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MILITARY SPECIFICATION

BREAKERS, PAVING, GASOLINE-POWERED, SELF-CONTAINED

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

1. SCOPE

1.1 Scope. This specification covers a self-contained, gasoline-engine-driven multi-purpose paving breaker-driver-sinker drill.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications and standards. Unless otherwise specified (see 6.2), the following specifications and standards of the issue listed in that issue of the Department of Defense Index of Specifications and Standards (DoDISS) specified in the solicitation form a part of this specification to the extent specified herein.

SPECIFICATIONS

FEDERAL

P-C-444	- Cleaning Compound, Solvent Soluble, Grease Emulsifying.
PPP-B-601	- Boxes, Wood, Cleated-Plywood.
PPP-B-636	- Boxes, Shipping, Fiberboard.
PPP-P-40	- Packaging and Packing of Hand Tools.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: USA Belvoir Research and Development Center, ATTN: STRBE-DS, Fort Belvoir, VA 22060 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

MILITARY

MIL-P-116	- Preservation, Methods of.
MIL-B-121	- Barrier Material, Greaseproofed, Waterproofed, Flexible.
MIL-V-173	- Varnish, Moisture-and-Fungus-Resistant, (for the Treatment of Communications, Electronic, and Associated Electrical Equipment).
MIL-P-514	- Plates, Identification Instruction and Marking Blanks.
MIL-T-704	- Treatment and Painting of Materiel.
MIL-L-2104	- Lubricating Oil, Internal Combustion Engine (Heavy Duty).
MIL-G-3056	- Gasoline, Automotive, Combat.
MIL-E-10062	- Engines: Preparation for Shipment and Storage of.
MIL-G-10924	- Grease, Automotive and Artillery.
MIL-C-12044	- Chests, Plywood.
MIL-P-19834	- Plate, Identification, Metal Foil, Adhesive Backed.
MIL-G-20241	- Gasket Material, Wool Felt, Impregnated, Adhesive, Pressure-Sensitive.
MIL-T-22085	- Tape, Pressure Sensitive, Adhesive, Preservation and Sealing.
MIL-L-46167	- Lubricating Oil, Internal Combustion Engine, (Arctic).
MIL-E-52929	- Enamel, Alkyd, Camouflage, Flash Dry.
MIL-S-81733	- Sealing and Coating Compound, Corrosion Inhibitive.

STANDARDS

MILITARY

MIL-STD-105	- Sampling Procedures and Tables for Inspection by Attributes.
MIL-STD-129	- Marking for Shipment and Storage.
MIL-STD-130	- Identification Marking of US Military Property.
MIL-STD-461	- Electromagnetic Interference Characteristics Requirements for Equipment.
MIL-STD-889	- Dissimilar Metals.
MIL-STD-1186	- Cushioning, Anchoring, Bracing, Blocking and Waterproofing; with Appropriate Test Methods.
MIL-STD-1188	- Commercial Packaging of Supplies and Equipment.
MIL-STD-1472	- Human Engineering Design Criteria for Military Systems, Equipment and Facilities.
MIL-STD-1474	- Noise Limits for Army Materiel.

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

2.2 Other publications. The following document(s) form a part of this specification to the extent specified herein. The issues of the documents which are indicated as DoD adopted shall be the issue listed in the current DoDISS and the supplement thereto, if applicable.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

S5.1 - Test Code for the Measurement of Sound from Pneumatic Equipment.

(Application for copies should be addressed to the American National Standards Institute, Inc., 1430 Broadway, New York, NY 10018.)

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE)

SAE Handbook

(Application for copies should be addressed to the Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, PA 15086.)

(Industry association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, the text of this specification shall take precedence.

3. REQUIREMENTS

3.1 Description. The breaker shall be a hand-operated and controlled two cycle-gasoline-engine driven multipurpose unit. The unit shall be capable of performing the following functions (1) breaking, (2) drilling, (3) tamping, (4) driving stakes, earth anchors and grounding rods (5) digging hardened soils and frozen ground and (6) cutting asphalt. The unit shall be referred to as a breaker and shall consist essentially of a light-weight power unit, controls, housing, and a front head equipped with a chuck for collared-shank tools. The breaker shall produce compressed air internally for use in drilling. The breaker shall be the current commercial production model of a standard product and except for product improvements which have been incorporated in the commercial production units, shall have been marketed and fielded for use continually in the exact configuration with all components to be furnished for at least one year prior to opening of technical proposal or bid. The breaker shall have proven wide spread commercial usage experience and acceptance in most types of geographic areas, climatic conditions and altitudes. The breaker shall be equipped with all components necessary to enable the breaker to function

reliably and efficiently in a sustained operation. The breaker shall conform to all federal laws and regulations governing, safety, noise levels, and pollution which are in effect on date of bid.

3.2 First article. The contractor shall furnish one or more breakers for examination and testing within the time frame specified (see 6.2) to prove prior to starting production, that his production methods and choice of design detail will produce breakers that comply with the requirements of this specification. Examination and tests shall be as specified in section 4 and unless otherwise specified herein, all examinations and tests shall be conducted by the contractor subject to surveillance and approval by the Government (see 6.3). When specified (see 6.2), the Government will conduct any or all of the preproduction examination and tests, as specified.

3.3 Length. The length, less attachment, shall be not more than 30 inches (76.2cm).

3.3.1 Width. The width shall be not more than 18 inches (45.72cm).

3.4 Weight. The dry weight of the breaker without tools attached shall be not more than 65 pounds (29.48 kilograms).

3.5 Interchangeability. All parts having the same manufacturer's part number shall be interchangeable with each other with respect to installation and performance.

3.6 Materials. Material shall be as specified herein. Material not specified shall be selected by the contractor and shall be subject to all provisions of this specification (see 6.8).

3.6.1 Material deterioration and control. The breaker shall be made from compatible materials that are inherently corrosion resistant or treated in order to provide protection against the various forms of corrosion and deterioration that may be encountered in any of the applicable storage or operating environment to which the item may be exposed.

3.6.1.1 Dissimilar metals. Dissimilar metals, as defined in MIL-STD-889, shall be electrically insulated from one another to minimize or prevent galvanic corrosion. Insulation shall be provided by an insulating barrier of corrosion inhibiting sealant conforming to MIL-S-81733 or chromate tape conforming to MIL-G-20241. Protection against any galvanic corrosion could also be obtained by exclusion of the electolyte, if feasible.

3.6.1.2 Identification of materials and finishes. The contractor shall identify the specific material, material finish or treatment for use with components and sub-components, and shall make information available, upon request by the contracting officer or designated representative (see 6.2).

3.7 Operating temperature requirements. The breakers shall operate as specified herein in any ambient temperature from plus 120° F to minus 25° F.

3.8 Safety and human factors. The characteristics of the breaker configuration shall provide for operation by personnel ranging from the small man, clothed, through large man, arctic and NBC (see 3.8.2) clothed, in accordance with SAE J833 and MIL-STD-1472. All exposed parts which are subject to high operating temperatures or which are energized electrically shall be insulated, enclosed, or guarded. All moving parts which are of such nature or so located as to be a hazard to operating or maintenance personnel shall be enclosed or guarded. Protective devices shall not impair operating functions.

3.8.1 Sound level. The sound level at the operator's station shall not exceed category D of MIL-STD-1474 [85 dB(A)] when measured in accordance with ANSI S5.1. Reference level is 20 MPa.

3.8.2 Nuclear-biological-chemical (NBC) protection. Unless otherwise specified the breaker shall be operable by personnel wearing the following complete protective ensemble (see 6.2).

a. Chemical-biological mask, 4240-00-926-4200.
b. Chemical-biological hood, 4240-00-999-0420.
c. Chemical protective suit, 8415-00-407-1062.
d. Chemical protective glove set, 8415-01-033-3519.
e. Chemical protective footwear, 8430-01-021-5978.

The operator shall be capable of actuating all controls (i.e., levers, switches, knobs and handles) without interference caused by the ensemble that is detrimental to the operation of the breaker. The protective ensemble, as listed above, shall be furnished as Government furnished equipment (GFE) in order to permit performance of the tests.

3.9 Ease of maintenance. All major assemblies shall be accessible for maintenance, repair, and replacement. Each maintenance, assembly, or disassembly operation performed as a result of testing in accordance with 4.5.2 shall be accomplished by one man using common tools and tools furnished with the breaker.

3.10 Gasoline-engine-drive.

3.10.1 Power unit. The power unit shall be a lightweight, air-cooled, 2-cycle gasoline engine. The engine shall develop sufficient power to enable the breaker to meet all performance requirements specified herein.

3.10.2 Fuel system. The engine shall be equipped with a fuel system which enables the machine to operate in any position from vertical through horizontal. The fuel system shall be equipped with a fuel strainer at the fuel inlet. The fuel tank shall be provided with a fuel shut-off valve.

3.10.3 Fuel tank. The fuel tank shall be cast or molded non-corrosive type material. The fuel capacity of the tank shall be not less than 1.4 quarts (1.32 liters). Construction and mounting of the fuel tank shall be such that neither vibration nor excessive tightening of the mounting provisions (when used) will

cause leaks. The fill-opening cap shall have a leakproof vent to enable positioning of the breaker from the verticle to the horizontal in all positions without leakage. The manufacturer's recommended mixture of gasoline and oil shall be on an instruction plate or permanently marked on the breaker or cap.

3.10.4 Air cleaner. The air inlet shall be fitted with an air cleaner to prevent the entrance of dirt and dust into the engine. The filter element shall be accessible and removable without the use of special tools, and shall be reusable. Cleaning shall be accomplished by the use solvents conforming to P-C-444, by air or soap and water.

3.10.5 Ignition system. When a flywheel magneto is used, the flywheel shall be keyed or doweled to preclude incorrect position on the crankshaft. Ignition wiring shall be secured to prevent chafing from vibration or moving parts. The use of electronic ignition systems are encouraged in complying with this specification.

3.10.6 Controls. The breaker shall be equipped with a throttle control. The throttle control shall be operated without removing the hands from the breaker handles. The control for engaging and disengaging the rotation mechanism and the hammer shall be a built-in capability.

3.10.7 Exhaust deflector. The engine shall be equipped with an exhaust deflector to direct the exhaust gases away from the operator.

3.10.8 Cranking system. Cranking shall be accomplished manually by means of an automatic rewind starter.

3.11 Front head assembly. The front head assembly shall consist essentially of a housing, chuck, and tool steel retainer, and shall permit rapid removal and replacement of tool steels.

3.11.1 Tool steel retainer. The tool steel retainer shall be constructed of forged or spring steel and shall be secured on the front head housing with vibration-cushioned bolts or pins, or by a spring-locked lever.

3.12 Oil can. When specified (see 6.2) a graduated reusable oil can shall be provided, to permit ease of measuring the correct amount of oil for the gasoline and oil mixture. The size shall not exceed 1 quart (.95 liters).

3.13 Electromagnetic interference. The electromagnetic interference emission of the breaker shall conform to MIL-STD-461, tactical and special purpose vehicles and engine driven equipment.

3.14 Lubricants. The breaker shall operate as specified herein when lubricated with military lubricants conforming to MIL-G-10924, MIL-L-2104 and MIL-46167 (see 6.4).

3.15 Fungus and moisture resistance. The electrical circuitry, including all components and connections except as specified below, shall be protected from the effects of moisture and fungus growth by an overall treatment with a varnish

conforming to MIL-V-173 except that 1 percent copper 8-quinolinolate (by weight) based on the nonvolatile content of the varnish shall be used in lieu of salicylanilide, the specified fungitoxicant.

a. Components or circuit elements that are inherently fungus and moisture resistant or which are hermetically sealed need not be treated.
b. Components or circuit elements whose functions will be adversely affected by the varnish coating shall not be treated.

When used, the varnish shall be applied by spray, brush, or a combination of both to give a minimum dry-film thickness of 1 mil to component or element surfaces previously cleaned and prepared so that the surfaces are free from all foreign matter which would interfere with the adherence or function of the varnish.

3.16 Identification marking. The breaker shall be identified in accordance with MIL-STD-130. The identification plate shall conform to MIL-P-514, type III, composition C of type I, grade A, class I material, plates shall be attached by screws, bolts, or rivets in a location where the plate shall be both visible and legible.

3.17 Instruction plates. The breaker shall be equipped with an instruction plate describing the procedure to be followed in operating and servicing the breaker.

3.18 Fuel mix. The gasoline engine shall use gasoline fuel conforming to MIL-G-3056 and lubricating oil conforming to MIL-L-2104. The gasoline and oil mixture shall be in accordance with the manufacturer's recommendation.

3.19 Treatment and painting. The portions of the breaker and accessories normally painted shall be cleaned, treated, and painted in accordance with MIL-T-704, type A, color as specified. Anodized surfaces shall not be painted. Unless otherwise specified (see 6.2), the finishing coat shall be lusterless forest green in accordance with MIL-E-52929, type II.

3.20 Maintenance characteristics. Unless otherwise specified (see 6.2), the repair, replacement, periodic inspection, and servicing of components and assemblies that require periodic maintenance shall be accomplished with the use of common hand tools and without the need for special tools or special equipment. Special tools are defined as tools that are not available to the user of this equipment.

3.21 Carrying case. Unless otherwise specified (see 6.2), the breaker, accessories oil can, technical publications, repair parts, and maintenance tools shall be enclosed in a carrying case (chest) conforming to MIL-C-12044. The chest shall hold the contents in place during transit.

3.22 Performance. The force of blow of the breaker shall be not less than 22 foot-pounds (29.82 newton meters) per blow under vertical operating conditions with no extra force applied on top of the breaker. The piston speed at no load

shall be not less than 2500 blows per minute. The breaker allowing one refilling of the fuel tank shall operate continuously for 1.5 hours (90 minutes) breaking either asphalt or concrete pavement. The breaker shall operate in all positions from the vertical to the horizontal. The conversion changeover from breaker to sinker drill shall be completed, without the addition or removal of any parts, in not more than 20 seconds. When drilling in Barre granite with a 1.5-inch diameter, 4-point, carbide insert detachable bit with an H type thread, the minimum average drilling rate shall be 4 inches (10.2 cm) per minute for holes up to 25-inch (63.5 cm) depths (excluding 1-inch- [2.54 cm]) deep starter hole).

3.22.1 Blowing air. The breaker shall produce and deliver sufficient cubic feet (cu meter) of free air per minute, and at a pressure to clear chips from the bit while drilling and clean the holes specified herein of chips and dust.

3.22.2 Rotating mechanism. The rotating mechanism shall provide automatic counterclockwise rotation of the tool-steel chuck.

3.22.3 Chuck. The tool-steel chuck shall be dimensioned to receive standard tool steels having collared hexagon shanks 7/8 inch across the flats by 4-1/4 inches. The hexagonal opening for receiving the tool steel shall be not less than 0.884 inch nor more than 0.892 inch between flats.

3.22.4 Accessories. When specified (see 6.2), the following accessories shall be furnished with each breaker. All measurement of length shall be taken from under the collar of the tool.

a. Narrow chisel - not less than 1 inch wide and 11 inches long.
b. Moil point - not less than 11 inches long.
c. Asphalt chisel - not less than 3 inches wide and 11 inches long.
d. Spade - not less than 4 inches wide and 16 inches long.
e. Tamping rod and pad - not less than 6 inches long and not less than 5 inches square.
f. Drill integral - not less than 16 inches long (with tungsten carbide chisel insert).
g. Drill rod steel - the length 18 inches, 30 inches, or 48 inches (with "H" thread) (see 6.2).
h. Adapter - adapter "H" to "D" thread.
i. Bits rock detachable 1-1/2 inch, 1-5/8 inch, 1-3/4 inch or 2 inch carbide insert with "H" thread.
j. Bits rock detachable 1-1/2 inch, 1-5/8 inch, 1-3/4 inch or 2 inch without carbide insert with "H" thread.
k. Driver tool - for U-channel post 3-5/8 inches by 2 inches thick.
l. Stake and pin driver 2 inches I.D. by 2 inches deep cup.
m. Ground rod drivers - 1 inch I.D. X 2 inches deep.

3.22.5 Breaker set. When specified (see 6.2), a complete breaker set shall be furnished as specified herein. Tool shanks shall be 7/8-inch and length shall be measured under collar (U.C.).

Item	Quantity
Breaker	1
Drill, integral 3/4" X 12" (U.C.) with tungsten carbide chisel insert	1
Drill, integral 1" X 12" (U.C.) with tungsten carbide chisel insert	1
Drill, rod, 12" (U.C.) "H" thread	1
Drill, rod, 18"(U.C.), "H" thread	1
Bit, rock, detachable, 1-1/2", carbide insert, "H" thread	1
Bit, rock, detachable, 1-3/4", carbide insert, "H" thread	1
Bit, rock, detachable, 2-inch, carbide insert, "H" thread	1
Chisel, narrow 1" X 14" (U.C.)	2
Chisel, 3" X 14" (U.C.)	1
Chisel, digging 3" X 24" (U.C.)	1
Chisel, asphalt cutting, 5" X 14" (U.C.)	1
Spade, 5" X 16" (U.C.)	1
Moil point, 18" (U.C.)	2
Tamper, square 6" pad with shank	1
Drill rod, 18" (U.C.), "D" thread	1
Bit, rock, detachable, 3", carbide insert, "D" thread	1
Driver, ground, rod 1/2" I.D.	1
Driver, ground rod 5/8" I.D.	1
Driver, ground, rod 3/4" I.D.	1
Driver, pipe 1-1/4" O.D.	1
for 1-1/2" pipe	1
Driver, pipe 1-1/2" O.D.	1
for 1-3/4" pipe	1
Driver, stake (pin) 1-1/4" I.D.	1
Driver, stake (pin) 1-1/2" I.D.	1
Driver, stake (pin) 2" I.D.	1
Driver, stake (pin) 2-1/2" I.D.	1
Driver, stake (pin) 2-3/4" I.D.	1
Handle, lower support.	1

Box storage.	2

The manufacturer's standard 32 inches (81.3 cm) long X 15 inches (38.1 cm) X 11 inches (27.9 cm) high wood storage box shall be provided for storing breaker, work-tools, field tool kit, spare parts, and manuals (see 3.21). Operation and maintenance instructions shall be clear plastic laminated and secured to the inside surface of the storage box lid. As a minimum box corners and edges shall be metal reinforced, cover clasps shall be padlockable, and carrying handles shall be provided on each end. Each box shall be marked with the National Stock Number for the breaker set and set markings (e.g., Box 1 of 2, Box 2 of 2, etc.) when a set consists of more than one box.

3.22.6 Harness. When specified (see 6.2) a back-carrying harness for transporting the breaker and two drill steels shall be furnished with the breaker. The harness shall be contained in the chest.

3.22.7 Energy efficiency requirements. The fuel consumption shall not exceed 2.0 quarts (1890 milliliters) per hour during the operation of any of the accessories.

3.23 Workmanship. All parts, components, and assemblies of the breaker including castings, forgings molded parts, stampings, bearings, seals, machined surfaces, and welded parts shall be clean and sound and free from sand, dirt, fins, pits, sprues, scale, flux, and harmful extraneous material. All edges shall be rounded or chamfered.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Acceptability criteria. Breakers which conform to all requirements in sections 3 and 5 of this specification and pass all applicable examinations and tests in section 4 of this specification will be considered acceptable by the Government.

4.1.2 Component and material inspection. The contractor is responsible for assuring that components and materials used are manufactured, examined, and

tested in accordance with the requirements of referenced specifications and standards set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.2 Classification of inspection. Inspection shall be classified as follows:

a. First article inspection (see 4.3).
b. Quality conformance inspection (see 4.4).
c. Inspection comparison (see 4.6).
d. Inspection of packaging (see 4.7).

4.3 First article inspection.

4.3.1 Examination. The breaker shall be examined for the defects as specified in 4.5.1. Presence of one or more defects shall be cause for rejection.

4.3.2 Tests. The first article breaker shall be tested as specified in 4.5.2. Failure of any test shall be cause for rejection.

4.4 Quality conformance inspection.

4.4.1 Examination. Each breaker shall be examined as specified in 4.5.1, items 111, 116, 120, 123, 124, 126, 129, 130, 131 and 132. Presence of one or more defects shall be cause for rejection.

4.4.2 Quality conformance test. Each breaker shall be serviced as required and shall be run-in in accordance with the manufacturer's normal procedures for a period of not less than 15 minutes.

4.4.2.1 Failure criteria. One or more functional defects shall constitute failure and acceptance of the equipment shall not be approved until all defects are corrected.

4.5 Inspection procedures.

4.5.1 Examination. The breaker shall be examined for the following defects:

101.	Weight not as specified.	3.4
102.	Interchangeability not as specified.	3.5
103.	Material not as specified.	3.6
104.	Materials are not corrosion resistant or treated to be made corrosion resistant for the applicable storage and operating environment.	3.6.1
105.	Dissimilar metals as defined in MIL-STD-889 are not effectively insulated from each other.	3.6.1.1
106.	Contractor does not have documentation available for identification of material, material finishes or treatments.	3.6.1.2
107.	Safety protection not as specified.	3.8

108.	Human factors not as specified.	3.8
109.	Ease of maintenance not as specified.	3.9
110.	Gasoline-engine-power unit not as specified.	3.10
111.	Fuel strainer not furnished.	3.10.2
112.	Air cleaner not as specified.	3.10.4
113.	Ignition system not as specified.	3.10.5
114.	Controls not furnished or not as specified.	3.10.6
115.	Fuel tank not as specified.	3.10.3
116.	Exhaust deflector not furnished or not as specified.	3.10.7
117.	Cranking system not as specified.	3.10.8
118.	Front head assembly not as specified.	3.11
119.	Tool steel retainer not as specified.	3.11.1
120.	Oil can not as specified.	3.12
121.	Electromagnetic interference emission not as specified.	3.13
122.	Fungus and moisture resistance treatment not as specified.	3.15
123.	Identification markings not as specified.	3.16
124.	Instruction plates not as specified.	3.17
125.	Treatment and painting not as specified.	3.19
126.	Chest not as specified.	3.21
127.	Blowing air not as specified.	3.22.1
128.	Rotating mechanism not as specified.	3.22.2
129.	Chuck not as specified.	3.22.3
130.	Accessories not as specified.	3.22.4
131.	Breaker kit not as specified.	3.22.5
132.	Harness not as specified.	3.22.6
133.	Workmanship not as specified.	3.23

4.5.2 Tests.

4.5.2.1 Test conditions. Prior to being tested, the breaker shall be lubricated with military oils conforming MIL-L-2104 and MIL-L-46167. Oils shall be those designated for use in the ambient temperatures at which the test is being performed. Fuel mix shall be in accordance with 3.18.

4.5.2.1.1 Energy efficiency requirements. Energy efficiency shall be computed based upon the total number of hours as required for testing (see 4.5.2.4, 4.5.2.4.2, 4.5.2.5, 4.5.2.5.2, 4.5.2.6, 4.5.2.6.2, 4.5.2.6.3 and 4.5.2.7) fuel consumption exceeding 2.0 quarts (1890 ml) per hour shall constitute failure of any operational test herein (see 3.22.7).

4.5.2.2 Test procedure. Run-in the breaker in accordance with the manufacturer's recommended procedure; following the run-in, operate the breaker continuously with the following accessories. Eight hours with 1-inch chisel and four hours with moil point breaking up concrete, six hours with asphalt chisel cutting up asphalt, 2 hours tamping, two hours with spade digging clay; and two hours with drill rod and bits drilling in barre granite.

4.5.2.2.1 Air Filter. The air filter shall be cleaned and checked after each 8 hours of operation. Using solvents in accordance with P-C-444, air or soap and water.

4.5.2.2.2 Failure criteria. Evidence of loss of power, of the breaker, deterioration of the filter or filter element, mechanical failure, malfunction, permanent deformation, leaking, failure to meet the criteria in 4.5.2.2.1 shall constitute failure of this test.

4.5.2.3 Breaker performance.

4.5.2.4 Breaking concrete. Operate the breaker using the 1 inch chisel to break concrete for 8 hours consisting of 8 consecutive periods of 50 minutes of continuous operation. Stop the breaker only to refuel the tank. The concrete compressive strength shall be not less than 5,000 psi (34.48 MPa). The concrete shall be not less than 4 inches (10.16cm) thick. The breached rate of concrete shall be not less than 25 square feet (2.32 square meters) per hour and shall be as uniform in size as possible, no size shall be greater than the slab thickness.

4.5.2.4.1 Failure criteria. Evidence of mechanical failure malfunction, permanent deformation, leaking, breakage of any part or component and failure to meet the criteria in 4.5.2.4 shall constitute failure of this test.

4.5.2.4.2 Moil point. Operate the breaker using a Moil point breaking concrete for 4 hours consisting of four consecutive periods of 50 minutes of continuous operation. Stop the breaker only to refuel the tank. The concrete compressive strength shall be not less than 5,000 psi (34.48 MPa). The concrete shall be not less than 4 inches (10.16 cm) thick and shall be as uniform in size as possible. No size shall be greater than the slab thickness.

4.5.2.4.2.1 Failure criteria. Evidence of mechanical failure, malfunction, permanent deformation, leaking, breakage of any part or component and failure to meet the criteria in 4.5.2.4.1 shall constitute failure of this test.

4.5.2.4.3 Nuclear-biological-chemical (NBC) protection. The breaker shall be tested for 2 hours in accordance with 3.8.2 and 4.5.2.4. Nonconformance to 3.8.2 shall constitute failure of this test.

4.5.2.5 Cutting asphalt. Operate the breaker using a not less than 3 inch chisel to cut asphalt pavement for 6 hours consisting of six consecutive periods of 50 minutes operation. Stop the breaker only to refuel the tank. Pavement cut shall be as uniform in size as possible. Dimensions shall not be greater than 6 inches (15.24 cm) by 6 inches (15.24 cm) with a thickness not less than 8 inches (20.32 cm). The breached rate of asphalt pavement shall be not less than 5 square feet (.46 square meter) per hour.

4.5.2.5.1 Failure criteria. Evidence of mechanical failure, malfunction, permanent deformation, leaking, breakage of any part or component and failure to meet the criteria in 4.5.2.5 shall constitute failure of the test.

4.5.2.5.2 Tamping rod with pad. Operate the breaker using a tamping rod with pad not less than 5 inches square, compact soil in a confined area, such as abutments, retaining walls, trenches and foundation bases for concrete slabs.

Continuously operate for at least 2 hours at full engine throttle, i.e. 2 consecutive periods of 50 continuous minutes of operation. Stop the breaker only to refuel the tank.

4.5.2.5.2.1 Failure criteria. Evidence of mechanical failure, malfunction, permanent deformation, leaking, breakage of any part or component, and failure to meet criteria in 4.5.2.5.2 shall constitute failure of the test.

4.5.2.6 Digging hard clay. Operate the breaker using a not less than 4-inch spade digging a 36-inch (91.44 cm) by 36-inch (91.44 cm) by 24-inch (60.96 cm) hole. Use the spade for digging, loosening, and breaking in clay. The soil shall be cH classified with a cone index not less than 250 psi (1.72 MPa) in accordance with the unified soil classification chart. The time for digging two holes shall not exceed 120 minutes.

4.5.2.6.1 Failure criteria. Evidence of mechanical failure, malfunction, permanent deformation, breakage of any part or component and failure to meet the criteria in 4.5.2.6 shall constitute failure of the test.

4.5.2.6.2 Driving stakes and earth anchors. Operate the breaker using a suitable driving head to drive a round aluminum stake that measures 48 inches (121.92 cm) long 1-3/4 inches (4.46 cm) OD, tapered head and pointed end into the ground a depth of 39 inches (99.1 cm). The soil in which the stake is driven shall be cH classified, with a cone index not less than 250 PSI (1.72 MPa) in accordance with the unified soil classification chart.

4.5.2.6.2.1 Failure criteria. Evidence of mechanical failure, malfunction, permanent deformation, breakage of any part or component, damage to the stake by the driving head, or failure to drive the stake to the specified depth in 2 minutes and failure to meet the criteria in 4.5.2.6.2 shall constitute failure of the test.

4.5.2.6.3 Tamping soil. Operate the breaker using a not less than 5 inches square (32.26 sq cm) tamper accessory to tamp the material back into the hole dug in accordance with 4.5.2.6.

4.5.2.6.3.1 Failure criteria. Evidence of mechanical failure, malfunction, permanent deformation, breakage of any part or component and failure to meet the criteria in 4.5.2.6.3 shall constitute failure of the test.

4.5.2.7 Drilling performance. Convert the breaker to a sinker drill. Using a 1.5 inch diameter, 4-point, carbide insert detachable bit, drill four 25 inch deep holes in Barre granite, with a minimum compressive strength of 24,000 psi (165.48 MPa) excluding a 1-inch (2.54 cm) deep start hole. The vertical holes shall be drilled at a rate of not less than 4 inches (10.16 cm) per minute. One of the four holes shall be at an angle of 90 degrees from the vertical and shall be drilled at a rate of not less than 2.5 inches (6.35 cm) per minute with one operator.

4.5.2.7.1 Failure criteria. Evidence of mechanical failure, malfunction, permanent deformation, breakage of any part or component, conversion time from breaker to drill exceeding 20 seconds or requiring the addition or removal of

any parts, or an average drilling rate of less than 4 inches per minute vertical and 2.5 inches (6.35) per minute horizontal and failure to meet the criteria in 4.5.2.7 constitute failure of this test.

4.5.2.8 Force of blow. Attach a steel ball with a Brinell hardness of not less than 200 and a 0.499 to 0.500 inch spherical diameter to the end of an accessory bar. Make 20 impressions with the steel ball in a 1/4 inch thick strip of 1020 steel which has a Brinell hardness between 163 and 179. Measure in millimeters the mean diameter of the impressions. Take an average of the impressions and convert to foot-pounds using table I.

4.5.2.8.1 Failure criteria. Force of blow averaging less than 22 foot-pounds per blow and failure to meet the criteria in 4.5.2.8 shall constitute failure of this test.

TABLE I. Force of blow conversion.

Impression diameter	Force of blow-ft-lb (Newton-meters)1/									
MM	0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90
4.0	6.00 (8.136)	6.40 (8.68)	7.00 (9.49)	7.60 (10.31)	8.25 (11.18)	8.75 (11.86)	9.40 (12.75)	10.00 (13.56)	10.50 (14.23)	11.50 (15.59)
5.0	11.75 (15.59)	12.50 (16.95)	13.45 (18.23)	14.75 (20.00)	15.25 (20.67)	16.10 (21.83)	17.00 (23.05)	18.00 (24.40)	18.75 (25.42)	19.25 (26.10)
6.0	20.75 (28.13)	21.65 (29.35)	22.50 (30.51)	23.50 (31.86)	24.65 (33.42)	25.75 (34.92)	26.75 (36.27)	27.80 (37.69)	29.00 (39.24)	30.00 40.68)

1/ Numbers in parentheses are Newton-meters.

4.5.2.9 Piston speed. Determine the piston speed (blows per minute at no load).

4.5.2.9.1 Failure criteria. Piston speed less than 2,500 blows per minute at no load shall constitute failure of this test.

4.5.2.10 Temperature.

4.5.2.10.1 Low temperature. Subject the breaker to a temperature of minus 25° F (-32° C) for a period of not less than 24 hours. Start the engine and operate the breaker for 30 minutes while in an ambient temperature not warmer than minus 25° F (-32° C).

4.5.2.10.1.1 Failure criteria. Failure of the engine to start or inability of the breaker to operate shall constitute failure of this test.

4.5.2.10.2 High temperature. Subject the breaker to a temperature of not less than 120° F (49° C) for a period of not less than 24 hours. Start the engine and operate the breaker for 30 minutes while in an ambient temperature not cooler than 120° F (49° C). After each 10 minutes of operation, run the engine at idle speed for 1 minute. Stop the engine and allow to remain undisturbed for 5 minutes. Restart and continue operation.

4.5.2.10.2.1 Failure criteria. Inability of the engine to start or inability of breaker to operate shall constitute failure of this test.

4.5.2.11 Electromagnetic interference. The first article shall be tested to determine conformance with 3.13. The contractor shall furnish the contracting officer the report of tests required by MIL-STD-461.

4.5.2.11.1 Failure criteria. Disapproval of the report shall constitute failure of this test.

4.5.2.12 Safety and human factors. Throughout all tests specified in section 4, evaluate safety and human factors considerations in accordance with 3.8. Nonconformance to 3.8 shall constitute failure of this test.

4.5.2.13 Sound level measurement. The sound level at the operator's station shall not exceed category D of MIL-STD-1474 (85 dB(A)) when measured in accordance with ANSI S5.1, except the following locations shall be used in lieu of the fifth microphone location:

a. Locate the microphone, 6 inches (15.24 cm) horizontally to the right of the operator's right ear.
b. Locate the microphone 6 inches (15.24 cm) horizontally to the left of the operator's left ear.

The instrumentation shall be in accordance with MIL-STD-1474.

4.5.2.13.1 Failure criteria. When the noise level of the breaker exceeds 85 dB(A), noise hazard caution signs shall be postd by the contractor on the chest and appropriate warning in the technical manual in accordance with MIL-STD-1474. The contractor shall permanently affix a caution plate to the breaker in accordance with MIL-P-19834. The caution plate shall state "Caution, hearing protection required when operating the breaker." The caution plate shall have a yellow background with black lettering and shall be made of corrosion resistant material and be permanently affixed to the breaker. Frequency measurements, dB(A) levels, instrument identification, environmental information, 85 dB(A) contour line and main sound source identification shall be reported.

4.6 Inspection comparison. The Government may select breakers at any time during the contract production period and subject these breakers to the examination specified in 4.5.1 and the tests specified in 4.5.2 to determine conformance to the requirements of this specification. The inspection will be performed by the Government, at a site selected by the Government, on units

selected at random from those which have been accepted by the Government and will not include the previously inspected first article. In addition to any test specified as part of the inspection comparison, the Government reserves the right to conduct any and all other tests contained in this specification as part of the inspection comparison and failure of such additional tests shall have the same effect as failure of those tests specified as inspection comparison.

4.6.1 Inspection failure. Failure of an inspection comparison breaker to meet any requirement specified herein during and as a result of the examination and tests specified in 4.5 shall be cause for rejection of the inspection comparison breaker(s) and shall be cause for refusal by the Government to continue acceptance of production breakers until evidence has been provided by the contractor that corrective action has been taken to eliminate the deficiencies. Correction of such deficiencies shall be accomplished by the contractor at no cost to the Government on breakers previously accepted and produced under the contract. Any deficiencies found as a result of the inspection comparison will be considered prima facie evidence that all breakers accepted prior to the completion of inspection comparison are similarly deficient unless evidence to the contrary is furnished by the contractor and such evidence is acceptable to the contracting officer.

4.7 Inspection of packaging.

4.7.1 Quality conformance inspection of pack.

4.7.1.1 Unit of product. For the purpose of inspection, a completed pack prepared for shipment shall be considered a unit of product.

4.7.1.2 Sampling. Sampling for examination shall be in accordance with MIL-STD-105.

4.7.1.3 Examination. Samples shall be examined for the following defects. AQL shall be 2.5 percent defective.

134. Materials, methods, and containers not as specified for level A or B. Each incorrect material, method, or container shall be considered one defect.
135. Disassembly not as specified for level A.
136. Unprotected metal surfaces not coated with preservative as specified for level A.
137. Gasoline engine not preserved in accordance with the referenced document for level A.
138. Components not lubricated as specified for level A.
139. Accessories not coated with preservative as specified for level A.
140. Maintenance tools not preserved in accordance with the referenced document for level A.
141. Consolidation and immobilization of components in the chest or box not as specified for level A.
142. Packing not as specified for level A.
143. Preservation and packing not in accordance with the referenced document as specified for commercial.

144. Marking missing, illegiable, incorrect, or incomplete for level A, B, or commercial.
145. Chest lid not secured as specified for level B and C.
146. Marking illegible, incorrect, or incomplete.

5. PACKAGING

5.1 Preservation. Preservation shall be level A or commercial as specified (see 6.2).

5.1.1 Level A.

5.1.1.1 Disassembly. Disassembly shall be the minimum deemed necessary by the contractor to accomplish the requirements specified in 5.1.1.11.

5.1.1.2 Preservative. Preservatives specified herein shall conform to the applicable specifications listed in and shall be applied in accordance with MIL-P-116.

5.1.1.3 Unprotected surfaces. Unprotected exterior metal surfaces requiring the application of a contact preservative in accordance with MIL-P-116 shall be preserved as follows.

5.1.1.3.1 Machined surfaces. Exposed exterior machined metal surfaces shall be coated with type P-6 or P-11 preservative. The coated surfaces shall be covered or wrapped with barrier material conforming to MIL-B-121, type 1, grade A, class 2, and secured in place with tape conforming to MIL-T-22085, type II.

5.1.1.3.2 Unfinished (not machined) surfaces. Exposed exterior unfinished metal surfaces shall be coated with type P-1 or P-19 preservative. No wrap shall be required.

5.1.1.4 Engine. The engine and engine accessories shall be preserved in accordance with MIL-E-10062, level A, as specified for type II classification.

5.1.1.5 Other components. Other components not lubricated by the engine lubricating system, such as the rotation joint, bearing for starting wheel, and the arm joints, shall be lubricated with the applicable grade and type of lubricant recommended for operation.

5.1.1.6 Accessories. The bits, drill steel, chisels, moil point, spade, tamping rod, and pad shall be coated with type P-1 or P-19 preservative.

5.1.1.7 Harness. The harness shall be preserved in accordance with MIL-P-116, method IC-1 or IC-3.

5.1.1.8 Repair parts. The repair parts shall be preserved in accordance with the applicability selection and application provisions of MIL-P-116.

5.1.1.9 Maintenance tools. Maintenance tools shall be preserved in accordance with PPP-P-40 level A.

5.1.1.10 Technical publications. Technical publications shall be preserved in accordance with MIL-P-116, method IC-1 or IC-3.

5.1.1.11 Consolidated.

5.1.1.11.1 When chest is furnished. When a chest is furnished, all components shall be placed in the chest, immobilized to prevent movement or damage, and the chest lid closed and secured.

5.1.1.11.2 When chest is not furnished. When a chest is not furnished, all components shall be placed together in a close-fitting box conforming to PPP-B-636, V13c, SFF-L. The contents shall be blocked, braced, and cushioned within the box in accordance with MIL-STD-1186. Box closure and sealing shall be as for method V in accordance with the appendix to the box specification.

5.1.2 Commercial. Each complete breaker shall be preserved in accordance with MIL-STD-1188.

5.2 Packing. Packing shall be level A, B, or commercial as specified (see 6.2).

5.2.1 Level A. Breakers furnished with or without chests shall be packed in close-fitting boxes conforming to PPP-B-601, overseas type, style optional. The box shall be closed and strapped in accordance with the appendix to the box specification.

5.2.2 Level B.

5.2.2.1 Breakers furnished without chests. Breakers furnished without chests shall be packed as specified in 5.2.1 except boxes shall be domestic type.

5.2.2.2 Breakers furnished with chests. Breakers furnished with chests shall be packed as specified in 5.2.2.1, or at the option of the contractor, packed in a close-fitting box conforming to PPP-B-636, V3c or V13c. Cushioning shall be provided within the box to prevent damage to the chest hasp, hinges, or corner protectors. The box shall be closed and strapped in accordance with the appendix to the box specification.

5.2.3 Commercial. Breakers furnished with or without chests shall be packed in accordance with MIL-STD-1188.

5.3 Marking.

5.3.1 Military. Marking for military levels of protection (level A or B) shall be in accordance with MIL-STD-129.

5.3.2 Commercial. Marking for commercial packaging shall be in accordance with MIL-STD-1188.

6. NOTES

6.1 Intended use. The breakers covered by this specification are intended for use in breaking up concrete, brick, and macadam pavement; loosening compacted gravel and stiff clay; drilling, performing other similar demolition work; and driving earth anchors, stakes and ground rods.

6.2 Ordering data. Procurement documents should specify the following:

a. Title, number, and date of this specification.
b. Date of issue of DoDISS applicable and exceptions thereto (see 2.1.1).
c. Time frame required for submission of first article and number of first articles required. When the Government will conduct any or all of the first article examination and tests. When the Government will conduct some but not all of the first article examination and tests, the contracting officer should specify which examination and tests will be conducted by the Government and which examination and tests shall be conducted by the contractor (see 3.2).
d. When the identification of materials are required (see 3.6.1.2).
e. When an oil can is required (see 3.12).
f. When the finishing coat shall be other than lusterless forest green (see 3.19).
g. When special tools and special equipment other than specified are allowed (see 3.20).
h. When a carrying case is not required (see 3.21).
i. Type of accessories that are required (see 3.22.4).
j. Length of drill rod required (see 3.22.4).
k. When breaker set is required (see 3.22.5).
l. When harness is required (see 3.22.6).
m. Degree of preservation and degree of packing required (see 5.1 and 5.2).
n. When nuclear-biological-chemical (NBC) requirements are not specified (see 3.8.2).

6.3 First article. When a first article inspection is required, the item shall be tested and shall be a first produced breaker. Any changes or deviations of production breakers from the approved first article during production will be subject to the approval of the contracting officer. Approval of the first article will not relieve the contractor of his obligation to furnish breakers conforming to this specification.

6.4 Lubricants. The contracting officer should furnish a list of lubricants applicable to the breakers covered by this specification as contained in the Federal Supply Catalogue, Department of Defense Section, Identification List C9100-IL, for FSC Group 91.

6.5 Data requirements. The contracting officer should include requirements for such data as technical publications, instructional materials, illustrated parts lists, and contractor's maintenance and operation manual to be furnished with each breaker.

6.6 Provisioning. The contracting officer should include provisioning requirements for repair parts and maintenance tools as necessary (including any special tools), and instructions on shipment of breaker. A suggested paragraph is as follows:

"Shipment of breakers shall include repair parts, maintenance tools, operational instructions, and accessories, unless exceptions are provided elsewhere in the contract."

6.7 Government-furnished equipment. The contracting officer should arrange to furnish the equipment specified in 3.8.2.

6.8 Recycled material. It is encouraged that recycled material be used when practical as long as it meets the requirements of this specification (see 3.6).

Custodians:
Army - ME
Navy - YD
Air Force - 99

Preparing activity:
Army - ME

Project 3820-0176

Review activities:
Air Force - 84
DLA - CS
User activity:
Navy - MC