

METRIC  
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## MILITARY SPECIFICATION

### LUBRICANT, MOLYBDENUM DISULFIDE IN ISOPROPANOL

This specification is approved for use by the Naval Sea Systems Command, Department of the Navy, and is available for use by all Departments and Agencies of the Department of Defense.

#### 1. SCOPE

1.1 Scope. This specification covers requirements for a lubricant consisting of molybdenum disulfide and isopropanol, intended for use with metal parts having limited clearances and in applications where control of impurities is required.

\*

#### 2. APPLICABLE DOCUMENTS

##### 2.1 Government documents.

2.1.1 Specifications and standards. The following specifications and standards form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto cited in the solicitation.

## SPECIFICATIONS

### FEDERAL

TT-I-735 - Isopropyl Alcohol.  
 PPP-P-1892 - Paint, Varnish, Lacquer, and Related  
 Materials, Packaging, Packing, and  
 Marking of.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed: Commander, Naval Sea Systems Command, SEA 5523, Department of the Navy, Washington, DC 20362-5101 by using the Standardization Document Improvement Proposal (DD Form 1426) appearing the end of this document or by letter.

AMSC N/A

FSC 9150

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 distribution unlimited

## MIL-L-24478C(SH)

## MILITARY

MIL-M-7866 - Molybdenum Disulfide, Technical,  
Lubrication Grade.

MIL-I-45208 - Inspection System Requirements

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

2.2 Order of precedence: In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained."

### 3. REQUIREMENTS

#### 3.1 General requirements.

3.1.1 Materials. The lubricant shall consist of molybdenum disulfide in conformance with the requirements of MIL-M-7866 and isopropyl alcohol in conformance with the requirements of grades A or B of TT-I-735.

\* 3.1.2 Containers. The containers and caps for the lubricant shall be either nonhalogenated plastic or seamless uncoated tinned metal and shall be unaffected by their contents. The containers shall be leaktight and unbreakable. The container materials in contact with the mixed lubricant shall be sufficiently inert, corrosion resistant, and sufficiently free of contaminants that the contents will be unaffected.

3.1.3 Marking and labeling. The legend on each container may be printed or be on an affixed label. The legend shall be capable of being cleaned of smeared lubricant using acetone, denatured alcohol, isopropanol, or trichlorotrifluoroethane. It shall be of such quantity that it will withstand normal handling, use, and cleaning without obliteration or loss.

\* 3.2 Premixed lubricant. This material shall be provided as a mixture of the two ingredients in a container ready for use.

3.2.1 The lubricant shall consist of 135 grams (g) of molybdenum disulfide and 90 milliliters (mL) of isopropanol. The net weight shall be  $205 \pm 5$  g.

## MIL-L-24478C(SH)

3.2.2 Filling and mixing. Ingredients for the premixed lubricant shall be individually filled into each container and then vigorously mixed to produce a homogeneous mixture. The containers shall be allowed to stand for at least 24 hours after which the lubricant shall be vigorously mixed again prior to final packaging and shipping.

3.2.3 Container. Lubricant containers shall have a capacity of 250 cubic centimeters (cm<sup>3</sup>) or eight fluid ounces and shall be of the "wide-mouth type" with a screw cap and integral brush applicator. The applicator shall be a bristle brush 5/16-3/8 inch wide and 5/8-3/4 inch long, attached to a stem and firmly fixed to the screw cap and extending to within 1/4 inch of the bottom of the container. The stem material shall meet the requirements as specified in 3.1.2. Materials or alloys containing lead shall not be used in the assembly of the applicator or cap assembly.

3.2.4 Legend. The legend on the containers (see 3.2.3) shall be in black letters against a light blue background and shall include the following:

3.2.4.1 Identification.WARNING - FLAMMABLE

Lubricant  
MOLYBDENUM DISULFIDE IN ISOPROPANOL  
(MIL-L-24478)

National Stock No. \_\_\_\_\_

KEEP CONTAINER CLOSED WHEN NOT IN USE.

MIX THOROUGHLY JUST PRIOR TO EACH USE.

Date Manufactured \_\_\_\_\_

Batch Nos.: Molybdenum Disulfide \_\_\_\_\_

Isopropanol \_\_\_\_\_

Lot No. \_\_\_\_\_ Net Weight \_\_\_\_\_

(Vendor Name and Address)

## MIL-L-24478C(SH)

3.2.4.2 InstructionsINSTRUCTIONS/PRECAUTIONS

1. Prevent contamination of surrounding surfaces and weld preparation areas. Shield or mask as required.
2. For each application, shake container vigorously for about one minute and then apply lubricant.
3. When dry, rub lightly with a cloth or soft bristle brush until surface is covered with a smooth, gray-black film.
4. After usage of lubricant and installation of fastener, inspect the surrounding areas of contamination. Remove lubricant found as follows:

\*

- (a) Clean the area with acetone, denatured alcohol, or isopropanol, and wipe dry.
- (b) Visually inspect and, if necessary, mechanically clean the surface by brushing with a clean, corrosion-resistant steel brush.
- (c) Repeat step (a) if mechanical cleaning is performed.

3.2.4.3 Lettering shall be clearly legible and proportional to the available space of the container. The words "Molybdenum Disulfide in Isopropanol," "Keep Container Closed When Not in Use", "Mix Thoroughly Just Prior to Each Use", and "Instructions/Precautions" shall be in letters smaller than those in "WARNING - FLAMMABLE" and larger than the other letters.

## 4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the supplier 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 the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

"4.1.1 Responsibility for compliance. All items shall meet all requirements of sections 3 and 5. The inspection set forth

## MIL-L-24478C(SH)

in this specification shall become a part of the contractor's 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."

4.1.2 Inspection system. The supplier shall provide and maintain an inspection system acceptable to the Government for supplies and services covered by this specification. The inspection system shall be in accordance with MIL-I-45208.

4.1.3 Certification of quality conformance. A certification of quality conformance shall be furnished to the procuring agency or Command with each lot of material offered for acceptance. The certification shall include actual results of specified tests, general information for identification of the samples and ingredients, and certification that the batches of ingredients used conform to specification requirements.

4.1.3.1 The minimum certification data required shall be as listed in figure 1, the Certificate of Quality Conformance, and may be submitted in the format as shown in figure 1.

4.2 Quality conformance.

4.2.1 Definitions

4.2.1.1 Batch. A batch of ingredient shall consist of a quantity of material produced at one time for use in the final product and identified by a designation characteristic of the one batch.

\* 4.2.1.2 Lot. A lot of finished product shall consist of all containers of premixed lubricant manufactured using the same combination of batches of ingredients and shall be identified by a designation characteristic of the one lot. Lots of lubricant manufactured from the same combination of batches of ingredients shall be assigned different designations.

4.2.1.3 Samples. Samples taken shall be from the final product in the marked approved containers as specified in 3.2.3.

## MIL-L-24478C(SH)

The final product shall be held in the containers for at least 48 hours and then mixed thoroughly before samples are taken for test.

4.2.2 Quality conformance inspection.

- \* 4.2.2.1 Sample size. Two containers from each lot of premixed lubricant shall be selected at random and inspected as specified in 4.2.2.1.1 through 4.2.2.1.5.

4.2.2.1.1. Container content and leakage. The containers shall meet the requirements for weight as specified in 3.2.1, using an identical unfilled container as a tare weight, and the requirements of PPP-P-1892 for "Leakage".

4.2.2.1.2 Ingredient verification. The two ingredients shall be verified to meet the requirements as specified in 3.1.1 by ensuring certifications for the batches of ingredient are provided and by examining records kept in accordance with MIL-I-45208.

4.2.2.1.3 Odor. The odor of the contents of the containers shall be characteristic of isopropanol. No odor of halogenated solvents shall be detected. This shall be performed by a technician with normal olfactory acuity.

4.2.2.1.4 Ingredient proportion verification. The total solids (nonvolatile) of samples taken from each container shall be determined using the following procedure and shall meet the acceptance criteria specified.

A. Procedure.

1. Shake the container vigorously for about one minute and then immediately pour about 10 mL of lubricant very rapidly into a weighed 30-mL weighing bottle.
2. Weigh the weighing bottle and sample to the nearest milligram (mg) and determine weight of sample. (If necessary a suitable piece of stout wire may be weighed with the weighing bottle and used as a stirrer to break up any film formed during evaporation of the volatile materials.)
3. Allow most of the solvent to evaporate (to minimize fire hazard prior to placing weighing bottle in the oven).

## MIL-L-24478C(SH)

4. Heat the weighing bottle and contents in a well-ventilated convection type oven maintained at about 230°F for at least three hours. (At intervals, any films that have formed should be broken up with the stirrer.)
5. Cool in desiccator and weigh bottle, sample, and wire stirrer. Determine weight of residue to the nearest mg.
6. Calculate the percent by weight of total solids using the following expression:

$$\begin{array}{l} \text{Total solids} \\ \text{(weight percent)} \end{array} = \frac{\text{g of residue}}{\text{g of sample}} \times 100$$

- B. Acceptance criteria. The total solids (nonvolatile) content shall be 63-69 weight percent.

4.2.2.1.5. Legend verification. The legend on the containers shall be verified to meet the requirements as specified in 3.2.4.

## 5. PREPARATION FOR DELIVERY

5.1. Subcontracted materials. The preparation for delivery requirements of referenced specifications do not apply to materials packaged in accordance with the requirements of this specification.

5.2 Packaging, packing, and marking. The lubricant shall be packaged, packed, and marked for delivery in accordance with level C of PPP-P-1892, unless otherwise specified (see 6.2).

## 6. NOTES

6.1 Intended use. This lubricant is intended for use on threaded fasteners and other antiseize applications of closely fitted parts.

### 6.1.1 Prohibitions and precautions.

6.1.1.1 Molybdenum disulfide shall not be applied on 300 series or type 17-4 stainless steel component surfaces.

6.1.1.2 Areas to be welded must be protected from contamination with this lubricant. The following precautions shall be taken:

- (a) Where practical, application and burnishing of lubricant shall be accomplished in areas away from where welding is being performed.

MIL-L-24478C(SH)

- (b) Where necessary, protect weld preparation areas by masking.

6.1.1.3 Lubricant material to this revision of MIL-L-24478 is interchangeable with material to previous revisions.

6.2 Ordering data. Procurement document should specify the following:

- \* (a) Title, number, and date of this specification.
- (b) Packaging and packing levels, if other than level C (see 5.2).
- (c) Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1).

6.3 Certification of quality conformance format (see 4.1.3). The minimum certification data required is shown on figure 1.

- \* 6.4 Changes from previous issue. The margins of this specification are marked with an asterisk to indicate where changes (additions, modifications, corrections, deletions) from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

Preparing Activity:  
Navy - SH  
(Project 9150-N814)

## MIL-L-24478C(SH)

1. Manufacturer \_\_\_\_\_
2. Address \_\_\_\_\_
3. Date \_\_\_\_\_
4. Customer Name \_\_\_\_\_
5. Customer Order No. \_\_\_\_\_
6. Identification and Inspection Requirements \_\_\_\_\_

Identification  
and Inspection  
Requirements

Molybdenum Disulfide  
to Military Spec.  
MIL-M-7866

Isopropanol to  
Federal Spec.  
TT-I-735

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I. General Information

1. Batch Number  
(4.2.1.1)
2. Purchase Order
3. Verification of  
Ingredient  
Conformance to  
Specification  
(4.2.2.1.2)

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II. Premixed Lubricant

Container "A"

Container "B"

4. Lot Number  
(4.2.1.2)
5. Date of Manufacture  
of Lubricant  
(4.2.1.2)
6. Content Weight  
(4.2.2.1.1)

FIGURE 1. Sample Certificate of Quality Conformance

## MIL-L-24478C(SH)

	<u>Container "A"</u>	<u>Container "B"</u>
7. Container Leakage (4.2.2.1.1)		
8. Odor (4.2.2.1.3)		
9. Total solids (4.2.2.1.4)		
10. Legend Verification (4.2.2.1.5)		

The above tests and inspections were conducted in accordance with the applicable paragraphs of this and referenced documents. The material supplied meets the requirements of the subject specification.

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Title

FIGURE 1. Sample Certificate of Quality Conformance - Cont'd

# STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

## INSTRUCTIONS

- 1 The preparing activity must complete blocks 1, 2, 3, and 8 In block 1, both the document number and revision letter should be given
- 2 The submitter of this form must complete blocks 4, 5, 6, and 7
- 3 The preparing activity must provide a reply within 30 days from receipt of the form

NOTE This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements

**I RECOMMEND A CHANGE:**
**1 DOCUMENT NUMBER**

MIL-L-24478C (SH)

**2 DOCUMENT DATE (YYMMDD)**

901212

**3 DOCUMENT TITLE**

LUBRICANT, MOLYBDENUM DISULFIDE IN ISOPROPANOL

**4 NATURE OF CHANGE** *(Identify paragraph number and include proposed rewrite, if possible Attach extra sheets as needed)*
**5. REASON FOR RECOMMENDATION**
**6. SUBMITTER**
**a. NAME** *(Last, First, Middle Initial)*
**b. ORGANIZATION**
**c. ADDRESS** *(Include Zip Code)*
**d. TELEPHONE** *(Include Area Code)*
**7. DATE SUBMITTED** *(YYMMDD)*

(1) Commercial

(2) AUTOVON  
*(if applicable)*
**8. PREPARING ACTIVITY**
**a. NAME**

Commander, Naval Sea Systems Command (SEA 55Z3)

**b. TELEPHONE** *(Include Area Code)*

(1) Commercial  
(703) 602-9137

(2) AUTOVON

332-9137

**c. ADDRESS** *(Include Zip Code)*

Department of the Navy  
Washington, D.C. 20362-5101

**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