

VV-P-216C
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SUPERSEDING
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November 24, 1971

FEDERAL SPECIFICATION

PENETRATING OIL (FOR LOOSENING
FROZEN METALLIC PARTS)

This specification was approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers the requirements for a penetrating oil to free metallic parts resisting movement due to corrosion.

1.2 Classification. Penetrating oils shall be of the following types, as specified (see 6.2.1):

- Type I - Liquid application (brush, dip, or spray).
- Type II - Aerosol application.

2. APPLICABLE DOCUMENTS

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

Federal Specification:

PPP-C-96 - Cans, Metal, 28 Gage and Lighter.

Federal Standard:

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

(Activities outside the Federal Government may obtain copies of Federal specifications, standards, and commercial item descriptions as outlined under General Information in the Index of Federal Specifications, Standards, and Commercial Item Descriptions. The Index, which includes cumulative bimonthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

(Single copies of this specification and other Federal specifications and commercial item descriptions required by activities outside the Federal Government for bidding purposes are available without charge from General Services Administration Business Service Centers in Boston, MA; New York, NY; Philadelphia, PA; Washington, DC; Atlanta, GA; Chicago, IL; Kansas City, MO; Fort Worth, TX; Houston, TX; Denver, CO; San Francisco, CA; Los Angeles, CA; and Seattle, WA.

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(Federal Government activities may obtain copies of Federal standardization documents, and the Index of Federal Specifications, Standards, and Commercial Item Descriptions from established distribution points in their agencies.)

Military Standards:

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

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

Federal Regulations:

Consumer Products Safety Commission

- 16 CFR, Part 1500 - Hazardous Substances and Articles; Administration and Enforcement Regulations.

Department of Transportation (DOT)

- 49 CFR, Part 173 - Shippers - General Requirements for Shipments and Packagings.

(The Code of Federal Regulations (CFR) and the Federal Register (FR), are for sale on a subscription basis by the Superintendent of Documents, U. S. Government Printing Office, Washington, D.C. 20402. When indicated, reprints of certain regulations may be obtained from the Federal agency responsible for issuance thereof.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. The issues of the documents which are indicated as DOD adopted shall be the issue listed in the current DODISS and the supplement thereto, if applicable.

American Society for Testing and Materials (ASTM):

- D-56 - Test for Flash Point by Tag Closed Tester.
- D-93 - Test for Flash Point by Pensky Martin Closed Cup Tester.
- D-95 - Test for Water in Petroleum Products and Bituminous Material by Distillation.
- D-97 - Test for Pour Point of Petroleum Oil.
- D-445 - Test for Kinematic Viscosity of Transparent and Opaque Liquids.
- D-971 - Test for Interfacial Tension of Oil Against Water by the Ring Method.

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

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2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, the text of this specification shall take precedence.

3. REQUIREMENTS

3.1 First article. When specified (see 6.2.1), the contractor shall furnish a container of penetrating oil for first article inspection and approval (see 4.2.1 and 6.4).

3.2 Standard commercial product. Penetrating oils of the same classification shall, as a minimum, meet the requirements specified herein and shall be the manufacturer's standard commercial product. Additional or better features which are not specifically prohibited by this specification, but which are a part of the manufacturer's standard commercial product shall be included in the penetrating oil being furnished. A standard commercial product is a product which has been sold or is currently being offered for sale on the commercial market through advertisements in manufacturer's catalogs, or brochures, and represents the latest production.

3.3 Material. The penetrating oil shall consist of a synthetic oil or a light mineral oil, or a mixture of these oils, with or without additives, as necessary to meet the requirements of this specification.

3.3.1 Propellant. The propellant used in the aerosol can shall be composed of one of the following gases: carbon dioxide, nitrous oxide, or nitrogen. The propellant shall be capable of propelling all the penetrating oil in the can and shall be nonflammable as defined in 49 CFR 173.300, DOT Regulations.

3.4 Performance.

3.4.1 Physical properties. The penetrating oil shall meet the requirements specified in table I when tested as specified in 4.6.

TABLE I. Physical properties

Test	Limit
Pour point	-40°C, maximum
Viscosity, kinematic	1.7 to 10 centistokes (cSt)
Flash point	43.3°C, minimum
Water	0.0 percent
Corrosion	none
Surface tension	44 dynes per centimeter, maximum
Interfacial tension	36 dynes per centimeter, maximum

3.4.2 Pressure. The complete unit shall be capable of withstanding the maximum DOT recommended pressure for the applicable class container. Type II containers shall be tested in accordance with 4.7.1.

3.4.3 Leakage. The complete unit shall show no evidence of leakage. Type II containers shall be tested in accordance with 4.7.2.

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3.5 Containers.

3.5.1 Type I containers. Unless otherwise specified (see 6.2.1), type I containers shall conform to type V of PPP-C-96 with the class and size as specified (see 6.2.1).

3.5.2 Aerosol containers. Type II penetrating oil shall be packaged in aerosol containers conforming to type IX, class 2 or class 3 of PPP-C-96 with the size as specified (see 6.2.1). The container shall be fitted with an activating mechanism and a snap-fitted cover to protect the mechanism. The activating mechanism and a spray nozzle shall be designed for convenient operation and shall require use of only one hand to hold and operate the unit. The mechanism shall be readily operated by a downward finger pressure, which shall activate the valve. The complete unit shall be in compliance with the applicable DOT regulations.

3.5.2.1 Valve. The valve shall be centrally located on the valve cup and shall be capable of being operated by the activating mechanism. The valve shall be the wet spray type having a nozzle through which the propellant and active ingredient are delivered. The valve shall not leak or clog when tested in accordance with 4.7.3.

3.6 Toxicity. When used for its intended purpose, type I and II penetrating oil and propellant used in type II, shall have no adverse effect on the health of personnel. Questions relating to the health effects of the oil and propellant shall be referred by the contracting activity to the appropriate departmental medical service who will act as an advisor to the contracting agency. Toxicity information shall be submitted in accordance with 3.8 (see 6.3).

3.7 Special markings. Precautionary markings on the aerosol container shall be in accordance with 16 CFR 1500, Consumer Products Safety Commission.

3.8 Material safety data sheets. The contractor shall prepare a Material Safety Data Sheet in accordance with FED STD 313 and distribute as specified therein, with one additional copy furnished to the contracting officer (see 6.3).

3.9 Workmanship. The penetrating oil shall be free of dirt, sediment, disagreeable odors, or other foreign matter, as determined by visual examination (see 4.5).

4. QUALITY ASSURANCE PROVISIONS

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

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

- a. First article inspection (see 4.2.1).
- b. Quality conformance inspection (see 4.2.2).

4.2.1 First article inspection. First article inspection shall be performed on one container of each type of penetrating oil to be supplied when a first article sample is required (see 3.1 and 6.2). This inspection shall include the examination of 4.5, the tests of 4.6, and 4.7 when aerosol containers are required. The first article may be a first production item or a standard production item from the manufacturer's current inventory, provided the product meets the requirements of the specification and is representative of the remaining products to be furnished under the contract.

4.2.2 Quality conformance inspection. The quality conformance inspection shall include the examination of 4.5, the tests of 4.6 and 4.7, and the preparation for delivery inspection of 4.9. This inspection shall be performed on samples selected in accordance with 4.4.

4.3 Inspection lot.

4.3.1 Bulk lot. A bulk lot shall be defined as an indefinite quantity of a homogeneous mixture of lubricant 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.

4.3.2 Packaged lot. A packaged lot shall be defined as an indefinite number of unit containers of identical size and type, offered for acceptance, and filled with a homogeneous mixture of lubricant from a single, isolated container; or filled with a homogeneous mixture of lubricant manufactured in a single plant run (not exceeding 24 hours), through the same processing equipment, with no change in the ingredient materials.

4.4 Sampling. Sampling shall be in accordance with MIL-STD-105.

4.4.1 Sampling for examination. Examination shall be based on inspection level S-2 and an Acceptable Quality Level (AQL) of 4.0 percent defective.

4.4.2 Sampling for physical tests. Physical tests shall be based on inspection level S-2. Samples drawn from a bulk lot shall be representative of that lot.

4.4.3 Sampling for aerosol container tests. Aerosol container tests shall be based on inspection level I and an AQL of 1.5 percent defective.

4.5 Examination. Samples selected in accordance with 4.4.1 shall be examined for compliance with the requirements specified in section 3 of this specification. This element of inspection shall encompass all visual examinations.

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4.6 Physical tests. Penetrating oil samples selected in accordance with 4.4.2 shall be tested in accordance with methods specified in table II and shall meet the requirements of table I (see 3.4.1). Test methods and conditions described in FED-STD-791 and applicable ASTM test methods shall be used.

TABLE II. Tests

Test	Method in Fed Test Method Std 791 or ASTM
Pour point	ASTM D-97
Viscosity, kinematic	ASTM D-455
Flash point <u>1/</u>	ASTM D-56 or D-93
Water	ASTM D-95
Corrosion <u>2/</u>	5306
Surface tension	ASTM D-971
Interfacial tension	ASTM D-971

1/ For oils with viscosities from 1.7 to 5.5 cSt @ 40° centigrade (C), D-56 should be used. For those oils having viscosities in excess of 5.5 cSt @40°C, D-93 should be used.

2/ Eliminate requirements for emulsification of sample and subsequent addition of distilled water when not applicable.

4.7 Aerosol container tests. Aerosol containers selected in accordance with 4.4.3 shall be subjected to the tests in 4.7.1 through 4.7.4. Unless otherwise specified, these tests shall be made under one atmosphere of pressure and at a temperature of $21 \pm 1^\circ\text{C}$. Fully loaded aerosol containers shall be utilized for each test.

4.7.1 Pressure. The aerosol container pressure shall be measured by means of a standard pressure gage fitted with a suitable adapter in accordance with DOT regulations.

4.7.2 Leakage. Fully loaded aerosol containers shall be tested for leakage in accordance with DOT regulations.

4.7.3 Valve operation. Self-closing valves on aerosol containers shall be manually operated 30 times successively without requiring excessive finger pressure and shall close immediately upon each release. The penetrating oil shall be propelled in a wet spray or stream and collected in a beaker for tests specified in 4.6. The valve shall then be tested for leakage by submersion for 5 minutes in water containing a wetting agent and maintained at a temperature of $21 \pm 1^\circ\text{C}$.

4.7.4 Net contents. Fully loaded aerosol containers shall be weighed and then sprayed for 3-minute periods followed by 1-minute pauses until the can is empty. The empty can shall be reweighed and its net contents calculated. Any container under required fill shall be cause for rejection of the entire lot.

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4.8 Preparation for delivery inspection. The packaging, packing, palletization, and marking of the item shall be examined to verify conformance to the requirements of section 5.

5. PREPARATION FOR DELIVERY

5.1 Packaging, packing, palletization, and marking. Packaging, packing, palletization, and marking shall be in accordance with the requirements of MIL-STD-290 with the level of protection as specified (see 6.2.1). Unit containers shall be as specified in 3.5. Special markings shall be as specified in 3.7. Each unit container for type II material shall be marked with the name of the material used as a propellant.

6. NOTES

6.1 Intended use. Penetrating oil covered by this specification is intended for use in the freeing of corroded and frozen metallic parts without causing damage to such parts.

6.2 Ordering data. Purchasers should select the preferred options permitted herein, and include the following information in procurement documents.

6.2.1 Procurement requirements.

- a. Title, number, and date of this specification.
- b. Type of penetrating oil required (see 1.2).
- c. When first article is required for inspection and approval (see 3.1, 4.2.1, and 6.4).
- d. When container is other than specified (see 3.5.1).
- e. Class and size of type V, PPP-C-96 container required (see 3.5.1).
- f. Size of type IX, PPP-C-96 container required (see 3.5.2).
- g. Level of protection required (see 5.1).

6.3 Data requirements. 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) 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 paragraph:

<u>Paragraph No.</u>	<u>Data requirements title</u>	<u>Applicable DID No.</u>	<u>Option</u>
3.8	List, Toxic/Dangerous Material	UDI-R-235 84	

(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.)

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6.4 First article. When a first article inspection is required, the item will be tested and should be a first production item or a standard production item as specified in 4.2.1. The first article should consist of one unit. The contracting officer should include specific instructions in acquisition documents regarding arrangements for examination, test, and approval of the first article.

MILITARY INTERESTS:

Custodians

Army - ME
Navy - YD
Air Force - 68

Review activities

Army - AV, AR,
Navy - SH, MS, SA
DLA - PS, GS

User activities

Army - AL, AT
Navy - MC

CIVIL AGENCY COORDINATING ACTIVITIES:

GSA - FSS
HHS - FEC

PREPARING ACTIVITY:

Navy - YD

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Orders for this publication are to be placed with General Services Administration, acting as an agent for the Superintendent of Documents. See section 2 of this specification to obtain extra copies and other documents referenced herein.