INCH-POUND
ATPD 2232
9 January 1998
SUPERSEDING
MIL-E-10062E
16 August 1982

PURCHASE DESCRIPTION

ENGINES: PREPARATION FOR SHIPMENT AND STORAGE OF

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

1. SCOPE

1.1 Scope. This purchase description covers the general requirements for materials, methods, and procedures for the preservation, packaging, packing, and marking of internal combustion engines. It includes both spare engines, and engines installed in equipment except aircraft engines and engines installed in tactical and combat vehicles.

1.2 Classification. Preservation for the applicable level of protection shall be one of the following preparation types and methods as specified in table I (see 6.2 and 6.12):

Type I - Preparation of engines installed in equipment not to be packed in containers.
Type II - Preparation of engines installed in equipment to be packed in containers.
Type III - Preparation of marine engines installed in equipment, both packed and not packed in containers.
Type IV - Preparation of spare engines (other than marine).
Type V - Preparation of spare marine engines.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: U.S. Army Tank-automotive and Armaments Command, ATTN: AMSTA-TR-E/BLUE, Warren, MI 48397-5000, by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document, or by letter.

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Method 20 - Preservative coating (with grease-proof wrap as required) specified in MIL-STD-2073-1.
Submethod 53 - Water-vaporproof enclosure with desiccant (with preservative as required), floating bag, sealed as specified in MIL-STD-2073-1.
Submethod 55 - Water-vaporproof enclosure with desiccant (with preservative as required), rigid metal container sealed as specified in MIL-STD-2073-1.

TABLE I. Preservation for the applicable level of protection.

Type	Method 20	Submethod 53	Submethod 55
I	X		
II	X	X	X
III	X		
IV	X	X	X
V	X	X	X

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this purchase description. This section does not include documents cited in other sections of this purchase description 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 requirement documents cited in sections 3 and 4 of this purchase description, 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 listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATIONS

FEDERAL

A-A-883 - Pressure-Sensitive Adhesive, Masking.
A-A-1800 - Varnish, Oil and Spar.
A-A-52557 - Fuel Oil, Diesel, for Camps and Stations.

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A-A-52624	- Antifreeze, Multi-Engine Type.
O-S-801	- Sulfuric Acid, Electrolyte, For Storage Batteries.
TT-P-664	- Primer Coating, Alkyd, Corrosion-Inhibiting, Lead and Chromate Free, VOC-Compliant.
UU-T-81	- Tags, Shipping and Stock.
PPP-P-40	- Packaging and Packing of Hand Tools.
PPP-B-140	- Battery, Storage, Industrial, Automatic, Aircraft, and Navy Portable: Preparation for Shipment and Storage of.
PPP-B-566	- Boxes, Folding, Paperboard.
PPP-B-601	- Boxes, Wood, Cleated Plywood.
PPP-B-621	- Box, Wood, Nailed and Lock Corner.
PPP-B-676	- Boxes, Setup.

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MIL-C-104	- Crate, Wood, Lumber and Plywood Sheathed, Nailed and Bolted.
MIL-B-121	- Barrier Material, Greaseproofed, Waterproofed, Flexible.
MIL-S-196	- Support Items, Accessories and Kits, Mechanical, Packaging of.
MIL-L-2104	- Lubricating Oil, Internal Combustion Engine Technical Service.
MIL-C-5501	- Caps and Plugs, Protective, Dust and Moisture Seal.
MIL-PRF-10924	- Grease, Automotive and Artillery.
MIL-C-11264	- Container: Shipping, Reusable for Tank Automotive Engines, Transmissions, Differentials, Transfers, Final Drives, and Similar Assemblies.
MIL-C-11796	- Corrosion Preventive Compound, Petrolatium, Hot Application.
MIL-P-14105	- Paint, Heat-Resisting (for Steel Surfaces).
MIL-PRF-16173	- Corrosion Preventive Compound, Solvent Cutback, Cold-Application.
MIL-L-21260	- Lubricating Oil, Internal Combustion Engine, Preservative and Break-In.
MIL-T-22085	- Tape, Pressure-Sensitive Adhesive, Preservation and Sealing.
MIL-I-23310	- Inhibitor, Corrosion, Volatile, Oil Type.
MIL-P-46002	- Preservative Oil, Contact and Volatile Corrosion-Inhibiting.

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STANDARDS

FEDERAL

FED-STD-101 - Packing Materials, Test Procedures for.

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MIL-STD-129 - Marking for Shipment and Storage.
MIL-STD-1186 - Cushioning, Anchoring, Bracing, Blocking, and Waterproofing; with Appropriate Test Methods.
MIL-STD-2073-1 - Standard Practice for Military Packaging.

(Unless otherwise indicated, copies of the above specifications, standards, and handbooks are available from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

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 are those cited in the solicitation.

DEPARTMENT OF LABOR

Occupational Safety and Health Act - Public Law 91-596.

(Application for copies should be addressed to the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.)

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 the documents which are DoD adopted are those listed in the issue of the DoDISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS are the issues of the documents cited in the solicitation (see 6.2).

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D3951 - Standard Practice for Commercial Packaging (DoD Adopted).
ASTM D5118 - Standard Practice for Fabrication of Fiberboard Shipping Boxes (DoD Adopted).

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ASTM D5486 - Standard Specification for Pressure-Sensitive Tape for Packaging, Box Closure, and Sealing (DoD Adopted).

(Application for copies of ASTM publications may be obtained from the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.)

2.4 Order of precedence. In the event of a conflict between the text of this purchase description and references cited herein, the text of this specification should takes precedence.

3. REQUIREMENTS

3.1 Materials. Materials shall be as specified herein and in referenced specifications, standards, and drawings. Material shall be free of defects which affect performance or serviceability of finished product. Materials not specified, shall be selected by supplier and shall be subject to all provisions of this specification (see 6.10).

3.1.1 Tags. Tags used for matchmarking, identification, information, and warning marking, specified herein, shall conform to type A of UU-T-81. Information applied on the tags shall be with waterproof ink, or the tags waterproofed using varnish conforming to A-A-1800.

3.1.2 Preservative lubricating oil. Preservative lubricating oil specified herein shall conform to MIL-L-21260.

3.1.3 Tape. Tape used for sealing of openings and securing of components and wraps as specified herein, shall conform to ASTM D5486, MIL-T-22085, or A-A-883, type and class as specified herein.

3.2 Methods and preservatives. Methods of preservation and packaging indicated by symbols and preservatives identified by “P numbers” in this specification, shall conform to the corresponding symbols and applicable specifications in MIL-STD-2073-1.

3.3 Cleaning and drying. Prior to the application of preservation compounds or paint to exterior surfaces of engines, surfaces shall be cleaned and dried by any suitable process or processes which are not injurious to the item.

3.4 Repainting. Painted surfaces of engines and accessories on which paint film has been damaged shall be cleaned and repainted using materials of the same type, quality, and color as originally used, or as required by the end item specification for the engine (see 6.4).

3.5 Disassembly. Disassembly shall be confined to the minimum necessary to safeguard parts vulnerable to damage that would otherwise increase cube if not removed. Disassembly shall also be confined to those parts that can be removed and reinstalled without special tools.

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Removed bolts, nuts, screws, washers, keys, and other fasteners shall be reinstalled in mating parts and secured to prevent loss. When not practical to reinstall hardware, items shall be preserved as specified in MIL-STD-2073-1. Under no circumstances should the ducting be disassembled or alternations made to the engine, which would allow dust or dirt to enter the engine after the oil or fuel filters.

3.6 Matchmarking. The mating locations on engine parts and accessories removed shall be matchmarked when necessary to facilitate reassembly and shall be identified with tags attached to mating parts and locations.

3.7 Depreservation guides. When preparation of types IV and V engines is specified, two depreservation guides DD Form 1397 (see 6.5), shall be prepared. One guide shall be preserved method 33 marked "DEPRESERVATION GUIDE," and the preserved guide secured to the engine. The other copy shall be placed in package of technical publications and package marked to indicate: "DEPRESERVATION GUIDE INSIDE." When preparation of types I, II, and III engines is specified, the engine depreservation instructions shall be combined with depreservation instructions for the complete equipment in which the engine is installed. Unless otherwise specified (see 6.2), "DA Form 2258 (see 6.5) Depreservation Guide for Vehicles and Equipment" shall be used.

3.8 Preservative formula for preservation of combustion chambers and valves of engine. The amount of preservative lubricating oil conforming to MIL-L-21260 and the amount of corrosion inhibiting oil conforming to MIL-P-46002 or MIL-I-23310 to be sprayed into each cylinder, can be determined as follows:

a. One-half ounce for each cylinder with a piston displacement of up to 25 cubic inches (in^3) or 409.75 cubic centimeters (cm^3).
b. One ounce for each cylinder with a piston displacement of between 25 and 50 in^3 or 409.75 and 819.5 cm^3.
c. One and one-half ounces for each cylinder with a piston displacement of between 50 and 75 in^3 or 819.5 and 1229.25 cm^3.
d. Two ounces for each cylinder with a piston displacement over 75 in^3 or 1229.25 cm^3.

(CAUTION: Precautions shall be taken to assure the amount of oil injected into combustion chambers and manifolds shall not result in hydrostatic lockup of engine. Prior to preserving additional engines, the first engine preserved shall be allowed to stand idle for 12 hours. The engine crank-shaft shall be rotated manually or by starting motor if manual rotation is not possible, to assure that amount of oil injected into combustion chambers and manifolds permits free rotation of engine.)

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3.9 Liquid coolant systems. Liquid coolant systems shall be processed by one of the following procedures specified for applicable preparation, type, and method.

3.9.1 Preservative and drain procedure. At beginning of engine preservation, the coolant system shall be filled to proper level with compound conforming to grade 5 of MIL-PRF-16173. For coolant systems thermostatically controlled, the engine shall be operated until temperature reached opens thermostats, assuring complete mixing and even distribution of compound to all areas of systems. On completion of engine preservation, coolant system shall be drained. Drain cocks shall be left open. A warning tag shall be prepared indicating: "COOLANT SYSTEM DRAINED - FLUSH WITH HOT WATER (180 degrees Fahrenheit (°F) or above) - CLOSE DRAIN COCKS - FILL SYSTEM TO PROPER OPERATING LEVEL WITH COOLANT PRIOR TO OPERATING THE ENGINE." Tag shall be attached to neck of coolant fill tube.

3.9.1.1 Engine blocks and water jackets for preparation of types IV and V engines. If complete liquid coolant system is not furnished with engines, temporary coolant system used to operate engine during engine preservation shall be filled with clean water prior to beginning engine preservation. On completion of engine preservation, blocks and water jackets shall be completely drained of water. Drain cocks shall be closed. Engine blocks and water jackets shall be filled with compound conforming to grade 5 of MIL-PRF-16173 and completely drained. Drain cocks shall be left open until preservative flow ceases. Drain cocks shall then be closed.

3.9.2 Water and antifreeze procedure. For engine preservation, coolant system shall be filled with premixed equal parts (by volume) of antifreeze (ethylene glycol) conforming to A-A-52624 and clean water. Engines with thermostatically controlled coolant systems shall be operated till temperature is reached which opens thermostats assuring complete mixing and even distribution of solution to all areas of systems. A warning tag shall be prepared indicating: "COOLANT SYTEM CONTAINS WATER AND ANTIFREEZE IN EQUAL PARTS BY VOLUME - DO NOT DRAIN - CHECK COOLANT LEVEL - IF COOLANT IS LOW, ADD COOLANT OF SAME MIXTURE." The tag shall be attached to neck of coolant fill tube.

3.10 First article.

3.10.1 First article (preproduction pack). Unless otherwise specified, contractor shall furnish a preproduction pack for examination and tests within time frame specified (see 6.2) to prove prior to starting production, preservation, and packing, that applied preservation, packing, and marking conform to requirements of this specification (see 6.3 and 6.6).

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3.11 Preservation. Preservation shall be level A, B, or Commercial as specified (see 6.2).

3.11.1 Level A.

3.11.1.1 Type I preparation, method 20 (engines installed in equipment not packed in containers).

3.11.1.1.1 Crankcases.

a. The following procedure shall be used for crankcase preservation and marking of spark-ignition engines and compression-ignition engines operating at output level up to 150 pounds per square inch (psi), brake mean effective pressure (bmep). At beginning of engine preservation, engine crankcase and crankcases of mounted accessories having separate crankcase from engine, shall be filled to operating level with preservative lubricating oil conforming to grade 10, 30, or 50 as applicable in MIL-L-21260. On completion of engine preservation, preservative oil shall remain in crankcases. A tag shall be prepared for each crankcase indicating: "THIS CRANKCASE IS FILLED TO OPERATING LEVEL WITH PRESERVATIVE OIL GOOD FOR OPERATION UNTIL FIRST REQUIRED LUBRICANT CHANGE - DO NOT DRAIN - CHECK OIL LEVEL - IF LOW, ELEVATE TO OPERATING LEVEL WITH OPERATING OIL (MIL-L-2104, APPLICABLE GRADE)." Tags shall be attached to the crankcase fill tube.
b. The following procedure shall be used for crankcase preservation and marking of compression-ignition engines operating at output level of 150 psi (bmep) and above. At beginning engine preservation, engine crankcase, and crankcases of any mounted accessories having a separate crankcase from engine, shall be filled to operating level with preservative lubricating oil conforming to grade 10, 30, or 50 as applicable in MIL-L-21260. On completion of engine preservation, preservative oil shall remain in crankcases. A red "Caution" tag shall be prepared for each crankcase indicating: "THIS CRANKCASE IS FILLED WITH PRESERVATIVE OIL. DRAIN AND REFILL TO OPERATING LEVEL WITH OPERATING OIL (MIL-L-2104, APPLICABLE GRADE) BEFORE START-UP." The tag shall be attached to the crankcase fill tube(s).
c. When specified (see 6.2), upon completion of engine preservation, 6 ounces of oil conforming to grade 1 of MIL-P-46002, or inhibited oil conforming to grade 1 of MIL-I-23310, shall be atomize sprayed into crankcase. Flexible extension nozzle to reach upper crankcase shall be used. The nozzle shall not be submerged in crankcase oil.

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3.11.1.1.2 Liquid coolant systems. Unless otherwise specified, liquid coolant systems shall be processed in accordance with 3.9.2. When specified (see 6.2), the coolant systems shall be processed in accordance with preservative and drain procedure specified in 3.9.1.

3.11.1.1.3 Spark-ignition engines (gasoline, including auxiliary engines).

3.11.1.1.3.1 Fuel systems, combustion chambers, and valves. Unless otherwise specified (see 3.11.1.1.4.2), processing shall be as follows: Air compressors shall be preserved during fuel system preservation as specified herein (see 3.11.1.1.9).

3.11.1.1.3.1.1 Fuel systems.

a. Engines with carburetors. A portable container with two compartments shall be positioned to provide gravity feed to engine. One compartment shall contain gasoline and the other compartment shall contain type P-10, grade 10 preservative oil. The engine fuel supply line shall be disconnected at convenient point. A flexible line from the portable container shall be connected to fuel supply line leading to the engine. The container selector valve shall be turned to gasoline position. The engine shall be started and operated at fast idle until running smoothly, then accelerated to 3/4 speed without load. The fuel supply selector valve shall be switched to preservative oil position. When oil reaches combustion chambers, (evidenced by loss of speed, misfiring, and excessive smoking), the ignition shall be turned off. After engine has stopped, the line from the portable container shall be disconnected from engine fuel supply line. The engine fuel supply line shall be reconnected. Fuel filters and sediment bowls shall be drained.
b. Engines with fuel injectors. Fuel systems shall be preserved as specified in 3.11.1.4.1(b) except that corrosion inhibiting oil conforming to grade 1 of MIL-I-23310 shall be used in lieu of type P-9 preservative oil.

3.11.1.1.3.1.2 Combustion chambers and valves. After completion of fuel system preservation, engine shall be allowed to cool to cylinder head temperature of maximum 100°F, measured at spark plug area of all cylinders. Cooling may be accelerated by induced air currents. After engine has cooled, spark plugs shall be removed. Care shall be taken to avoid damage to threads, electrodes, and gaskets. While cranking engine, one-half predetermined amount (see 3.8) oil conforming to grade 30 of MIL-L-21260 preservative lubricating oil shall be atomize sprayed into each cylinder through each spark plug opening. The nozzle shall be inserted into combustion chamber and maximum air pressure for spraying shall not exceed 25 psi. Without cranking engine, the additional one-half of preservative lubricating oil specified herein, shall be atomize sprayed into each cylinder through each spark plug opening, after which crankshaft shall not be rotated. The spark plug threads shall be coated with lubricating oil specified herein. Spark plugs shall be reinstalled. A tag shall be prepared indicating: “ENGINE PRESERVED - DO NOT CRANK UNTIL ISSUED TO USER”. The tag shall be attached near engine “Start” control switch.

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3.11.1.1.3.2 Other procedures for preservation of fuel systems, combustion chambers, and valves of spark-ignition engines. When specified (see 6.2), fuel systems, combustion chambers, and valves shall be processed as follows:

3.11.1.1.3.2.1 Fuel Systems.

a. Engines with carburetors. Fuel systems shall be preserved as specified in 3.11.1.1.4.1.1(a) except that corrosion inhibiting oil conforming to grade 1 of MIL-I-23310 shall be used in lieu of type P-10, grade 10 preservative oil.
b. Engines with fuel injectors. Fuel systems shall be preserved as specified in 3.11.1.1.4.1.1(b) except that corrosion inhibiting oil conforming to grade 1 of MIL-I-23310 shall be used in lieu of type P-10, grade 10 preservative oil.

3.11.1.1.3.2.2 Combustion chambers and valves. Combustion chambers and valves shall be preserved as specified in 3.11.1.4.1.2. Corrosion inhibited oil conforming to grade 1 of MIL-I-23310 shall be used to preserve the combustion chambers and valves in lieu of preservative lubricating oil specified therein, and the engine shall then be tagged as specified therein.

3.11.1.1.3.3 Valve mechanisms. Valve compartment cover plates shall be removed. All surfaces within the valve compartment including rocker arm mechanisms, valve stems, springs, guides, push rods, and the inside of cover plates shall be atomize sprayed with oil conforming to grade 30 of MIL-L-21260. Cover plates shall be reinstalled using new gaskets if original gaskets show evidence of damage.

3.11.1.1.4 Compression-ignition engines (diesel and multifuel).

3.11.1.1.4.1 Fuel systems, combustion chambers, and valves. Unless otherwise specified (see 3.11.1.1.4.3), fuel systems, combustion chambers, and valves shall be preserved in accordance with 3.11.1.1.4.1.1 through 3.11.1.1.4.2. Air compressors shall be preserved during fuel system preservation (see 3.11.1.1.9).

3.11.1.1.4.1.1 Fuel Systems (2 and 4 cycle).

a. Gasoline starting engines. A portable container with two compartments shall be positioned to provide gravity feed to the engine. One compartment shall contain gasoline and the other compartment shall contain type P-10, grade 10 preservative oil. Flexible line from the portable container shall be connected to engine fuel pump intake line. Engine fuel return line shall be disconnected at quick-disconnect coupling. A transparent plastic line shall be connected to disconnected engine fuel return line, and other end shall be inserted into a recovery container to collect returned fuel. Another portable container shall be provided and shall contain type

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P-10, grade 10 preservative oil. Diesel or multifuel engine fuel supply line shall be disconnected at convenient point nearest fuel pump. The line from portable container shall be connected to fuel-to-engine line at point of disconnect. Controls shall be positioned for gasoline operation. The three-way valve on two compartment container shall be turned to the gasoline "ON" position. Engine shall be started and operated until running smoothly. Engine speed shall be increased to 3/4 speed and container selector valve turned to preservative oil "ON" position. Engine shall be operated until it begins to misfire and the engine controls shall immediately be switched to diesel or multifuel operation. Engine shall be operated at operated at 1/2 speed till undiluted preservative oil is flowing into recovery container. Engine shall be increases to 3/4 speed approximately 15 seconds and engine then turned off. Portable container valves shall be turned to "OFF" position and lines disconnected from engine fuel intake lines. Engine fuel intake lines shall be reconnected. Temporary fuel return line shall be disconnected and permanent fuel return line reconnected. (The recovered fuel oil mixture shall not be used to preserve other fuel systems.)

b. Straight diesel and multifuel engines. Engine fuel intake line shall be disconnected at the most convenient accessible point near fuel supply tank. A line from portable container with two compartments shall be connected to fuel intake line leading to the engine. One compartment shall contain fuel conforming to A-A-52557 and the other compartment shall contain type P-10, grade 10 preservative oil. Injector fuel return line shall be disconnected at the disconnect coupling. A transparent line shall be connected to the injector fuel return coupling to allow drainage into a recovery container. The fuel valve of the portable container shall be turned to "ON" position. Engine shall be started and operated at fast idle until thoroughly warm. The engine shall be accelerated to 3/4 speed at which time fuel supply shall be switched to portable container containing type P-10, grade 10 preservative oil. Engine shall be operated at this speed until undiluted preservative oil is flowing into recovery container. Engine shall be stopped. Temporary fuel return line shall be disconnected and permanent fuel return line reconnected. Temporary fuel intake line shall be disconnected and permanent fuel intake line reconnected. (Recovered fuel oil mixture shall not be used to preserve other systems.)

c. Gasoline starting auxiliary (pony) engines. After attached diesel or multifuel engine has been preserved, gasoline engine shall be disengaged from diesel or multifuel engine. Gasoline engine fuel system, combustion chambers, and valves shall be preserved as specified for spark-ignition engines in 3.11.1.1.3 through 3.11.1.1.3.1.2, or when specified, in accordance with 3.11.1.1.3.2 through 3.11.1.1.3.2.2. Valve mechanisms shall be preserved as specified in 3.11.1.1.3.3.

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3.11.1.1.4.1.2 Combustion chambers and valves. After engines have cooled to cylinder head temperature of 100°F or less, measured at injector nozzle flange area surfaces of each cylinder, combustion chambers and valves of compression-ignition engines shall be preserved as follows.

3.11.1.1.4.1.2.1 Four-cycle spark-ignition (gasoline) starting engines. The intake manifolds, exhaust manifolds, and rocker arm covers shall be removed. Engine controls shall be set for gasoline operation. Diesel or multifuel throttle shall be completely closed. Spark plug wires shall be disconnected. Each intake valve shall be manually depressed, and while each valve is held open, one-fourth predetermined amount (see 3.8) of oil conforming to grade 10 of MIL-L-21260 shall be atomize sprayed into each cylinder through intake ports. Nozzle tip shall be inserted into port. Maximum air pressure spraying shall not exceed 25 psi. Each exhaust valve shall be manually depressed, and while each valve is held open, one-fourth determined amount of type and grade of preservative lubricating oil specified herein, shall be atomize sprayed through each exhaust port into each cylinder. In addition to the determined amount, one-fourth ounce preservative lubricating oil specified herein shall atomize sprayed into each starting valve port. With valves released, the engine crankshaft shall be rotated until all pistons have completed a full cycle. Preservative cycle shall be repeated and crankshaft shall not be rotated. Spark plugs shall be removed. Care shall be exercised to prevent damage to threads, electrodes and gaskets. Spark plug threads shall be coated with preservative lubricating oil specified herein. Spark plugs shall be reinstalled. Exhaust manifolds shall be reinstalled using new gaskets if original gaskets show evidence of damage. Rocker arm assembles, springs, guides, valve stems, push rods, and the inside of rocker arm covers shall be sprayed with preservative lubricating oil specified herein. Rocker arm covers shall be reinstalled using new gaskets if original gaskets evidence damage. A tag shall be prepared indicating: "ENGINE PRESERVED - DO NOT CRANK UNTIL ISSUED TO USER." The tag shall be attached near engine "Start" control.

3.11.1.1.4.1.2.2 Four-cycle, straight diesel or multifuel engines.

a. Engines with compression release start feature. Intake manifolds, exhaust manifolds, and rocker arm covers shall be removed. The fuel throttle shall be completely closed. Each intake valve shall be manually depressed and held open, one-fourth predetermined amount (see 3.8) of oil conforming to grade 10 MIL-L-21260, shall be atomize sprayed into each cylinder through each open intake port. The nozzle tip shall be inserted into open port. The maximum air pressure spraying shall not exceed 25 psi. Each exhaust valve shall be manually depressed, and while each valve is held open, one-fourth predetermined amount of preservative lubricating oil shall be atomize sprayed into each cylinder through each open exhaust port. Compression release shall be set in the "OFF" position. With valves released, engine crankshaft shall be rotated with starting motor until all pistons have completed a full cycle. Preservative cycle shall then be repeated

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and crankshaft shall not be rotated. Exhaust manifolds and intake manifolds shall be reinstalled using new gaskets if original gaskets evidence damage. Rocker arm assembles, springs, guides, valve stems, push rods, and the insides of rocker arm covers shall be atomize sprayed with preservative lubricating oil specified herein. Rocker arm covers shall be reinstalled using new gaskets if original gaskets evidence damage. A tag shall be prepared indicating: "ENGINE PRESERVED - DO NOT CRANK UNTIL ISSUED TO USER." The tag shall be attached near

b. Engines without compression release start feature. The combustion chambers and valves shall be preserved as specified in (a) herein, except that, due to the tendency of the engine to fire and run on the preservative lubricating oil, the crankshaft shall be rocked with starting motor in lieu of continuous rotation. The engine shall be tagged as specified in (a) herein.

3.11.1.1.4.1.2.3 Two-cycle engines.

a. Engines with intake ports and exhaust valves. The fuel throttle shall be completely closed. Air box covers on the side of engine opposite blower shall be removed. Exhaust manifolds and rocker arm covers shall be removed. Engine crankshaft shall be rotated with starting motor until the piston in cylinder to be sprayed is below the intake port. The spray nozzle shall be inserted into open port. Maximum air pressure shall not exceed 25 psi. One-half determined amount (see 3.8) of oil conforming to grade 10 of MIL-L-21260, shall be sprayed into open port. The preservation cycle shall be performed on each cylinder until all cylinders have been atomize sprayed with preservative lubricating oil, after which the crankshaft shall not be rotated. With each exhaust valve manually depressed, the remaining one-half determined amount preservative lubricating oil shall be atomize sprayed through each open exhaust valve port. The interior of air box covers shall be coated with preservative lubricating oil specified herein. The air box covers shall be reinstalled using new gaskets if original gaskets evidence damage. Exhaust manifolds shall be reinstalled using new gaskets if original gaskets evidence damage. Rocker arm assemblies, springs, guides, valve stems, push rods, and the inside of rocker arm covers shall be atomize sprayed with preservative lubricating oil specified herein. The rocker arm covers shall be reinstalled using new gaskets if original gaskets evidence damage. A tag shall be prepared indicating: "ENGINE PRESERVED - DO NOT CRANK UNTIL ISSUED TO USER." The tag shall be attached near engine "Start" control.
b. Engines without valves. The fuel throttle shall be completely closed. Exhaust manifolds shall be removed. Engine crankshaft shall be rotated until the piston in cylinder to be sprayed is below exhaust port. The spray nozzle shall be inserted into open exhaust port. Maximum air pressure shall not exceed 25 psi. One-half

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determined amount (see 3.8) of oil conforming to grade 10 of MIL-L-21260 shall be atomize sprayed through open exhaust port. Crankshaft shall be rotated until each cylinder has been sprayed through open exhaust port. The preservation cycle shall then be repeated and the crankshaft shall not be rotated. The exhaust manifolds shall be reinstalled using new gaskets, if the ones originally used evidence damage. A tag shall be prepared indicating: "ENGINE PRESERVED - DO NOT CRANK UNTIL ISSUED TO USER." The tag shall be attached near

3.11.1.1.4.2 Alternate procedures for preservation of combustion chambers and valves of all compression-ignition engines. In lieu of the procedures specified in 3.11.1.1.4.1.2.1 through 3.11.1.1.4.1.2.3, alternate procedures may be used by the contractor to preserve combustion chambers and valves of all compression-ignition engines, provided complete coverage of the exhaust valves, intake valves, valve stems, and combustion chambers with oil conforming to grade 10 of MIL-L-21260 is obtained. The procedures proposed by contractor shall not cause excessive preservative lubricating oil to be left in combustion chambers and manifolds that could result in hydrostatic lockup of engine. The contractor shall furnish an engine for examination and test of his proposed procedure prior to production preservation (see 4.3.3). The proposed procedure shall be subject to prior approval of the contracting officer. Procedures previously approved by the Government may be used (see 6.7.)

3.11.1.1.4.3 Alternate procedures for preservation of fuel systems, combustion chambers, valves of compression-ignition engines, (diesel and multifuel), 2 cycle and 4 cycle. When specified (see 6.2), fuel systems, combustion chambers, and valves shall be preserved in accordance with 3.11.1.1.4.3.1 and 3.11.1.1.4.3.2.

3.11.1.1.4.3.1 Fuel systems. Compression-ignition engine fuel systems shall be preserved as specified in 3.11.1.1.4.1, except corrosion inhibited oil conforming to grade 1 of MIL-P-46002, or corrosion inhibiting oil conforming to grade 1 of MIL-I-23310, shall be used in lieu of type P-10, grade 10 preservative oil specified therein.

3.11.1.1.4.3.2 Combustion chambers and valves. Compression-ignition engine combustion chambers and valves shall be preserved as specified in 3.11.1.1.4.1, except corrosion inhibiting oil conforming to grade 1 of MIL-P-46002, or grade 1 of MIL-I-23310, shall be used in lieu of oil conforming to grade 10 of MIL-L-21260.

3.11.1.1.5 Air intake. Unless otherwise specified, the air cleaner shall be removed and one ounce of oil conforming to grade 30 of MIL-L-21260 shall be atomize sprayed into the air intake tube. When specified (see 6.2), the processing of air intake systems shall be in accordance with alternate method specified in 3.11.1.1.5.1 and 3.11.1.1.5.2.

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3.11.1.1.5.1 Air intake systems with blowers. The air intake tube at outlet side of blower shall be disconnected and one ounce of oil conforming to grade 1 of MIL-P-46002, or grade 1 of MIL-I-23310, shall be atomize sprayed into the air intake tube toward engine. Air intake tube to air cleaner shall be reconnected.

3.11.1.1.5.2 Air intake system with either a supercharger or turbocharger. The air intake tube between the air cleaner and supercharger or turbocharger shall be disconnected at outlet side of air cleaner. The air tubes between the supercharger or turbocharger and intake manifold shall be disconnected. One ounce oil conforming to grade 1 of MIL-P-46002 or grade 1 of MIL-I-23310, shall be atomize sprayed into air tubes toward the supercharger or turbocharger, and additional one ounce of same type oil shall be atomize sprayed into supercharger or turbocharger at outlet side. In addition, two ounces of same oil shall be sprayed through the air tubes toward manifold or cylinders. Air intake tubes shall be reconnected.

3.11.1.1.6 Air cleaners.

3.11.1.1.6.1 Oil-bath type. Oil-bath type air cleaners shall be filled to operating level with oil conforming to grade 30 of MIL-L-21260. Unpainted, uncoated surfaces above the operating level shall be coated with preservative lubricating oil. When specified (see 6.2), interior surfaces of air cleaner above oil level shall be sprayed with one-half ounce oil conforming to grade 1 of MIL-P-46002 or grade 1 of MIL-I-23310.

3.11.1.1.6.2 Dry type. After engine preservation has been completed, if equipped with removable element, the element shall be removed and unpainted, uncoated interior metal surfaces of air cleaner shall be atomize sprayed with oil conforming to grade 30 of MIL-L-21260. Metallic elements shall be dipped in the same type preservative lubricating oil and allowed to drain. The element shall be reinstalled. Care shall be exercised to prevent preservative oil from contacting nonmetallic elements. When specified (see 6.2), unpainted, interior metal surfaces of air cleaner shall be atomize sprayed with oil conforming to grade 1 of MIL-P-46002 or grade 1 of MIL-I-23310.

3.11.1.1.6.3 Sealing. After completion of air intake system preservation, air cleaners shall be sealed with tape conforming to type IV of ASTM D5486, or to type II of MIL-T-22085.

3.11.1.1.7 Exhaust systems. Unless otherwise specified (see 3.11.1.1.7.1), after completion of engine preservation, painted surfaces of exhaust pipes and stacks, exhaust manifolds, and mufflers on which paint has been damaged, shall be cleaned of rust and scale and the surfaces coated with paint originally used. (see 6.4). surfaces not originally painted and requiring the application of contact preservative in accordance with MIL-STD-2073-1, shall be cleaned of dirt, rust, and scale, and coated with heat resisting paint conforming to MIL-P-14105 or with type P-19 preservative. Interior surfaces of tail pipes and vertical exhaust stacks shall be

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atomize sprayed with oil conforming to grade 30 of MIL-L-21260. Vertical exhaust stacks shall be removed when a reduction in cube is required. Openings shall be sealed with plastic caps or plugs conforming to MIL-C-5501 or with tape conforming to type IV of ASTM D5486, or to type II of MiL-T-22085. Ends of vertical exhaust stacks (if not removed and equipped with rain caps) shall be sealed as specified herein. If equipped with rain caps, seal rain caps with tape specified herein.

3.11.1.1.7.1 Other procedures for preservation of exhaust systems. When specified (see 6.2), exhaust systems shall be preserved in accordance with 3.11.1.1.7.1.1 and 3.11.1.1.7.1.2 as applicable.

3.11.1.1.7.1.1 Exhaust systems on engines without a supercharger or turbocharger. One ounce of oil conforming to grade 1 of MIL-P-46002 or grade 1 of MIL-I-23310 for each 2 feet of length shall be sprayed into tail pipe or exhaust stacks directed toward engine. Openings into stacks (including rain caps) shall be sealed as specified in 3.11.1.1.7. Rain caps shall be secured to prevent opening as specified in 3.11.1.1.7.

3.11.1.1.7.1.2 Exhaust systems on engines with superchargers or turbochargers. Exhaust tubes between the supercharger or turbocharger and the exhaust manifold shall be disconnected and on ounce of oil conforming to grade 1 of MIL-P-46002, or grade 1 of MIL-I-23310, shall be atomize sprayed into the supercharger or turbocharger, and one ounce sprayed into the exhaust tubes toward the manifold. The tubes shall be reconnected and the remainder of the exhaust system shall be processed and sealed as specified in 3.11.1.1.7.

3.11.1.1.8 Uncoated fuel tanks. Fuel tanks not coated or otherwise treated to resist corrosion shall be preserved.

3.11.1.1.8.1 Tanks without baffles. Fuel tanks without baffles shall be completely drained of fuel. The interior of tanks shall be atomize sprayed with oil conforming to grade 30 of MIL-L-21260, using a flexible nozzle of sufficient length to assure coverage of all interior surfaces of tanks. Tanks shall be allowed to stand with drain plugs removed until preservative oil flow ceases. Drain plugs shall be coated with preservative lubricating oil and specified herein and reinstalled.

3.11.1.1.8.2 Tanks with baffles. Fuel tanks with baffles shall be completely drained of fuel. Tanks shall be filled with oil conforming to grade 30 of MIL-L-21260. Oil shall then be drained into recovery container. Tanks shall be allowed to stand with drain plugs removed till preservative oil flow ceases. Drain plugs shall be coated with preservative lubricating oil specified herein and reinstalled. (The recovered fuel-oil mixture may be used for preserving other fuel tanks. However, it shall be discarded when more than ten percent of resultant mixture is fuel (see 6.8).

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3.11.1.1.8.3 Fuel cap vent holes. Fuel cap vent holes shall be sealed with tape conforming to type IV, class 1 of ASTM-D5486 or to type II of MIL-T-22085.

3.11.1.1.9 Air compressor. The air compressor shall be preserved during fuel system preservation (see 3.11.1.1.3.1 and 3.11.1.1.4.1). Compressor, if not lubricated from the engine, shall be filled to operating level with oil conforming to grade 10 of MIL-L-21260. Air cleaner shall be removed and air intake and outlet disconnected. While the fuel system is being preserved, preservative lubricating oil specified herein, shall be sprayed into the air intake until preservative appears at the outlet. The air intake and air outlet shall be reconnected.

3.11.1.1.10 Dry-type governors. Dry-type governor mechanisms such as weights, springs, pins, and linkage, and other parts and assemblies within the housing, shall be sprayed with oil conforming to grade 10 of MIL-L-21260. Linkages, pins, and other metallic devices not enclosed shall be coated with type P-11 preservative. If practical, coated surfaces shall be wrapped or covered with barrier material conforming to type I grade A class 2 of MIL-B-121; and the wraps or covers secured with tape conforming to type IV, class 1 of ASTM-D5486.

3.11.1.1.11 Tachometer drive adapters. The tachometer drive adapters shall be removed. Metal surfaces not normally lubricated by the engine lubricating systems shall be coated with type P-11 preservative and reinstalled.

3.11.1.1.12 Drive belts. Unless otherwise specified , tension of all drive belts shall be relieved. Unpainted surfaces of pulley grooves shall be coated with a thin film of primer conforming to TT-P-664. A tag shall be prepared indicating: “BELT TENSION RELIEVED - ADJUST PRIOR TO STARTING ENGINE.” The tag shall be attached to the accessory driven by belts.

3.11.1.1.13 Flywheel ring gear. When disassembly of clutch is specified (see 6.2), the flywheel ring gear shall be coated with a thin film of primer conforming to TT-P-664.

3.11.1.1.14 Clutch (disc-type) dry type. With cover plates removed and clutch engaged, all accessible metal interior components of clutch shall sprayed with primer conforming to TT-P-664. Cover plates shall be reinstalled. When specified (see 6.2), the clutch shall be disassembled sufficiently to permit the application of a continuous thin film of primer, specified herein, to friction surfaces of the pressure plate. After being sprayed, spring-loaded-type clutches shall be secured in disengaged position. Snap-over center and toggle-in-type clutches shall be completely disengaged. Cover plates shall be reinstalled.

3.11.1.1.15 Batteries and electrolyte. Batteries, cables, and carrier shall be cleaned and dried by any applicable process of MIL-STD-2073-1. Unless otherwise specified in the contract, battery cables shall be disconnected and secured to battery carrier or compartment with tape

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conforming to ASTM D5486. Batteries shall remain in the battery compartment and shall be secured in place. Battery terminals and contact plug end of cables shall be preserved with P-6 or P-11, wrapped with barrier material conforming to Grade C of MIL-B-121, and secured with tape conforming to any applicable type of ASTM D5486. The carrier shall be painted with acid resistant paint or coated with P-1 preservative. The filler openings of batteries shall be moisture sealed such that batteries cannot be activated without destroying the seals. Electrolyte shall be packaged in accordance with O-S-801. The packaged electrolyte shall then be stowed with Basic Issue Items (BII) and secured independently to permit separate removal. When specified (see 6.2), the batteries shall be packed in accordance with PPP-B-140 and secured to equipment as specified herein for electrolyte.

3.11.1.1.16 Starters and generators. When specified, disassemble and spray interior of starter and generators with electrical primer specified by the acquisitioning activity (see 6.2).

3.11.1.1.17 Engine openings. Upon completion of engine preservation, all openings into the engine (except air box drain tubes of 2-cycle engines) such as crankcase breathers, oil filler caps, valve cover breather holes, fuel cap vent holes, oil level dipstick tubes, and openings into accessories, shall be sealed with plastic caps or plugs conforming to MIL-C-5501 or with tape conforming to type IV of ASTM D5486 or type II of MIL-T-22085.

3.11.1.1.18 Warning tag. A red “Warning” tag shall be prepared indicating: “DEPROCESS THIS ENGINE IN ACCORDANCE WITH INSTRUCTIONS CONTAINED ON DA FORM 2258 OR DD FORM 1397 (ATTACHED TO THIS EQUIPMENT) - IN ADDITION, THE AIR CLEANERS, FILL CAPS, EXHAUST STACKS, TAIL PIPES, BREATHER TUBES, DIPSTICK TUBES, FUEL CAP VENT HOLES, BATTERY FILLER OPENINGS, AND ACCESSORIES HAVE BEEN SEALED - REMOVE ALL SEALS PRIOR TO CRANKING THE ENGINE.” The tag shall be securely attached near the engine “Start” controls.

3.11.1.1.19 Repair parts. Unless otherwise specified herein, preservative application criteria and applicable methods shall of MIL-STD-2073-1 shall be used to preserve and package repair parts. When specified (see 6.2), repair parts shall be preserved and packaged in accordance with level A requirement of MIL-S-196.

3.11.1.1.20 Maintenance tools. Maintenance tools shall be preserved in accordance with level A requirements of PPP-P-40.

3.11.1.1.21 Technical publications. Technical publications for the engine shall be preserved together with technical publications for the equipment in which the engine is installed in accordance with level A requirements of end item specifications for equipment.

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3.11.1.1.22 Consolidated packaging. Consolidated packaging of disassembled components, repair parts, tools, and publications for the engines shall be with other components of the equipment, and shall be in accordance with level A requirements of end item specifications for equipment.

3.11.1.2 Type II preparation, method 20, (engines installed in equipment to be packed in containers. The engines shall be preserved in accordance with the applicable requirements of 3.1 through 3.11.1.1.18, and as follows:

a. When the weight of packed equipment will not exceed 1000 pounds, engine crankcase (including separate crankcases for accessories) shall be drained into a recovery container. (The preservative lubricating oil may be used for preserving other crankcases and lubricating systems, but shall be discarded when it shows evidence of contamination or discoloration.)
b. Unless otherwise specified, liquid coolant systems shall be processed by preservative and drain procedure specified in 3.9.1. When specified (see 6.2), coolant systems shall be processed in accordance with 3.9.2.
c. Oil-bath-type air cleaners shall be drained when weight of packed equipment in which the engine is installed, will not exceed 1000 pounds. (Reuse of the preservative lubricating oil shall be as specified in (a) herein.)
d. Preservation and consolidated packaging of repair parts, tools, publications, and disassembled components shall be as specified in 3.11.1.1.19 through 3.11.1.1.22.

3.11.1.3 Type II preparation, submethod 53 and submethod 55 (engines installed in equipment to be packed in containers). The general requirements of 3.1, 3.1.1, 3.1.2, 3.1.3, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, and 3.10, as applicable, shall apply. Components of engines and engine accessories shall be preserved as follows:

a. The crankcases shall be preserved in accordance with 3.11.1.2(a). After completion of engine preservation, crankcases shall be drained into a recovery container when gross weight of equipment in which the engine is installed will not exceed 1000 pounds. (Reuse of the preservative lubricating oil shall be as specified in 3.11.1.2(a).)
b. Fuel systems shall be preserved as follows:

    1. Spark ignition engines. In accordance with 3.11.1.1.3.1(a) or (b) as applicable.
    2. Compression-ignition engines. In accordance with 3.11.1.1.4.1.1 (a), (b), or (c) as applicable.

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c. Combustion chambers and valves shall be preserved as follows:

1. Spark-ignition engines. In accordance with 3.11.1.1.3.1.2.
2. Compression-ignition engines. In accordance with 3.11.1.1.4.1.2 through 3.11.1.1.4.2 as applicable.

d. Valve compartment cover plates and air box access cover plates shall not be installed. The gaskets and covers shall be secured to the engine to provide maximum ventilation of engine through the valve compartment and air boxes.
e. When applicable (spark ignition engines and gasoline starting diesel and multifuel engines), one spark plug shall be removed from each cylinder. Threads of plugs shall be coated with oil conforming to grade 10 of MIL-L-21260. The plugs shall be individually wrapped with barrier material conforming to MIL-B-121, type I grade A class 2, and the wraps secured with tape conforming to A-A-883. The wrapped plugs shall be packaged together in a box conforming to grade 125 style RSC of ASTM D5118 domestic type, variety SW. The box shall be secured to engine under method 50 barrier, with tape conforming to A-A-883.
f. Unless otherwise specified, coolant systems shall be processed by preservative and drain procedure specified in 3.9.1. When specified (see 6.2), coolant systems shall be processed in accordance with 3.9.2.
g. Openings into engines, accessories, and dry charged batteries shall be left to provide for ventilation into interior surfaces.
h. An inspection window 4 inches by 8 inches shall be provided in barrier material in accordance with MIL-STD-2073-1 for those items preserved by method 53.
i. Preservation and consolidated packaging of repair parts, tools, publications, and disassembled components shall be as specified in 3.11.1.1.19 through 3.11.1.1.22.

3.11.1.4 <u>Type III preparation, method 20 (marine engines installed in equipment not to be packed in containers, and marine engines installed in equipment packed in containers)</u>. Engines and engine accessories shall be preserved in accordance with applicable requirements of 3.1 through 3.11.1.1.18 as follows:

a. When engines are installed in equipment to be packed in containers, the requirements of 3.11.1.2(a) and (c) shall be applicable.
b. Closed coolant systems of engines installed in equipment not to be packed in containers shall be processed by water and antifreeze procedure specified in 3.9.2.
c. Closed coolant systems for engines installed in equipment packed in containers shall be processed by preservative and drain procedure specified in 3.9.1.
d. After completion of engine preservation, raw water systems for all marine engines installed in equipment shall be flushed with compound conforming to grade 5 of

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MIL-PRF-16173. The excess preservative shall be drained. Drain valves and drain cocks shall be left open.

e. Preservation and consolidated packaging of repair parts, tools, publications and disassembled components shall be as specified in 3.11.1.1.17 through 3.11.1.1.22.

3.11.1.5 Type IV preparation, method 20 (spare engines - other than marine.) The engines shall be preserved in accordance with the applicable requirements of 3.1 through 3.11.1.1.18, and as follows:

3.11.1.5.1 Crankcases.

a. To preserve crankcases of air-cooled engines lubricated by adding lubricating oil to fuel, preservative lubricating oil conforming to grade 10, 30, or 50 as applicable of MIL-L-21260 shall be added to fuel in the ratio specified for normal operation. The engine shall be started and operated at fast idle until running smoothly. Engine shall then accelerated to 3/4 speed, without load, to assure coverage of all interior surfaces of the lubricating system.
b. To preserve air-cooled dry-sump engines which operate with no oil in crankcase, the plugs shall be removed from bottom of crankcases. The interior of crankcases shall be sprayed with oil conforming to grade 30 of MIL-L-21260 while rotating the engine crankshaft for three complete revolutions. Excess preservative shall be allowed to drain. Drain plug threads shall be coated with preservative lubrication oil specified herein, and drain plugs shall be reinstalled.
c. Preservative lubricating oil in other engine crankcases shall be drained if gross weight of engine, after being packed, is less than 1000 pounds. The drained preservative oil shall be used to preserve other lubricating systems but discarded if it shows evidence of contamination or discoloration.
d. Unless otherwise specified, the complete coolant systems shall be processed by the preservative and drain procedure specified in 3.9.1. When specified (see 6.2), coolant systems shall be processed in accordance with 3.9.2.

3.11.1.5.2 Openings. Large openings into engines caused by removal of components such as bell housings, shall have exposed bare metal surfaces coated with type P-11 preservative. The opening (including the preserved surfaces) shall be covered with barrier material conforming to type I grade A class 2 of MIL-B-121, secured in place with tape conforming to type IV of ASTM D5486 or type II of MIL-T-22085. Other openings caused by removal of components such as carburetors, air intakes, and other accessories shall have exposed bare metal surfaces coated with type P-11 preservative, and the coated surfaces covered with barrier material specified herein. The openings shall then be sealed with plastic caps or plugs, or tape as specified herein.

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3.11.1.5.3 Drive belts. Drive belts, if removed, shall be preserved in accordance with method 33. Preserved belts shall be secured to engine in a protected location or the belts shall be consolidated in packages as specified in 3.11.1.5.9.

3.11.1.5.4 Engines less clutch. Clutch contact surfaces, ring gear, and flywheel shall be coated with a thin film of primer conforming to TT-P-664.

3.11.1.5.5 Repair parts. Unless otherwise specified (see 6.2), the preservative application criteria and applicable methods of MIL-STD-2073-1 shall be used to preserve repair parts. When specified (see 6.2), repair parts shall be preserved and packaged in accordance with level A requirements of MIL-S-196.

3.11.1.5.6 Maintenance Tools. Maintenance tools shall be preserved in accordance with level A requirements of PPP-P-40.

3.11.1.5.7 Technical publications. Technical publications for each engine shall be preserved together, method 33 or 31.

3.11.1.5.8 Disassembled components. Components removed from engines shall be preserved as specified in 3.11.1.5.5 for repair parts. Parts requiring protection from mechanical and physical damage shall be packaged in boxes conforming to PPP-B-566, PPP-B-676, variety 2, ASTM D5118 class WR; styles, types, and grades of containers optional.

3.11.1.5.9 Consolidated packaging. The preserved repair parts, tools, publications, and disassembled components requiring additional protection shall be consolidated packaged as follows:

a. For engines to be packed in nailed wood and wood-cleated plywood boxes, the item shall be consolidated and packaged in close-fitting boxes conforming to W5c, W6c, or V3c of ASTM D5118, as applicable. After closure, fiber boxes shall be waterproof sealed with tape as specified for slotted style boxes in accordance with the appendix to box specifications.
b. For engines to be packed in crates, the items shall be consolidated and packaged close-fitting boxes conforming to style I or J of PPP-B-601, domestic type. Strapping of boxes will not be required.

3.11.1.6 Type IV preparation, submethod 53 and submethod 55 (spare engines other than marine). The engines shall be preserved as specified in 3.11.1.3 (a) through (h), and when applicable (i), in accordance with 3.11.1.5.5 through 3.11.1.5.9(a) or (b).

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3.11.1.7 Type V preparation, method 40 (spare marine engines). The engines and engine accessories shall be preserved and packaged in accordance with applicable requirements of 3.1 through 3.11.1.1.18, and 3.11.1.5 through 3.11.1.5.9. Coolant systems shall be processed in accordance with 3.11.1.5.1(d) or (e) as applicable.

3.11.1.8 Type V preparation, submethod 53 and submethod 55 (spare marine engines). The engines and engine accessories shall be preserved as specified in 3.11.1.3(a) through (h), and when applicable (i). Coolant systems shall be processed in accordance with 3.11.1.5.1 (d) or (e) as applicable.

3.11.2 Level B. Level B preservation shall be limited to the following types and methods of preparation for engines. The engines shall be preserved in accordance with applicable requirements of 3.1 through 3.10 and the following.

3.11.2.1 Type I, method 20.

3.11.2.1.1 Crankcases. Crankcases shall be preserved the same as level A (see 3.11.1.1.1).

3.11.2.1.2 Liquid coolant systems. The coolant systems shall be preserved the same as in level A (see 3.11.1.1.2).

3.11.2.1.3 Air cleaners. Air cleaners shall be preserved the same as level A (see 3.11.1.1.6).

3.11.2.1.4 Batteries and electrolyte. Batteries and electrolyte shall be preserved the same as level A (see 3.11.1.1.15).

3.11.2.1.5 Repair parts. Repair parts shall be preserved the same as in level A (see 3.11.1.1.19). When specified (see 6.2), repair parts shall be preserved level A in accordance with MIL-S-196.

3.11.2.1.6 Maintenance tools. Maintenance tools shall be preserved level B in accordance with PPP-P-40.

3.11.2.1.7 Technical publications. Technical publications shall be preserved the same as level A (see 3.11.1.1.21).

3.11.2.1.8 Consolidated packaging. Consolidated packaging of disassembled components, repair parts, tools, and publications for the engines shall be with other components of the equipment in which the engine is installed and shall be in accordance with level B

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requirements of end item specification for the equipment. If end item specification for equipment does not contain level B requirements, level A requirements shall apply.

3.11.2.2 Type II, method 20. Engines shall be preserved in accordance with level B requirements above (3.11.2.1.1 through 3.11.2.1.8 and 3.11.1.2a through d).

3.11.2.3 Type III, method 20. Engines shall be preserved in accordance with level B requirements above (3.11.2.1.1 through 3.11.2.1.8 and 3.11.1.4a through d).

3.11.2.4 Type IV, method 20. Engines shall be preserved in accordance with level B requirements above (3.11.2.1.1 through 3.11.2.1.8 except where the requirements contained in 3.11.1.5.1 and 3.11.1.5.7 through 3.11.5.9 apply).

3.11.2.5 Type V, method 20. Engines shall be preserved in accordance with level B requirements of 3.11.2.4 above except where requirements contained 3.11.1.5.1(d) or (e) apply.

3.11.3 Commercial. Unless otherwise specified (see 6.2), engines, repair parts, tools, and publications shall be preserved and packaged in accordance with ASTM D3951. Cooling systems shall be processed as specified in contract or order. When specified (see 6.2), the alternate requirements contained in paragraph 2.3.2 of ASTM D3951 shall apply.

3.12 Packing. Packing is not applicable to types I, II, or III preparation of engines (see 6.10). Packing shall be level A, B, or Commercial as specified for types IV and V preparation of engines (see 6.2).

3.12.1 Level A.

3.12.1.1 Engines not to exceed 1000 pounds. Unless specifically designed returnable container is furnished with engine, and engine is not preserved method 55, each engine with repair parts, tools, publications, and disassembled components, preserved and packaged as specified in 3.11.1.5, 3.11.1.6 (method 53), 3.11.1.7, 3.11.1.8 (method 55), and 3.11.1.9, as applicable, shall be packed conforming to PPP-B-601, military overseas type, style optional, or a box conforming to class 2, style 2, 2-1/2, 4, or style 7 (with hood) of PPP-B-621. Engines preserved by method 53 shall be secured to the base of container by bolting directly through barrier material. Engines preserved method 20 shall be blocked, braced, and anchored in accordance with MIL-STD-1186. Boxes (except style 7) exceeding 250 pounds gross weight shall be modified to include skids in accordance with the applicable box specification. Closure and strapping shall be in accordance with applicable box specifications. Strapping shall be zinc-coated, and on modified boxes, shall be placed parallel with and not over skids.

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3.12.1.2 Engines exceeding 1000 pounds. Unless specifically designed returnable container is furnished with engine, and the engine is not preserved by method 55; each engine with repair parts, tools, publications and disassembled components, preserved and packaged as specified in 3.11.1.5, 3.11.1.6 (method 55), 3.11.1.7, 3.11.1.8 (method 53) and 3.11.1.9, as applicable, shall be packed in crates conforming to MIL-C-104 type I class 1 or 2, style optional, or MIL-C-11264, type IV or V. Engines preserved by method 53 shall be secured to base of crate by bolting directly through barrier material. Engines preserved by method 10 shall be blocked, braced, and anchored in accordance with MIL-STD-1186. Closure shall be in accordance with applicable container specification using zinc coated strapping.

3.12.2 Level B. Engines preserved in accordance with 3.11.1.5 and 3.11.2.4, or 3.11.2.5 shall be packed as specified in 3.12.1.1 or 3.12.1.2 as applicable. Boxes shall be domestic type or class and zinc-coated strapping is not required.

3.12.3 Commercial. Unless specifically designed returnable container is furnished for engines, for engines, the engines with repair parts, tools, publications, and disassembled components shall be preserved and packaged in accordance with 3.11.1.5, 3.11.1.7, 3.11.1.8 (method 53), 3.11.2, 3.11.2.4, and 3.11.2.5, as applicable, in accordance with ASTM D3951. Containers shall be stacked for shipment and storage. In addition, engines preserved by method 53 shall be secured to base of rigid wood container by bolting directly through barrier material.

3.13 Marking.

3.13.1 Military. In addition to any special marking required and specified (see 6.2), packages and shipping containers shall be marked in accordance with MIL-STD-129.

3.13.2 Commercial. Marking for commercial preservation packaging and packing shall be in accordance with ASTM D3951.

3.14 Safety. All operations involving primers, paints, fuels, corrosion preventative compounds, etc., will be provided with adequate ventilation required by 1910.94 OSHA.

3.15 Workmanship. Workmanship shall provide maximum protection to engines by application of the procedures specified herein, as to prevent corrosion, deterioration, and mechanical or physical damage to engines during handling, shipment, and storage.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified, contractor is responsible for performance of all inspection requirements specified herein. Except as otherwise specified in the contract, contractor may use any facilities suitable for performance of inspection requirements

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specified herein, unless disapproved by the Government. The Government reserves the right to perform any inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Material inspection. Contractor is responsible for insuring that supplies and materials used are manufactured, examined, and tested in accordance with referenced specifications and standards.

4.2 Classification of inspections. Inspections shall be classified as follows:

a. First article (preproduction) pack inspections (see 4.3).
b. Quality conformance inspection (see 4.4).

4.3 First article (preproduction) pack inspection. When specified, the first article (preproduction) pack inspection shall be performed on the number of engines to be specified in the time frame required (see 3.10 and 6.2). The first article inspection (preproduction) shall consist of examination and test requirements which follow.

4.3.1 Examination. The preproduction pack shall be examined for defects listed in table I. Types I, II, and III preparation engines shall be examined as installed in the equipment. Types IV and V preparation engines shall be examined in three stages as specified in 4.4.1. One or more defects shall be cause for rejection of preproduction pack.

4.3.2 Tests. The preproduction pack types IV and V preparation engines for level A or B, except when packed in a specifically designed returnable container, shall be tested as follows:

4.3.2.1 Boxed engines not exceeding 1000 pounds. Boxed engines not exceeding 150 pounds shall be subjected to the free-fall drop tests in accordance with FED-STD-101 method 5007 procedure b and e. Any container with an item whose net weight exceeds 100 pounds and which is secured to a base within, or to the base of the container, shall be tested as an item exceeding 150 pounds as follows: Boxed engines exceeding 150 pounds shall be subjected to either pendulum-impact test (method 5012) or incline-impact test (method 5023); and either the edgewise rotation drop test (method 5008) or cornerwise rotational drop test (method 5005) of FED-STD-101.

4.3.2.2 Crated engines exceeding 1000 pounds. Unless otherwise specified, crated engines shall be tested as specified in paragraph 4.3.2.1 for boxed engines exceeding 150 pounds. When specified (see 6.2), crated engines shall be subject to guided-impact test (railroad car).

4.3.2.3 Basis for rejection. Shifting of contents, visible damage to engine, loosening or breaking of anchoring, blocking, or bracing within container shall be cause for rejection.

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4.3.3 Inspection of alternate preservative application procedures for preservation of combustion chambers and valves of compression-ignition engines (diesel and multifuel). The engine furnished by the contractor shall be operated until thoroughly warm. The engine shall then be preserved using the contractor's proposed procedure. The preservative lubricating oil used for this procedure shall contain an oil-soluble red dye. Upon completion of preservation, the engine shall be torn down sufficiently to allow for examination of the cylinder walls and valves. Examination shall be visual by wiping surfaces of cylinder walls, valve stems, and valve seats with white filter paper to determine whether all surfaces are completely coated with the preservative lubricating oil. If complete coverage is not evident, the procedure shall be rejected. If complete coverage is evident, the engine components shall be wiped clean of preservative oil, the engine reassembled, and the engine again preserved, using the proposed procedure. After engine has remained idle for 12 hours, the engine crankshaft shall be manually rotated until all pistons have completed a full cycle. Any evidence of hydrostatic lockup of the engine caused by an excessive amount of preservative in the combustion chambers and manifolds, shall be cause for rejection of the proposed procedure.

4.4 Quality conformance inspection.

4.4.1 Examination stages. Examination shall be in three stages as follows:

a. The first stage shall include inspection of procedures, methods, materials, containers, and marking of completely preserved engines for types I through V preparation engines.
b. The second stage shall include inspection of materials, marking, blocking, and bracing of types IV and V preparation engines prior to closing the shipping containers.
c. The third stage shall include inspection of materials, closure, strapping, and marking of closed containers containing types IV and V preparation engines.

4.4.2 Unit of product. For the purpose of inspection, a completely preserved engine installed in equipment for types I, II, and III preparation engines shall be considered a unit of product. For types IV and V preparation engines, a complete pack prepared for shipment shall be considered a unit of product.

4.4.3 Sampling. Unless otherwise specified (see 6.2), sampling for examination shall be in accordance with acceptable commercial standards.

4.4.4 Examination. Samples selected in accordance with 4.4.3 shall be examined for defects marked "X" in table II.

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TABLE II. Classification of defects.

Category	Defect	Level A	Level B	Level 1/
101	Materials, methods, and containers not as specified. Each incorrect material, method, or container shall constitute one defect (see 3.1, 3.2, 3.11.1.1, 3.11.1.2, 3.11.1.3, 3.11.1.4, 3.11.1.5, 3.11.1.6, 3.11.1.7, 3.12.1.1, and 3.12.1.2).	X	X	X
102	Tags not waterproofed for preparation type I and type III when required (see 3.1.1).	X		
103	Surfaces not cleaned as specified or not dried as specified (see 3.3).	X		
104	Damaged surfaces not repainted as specified (see 3.4).	X		
105	Disassembly not as specified (see 3.5).	X		
106	Matchmarking not as specified (see 3.6).	X		
107	Depreservation guides not prepared as specified (see 3.7).	X		
108	Amount of preservative oils applied to combustion chambers and valves excessive (see 3.8).	X		
109	Coolant systems not preserved as specified or tagged as specified (see 3.9.1, 3.9.1.1, and 3.9.2).	X		
110	Crankcases not preserved as specified or filler tube not tagged as specified (see 3.11.1.1.1(a), (b), and (c)).	X		
111	Coolant systems not preserved by applicable procedure as specified (see 3.11.1.1.1).	X		
112	Fuel systems of gasoline engines not preserved as specified (see 3.11.1.1.3.1.1 and 3.11.1.1.3.2.1), when applicable.	X		
113	Combustion chambers and valves of gasoline engines not preserved as specified (see 3.11.1.1.3.1.2 and 3.11.1.1.3.2.2), when applicable.	X		
114	Spark plug threads not coated with preservative oil prior to reinstallating (see 3.11.1.1.3.1.2).	X		
115	Engines not tagged as specified (see 3.11.1.1.3.1.2).	X		
116	Valve mechanisms not preserved as specified or defective gaskets not replaced as specified (see 3.11.1.1.4.3).	X		
117	Fuel systems of compression-ignition engines not preserved as specified (see 3.11.1.1.4.1.1(a), (b), (c), and 3.11.1.4.3.1), when applicable.	X		
118	Combustion chambers and valves of compression-ignition engines not preserved as specified (see 3.11.1.1.4.1.2.1 through 3.11.1.1.4.1.2.3 and 3.11.1.1.4.3.2), when applicable.	X		
119	Manifold gaskets, rocker arm covers, or air box cover gaskets not replaced when defective (see 3.11.1.1.4.1.2.1 through 3.11.1.1.4.1.2.3 and 3.11.1.1.4.3.2), when applicable.	X		
120	Engines not tagged as specified (see 3.11.1.1.4.1.2.1 through 3.11.1.1.4.1.2.3 and 3.11.1.1.4.3.2), when applicable.	X		
121	Air intakes not preserved as specified (see 3.11.1.1.5 through 3.11.1.1.5.2), when applicable.	X		

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TABLE II. Classification of defects - Continued.

Category	Defect	Level A	Level B	Level 1/
122	Air cleaners not preserved as specified (see 3.11.1.1.6.1 and 3.11.1.1.6.2).	X		
123	Air cleaners not sealed with tape as specified (see 3.11.1.1.6.3).	X		
124	Exhaust systems not cleaned of rust and scale or not preserved as specified (see 3.11.1.1.7 and 3.11.1.1.7.1), when applicable.	X		
125	Vertical exhaust stacks not sealed, if not equipped with rain caps (see 3.11.1.1.7).	X		
126	Rain caps not secured to prevent opening (see 3.11.1.1.7).	X		
127	Vertical exhaust stacks not removed when reduction in cube is desired (see 3.11.1.1.7).	X		
128	Uncoated fuel tanks not preserved as specified (see 3.11.1.1.8.1 and 3.11.1.1.8.2).	X		
129	Preservative for preserving fuel tanks contaminated beyond specified limits (see 3.11.1.1.8.2).	X		
130	Fuel cap vent holes not sealed as specified (see 3.11.1.1.8.3).	X		
131	Air compressors not preserved as specified or air cleaners not sealed as specified (see 3.11.1.1.9).	X		
132	Dry-type governor mechanisms not sprayed with preservative or coated with preservative as specified (see 3.11.1.1.10).	X		
133	Tachometer adapter not removed, coated with preservative, or reinstalled as specified (see 3.11.1.1.11).	X		
134	Drive belts not released from tension, or pulley grooves not coated with primer as specified (see 3.11.1.1.12).	X		
135	Flywheel ring gear not coated with primer when disassembly of clutch is specified (see 3.11.1.1.13).	X		
136	Components of clutches not coated with primer, not coated with preservative, or clutches not disengaged as specified (see 3.11.1.1.14).	X		
137	Starters and generators not coated with primer as specified (see 3.11.1.1.16).	X		
138	Battery cables not disconnected or secured to battery compartment as specified (see 3.11.1.1.15).	X		
139	Filler openings of batteries not moisture sealed as specified (see 3.11.1.1.15).	X		
140	Batteries and electrolyte not preserved as specified (see 3.11.1.1.15).	X		
141	Engine openings not sealed as specified (see 3.11.1.1.17).	X		
142	Red warning tag not prepared or attached near engine “Start” controls as specified (see 3.11.1.1.18).	X		
143	Crankcases of engines to be installed in equipment to be packed in containers not drained as specified (see 3.11.1.2(a)).	X		
144	Oil-bath type air cleaners of engines installed in equipment to be packed in containers not drained as specified (see 3.11.1.2(c)).	X		
145	Crankcases not drained when applicable, when method 50 is specified (see 3.11.1.3(a)).	X		

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TABLE II. Classification of defects - Continued.

Category	Defect	Level A	Level B	Level 1/
146	Valve cover plates and air box covers not removed when method 50 is specified (see 3.11.1.3(d)).	X		
147	Spark plugs not removed when applicable, threads not coated with preservative, or plugs not packaged as specified (see 3.11.1.3(e)).	X		
148	Openings into engines not left open to provide for ventilation (see 3.11.1.3(g)).	X		
149	Inspection window not provided in barrier (see 3.11.1.3(h)).	X		
150	Raw water systems of marine engines not flushed with preservative as specified (see 3.11.1.4(d)).	X		
151	Crankcases of spare engines not preserved as specified (see 3.11.1.5.1(a), (b), and (c)).	X		
152	Coolant systems of spare engines not preserved as specified (see 3.11.1.5.1(d).	X		
153	Openings into spare engines not sealed as specified (see 3.11.1.5.2).	X		
154	Removed drive belts not packaged as specified (see 3.11.1.5.3).	X		
155	Clutch contact surfaces, ring gears, and flywheels not coated with primer on engines (less clutch) (see 3.11.1.5.4).	X		
156	Consolidated packaging not as specified (see 3.11.1.5.9(a) or (b)).	X		
157	Consolidated containers not waterproof sealed with tape as specified (see 3.11.1.5.9(a)).	X		
158	Crankcases not preserved as specified (see 3.11.2.1.1).		X	
159	Coolant system not preserved as specified (see 3.11.2.1.2).		X	
160	Air cleaners not preserved as specified (see 3.11.2.1.3).		X	
161	Batteries and electrolyte not preserved as specified (see 3.11.2.1.4).		X	
162	Repair parts not preserved as specified (see 3.11.2.1.5).		X	
163	Maintenance tools not preserved as specified (see 3.11.2.1.6).		X	
164	Technical publications not preserved as specified (see 3.11.2.1.7).		X	
165	Consolidated packaging not as specified (see 3.11.2.1.8).		X	
166	Engines preserved method 50 not secured to base of container as specified (see 3.12.1.1, 3.12.1.2, 3.12.2, and 3.12.3).	X	X	X
167	Strapping not zinc-coated (see 3.12.1.1 and 3.12.1.2).	X		
168	Marking illegible, incomplete, incorrect (see 3.13).	X	X	X

1/ Commercial level.

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5 PACKAGING

Section not applicable to this purchase description.

6. NOTES

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

6.1 Intended use. This purchase description is intended to be used for the preservation, packing, and marking of internal combustion engines (except aircraft and engines installed in tactical and combat vehicles). It is to be used for reference in Section 5 of end item specifications for direct reference in contracts or purchase orders, and can be used for preparation of packaging data sheets.

6.2 Ordering data. Acquisition documents should specify the following:

a. Title, number, and date of this purchase description.
b. Type of preparation and method required (see 1.2).
c. If depreservation guide forms are other than specified (see 3.7).
d. If a preproduction pack is required, the number required and the time frame required for the submission of preproduction pack.
e. Level of preservation required (see 3.11).
f. If upper crankcase is to be sprayed with corrosion inhibiting oil (see 3.11.1.1.1(c)).
g. Procedure to be utilized to process coolant systems (see 3.11.1.1.2).
h. Fuel systems, combustion chambers, and valves of spark ignition engines are to be processed by procedure specified (see 3.11.1.1.3.2).
i. If fuel systems, combustion chambers, and valves of compression ignition engines are to be processed by alternate method (see 3.11.1.1.4.3).
j. If air intake is to be processed by alternate method (see 3.11.1.1.5).
k. If interior of the air cleaners above the operating level is required to be sprayed with corrosion inhibiting oil (see 3.11.1.1.6.1 and 3.11.1.1.6.2).
l. If exhaust systems are to be processed as specified (see 3.11.1.1.7.1).
m. If tension relief of drive belts is not required (see 3.11.1.1.12).
n. If disassembly of the clutch is required (see 3.11.1.1.13 and 3.11.1.1.14).
o. If batteries are to be packed in accordance with PPP-B-140 (see 3.11.1.1.15).
p. If repair parts are to be processed in accordance with MIL-S-196 and level of protection required (see 3.11.1.1.19, 3.11.1.5.5, and 3.11.2.1.5).
q. If the alternate requirements of paragraph 2.3.2 of ASTM D3951 apply (see 3.11.3).

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r. Level of packing requirements for type IV and type V preparation engines (see 3.12).
s. If special marking is required (see 3.13).
t. If starters and generators require an interior electrical primer and the type of primer required (see 3.11.1.1.16).
u. If the guided impact test (railroad car) is required (see 4.3.2.2).

6.3 First article. First article samples shall be tested and approved under the appropriate provisions of 7-104.55 of the Defense Acquisition Regulation. The contracting officer should include specific instructions in all acquisition instruments regarding arrangements for examination, tests and approval of the first article (see 3.10).

6.4 Repainting requirements. Repainting requirements (see 3.4) are intended to apply only in those cases where the painting requirements of the end item specification would not otherwise be applicable, such as on separate packaging contracts, or in Government Depot operations.

6.5 Depreservation guides. The contracting officer should arrange to furnish the necessary copies of DA form 2258 or DD form 1397 when requested by the contractor (see 3.7).

6.6 Preproduction pack. Any changes or deviations of production packs from the approved preproduction pack will be subject to the approval of the contracting officer. Approval of the preproduction pack will not relieve the contractor of his obligation to preserve, package, pack, and mark the engines in accordance with this specification (see 3.10).

6.7 Alternate preservative procedures. The use of other preservative application procedures for preservation of combustion chambers and valves of compression-ignition engines (see 3.11.1.1.4.2) has been added due to certain design features of certain engines that make it possible to achieve complete preservation coverage of combustion chambers and valves without removing the intake and exhaust manifolds.

6.8 Preservative oil contamination. The percentage of fuel oil contained in preservative oil which has been used to preserve fuel tanks (see 3.11.1.1.8.2) may be determined within practical limits by use of American Petroleum Institute hydrometers and control specimens of known dilution.

6.9 Packing of types I, II, and III preparation engines. Packing of types I, II, and III engines (see 3.12) should be in accordance with the packing provisions of the end item specification for equipment in which the engine is installed.

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6.10 Recycled materials. The use of recycled materials which meet the requirements of the applicable material specifications without jeopardizing the intended use of the item shall be encouraged (see 3.1).

6.11 Changes from previous issue. Asterisks are not used in this revision to identify changes with respect to the previous issue, due to the extent of changes.

6.12 Detail references. As an aid in using this document to preserve any one specific preservation type and method engine, the following references in tables III through XIII will indicate paragraphs applicable to each specific type:

TABLE III. Requirements common to all preparation.

Items	Paragraphs
Materials	3.1, 3.1.1, 3.1.2, & 3.1.3
Methods of preservation	1.2 & 3.2
Cleaning and drying	3.3
Repainting	3.4
Disassembly	3.5
Matchmarking	3.6
Depreservation guides	3.7
Preservation formula	3.8 (a), (b), (c), & (d)
Preproduction pack	3.10
Marking 1/	3.13
Workmanship	3.15
Responsibility for inspection	4.1
Material inspection	4.1.1
Classification of inspection	4.2 (a) & (b)
Preproduction pack inspection	4.3
Examination	4.3.1
Inspection of alternate preservation procedures for compression-ignition engines	4.3.3
Quality conformance inspection	4.4
Inspection stage one	4.4.1 (a)
Sampling for examination	4.4.3
Examination	4.4.4 & table I

1/ Waterproofing of tags (3.1.1) applicable only to preparation types I and III engines not to be packed in container.

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TABLE IV. Preparation, type I engines preserved method 20.

Items	Paragraphs
Crankcases:	
a. Spark-ignition and compression-ignition engines operating at output level up to 150 bmep	3.11.1.1.1(a)
b. Compression-ignition engines operating at output level over 150 bmep	3.11.1.1.1(b)
c. Additional crankcase preservation	3.11.1.1.1(c)
Coolant systems	3.11.1.1.2
Fuel systems:	
a. Spark-ignition engines with carburetors	3.11.1.1.3.1.1(a)
(1) Other procedures, spark-ignition engines with carburetors	3.11.1.1.3.2.1(a)
b. Spark-ignition engines with fuel injectors	3.11.1.1.3.1.1(b)
(1) Other procedures, spark-ignition engines with fuel injectors	3.11.1.1.3.2.1(b)
c. Compression-ignition engines	3.11.1.1.4.1
(1) Gasoline starting engines	3.11.1.1.4.1.1(a)
(2) Straight diesel and multifuel engines	3.11.1.1.4.1.1(b)
(3) Gasoline starting (pony) engines	3.11.1.1.4.1.1(c)
(4) Other procedures, compression-ignition engines	3.11.1.1.4.3
Combustion chambers and valves:	
a. Spark-ignition engines	3.11.1.1.3
(1) Other procedures, all spark-ignition engines	3.11.1.1.3.2
b. Compression-ignition engines	3.11.1.1.4.1.2
(1) Four cycle, gasoline starting	3.11.1.1.4.1.2.1
(2) Four cycle, straight diesel or multifuel with compression release start feature	3.11.1.1.4.1.2.2(a)
(3) Four cycle, straight diesel or multifuel without compression release start feature	3.11.1.1.4.1.2.2(b)
(4) Two cycle engines with intake ports and valves	3.11.1.1.4.1.2.3(a)
(5) Two cycle engines without valves	3.11.1.1.4.1.2.3(b)
(6) Alternate procedures for all diesel and multifuel engines	3.11.1.1.4.2
(7) Other procedures for all diesel and multifuel engines	3.11.1.1.4.3
Valve mechanisms: Spark-ignition engines	3.11.1.1.3.3
Air intake:	3.11.1.1.5
a. Air intake systems with blowers	3.11.1.1.5.1
b. Air intake systems with either supercharger or turbocharger	3.11.1.1.5.2
Air cleaners:	
a. Oil-bath type	3.11.1.1.6.1
b. Dry-type	3.11.1.1.6.2
c. Sealing	3.11.1.1.6.3

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TABLE IV. Preparation, type I engines preserved method 20 - Continued.

Items	Paragraphs
Exhaust systems:	3.11.1.1.7
a. Exhaust systems on engines without a supercharger or turbocharger	3.11.1.1.7.1.1
b. Exhaust systems on engines with a supercharger or turbocharger	3.11.1.1.7.1.2
Uncoated fuel tanks:	3.11.1.1.8
a. Tanks without baffles	3.11.1.1.8.1
b. Tanks with baffles	3.11.1.1.8.2
c. Fuel cap vent holes	3.11.1.1.8.3
Air compressors	3.11.1.1.9
Dry-type governors	3.11.1.1.10
Tachometer drive adapter	3.11.1.1.11
Drive belts	3.11.1.1.12
Flywheel ring gear	3.11.1.1.13
Clutch (disc-type), dry-type	3.11.1.1.14
Batteries and electrolyte	3.11.1.1.15
Starters and generators	3.11.1.1.16
Engine openings	3.11.1.1.17
Warning tag	3.11.1.1.18
Repair parts	3.11.1.1.19
Maintenance tools	3.11.1.1.20
Technical publications	3.11.1.1.21
Consolidated packaging	3.11.1.1.22

TABLE V. Preparation, type II engines preserved method 20.

Items	Paragraphs
All engines	3.11.1.2
Crankcases	3.11.1.2(a)
Liquid coolant systems	3.11.1.2(b)
Oil-bath type air cleaners	3.11.1.2(c)
Repair parts, tools, publications, and disassembled components	3.11.1.2(d)

TABLE VI. Preparation, type II engines preserved submethod 53 or 55.

Items	Paragraphs
All engines	3.11.1.3
Crankcases	3.11.1.3(a)
Fuel Systems	3.11.1.3(b) & (b)-1, 3.11.1.3(b)-2
Combustion chambers & valves:	
a. Spark-ignition engines	3.11.1.3(c)-1
b. Compression-ignition engines	3.11.1.3(c)-2

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TABLE VI. Preparation, type II engines preserved submethod 53 or 55.

Items	Paragraphs
Valve compartment cover plates & air box access cover plates	3.11.1.3(d)
Spark plugs	3.11.1.3(e)
Coolant systems	3.11.1.3(f)
Engine openings	3.11.1.3(g)
Inspection window	3.11.1.3(h)
Repair parts, tools, publications, & disassembled components	3.11.1.3(i)

TABLE VII. Preparation, type III engines preserved method 20.

Items	Paragraphs
All engines	3.11.1.4
Engines installed in equipment to be packed in containers	3.11.1.4(a) & (c)
Coolant systems:	
a. Coolant systems of engines installed in equipment not to be packed in containers	3.11.1.4(b)
b. Coolant systems of engines installed in equipment to be packed in containers	3.11.1.4(c)
c. Raw water systems	3.11.1.4(d)
Repair parts, tools, publications, & disassembled components	3.11.1.4(e)

TABLE VIII. Preparation, type IV engines preserved method 20.

Items	Paragraphs
All engines	3.11.1.5
Crankcases:	
a. Engines lubricated by fuel & oil mixture	3.11.1.5.1(a)
b. Dry-sump engines	3.11.1.5.1(b)
c. Wet-sump engines	3.11.1.5.1(c)
Coolant systems:	
a. Complete systems	3.11.1.5.1(d)
b. Partial systems	3.11.1.5.1(e)
Engine openings	3.11.1.5.2
Drive belts	3.11.1.5.3
Engines less clutch	3.11.1.5.4
Repair parts	3.11.1.5.5
Maintenance tools	3.11.1.5.6
Technical publications	3.11.1.5.7
Disassembled components	3.11.1.5.8
Consolidated packaging:	
a. For engines to be packed in nailed wood or wood-cleated plywood boxes	3.11.1.5.9(a)
b. For engines to be packed in crates	3.11.1.5.9(b)

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TABLE IX. Preparation, type IV engines preserved submethod 53 or 55.

Items	Paragraphs
All Engines	3.11.1.6

TABLE X. Preparation, type V engines preserved method 20.

Items	Paragraphs
All engines	3.11.1.7
Coolant system	3.11.1.7(a)

TABLE XI. Preparation, type V engines preserved submethod 53 and 55.

Items	Paragraphs
All engines	3.11.1.8
Coolant systems	3.11.1.8(a)

TABLE XII. Packing of preparation types I, II, and III engines.

Items	Paragraphs
All engines	3.12

TABLE XIII. Packing of preparation types IV and V engines preserved method 20, submethod 53, and submethod 55.

Items	Paragraphs
Level A	3.12.1
a. Engines not to exceed 1000 pounds	3.12.1.1
1. Inspection stages	4.3.1
2. Tests	4.3.2.1
3. Basis for rejection	4.3.3
b. Engines exceeding 1000 pounds	3.12.1.2
1. Inspection stages	4.3.1
2. Tests	4.3.2.2
3. Basis for rejection	4.3.3
Level B	3.12.2
Commercial	3.12.3

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