

**MIL-M-51038**  
29 DECEMBER 1960

## MILITARY SPECIFICATION

# MIXING AND TRANSFER UNIT, INCENDIARY OIL, M5

*This specification has been approved by the Department of Defense and is mandatory for use by the Departments of the Army, the Navy, and the Air Force.*

### 1. SCOPE

1.1 This specification covers a mixing and transfer unit for the continuous mixing of thickener with gasoline and the transfer of the thickened fuel into mechanized flamethrowers.

### 2. APPLICABLE DOCUMENTS

2.1 Government documents. The following documents of the issue in effect on date of invitation for bids form a part of this specification to the extent specified herein:

#### SPECIFICATIONS

##### FEDERAL

- |           |   |
|-----------|---|
| NN-P-515  | — Plywood, Container Grade.                     |
| UU-P-271  | — Paper, Wrapping, Waterproofed Kraft.          |
| UU-T-81   | — Tags, Shipping and Stock.                     |
| PPP-B-636 | — Boxes, Fiberboard,                            |
| PPP-G843  | — Cushioning Material, Cellulosic.              |
| PP-T-60   | — Tape; Pressure-Sensitive Adhesive, Waterproof |
|           | — For Packaging and Sealing.                    |

- |          |  |
|----------|--|
| PPP-T-76 | — Tape, Pressure-Sensitive Adhesive, Paper, Water Resistant. |
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##### MILITARY

- |            |   |
|------------|---|
| MIL-C-104  | — Crates, Wood; Lumber and Plywood Sheathed, Nailed and Bolted. |
| MIL-P-116  | — Preservation, Methods of.                                     |
| MIL-B-121  | — Barrier-Material, Grease-proofed, Flexible (Waterproofed).    |
| MIL-P-130  | — Paper, Wrapping, Laminated and Creped.                        |
| MIL-B-131  | — Barrier-Material, Water Vaporproof, Flexible.                 |
| MIL-A-140  | — Adhesive, Water-Resistant, Waterproof Barrier-Material.       |
| MIL-T-704  | — Treatment and Painting of Material.                           |
| MIL-L-3150 | — Lubricating-Oil, Preservative, Medium.                        |
| MIL-P-3542 | — Primer, Pressure - Sensitive Tape.                            |

## MIL-M-51038

MIL-E-10062 — Engines, Spare or Installed (Other than Aircraft); Preparation for Shipment and Storage of.

MIL-I-0011683-Interference Suppression, Radio, Requirements for Engine Generators and Miscellaneous Engines.

MIL-V-13811 — Varnish, Waterproofing, Electrical Ignition,

MILP-16298 — Preservation, Packaging, Packing, and Marking of Electric Machines Having Rotating Parts and Associated Repair Parts.

MIL-G17504 — Coating Compound, Acrylic, Clear.

## STANDARDS

## MILITARY

MIL-STD-129 — Marking for Shipment and Storage

## DRAWINGS

## CHEMICAL CORPS

D14-288-477 — Mixing and Transfer Unit, Incendiary Oil, M5 Bill of Material.

D4-17-699 — Packing, Incendiary Oil Mixing and Transfer Unit, Bill of Material.

## PUBLICATIONS

## MARINE CORPS

TM-OR-O0516A-15 — Mixing and Transfer Unit, Incendiary Oil, M5.

(Copies of specifications, standards, drawings, and publications required by suppliers 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 document forms a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids shall apply.

#### UNIFORM CLASSIFICATION COMMITTEE Uniform Freight Classification Rules.

(Application for copies of these freight classification rules should be addressed to the Uniform Classification Committee, 202 Union Station, Chicago 6, Ill.)

## 3. REQUIREMENTS

## 3.1 Materials and components.

3.1.1 *Materials*. All material cited on Drawing D14-28-477 (4 sheets) or on subsidiary drawings shall conform to the specifications thereon, or to the specific characteristics set forth on the drawings.

3.1.2 *Components*. All components of the unit shall conform to the specifications and drawings listed on Drawing D14-28-477 (4 sheets) and subsidiary drawings.

3.2 Assembly. The unit shall be assembled as shown on Drawing D14-28-478 (5 sheets), which are listed on Drawings D14-28-477 (4 sheets), and subsidiary drawings listed thereon.

## 3.3 Heater.

3.3.1 *Capacity*. The heater shall be capable of an output of 550,000 British thermal units (Btu) per hour when tested as specified in 4.5.3.

3.3.2 *Leakage*. The heater shall not leak when tested as specified in 4.5.2.1 or 4.5.2.2.

3.4 Radio interference suppression. The unit shall be equipped for the suppression of radio interference in accordance with the requirements of Specification MIL-I-0011683.

3.5 Generator. The generator shall be a gasoline engine-driven, direct-current generator capable of delivering at least 87.7 amperes (amp) at 28 + 1 volts (v) at not more than 3,800 revolutions per minute (rpm).

## 3.6 Unit performance.

3.6.1 *Functioning*. The unit and all components thereof shall operate properly when tested as specified in 4.5.1.

3.6.2 *Leakage*. The heater and all interconnecting piping shall not leak when tested as specified in 4.5.1,

3.7 *Workmanship*. The mixing and transfer unit shall be free from any damage or any irregularities that would prevent normal assembly and functioning.

#### 4. QUALITY ASSURANCE PROVISIONS

4.1 *Supplier's responsibility*. The supplier is responsible for the performance of 811 inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own or any other inspection facilities and services acceptable to the Government. Inspection records of the examination and tests shall be kept complete and available to the Government as specified in the contract or order. 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.

4.1.1.1 *Joint responsibility*. Tests prescribed in 4.5 shall be performed jointly by the Government and supplier.

4.2 *Objective evidence*. The supplier shall present objective evidence as required by the Government representative that all requirements of section 3 and of section 5 have been met (see 6.3) .

4.3 *Alternative inspection* (including testing procedures, The supplier may utilize any alternative inspection procedure which will assure equal or better quality by submitting a written proposal with justification and obtaining written approval from the Government prior to its institution. In case of dispute, the procedures of this specification shall govern,

4.4 *Inspection*. Each unit shall be subjected to in-process inspection for compliance with preservation, packaging, packing, and marking requirements of section 5 in accordance with the characteristics listed in paragraph 4.4.1. The supplier shall certify that the requirements of section 5 have been met (see 4.2).

4.4.1 *Preservation, packaging, packing, and marking characteristics*.

- (1) Tags missing or not waterproofed as specified.
- (2) Surfaces to which a preservative is to be applied not clean.
- (3) Preservatives or coatings missing, incorrect, or not applied as specified.
- (4) Packaging methods or wrappings incorrect.
- (5) Tape application incorrect.
- (6) Openings, covers, and doors not processed as specified.
- (7) Damaged portions of painted areas not treated and repainted as specified.
- (8) Containers incorrect.
- (9) Quantity per container or package incorrect.
- (10) Components, repair parts, accessories, or technical publications missing.
- (11) Container closure incorrect.
- (12) Blocking, bracing, or cushioning incorrect or missing where specified.
- (13) Container or package damaged (broken, torn, punctured, crushed, or wracked).
- (14) Strapping loose or missing.
- (15) Marking incorrect, missing, or illegible.

#### 4.5 Tests.

4.5.1 *Functioning*. Each mixing and transfer unit shall be operated in accordance with Technical Manual TM-OR-00516A-15.

#### 4.5.2 *Heater leakage*.

4.5.2.1 *Oil method*. Prior to assembly to the unit, the heater shall be tested by introducing a preservative oil conforming to Specification MIL-L-3150 at a controlled pressure of 60 pounds per square inch (psi) for a period of 20 minutes and observed for leaks. An alternate method below may be used at the option of the supplier.

4.5.2.2 *Air method*. Prior to assembly to the unit, the heater shall be tested by introducing air at a minimum pressure of 60 psi and submerging in a tank of water containing a wetting agent in sufficient concentration to prevent air bubbles from clinging to the surface and observed for leaks.

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4.5.3 *Heater capacity.* The unit shall be operated for a period of 5 minutes using a supply of water (wasted to the sewer) to determine the ability of the heater to produce 550,000 Btu per hour as follows:

- (a) Determine flow rate of water.
- (b) Check change in water temperature. The heater will be acceptable if the numerical product of the flow rate (gallons per minute) and the temperature rise of water ( $0^{\circ}$  F. outlet temperature minus inlet temperature) is not less than 1,100.
- (c) Proper operation of the heater unit by analysis of the exhaust gases using an Orsat apparatus or any other suitable method. The oxygen content of the exhaust gases shall not exceed 5 percent.

4.5.4 *Acceptance/rejection criteria.* If any unit fails the functioning test or the requirements in this specification and drawings, that unit shall be rejected.

## 5. PREPARATION FOR DELIVERY.

### 5.1 Disassembly and matchmarking.

5.1.1 *Disassembly.* Unless otherwise specified in the contract or order, extent of disassembly shall be confined to the removal of those parts that would unnecessarily increase cubage of the packed item, and shall be in accordance with the recommendations of the equipment manufacturer subject to approval of the procuring agency. All bolts, nuts, pins, and washers removed during disassembly shall be replaced on one of the mating parts and secured in such manner as to prevent loss.

5.1.2 *Matchmarking.* Cloth shipping tags, Specification UU-T-81, type A, shall be securely attached to parts removed and mating parts on the basic unit, in such manner as not to damage the item, the paint, or the preservative. Suitable matchmarking identification shall be printed on the tags, and the printed tags waterproofed with a clear acrylic coating compound conforming to Specification MIL-C-17504.

5.2 Cleaning and drying. After test runs, if any, have been completed, and before application of any preservative, all surfaces to which a preservative is to be applied shall be cleaned and dried in conformance with Specification MIL-P-116, using cleaning Method C-1, and any of the drying methods listed therein.

5.3 Preservation and packaging. Levels shall be as specified (see 6.2). Drawings cited herein are listed on Drawing D14-17-699.

#### 5.3.1 Level A.

5.3.1.1 *Repainting.* Damaged portions of painted surfaces shall be treated and repainted in accordance with Specification MIL-T-704, type A, except that two finish coats shall be applied, with the primer and finish coat materials to be as specified on applicable drawings.

5.3.1.2 *Preservatives and application.* Preservatives shall be as specified hereinafter, with the application thereof to be in accordance with Specification MIL-P-116. Preservatives shall not be applied to painted surfaces, and provisions shall be made to prevent such parts from coming in contact with preservatives on adjacent metal surfaces.

5.3.1.2.1 *Pressure-sensitive tape application.* Painted surfaces to which tape is to be applied shall be cleaned to remove dirt, grease, and other foreign matter, after which such surfaces shall be coated with primer, pressure-sensitive tape, conforming to Specification MIL-P-3542, to increase adhesiveness of tape and durability of seals formed by the tape.

5.3.1.3 *Threaded and other unpainted exposed metallic surfaces.* Unless otherwise specified hereinafter, threaded and other unpainted exposed metallic surfaces, including such surfaces exposed by disassembly shall be coated with type P-1 preservative compound, conforming to Specification MIL-P-116.

#### 5.3.1.4 Prime unit.

5.3.1.4.1 *Unit.* The unit shall be flushed with type P-10, grade 2 preservative oil, conforming to Specification MIL-P-116, draining off all excess preservative oil. Prior to flushing unit with preservative oil, remove the coalescer cartridges

from the water separator. Upon completion of flushing operation, replace the coalescer cartridges in water separator. The engine generator assembly, preserved as specified in 5.3.1.4.2 and 5.3.1.4.3 and electrical control assemblies, other than those mounted directly on the engine generator assembly shall be packaged in place on the prime unit in accordance with Method IIa of Specification MIL-P-116, using class 2, water vapor-proof barrier-material conforming to Specification MIL-B-131. Large openings on the unit, including openings into blower, shall be covered with the same barrier-material as cited above, and sealed with type III, class 1 pressure-sensitive tape, conforming to Specification PPP-T-60, with the tape and barrier-material overcoated with electrical ignition waterproofing varnish, conforming to Specification MIL-V-13811. All covers and small openings shall be sealed with the same kind of tape, with the tape overcoated as specified above. All exposed wiring, electrical connections and switches shall be covered with the same kind of tape and overcoated as specified above, or wrapped with grade C greaseproof barrier-material, conforming to Specification MIL-B-121, securing wrap with the above cited pressure-sensitive tape, overcoating tape and barrier-material with the electrical ignition waterproofing varnish. All gage and meter faces shall be covered with a fitted piece of solid fiberboard, conforming to type II of Specification PPP-B-636, or plywood conforming to type III, class 1 of Specification NN-P-515 and secured in place with pressure-sensitive tape, conforming to type III, class 1 of Specification PPP-T-60, overcoating the tape, fiberboard or plywood and exposed metal surfaces of the gages with electrical ignition waterproofing varnish, conforming to Specification MIL-V-13811. Close control panel assembly cover, sealing all seams around with the same kind of tape, overcoating the tape with the electrical ignition waterproofing varnish.

5.3.1.4.2 *Generator engine*. The generator shall be preserved in accordance with the applicable requirements of Specification MIL-E-10062, except that openings into the engine shall not be covered,

5.3.1.4.3 *Generator*. The generator shall be preserved in accordance with the applicable re-

quirements of Specification MIL-P-16298, except that openings into the generator shall not be covered,

5.3.1.4.4 *Tools and technical manuals*. Tools and technical manual shall be packaged as specified in table I. The packaged technical publications shall be further packaged as specified on Drawing C14-17-692.

5.3.1.4.5 *Repair parts and accessories*. The repair parts and accessories packaged as specified in tables II and III shall be packed in a W5c, style RSC fiberboard box, conforming to Specification PPP-B-636. Voids shall be filled with cushioning material conforming to type III, class B of Specification PPP-C-843. AH seams, including manufacturer's joint of the box shall be sealed with minimum 3-inch wide pressure-sensitive tape, conforming to Specification PPP-T-76, extending the tape over all corners and edges of the box,

5.3.1.4.6 *Filters*. The felt filters shall be placed in their air filter box, the lid fastened with self-tapping screws, and sealed with pressure-sensitive tape, conforming to type III, class 1 of Specification PPP-T-60.

5.3.1.4.7 *Hose and suction pipe*. Ferrous and aluminum hose fittings shall be coated with type P-1 preservative compound, Specification MIL-P-116. Nonferrous hose fittings, except aluminum, require no preservative coating. All preserved or unpreserved hose fittings shall be wrapped with laminated and creped wrapping paper, conforming to Specification MIL-P-130, securing wrap in place with pressure-sensitive tape conforming to Specification PPP-T-76. The suction pipe shall be removed from the hose and packaged as specified on Drawing D14-17-665. The lever shall be removed from the gate valve and taped to the suction hose with pressure-sensitive tape conforming to type III, class 1 of Specification PPP-T-60,

5.3.1.4.8 *Cover*. The cover shall be folded into a compact bundle and wrapped with type E2 or H1 through H4 waterproof Kraft wrapping paper, conforming to Specification UU-P-271 and sealed with water-resistant adhesive, conforming to Specification MIL-A-140,

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TABLE I. *Packaging of tools and publications*

<i>Nomenclature</i>	<i>Cleaning method</i> <sup>1</sup>	<i>Preservation</i> <sup>1</sup>	<i>Unit package method</i> <sup>1</sup>	<i>No. per unit package</i>
Pliers, chain, without cutters.....	C-1	P-7	I	1
Pliers, slip joint.....	C-1	P-7	I	1
Wrench, pipe.....	C-1	P-7	I	1
Wrench, adjustable, 6-inch.....	C-1	P-7	I	1
Wrench, adjustable, 8-inch.....	C-1	P-7	I	1
Wrench, set, engineers.....	C-1	P-7	I	1 set
Wrench, set, socket.....	C-1	P-7	I	1 set
Screwdriver, 1 $\frac{1}{8}$ -inch.....	C-1	P-1	I	1
Screwdriver, 4-inch.....	C-1	P-1	I	1
Screwdriver, 6-inch.....	C-1	P-1	I	1
File, contact point.....	C-1	P-7	IC-1	1
Pliers, chain, with cutters.....	C-1	P-7	IC-1	1
Wrench, allen, $\frac{5}{16}$ -inch.....	C-1	P-7	IC-1	1
Technical Manual TM-OR-00516A-15.....	.....	.....	IC-3	1

<sup>1</sup> Note. Specification MIL-P-116.TABLE II. *Packaging repair parts and accessories*

			As received from vendor	
Filter, air element.....				
Gasket, mixer (square type).....	C-1	None	IC-3	10
Spark plug (generator).....	C-1	None	IA-8	1
Cable, spark plug (generator).....	C-1	None	IA-15	1
Rope, starting.....	None	None	III	1
Insulating compound, electric.....	None	None	III	1
Insulating compound, electric, noncorrosive....	None	None	III	1
Screen, inner.....	C-1	None	III	1
Coupling, drive.....	C-1	P-7	IC-2	1
Tube, permatex.....	None	None	III	1
Auxiliary drive, meter.....	C-1	None	IA-15	1
Gasket, meter.....			Package with auxiliary drive	
Wire, shear pin.....	C-1	None	IC-1	1
Chain, roller.....	C-5	P-9	IA-15	1
Link, connecting, link, connecting (half).....	C-5	P-9	IA-8	1 set
Key.....	C-1	P-9	IA-8	1
Pin, cotter.....	C-1	P-9	IC-1	6
Pin, clevis.....	C-1	P-9	IC-1	1
Spark plug (heater).....	C-1	None	IA-15	1
Electrode, ground.....	C-3	P-7	IC-2	1
Electrode, igniter, heater.....	.....	.....	.....	1

<sup>1</sup> Note. Specification MIL-P-116.TABLE III. *Packaging additional accessories and repair parts*

Cartridge filter, separator.....	C-1	.....	IA-15	1
Cartridge filter, coalescer.....	C-1	.....	IA-15	1
Gasket, head.....	C-1	.....	IC-1	4
Gasket, separator cartridge.....	C-1	.....	IC-1	2
Gasket, coalescer cartridge.....	C-1	.....	IC-1	2
Glass, water level gage.....	C-1	.....	III	1
Gage, liquid.....	C-1	.....	IC-5	1
Water detecting paste.....	C-1	.....	IC-5	2
Adapter, accessories, L.V.T.....	C-1	P-7	IC-1	2

<sup>1</sup> Note. Specification MIL-P-116.



5.3.1.4.9 *Generator lead.* Remove the generator lead (Dwg. C14-28-364) from the unit and package in accordance with Method IA-15 of Specification MIL-P-116.

5.3.1.4.10 *Fuel line assembly.* The fuel line assembly shall be removed from the heater shell and the end of the line sealed with pressure-sensitive tape, conforming to type III, class 1 of Specification PPP-T-60. A square head steel plug shall be installed in the exposed hole in the heater shell.

5.3.1.4.11 *Fuel strainer.* The fuel strainer shall be packaged as specified on Drawing D14-17-665.

5.3.1.4.12 *Fire extinguisher.* All openings into the extinguisher shall be sealed with type III, class 1, pressure-sensitive tape, conforming to Specification PPP-T-60. The taped openings including all unpainted exterior surfaces of the extinguisher shall be coated with electrical ignition water proofing varnish, conforming to Specification MIL-V-13811. The fire extinguisher and hose thereto shall then be packaged as specified on Drawing C14-17-694.

5.3.1.4.13 *Stovepipe.* The stovepipe joint and the stovepipe elbow shall be packaged as specified on Drawings C14-17-709 and C14-17-692, respectively.

5.3.1.4.14 *Grounding wire.* The grounding wire shall be coated with type P-7 preservative oil, conforming to Specification MIL-P-116 and packaged in accordance with Method IC-2 of the same specification. The unit packaged grounding wire shall be packaged with stovepipe elbow as shown on Drawing C14-17-692.

5.3.1.4.15 *Water detecting paste.* The two, 2½-ounce jars of water detecting paste shall be packaged as specified on Drawing C14-17-709.

5.3.1.4.16 *Name, identification, and instruction plates.* Name, identification, and instruction plates on the mixing and transfer unit shall be coated with a clear acrylic coating compound, conforming to Specification MIL-c-17504.

5.3.2 *Level C.* The mixing and transfer unit, including components, repair parts, tools, and supply and technical manuals shall be cleaned

and dried as specified in 5.2 and preserved and packaged in accordance with the manufacturer's commercial practice.

5.4 *Packing.* Levels shall be as specified (see 6.2). Drawings cited herein are listed on Drawing D14-17-699.

5.4.1 *Level A.* The mixing and transfer unit, including components repair parts, tools, accessories and supply and technical manuals preserved and packaged as specified in 5.3, shall be packed in a type II, class 1, style a crate, conforming to Specification MIL-C-104, in the manner specified on Drawing D14-17-700 (8 sheets). Prior to packing of the unit, the tools packaged as specified in 5.3.1.4.4 shall be placed in toolbox provided with the unit, closing toolbox lid and sealing same with minimum 3-inch wide, type II, class 1 pressure-sensitive tape, conforming to Specification PPP-T-60, overcoating the tape with electrical ignition waterproofing varnish, conforming to Specification MIL-V-13811. Prior to closure of toolbox, cushioning conforming to type III, class B of Specification PPP-G843, shall be used as required to prevent movement within toolbox.

5.4.2 *Level C.* The mixing and transfer unit, including components, repair parts, tools, accessories, and supply and technical manuals preserved and packaged as specified in 5.3 shall be packed in such manner as to insure carrier acceptance and safe delivery at first destination for immediate use. Containers shall be in accordance with Uniform Freight Classification Rules or regulations of other carriers applicable to the mode of transportation.

5.5 *Marking.* In addition to any special marking required by the contract or order, unit packages and shipping containers shall be marked in accordance with Standard MIL-STD-129.

## 6. NOTES

6.1 *Intended use.* The item covered by this specification is intended for use in transferring gasoline from drums or other containers to a venturi mixer where a powdered thickener is mixed into the gasoline and then pumped into mechanized flamethrower. The unit can be operated as

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a mixer or as a mixing and heating unit combined whenever ambient temperatures necessitate the heating of the fuel.

6.2 Ordering data. Procurement documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Level of packaging and packing required,

6.3 Objective evidence. Provisions for objective evidence and inspection records and maintenance of inspection records will be specified by the procuring activity.

Custodians:

Army-CmlC  
Navy-MC

6.4 Stock number. The Federal stock number of this item is 1040-339-1615.

Notice. When Government specifications, drawings, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said specifications, drawings, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder - any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

Preparing activity:

Army—CmlC