

INCH-POUND

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FEDERAL SPECIFICATION

GRADERS, ROAD, MOTORIZED

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 diesel engine-powered, pneumatic-tired hydraulically-operated motor graders.

1.2 Classification. The graders shall be of the following types and sizes as specified (see 6.2).

- Type I - 4-wheel, 2-wheel drive, front-wheel steer and articulated frame steer.
- Type II - 6-wheel, 4-wheel drive, front-wheel steer.
- Type III - 6-wheel, 4-wheel drive, front-wheel steer and articulated frame steer.
- Type IV - 6-wheel, all-wheel drive, front-wheel steer.
- Type V - 6-wheel, all-wheel drive, front-wheel steer and articulated frame steer.

Sizes - see table I

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.

FSC 3805

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TABLE I. Size classification (U.S. Customary units).

Size	Operating weights in pounds (lbs)				Wheel Base Inches	Blade Pull (lbs) 1/
	Type I	Type II, Type III	Type IV	Type V		
1	10,000 thru 16,500	10,000 thru 16,500	-	-	154	7,500
2	16,501 thru 22,500	16,501 thru 22,500	-	-	198	9,400
3		22,501 thru 25,000	-	-	224	10,400
4		25,001 thru 27,500	27,000 thru 29,000	25,000 thru 27,500	224	13,200
5		27,501 thru 30,500	29,001 thru 30,000	27,501 thru 31,500	233	15,600
6		30,501 thru 34,000	30,001 thru 33,000	31,501 thru 35,500	233	18,000
7		34,001 up	-	-	240	20,300

[1] For blade Pull limitations, see 3.4.3.

TABLE I. Size classification (Metric units).

Size	Operating weights in kilograms (kg)				Wheel Base (mm)	Blade Pull (kg) 1/
	Type I	Type II, Type III	Type IV	Type V		
1	4535 thru 7483	4535 thru 7483	-	-	3911	3402
2	7484 thru 10 203	7484 thru 10 203	-	-	5029	4263
3		10 204 thru 11 337	-	-	5689	4716
4		11 338 thru 12 471	12 245 thru 13 151	11 338 thru 12 471	5689	5986
5		12 472 thru 13 832	13 152 thru 13 605	12 472 thru 14 285	5918	7075
6		13 833 thru 15 419	13 606 thru 14 965	14 286 thru 16 100	5918	8163
7		15 420 up	-	-	6096	9206

[1] For blade Pull limitations, see 3.4.3.

2. APPLICABLE DOCUMENTS

2.1 Government publications. The following documents, of the issues in effect on the date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein.

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Federal Standards:

FED-STD-595 - Colors Used in Government Procurement.

(Activities outside the Federal Government may obtain copies of federal standard as specified in the General Information section of the Index of Federal Specifications, Standards and Commercial Item Descriptions. The Index is for sale on a subscription basis from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.)

(Single copies of this specification required by activities outside the Federal Government for bidding purposes are available without charge from the General Services Administration, Federal Supply Service Bureau, Specification Section, Suite 8100, 470 L'Enfant Plaza, SW, Washington, DC 20407)

Military Specification:

MIL-P-514 - Plates, Identification, Instruction and Marking, Blank

Military Standards:

MIL-STD-209 - Slings and Tiedown Provisions for Lifting and Tying Down Military Equipment.

(Copies of military specification and standard required by contractors in connection with specific procurement functions are obtained from the Standardization Documents Order Desk, Bldg. 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

Code of Federal Regulations (CFR):

29 CFR 1926.1001 - Rollover Protective Structure.

(The Code of Federal Regulations (CFR) are for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. When indicated, reprints of certain regulations may be obtained from the federal agency responsible for issuance thereof.)

Department of Transportation (DOT):

Federal Motor Carrier Safety Regulations.

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

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

Society of Automotive Engineers (SAE):

SAE J53 - Minimum Performance Criteria for Emergency Steering of Wheeled Earthmoving Construction Machines.
SAE J88 - Sound Measurement - Earthmoving Machinery - Exterior.

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SAE J350 - Spark Arrester Test Procedure for Medium Size Engines.
SAE J872 - Drawbar Test Procedure for Construction, Forestry, and Industrial Machines
SAE J1152 - Braking Performance - Rubber-Tired Construction Machines.
SAE J1166 - Sound Measurement - Off-Road Self-Propelled Work Machines Operator-Work Cycle.

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

Tire and Rim Association, Inc. (TRA):

Tire and Rim Association Yearbook.

(Application for copies should be addressed to the Tire and Rim Association, Inc., 175 Montrose West Avenue, Suite 150, Copley, OH 44321.)

2.3 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 graders shall be diesel-engine-driven, pneumatic-tired and controllable by one operator for general construction work, such as course and fine grading, low and high bank cutting, scarifying and V-ditching. The graders shall be equipped with all necessary operating accessories necessary to enable the unit to function reliably and efficiently in sustained operation.

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

3.3 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 is allowed under this specification.

3.4 Grader characteristics.

3.4.1 Weight. The operating weight of the grader shall be not less than specified in table I. Weight shall be determined with the grader in a fully serviced condition including fuel, oil, water, rollover protective structure (ROPS) cab, and with standard accessories as specified herein. Weight shall not include hydroinflation or other tire ballast, bolt on wheel weights, or other bolt on "dead" weight, or an operator. The grader shall have not less than 65

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percent nor more than 75 percent of the operating weight on the rear tandem wheel except type I.

3.4.2 Wheelbase dimension. The minimum wheelbase dimension shall be as specified in table I.

3.4.3 Blade pull. The grader shall develop a grade pull of not less than specified in table I when tested in accordance with SAE J872 at 2 miles per hour (mph) or 3.22 kilometers per hour (km/h) on a dry concrete surface with the slip factor not to exceed 15 percent.

3.4.4 Type I. The type I graders shall be of the 4-wheel, 2-wheel drive, front-wheel steer, articulated frame type. The rear drive shall be rigid and shall have an automatic locking differential.

3.4.5 Type II. The type II graders shall be of the 6-wheel, 4-wheel drive, front-wheel steer, rigid frame type. The final drive shall be on the four rear wheels arranged in tandem, two on each side. The tandem frames shall be mounted on and pivot about the driving axle, so that equal weight is carried on all four wheels when operating over rough terrain to minimize the effect on the evenness of the blade cut.

3.4.6 Type III. Type III graders shall be of the 6-wheel, 4-wheel drive, front-wheel steer, articulated frame type. The final drive shall be on the four rear wheels, arranged in tandem, two on each side. The tandem frames shall be mounted on and pivot about the driving axle, so that equal weight is carried on all four wheels operating over rough terrain to minimize effect on the evenness of the blade cut. The grader shall have a limited slip differential or a manual lock-unlock differential or an automatic locking differential.

3.4.7 Type IV. Type IV graders shall be of the 6-wheel, all-wheel drive, front-wheel steer, rigid frame type. The tandem drive frames shall be mounted on and pivot about the driving axle, so that equal weight is carried on all four wheels when operating over rough terrain to minimize effect on the evenness of the blade cut.

3.4.8 Type V. Type V graders shall be of the 6-wheel, all-wheel drive, front-wheel steer, articulated frame type. The tandem drive frames shall be mounted on and pivot about the driving axle, so that equal weight is carried on all four wheels when operating over rough terrain to minimize effect on the evenness of the blade cut. The grader shall be equipped with an automatic or manual locking differential.

3.5 Frame. The frame shall be of structural steel. The frame shall be designed to withstand maximum stresses under normal operating conditions, and in addition, provide adequate support for any device specified in combination with the grader. Articulated frames shall be joined by a rugged hinge assembly that allows free movement to either side but which holds the frame rigid against twisting forces. A mechanical lockout to prevent hinge action shall be provided on articulated frames.

3.6 Safety. All moving parts and parts subject to high operating temperature which are so located to be a hazard to operating and maintenance personnel shall be enclosed or guarded. The starting system shall be such that

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the transmission must be placed in neutral before the engine can be started.

Graders with articulated frames shall have a decal located in the area of the articulation points warning of personnel clearance during frame articulation and placement of the safety pin or bar in the transport mode. Handles and nonskid steps shall be of a size, shape, and location to permit safe mounting and dismounting. The graders shall be furnished with seatbelts, horn, and reverse signal alarm. Unless otherwise specified herein, the graders shall conform to all Federal Laws and Regulations governing noise, air pollution, and other health and safety requirements which are in effect for this type of equipment at the time of contract award.

3.6.1 Noise. The grader exterior sound level shall not exceed 88 dB(A) when tested as specified in 4.2.2. If operator sound exposure exceeds 85 dB(A) for any part of specified test, a noise hazard decal stating the following shall be permanently mounted in the operator compartment: "CAUTION: Hearing Protection Required."

3.7 Engine. The engine shall be the heavy-duty diesel furnished commercially including all systems, components, accessories, and auxiliaries.

The engine shall be four-stroke cycle.

3.7.1 Cooling system. The manufacturer's current standard production engine cooling system shall be provided. A radiator and fan tip guard shall be provided. The cooling system shall be filled with a clean solution of 50 percent water and 50 percent ethylene glycol type antifreeze.

3.7.2 Engine starting requirements. The engine shall start within 5 minutes and the grader controls shall be operable within 15 minutes after engine start in any ambient temperature in the range of -25 degrees Fahrenheit (oF) (-32 degrees Celsius (oC)) +110oF (43oC). The engine shall have glow plugs, intake manifold preheat device, or a premeasured shot ether type cold start aid controlled from the operator's seat. If ether type start aid is used, start aid shall not operate when engine or ambient temperature does not warrant starting aid use.

3.7.3 Engine shields. The engine shall be protected with metal or fiberglass top and lower hood side panels. When the grader frame members or other components provide protection for the engine, lower side panels will not be required. When specified (see 6.2), the graders shall be equipped with removable side panels with quick-disconnect latches or hinged engine compartment doors. When engine compartment doors are hinged they shall have retainers to hold doors in an open position.

3.7.4 Engine accessories. The engine shall be equipped with the following:

- a. Two stage dry type air cleaner with service indicator and automatic dust ejector.
- b. Oil filter, full-flow replaceable-element type.
- c. Fuel filter, full-flow replaceable-element type.
- d. Governor.
- e. Muffler.
- f. Exhaust stack with rain cap or curved bevel-cut extension.

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- g. Non-turbocharged engines shall be equipped with a spark arrester having an arresting efficiency of 80 percent as determined by SAE J350.

3.7.5 Fuel tank. The fuel tank shall have capacity for 8 hours of continuous operation and shall be equipped with means for draining water and sediment from the bottom of the tank.

3.8 Transmission. The grader shall be equipped with a powershift type transmission capable of shifting under full engine power through successive forward and reverse gear ratios within ranges. Graders equipped with torque converter drives shall have gear reductions suitable to keep the torque converter working efficiently throughout the entire range of grader speeds. The number of forward and reverse speeds, the maximum forward speed ranges in first and second gears in the unloaded condition, and the minimum travel speed in high gear for each size of grader at governed engine speed, shall be as shown in table II.

TABLE II. Powershift equipped graders (U.S. Customary units).

Size (all types)	Minimum number of speeds		Reverse speed ranges		Forward speed ranges		
	FWD	REV	lowest speed (mph)	highest speed (mph)	1st gear (mph)	2nd gear (mph)	high gear (mph)
1	3	2	0 to 4.1	7.0 and up	0 to 4.0	2.7 to 8.0	18
2	3	2	0 to 4.0	7.0 and up	0 to 4.0	2.7 to 8.0	18
3	4	2	0 to 4.0	7.0 and up	0 to 4.0	2.7 to 8.0	20
4	4	2	0 to 4.0	7.0 and up	0 to 4.0	2.7 to 8.0	20
5	4	2	0 to 4.0	7.0 and up	0 to 4.0	2.7 to 8.0	20
6	4	2	0 to 4.0	7.0 and up	0 to 4.0	2.7 to 8.0	20
7	4	2	0 to 4.0	7.0 and up	0 to 4.0	2.7 to 8.0	20

TABLE II. Powershift equipped graders (Metric units).

Size (all types)	Minimum No. of speeds		Reverse speed ranges		Forward speed ranges		
	FWD	REV	lowest speed (km/h)	highest speed (km/h)	1st gear (km/h)	2nd gear (km/h)	high gear (km/h)
1	3	2	0 to 6.6	11.3 and up	0 to 6.4	4.3 to 12.9	29.0
2	3	2	0 to 6.4	11.3 and up	0 to 6.4	4.3 to 12.9	29.0
3	4	2	0 to 6.4	11.3 and up	0 to 6.4	4.3 to 12.9	32.2
4	4	2	0 to 6.4	11.3 and up	0 to 6.4	4.3 to 12.9	32.2
5	4	2	0 to 6.4	11.3 and up	0 to 6.4	4.3 to 12.9	32.2
6	4	2	0 to 6.4	11.3 and up	0 to 6.4	4.3 to 12.9	32.2
7	4	2	0 to 6.4	11.3 and up	0 to 6.4	4.3 to 12.9	32.2

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3.9 Final drive. All shafts, gears, sprockets, chains, and bearings shall have sufficient strength and capacity to safely transmit full power of the engine to the driving wheels. Drive gears shall run in an oil bath and all driving mechanisms shall be fully enclosed and protected against lubricant leakage and entrance of dust, mud, and water.

3.10 Limiting device. All graders, except type I, shall have a device permanently attached to the grader to limit or prevent tandem oscillation. In lieu of the limiting device, lifting attachments may be located at the center of balance of the tandem cases to prevent tandem case oscillation or damage to the grader during loading and shipment.

3.11 Front axle. The front axle shall be pivot mounted, of rugged construction, and fitted with leaning-type wheels and operating mechanism. Positive means shall be provided to prevent the tires from rubbing when the wheels are in the leaning position. The leaning wheel mechanism shall lean the wheels not less than 15 degrees right and left.

3.12 Steering. The graders shall have hydraulically boosted mechanical or full hydraulic power steering. The grader shall be equipped with an emergency steering system conforming to SAE J53 that will give the operator steering control in the event of engine failure.

3.13 Controls. All movement of the moldboard (except moldboard tilt size 1 grader), scarifier, ripper and leaning wheel mechanism shall be controlled through hydraulic valves. All control levers shall be located in and operated from the operator's compartment. The controls shall permit simultaneous operation of not less than three functional components without appreciable loss of component speed or power with engine at normal operating speed.

3.14 Hydraulic system. The hydraulic system shall be the manufacturer's standard commercial system and shall provide sufficient force and means for operating the blade, scarifier, and related components.

3.15 Brake system. A service brake system effective on not less than four wheels shall be provided. A parking brake and an emergency stopping system shall be provided. The braking system shall comply with SAE J1152.

3.16 Operator's compartment.

3.16.1 Cab. The grader shall be furnished with a fully enclosed ROPS cab or a ROPS with canopy as specified (see 6.2). The ROPS shall comply with 29 CFR 1926.1001. The fully enclosed cab shall be the manufacturer's current standard production type, enclosing the operator's seat and all controls. The cab shall not obstruct the view of operation while the operator is seated. The cab shall be equipped with two doors, one on each side of the cab, and each door shall be provided with a lock or latch to secure the door in an open position. A personnel heater, defroster fan, front and rear windshield wipers and a rear view mirror (mounted outside and on the left hand side of the cab) shall be furnished.

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3.16.2 Seat. The manufacturer's standard commercial operator's seat shall be provided. The seat shall be located to provide the operator with convenient access to operating controls and to provide good visibility of the work zone, when seated with seatbelt fastened and properly adjusted. When specified (see 6.2), the manufacturer shall provide a full suspension type seat, adjustable for load and height.

3.16.3 Instruments and gages. The manufacturer's standard instruments and gages shall be provided, and as a minimum shall include the following:

- a. Engine lubricating oil pressure.
- b. Engine cooling liquid temperature.
- c. Torque converter temperature (when available, either standard or optional).
- d. Ammeter, voltmeter or battery charging indicator.
- e. Hourmeter.
- f. Tachometer.
- g. Fuel level indicator.

Instruments may be either analog or audio visual warning type.

3.17 Circle and moldboard assembly. The circle and moldboard assembly shall provide for all operations listed in table IV. The moldboard sideshift shall be hydraulic power operated, both to the right and to the left of the circle. The assembly shall be provided with shims or other means of adjustment for wear.

3.17.1 Moldboard. Unless otherwise specified (see 6.2), moldboards shall be in accordance with table IV, and shall be equipped with standard punched replaceable cutting edges having a high resistance to wear and abrasion. Cutting edges shall be the highest quality available in manufacturer's brochures, either standard or optional.

TABLE IV. Moldboard minimum dimensions (U.S. Customary units).

			Height with cutting edge[1]	Cut below ground level[1]	Lift above ground level[2]	Reach outside rear tires[2] right & left (inches)	Bank cutting angle right & left (degrees)	Rotation (degrees)
Size	Length (feet)	Thickness (inches)	(inches)	(inches)	(inches)			
1	10	1/2	14	4	10	36-36	-	120
2	12	3/4	22	12	13	65-60	90	360
3	12	3/4	24	16	16	68-68	90	360
4	12	3/4	24	17	16	68-68	90	360
5	12	3/4	24	17	16	72-68	90	360
6	12	7/8	26	17	16	72-68	90	360
7	14	1	26	17	16	82-81	90	360

[1] Measured on curve of moldboard.

[2] Measured with tires furnished in 3.18.

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TABLE IV. Moldboard minimum dimensions (Metric units).

Size	Length (meters) (m)	Thick- ness (mm)	Height with cutting edge[1] (mm)	Cut below ground level[2] (mm)	Lift above ground level[2] (mm)	Reach outside rear tires[2] right & left (mm)	Bank cutting angle right & left (degrees)	Rotation (degrees)
1	3.0	12.7	356	102	254	914-914	-	120
2	3.7	19.1	559	305	330	1651-1524	90	360
3	3.7	19.1	610	406	406	1727-1727	90	360
4	3.7	19.1	610	432	406	1727-1727	90	360
5	3.7	19.1	610	432	406	1829-1727	90	360
6	3.7	22.2	660	432	406	1829-1727	90	360
7	4.3	25.4	660	432	406	2083-2057	90	360

[1] Measured on curve of moldboard.

[2] Measured with tires furnished in 3.18.

3.17.2 Actuating mechanism interference. No movement or combination of movements or adjustments of the moldboard assembly shall cause any part of the actuating mechanism to contact any structural part of the grader in such a manner as to damage the structure or mechanism when operated in accordance with manufacturer's operating and maintenance manuals. Electric limit switches to provide this protection shall not be permitted.

3.18 Wheels and tires. Commercial standard demountable wheels or rims shall be provided. Tires shall be of the tubeless type, shall have a tread pattern suitable for grader operation, and conforming to the TRA recommendation.

TABLE V. Tires.

Grader size	Minimum tire size	Ply rating
1	38.5 x 15	6
2	13.00 x 24	8
3	13.00 x 24	8
4	13.00 x 24	10
5	13.00 x 24	12
6	14.00 x 24	10
7	16.00 x 24	12

3.19 Tow hitch. Graders shall be equipped with the manufacturer's standard rear removable pin type hitch. The height from the ground to the centerline of the hitch jaw opening shall be between 20 and 38 inches (508 and 965 mm).

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3.20 Accessories and attachments. Graders shall be furnished with the following accessories as specified (see 6.2).

- a. Lights. The following lights (meeting DOT Motor Carrier Safety Regulations, as applicable) with associated circuits and switches shall be provided:
 - (1) Two headlights.
 - (2) Working lights (mounting location shall be furnished by buyer).
 - (3) Combination stop and taillights.
 - (4) Turn signals with emergency flasher.
 - (5) Instrument panel lighting.
 - (6) Rear floodlight.
 - (7) Dome light (cab).
 - (8) Flashing amber beacon rotating, mounted to give 360 degree visibility.
- b. Scarifier. The grader shall be furnished with a V-type scarifier equipped with not less than nine removable shanks (seven for size 1 graders) with replaceable points.
- c. Ripper. A rear mounted ripper shall be furnished and shall be equipped with not less than three replaceable shanks with replaceable points.
- d. Bulldozer. The bulldozer shall be equipped with standard punched replaceable cutting edges having a high resistance to wear and abrasion. Cutting edges shall be of a commercial type. The blade shall be equipped with an all-welded, steel push frame for mounting on the grader and shall be controlled by the grader hydraulic system.
- e. Snowplow. The snowplow shall be of the V-blade type and shall be equipped with replaceable cutting edges. The snowplow shall be provided with adjustable shoes with renewable wear plates and be controlled by the grader hydraulic system.
- f. Snow wing. The snow wing shall be not less than 12 feet (3.7 m) long and shall be provided with adjustable arms for setting the horizontal angle of the wing to at least the angle the V-plow makes with the horizontal axis of the grader. Vertical adjustment shall be accomplished hydraulically or by other suitable methods with controls accessible to the operator in his normal operating position. Cutting edges conforming to the contractor's standard commercial product shall be provided.
- g. Blade extensions, right and left.
- h. Front tow hook(s) or eye(s).
- i. Radiator shutters.
- j. Hydraulic tilt moldboard (size 1 grader).
- k. Anti-vandalism protection. The grader shall be equipped with locks to secure the following:
 - (1) Fuel tank filler cap.
 - (2) Hydraulic oil tank filler cap.
 - (3) Engine enclosures.
 - (4) Transmission oil filler cap and dipstick, unless located within the engine compartment.
 - (5) Radiator filler cap.
 - (6) Toolbox.

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- (7) Battery box, unless located within the engine compartment.
- (8) Instrument panel cover, or locking doors with enclosed cab.

- l. Automatic blade float control.
- m. Fire extinguisher. Minimum 1A-10BC rating.
- n. Tire inflation kit or pump. The tire inflation kit or pump shall be equipped with flexible high pressure air hose of sufficient length to reach all wheels. The hose shall be equipped with a valve stem chuck and tire pressure gage.
- o. Storage box. The storage box shall be of sufficient size to store the scarifier shanks with the points installed.

3.21 Cleaning, treatment, and painting. Surfaces normally painted in good commercial practice shall be cleaned, treated, and painted as specified herein. Unless otherwise specified (see 6.2), the color of finish coat shall be manufacturer's standard nearest match to yellow, chip number 13538 of FED-STD-595. 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 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 insure the adhesion of the coating system. The painting shall consist of at least one coat of primer and one finish coat of lead free paint. 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.

3.22 Identification plate. When specified (see 6.2), an identification plate conforming to MIL-P-514, shall be permanently affixed to the grader in a conspicuous place. The contractor shall stamp all necessary data in the blank spaces provided for that purpose.

3.23 Manufacturer's brochures. A copy of the manufacturer's standard brochure describing this grader shall be furnished to the contract office for shipment to the ordering office.

3.24 Air transportability. When specified (see 6.2), the grader shall be air transportable. Detailed air transportability requirements shall be as specified in the contract or purchase order.

3.25 Lifting and tiedown attachments. When specified (see 6.2), the equipment 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 equipment. 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 equipment on the carrier when shipped.

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3.26 Manuals. When specified (see 6.2), one copy of the operators, maintenance, repair parts, and overhaul manuals shall be furnished for each unit.

4. QUALITY ASSURANCE PROVISIONS

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

4.2 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 a grader when a first article is required (see 3.2 and 6.2). This inspection shall include the examination of 4.3 and the tests of 4.4. The first article grader 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 and the operational tests of 4.4.3.

4.3 Examination. Each unit 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 requirement or presence of one or more defects preventing or lessening maximum efficiency shall constitute cause for rejection.

4.4 Test. Failure to pass any test shall constitute cause for rejection.

4.4.1 Grader blade pull test. The blade pull shall be tested in accordance with SAE J872 to verify conformance to 3.4.3.

4.4.2 Noise test. Exterior sound level shall be measured in accordance with SAE J88 to verify conformance to 3.6.1. Operator sound level exposure shall be tested in accordance with SAE J1166.

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4.4.3 Operational Test. The grader shall be operated for not less than one (1) hour to verify the satisfactory operational functions of all components and controls.

5. PACKAGING

5.1 Packaging requirements. The preservation, packaging, and packing shall be as specified in the contract or purchase order (see 6.2).

6. NOTES

6.1 Intended use. Where factors such as weather, tractive conditions, and other unusual work conditions prevail, the agency issuing bids should describe such conditions of intended use.

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

- a. Title, number, and date of this specification.
- b. Type and size required (see 1.2).
- c. When a first article is required for inspection (see 3.2).
- d. When removable engine side panels with quick-disconnect latches or hinged engine compartment doors are required (see 3.7.3).
- e. Operators compartment required; Enclosed ROPS cab or ROPS with canopy. (see 3.16.1).
- f. When a full suspension type operator seat is required (see 3.16.2).
- g. When moldboards other than specified are required (see 3.17.1).
- h. Optional accessories and attachments required (see 3.20).
- i. When color of finish coat is other than yellow (see 3.21).
- j. When identification plates are required (see 3.22).
- k. When air transportability is required (see 3.24).
- l. When lifting and tiedown devices are required (see 3.25).
- m. When manuals are required (see 3.26).
- n. Packaging requirements (see 5.1).

6.3 Subject term (key word) listing.

Articulated
Diesel-engine-driven
Power shift
ROPS Cab

6.4 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

OO-G-630G

MILITARY INTEREST:

Custodians
Navy - YD1

Review activities
Navy - MC
DLA - CS

CIVIL AGENCY
COORDINATING ACTIVITIES:

GSA/FSS

PREPARING ACTIVITY:
Navy - YD1

(Project 3805-0153)