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**MIL-HDBK-838
3 December 1997
SUPERSEDING
MIL-STD-838C
30 December 1983**

DEPARTMENT OF DEFENSE HANDBOOK



LUBRICATION OF MILITARY EQUIPMENT

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30 December 1983

DEPARTMENT OF DEFENSE
Washington D.C. 20301

LUBRICATION OF MILITARY EQUIPMENT
MIL-STD-838C

1. This Military Standard is approved for use by all Departments and Agencies of the Department of Defense, effective 30 December 1983. This revision supersedes MIL-STD-838B, dated 22 August 1969.
2. Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: AFWAL/MLSE, Materials Laboratory, WPAFB, OH 45433 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.
3. This standard has been prepared to facilitate logistic support of military equipment.

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1. SCOPE

1.1 Purpose. This standard establishes the requirements and procedures applicable to the selection and application of lubricants required for the lubrication of flight and surface vehicles, and their associated equipment, electronic equipment, and shipboard equipment (see Section 3).

2. REFERENCED DOCUMENTS

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

SPECIFICATIONS

MILITARY

MIL-F-3541 Fittings, Lubrication

STANDARDS

MILITARY

MIL-STD-143 Standards and Specifications, Order of Precedence for the Selection of
MIL-STD-454 Standard General Requirements for Electronic Equipment
MS15000 Fittings, Lubrication (Hydraulic) Acceptable Tip Designs
MS15001 Fittings, Lubrication (Hydraulic) Surface Check, 1/4-28 Taper Threads, Steel, Type I
MS15002 Fittings, Lubrication (Hydraulic) Surface Check, Straight Threads, Steel, Type II
MS15004 Fittings, Lubrication (Hydraulic) Surface Check, 1/4-28 Taper Threads, Nickel-Copper Alloy Type IV
MS15720 Fittings, Lubrication (Hydraulic) Throat or Surface Check 1/4-28 Taper Threads, Corrosion-Resistant Steel, Type VII

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HANDBOOKS

MILITARY

- MIL-HDBK-113 Guide for the Selection of Lubricants, Power Transmission, Fluid Corrosion Preventatives for Use in Ground Equipment Systems
- MIL-HDBK-275 Guide for Selection of Lubricants, Fluids, and Compounds for Use in Flight Vehicles and Components
- MIL-HDBK-267 Guide for Selection of Lubricants and Hydraulic Fluids for Use in Shipboard Equipment.

NAVAL SEA SYSTEMS COMMAND

OD 3000 - Lubrication of Ordnance Equipment

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

3. DEFINITIONS

3.1 Lubricant. The term lubricant as stated herein is defined as any solid, fluid, or semifluid material that performs a lubricating or related specialty function. Such materials include lubricating oils, greases, hydraulic fluids, damping fluids, dielectric coolants, anti-seize compounds, corrosion preventives, and bonded or unbonded solid films.

3.1.1 Standard lubricant. A standard lubricant as stated herein is defined as a lubricant which is specifically authorized by this standard, and which is qualified or acquired in accordance with only those federal or military specifications or official purchase descriptions which are listed in MIL-HDBK-275, MIL-HDBK-113, MIL-HDBK-267, MIL-STD-454, Requirement 43, or OD 3000.

3.1.2 Nonstandard lubricant. A nonstandard lubricant as stated herein is defined as any lubricant other than those defined as standard lubricants in 3.1.1.

3.2 Flight vehicles. Flight vehicles as stated herein are defined as military aircraft, missiles, or space vehicles and the associated propulsion systems used in the vehicle.

3.3 Ground equipment. Ground equipment as stated herein is defined as mobile equipment such as armored equipment, automotive equipment, and construction equipment.

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3.4 Associated equipment. Associated equipment as stated herein is defined as airborne or auxiliary ground equipment that functions as part of, in conjunction with, or in direct support of flight or surface vehicles.

3.5 Electrical equipment. Electrical equipment as stated herein is defined as equipment designed in accordance with MIL-STD-454.

3.6 Shipboard equipment. Shipboard equipment as stated herein is defined as all equipment in use aboard ships and small craft. Specifically excluded is equipment used aboard deep submergence vehicles.

4. GENERAL REQUIREMENTS

4.1 Lubrication selection responsibility. The prime contractor shall be responsible for the selection of suitable lubricants for equipment defined in section 3, including that of subcontractor-manufactured items. This provision does not apply to Government furnished equipment.

4.2 Inspection of lubricants. Conditions for inspection and acceptance of lubricants selected in accordance with this standard shall be as stated in the applicable product specification.

4.2.1 Lubricants properly identified. Lubricants properly identified by stamps, tags, or signed shipping documents as having been previously inspected by a Government quality assurance representative, may be accepted at the receiving contractor's plant without further inspection, except for checking quantities, damage in shipment, and serial number of seals, when applicable.

5. DETAILED REQUIREMENTS

5.1 Materials

5.1.1 Standard lubricants. Consistent (except as noted in 5.1.2) with established performance requirements of the end item, all lubricants used in military equipment shall be standard lubricants selected in order of precedence established in MIL-STD-143.

5.1.2 Nonstandard lubricants. The use of nonstandard lubricants will only be approved by the contracting activity in any one of the following instances:

- a. Potentially suitable standard lubricants have been tested by the contractor or his vendor in the application and found to be inadequate for the minimum performance requirements of the equipment involved. The contractor shall furnish the contracting activity with a report of the results of tests which indicate that the standard lubricants are inadequate for the application. Such a report shall include a comparison of the results of tests of both the standard and nonstandard lubricants.

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- b. The specific part requiring the nonstandard lubricant does not require relubrication at any time during its operating life.
- c. The specific part requiring the nonstandard lubricant will be relubricated only at major overhauls by either the manufacturer of the part, or by a designated commercial maintenance facility that supplies the lubricant as part of a maintenance contract.
- d. For commercial-type surface (administrative) vehicles or for any vehicles or equipment in which the use of a standard lubricant would violate warranty provision.

5.1.2.1 Supplemental data. In the event that a nonstandard lubricant is proposed for use, the contractor shall prepare and maintain supplemental data as specified in 5.3.1. Such data shall be prepared simultaneously with the lubrication list required in 5.3.

5.1.2.2 Restriction of nonstandard commercial products. It is the general policy within the DOD that every effort should be made by equipment developers to use existing standard lubricants, fluids, and corrosion preventatives. It is most important that similar or duplicative materials be precluded from entering the military supply system. Military and federal specification products are designed to satisfy requirements for equipment operations throughout the world. Indiscriminate use of commercial nonstandard products or proprietary products can lead to a variety of problems creating not only increased logistics and supply difficulties, but more importantly, performance malfunctioning of critical equipment systems. The use of any commercial nonstandard product should be considered only after it has been determined that no suitable military or federal specification equivalent exists within the supply system. If a single source commercial nonstandard lubricant is required, the using activity shall be required to submit a sole source justification to the procuring activity.

5.1.3 Naval Air lubricants. Unless otherwise authorized by Naval Air Systems Command, lubricants used for Naval flight vehicles shall be restricted to those listed in MIL-HDBK-275.

5.1.4 Naval Sea lubricants. Unless otherwise authorized by Naval Sea Systems Command, lubricants used in shipboard equipment shall be restricted as follows:

5.1.4.1 General equipment lubricants. For all equipment other than ordnance or electronic equipment, lubricants shall be restricted to those listed in MIL-HDBK-267.

5.1.4.2 Ordnance equipment lubricants. For ordnance equipment, lubricants shall be restricted to those listed in OD 3000.

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5.1.4.3 Lubricant deviations. Use of lubricants other than those permitted by 5.1.4 must be specifically approved by the acquiring activity. Each request for a deviation from the use of standard lubricants shall include reasons why standard lubricants cannot be used and what design changes would be required to allow the use of a standard lubricant. Deviations from the use of standard lubricants will be considered if:

- a. The specific part requiring such lubrication is initially lubricated by the manufacturer and does not require relubrication during repair or maintenance.
- b. The equipment is of a design already approved by the acquiring activity and changing the lubricant will require a design change.

5.1.4.4 Lubricant deviation procedure. In the event that a lubricant other than one permitted by 5.1.4 is proposed for use, the contractor shall prepare and maintain supplemental data as specified in 5.3.1. Such data shall be prepared simultaneously with the lubrication list required by 5.3 and shall include the following:

- a. Identification of the lubricant (manufacturer's name, lubricant number, information, other identifying data).
- b. Identification of equipment to be lubricated and the specific function(s) of the equipment(s) affected by the lubricant(s). Such information will also identify the applicable Project Manager and the prime or subcontractor for the equipment(s).
- c. Information as to why an existing standard lubricant cannot be used and what requirements exist for the use of standard lubes under the equipment contract.
- d. Anticipated annual usage of the lubricant (volume of lube and dollar cost).
- e. Certification that potential standard substitute lubricants have been evaluated.

5.1.5 Electronic equipment. Unless otherwise authorized by the acquiring activity, lubricants used for electronic equipment shall be restricted to those listed in MIL-STD-454, Requirement 43.

5.1.6 Lubricants for Army ground equipment. Unless otherwise authorized by the Army Mobility Equipment Research and Development Command, lubricants used for ground equipment systems shall be restricted to those listed in MIL-HDBK-113.

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5.1.7. Lubricants for Air Force equipment. Unless otherwise authorized by the Air Force Wright Aeronautical Laboratories, lubricants used for Air Force flight vehicles shall be restricted to those in MIL-HDBK-275.

5.2. Selection and application of lubricants. Lubricants shall be selected and applied in such a manner as to permit the applicable military equipment to meet all requirements of the detail specification affected by lubrication. The number of different lubricants used shall be held to a minimum, consistent with satisfactory performance.

5.2.1. Operating life. Where the part is lubricated for operating life, the lubricant shall be so selected that satisfactory operation is obtained under all climatic and operational conditions expected to be encountered, without change of lubricant. If the part lubricated is not expected to function without further lubrication for its normal operating life, provisions shall be made for periodic lubrication in the field in accordance with 5.2.2.

5.2.2. Periodic lubrication. Where the part requires periodic lubrication, the provisions of 5.2.2.1 through 5.2.2.3 shall apply.

5.2.2.1. Lubrication interval. The lubrication interval recommended by the contractor shall coincide as closely as possible with relubrication practices specified by the individual contracting activity.

5.2.2.2. Temperature range. Where possible, a single lubricant shall be selected to cover the required range of operating temperatures for any component. Where such selection unduly penalizes performance, consideration shall be given to the use of an alternate lubricant.

5.2.2.3. Fittings. Fittings, where required for pressure lubrication, shall be in accordance with MIL-F-3541 and MS15000; MS15001, type I; MS15002, MS15004, or MS15720. In accordance with ASCC AIR STD 17/8B (see 6.1) only those fittings with 1/4-28 taper threads shall be used on the flight vehicles (as defined under 3.2), including engines and components.

5.2.3. Application of lubricant. All surfaces to be lubricated shall be clean and free from moisture, solvents, and other contaminants at the time of application of the lubricant. Application may be by any method acceptable to the contracting activity, that will assure freedom from contamination of the lubricant and lubricated part. In no case shall a lubricant be applied over a rusted or corroded surface. Adequate precautions shall be taken during the handling of highly finished surfaces prior to lubrication to prevent contamination by body moisture or other agents that may initiate corrosion after the lubricant is applied. In no case shall a lubricating grease be heated or melted to aid its application to the part lubricated.

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5.3 Lubrication list. The contractor shall prepare a detail lubrication list, conforming to Table I, for approval prior to inclusion of such lubrication data in any technical order, handbook, or other maintenance document scheduled for delivery to the Government on applicable contracts. Listing of a lubricant and a corresponding lubrication interval for a given application constitutes assurance by the contractor that such equipment will perform as require when so lubricated for the specified operating period. In addition, whenever nonstandard lubricants are proposed, the contractor shall prepare a supplemental data sheet as specified in 5.3.1. The detailed lubrication list and supplemental data sheet shall be prepared on 8-1/2 by 11-inch bond paper.

5.3.1 Supplemental data sheet. The supplemental data sheet, when applicable, (see 5.3), shall contain the following:

- a. Trade name of each nonstandard lubricant, source from which it may be acquired, and application in which it is required.
- b. Test data to substantiate use of nonstandard lubricants. This shall not be required, however, when nonstandard lubricant is used under the conditions described in 5.1.2(d).
- c. A copy of the contractor design and performance specification or purchase description covering the nonstandard lubricant. This shall not be required, however, when a nonstandard lubricant is used under the conditions described in 5.1.2(d).

5.3.2 Approval of lubrication list. The lubrication list and any supplemental data (see 5.3 and 5.3.1) shall be forwarded for approval to one of the following addresses, as applicable:

- a. Air Force Wright Aeronautical Laboratories, Materials Laboratory, ATTN: AFWAL/MLSE, Wright-Patterson AFB OH 45433.
- b. Commander, Naval Air Systems Command, ATTN: AIR-5304, Department of the Navy, Washington, D.C. 20360.
- c. Commander, Army Mobility Equipment Research & Development Command (MERADCOM), ATTN: DRDME-GL, Fort Belvoir VA 22060.
- d. Naval Sea Systems Command, Washington, D.C. 20362, ATTN: SEA 05E4, Materials Engineering Office.

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TABLE I. Lubrication list.

Contract No. ^{1/}	Detail lubrication list for: ^{2/} Government contracting officer: (Name and office symbol)		
	Manufacturer's name and address:	Project engineer of equipment procured: (Name and office symbol)	
Assembly or system: ^{3/}			
Component or item: ^{4/}	Lubricant ^{5/}	Lubrication interval ^{6/}	Normal operating ambient temperature range ^{7/}
Date of previous list ^{8/}		Date of approval ^{9/}	
Page ___ of ___ pages			

- 1/ Enter Air Force, Navy, or Army contract number; e.g., AF33(600)99999.
- 2/ Enter end item nomenclature; e.g., F-120 aircraft, tachometer generator, or aircraft engine, etc., citing Government specification that covers the item, if applicable.
- 3/ Major assembly or system of components of the end item that requires lubrication, and Government specification number, if applicable.
- 4/ Individual component that requires lubrication, and Government specification number, if applicable.
- 5/ Lubrication by Government specification number, or contractor performance specification number (see 5.3.1(c)).
- 6/ Normal interval (e.g., 100 hours) at which relubrication is required. If relubrication is not required during the operating life of the part, state "none".
- 7/ Actual operating range that the component will be subjected to in its intended use in the designated application.
- 8/ Enter issue date of last previous list submitted on the same item, same contract, or an earlier contract, if applicable.
- 9/ Date of Government approval of the list cited in footnote 8.

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6. NOTES

6.1 International standardization agreement. Certain provisions (see 5.2.2.3) of this standard are the subject of the international standardization agreement ASCC AIR STD 17/8B. When amendment, revision, or cancellation of this standard is proposed which will affect or violate the international agreement concerned, the preparing activity will take appropriate reconciliation action through international standardization channels, including departmental standardization offices, if required.

6.2 When this specification is used in an acquisition which incorporates a DD Form 1423, Contract Data Requirements List (CDRL), the data requirements identified below shall be developed as specified by an approved Data Item Description (DD Form 1664) and delivered in accordance with the approved CDRL incorporated into the contract. When the provisions of DAR 7-104.9 (n) (2) are invoked and the DD Form 1423 is not used, the data specified below shall be delivered by the contractor in accordance with the contract or purchase order requirements. Deliverable data required by this specification is cited in the following paragraphs.

Paragraph No.	Data requirement title	Applicable DID no.	Option
a. 5.1.2.1	Supplemental data	UDI-P-21274	--
b. 5.3	Lubrication list	UDI-P-21274	--

(Data item descriptions related to this specification, and identified in section 6 will be approved and listed as such in DOD 5000.19L., Vol. II, AMSDL. Copies of data item descriptions required by the contractors in connection with specific acquisition functions should be obtained from the Naval Publications and Forms Center or as directed by the contracting officer.)

Custodians:

Army - ME
Navy - AS
Air Force - 20

Preparing activity:

Air Force - 20

Project No. 9150-0625

Review activities:

Army - AV, AT, AR, MI, ME
Air Force - 68
Navy - SH, OS
DLA-PS

User Activity:

Army - CE

International interest (see 6.1)

INSTRUCTIONS. In a continuing effort to make our standardization documents better, the DoD provides this form for use in submitting comments and suggestions for improvements. All users of military standardization documents are invited to provide suggestions. This form may be detached, folded along the lines indicated, taped along the loose edge (*DO NOT STAPLE*), and mailed. In block 5, be as specific as possible about particular problem areas such as wording which required interpretation, was too rigid, restrictive, loose, ambiguous, or was incompatible, and give proposed wording changes which would alleviate the problems. Enter in block 6 any remarks not related to a specific paragraph of the document. If block 7 is filled out, an acknowledgement will be mailed to you within 30 days to let you know that your comments were received and are being considered.

NOTE This form may not be used to request copies of documents, nor to request waivers, deviations, or clarification of specification 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.

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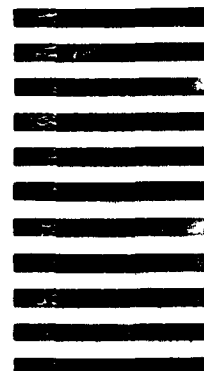
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STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions - Reverse Side)

1 DOCUMENT NUMBER MIL-STD-838C		2 DOCUMENT TITLE Lubrication of Military Equipment	
3a NAME OF SUBMITTING ORGANIZATION		4 TYPE OF ORGANIZATION <i>(Mark one)</i> <input type="checkbox"/> VENDOR <input type="checkbox"/> USER <input type="checkbox"/> MANUFACTURER <input type="checkbox"/> OTHER <i>(Specify)</i> _____	
b ADDRESS <i>(Street, City, State, ZIP Code)</i>			
5 PROBLEM AREAS			
a. Paragraph Number and Wording:			
b. Recommended Wording			
c. Reason/Rationale for Recommendation			
6 REMARKS			
7a NAME OF SUBMITTER <i>(Last, First MI)</i> - Optional		b WORK TELEPHONE NUMBER <i>(Include Area Code)</i> - Optional	
c MAILING ADDRESS <i>(Street, City, State, ZIP Code)</i> - Optional		8 DATE OF SUBMISSION (YYMMDD)	

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