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\* NOT MEASUREMENT \*  
\* SENSITIVE \*  
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OO-D-2854  
February 18, 1994  
SUPERSEDING  
MIL-D-29227A  
28 October 1988

FEDERAL SPECIFICATION

DITCHING MACHINE, WHEEL TYPE TRENCHER,  
CRAWLER-MOUNTED, DIESEL-ENGINE-DRIVEN

This specification is approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

1. SCOPE

1.1 Scope. This specification covers a commercial, diesel-engine-driven, crawler-mounted, wheel trenching type ditching machine.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications and standards. The following specifications and standards 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).

Federal Specification

W-B-131 - Battery, Storage (Vehicular, Ignition, Lighting and Starting)

Federal Standards

FED-STD-123 - Marking for Shipment (Civil Agencies)  
FED-STD-595 - Colors Used in Government Procurement

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\*Beneficial comments (recommendations, additions, deletions) and any \*  
\*pertinent data which may be of use in improving this document should be \*  
\*addressed to: Commanding Officer (Code 156), Naval Construction Battalion \*  
\*Center, 1000 23rd Avenue, Port Hueneme, CA 93043-4301, by using the \*  
\*Standardization Document Improvement Proposal (DD Form 1426) appearing at \*  
\*the end of this document or by letter. \*  
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FSC 3805

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## Military Specification

MIL-T-3351 - Tractor, Full-Track, Low Speed; Tractor Wheeled, Agricultural; and Tractor Wheeled, Industrial; and Their Attachments, Packaging of

## Military Standards

MIL-STD-129 - Marking for Shipment and Storage  
MIL-STD-209 - Slings and Tiedown Provisions for Lifting and Tying Down Military Equipment

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

2.2 Other publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

Society of Automotive Engineers, Inc. (SAE):

SAE J534 - Lubrication Fittings

(Application for copies should be addressed to the Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, PA 15096.)

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also may be available in or through libraries or other informational services.)

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein (except for associated detail specifications or standards), the text of this specification takes precedence. Nothing in this specification, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

## 3. REQUIREMENTS

3.1 Description. The ditching machine shall be a diesel-engine-driven, crawler mounted, wheel trenching type, used for general purpose ditching and excavating for building foundations, drainage, and pipeline ditches.

3.2 Standard commercial product. The equipment offered shall be in accordance with the requirements of this specification and shall be the standard product of the contractor and shall have been marketed and in commercial field use for at least one year prior to the date of bid opening. Product improvements are acceptable. When specific requirements are not stated herein; all items listed as standard equipment in the contractor's published specification brochures and catalogs, or normally furnished to commercial customers as standard equipment, shall be furnished. The item shall be furnished with optional equipment as specified herein. Optional equipment is defined as equipment not standard with the item but which has been furnished to the commercial customer for the purpose intended, such as special features or

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allied equipment. The item shall be equipped with all components necessary to enable it to function reliably and efficiently in sustained operation. The item shall conform to all Federal laws and regulations applicable to the manufacturer governing safety and pollution which are in effect for this type of equipment at the time of manufacture. Upon the request of the contracting officer, the offerer/contractor shall provide sales data verifying that the basic configuration offered under this solicitation has been sold in the commercial market and meets the definition set forth in FAR 11.001 for a "commercial product" or "commercial type product." In addition, the contracting officer may require submission of published specifications in order to verify conformance of this specification.

3.3 First article. When specified in the contract or purchase order, a sample shall be subjected to first article inspection (see 4.2.1, 6.2 and 6.4).

3.4 Materials. Materials used shall be free from defects which would adversely affect the performance or maintainability of individual components or of the overall assembly. Materials not specified herein shall be of the same quality used for the intended purpose in commercial practice. Unless otherwise specified herein, all equipment, material, and articles incorporated in the work covered by this specification are to be new and fabricated using materials produced from recovered materials to the maximum extent possible without jeopardizing the intended use. The term "recovered materials" means materials which have been collected or recovered from solid waste and reprocessed to become a source of raw materials, as opposed to virgin raw materials. None of the above shall be interpreted to mean that the use of used or rebuilt products is allowed under this specification unless otherwise specified.

3.5 Interchangeability. All units of the same classification furnished with similar options under a specific contract shall be identical to the extent necessary to insure interchangeability of component parts, assemblies, accessories, and spare parts.

3.6 Safety. All rotating or reciprocating parts and all parts subject to high operational temperatures, that are of such a nature or are so located as to be or become a hazard to the safety of the operating personnel, shall be insulated, enclosed, or guarded to the extent necessary to eliminate the hazard.

3.6.1 Noise. If the noise level in the area occupied by the operator exceeds 85 decibels (dB), a clearly visible and legible warning plate containing the following shall be permanently affixed to the ditching machine in a conspicuously protected location: "CAUTION: HEARING PROTECTION REQUIRED WHEN DITCHING MACHINE IS IN OPERATION." The plate shall have a yellow background with black lettering and shall be of corrosion-resistant material.

3.7 Operational requirements. The ditching machine shall perform as specified herein in any ambient temperature from -20 to +120 degrees Fahrenheit (oF) (-29 to +49o Celsius (C)). Starting aids may be either electric glow plug or ether primer. When an ether primer system is provided, it shall be of the measured shot type with storage capacity of not less than 12 fluid ounces (355 milliliters (mL)).

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3.8 Shipping weight. The shipping weight of the ditching machine shall be not less than 16,000 pounds (lb) (7250 kilograms (kg)) and not more than 26,000 lb (11 790 kg).

3.9 Performance. The ditching machine shall be capable of digging into various earth formations, a ditch up to 24 inches (610 millimeters (mm)) in width, and (a) not less than 5 feet 10 inches (1770 mm) deep in firm clay soil at a digging rate of not less than 5 feet per minute (fpm) (1.52 meters per minute (m/min)), or (b) not less than 5 feet 10 inches (1770 mm) deep in clay-gravel soil at a digging rate of not less than 4 fpm (1.22 m/min). The crowding speed shall be selectively controlled by the operator. Walls and bottom of the cut shall be clean and true to line and grade. The discharge conveyor shall be capable of depositing spoil in windrows at either side of the excavation and at a distance sufficient to prevent re-entry of spoil into the trench.

3.9.1 Travel speeds. The ditching machine shall have not less than three travel speeds forward and one reverse, or an infinitely variable speed hydrostatic drive. The highest forward travel speed shall be not less than 2 miles per hour (mph) (3.2 kilometers per hour (km/h)).

3.9.2 Digging speeds. The ditching machine shall have not less than five digging (crowding) speeds ranging from not greater than 3 fpm (0.914 m/min) to not less than 6 fpm (1.82 m/min) or having variable digging (crowding) speeds from 0 to not less than 30 fpm (0 to 9.14 m/min) at engine governed speed. The crowding or digging speeds shall be so selective as to provide maximum efficiency at all times. A hydrostatic drive that will meet required digging speeds is acceptable.

3.10 Design and construction.

3.10.1 Wheel assembly. The diameter of the wheel assembly, measured to the tips of the bucket teeth, shall be not less than 115 inches (2920 mm).

3.10.2 Buckets. The ditching machine shall be equipped with buckets and teeth to cut trenches, one at a width of not less than 18 inches (450 mm), and one at a width of not less than 24 inches (610 mm). The cutting width requirements may be met with bolted on side cutters. The teeth shall be of the quick interchangeable type. Replacement of teeth shall be accomplished without the use of special tools.

3.10.3 Bucket cleaner. Manufacturer's standard type bucket cleaner shall be furnished.

3.10.4 Spoil conveyor. The spoil conveyor shall be individually controlled, dischargeable to either side, from the operator's seat, and belt speed so controlled as to provide the correct operational speed to give maximum or minimum discharge. The spoil conveyor positioning shall be hydraulically powered.

3.10.4.1 Spoil conveyor belt. The spoil conveyor belt shall be of adequate width to handle the spoil while digging at maximum depth and maximum crowding speed. The belt drive shall be hydrostatic or hydraulically driven.

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3.10.5 Framework. The digging boom, spoil conveyor, and powerplant shall be mounted in a framework fabricated from steel and shall be bolted, riveted, welded, or a combination thereof, reinforced and braced to maintain proper alignment of all components through all operations.

3.10.6 Crawler. The crawler shall have steel semigrouser, or grouser type track shoes. The track shoes shall be not less than 16 inches (400 mm) in width. Provisions shall be made to adjust for slack due to wear.

3.10.6.1 Toolbox. Manufacturer's designed toolbox of sufficient size to store tools required for field servicing shall be provided.

3.10.7 Engine. The ditching machine shall be powered by the manufacturer's standard commercial engine with accessories and electrical starting system normally furnished to the commercial market for this size ditching machine. The power and speed required of the engine to meet the performance requirement of the ditching machine shall be not greater than the continuous horsepower values at which the engine is rated. An hourmeter capable of registering not less than 9,999 hours of engine operating time shall be provided.

3.10.7.1 Dry charged batteries. Unless otherwise specified (see 6.2), batteries furnished shall be dry charged in accordance with W-B-131 and without electrolyte. Sealed caps to prevent the intrusion of atmospheric moisture shall be provided.

3.10.8 Hydraulic system. A complete hydraulic system, including a pump, hydraulic rams, reservoir, pressure relief valve, and all necessary lines and controls, shall be provided to perform all required hydraulic operations. The pump shall be driven by the ditching machine engine and shall have sufficient capacity to energize all hydraulically powered components operating simultaneously.

3.10.9 Controls. All controls shall be located within easy reach of the operator and shall be clearly identified for their intended function with permanently affixed identification plates made of corrosion-resistant material.

3.11 Lifting and tiedown attachments. When specified (see 6.2), the ditching machine shall be equipped with lifting and tiedown attachments. Lifting and tiedown attachments shall conform to type II or type III of MIL-STD-209. A nonferrous transportation plate shall be provided and mechanically attached to the ditching machine. Transportation plates shall be inscribed with a diagram showing the lifting attachments and lifting slings, the capacity of each attachment, and the required length and size of each sling cable. A silhouette of the item furnished showing the center of gravity shall be provided on the transportation plate. Tiedown attachments may be identified by stenciling or other suitable marking. Tiedown marking shall clearly indicate that the attachments are intended for the tiedown of the ditching machine on the carrier when shipped. Lifting attachments shall be designed to exclude the use of spreader bar(s).

3.12 Lubrication. Means for lubrication shall be in accordance with the manufacturer's standard practice. The lubricating points shall be easily visible and accessible. Hydraulic lubrication fittings shall be in accordance

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with SAE J534. Where use of high pressure lubricating equipment will damage grease seals or other parts, a warning label shall be affixed to the equipment in a conspicuous location near concerned lubrication point.

3.12.1 Servicing and adjustments. Prior to acceptance of the ditching machine by the Government, the contractor shall service and make adjustments for immediate operational use as required in the operator's manual.

3.13 Cleaning, treatment, and painting. Surfaces normally painted shall be painted according to manufacturer's standard practice and shall be cleaned, treated, and painted as specified herein. Surfaces to be painted shall be cleaned and dried to insure that they are free from contaminants such as oil, grease, welding slag and spatter, loose mill scale, water, dirt, corrosion products, or any other interfering substances. As soon as practicable, after cleaning, and before any corrosion product or other coating interfering material can result, the surface shall be prepared or treated to insure the adhesion of the coating system. The painting shall consist of at least one coat of primer and one finish coat of acrylic based enamel or polyurethane enamel. The primer shall be applied to a clean, dry surface as soon as practicable after cleaning and treating. Painting shall conform to manufacturer's current factory level requirements for material and quality. The total dry film thickness shall be not less than 2.5 mils over the entire surface. The paint shall be free from runs, sags, orange peel, or other defects. Color of the finish coat of the end item, allied equipment and attachments shall be Green, No. 14064, conforming to FED-STD-595.

3.14 Identification plate. An identification plate will be furnished by the contracting officer for each ditching machine. The contractor shall stamp all necessary data in the blank spaces of the plate provided for that purpose, and securely affix a plate to each ditching machine in a conspicuous place with nonferrous screws, rivets, or bolts not less than 1/8-inch (3.2 mm) in diameter. The applicable nomenclature contained in the contract item description shall be placed in the top blank.

3.15 Instruction plates. The ditching machine shall be equipped with instruction plates located so as to be visible from the operator's platform, describing any special or important procedures to be followed in operating and servicing the equipment. Plates shall be of a material which will last and remain legible for the life of the equipment. Plates shall be securely affixed to the equipment with nonferrous screws or bolts of not less than 1/8-inch (3.2 mm) diameter.

3.16 System of measurement. The dimensions used in this specification are not intended to preclude the use of the metric system of measurement in the fabrication and production of the material, individual parts, and the finished product, provided form, fit, and function requirements are satisfied.

3.17 Workmanship.

3.17.1 Steel fabrication. The steel used in fabrication shall be free from kinks, sharp bends, and other conditions which would be deleterious to the finished product. Manufacturing processes shall not reduce the strength of the steel to a value less than intended by the design. All bends shall be made by controlled means to insure uniformity of size and shape.

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3.17.2 Bolted connections. Boltholes shall be punched or drilled within manufacturer's design tolerances and shall have the burrs removed. Washers or lockwashers shall be provided, and all bolts, nuts, and screws shall be tight.

3.17.3 Riveted connections. Rivet holes shall be punched or drilled within manufacturer's design tolerances and shall have the burrs removed. Rivets shall be driven with pressure tools and shall completely fill the holes. Rivet heads, when not countersunk or flattened, shall be of approved shape and of uniform size for the same diameter of rivet. Rivet heads shall be full, neatly made, concentric with the rivet holes, and in full contact with the surface of the member.

3.17.4 Welding. Welding procedures shall be in accordance with a nationally recognized welding code. The surface of parts to be welded shall be free from rust, scale, paint, grease, or other foreign matter. Welds shall be of sufficient size and shape to develop the full strength of the parts connected by the welds. Welds shall transmit stress without permanent deformation or failure when the parts connected by the weld are subjected to proof and service loadings. Welders performing welding on the ditching machine shall be certified by a nationally recognized welding organization. Certification shall be kept on record by the contractor, and upon request, shall be made available to the Government for review.

3.17.5 Castings. All castings shall be sound and free from patching, misplaced coring, warping, or any other defect which reduces the casting's ability to perform its intended function.

#### 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 (examinations and tests) as specified herein. Except as otherwise specified in the contract or purchase 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 this document where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items shall meet all requirements of sections 3 and 5. The inspection set forth in this document shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in this document shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

4.1.2 Component and material inspection. Components and materials shall be inspected in accordance with all the requirements specified herein and in applicable referenced documents.

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

- a. First article inspection (see 4.2.1).
- b. Quality conformance inspection (see 4.2.2).

4.2.1 First article inspection. The first article inspection shall be performed on one ditching machine when a first article is required (see 3.3 and 6.4). This inspection shall include the examination of 4.3, the tests of 4.4 and, when specified, the preproduction pack inspection of 4.6. The first article may be either a first production item or a standard production item from the supplier's current inventory provided the item meets the requirements of the specification and is representative of the design, construction, and manufacturing technique applicable to the remaining items to be furnished under the contract. When a first article test is specified in the contract and the contractor desires to deliver the test unit as a contract item, it shall be delivered only after the contractor, at his own expense, shall as a minimum perform the following: completely clean the unit, reconditioned and/or overhauled, making such replacements and modifications thereto as required to make the unit acceptable as a contract item.

4.2.2 Quality conformance inspection. The quality conformance inspection shall include the examination of 4.3, the tests of 4.5, and the packaging inspection of 4.6.

4.3 Examination. Each ditching machine shall be examined for compliance with the requirements specified in section 3 of this specification. Any redesign or modification of the contractor's standard product to comply with specified requirements, or any necessary redesign or modification following failure to meet specified requirements shall receive particular attention for adequacy and suitability. This element of inspection shall encompass all visual examinations and dimensional measurements. Noncompliance with any specified requirements or presence of one or more defects preventing or lessening maximum efficiency shall constitute cause for rejection.

4.4 First article tests. The ditching machine shall be subjected to the tests specified in 4.4.1 through 4.4.3 to determine ruggedness of construction and satisfactory performance. Failure to pass any phase of these tests shall constitute cause for rejection.

4.4.1 Digging tests. The digging tests shall be performed in one or more of the formations specified in 3.9. This test is to provide an accumulative digging time of not less than 4 hours, varying in depth from 4 feet to 5 feet 10 inches (1210 mm to 1770 mm), in order to test the production capability as required in 3.9. The spoil discharge shall be alternated from one side to the other not less than five times during the digging tests. The boom shall not be elevated during the digging tests, except to remove or pass over obstacles extending beyond the width of the trench or beyond the depth capacity of the ditching machine.

4.4.2 Travel test. The ditching machine shall be operated in each travel speed specified in 3.9.1. The forward travel speed shall be measured to determine conformance to 3.9.1.



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4.4.3 Lifting and tying down attachments test. When lifting and tying down attachments are required, the ditching machine shall be tested to determine conformance to 3.11.

4.5 Production unit operation test. Each production ditching machine produced in fulfillment of a Government contract or order shall be completely assembled, adjusted, lubricated, or otherwise serviced for operation. The engine shall be started and subjected to a warmup period as recommended by the manufacturer. The ditching machine shall be given a run-in test and all controls shall be operated a sufficient number of times to ascertain that the components and mechanisms actuated by the controls operate promptly, fully, and without restriction or malfunction. Failure to pass any phase of this test shall be cause for rejection.

4.6 Preparation for delivery inspection. The inspection of the preservation, packing, and marking shall be in accordance with the requirements of section 4 of MIL-T-3351.

## 5. PREPARATION FOR DELIVERY

5.1 Preservation, packaging, and packing. Preservation, packaging, and packing shall be in accordance with the requirements of MIL-T-3351, with the level of preservation, packaging and the level of packing as specified (see 6.2).

### 5.2 Marking.

5.2.1 Military agencies. Shipments to military agencies shall be marked in accordance with MIL-STD-129.

5.2.2 Civil agencies. Shipments to civil agencies shall be marked in accordance with FED-STD-123.

## 6. NOTES

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

6.1 Intended use. The ditching machine covered by this specification is intended for use in general purpose ditching and excavating for building foundations, drainage, and pipeline ditches at military installations.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of this specification
- b. Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1.1)
- c. When first article and inspection sample is required (see 3.3 and 4.2.1)
- d. When batteries shall be other than dry charged, without electrolyte (see 3.10.7.1)
- e. When lifting and tiedown attachments are required (see 3.11)

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f. Level of preservation/packaging and level of packing required (see 5.1)

6.3 Data requirements. When this specification is used in an acquisition and data are required to be delivered, the data requirements shall be developed as specified by an approved Data Item Description (DD Form 1664) and delivered in accordance with the approved Contract Data Requirements List (DD Form 1423) incorporated into the contract. When the provisions of DoD Federal Acquisition Regulations (FAR) Supplement, Part 27, Sub-Part 227.405-70 are invoked and the DD Form 1423 is not used, the data should be delivered by the contractor in accordance with the contract or purchase order requirements.

6.4 First article. When a first article inspection is required, the item will be tested and should be a first production item or it may be a standard production item from the contractor's current inventory as specified in 4.2.1. The first article should consist of one unit. The contracting officer should include specific instructions in acquisition documents regarding arrangements for examination, test, and approval of the first article.

6.5 Subject term (key word) listing.

Construction  
Digging  
Excavating

6.6 Supersession data. This specification replaces military specification MIL-D-29227A dated 28 October 1988.

MILITARY INTERESTS:  
ACTIVITIES:

CIVIL AGENCY COORDINATING

Custodian

GSA - FSS

Navy - YD1

PREPARING ACTIVITY:

Review Activity

Navy - YD1

DLA - CS

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