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26 July 1978
SUPERSEDING
MIL-P-24548(SH)
3 November 1976
(See 6.2)

PERFORMANCE SPECIFICATION

PENETRATING FLUID

1. SCOPE

1.1 Scope. This specification covers the requirements for a penetrating fluid for direct, brush, or dip application to free corroded and frozen metallic parts without causing damage to such parts.

2. APPLICABLE 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 specification to the extent specified herein.

SPECIFICATION

FEDERAL

PPP-8-1892 - Paint, Varnish, Lacquer and Related Materials; Packaging, Packing, and Marking of.

STANDARDS

FEDERAL

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-129 - Marking for Shipment and Storage.

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

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

D 93 - Flash Point by Pensky-Martens Closed Tester, Test for.

D 97 - Pour Point of Petroleum Oils, Test for.

D 445 - Kinematic Viscosity of Transparent and Opaque Liquids (and the Calculation of Dynamic Viscosity), Determination of.

D 1218 - Refractive Index and Refractive Dispersion of Hydrocarbon Liquids, Test for.

E 70 - pH of Aqueous Solutions with the Glass Electrode, Test for.

(Application for copies of applicable test methods should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.)

(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.)

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Naval Ship Engineering Center, SEC 6124, 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.

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2. REQUIREMENTS

2.1 Material. The penetrating fluid shall be formulated as necessary to meet the requirements of this specification. It shall be non-flammable.

2.1.1 Chemical restrictions. The penetrating fluid shall not contain any of the elements listed in Table I in excess of the amounts shown.

TABLE I. Chemical content restrictions for penetrating fluid.

| Element | Allowable content |
|------------------|-------------------|
| Mercury | 10 ppm max |
| Lead | 250 ppm max |
| Sulphur | 250 ppm max |
| Halogens (Total) | 250 ppm max |
| Antimony | 250 ppm max |
| Arsenic | 250 ppm max |
| Bismuth | 250 ppm max |
| Cadmium | 250 ppm max |
| Magnesium | 250 ppm max |
| Tin | 250 ppm max |
| Zinc | 250 ppm max |
| Phosphorus | 500 ppm max |

2.2 Toxicity. When used for its intended purpose, the penetrating fluid shall have no adverse effect on the health of personnel. Questions relating to the health effects of the fluid shall be referred to the appropriate departmental medical service acting as advisor to the procuring agency. Toxicity information shall be submitted in accordance with 4.4.

2.3 Physical properties. The penetrating fluid shall conform to test requirements shown in table II and 2.3.1.

TABLE II. Physical properties.

| Characteristic | Min | Max |
|---------------------------------|-----------------|--------|
| Pour point, °F | --- | 27 |
| pH at 77°F | 9.8 | 9.7 |
| Viscosity, centistokes at 100°F | --- | 1.5 |
| Corrosion amount | --- | None |
| Flash point | None to boiling | --- |
| Refractive index at 68°F | 1.3516 | 1.3636 |

2.3.1 Solubility. The penetrating fluid shall show no trace of separation, milkiness, or turbidity when tested as specified in 4.3.1.1.

2.4 Workmanship. The penetrating fluid shall not have an objectionable odor and shall be free of dirt, sediment, or other foreign matter.

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.

4.1.1 Reports. Three copies of certified reports with the information listed below shall be furnished by the contractor:

- (a) Lot number of supply and purchase order number.
- (b) Compliance with chemical content restrictions.
- (c) Compliance with physical property requirements.

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The reports shall certify that the required tests have been performed and the results comply with specification requirements. Upon request, the actual test results shall be made available for review by Government inspectors in the contractor's facility.

4.2 Quality conformance inspection.

4.2.1 Lot definition. A lot shall be defined as an indefinite number of unit containers of identical size and type, offered for acceptance at one time and filled with a homogeneous mixture of penetrating fluid containing material manufactured in one operation; or filled with a homogeneous mixture of penetrating fluid manufactured in a single plant run (not exceeding 24 hours), through the same processing equipment with no change in the ingredient materials.

4.2.2 Sampling for test. From each lot a random sample of filled containers of penetrating fluid shall be selected in accordance with inspection level S-2 of MIL-STD-105. Acceptable Quality Level (AQL) shall be 1 percent defective.

4.3 Tests.

4.3.1 Physical properties. Penetrating fluid samples selected in accordance with 4.2.2 shall be tested in accordance with the methods specified in table III, described in FED-STD-791 and applicable ASTM test methods, and 4.3.1.1.

TABLE III. Physical tests.

| Test | ASTM test method no. | Federal test method |
|------------------|----------------------|---------------------|
| Pour point | D 97 | --- |
| pH | E 70 | --- |
| Viscosity | D 445 | --- |
| Refractive index | D 1218 | --- |
| Flash point | D 93 | --- |
| Corrosion | --- | 5306 |

4.3.1.1 Solubility. Use equal portions of penetrating fluid and distilled water to form a composite specimen of not less than one pint. Maintain the solution at $77^{\circ}\text{F} \pm 4^{\circ}\text{F}$ and stir vigorously for 5 minutes. Examine visually for compliance with 3.3.1.

4.3.2 Chemical analysis. Samples selected in accordance with 4.2.2 shall be analyzed for compliance with 3.1.1 using appropriate and adequate analytical techniques.

4.4 Toxicity. The contractor shall furnish the procuring activity with all information necessary to evaluate the safety of the product. Such information shall be furnished in one of the following forms:

- (a) A complete listing of the constituent materials, giving the percentages of composition and standard chemical nomenclature of the materials. (This is the simplest and most direct method. In most instances, it will completely satisfy the information requirement.)
- (b) Results of toxicological testing of a scope and quality acceptable to the procuring activity.

All information furnished by contractors in connection with toxicity evaluation shall be signed by a responsible official of the supplying firm. Such information shall be held in strict confidence by the procuring activity and shall not be divulged to competing contractors.

4.5 Inspection of preparation for delivery. The packaging and packing of the subject fluid shall be inspected to determine conformance with the applicable requirements of section 5 of this specification.

5. PREPARATION FOR DELIVERY

5.1 Packaging and packing. The penetrating fluid shall be packaged and packed in accordance with level C of PPP-P-1892, unless otherwise specified (see 6.1), and in accordance with 5.2 and 5.3.

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5.2 Containers.

5.2.1 Penetrating lubricant containers shall be leaktight and unbreakable and shall have a capacity of 8 fluid ounces with a "squirt-type" nozzle. The nozzle shall be fitted with a leak-proof cap that remains attached to the container when opened.

5.2.2 The containers and caps shall be nonhalogenated plastic or seamless uncoated tinned metal and shall be essentially unaffected by the penetrating fluid. The container materials in contact with the penetrating fluid shall be inert, corrosion resistant, and sufficiently free of lead, halides, sulphur, mercury and cadmium, such that the composition of the penetrating fluid during storage will not be affected.

5.3 Marking and labeling. Packages and packs shall be marked in accordance with MIL-STD-129. As a minimum, label all lubricant containers to include the following:

"Penetrating Fluid - MIL-P-24548
 Manufacturer's information - (Name _____
 Address _____)
 Lot number _____ Date _____
 National stock number _____
 Keep container closed, mix thoroughly before using."

The words "Penetrating fluid", and "Keep container closed, mix thoroughly before using" shall be in larger letters than the other lettering.

6. NOTES

6.1 Ordering data. Procurement documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Packaging and packing levels, if other than level C (see 5.1).

6.2 Changes from previous issue. The margins of this specification are marked "+" 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.

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