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* Inch-pound *

OO-D-2765
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SUPERSEDING
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FEDERAL SPECIFICATION

DITCHING MACHINES; LADDER-TYPE, LIGHT DUTY, 4-WHEEL-DRIVE, PNEUMATIC-TIRED, GED OR DED

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

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers self-propelled, 4-wheel-drive pneumatic-tired, gasoline or diesel engine-driven, ladder type ditching machines.

1.2 Classification. The ditching machines shall be of the following sizes, as specified (see 6.2).

Size A - Minimum 2100 pounds (lbs) basic unit weight; not less than 18 horsepower (hp).
Size B - Minimum 3000 lb basic unit weight; not less than 30 SAE-HP.

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).

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, Port *
*Hueneme, CA 93043-5000, by using the self-addressed Standardization *
*Document Improvement Proposal (DD Form 1426) appearing at the end of this *
*document or by letter. *

AMSC N/A FSC 3805

Military Specification

MIL-T-3351 - Tractor, Full-Tracked, Low-Speed; Tractor Wheeled, Agriculture; and Tractor Wheeled, Industrial: and Their Attachments, Packaging of.

Federal Standard

FED-STD-595 - Colors.

Military Standard

MIL-STD-209 - Slinging 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

2.1.2 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 (DoL)
Occupational Safety and Health Administration (OSHA)

Occupational Safety and Health Standards.

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

2.2 Non-Government publications. The following document(s) 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 which are current on the date of the solicitation (see 6.2).

Society of Automotive Engineers, Inc. (SAE):

SAE Standards and Recommended Practices.

SAE J404 - Chemical Compositions Alloy
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.)

Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Description. The ditching machine shall consist essentially of a pneumatic-tired, gasoline or diesel engine driven, 4-wheel-drive carrier. A hydraulic operated backfill blade. A hydraulic, and or mechanically lifted, and driven, ladder type digging attachment, a brake system, a steering system, a discharge spoil conveyor or auger, an operator seat, and all necessary controls.

3.2 First article. When specified (see 6.2), the contractor shall furnish a ditching machine for first article inspection and approval (see 4.2.1 and 6.3).

3.3 Standard commercial product. The ditching machine shall, as a minimum, be in accordance with the requirements of this specification and shall be the manufacturer's standard commercial product. Additional or better features which are not specifically prohibited by this specification but which are a part of the manufacturer's standard commercial product, shall be included in the ditching maghine being furnished. A standard commercial product is a product which has been sold or is being currently offered for sale on the commercial market through advertisements or manufacturer's catalogs, or brochures, and represents the latest production model.

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

3.5 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. Unless otherwise specified, none of the above shall be interpreted to mean that the use of used or rebuilt products are allowed under this specification unless otherwise specified.

3.6 Safety. All rotating or reciprocating parts, and all parts subject to high operational temperatures, that are of such nature or are so located as to be or become a hazard to the operating or attending personnel, shall be substantially guarded or insulated to the extent necessary to eliminate the hazard. The ditching machine shall comply with DoL, OSHA safety regulations in effect at date of manufacture.

3.7 Performance. The ditching machine shall be capable of excavating various types of earth formations, including muddy soil, clay, clay-loam, clay-gravel, and sand, or any combination thereof with varying water content, to the depths and widths as specified in table I. The crowding speed shall be selective automatically or by the operator. The full crowding effort of the ditching machine shall be applied over the entire digging depth range. Digging in muddy soil, clay, clay-loam, clay-gravel, and sand or combination, the crowding speed for size A shall be not less than 12 feet per minute (fpm) at governed engine speed not less than 15 fpm at governed engine speed for size B. Wall and bottom of the cut shall be finished to line and grade without spoil. The discharge conveyor or auger shall be capable of depositing spoil on at least one side of excavation and at a distance sufficient to clear the guide line preventing re-entry of the spoil into the cut. Size A ditching machine shall be capable of traveling not less than 4 miles per hour (mph) at governed engine speed; size B, or shall be capable of traveling not less than 4.5 mph at governed engine speed. The ditching machine shall be capable of digging trenches with sidewalls vertical within 5 degrees (o) and negotiating at a 20 percent grade.

TABLE I. Digging capabilities.

Size	Trench width (inches)	Minimum Trench depth (feet)
A	4	3.5
	6	3.0
	8	2.5
	10	2.0
	12	1.0
B	6	3.5
	8	3.0
	12	1.0

3.7.1 Driving mechanism. The driving mechanism shall provide not less than three forward speeds and one reverse speed, or hydrostatic type drive. When specified (see 6.2), the drive mechanism shall be of the over-center clutch type, single forward speed.

3.8 Operational requirements. The ditching machine shall be capable of operating satisfactorily in ambient temperature from 0o up to 125o Fahrenheit (F) at sea level elevation (29.92 inches of mercury (hg) barometric pressure) and from 0o to a maximum temperature of 107oF at 5,000 feet elevation (24.89 inches hg).

3.9 Digging attachments. Unless otherwise specified (see 6.2), the digging attachments shall consist essentially of a lift arm equipped with a ladder digging line, driving mechanism, spoil conveyor or auger, and hoisting mechanism. The hydraulic hoisting mechanism, operating independently of other drives, shall enable the operator to regulate the digging depth accurately, and to raise the attachment into travel position. The digging attachments, in operating position, shall be located at the front end or the rear end of the ditching machine.

3.10 Ladder. The ladder digging line shall be mounted on the lift arms, and shall be so constructed that each digging tooth can be removed individually. A safe accessible means shall be provided for the adjustment of the digging line.

3.11 Teeth. The ditching machine shall be supplied with two sets of teeth for each trench width. The teeth shall be of manganese alloy or other alloy steels; the tip shall have a Rockwell C scale hardness of not less than 51. Tooth shall be the bolt-on type to allow tooth removal and replacement with the use of common tools.

3.12 Shafts. All power driven shafts used on the digging attachment shall be of alloy steel equal to or exceeding the physical characteristics of 4140 in SAE J404.

3.13 Backfill blade. A steel backfill blade shall be provided. The blade shall be hydraulically operated and controlled, and shall be so constructed that it can be angled right or left. The blade edge(s) shall be of abrasion resistant steel.

3.14 Backhoe attachment. When specified (see 6.2), the manufacturer's standard commercial hydraulically operated backhoe attachment with an 18 inch bucket and a minimum 69 inch digging depth shall be provided for the size B ditching machine.

3.15 Hydraulic system. A complete hydraulic system, including a pump, hydraulic ram(s), a filter, control valve, relief valve, reservoir, hoses, and fittings, shall be provided to perform all required hydraulic operations. Means shall be provided to control each operation separately. All controls shall be within easy reach of the operator and shall be permanently identified. Hydraulic lines, which are to be disconnected when changing digging attachment, shall be provided with self-sealing, quick-disconnect fittings. Hydraulic lines shall consist of tubing, hose, and fittings. Hose shall be used where flexing and vibration may contribute to failure. All lines shall be routed and located so as to provide the shortest line, minimum number of bends, simplicity, ease of maintenance, and maximum protection. Provision shall be made to prevent damage to lines due to chafing. The hose installation, such as angle of fittings and location, shall cause no stress concentration of the hose at the fittings and shall be supported to eliminate sagging hose.

3.16 Controls. All controls for the ditching machine shall be so located as to be easily accessible to the operator in his normal seated position. The operator's seat shall be located in a position to give the operator an unobstructed view of the guide line and the trenching and backfilling operations.

3.17 Carrier. The carrier shall be gasoline-engine-driven, pneumatic-tired, 4-wheel-drive, articulated or rigid frame, fabricated of steel to withstand the maximum load, with a selective or automatic type transmission having the travel speeds as specified herein.

3.18 Steering. Steering shall be accomplished by means of wheel or lever actuated hydraulic or hydraulic assisted power steering.

3.19 Engine. The engine furnished for the ditching machine shall be of the air or liquid cooled, gasoline or diesel powered type having hp, torque, and speed characteristics to satisfactorily meet all the digging machine performance requirements specified herein. The engine shall be furnished complete with accessories as follows. (when diesel engine is required, see 6.2).

a. An instrument panel complete with a fuel gage or stick; a cooling liquid-temperature indicator when liquid cooled engine is furnished; an ammeter, charging indicator, or voltmeter.
b. A fuel tank with sufficient capacity for 3 hours normal operation.
c. A 12-volt electric cranking system.
d. A charging generator or alternator with a rating of not less than 24 amperes.
E. When diesel engine is required a cold start system shall be installed.

3.19.1 Engine hour meter. An engine hour meter having a totalizing mechanism of not less than 9,999 hours shall be furnished to register accurately the number of hours of engine operating time. Meter shall be of strong rugged construction to ensure continuous trouble-free performance under the most extreme equipment operating conditions indicated in this specification.

3.19.2 Housing. An engine housing shall be provided. Housing doors or covers shall be provided to allow accessibility to any engine components requiring routine maintenance and repair. Latches shall be provided to hold all doors or covers in the closed position. Doors or covers, if hinged, shall be designed to permit their being restrained in the open position. The housing shall be removable or otherwise designed to permit engine removal and replacement.

3.20 Toolbox. The ditching machine shall be equipped with the manufacturer’s standard commercial metal toolbox. The toolbox shall have a hinged lid with a padlock closing device, less lock and key. The toolbox shall be securely fastened to the ditching machine in a readily accessible and protected position.

3.21 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 markings shall clearly indicate that the attachments are intended for the tie down of the ditching machine on the carrier when shipped.

3.22 Cleaning, treatment, and painting. Surfaces normally painted in good commercial practice shall be cleaned, treated, and painted as specified herein. The color of the finish coat shall be as specified (see 6.2), and be in accordance with FED-STD-595. Surfaces to be painted shall be cleaned and dried to ensure that they are free from contaminants such as oil, grease, welding slag

and spatter, loose mill scale, water, dirt, corrosion product, or any other contaminating substances. As soon as practicable after cleaning, and before any corrosion product or other contamination can result, the surfaces shall be prepared or treated to ensure the adhesion of the coating system. The painting shall consist of at least one coat of primer and one finish coat. The primer shall be applied to a clean, dry surface as soon as practicable after cleaning and treating. Painting shall be with manufacturer's current materials according to manufacturer's current processes and 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.

3.23 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 in diameter. The applicable nomenclature contained in the contract item description shall be placed in the top blank.

3.24 Instruction plates. The ditching machine shall be equipped with instruction plates suitably located, 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 diameter.

3.25 Lubrication. Unless otherwise specified (see 6.2), 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 with SAE J534. Where use of high-pressure lubricating equipment, 1,000 pound-force per square inch (psi) or higher, will damage grease seals or other parts, a suitable warning shall be affixed to the equipment in a conspicuous location.

3.26 Workmanship.

3.26.1 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. Manufacturing processes shall be done neatly and accurately. All bends shall be made by controlled means to ensure uniformity of size and shape.

3.26.2 Bolted connections. Bolt holes shall be accurately punched or drilled and shall have the burrs removed. Washers or lockwashers shall be provided in accordance with good commercial practice, and all bolts, nuts, and screws shall be tight.

3.26.3 Riveted connections. Rivet holes shall be accurately punched or drilled 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.

3.26.4 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.

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.

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 ditching machine when a first article is required (see 3.2, 6.2, and 6.3). This inspection shall include the examination of 4.3, the tests of 4.4, and when specified, the preproduction pack inspection of 4.6 (see 4.6 and 6.2). 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.

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 document. 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 first article shall be subjected to the tests specified in 4.4.1 and 4.4.2; and when provided with lifting and tiedown attachments, and backhoe attachment to the tests specified in 4.4.3 and 4.4.4, as applicable. Failure to pass any phase of these tests shall be cause for rejection.

4.4.1 Digging tests. Ditching machines shall excavate separate trenches in different widths and depths for determining digging capabilities as specified in table I. The depths and widths of the trenches to be expanded on each trench shall be as specified in 3.7. Not less than one right angle cut to the right, and one right angle cut to the left, shall be made during the excavation test. The spoil shall be discharged in windrow a sufficient distance to clear the excavated area. 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 machine, or when making right angle cuts, or when making maximum radii turns.

4.4.2 Speed and gradeability. The ditching machine shall be road tested to verify conformance to the applicable travel speed specified in 3.7. The ditching machine shall also be tested for the capability to climb and descend, at low speed, a 20 percent grade.

4.4.3 Lifting and tiedown attachments test. The ditching machine, when equipped with lifting and tiedown attachments, shall be tested to verify that the attachments conform to the requirements specified in 3.21.

4.4.4 Backhoe attachment test. The ditching machine, when equipped with backhoe attachment, shall be tested to assure proper operation of the backhoe attachment, hydraulic system, components, and controls.

4.4.5 Production sample. Upon acceptance of the first article, the first article shall remain at the manufacturing facility as a production sample, and shall be the last ditching machine delivered on the contract. The first article shall be reconditioned, including replacement of abnormally worn parts and paint touch-up or repainting, prior to delivery to enable it to be accepted as a contract item. The contractor shall maintain the first article in a serviceable condition for the duration of the contract.

4.5 Production unit tests. Each ditching machine shall be operationally tested, under no-load conditions, to verify that all digging and crowding

controls, travel controls, and hydraulic controls are functioning effectively and responsively.

4.6 Packaging inspection. The inspection of the preservation, packing, and marking shall be in accordance with the requirements of section 4 of MIL-T-3351. The inspection shall consist of the quality conformance inspection; and, when specified (see 6.2), a preproduction pack shall be furnished for examination and test within the time frame required (see 6.2).

5. PACKAGING

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

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 machines covered by this specification are intended for light-duty ditch excavations.

6.2 Ordering data. Purchasers should select the preferred options permitted herein and include the following information in acquisition documents:

a. Title, number, and date of this specification.
b. Size of ditching machine required (see 1.2).
c. Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1.1 and 2.2).
d. when diesel engine is required (see 3.19).
e. When first article is required for inspection and approval (see 3.2, 4.2.1, and 6.3).
f. When over-center clutch type is required (see 3.7.1).
g. When backhoe attachment is required for size B ditching machine (see 3.14).
h. When lifting and tiedown attachments are required (see 3.21).
i. Color of finish coat required (see 3.22).
j. When other than standard lubrication is required (see 3.25).
k. When a preproduction pack inspection is required and time frame required for submission (see 4.2.1 and 4.6).
l. Level of preservation and level of packing required (see 5.1).

6.3 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.

MILITARY INTERESTS:

Custodian

Navy - YD

CIVIL AGENCY COORDINATING ACTIVITIES:

GSA - FSS

PREPARING ACTIVITY:

NAVY - YD
(Project 3805-0140)