MIL-HDBK-267(SH)
2 March 1981

MILITARY HANDBOOK

GUIDE FOR SELECTION OF LUBRICANTS AND HYDRAULIC FLUIDS FOR USE IN SHIPBOARD EQUIPMENT

FSC 9150

DEPARTMENT OF THE NAVY

NAVAL SEA SYSTEMS COMMAND

WASHINGTON, DC 20362

MIL-HDBK-267(SH)
Guide for Selection of Lubricants
and Hydraulic Fluids for Use in
Shipboard Equipment

1. This standardization handbook was developed by the Department of the Navy in accordance with established procedure.

2. This publication was approved on 2 March 1981, for printing and inclusion in the military standardization handbook series.

3. This document provides basic and fundamental information on the selection and limitations of lubricants and hydraulic fluids for use in shipboard equipment.

4. Every effort has been made to reflect the latest information on lubricants and hydraulic fluids in shipboard equipment. It is the intent to review this handbook periodically to insure its completeness and currency. Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Naval Sea Systems Command, SEA 3112, Department of the Navy, Washington, DC 20362 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

CONTENTS

CONTENTS (Continued)

1. SCOPE

1.1 Purpose. This handbook establishes design guides for selection of lubricant fluids and compounds which conform to approved specifications and includes descriptive information relative to shipboard equipment applications, and limitations of the lubricants. Materials used only during normal overhaul of shipboard equipment are not within the scope of this handbook. Materials used only for corrosion protection have been excluded from this handbook. Design and lubrication requirements for military electronic equipment are established under MIL-STD-454.

2. REFERENCED DOCUMENTS

2.1 Issues of documents. The following documents, of the issue in effect on date of invitation for bids or request for proposal, form a part of this handbook to the extent specified herein.

SPECIFICATIONS

FEDERAL

- SS-G-659 - Graphite, Dry (Lubricating).
- VV-B-680 - Brake Fluid, Automotive.
- VV-L-820 - Lubricating Oil, General Purpose (Light).
- VV-L-825 - Lubricating Oil, Refrigerant Compressor.
- VV-P-216 - Penetrating Oil (For Loosening Frozen Metallic Parts).

MILITARY

- MIL-A-907 - Antiseize Compound, High Temperature.
- MIL-L-2104 - Lubricating Oil, Internal Combustion Engine, Tactical Service.
- MIL-L-2105 - Lubricating Oil, Gear, Multipurpose.
- MIL-T-5542 - Thread Compound, Antiseize, Oxygen Systems.
- MIL-G-6032 - Grease, Plug Valve, Gasoline and Oil Resistant.
- MIL-L-6085 - Lubricating Oil, Instrument, Aircraft, Low Volatility.
- MIL-S-8660 - Silicone Compound.
- MIL-L-9000 - Lubricating Oil, Shipboard Internal Combustion Engine, High Output Diesel.
- MIL-L-15019 - Lubricating Oil, Compounded.
- MIL-L-15719 - Lubricating Grease (High-Temperature, Electric Motor, Ball and Roller Bearings).
- MIL-F-16884 - Fuel Oil, Diesel, Marine.
- MIL-L-17331 - Lubricating Oil, Steam Turbine and Gear, Moderate Service.
- MIL-H-17672 - Hydraulic Fluid, Petroleum, Inhibited.
- MIL-G-18458 - Grease, Wire Rope-Exposed Gear.
- MIL-H-22072 - Hydraulic Fluid, Catapult.
- MIL-T-22361 - Thread Compound, Antiseize, Zinc Dust-petrolatum.
- MIL-G-23549 - Grease, General Purpose.
- MIL-L-23699 - Lubricating Oil, Aircraft Turbine Engines, Synthetic Base.

MILITARY (Continued)

MIL-L-24131 - Lubricant, Colloidal Graphite in Isopropanol.
MIL-G-24139 - Grease, Multipurpose, Quiet Service.
MIL-L-24478 - Lubricant, Molybdenum Disulfide in Isopropanol.
MIL-L-24479 - Lubricant, Red Lead and Graphite in Mineral Oil.
DOD-G-24508 - Grease, High Performance, Multipurpose (Metric).
MIL-P-24548 - Penetrating Fluid.
DOD-L-24574 - Lubricating Fluid for Low and High Pressure Oxidizing Gas Systems (Metric).
MIL-G-27617 - Grease, Aircraft and Instrument, Fuel and Oxidizer Resistant.

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

2.2 Other publications. The following documents form a part of this handbook to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

BOATING INDUSTRIES ASSOCIATION (BIA)
Recommended Practice 312, Type TC-W.

(Application for copies should be addressed to the Boating Industries Association, 401 N. Michigan Avenue, Chicago, IL 60611.)

(Technical society and technical association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

3. DEFINITIONS

Not applicable.

4. GENERAL REQUIREMENTS

4.1 Lubricating Greases, General Applications and Limitations.

4.1.1 MIL-G-6032, types I and II - Grease, Plug Valve, Gasoline and Oil Resistant.

(a) Uses: These greases are intended for use in tapered plug valves. The two types provide for the use of nigh pressure lubrication equipment or for servicing those valves which require a stick type lubricant. The greases may also be used as a gasket lubricant or seal and for general plug valve service in systems where gasoline, oil, alcohol, or water resistance is required.

(b) Limitations: These greases are not suitable for use with strong acids, alkali, or hydrogen peroxide. They should not be used in nonspecified applications without prior performance evaluation.

4.1.2 MIL-L-15719 - Lubricating Grease (High-Temperature, Electric Motor, Ball and Roller Bearings).

(a) Uses: This grease is intended for lubricating ball and roller bearings in class H insulated (silicone) electric motors with heat-stabilized ball bearings operating above 300°F. It is also used in the lubrication of boiler sliding feet.

(b) Limitations: This grease should not be applied to bearings in which the main action involves the sliding of metal on metal, as in journal bearings, spiral gears, gear trains, and similar applications, with the exception of the application to boiler sliding feet. It should not be used in nonspecified applications without prior performance evaluation.

4.1.3 MIL-G-18458 - Grease, Wire Rope-Exposed Gear.

(a) Uses: This grease is intended for external application to wire running ropes and exposed gears for lubrication and corrosion protection.

(b) Limitations: This grease should not be used for other than the recommended application without prior performance evaluation.

4.1.4 MIL-G-23549 - Grease, General Purpose.

(a) Uses: This grease is intended primarily for use on steam catapults. It is intended for use under conditions of high temperatures, high load, salt water, and contact with live steam.

(b) Limitations: This grease should not be used at temperatures below 0°F or in other nonspecified applications without prior performance evaluation, and cannot be satisfactorily used in grease guns at temperatures below 40°F.

4.1.5 MIL-G-24139 - Grease, Multipurpose, Quiet Service.

(a) Uses: This grease is intended for use in water-resistant applications, particularly where dispensing through long lengths of tubing is required.

(b) Limitations: This grease is not to be used at an operating temperature below 32°F. It should not be used in nonspecified applications without prior performance evaluation.

4.1.6 DOD-G-24508 - Grease, High Performance, Multipurpose (METRIC).

(a) Uses: This grease is intended for use as a lubricant for ball and roller bearings operating continuously at up to 149°C (300°F) and intermittently up to 177°C (350°F) for periods up to four hours in any 24-hour period. This grease is also used for lubrication of gear type and high speed flexible couplings and steam plant valves and fittings.

(b) Limitations: Use of this grease in nonspecified applications should be done only after evaluating its compatibility with all involved materials. It should not be used as a water-resistant grease.

4.1.7 MIL-G-27617, types I and III - Grease, Aircraft, and Instrument, Fuel and Oxidizer-Resistant.

(a) Uses: These greases are intended for use in lubrication of taper plug valves, gaskets, and bearings in fuel and oil systems, or high pressure air-systems at 1500 pounds per square inch (lb/in^2) or above, oxygen systems, or oil-free nitrogen systems. These greases are also suitable for use in the presence of liquid oxygen as a lubricant for threads. Type I is used over an operating temperature range from -65°F to 300°F. Type III is used over an operating temperature range from -30°F to 500°F.

(b) Limitations: These greases are not recommended for antifriction bearing lubrication and may not be suitable for aluminum or magnesium dynamic bearing lubrication because of possible ignition hazards. They are not for use in nonspecified applications without prior performance evaluation.

4.2 Lubricating Oils, General Applications and Limitations.

4.2.1 VV-L-820 - Lubricating Oil, General Purpose (Light).

(a) Uses: This oil is intended for the lubrication of miscellaneous equipment requiring a light oil, such as typewriters and sewing machines.

(b) Limitations: This oil is not for use in high-speed data processing equipment, such as high-speed card-punching machinery, or as a substitute for special proprietary products recommended by equipment manufacturers. It should not be used where a high degree of corrosion protection or oxidation resistance is required and should not be used in nonspecified applications without prior performance evaluation.

4.2.2 VV-L-825, types II and IV - Lubricating Oil, Refrigerant Compressor.

(a) Uses: These lubricating oils are intended for the lubrication of the compression unit of refrigeration equipment. Type II is intended for use in equipment where refrigerants 11, 12, and 113 are used. Type IV is intended for use in equipment where refrigerant 22 is used.

(b) Limitations: These oils should not be used for other than the recommended applications without prior performance evaluation.

4.2.3 MIL-L-2104, grade 10 - Lubricating Oil, Internal Combustion Engine, Tactical Service.

(a) Uses: This lubricating oil is intended for use in shipboard diesel engines operating at ambient temperatures less than 32°F where JP-5 is used as the fuel.

(b) Limitations: This oil should not be used at ambient temperatures above 32°F where MIL-F-16884 fuel is used. It should not be used in engines containing silver bearings or in other nonspecified applications without prior performance evaluation.

4.2.4 MIL-L-2105, grades 75W and 80W-90 - Lubricating Oil, Gear, Multipurpose.

(a) Uses: These oils are intended for automotive gear units, heavy duty industrial type enclosed gear units, automotive type steering gears, and fluid-lubricated universal joints of automotive equipment. Grade 75W is intended for an operating temperature range from -65°F to 275°F, and also in applications where limited torque is available. Grade 80W-90 is intended for an operating temperature range from 0°F to 275°F.

(b) Limitations: These oils should not be used for applications involving moisture or other than the recommended application without prior performance evaluation.

4.2.5 MIL-L-6085 - Lubricating Oil, Instrument, Aircraft, Low Volatility.

(a) Uses: This lubricating oil is a low temperature oil, containing a synthetic oil component, inhibited against oxidation, and possessing rust preventive properties. Primary applications are for instruments and electronic equipment.

(b) Limitations: The special synthetic components used in this instrument oil may soften paint, natural rubber, neoprene, and electrical insulating materials. It should not be used in nonspecified applications without prior performance evaluation.

4.2.6 MIL-L-9000 - Lubricating Oil, Shipboard Internal Combustion Engine, High Output Diesel.

(a) Uses: This lubricating oil is intended for use in advanced design high output shipboard main propulsion and auxiliary diesel engines, using fuel conforming to MIL-F-16884.
(b) Limitations: This oil is not suitable for crank-case lubrication of gasoline engines, nor for use in diesel engines, nor for use in ambient temperatures below 32°F. For use at ambient temperatures below 32°F, see 4.2.3.

4.2.7 MIL-L-15019, symbol 6135 - Lubricating Oil, Compounded.

(a) Uses: This lubricating oil is used in special gear applications, generally involving moisture.
(b) Limitations: This oil should not be used for other than the recommended application without prior performance evaluation.

4.2.8 MIL-L-17331 - Lubricating Oil, Steam Turbine and Gear, Moderate Service.

(a) Uses: This lubricant is intended for use in main and auxiliary steam turbines and gears, air compressors, and hydraulic equipment, as well as general mechanical lubrication.
(b) Limitations: This oil should not be used for other than the recommended applications without prior performance evaluation.

4.2.9 MIL-L-23699 - Lubricating Oil, Aircraft Turbine Engines, Synthetic Base.

(a) Uses: This oil is intended for use in marinized aircraft turbine engines in shipboard main propulsion and auxiliary applications, and also in engine accessory equipment.
(b) Limitations: Certain types of silicone materials such as (oil foaming, material softening) may not be compatible with this oil at temperatures varying with the type of silicone material used. It should not be used in nonspecified applications without prior performance evaluation.

4.2.10 DOD-L-24574 - Lubricating Fluid for Low and High Pressure Oxidizing Gas Systems (Metric).

(a) Uses: Type I lubricating fluid is intended for use at operating temperatures from -46°C (-50°F) to 0°C (32°F), for example, as a crankcase lubricant in compressors for low temperature liquid air distillation plants. Type II is intended for use at operating temperatures from -20°C (-4°F) to 40°C (104°F), for example, as a compressor lubricant in liquid oxygen transfer pumps. Type III is

intended for use at operating temperatures from 20°C (68°F) to 70°C (158°F), for example, as a crankcase lubricant in oxidating gas systems, including oxygen and compressed air at all pressures including oil-free nitrogen at pressures above 10,300 kPa (1500 lb/in^2).

(b) Limitations: These fluids are not recommended for lubrication of aluminum or magnesium materials because of possible ignition problems. They are not for use in other nonspecified applications without prior performance evaluation.

4.2.11 Boating Industries Association - Lubricating Oil, type TC-W.

(a) Uses: This oil is intended for use in two-cycle gasoline engines where the fuel and lubricant are premixed.

(b) Limitations: This oil is not for use in nonspecified applications without prior performance evaluation.

4.3 Hydraulic Fluids, General Applications and Limitations.

4.3.1 VV-B-680 - Brake Fluid, Automotive.

(a) Uses: This brake fluid is intended for use as an operating fluid in automotive type hydraulic brake systems at ambient temperatures ranging from -31°F to 131°F, and fluid temperatures ranging from -31°F to 401°F.

(b) Limitations: This fluid is not to be used in preserving brake parts and components in warehouse storage, nor is it to be used in the brake system of vehicles that will be subjected to prolonged periods of standby storage. It should not be used in nonspecified applications without prior performance evaluation.

4.3.2 MIL-H-17672 - Hydraulic Fluid, Petroleum Inhibited.

(a) Uses: This petroleum base hydraulic fluid is available in three viscosity grades: Symbols 2075-T-H, 2110-T-H, and 2135-T-H. Symbols 2110-T-H and 2135-T-H are intended for use in surface ship deck equipment. Symbol 2135-T-H is intended also for use in hydraulic steering gears. Symbol 2075-T-H is intended for use in submarine external hydraulic systems and other applications operating in an ambient temperature range from -20°F to 20°F.

(b) This fluid is not fire-resistant and should not be used in accumulator-loaded hydraulic systems at pressures above 600 lb/in^2. For a fire-resistant fluid, see 4.3.3.

4.3.3 MIL-H-22072 - Hydraulic Fluid, Catapult.

(a) Uses: This hydraulic fluid is a water-glycol, intended for use as a fire-resistant power transmission fluid for hydraulically actuated systems in naval aircraft launching catapults and in hydraulic-type weapons elevators.

(b) Limitations: This fluid may soften and remove most commonly used paints. It is not interchangeable with any other type of hydraulic fluid and should not be used in nonspecified applications without prior performance evaluation.

4.4 Miscellaneous Lubricants, General Applications and Limitations.

4.4.1 SS-G-659 - Graphite, Dry (Lubricating).

(a) Uses: This material is a 200-mesh, high-grade, powdered graphite used for the lubrication of security locks.
(b) Limitations: This material is not intended for blending with oils or greases by operating fleet units. It should not be used in nonspecified applications without prior performance evaluation.

4.4.2 VV-P-216 - Penetrating Oil (For Loosening Frozen Metallic Parts).

(a) Uses: This penetrating oil is intended for use in the freeing of corrosion-seized parts without damage to such parts.
(b) Limitations: Aerosol cans containing this oil should not be exposed to direct sunlight, radiators, fires, hot water, or other sources of heat. This oil may be used aboard submarines only while in port while ventilating outboard.

4.4.3 MIL-A-907 - Antiseize Compound, High Temperature.

(a) Uses: This antiseize compound is intended for use on threads of steel nuts and bolts of super-heated steam installations at temperatures up to 1050°F.
(b) Limitations: This compound is not intended for use with stainless steels, or in other nonspecified applications.

4.4.4 MIL-T-5542 - Thread Compound, Antiseize, Oxygen Systems.

(a) Uses: This compound is intended for use in both high and low pressure air or oxygen systems which contain no aluminum or aluminum alloy components.
(b) Limitations: This compound is not intended for use with stainless steels or in other nonspecified applications.

4.4.5 MIL-S-8660 - Silicone Compound.

(a) Uses: This compound is used as a sealant to prevent galvanic corrosion due to moisture penetration in areas of dissimilar metal contact, sealing and insulating electronic equipment where material must remain in soft state to allow disassembly, as a lubricant and sealant for rubber "O" rings and gaskets. It is suitable for use between -65°F and 400°F.

(b) Limitations: This compound is not to be used on electrical connectors having natural rubber inserts, as noted in applicable technical orders or specifications for connectors, or in other nonspecified applications.

4.4.6 MIL-T-22361 - Thread Compound, Antiseize, Zinc Dust-petrolatum.

(a) Uses: This compound is intended to prevent seizing during assembly or disassembly of threaded or unthreaded components fabricated from aluminum or its alloys, engaged with components fabricated from similar or dissimilar metals. It is also intended to provide corrosion protection to metal surfaces.

(b) Limitations: Application of an excessive amount of the compound may prevent proper seating of the components. Under low temperature conditions, this compound hardens and is difficult to apply. This compound is not suitable for use on the threaded or unthreaded components of such equipment as optical instruments.

4.4.7 MIL-L-24131 - Lubricant, Colloidal Graphite in Isopropanol.

(a) Uses: This compound is used on sliding surfaces and threaded fasteners to reduce friction and the likelihood of galling where lead or sulfur contamination cannot be tolerated.

(b) Limitations: The range within which the coefficient of friction of this compound lies is wide compared to that of molybdenum disulfide in isopropanol in accordance with MIL-L-24478, and red lead and graphite in mineral oil in accordance with MIL-L-24479. Therefore, in threaded fastener applications where pre-load is established by torque on the bolt or nut, these other compounds may be preferable to graphite in isopropanol.

4.4.8 MIL-L-24478 - Lubricant, Molybdenum Disulfide in Isopropanol.

(a) Uses: This compound is used on sliding surfaces and threaded fasteners to reduce friction and the likelihood of galling. It is also used in high load, low velocity sliding surface applications where dry lubrication is desirable.

(b) Limitations: This compound should not be used in contact with austenitic stainless steels or chrome-nickel steel alloy 17-4PH since cracking of these alloys may result. Of particular concern are applications where this lubricant may be applied on surfaces near areas yet to be welded, on surfaces to be heat treated above 1200°F, or on surfaces which will experience long term operational temperatures above 650°F.

4.4.9 MIL-L-24479 - Lubricant, Red Lead and Graphite in Mineral Oil.

(a) Uses: This compound is used on threaded fasteners to reduce friction and the likelihood of galling. It has a smaller range of coefficient of friction and better antiseize properties than either molybdenum disulfide in isopropanol in accordance with MIL-L-24478 or graphite in isopropanol in accordance with MIL-L-24131.

(b) Limitations: This lubricant should not be used on alloys with nickel content greater than 50 percent which will experience service temperatures in excess of 400°F. Under these conditions, cracking may result.

4.4.10 MIL-P-24548 - Penetrating Fluid.

(a) Use: This fluid is used to aid in freeing corroded and frozen metallic parts.

(b) Limitations: It should not be used below a temperature of 30°F.

5. DETAILED REQUIREMENTS

5.1 Detailed requirements for lubricants, hydraulic fluids, and compounds contained in section 4 of this handbook may be found in the referenced Military or Federal specifications.

Preparing activity:
Navy - SH
(Project 9150-N624)

☆U.S. GOVERNMENT PRINTING OFFICE: 1981-703-023/1483

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

OMB Approval
No. 22-R255

INSTRUCTIONS: The purpose of this form is to solicit beneficial comments which will help achieve procurement of suitable products at reasonable cost and minimum delay, or will otherwise enhance use of the document. DoD contractors, government activities, or manufacturers/ vendors who are prospective suppliers of the product are invited to submit comments to the government. Fold on lines on reverse side, staple in corner, and send to preparing activity. 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. Attach any pertinent data which may be of use in improving this document. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity.

DOCUMENT IDENTIFIER AND TITLE
MIL-HDBK-267(SH)

NAME OF ORGANIZATION AND ADDRESS

CONTRACT NUMBER

MATERIAL PROCURED UNDER A
☐ DIRECT GOVERNMENT CONTRACT ☐ SUBCONTRACT

1. HAS ANY PART OF THE DOCUMENT CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE?
   A. GIVE PARAGRAPH NUMBER AND WORDING.

   B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES

2. COMMENTS ON ANY DOCUMENT REQUIREMENT CONSIDERED TOO RIGID

3. IS THE DOCUMENT RESTRICTIVE?
   ☐ YES ☐ NO *(If "Yes", in what way?)*

4. REMARKS

SUBMITTED BY *(Printed or typed name and address - Optional)*

TELEPHONE NO.

DATE

DD FORM 1 JAN 72 1426

REPLACES EDITION OF 1 JAN 66 WHICH MAY BE USED

S/N 0102-014-1802