

METRIC

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SUPERSEDING
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COMMERCIAL ITEM DESCRIPTION

CLEANING COMPOUND, ALKALI, BOILING VAT (SOAK) OR HYDROSTEAM

The General Services Administration has authorized the use of this commercial item description for all federal agencies.

1. SCOPE. This commercial item description (CID) establishes one grade of alkaline cleaning compound for use in the hot soak tank cleaning of ferrous and nonferrous alloy parts. It is also used in hydrosteam units operating on existing steam supply for steam cleaning.

2. SALIENT CHARACTERISTICS

2.1 Performance requirements. The steam cleaning compound shall be equal to or superior in effectiveness to the comparison formula of table I. This shall be demonstrated by meeting the performance requirements of table II when tested as specified therein.

2.2 Cleaning efficiency test.

2.2.1 Performance requirements. When tested as specified in 2.2.6, a 4.75 percent solution of the cleaning compound shall completely remove mineral oil and asphalt soils from steel test panels. The removal of the mineral oil is indicated by freedom from water-break and "residue pattern" stains.

2.2.2 Preparation of test panels. Test panels of SAE 1020 18-20 gage cold rolled steel shall be prepared 5.6 X 5.6 centimeters (cm) (2-1/2 X 2-1/2 inches) in size. Each test panel shall have a hole 6 millimeters (mm) (1/4 inch) in diameter placed 3 mm (1/8 inch) from one corner. Sharp edges shall be smoothed with a No. 1 coarse emery cloth. The panels shall then be degreased in ACS grade acetone. Both faces of each panel shall be polished with the same abrasive, stroking in one direction only. Clean in a hot alkaline solution until free from water-break. Rinse in water then dip in absolute ethyl alcohol and air dry.

Beneficial comments, recommendations, additions, deletions, clarifications, etc. and any data that may improve this document should be sent to DLA Aviation, VEB, 8000 Jefferson Davis Highway, Richmond, VA 23297-5616 or e-mailed to STDZNMGT@dla.mil Since contact information can change, you may want to verify the currency of this address information using the ASSIST database at <https://assist.dla.mil>.

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TABLE I. Composition of comparison compound.

Component	Percent by weight
Sodium metasilicate, anhydrous	31.3
Sodium phosphate, monobasic anhydrous	12.3
Trisodium phosphate, anhydrous	24.8
Nonionic surfactant (ethoxylated straight chain primary alcohol, ethoxylated straight chain secondary alcohol, ethoxylated straight chain alkylphenol, Triton X100)	7.9
Anionic surfactant (straight chain sodium alkyl benzene sulfonate (C ₁₂ to C ₁₈ alkyl), 40 percent active)	22.7

TABLE II. Performance requirements.

Performance requirement	Limits	Test paragraph
Cleaning efficiency	2.2.1	2.2.6
Stability	2.3.1	2.3.3
Corrosion	2.4.1	2.4.4 and 2.4.5
pH value	pH \leq 12.2	2.5
Surface tension	\leq 36 dynes/centimeter	2.6
Dust forming properties	Change in litmus paper	2.7
Penetration	\geq 30.0	2.8
Segregation	\leq 2%	2.9
Biodegradability	\geq 80%	2.10

2.2.3 Preparation of mineral oil soiled panels. The soiling material shall be mineral oil conforming to SAE J1966, "Lubricating Oils, Aircraft Piston Engine (Non-Dispersant Mineral Oil)". The cleaned panels, prepared as described in 2.2.2, shall be suspended on an "S" hook and dipped, one at a time, into a 400-milliliter (mL) beaker of the oil maintained at a temperature of 26 °C \pm 1 °C (79 °F \pm 2 °F). They shall be removed and allowed to drain at the same temperature for 30 minutes. The remaining drop of mineral oil in the lower corner of each panel is then removed with absorbent cotton. The amount of mineral oil adhering per panel shall be approximately 0.15 gram (g).

2.2.4 Preparation of asphalt soiled panels. The soiling material shall be petroleum asphalt conforming to ASTM D946/D946M, "Standard Specification for Penetration-Graded Asphalt Cement for Use in Pavement Construction", Penetration Grade 85-100. The soil, heated to approximately 50 °C (122 °F), shall be spread evenly over one face of the cleaned test panels using the edge of a steel spatula, leaving the triangular area at the corner that includes the 6-mm (1/4-inch) hole unsoiled. The amount of asphalt of each panel shall be 0.32 g through 0.34 g, determined by trial and error. Allow each panel to stand for 15 minutes before stripping.

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2.2.5 Preparation of cleaning solution. In a 2-liter (L) beaker, prepare 1600 mL of a 4.75 percent (4.75 g of compound in 100 mL of distilled water) solution of the test compound. Bring the solution to a boil and keep at this temperature throughout the test. Maintain the solution level throughout the test by addition of distilled water.

2.2.6 Test procedure. Three test panels for each type of soil, prepared as specified in 2.2.2, 2.2.3, and 2.2.4, shall be cleaned successively in the following order: mineral oil then asphalt. The soiled test panels shall be immersed in the cleaning solution specified in 2.2.5 by means of an iron hook, one end of which passes through the 6-mm (1/4-inch) hole and the other end over a glass rod placed across the top of the 2-L beaker. At the end of 3-minute intervals, the test panel shall be moved forward and backward six times in each direction, and then up and down three times in each direction. This agitation of the panels is applied in the cleaning of the asphalt test panels but not in the cleaning of the mineral oil panels. The panel shall then be removed from the solution for visual inspection of the extent of soil removal and quickly replaced. The entire operation of agitation of the test panel and visual inspection shall require not more than 6 seconds. Mineral oil test panels shall be cleaned for 3 minutes and asphalt soiled panels for 21 minutes. At the end of the specified cleaning period, or before if visual examination indicates completeness of soil removal, the panel shall be removed from the cleaning solution and given two 6-second rinses in distilled water (no agitation); there shall be a 4-second drain between rinses. The rinsing solutions shall consist of two 1-L beakers, each containing 800 mL of distilled water at $23\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$ ($73\text{ }^{\circ}\text{F} \pm 5\text{ }^{\circ}\text{F}$).

2.2.7 Measurement of residual soil - asphalt. After the treatment specified in 2.2.6, the rinsed asphalt test panels shall be dried for 15 minutes in an oven at a temperature of $75\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$ ($167\text{ }^{\circ}\text{F} \pm 2\text{ }^{\circ}\text{F}$), followed by cooling at room temperature for 30 minutes. They shall then be examined for residual soil. The test shall be run in triplicate.

2.2.8 Measurement of residual soil - mineral oil. After the treatment specified in 2.2.6, the rinsed mineral oil test panels shall be examined for the presence or absence of water-break. They shall then be dried for 15 minutes in an oven at a temperature of $50\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$ ($122\text{ }^{\circ}\text{F} \pm 2\text{ }^{\circ}\text{F}$), followed by a cooling at room temperature for 30 minutes. They shall then be examined for presence or absence of residual stains ("residue-pattern" stains), the number and approximate size of which are recorded. The test shall be run in triplicate.

2.3 Stability.

2.3.1 Performance requirements. A 4.75 percent solution of the cleaning compound, after boiling for 40 hours and tested as specified in 2.3.3, shall completely remove mineral oil and asphalt soils from steel test panels. The removal of the mineral is indicated by freedom from water-break and "residue pattern" stains.

2.3.2 Preparation of solution. In a 3-L beaker, prepare 1600 mL of a 4.75 percent (4.75 g of compound in 100 mL of distilled water) solution of the test compound. Boil the solution for 40 hours, replacing the water lost by evaporation as needed. Transfer the solution to a 2-L beaker, bring to boil, and keep the solution at a boil throughout the test, maintaining the solution level by addition of distilled water.

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2.3.3 Test procedure. Using the solution prepared in 2.3.2, three test panels for each type of soil prepared and soiled in accordance with 2.2.2, 2.2.3, and 2.2.4 shall be cleaned successively as specified in 2.2.6 (a total of six test panels). The residual soil on each panel shall be determined in accordance with 2.2.7 and 2.2.8.

2.4 Corrosion test.

2.4.1 Performance requirement. The cleaning compound shall not attack aluminum. When tested in accordance with 2.4.4, there shall be no loss in weight of aluminum test panels and a maximum of 0.5 milligram (mg) increase in weight. When tested galvanically coupled to magnesium test panels as described in 2.4.5, aluminum test panels shall gain between 1.0 mg and 2.0 mg in weight. In both tests, aluminum shall remain bright, unstained, and unetched.

2.4.2 Preparation of test panels. Test panels of 2024 aluminum shall be cut 7.6 cm by 1.9 cm (3 inches by 3/4 inch) in size from approximately 0.9 mm (0.034 inch) thick sheet aluminum conforming to SAE AMS-QQ-A-250/4, "Aluminum Alloy 2024, Plate and Sheet", T3 or T4 temper. Sharp edges shall be smoothed with number 150 alundum (Al_2O_3) polishing paper. Polish both faces with the same abrasive, stroking in one direction only.

2.4.3 Cleaning of panels. Panels shall be cleaned with ACS grade acetone using a swab of absorbent cotton. They shall then be wiped with paper toweling, dipped in absolute ethyl alcohol, and again wiped with paper toweling.

2.4.4 Test procedure - corrosion. Each cleaned test panel shall be weighed to 0.1 mg and immersed completely in 200 mL of the boiling 4.75 percent (4.75 g of compound in 100 mL of solution) distilled water solution of the compound contained in a 500-mL tall-form beaker. The solution shall be kept at a boil throughout the test, the solution level being maintained by additions of distilled water as required. After 60 minutes, the test panel shall be removed from the boiling solution, rinsed under flowing tap water (cold), rinsed in distilled water at 20 °C - 26 °C (68 °F - 79 °F), dipped in absolute alcohol, wiped dry with paper toweling, and reweighed. The presence of corrosion products shall be noted. The test shall be run in duplicate.

2.4.5 Test procedure - galvanic corrosion. Test panels of 2024 aluminum shall be cut 3.8 cm X 1.9 cm (1-1/2 inch X 3/4 inch) in size from approximately 0.9 mm (0.034 inch) thick sheet aluminum conforming to SAE AMS-QQ-A-250/4, "Aluminum Alloy 2024, Plate and Sheet", T-3 or T-4 temper. Sharp edges shall be smoothed with No. 150 alundum (Al_2O_3) polishing paper. Polish both faces with the same abrasive, stroking in one direction only. Test panels of magnesium shall be cut 7.6 cm by 1.9 cm (3 inches by 3/4 inch) in size from approximately 0.9 mm (0.034 inch) thick sheet magnesium conforming to SAE AMS4376, "Plate, Magnesium Alloy 3.0Al - 1.0Zn - 0.20Mn (AZ31B-H26) Cold Rolled and Partially Annealed" or SAE AMS4377, "Magnesium Alloy, Sheet and Plate, 3.0Al - 1.0Zn - 0.20Mn (AZ31B-H24) Cold Rolled, Partially Annealed". Sharp edges shall be smoothed with No. 150 alundum (Al_2O_3) polishing paper. Polish both faces with the same abrasive, stroking in one direction only. Two 1.6-mm (1/16-inch) holes shall be made in each panel, close to the narrow ends of the aluminum panels and at one end and the center of the magnesium panels, so that they can be fastened together. The test panels shall be cleaned as specified in 2.4.3 and weighed to

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0.1 mg. A magnesium and an aluminum panel shall then be fastened together by means of a cotton string and immersed completely in 200 mL of the boiling 4.75 percent (4.75 g of compound in 100 mL of solution) distilled water solution of the compound contained in a 500-mL tall-form beaker. The solution shall be kept at a boil for two hours, the solution level being maintained by additions of distilled water as required. The coupled panel shall then be removed from the boiling solution, rinsed under flowing tap water (cold), unfastened, rinsed in distilled water, dipped in absolute alcohol, wiped dry with paper toweling, and the members of the coupled panel reweighed. The test shall be run in duplicate.

2.5 pH value. The pH value of a distilled water solution of the compound at a concentration of 4.75 percent (4.75 g of compound in 100 mL of solution) shall not be more than 12.2 when tested at 25 °C (77 °F) in accordance with ASTM E70, "Standard Test Method for pH of Aqueous Solutions with the Glass Electrode".

2.6 Surface tension. The surface tension of a 0.0317 percent solution (0.0317 g of compound in 100 mL of distilled water) at 25 °C (77 °F) shall not be more than 36 dynes per centimeter when determined in accordance with ASTM D1331, "Standard Test Methods for Surface and Interfacial Tension of Solutions of Surface-Active Agents".

2.7 Dust forming properties. The inside walls of a 250-mL glass-stoppered graduate cylinder shall be rendered completely free of any grease and moisture. A 25-g sample of the cleaner shall then be placed on the bottom of the clean graduate cylinder. The graduate cylinder shall then be stoppered, inverted, and immediately returned to its original position. After any suspended dust has been allowed to settle for five seconds, the stopper of the graduate cylinder shall be removed and a moistened piece of red litmus paper strip suspended in the graduate cylinder without touching the walls so that the lower end of the litmus paper strip coincides with the 210-mL mark at the upper end of the graduate cylinder. After 60 seconds, the litmus paper shall be removed and examined for any color change. Excessive dusting is indicated by any change in the litmus paper from red to blue.

2.8 Penetration. Place 100 g of the compound in a flat bottom, straight side, Pyrex glass crystallizing dish, 40 mm high by 80 mm diameter. Place sufficient lead shot into a 250-mL low-form beaker so that the combined weight of the beaker and shot equals 800 g. Place the weighted 250-mL beaker on the top of the 100 g of compound. Place the assembly in a desiccator containing a saturated solution of potassium sulfate (K_2SO_4). Place the desiccator in an oven maintained at 43 °C - 46 °C (109 °F - 115 °F) for 24 hours. Remove the assembly from the oven and desiccator; remove weighted 250-mL beaker from the compound and allow the crystallizing dish containing the compound to cool at room temperature for two hours. Determine penetration at three points on the surface, each at least 12 mm from the side of the crystallizing dish, using the penetrometer and grease-penetrometer cone prescribed in ASTM D217, "Standard Test Methods for Cone Penetration of Lubricating Grease", with a five-second hold, 250 g total weight of the cone and attachments, and the temperature of the compound at 25 °C \pm 1 °C (77 °F \pm 2 °F). The test shall be run in duplicate and an average taken.

2.9 Segregation. Samples taken from different portions of the container shall be analyzed for one constituent of the compound (such as silicates) using ASTM D800, "Standard Test Methods

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of Chemical Analysis of Industrial Metal Cleaning Compositions". The difference between the average of all the samples and the measurement of any individual sample shall not exceed 2% when calculated as $((\text{sample measurement} - \text{average measurement}) / \text{average measurement}) \times 100$.

2.10 Biodegradability. A certificate of compliance shall be furnished by the contractor indicating that each lot of cleaning compound shall be at least 80 percent biodegradable.

3. REGULATORY REQUIREMENTS

3.1 Recovered materials. The offeror/contractor is encouraged to use recovered materials to the maximum extent practicable, in accordance with paragraph 23.403 of the Federal Acquisition Regulation (FAR).

3.2 Safety data sheet (SDS). Manufacturers shall prepare and submit a SDS in accordance with FED-STD-313, "Material Safety Data, Transportation Data and Disposal Data for Hazardous Materials furnished to Government Activities", and requirements of 29 CFR 1910.1200, "Occupational Safety and Health Standards".

4. PRODUCT CONFORMANCE PROVISIONS

4.1 Product conformance. The products provided shall meet the salient characteristics of this CID, conform to the producer's own drawings, specifications, standards, and quality assurance practices, and be the same product offered for sale in the commercial marketplace. The government reserves the right to require proof of such conformance.

4.2 Market acceptability. The product offered must have been previously sold either to the government or on the commercial market.

5. PACKAGING

5.1 Preservation, packing, labeling, and marking. Preservation, packing, and marking shall be as specified in the contract or order (see 6.2(c)).

6. NOTES

6.1 Sources of documents.

6.1.1 CFR and FAR. Copies of the CFR and FAR may be obtained from the U.S. Government Printing Office, 732 North Capital Street NW, Washington, DC 20401-0001 or online at <http://www.gpo.gov>.

6.1.2 ASTM standards. Copies of ASTM standards may be obtained from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959 or online at <http://www.astm.org/>.

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6.1.3 SAE standards. Copies of SAE standards may be obtained from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001 or online at <http://www.sae.org/>.

6.1.4 ACS documents. Copies of ACS specifications may be obtained from the American Chemical Society, 1155 Sixteenth Street, N.W., Washington, DC 20036 or online at <http://www.acs.org/>.

6.2 Ordering data. The acquisition order should specify the following:

- a. CID document number and revision.
- b. Unit quantity required.
- c. Packaging requirements.

6.3 Subject term (key word) listing.

alkaline
alloy
ferrous
nonferrous
tank

MILITARY INTERESTS:

Custodians:

Army - MR
Navy - SH
Air Force - 68

Review Activities:

Army - CR4, MI
Navy - MC

CIVIL AGENCY
COORDINATING ACTIVITY:

GSA - FAS

Preparing Activity:

DLA - GS3

(Project 6850-2015-002)

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