within one week of blending. Option A can only be used on those oils that have been blended for over one week. A ring of bubbles around the edge of the graduate shall be considered complete collapse or 0 ml.
7. Procedure 2 and dry air shall be used.
8. These Federal Test Methods (FTM) can be found in FED-STD-791.

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4.3 Conformance inspection. Each sample selected as specified in 4.3.2 shall meet all the requirements specified in table I except for scuffing load capacity (FZG), oxidation test (ASTM D4310), wear test (ASTM D4172), compatibility (both oil and elastomer), air release, and homogeneity.

4.3.1 Lot conformance requirements. The results from each sample selected as specified in 4.3, when tested as specified in table I, shall not vary from the analysis of the sample given qualification approval by more than the tolerances listed below:

Gravity, g/cc – ±0.005

Viscosity

Centistokes kinematic at 40 °C (104 °F) – ±8 [1/]

Centistokes kinematic at 100 °C (212 °F) – ±1 [1/]

Centistokes kinematic at 4.4 °C (40 °F) – maximum 800

Pour point, °C – +9 [1/]

Oxidation by rotating bomb – minus 15 percent maximum

NOTE:

[1/] Shall meet requirements of this specification (see table I).

4.3.2 Sampling for conformance.

4.3.2.1 Inspection lot.

4.3.2.1.2 At place of manufacture. Samples from a bulk lot (see 6.7.1) shall be taken for testing in accordance with ASTM D4057 or ASTM D4177, as appropriate.

4.3.2.1.3 At place of delivery. A representative sample of 5 gallons of fluid shall be taken from each lot in accordance with ASTM D4057 or ASTM D4177, as appropriate.

4.3.2.2 Sampling during loading. Samples shall be drawn at the discharge pipe where it enters the bulk carriers (tank cars, tank trucks, and so forth). At least four samples shall be taken at regular intervals during the entire period of loading or filling, each sample being 1 pint. Only one sample for one continuous drum filling operation is required and shall be taken after approximately 10 percent of the volume of product has been drummed.

4.3.2.3 Sampling a storage tank. A representative sample of 5 gallons of fluid shall be taken from each bulk lot (see 6.7.1) in accordance with ASTM D4057 or ASTM D4177, as appropriate.

4.3.2.4 Sampling of filled containers. Samples from a packaged lot (see 6.7.3) shall be taken for testing in accordance with ASTM D4057 or ASTM D4177, as appropriate. The contents of each container to be sampled shall be shaken, rolled, or stirred to mix the contents thoroughly. Equal portions shall be withdrawn from approximately the center of each container by means of a thief or other sampling device. If a lot consists of less than 5 containers, a one gallon sample shall be drawn from one drum. If a lot consist of 5 or more containers, quart samples shall be drawn from four randomly selected drums in the lot and composited.

4.3.3 Rejection of lots. When the sample of fluid fails any of the tests, except solid particle contamination, this shall be cause for rejection of the lot represented by the sample. If the sample only fails solid particle contamination, the batch may go through a one-pass filtration and be retested for solid particle contamination. Only mechanical restraint can be used to filter the oil.

4.4 Examination of filled containers. A random sample of filled containers shall be selected from each lot in accordance with ASQ Z1.4 at inspection level II to verify compliance regarding fill, closure, marking, and other requirements not involving tests. Samples shall be examined for defects of the container and the closure, for evidence of leakage, and for unsatisfactory markings. Each container shall also be weighed to determine quantity. Any container in the sample having one or more defects or under required fill shall be cause for rejection of the container.

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4.5 Off-gassing. The oil shall be tested by a Government-approved testing facility in accordance with NAVSEA S9510-AB-ATM-010 chapter titled "Material Control Program". The results shall be submitted to NAVSEA for evaluation and approval for use (see 3.5, 6.2, and 6.5).

4.6 2,6-di-tert-butylphenol (DTBP). Analytical data with the method documented from a NAVSEA-approved laboratory shall be submitted as specified (see 6.2) to document relative absence of DTBP, and, if detected, shall not exceed 10 ppm.

4.7 Toxicity. The fluid shall be evaluated by the Navy and Marine Corps Public Health Center (NMCPHC) using the administrative Health Hazard Assessment (HHA) (see 3.7). Sufficient data to permit an HHA of the product shall be provided by the manufacturer/distributor to the NMCPHC. To obtain current technical information requirements specified by the NMCPHC, see 6.6.

4.8 Oil compatibility. Oil shall be considered compatible with the referenced oils furnished by the Government if 1:1 mixtures of a test oil with all reference oils give passing values on the oxidation (ASTM D4310), corrosion (salt water), foam, and emulsion tests (see 3.8.1). For information on obtaining reference fluids, see 6.3.

4.9 Homogeneity. After determining the pour point of the oil, the test jar and oil shall be returned to a cooling bath. The test jar and oil shall be cooled to 6 °C (10 °F) below the pour point and held at that temperature for 3 hours. The jar of oil shall be removed from the cooling bath and allowed to warm to room temperature. Next, the jar of oil shall be placed in an oil bath, bringing the temperature of the bath to 163±2.8 °C (325±5 °F) and held at test temperature for 1 hour. The jar of oil shall be removed from the oil bath and allowed to cool in air to room temperature. The test oil shall be visually examined for sediment or separation of insoluble material at temperatures from 6 °C (10 °F) above the pour point and up to 163 °C (325 °C) (see 3.8.2).

4.10 Appearance. The appearance of the fluid shall be assessed by filling a clear quart-sized bottle with the fluid and holding the sample in front of a strong light source. The fluid shall be inspected for any cloudiness or haziness (see 3.8.4).

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 lubricant is intended for use in main and auxiliary turbines and gears, air compressors, and certain hydraulic equipment, as well as for general mechanical lubrication, on non-nuclear ships. This specification covers Navy-specific requirements for the mitigation of hazardous consequences or potential life threatening qualification tests, as well as qualification testing that requires special equipment not commonly available and testing that exceeds 30 days (720 hours).

6.2 Acquisition requirements. Acquisition documents should specify the following:

a. Title, number, and date of this specification.

b. Quantity required.

c. Requirement for the results of off-gas testing (see 4.5).

d. Requirement for analytical data documenting relative absence of DTBP (see 4.6).

e. Requirement for sufficient data to permit an HHA of the product to be provided to the NMCPHC (see 4.7).

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f. Packaging requirements (see 5.1).

g. Activities requiring copies of completed MSDS (see 6.4).

6.3 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 No. 32353 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 Commander, Naval Sea Systems Command, ATTN: SEA 05S, 1333 Isaac Hull Avenue, SE, Stop 5160, Washington Navy Yard DC 20376-5160 or emailed to commandstandards@navy.mil. An online listing of products qualified to this specification may be found in the Qualified Products Database (QPD) at https://assist.daps.dla.mil.

6.4 Material safety data sheets (MSDS). Contracting officers will identify those activities requiring copies of completed MSDS prepared in accordance with FED-STD-313. In order to obtain the MSDS, FAR clause 52.223-3 must be in the contract.

6.5 Material certification. Materials to be installed in submarines are to be controlled to prevent off-gassing, which contaminates the atmosphere and can result in health hazards to personnel or deleterious effects on machinery. These controls are accomplished through the Submarine Material Control Program, which is described in the Nuclear Powered Submarine Atmosphere Control Manual, NAVSEA S9510-AB-ATM-010 chapter titled "Material Control Program". Under the Submarine Material Control Program, all materials considered for use on submarines require certification and assignment of a usage category. Under the certification process, candidate materials are selected by Navy activities or contractors, and a request for certification is submitted to the Naval Sea Systems Command, SEA 05S, 1333 Isaac Hull Ave., SE, Stop 5160, Washington Navy Yard, DC 20376-5160 or emailed to commandstandards@navy.mil. The certification request is accompanied by detailed information, including descriptions of the material, method of application, usage, and storage. A chemical analysis is conducted, which is normally accomplished through off-gas testing. The off-gas test is required to be conducted in a Government-approved laboratory designated by the preparing activity. Information pertaining to this test requirement may be obtained from the Naval Sea Systems Command, SEA 05S, 1333 Isaac Hull Ave., SE, Stop 5160, Washington Navy Yard DC 20376-5160 or emailed to commandstandards@navy.mil. Based on the chemical analysis results, a usage category is assigned to the material defining whether, and to what extent, the material may be used on submarines.

6.6 Toxicity evaluation. The Navy and Marine Corps Public Health Center (NMCPHC) requires sufficient information to permit an HHA of the product. Any questions concerning toxicity and requests for HHA should be addressed to the Commanding Officer, Navy and Marine Corps Public Health Center (NMCPHC), ATTN: Industrial Hygiene Department, Acquisition Technical Support Division, 620 John Paul Jones Circle, Suite 1100, Portsmouth, VA 20378-2103. Upon receipt of the HHA, a copy should be provided to the Naval Sea Systems Command, ATTN: SEA 05S, 1333 Isaac Hull Ave., SE, Stop 5160, Washington Navy Yard, DC 20376-5160 or emailed to commandstandards@navy.mil.

6.7 Definitions.

6.7.1 Bulk lot. A bulk lot consists of a quantity of a homogeneous mixture of fluid offered for acceptance in a single, isolated container or manufactured in a single plant run, through the same processing equipment, with no change in the ingredient materials.

6.7.2 Ortho isomer. Isomers are compounds with the same molecular formula but different structures. The ortho isomer is one where adjacent sites on a benzene ring are substituted.

6.7.3 Packaged lot. A packaged lot consists of an indefinite number of 55-gallon drums or smaller unit packages of identical size and shape, offered for acceptance, and filled with a homogeneous mixture of fluid from a single, isolated container, or filled with a homogeneous mixture of fluid.

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6.8 History. This specification was developed through a Small Business Innovation Research (SBIR) project as a direct synthetic replacement for MIL-PRF-17331 mineral-based fluid. The lubricating oil covered by this specification can be used to "top-off" systems or during oil change-outs in systems currently utilizing MIL-PRF-17331 fluid, upon obtaining appropriate approval. This synthetic oil can offer significant advantages in applications currently utilizing MIL-PRF-17331 (2190 TEP) where long-term operational life and/or oxidative stability is desired, such as HPACs.

6.9 Subject term (key word) listing.

Bearing

Custodians:
Army – MI
Navy – SH
Air Force – 68
DLA – GS

Review Activities:
Army – AT
Navy – AS
Air Force – 03
DLA – GS3, PS, SA
GSA – FAS

Preparing Activity:
Navy – SH
(Project 9150-2009-001)

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 https://assist.daps.dla.mil.