

NOT MEASUREMENT SENSITIVE

MIL-H-46001D
7 December 1989
SUPERSEDING
MIL-H-46001C
11 March 1982

MILITARY SPECIFICATION

HYDRAULIC FLUIDS, PETROLEUM BASE, FOR MACHINE TOOLS

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

1. SCOPE

1.1 Scope. This specification covers four viscosity grades of petroleum-base hydraulic fluid which are intended for use in hydraulic systems of metal-working machine tools (see 6.1).

1.2 Classification. Hydraulic fluid is of the following viscosity grades, as specified (see 6.2).

- Grade 1 - ISO VG 32
- Grade 2 - ISO VG 46
- Grade 3 - ISO VG 68
- Grade 4 - ISO VG 150

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 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 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).

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: USA Belvoir Research, Development, and Engineering Center, ATTN: STRBE-TSE, Fort Belvoir, VA 22060-5606 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.
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AMSC N/A

FSC 9150

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

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STANDARDS

FEDERAL

- FED-STD-313 - Material Safety Data Sheets, Preparation and Submission of.
- FED-STD-791 - Lubricants, Liquid Fuels and Related Products; Methods of Testing.

MILITARY

- MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.
- MIL-STD-290 - Packaging of Petroleum and Related Products.

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Naval Publications and Forms Center, (ATTN: NPODS), 5801 Tabor Avenue, Philadelphia, PA 19120-5099.)

2.1.2 Other Government documents, drawings and publications. The following other Government documents and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those in effect on the date of the solicitation.

DEPARTMENT OF LABOR (DOL)

OSHA 29 CFR 1910.1200 Hazard Communication Interpretation Regarding Lubricating Oils.

(Application for copies should be addressed to the Superintendent of Documents, Government Printing Office, Washington, DC 20402.)

ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA No. 600/4-81-045, September, 1982 - Determination of Polychlorinated Biphenyls (PCBs) in Transformer Fluid and Waste Oil.

(Application for copies should be addressed to the Environmental Protection Agency, Environmental Monitoring and Support Laboratory, 26 Martin Luther King, Cincinnati, OH 45268.)

2.2 Non-Government publications. The following document(s) 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 TESTING AND MATERIALS (ASTM) STANDARD TEST METHODS

- D 92 - Flash and Fire Points by Cleveland Open Cup.
- D 97 - Pour Point of Petroleum Oils.
- D 287 - API Gravity of Crude Petroleum and Petroleum Products (Hydrometer Method).

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- D 445 - Kinematic Viscosity of Transparent and Opaque Liquids (and the Calculation of Dynamic Viscosity).
- D 664 - Neutralization Number by Potentiometric Titration.
- D 665 - Rust Preventing Characteristics of Inhibited Mineral Oil in the Presence of Water.
- D 892 - Foaming Characteristics of Lubricating Oils.
- D 1500 - ASTM Color of Petroleum Products (ASTM Color Scale).
- D 2270 - Calculating Viscosity Index from Kinematic Viscosity at 40 and 100 degrees C.
- D 2882 - Indicating the Wear Characteristics of Petroleum and Non-Petroleum Hydraulic Fluids in Constant Vane Pump.
- D 4057 - Manual Sampling of Petroleum and Petroleum Products.
- D 4175 - Standard Terminology Relating to Petroleum, Petroleum Products, and Lubricants.
- D 4177 - Automatic Sampling of Petroleum and Petroleum Products.

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

CINCINNATI MILACRON MARKETING COMPANY

Special Manual, Lubricants Purchase Specifications, Approved Products, Publication Number 10-SP-80160.

(Application for copies should be addressed to Cincinnati Milacron Inc., 4701 Marburg Avenue, Cincinnati, Ohio 45209.)

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

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, (except for related associated detail specifications, specification sheets or MS standards), 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 First article. Unless otherwise specified (see 6.2), the first article sample shall be subjected to first article inspection (see 6.3) in accordance with 4.4.

3.2 Materials. The hydraulic fluids shall be derived from petroleum fractions. These may be virgin or re-refined (recycled or reclaimed) stocks, as defined in ASTM D 4175, or a combination thereof. The stocks shall be compounded with such functional additives (anti-wear, oxidation inhibitors, corrosion inhibitors, etc.) as are necessary to meet specified requirements.

3.3 Toxicity. The material shall have no adverse effect on the health of personnel when used for its intended purpose. Questions pertinent to this effect shall be referred by the contracting activity to the appropriate departmental medical service who will act as an advisor to the contracting agency.

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3.3.1 Material Safety Data Sheets. Material Safety Data Sheets (MSDS) shall be prepared in accordance with FED-STD-313 (see 6.5). The MSDS shall be included with each shipment of the material covered by this specification.

3.4 Physical and chemical requirements. The hydraulic fluid shall conform to the respective requirements specified in table I and in 3.4.1 through 3.4.4 when the fluid is tested in accordance with the methods specified in table V.

TABLE I. Requirements.

PROPERTY	GRADE 1	GRADE 2	GRADE 3	GRADE 4
A.P.I. gravity 15.5 °C	30 to 33	28 to 32	29 to 31	27 to 30
Viscosity, kinematic, 40 °C, cSt	28.8 to 35.2	41.4 to 50.6	61.2 to 74.8	135 to 165
100 °C, cSt	Report	Report	Report	Report
Viscosity index, min	90	90	90	90
Pour point, °C, max	-12	-12	-12	-6
Flash point, °C, min	188	196	196	221
Fire point °C, min	216	218	218	246
Neutralization No., mg KOH/g oil, max	1.5	1.5	1.5	0.2
Color, max	2.0	3.0	3.0	5.0
Pump wear test, max	50 mg	50 mg	50 mg	Not required
Galvanic corrosion	Pass	Pass	Pass	Pass
Rust prevention, 24 hr test	Pass	Pass	Pass	Pass
PCBs, ppm, max	2	2	2	2
Total chlorine content, ppm, max	500	500	500	500

3.4.1 Foaming. The foaming characteristics of the hydraulic fluid shall not exceed the limitations specified in table II when the fluid is tested in accordance with ASTM D 892.

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TABLE II. Foaming requirements.

Test Temperature	Foam Volume at end of 5-minute blowing period, (max), mL	Foam volume at end of 10-minute settling period (max), mL
24 °C	No limit	100
93.5 °C	No limit	25
24 °C after test at 93.5 °C	No limit	100

3.4.2 Thermal stability. The hydraulic fluid shall meet the requirements specified in table III upon completion of the thermal stability test when tested in accordance with the test method specified in table V.

TABLE III. Thermal stability requirements.

Property	Requirement
Percent viscosity change, max	±5
Neutralization No. change, mg KOH/g, max	
grades 1, 2, 3:	±0.75
grade 4:	±0.15
Precipitate or sludge, mg/100 mL, max	25
Steel rod:	
Visual condition <u>1/</u>	report
Deposit, mg, max	3.5
Metal removed mg/200 mL, max	1.0
Copper rod:	
Visual condition <u>1/</u>	5
Metal removed mg/200 mL, max	10.0

1/ Rating shall be based on "Heat Test Standards for Copper and Steel Rods", Cincinnati Milacron publication, 10-SP-80160.

3.4.3 Compatibility. The product of hydraulic fluid shall be compatible with a reference fluid made up of previously purchased products, when tested in accordance with 4.7.2. Compatibility is defined as the conformance by the test mixture described in 4.7.2 to all the thermal stability requirements listed in table III.

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3.4.4 Workmanship. Each hydraulic fluid shall be a clear, transparent product, homogeneous in appearance, and free from visible sediment and suspended matter.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements (examinations and tests) as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in this specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items must meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

4.2 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. First article inspection (see 4.4).
- b. Quality conformance inspection (see 4.5).
- c. Inspection of packaging (see 4.6).

4.3 Toxicity. The contractor shall have the toxicological product formulations and associated information available for review by the contracting activity to evaluate the safety of the material for the proposed use through the submission of the Material Safety Data Sheet detailed in FED-STD-313 (see 6.5).

4.4 First article inspection. First article inspection shall consist of the requirements specified in table IV.

4.5 Quality conformance inspection.

4.5.1 Bulk lot. A bulk lot (batch) is an indefinite quantity of a homogeneous mixture of one grade of hydraulic fluid 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 the ingredient materials.

4.5.2 Packaged lot. A packaged lot is an indefinite number of drums or other unit containers of identical size and type, offered for acceptance, and filled with a homogeneous mixture of one grade of hydraulic fluid manufactured in a

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single plant run (not exceeding 24 hours) through the same processing equipment with no change in the ingredient materials.

TABLE IV. Inspection requirements.

Test	First Article	Quality Conformance	Paragraph Requirement	Test Method
A.P.I. gravity	x	x	table I	table V
Viscosity, kinematic	x	x	table I	table V
Viscosity index	x	x	table I	table V
Pour point	x	x	table I	table V
Flash point	x	x	table I	table V
Fire point	x	x	table I	table V
Neutralization No.	x	x	table I	table V
Color	x	x	table I	table V
Pump wear test	x		table I	table V
Galvanic corrosion	x	x	table I	table V
Rust prevention	x	x	table I	table V
PCBs	x	x	table I	table V
Chlorine content	x	x	table I	4.7.3
Foaming	x	x	3.4.1	table V
Thermal stability	x		3.4.2	table V
Compatibility	x		3.4.3	4.7.2
Workmanship	x	x	3.4.4	table V
MSDS	x	x	3.3.1	4.3
Certification:				
Pump wear test	x			4.7.1

4.5.3 Sampling for examination of filled containers. A random sample of filled containers and a sample of shipping containers fully prepared for delivery shall be selected from each lot or batch of fluid in accordance with MIL-STD-105.

4.5.4 Examination of filled containers. Samples selected in accordance with 4.5.3 shall be examined for compliance with MIL-STD-290 with regard to fill, closure, sealing, leakage, packaging, packing and marking requirements.

4.5.5 Sampling for tests. Samples for tests of bulk or packaged lots shall be taken in accordance with ASTM D 4177 or D 4057.

4.5.6 Examination of contents of filled containers. The quality conformance tests specified in table IV shall be performed on the contents of the filled containers selected according to 4.5.5 using the methods specified in table V.

4.6 Inspection of packaging.

4.6.1 Quality conformance inspection of packaging.

4.6.1.1 Unit of product. For the purpose of inspection, a complete pack prepared for shipment shall be considered a unit of product.

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4.6.1.2 Inspection lot. The inspection lot shall be as defined in 4.5.2 packed for shipment.

4.6.1.3 Sampling. Samples for examination of packaging shall be selected at random from each inspection lot in accordance with procedures prescribed in MIL-STD-105.

4.6.1.4 Examination. Samples selected in accordance with 4.6.1.3 shall be examined for the defects listed below.

101. Unit container not of type and volume specified.
102. Unit containers not in accordance with the applicable requirements of MIL-STD-290.
103. Exterior container not in accordance with the applicable requirements of MIL-STD-290.
104. Marking not as specified in MIL-STD-290 and 5.1.
105. Palletization, when required, not as specified.

4.7 Test methods and verification. Tests shall be performed in accordance with the applicable test methods listed in table V. The pump wear test shall be certified as specified in 4.7.1.

TABLE V. Test methods.

Test	FED-STD 791 Method No.	ASIM Method No.	Other
API gravity		D 287	
Viscosity, kinematic		D 445	
Viscosity index		D 2270	
Pour point		D 97	
Flash point		D 92	
Fire point		D 92	
Neutralization No.		D 664	
Color		D 1500	
Pump wear test		D 2882	
Galvanic corrosion	5322		
Rust prevention		D 665, proc. A	
PCBs			EPA No. 600/4-81-045
Foaming		D 892	
Thermal stability			Cincinnati Milacron Proc. A
Compatibility			4.7.2
Workmanship			Visual

4.7.1 Pump wear test certification grades 1 to 3. The contractor shall certify as part of the first article report that the hydraulic fluid offered for acceptance is the same formulation that an approved machine tool manufacturer's laboratory (see 4.7.1.1) has qualified for use in the machine tools manufacturer's equipment. The name of the machine tool manufacturer and trade name of the lubricant offered for acceptance shall also be indicated.

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4.7.1.1 Approved machine tool manufacturer. A list of approved machine tool manufacturers is available from the activity cited in 6.3.2.

4.7.2 Compatibility test. A mixture shall be prepared of 50 percent by volume of the reference fluid and 50 percent by volume of the brand and grade under test. This mixture shall be subjected to the thermal stability test (see table V) and shall meet the requirements of table III (see 3.4.2).

4.7.3 Total chlorine content. The total chlorine content of the hydraulic oil shall be determined by a gas chromatographic method or microcoulometric method which is accurate to ± 100 ppm or by the use of a portable test kit for the quantitative analysis of chlorine (see 6.8), such as the "Clor-D-Tect 1000" by Dexsil Corporation, or an equivalent kit with an accuracy of ± 100 ppm in the range 0 to 4000 ppm chloride ion. Nonconformance to table I shall constitute failure of this test.

5. PACKAGING

5.1 Packing, and marking. Packing and marking shall be in accordance with the level B or C requirements of MIL-STD-290 as specified (see 6.2). The type and size of container and any special markings shall be as specified (see 6.2). Manufacturers/suppliers of products under this specification shall provide a hazard warning label in accordance with the Hazard Communication Standard, 29 CFR 1910.1200. The appropriate warning shall convey the specific physical and health hazards including target organ effects of the material. This label shall be affixed to each container.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. Hydraulic fluids covered by this specification are intended for use in hydraulic systems of metal-working tools which require anti-wear oils. Corrosion inhibiting and oxidation resistant lubricating oils (R and O oils) of equivalent viscosity grades and without anti-wear additives are described by MIL-H-17672. The selection of viscosity grade and type of hydraulic oil should be based on the recommendation of the machine tool manufacturer.

6.1.1 Storage conditions. The hydraulic fluid may be stored at temperatures ranging from -46 to $+49$ °C.

6.2 Acquisition requirements. Acquisition documents shall 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 2.1.1 and 2.2).
- c. Grade and container size of hydraulic fluid (see 1.2, 6.6, and table VI).
- d. When first article testing is not required (see 3.1, 4.4 and 6.3).
- e. When a first article sample and documentation should be submitted to the specification preparing activity (see 6.3).

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- f. When a quality conformance sample and documentation should be submitted to the specification preparing activity (see 6.4).
- g. Those activities requiring Material Safety Data Sheets (see 6.5).
- h. Level of packing (see 5.1).
- i. Special marking, if required (see 5.1).

6.2.1 Purchase unit. The fluid covered by this specification should be purchased by volume, the unit being the U.S. gallon at 15.6 °C.

6.2.2 Consideration of data requirements. The following data requirements should be considered when this specification is applied on a contract. The applicable Data Item Descriptions (DID's) should be reviewed in conjunction with the specific acquisition to ensure that only essential data are requested/ provided and that the DID's are tailored to reflect the requirements of the specific acquisition. To ensure correct contractual application of the data requirements, a Contract Data Requirements List (DD Form 1423) must be prepared to obtain the data, except where DOD FAR Supplement 27.475-1 exempts the requirement for a DD Form 1423. Deliverable data required by this specification is cited in the following paragraphs:

Paragraph no.	Data requirement title	Applicable DID no.
4.4	First Article Inspection Report	DI-T-4902
4.7.1	Certification Data Report	DI-E-2121
4.5	Inspection Test Report	DI-T-5329

(The above DID's were those cleared as of the date of this specification. The current issue of DOD 5010.12-L, Acquisition Management Systems and Data Requirements Control List (AMSDL) must be researched to ensure that only current, cleared DID's are cited on the DD Form 1423.)

6.3 First article inspection. When first article inspection is required, the contracting officer should provide specific guidance to offerors concerning the requirements for testing of the first article sample of the offered product. Testing should be performed in the contractor's plant or in a Government approved laboratory. Testing should be certified by the DoD quality assurance representative (QAR) as meeting the requirements of the specification. The approved documentation should consist of:

- a. A complete laboratory report listing of all the tests performed, by method and results (see tables IV and V).
- b. The location and identity of the plant which produced the first article sample.
- c. Complete information concerning the source, type and composition of the ingredients used in formulating the product.
- d. Material Safety Data Sheet for the finished product (see 3.3.1).

6.3.1 First article test results. Copies of the approved documentation (see 6.3) and a one-gallon sample of the offered product should be sent to the specification preparing activity (see 6.3.2).

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6.3.2 Specification preparing activity. Information and instructions regarding first article inspection under this specification may be obtained from the US Army Belvoir Research, Development, and Engineering Center, ATTN: STRBE-VF, Fort Belvoir, VA 22060-5606.

6.3.3 Waiver of first article inspection. First article inspection may be waived at the option of the procuring activity when both of the following conditions have been met:

- a. A first article sample of the product has passed all of the first article inspection requirements within the previous five years.
- b. The contractor certifies that the composition of the hydraulic fluid is the same as the product which previously passed the first article inspection requirements.

6.4 Quality conformance inspection. Copies of the approved test results (table IV) and a representative one gallon sample from each batch of hydraulic fluid should be sent to the specification preparing activity (see 6.3.2).

6.5 Material Safety Data Sheets. Contracting officers will identify those activities requiring copies of completed Material Safety Data Sheets prepared in accordance with FED-STD-313. The pertinent Government mailing addresses for submission of data are listed in FED-STD-313.

6.6 Part identification number (PIN). Petroleum-base hydraulic fluids intended for use in metal-working machine tools shall be identified by a PIN consisting of an "M" prefix and basic specification number, followed by a two-digit number taken from table VI indicating grade, national stock number (NSN) and corresponding container size, as shown in the following example:

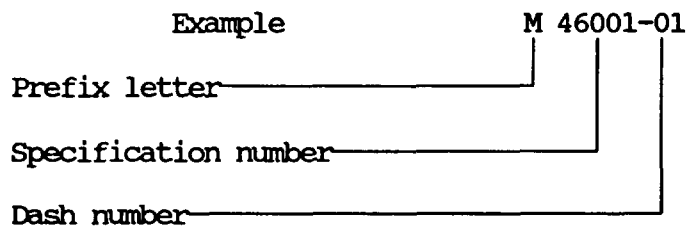


TABLE VI. National stock numbers, sizes, dash numbers.

Grade	Size/Unit of Issue	NSN	Dash Number
1	5 Gallon can (Cn)	9150-00-966-8830	01
1	55 Gallon drum (Dr)	9150-00-966-8831	02
2	55 Gallon drum (Dr)	9150-00-966-8833	03
2	5 Gallon can (Cn)	9150-00-966-8834	04
3	5 Gallon can (Cn)	9150-00-966-8832	05
3	55 Gallon drum (Dr)	9150-00-966-8835	06
4	5 Gallon can (Cn)	9150-00-966-8836	07
4	55 Gallon drum (Dr)	9150-00-966-8837	08

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6.7 Table of equivalents. Table VII includes each grade of hydraulic fluid of this specification, the equivalent viscosity grade, the Cincinnati Milacron equivalent specification, and the approximate viscosity conversion to Saybolt universal viscosity (SUS) at 37.8 °C.

TABLE VII. Equivalents.

MIL-H-46001 Grade	Viscosity Grade	Cincinnati Milacron Specification No.	SUS Conversion 37.8 °C
1	ISO VG 32	P-68	149 to 182
2	ISO VG 46	P-70	214 to 262
3	ISO VG 68	P-69	317 to 393
4	ISO VG 150	P-57	709 to 866

6.8 Chlorine detection kit. A simple, disposable kit for the detection of total chlorine supplied by the Dexsil Corporation, Hamden, Connecticut, or its equivalent, may be used for the detection of total chlorine content. Directions accompanying the test kit to determine the 500 ppm limit shall be followed.

6.9 Subject term (key word) listing.

Hydraulic fluids, metal-working.
Hydraulic oil, anti-wear.
Hydraulic oils.
R and O oils.

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

6.11 AQL certification. This specification is certified to be in compliance with current Army Materiel Command (AMC) policy for the elimination of AQL's/LTPD's (Acceptable Quality Levels/Lot Tolerance Percent Defectives) from military specifications.

(Certified by/date A. E. Taylor 12/7/89)

Custodians:

Army - ME
Navy - SA
Air Force - 68

Preparing activity:

Army - ME

Project 9150-1043

Review activities:

Army - AV, MD, SM
Navy - OS
DLA - GS, IP, NS

User activity:

Navy - MC, SH

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.

RECOMMEND A CHANGE:	1 DOCUMENT NUMBER MIL-H-46001D	2 DOCUMENT DATE (YYMMDD) 891207
3. DOCUMENT TITLE Hydraulic Fluids, Petroleum Base, for Machine Tools		
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) (1) Commercial (2) AUTOVON (if applicable)	e. DATE SUBMITTED (YYMMDD)
8. PREPARING ACTIVITY		
a. NAME	b. TELEPHONE (Include Area Code) (1) Commercial (703) 664-5717	(2) AUTOVON 354-5717
c. ADDRESS (Include Zip Code) US Army Belvoir RDE Center ATTN. STRBE-TSE Ft. Belvoir, VA 22060-5606	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 AUTOVON 289-2340	