INCH-POUND

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PERFORMANCE SPECIFICATION

CLEANER, LUBRICANT, AND PRESERVATIVE FOR WEAPONS AND WEAPON SYSTEMS

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

1. SCOPE

1.1 Scope. This specification describes the performance requirements and verification methods for CLEANER, LUBRICANT, AND PRESERVATIVE (CLP) FOR WEAPONS AND WEAPON SYSTEMS. This product is for use in cleaning, lubricating and short-term (see 6.10.5) preservation of small and large caliber military weapons, operating in the temperature range of -51 to + 71 °C (-60 to +160 °F). (See 6.1).

1.2 Identification. This lubricant is identified by Military Symbol CLP and North Atlantic Treaty Organization (NATO) Code Number S-758.

Comments, suggestions, or questions on this document should be addressed to: U.S. Army DEVCOM Armaments Center, ATTN: FCDD-ACE-QSA, Picatinny Arsenal, New Jersey 07806-5000 or e-mailed to usarmy.pica.devcom-ac.list.ardec-stdzn-branch@army.mil . Since contact information can change, you may want to verify the currency of this information using ASSIST Online database at https://assist.dla.mil .

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2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 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 cited in the solicitation or contract.

FEDERAL SPECIFICATIONS

O-E-751	Ether, Petroleum; Technical-Grade
O-M-232	Methanol (Methyl Alcohol)

FEDERAL STANDARDS

FED-STD-791	Testing Method of Lubricants, Liquid Fuels, and Related Products,

COMMERCIAL ITEM DESCRIPTIONS

A-A-51126	Anodes, Cadmium

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-PRF-680	Degreasing Solvent
MIL-DTL-18001	Anodes, Sacrificial Zinc Alloy
MIL-DTL-51408	Paper, Chemical Agent Detector, VGH, ABC-M8
MIL-DTL-51518	Paper, Chemical Agent Detector: M9 (SR119 DYE)

(Copies of these documents are available online at https://quicksearch.dla.mil/)

2.2.2 Other Government documents, drawings, and publications. The following other Government documents, drawings and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

US ARMY TEST OPERATIONS PROCEDURE

TOP 3-2-045	SMALL ARMS - Hand and Shoulder Weapons and Machineguns

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(Copies of this document is available from the Defense Technical Information Center online at https://discover.dtic.mil)

US ARMY TECHNICAL MANUAL

TM 9-1005-201-10 Technical Manual, Machine Gun, 5.56MM, M249

(This Technical Manual may be ordered from the Logistics Data Analysis Center, USAMC LDAC, ATTN: AMXLS-AL, Redstone Arsenal, AL 35898-7466. E-Mail: usarmy.redstone.ldac.mbx.tsb-smartdesk@army.mil)

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

ASTM INTERNATIONAL

ASTM A109/A109M	Standard Specification for Steel, Strip, Carbon, (0.25 Maximum Percent), Cold-Rolled
ASTM B16/B16M	Standard Specification for Rod, Brass, Free-Cutting, Bar and Shapes for Use in Screw Machines
ASTM B117	Standard Practice for Operating Salt Spray (Fog) Apparatus
ASTM B152/B152M	Standard Specification for Copper Sheet, Strip, Plate and Rolled Bar
ASTM B209	Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
ASTM D56	Standard Test Method for Flash Point by Tag Closed Cup Tester
ASTM D92	Standard Test Method for Flash and Fire Points by Cleveland Open Cup Tester
ASTM D97	Standard Test Method for Pour Point of Petroleum Products
ASTM D445	Standard Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (and the Calculation of Dynamic Viscosity)
ASTM D972	Standard Test Method for Evaporation Loss of Lubricating Greases and Oils
ASTM D1748	Standard Test Method for Rust Protection by Metal Preservatives in the Humidity Cabinet
ASTM D4057	Standard Practice for Manual Sampling of Petroleum and Petroleum Products
ASTM D4172	Standard Test Method for Wear Preventive Characteristics of Lubricating Fluid (Four-Ball Method)
ASTM D4177	Standard Practice for Automatic Sampling of Petroleum and Petroleum Products
ASTM D2625	Standard Test Method for Endurance (Wear) Life and Load Carrying Capacity of Solid Film Lubricants (Falex Pin and Vee Method)

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ASTM D6866	Standard Test Methods for Determining the Biobased Content of Solid, Liquid, and Gaseous Samples Using Radiocarbon Analysis

(Copies of these documents may be ordered at https://www.astm.org/)

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE)

AMS 4376	Plate, Magnesium Alloy 3.0Al – 1.0Zn – 0.20Mn (AZ31B-H26) Cold Rolled and Partially Annealed

(Copies of this document may be ordered at https//www.sae.org/)

2.4 Order of precedence. Unless otherwise noted herein or in the contract, 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 Qualification. CLP furnished under this specification shall be products authorized by the Qualifying Activity for listing on the applicable Qualified Products List (QPL) before contract award (see 4.1.1, 6.3).

3.1.1 Conformance inspection. When specified, a sample of CLP shall be subjected to a qualification conformance inspection (See 4.1.2 and TABLE III).

3.2 Support and ownership requirements.

3.2.1 Graphite. CLP shall contain no graphite or powdered metals.

3.2.2 Ozone depleting substances (ODS). CLP shall contain no ODS.

3.2.3 Toxicity and hazardous materials. CLP shall have no adverse effect on the health of personnel when used for its intended purpose (see 6.1, 6.4).

3.2.4 Color and appearance. CLP shall be uniform in color and appearance when examined in reflected light, and shall have no visible residue after shaking.

3.2.5 Physical properties. CLP shall conform to properties specified in TABLE I.

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TABLE I. Physical properties.

Properties	Values
Biobased Carbon Content, min (See 6.10.7)	33%
Flash Point, min	65 °C (149 °F)
Pour Point, max	-59 °C (-74 °F)
Viscosity, Kinematic (w/ solvent) @ +40 °C (104 °F), min	14.0 cSt
Viscosity, Kinematic (w/ solvent evaporated) @ -40 °C (-40 °F), max	5000 cSt (See 6.7)
Wear Preventive Characteristics, avg., Scar Diameter, max	0.8 mm
Load Carrying Capacity, Jaw Load, min	500 lbs

3.3 Interface requirements.

3.3.1 Corrosion production. CLP, when applied to the following metals, shall not produce visual evidence of corrosion such as pitting, etching, or dark discoloration, nor shall it cause a weight change in excess of the values shown in TABLE II:

TABLE II. Allowable weight change.

Metal	mg/sq cm	Metal	mg/sq cm	Metal	mg/sq cm	Metal	mg/sq cm
Zinc	1.5	Copper	1.5	Brass	1.0	Cadmium	1.5
Aluminum	0.2	Magnesium	0.5	Steel	0.2		

3.3.2 Interference with chemical agent detector paper. CLP applied to and allowed to soak into chemical agent detector paper shall cause no discoloration, in the soaked portion of the paper (See 6.5).

3.4 Environmental requirements.

3.4.1 Humidity resistance. CLP, applied to three test panels, shall protect the panels so that the total number of corrosion dots on all three panels (combined) is not greater than three after 900 hours exposure in a humidity cabinet. No single corrosion dot shall exceed one millimeter in length, width, or diameter.

3.4.2 Salt-spray resistance. CLP, applied to three test panels, shall protect the panels so that the total number of corrosion dots on each test panel is not greater than three after 100 hours exposure to a spray of 5 % salt solution. No single corrosion dot shall exceed one millimeter in length, width, or diameter.

3.4.3 Water displacement and water stability. CLP, applied to three test panels, shall displace water so that there is no evidence of rust spots, staining or pitting due to corrosion on the test panels after storage in the static humidity chamber for one hour.

3.5 Operating requirements.

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3.5.1 Firing residue removal. CLP shall provide cleaning capability to remove a minimum average of 40% of the residue generated from the ignition of WC 844 propellant.

3.5.2 Weapon performance. CLP shall provide cleaning, lubricating and preservative characteristics to support operating requirements of the MACHINE GUN, 5.56 MILLIMETER: M249, when exposed to the following conditions.

3.5.2.1 Cold temperature. CLP applied to an M249 that is then exposed to severe cold for 18 hours shall prevent any Class II or III stoppages, shall allow not more than two Class I stoppages in 200 rounds, and shall sustain a rate of fire of not less than 650 rounds per minute (rpm).

3.5.2.2 Dust environments. CLP applied to an M249 that is then exposed to very fine blowing dust for 50 minutes shall prevent any Class II or III stoppages, shall allow not more than five Class I stoppages in 500 rounds, and shall sustain a rate of fire of not less than 650 rpm.

3.5.2.3 Salt-spray environments. CLP applied to an M249 that is then exposed to a salt-spray environment for 96 hours shall prevent any Class II or III stoppages, shall allow not more than two Class I stoppages in 200 rounds, and shall sustain a rate of fire of not less than 650 rpm.

4. VERIFICATION

TABLE III. Requirement/verification cross-reference matrix.

Property	Requirement	Verification	Classification of Inspections	
			Qualification Testing	Conformance Inspection
Qualification	3.1	4.1.1	X	
Conformance inspection	3.1.2	4.1.2		X
Graphite	3.2.1	4.2.1	X	X
ODS	3.2.2	4.2.2	X	X
Toxicity and hazardous materials	3.2.3	4.2.3	X	X
Color and appearance	3.2.4	4.2.4	X	X
Flash Point	Table I	Table IV	X	X
Pour Point	Table I	Table IV	X	X
Viscosity, Kinematic @ + 40 °C (104 °F)	Table I	Table IV	X	X
Viscosity, Kinematic @ -40 °C (-40 °F)	Table I	Table IV	X	X
Wear Preventive Characteristics	Table I	Table IV	X	X
Load Carrying Capacity	Table I	4.2.6	X	X
Biobased Carbon Content	Table I	4.2.7	X	X
Corrosion Production	3.3.1	4.3.1	X	X
Chemical Agent Detector Paper	3.3.2	4.3.2	X	X
Humidity Resistance	3.4.1	4.4.1	X	
Salt-spray Resistance	3.4.2	4.4.2	X	X
Water Displacement/Stability	3.4.3	4.4.3	X	X
Firing Residue Removal	3.5.1	4.5.1	X	X
Cold Temperature - Weapons Firing	3.5.2.1	4.5.2.6	X	
Sand/dust environments - Weapons Firing	3.5.2.2	4.5.2.7	X	
Salt-spray environment - Weapons Firing	3.5.2.3	4.5.2.8	X	

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

a. Qualification inspection (see 4.1.1)
b. Conformance inspection (see 4.1.2)

4.1.1 Qualification inspection. Upon formal application, CLP qualification inspection shall consist of the specified tests for all requirements specified in Section 3, (See Table III).

4.1.1.1 Qualification samples. Qualification testing shall require three gallons of the candidate CLP product. If the final formulation contains solid materials, a one-half gallon sample shall be provided identical to the final product but without the addition of solid materials.

4.1.1.2 Qualification rejection. If a product sample fails to meet any of the requirements specified in Section 3, that product shall not be qualified, and shall not be listed on the QPL.

4.1.2 Conformance inspection. When specified, conformance inspection of production lots (See 6.3.1), shall consist of the specified tests for all the requirements specified in Section 3 except for humidity resistance and live-fire weapons tests (see Table III).

4.1.2.1 Rejection of lots. If a product sample fails to pass any of the specified tests, the production lot represented by that sample, shall be rejected.

4.1.3 Sampling for tests. Samples for tests shall be taken in accordance with ASTM D4057 or ASTM D4177, as applicable.

4.2 Support and ownership verifications.

4.2.1 Graphite. Objective evidence shall be examined to verify the product formulation contains no graphite or powdered metals. (See 6.3.2)

4.2.2 Ozone depleting substances. Objective evidence shall be examined to verify the product formulation contains no ODS. (See 6.3.2)

4.2.3 Toxicity and hazardous materials. A Toxicity Clearance by the Defense Centers for Public Health shall confirm conformance with the requirements of 3.2.3. (See 6.4).

4.2.4 Color and appearance. A 4 oz translucent container of product shall be shaken for a period not to exceed 30 seconds to disperse any visible residue. Immediately after shaking, the product shall be visually inspected to check for full dispersion of residue. Failure of residue to fully disperse after shaking or failure of the product to achieve a uniform color shall be cause for failure of product qualification.

4.2.5 Physical properties. Physical properties shall be verified by methods identified in TABLE IV, and as specified in 4.2.6.

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TABLE IV. Test methods.

Properties	Method
Flash Point	ASTM D56 1/
Pour Point	ASTM D97
Viscosity (w/o solid materials @ +40 °C)	ASTM D445 2/ a.
Viscosity (w/o solids & solvent @ -40 °C)	ASTM D445 2/ a. & b.
Wear Preventive Characteristics	ASTM D4172 3/ (test condition B)

1/ If the flash point is over 79 °C (175 °F), use the Cleveland Open Cup Method, ASTM D92.
2/ Use this method with the following exception:
a. The Kinematic viscosity shall be determined on that portion of the product containing no solid materials. Where periodic qualification re-evaluation tests or quality conformance tests are conducted on lots received from a manufacturer whose product contains particulate matter, the product must be centrifuged and pressure filtered using a Gelman, Filter-Gauge, 0.45 micron pore diameter and 0.2 micron pore diameter, stack (top to bottom), or equivalent method.
b. When evaluating the viscosity of the product without solvents, evaporate the solvents using ASTM D972 at 100 °C (212 °F) for the required time or until no further weight loss is observed.
3/ Use this method with the following exceptions:
a. Use a sample of 10 ± 0.5 milliliters.
b. Perform three runs and report the average of the three wear scar determinations.

4.2.6 Load carrying capacity (see 6.8). This test shall be conducted in accordance with ASTM D2625, except as noted below.

4.2.6.1 Pin and vee block preparation. Pin and vee blocks shall be prepared in accordance with Annex A of ASTM D2625 A1.1.1 only. To coat specimens, 4.2.6.1.1 to 4.2.6.1.2 shall be followed for the liquid lubricant.

4.2.6.1.1 Vee Block Preparation. Place vee blocks, prepared by the procedures in 4.2.6.1, on a flat surface with the vee groove facing up. Fill the vee groove with the test fluid and allow 1 min to pass for the liquid to react with the surface. Lay the vee block on the side with the vee groove vertical and place on an oil and lint free absorbent towel selected to remove excess lubricant draining to the bottom of the groove. Place the drained vee blocks into the test jaws. Avoid contact with the mating surfaces of the vee blocks and test pins when installing them in the test machine.

4.2.6.1.2 Pin Preparation. Place a pin, prepared by the procedures in 4.2.6.1, into the test shaft and secure with a brass shear pin. Fill a pipette with 2 cc of the test fluid. Coat the test pin with the entire 2 cc of the fluid, from the pipette, while manually rotating the test shaft. Allow 1 min (maximum 4 min) for the test fluid to drain and remove all excess fluid from the bottom of the test pin by dapping with an oil and lint free cloth. Be very careful to not disturb the coated test surfaces of either the vee blocks or the test pin while removing the excess fluid from the bottom of the test pin.

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4.2.6.2 Load carrying capacity tests. Prepared test pin and vee blocks shall be inserted in the machine and tested in accordance with ASTM D2625, Procedure B, except that the starting load shall be 250 pounds instead of 300 pounds. The test shall be performed three times, using a new set of test pin and vee blocks each time.

NOTE: The testing room temperature shall remain not less than 18 °C and not greater than 22 °C during testing. The machine jaws and chuck shall be allowed to cool to the stated room temperature prior to each test iteration.

4.2.6.3 Failure criteria. Failure to successfully achieve and sustain the 500 pound load on any of the three test iterations shall be cause for failure of product qualification. In addition to the failure criteria specified in ASTM D2625, test failure is also indicated by visual evidence of excessive friction such as glowing red color.

4.2.7 Biobased carbon content. The percentage of biobased carbon content in CLP shall be determined by testing the CLP in accordance with ASTM D6866. A test result of less than 33 percent biobased carbon content shall be cause for failure of product qualification.

4.3 Interface verifications.

4.3.1 Corrosion production. Test coupons measuring 25 by 51 by 6.4 mm made from metals as specified in TABLE V shall be used for the corrosion test.

CAUTION: The corrosion production test should not be performed if the flash point is not in conformance with the requirement of TABLE I. Therefore, it is essential that flash point be established prior to this corrosion production test.

TABLE V. Metal coupons for corrosion production tests.

Metal	Specification	Metal	Specification
Zinc	MIL-DTL-18001	Copper	ASTM B152/B152M
Aluminum	ASTM B209	Magnesium	AMS 4376
Brass	ASTM B16/B16M	Cadmium	A-A-51126
Steel	ASTM A109/A109M		

4.3.1.1 Preparation of test coupons. Polish all surfaces of the test coupons with increasingly finer abrasive paper. Final polishing shall be done using a slow speed horizontal metallurgical polishing wheel with 240-grit aluminum oxide paper or cloth moistened with Type II degreasing solvent conforming to MIL-PRF-680. The test coupons shall then be cleaned by swabbing with hot heptane with a final rinse in warm anhydrous methanol conforming to Grade A of O-M-232, except for the magnesium specimen which will be rinsed with 95 % ethanol. The test coupons shall be held in a manner to avoid contact with the operator's hands.

4.3.1.2 Exposure of test coupons. After weighing, place the test coupons, in order listed above, in a jar measuring approximately 90 mm in diameter and 95 mm deep and having a screw

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cap. Stand the test coupons on one 6.4 mm edge in a circular pattern so that the 25mm length is parallel to the jar circumference as indicated in Figure 1. Position the coupons along the jar circumference so that there is an approximately equal spacing between each. The test coupons shall be covered with enough of the product supplied, containing no solid particles, so that the tops of the coupons are at least 6 mm below the surface of the product. Screw the jar lid closed and place the jar in a convection oven maintained at 54.4 ± 1 °C (130 ± 2° F) for a period of 7 days ± 15 minutes.

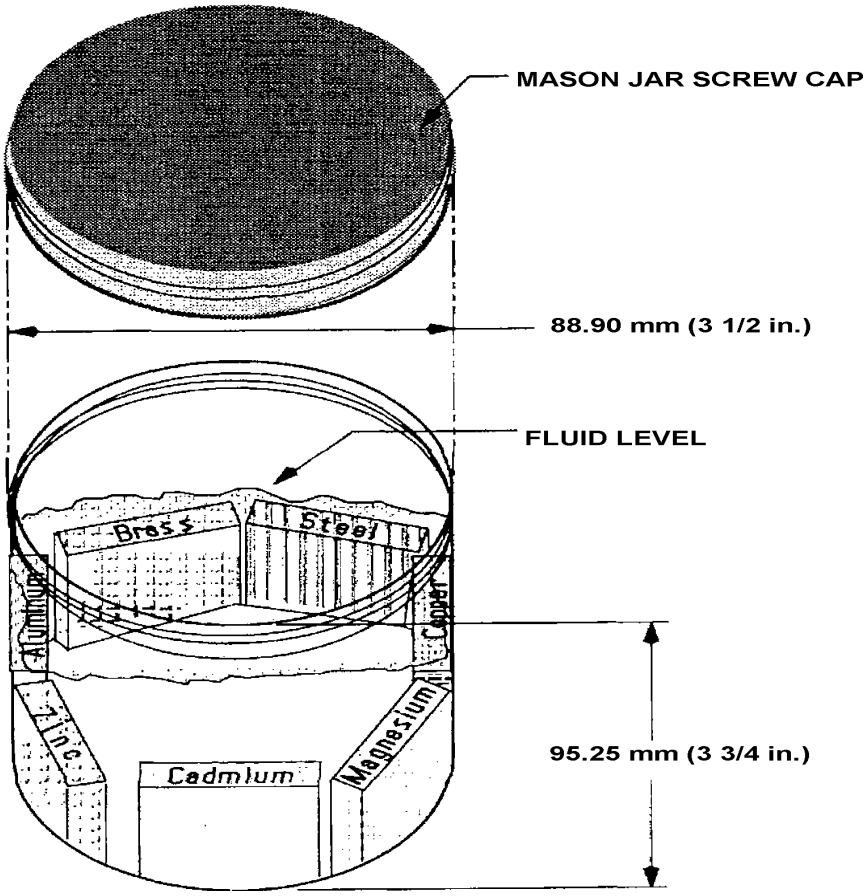

FIGURE 1. Corrosion production test.

4.3.1.3 Examination of test coupons. Upon completion `of the test, remove the CLP and any loose corrosion products from the specimen by swabbing with surgical gauze pads moistened with heptane, then with methanol (use 95 % ethanol for the magnesium), and follow by clean solvent rinses. Visually examine and re-weigh the specimens and calculate the weight loss or gain in milligrams per square centimeter. Visual evidence of corrosion such as pitting, etching or dark discoloration, or a weight change in excess of TABLE II shall be cause for rejection of product qualification.

4.3.2 Interference with chemical agent detector paper. This test shall be conducted using both M8 and M9 Chemical Agent Detector Paper, conforming to MIL-DTL-51408 and MIL-DTL-51518 respectively. Shake the CLP container for 10 to 15 seconds before application. Dip a nylon bristle tooth brush into the CLP container and using a dull knife blade brushed across the

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bristles, spatter fine droplets of the product onto a 50 mm square of each type detector paper. The paper shall be observed for color change after 5 minutes. The CLP shall be considered unacceptable if the fine droplets cause discoloration of the detector paper. Pink, orange, red-brown, yellow, green and blue are examples of unacceptable colors for the M8 paper and any shade of red, including pink, red-brown, red-purple, are unacceptable for the M9 paper.

4.4 Environmental verifications.

4.4.1 Humidity resistance. Three test panels shall be used to evaluate CLP for corrosion protection in high humidity in accordance with Method 5329 of FED-STD-791, except that 120 grit white aluminum oxide shall be used in place of silica sand to uniformly abrade the test surface. Visually examine the test panels after exposure. Corrosion on the outer 6.4mm of the panels shall not be cause for rejection.

4.4.2 Salt-spray (5 % solution) resistance.

4.4.2.1 Test panels and preparation. Three test panels conforming to Annex A1.10 of ASTM D1748 shall be used. The panels shall be cleaned and sandblasted in accordance with FED-STD-791, Method 5329, except that 120 grit white aluminum oxide shall be used in place of silica sand.

4.4.2.2 Panel edge dressing. Panel edges shall be examined closely, and sanded if necessary, to insure panel edges are fully rounded so as not to promote corrosion initiating at a sharp edge. No additional protective substance (e.g. wax or asphalt) shall be applied to the panel edges to inhibit corrosion.

4.4.2.3 Salt-spray test. The salt-spray resistance test shall be performed in accordance with ASTM B117 except that the panels shall be placed at an angle of 10-20° from the vertical with the four inch edge with drilled holes facing down in the cabinet during exposure to salt-spray.

4.4.2.4 Salt-spray failure criteria. Visually examine the test panels after exposure for compliance with requirements of 3.4.2. Corrosion on the outer ¼ inch (6.4 mm) of the panels shall not be cause for rejection.

4.4.3 Water displacement and water stability. Conduct the water displacement and water stability test in accordance with Method 3007 of FED-STD-791, except that the test shall be made only on the compound-water mixture.

4.5 Operating requirements verifications.

4.5.1 Firing residue removal. Weigh 5.0 ± 0.5 grams of WC 844 propellant powder into a clean porcelain evaporating dish (round bottom type) of approximately 102 mm in diameter and spread it around evenly with a small brush. Ignite the propellant and burn until all visible propellant is consumed. Allow dish to cool for 20 minutes.

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4.5.1.1 Dish preparation. Invert the dish, rap it sharply several times against the table top and then blow it out with a 15 psi stream of filtered air, to remove any non-adhering residue. The dish shall be held approximately 15 cm from the end of the air hose. Weigh the dish with the adhering residue, and subtract the weight of the evaporating dish (empty) to determine the weight of propellant residue adhering to the dish (W_1).

4.5.1.2 Cleaning process. Add 25 ± 1 ml of the CLP product and permit it to soak for 45 ± 3 min, at 54 ± 1 °C (129 ± 2 °F) in convection oven. Remove the dish and immediately swab the residue with a double layer of cotton gauze pad (Webril Handi-Pad or equivalent) wrapped around the wide end of a Coors # 60323 porcelain pestle, weighing approximately 470 grams and measuring approximately 190 mm high by 57 mm at its widest point. Swab the dish in both a circular and back and forth motion for a period of 90 seconds, letting the weight of the pestle perform the actual removal of the residue. Do not apply any downward force to the pestle.

4.5.1.3 Calculation of residue removed. After swabbing, decant the remaining oil and thoroughly wash the inside of the dish with 75 ml of petroleum ether in accordance with O-E-751. Heat the evaporating dish to 55 ± 1° C (131 ± 2 °F) for 30 ± 2 minutes, cool to room temperature and weigh the dish with the remaining residue. Subtract the weight of the evaporating dish (empty) to determine the weight of propellant residue still adhering to the dish after the cleaning cycle (W_2). Calculate the percent residue removed by the equation:

$$\% \text{ residue removed} = 100 \times \frac{W_1 - W_2}{W_1}$$

4.5.1.4 Firing residue removal failure criteria. If the average residue removal of three test iterations is less than forty percent (40%), the product shall fail to qualify.

4.5.2 Weapon performance. The performance of the candidate CLP product in cold temperatures, after exposure to blowing dust, and after salt-spray conditioning shall be tested by live-fire weapons tests in accordance with TOP 3-2-045, except as noted herein.

4.5.2.1 Test weapons. The test weapon shall be the MACHINE GUN, 5.56 MILLIMETER: M249. New weapons (guns that have been fired less than 5000 rounds), or guns with a used receiver with an all new operating group shall be used.

4.5.2.2 Inspection and preparation of test weapons.

4.5.2.2.1 Inspection. Disassemble the M249 and inspect the headspace, bore erosion, chamber dimensions, firing pin protrusion and indentation, trigger pull and overall condition.

4.5.2.2.2 Cleaning and preparation. While disassembled, clean all traces of lubricant and dirt by washing with a volatile mineral spirits, such as MIL-PRF-680, Degreasing Solvent. After complete removal of the solvent from all surfaces of the weapons by use of water-free compressed air or by air-drying, lubricate each weapon with a qualified CLP,
A normal application as specified in TABLE VI. A lint-free patch shall then be used to remove excess CLP from gun components.

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4.5.2.3 Validation of test weapons. Each weapon shall then test fire 200 rounds in 10-round bursts, in an ambient temperature from 10 to 32 °C (50 to 90 °F). Any weapon that fails to achieve a baseline cyclic rate of 700 to 850 rpm shall be disqualified for use as a test weapon.

4.5.2.4 Ammunition. Belts of ammunition shall be loaded as "combat mix", (4 ball (M855) and 1 tracer (M856)). The ammunition required for each of the three tests shall remain outside the individual environmental chambers, and shall not be conditioned.

4.5.2.5 Firing test summary. Summary weapons firing data is presented in TABLE VI.

TABLE VI. Weapons firing test summary.

Firing test	Application	Test condition	Rounds	Failure criteria (Note 1)
Inspection	Normal (note 2)	Ambient temp	200	<700-850 rds/min
Cold temp (2 Cycles)	Light (note 3)	-51 ± 2 °C (-60 ± 4 °F)	200	<650 rds/min, or >2 Class I stops/200 rds
Dust (5 Cycles)	Generous (note 4)	After dusting Ambient temp	500	<650 rds/min, or >5 Class I stops/500 rds
Salt-spray (1 Cycle)	Normal	After exposure Ambient temp	200	<650 rds/min, or >2 Class I stops/200 rds
Note 1 Any Class II or III weapon stoppage during any test is cause for failure of the test. Note 2 Normal application - as described in the operator's manual TM 9-1005-201-10. Note 3 Light application - apply a thin film of lube barely visible to the eye. Note 4 Generous application - apply lube heavy enough so that it can be spread with a finger.				

4.5.2.6 Cold temperature test. Three M249s shall be used for each candidate lubricant for cold temperature testing and the average performance of the three shall be used to determine if the requirement is met.

4.5.2.6.1 Inspection and preparation. The test weapons shall be disassembled, cleaned and lubricated with a light application (see TABLE VI, Note 3) of the candidate lubricant. With the bolt closed and the safety set in the "safe" position, the machine gun shall be conditioned at -51 ± 2 °C (-60 ± 4 °F) for 16 ± 1 hours.

4.5.2.6.2 Weapons firing. Weapons firing shall be conducted within the cold temperature chamber immediately after the first conditioning cycle is complete. The weapon shall be loaded with an un-conditioned (ambient temperature) 100-round belt of ammunition, and an initial burst of approximately 10-rounds shall be fired to validate the firing rate. The remainder of the belt shall be fired in 5 to 7-round bursts to check for stoppages. Repeat the cycle, except condition the weapon for only 2 hours ± 15 minutes at the same temperature. Fire the second, un-conditioned 100-round belt in the same manner employed in the first cold temperature firing cycle, for a total of 18 hours of cold temperature exposure, and 200 rounds fired from each weapon.

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4.5.2.6.3 Cold temperature failure criteria. Any Class II or III weapon stoppage, more than two Class I stoppages in 200 rounds, or a reduction in the rate of fire below 650 rpm, shall be cause for rejection of the lubricant.

4.5.2.7 Dust test. Three M249s shall be used for each candidate lubricant for dust testing and the average performance of the two weapons with the least number of stoppages shall be used to determine if the requirement is met. This test shall be conducted in accordance with provisions for static test procedure for dust exposure of TOP 3-2-045, except as noted below.

4.5.2.7.1 Inspection and preparation. The test weapons shall be disassembled, cleaned and lubricated with a generous application (see TABLE VI, Note 4) of the candidate product. The weapons (with bolts and ejector ports closed, and barrel dust caps installed, or muzzles taped) shall be placed in weapons racks in a vertical orientation in the chamber, and exposed to blowing dust. Dusting shall be as specified in TOP 3-2-045, except that the dusting cycle time shall be 10 minutes.

4.5.2.7.2 Weapons firing. After the first dusting cycle, the weapon shall be moved to the firing position, loaded with an un-conditioned 100-round belt and fired. An initial burst of approximately10 rounds shall be fired to validate the firing rate. The remainder of the 100-round belt shall be fired in 5 to 7-round bursts to check for stoppages. This conditioning and firing sequence shall be repeated four times for a total of 50 minutes of dust exposure, and 500 rounds fired from each weapon.

4.5.2.7.3 Dust test failure criteria. Any Class II or III stoppage, more than five Class I stoppages in 500 rounds, or a reduction in the rate of fire below 650 rpm, shall be cause for rejection of the lubricant.

4.5.2.8 Salt-spray environment test. Only one M249 shall be used for salt-spray testing and its performance alone shall determine if the requirement is met.

4.5.2.8.1 Inspection and preparation. The test weapons shall be disassembled, cleaned and lubricated with a normal application (see TABLE VI, Note 2) of the candidate product. With the bolt closed and the safety set in the "safe" position, the machine gun shall be placed in a salt-spray cabinet and exposed to 5 % salt-spray in accordance with the Salt Fog Test Procedure of TOP 3-2-045, except that salt-spray and dry cycles shall be 48 hours each instead of 24 hours, thus two 48-hour exposures and two 48-hour drying periods for a total of 96 hours of salt-spray exposure and 96 hours of drying.

4.5.2.8.2 Weapons firing. After the last salt-fog/dry cycle is complete, the weapon shall be moved to the firing position and loaded with an un-conditioned 100-round belt of ammunition. An initial burst of approximately 10 rounds shall be fired to validate the firing rate. The remainder of the 100-round belt shall be fired in 5-7 round bursts to check for stoppages. The second un-conditioned 100-round belt of ammunition shall be fired in the same manner, without further conditioning of the weapon.

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4.5.2.8.3 Salt-spray environment failure criteria. Any Class II or III stoppage, more than two Class I stoppages in 200 rounds, or a reduction in the rate of fire below 650 rpm, shall be cause for rejection of the lubricant.

5. PACKAGING

5.1 Packaging For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When packaging of material is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Service or Defense Agency, or within the military service's system commands. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

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

6.1 Intended use. The CLP covered by this specification is a highly penetrating, mobile liquid and is intended for field application to satisfy the complete need of cleaning, lubricating, and short term preservation of military weapons. CLP facilitates the effective removal of firing residues, gums and other contaminants from weapon components while providing lubrication and short term preservation for reliable weapons operation.

6.1.1 Other uses. CLP may be used in lieu of MIL-PRF-372 (RBC), MIL-PRF-3150 (PL-M), MIL-PRF-14107 (LAW) and MIL-PRF-46000 (LSA) where authorized by the appropriate weapons manual or lubrication order.

6.1.2 Ventilation requirements. Due to the solvent systems often employed in CLP type formulations, field users should avoid using CLP in conditions of limited ventilation, that is, closed rooms, sealed vehicles, etc.

6.1.3 Preservative application limitation. Caution should be exercised when using CLP where ventilation of the treated surface, prior to sealing, is not practicable. CLP should not be used for preservation for long-term storage without consulting the Qualifying Activity (see 6.3).

6.2 Acquisition requirements. Acquisition documents should specify the following:

a. Title, number, and date of this specification, and its related QPL (see 6.3)
b. Title, number, and date of all documents referenced (see 2.1)
d. Quantity of CLP required.
e. Conformance tests, copies of test reports, and CLP samples required (see 6.3.1).
f. Type and size of container (see 6.9 and 6.12).

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g. Packaging requirements (see 5.1 and 6.9)
h. Toxicological Data Requirements (see 3.2.3 and 4.2.3 and 6.4).

6.3 Qualification. With respect to products requiring qualification, awards will be made only for products that are, at the time of award of contract, qualified for inclusion on the Department of Defense (DoD) Qualified Products List, QPL-63460. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or purchase orders for the products covered by this specification. The addition of a CLP product to the QPL for competitive procurement does not guarantee future procurement by the Federal Government. Information pertaining to qualification of CLP products may be obtained from the DoD Qualifying Activity for CLP, i.e., U.S. Army DEVCOM Armaments Center, ATTN: FCDD-ACE-QSA, Picatinny Arsenal, NJ 07806-5000, or by E-Mail at usarmy.pica.devcom-ac.list.ardec-stdzn-branch@army.mil . An online listing of products qualified to this specification may be found in the Qualified Products Database (QPD) at https://quicksearch.dla.mil/ .

6.3.1 Conformance testing. Verification of successful, independent third party conformance testing in accordance with Table III, along with a one gallon conformance sample should be provided with each production lot delivered. In addition, subsequent deliveries more than 12 months after initial conformance tests were performed should require retesting, and submission of another one gallon sample. Copies of test reports should be E-Mailed to the DoD Qualifying Activity for QPL-63460 at usarmy.pica.devcom-ac.list.ardec-stdzn-branch@army.mil . Samples of CLP, with Safety Data Sheet (SDS), should be sent to the DoD Qualifying Activity for QPL-63460 at the following address;

U.S. Army DEVCOM Armaments Center
ATTN: FCDD-ACE-QSA. Bldg. 62
Picatinny Arsenal, NJ 07806-5000

6.3.2 Product formulation disclosure. As part of the qualification process towards inclusion on the QPL, CLP suppliers will be requested to submit to the Qualifying Activity a detailed quantitative description of the complete product formulation, identifying each constituent material (solvent, base oil, additive, etc.) by CAS number and percentage weight used in the finished product. Company proprietary information will be safeguarded from unauthorized disclosure. Also required to be submitted is the manufacturing source of each constituent material, and the location of the manufacturing facility of the finished product.

6.4 Toxicity clearance. Department of the Army (DA) regulations AR 40-5, Army Public Health Program, AR-70-1, Army Acquisition Policy, and DA Pamphlet 70-3, Army Acquisition Procedures, require that all new chemicals and materials being added to the Army supply system have a Toxicity Clearance. This involves a toxicological evaluation of materials to assure the safety of their use. The toxicological evaluation includes a thorough review of all data included on the CLP's Safety Data Sheet (SDS), as well as that which is included in the complete product formulation disclosure (see 6.3.2). Any toxicity related questions, or questions regarding the Toxicity Clearance should be addressed to: Division Chief, Toxicity Evaluation Division (TEV)

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Toxicology Directorate (TOX) Defense Centers for Public Health - Aberdeen (DCPH-A), 8988 Willoughby Rd. (E2100), Aberdeen Proving Ground, MD 21010-5403. E-mail uarmy.apg.medcom-aphc.mbx.tox-info@mail.mil.

6.5 Chemical agent detector paper. The source of supply for M8 and M9 Chemical Agent Detector Paper may be obtained upon request from the DoD Qualifying Activity identified in 6.3.

6.6 WC 844 propellant. The source of supply for WC 844 propellant may be obtained upon request from the DoD Qualifying Activity identified in 6.3.

6.7 Cold temperature viscosity. Candidate suppliers should note that although the maximum cold temperature viscosity is stated at 5000 cSt in TABLE I, viscosities in excess of 3700 cSt may result in failures during live-fire weapons testing.

6.8 Load carrying capacity. Load carrying capacity is one of the key characteristics that should be verified at the US Army DEVCOM Armaments Center for qualification. The DEVCOM Armaments Center uses a FALEX Pin and Vee Block Machine. Suppliers are cautioned that the use of other machines during product formulation may provide false or inaccurate results that could be inconsistent with the required DEVCOM Armaments Center testing, possibly resulting in failure of qualification.

6.9 Containers.

6.9.1 Container materials. Container material should be of a density sufficient to prevent migration of the product or any constituent materials through the container. Container may require pretreatment to ensure that printed identification will properly adhere and will not be removed by the product. Plastic, Polyethylene, Type I, Class H, Grade 2, Translucent in accordance with L-P-390 has been successfully used in the past.

6.9.2 One-half ounce bottle. When purchased in the 0.5 ounce size, NSN 9150-01-663-4635 (see 6.12), special packaging requirements should apply in addition to the material identified above:

a. The bottle should be cylindrical, not greater than 3.50 inches high with a diameter of not greater than 0.98 inches.
b. The bottle cap should have a tapered tip capable of dispensing one drop at a time. Drawing 8448204 is an example of an acceptable tip.
c. The cap should have a means of retention when opened. A “screw open/screw closed” type cap such as depicted on drawing 8448204 is preferred.
d. Part Number 8448444 or equivalent should be used. Drawings for this part number are available at usarmy.pica.devcom-ac.list.drawing-request-help-desk@army.mil., or from US Army DEVCOM Armaments Center, ATTN: FCDD-ACE-SPE, Picatinny Arsenal, NJ 07806-5000.

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6.10 Definitions.

6.10.1 Class I weapon stoppage. A failure that is immediately clearable (within 10 seconds or less) by the operator following prescribed immediate action procedures.

6.10.2 Class II weapon stoppage. A failure that is clearable by the operator (requiring more than 10 seconds but not more than 10 minutes) using only the equipment and tools issued with the weapon.

6.10.3 Class III weapon stoppage. A failure of a severe nature that; (1) is operator correctable but requires more than 10 minutes, (2) operator cannot correct and requires assistance (no time limit), (3) requires higher level of maintenance, or authorized operator correction cannot be accomplished because of unavailability of necessary tools, equipment or parts.

6.10.4 Production lot. An indefinite quantity of a homogeneous mixture of product offered for acceptance in a single, isolated container, or manufactured in a single plant run, through the same processing equipment, with no change in the ingredient materials in a 24 hour time period.

6.10.5 Short term preservation. Preservation period of time not to exceed 30 days.

6.10.6 Biobased product. In line with the U.S. Department of Agriculture BioPreferred Program; a biobased product is a commercial or industrial product (other than food or feed) that is composed, in whole or in significant part, of biological products, including renewable domestic agricultural materials (including plant, animal, and aquatic materials), forestry materials, intermediate materials, or feedstocks.

6.10.7 Biobased carbon content. Biobased carbon content is an estimate of the ratio of "new" organic carbon (such as from agricultural materials) to total organic carbon ("new" plus "old" or fossil fuel-based organic carbon), excluding water.

6.11 Biobased CLP. DoD qualified "biobased CLP" was formerly classified and identified as Type B CLP, and DoD qualified "non-biobased CLP" was formerly classified and identified as Type A CLP. Non-biobased CLP, i.e., Type A CLP, no longer meets DoD qualification requirements, and has been deleted from this specification. Only a biobased CLP that meets all of the requirements of this specification is a candidate product for DoD qualification (see 3.1). Qualified biobased CLP is no longer classified and identified as Type B CLP. It is simply; "CLP", just as it was before the Qualifying Activity initiated the Biobased CLP Program in 2014 (see 6.3). All of the performance requirements for CLP in this specification remain the same as they were for the formerly classified Type B CLP.

6.12 National stock numbers. The National Stock Numbers (NSNs) for CLP meeting the requirements of this specification are listed below. These NSNs are the same NSNs that the DoD Qualifying Activity requested in 2017 for biobased CLP (formerly identified as Type B CLP), which were subsequently assigned by the Defense Logistics Agency (DLA). All other NSNs associated with non-biobased CLP (formerly identified as Type A CLP), which are different from those listed below, do not meet the requirements of this specification.

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CLP NSN	Container
9150-01-663-4635	0.5 oz bottle
9150-01-663-3879	4 oz bottle
9150-01-663-4643	1 pt w/ sprayer
9150-01-663-4623	1 liter w/ sprayer
9150-01-663-4610	1 gal bottle
(*Verify with DLA*)	

6.13 Shelf-life. This specification covers items where the assignment of a Federal shelf-life code is a consideration. Specific shelf-life requirements should be specified in the contract or purchase order, and should include, as a minimum, shelf-life code, shelf-life package markings in accordance with MIL-STD-129 or FED-STD-123, preparation of materiel quality storage standard for type II (extendible) shelf-life items, and a minimum of 85 percent shelf-life remaining at time of receipt by the Government. These and other requirements, if necessary, are in DoD 4140.27-M, *Shelf-life Maintenance Manual*. The shelf-life codes are in the Federal Logistics Information System Total Item Record. Additive information for shelf-life management may be obtained from DoD 4140.27-M, or the designated shelf-life Points of Contact (POC). The POC should be contacted in the following order: (1) the Inventory Control Points that manage the item and (2) the DoD Service and Agency administrators for the DoD Shelf-Life Program. Appropriate POCs for the DoD Shelf-Life Program can be contacted through the DoD Shelf-Life Management website: https://www.shelflife.dla.mil .

6.14 International standardization agreements. This specification implements NATO STANAG 1135, Interchangeability of Fuels, Lubricants and Associated Products used by the Armed Forces of NATO Nations. When amendment, revision, or cancellation of this specification is proposed the Preparing Activity should coordinate the action with the U. S. National Point of Contact for the international standardization agreement, as identified in the ASSIST database at https://assist.dla.mil.

6.15 Subject term (keyword listing).

biobased corrosion ether formulation humidity methanol
petroleum propellant residue viscosity water stability

6.16 Changes from previous issue. The margins of this specification are marked with vertical lines to indicate where changes 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 previous issue.

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CONCLUDING MATERIAL

Custodians:
Army - AR
Navy - AS
Air Force - 68
DLA – PS
GSA - FAS

Review activities:
Army - AT, AV, MD, MI, TE
Navy – OS, MC, SA
Air Force – 03, 06, 20
DLA – GS

Preparing activity:
Army - AR
(Project: 9150-2024-001)

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST online database at https://assist.dla.mil.

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