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* INCH-POUND *

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SUPERSEDING
MIL-E-29239(YD)
15 July 1985

FEDERAL SPECIFICATION

EXCAVATORS, CRAWLER MOUNTED, DED, HYDRAULICALLY OPERATED

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 diesel powered, crawler mounted, hydraulically operated, excavators.

1.2 Classification. The excavator shall be one of the following types and sizes (SAE J1193 recommended practices) as specified (see 6.2):

Type I - Telescoping boom, type
Type II - Hoe type

Type	Size	Minimum over the side rated lifting capacity (SAE J1097)
I	1	6,500 pounds (lb) at 15-foot (ft) radius and ground level
I	2	7,500 lb at 20-ft radius and ground level
II	1	5,000 lb at 15-ft radius and ground level
II	2	7,000 lb at 15-ft radius and ground level
II	3	12,500 lb at 15-ft radius and ground level

Note: Radius equals any point through 360 degrees (o).

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. *

FSC 3805

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

(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.)

Federal Specifications

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

Military Specifications

MIL-P-514 - Plates, Identification, Instruction and Marking, Blank
MIL-T-704 - Treatment and Painting of Materiel
MIL-T-3351 - Tractors, Full-Tracked, Low-Speed; Tractor Wheeled, Agricultural; and Tractor Wheeled, Industrial; and Their Attachments, Packaging of

Military Standards

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

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

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, U.S. Government Printing Office, Washington, DC 20402.)

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 Department of Defense (DoD) adopted shall be the issue listed in the current DoDISS and the supplement thereto, if applicable.

POWER CRANE AND SHOVEL ASSOCIATION (PCSA)

No. 5 - Mobile Hydraulic Excavator Standards.

(Application for copies should be addressed to the Power Crane and Shovel Association, Marine Plaza, Suite 1700, 111 East Wisconsin Avenue, Milwaukee, WI 53202.)

SOCIETY OF AUTOMOTIVE ENGINEERS, INC. (SAE)

SAE J517 Hydraulic Hose, Standard.
SAE J534 Lubrication Fittings, Standard.
SAE J1097 Hydraulic Excavator Lift Capacity Calculation and Test Procedure, Standard.
SAE J1193 Nomenclature and Dimensions for Hydraulic Excavators, Recommended Practice. SAE J1197 Rated Operating Load for Loaders Equipped with Log or Material Forks Without Vertical Mast, Recommended Practice.

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

(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. This specification consists of diesel engine driven, crawler mounted, fully revolving, upperstructure type excavators and allied equipment of conventional design, and heavy-duty construction, complete with all necessary operating accessories customarily furnished with excavators of this type, whether stipulated herein or not, together with such modifications and attachments necessary to enable the unit to function reliably and efficiently in sustained operation. The excavator shall be capable of traveling over rough ground under adverse or severe conditions. The excavator shall comply with the mobile hydraulic excavator standards PCSA No. 5.

3.2 First article. When specified (see 6.2), the contractor shall furnish an excavator of the type and size as required for first article inspection and approval (see 4.2.1 and 6.3).

3.3 Standard commercial product. The excavator 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 excavators 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 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 are 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 Maintainability. The excavator design, together with component and accessory location and installation, shall permit ready accessibility to all items requiring periodic maintenance service in the field, which will be accomplished with the use of conventional general-purpose tools associated with equipment of this nature. The replacement and adjustment of components and accessories shall be accomplished with minimum drainage requirements and minimum disturbance to other elements of the excavator.

3.7 Safety. The excavator shall comply with PCSA No. 5 and OSHA regulations. All rotating or reciprocating parts and all parts subject to high operational temperature, that are of such a nature or are so located as to become a hazard to the operating or attending personnel, shall be substantially guarded, or insulated, to the extent necessary to eliminate the hazard. The principal platform walking surfaces shall be of an antiskid type. Ladders, steps, and handholds shall be provided in such quantity and of such size on the sides of the excavator cab or super-structure that entrance thereto and exit therefrom may be unhampered and nonhazardous. Engine cooling fans shall have heavy grille or ring type guards.

3.7.1 Noise. If the noise level in the area occupied by the operator exceeds 85 decibels, a caution plate shall be permanently posted on the excavator in a conspicuous protected location and shall be clearly visible and legible to all personnel exposed to the excessive noise levels. The caution plate shall read: CAUTION - HEARING PROTECTION REQUIRED. The plate shall have a yellow background with black lettering and plate shall be made of corrosion-resistant material.

3.7.2 Electrical warning decal. An electrical warning decal, in accordance with OSHA requirements, cautioning the operator about operating the excavator near electric power lines, shall be provided.

3.7.3 Strike-hazard. Hazard marking stripes shall be applied to the counterweight. Stripes shall be alternating yellow and black stripes to denote a strike-hazard to personnel on the ground. Colors shall be reflective for night operation.

3.8 Environmental conditions. The excavator shall start and maintain constant performance characteristics as specified herein under any of the following conditions or combination of conditions:

a. Temperature conditions. In any ambient temperature from -5 degrees Fahrenheit (oF) to 110oF, except as specified in 3.8b below.
b. Elevation conditions. At any elevation from sea level (barometric pressure 29.92 inches mercury) and a maximum ambient temperature of 110oF to 5,000 ft (barometric pressure 24.89 inches mercury) and a temperature of 100oF.

3.9 Upperstructure. The upperstructure shall consist essentially of a cab enclosing the machinery and operator's position, mounted on a full revolving platform. All operating machinery shall be mounted on and attached to the revolving platform. The boom and machinery shall be attached to the principal members of the platform frame. The upperstructure shall be furnished with work lights at front and rear, minimum number acceptable is two at each end, located near the outer edges of the machine.

3.9.1 Cab. The cab shall be fabricated of sheet metal or sheet fiberglass and shall have sufficient windows and glazed doors to permit 270o vision for the operator. All glass shall be of the safety type, and shall be held in place by channels of rubber composition or other suitable weatherproof materials for easy replacement. The front window shall be arranged for easy opening or removal. Provision shall be made to fold or store the front window clear of the operator.

Cab doors, whether of the sliding, folding, or swinging type, shall be adequately restrained from accidently opening or closing while the excavator is traveling or operating. A comfortable seat for the operator, with four-way adjustment within easy reach of the control levers and pedals shall be provided for maximum unobstructed visibility of the work by the operator without leaving the seat. Unless otherwise specified (see 6.2), the cab shall be provided with a fan type defroster and a heater. The heater shall direct a steady flow of heated air to the operator's feet, and the defroster shall be capable of defrosting at least 75 percent of the window area. A large heater used for dual purpose as a heater and defroster combination is permissible. The defroster and heater shall be mounted and positioned to permit routine maintenance and quick removal.

3.9.2 Swing stop device. A means capable of locking the upperstructure in position shall be provided. The swing stop controls shall be of the automatic type, with provisions made for easy adjustment. The swing stop must be an automatic brake and the swing function (must be nondirectional) and equal strength in both directions.

3.10 Operating controls. Operator controls shall conform to SAE J1197. The levers and pedals shall be conveniently located and arranged for easy access and operation by the operator while in a seated position and shall not obstruct the operator's view of the work. The levers shall require not more than 25 lb force to operate unless greater force is required for safety reasons. All brakes shall be capable of being easily locked or unlocked.

3.11 Hydraulic system. The hydraulic system shall consist of oil reservoir, pumps, full flow filtering system, manifolds, hydraulic pistons, overloading and pressure relief valves, piping, tubing, high pressure hoses and connections required to properly operate the excavator. The hydraulic oil reservoir shall be equipped with site level gauges to indicate oil level when oil is hot or cold. All high pressure hydraulic hoses and fittings shall be capable of withstanding a bursting test pressure of four times the working pressure, and a proof pressure of at least two times the working pressure. High pressure hydraulic hoses shall have the physical qualities equal to or conforming to SAE J517. Hydraulic oil shall be of the noncorrosive type with the characteristics to withstand a temperature range from -10oF to 200oF. All functions shall be controlled from the operator's position. The following functions shall be hydraulically operated and controlled:

a. Telescoping boom or boom arm.
b. Rotation of bucket or boom tilt.
c. Vertical control of boom.
d. Revolving of upperstructure.
e. Operation of attachments.
f. Forward, reverse drive for each track of crawler undercarriage.

3.12 Boom and attachments. The excavator shall be supplied with manufacturer's standard boom with the following minimum characteristics and capabilities when measured in accordance with SAE J 1193 recommended practice. Boom shall be furnished with work lights, attached to each side, located to illuminate maximum work area.

a. Extended length (AU) not less than 24 ft for type I, size 1 excavator, and not less than 29 ft for type I, size 2 excavator.
b. Retracted length (AV) not more than 14 ft for type I, size 1 excavator, and not more than 15 ft 9 inches for type I, size 2 excavator.
c. Maximum digging depth (AB) not less than 16 ft (below ground level) for all types and sizes of excavators.
d. Digging reach (AA) not less than 26 ft for all types and sizes of excavators.
e. Dumping height (BD) not less than 15 ft for all types and sizes of excavators.
f. Digging through a range around the excavator not less than 360o continuous.
g. Swing shall be continuous.
h. Boom or bucket rotation or tilt (AX) type I, not less than 45o to right and left.
i. Bucket pivot (AS) not less than 150o for all types and sizes.
j. The type I boom telescoping action shall be supported by adjustable hardened steel rollers or bearings which shall provide full support for all vertical and horizontal forces applied to the boom during excavating and lifting operations.

The following excavating attachments shall be furnished as specified (see 6.2):

		Minimum capacity (cubic yards)
k.	Type I, size 1 excavator:	
	Bucket, excavating, 24-inch cutting width.	5/16
	Bucket, ditch cleaning, 60-inch width.	3/4
	Bucket, ditch cleaning, 72-inch width.	1.0
	Bucket, excavating, 30-inch width.	1/2
	Bucket, sidewalk removal, 40-inch width.	
	Blade, grading, 8-ft width with straight edge.	
	Boom extension, not less than 4 ft, complete with necessary mounting gear.	
l.	Type I, size 2 excavator:	
	Bucket, excavating, 26-inch cutting width.	3/8
	Bucket, excavating, 36-inch cutting width.	5/8
	Bucket, excavating, 46-inch cutting width.	3/4
	Bucket, dredging, 72 inches.	1.0
	Bucket, ditching, cleaning 72 inches.	1.1/4
	Bucket, concrete pouring.	1/2
	Bucket, pavement removal, not less than 40 inches.	1/2
	Ripper, single tooth, heavy duty.	
	Blade, grading 8-ft width, with straight edge.	
	Boom extension, not less than 4 ft, complete with necessary mounting gear.	
	Boom extension, not less than 8 ft, complete with necessary mounting gear.	
m.	Type II, size 1 excavator.	
	Bucket, general purpose 18-inch cutting width.	.32 yard
	Bucket, general purpose 22-inch cutting width.	.41 yard
	Bucket, general purpose 26-inch cutting width.	.50 yard
	Bucket, general purpose 30-inch cutting width.	.59 yard
	Bucket, general purpose 34-inch cutting width.	.68 yard
	Bucket, general purpose 38-inch cutting width.	.77 yard
	Bucket, general purpose 42-inch cutting width.	.86 yard
	Bucket, general purpose 46-inch cutting width.	.95 yard
	Bucket, rock purpose 22-inch cutting width.	.43 yard
	Bucket, rock purpose 28-inch cutting width.	.58 yard
	Bucket, rock purpose 38-inch cutting width.	.82 yard
n.	Type II, size 2 and 3 excavators:	
	Bucket, general purpose 24-inch cutting width.	.50 yard
	Bucket, general purpose 30-inch cutting width.	.75 yard
	Bucket, general purpose 36-inch cutting width.	.75 yard
	Bucket, general purpose 48-inch cutting width.	1.0 yard
	Bucket, rock purpose 24-inch cutting width.	.62 yard
	Bucket, rock purpose 29-inch cutting width.	.75 yard
	Bucket, rock purpose 35-inch cutting width.	.75 yard
	Bucket, rock purpose 42-inch cutting width.	.75 yard
	Bucket, rock purpose 48-inch cutting width.	1.13 yards
	o.Hydraulic impact hammer.	

A hydraulic operated impact hammer capable of operating from the excavator's hydraulic system, complete with tool bits as listed shall be provided when specified. The hammer, as a minimum, shall meet the following requirements:

1. Energy output per minute .....750,000 ft lb minimum
2. Impact force .....1,200 lb minimum
3. Impacts per minute .....500 minimum

Tool Bits Required:

1. Moil point .....3 each
2. Chisel point .....1 each
3. Spade .....1 each
4. Tamping plate, minimum 144 square inch face .....1 each

The above listed attachments shall fit and operate on the excavator and shall be replaceable without the use of special tools.

3.12.1 Quick connect-disconnect attachments. A quick-disconnect coupler system shall be fitted to the boom tip and all attachments. The device shall allow for one person operation requiring not more than two hand tools, such as an adjustable wrench and a pair of pliers, taking not more than five-minutes time to switch from any attachment to another powered or nonpowered attachment. Hand tools required shall be furnished with each excavator. Quick-disconnect hydraulic fitting shall be furnished with captive sealing cap and/or plugs to prevent contamination entering the system. All attachments shall be permanently marked with USN or excavator identification number.

3.13 Lifting capacity and tipping load. Lift capacities shall be calculated and in compliance with SAE J 1097. Loads shall not exceed 87 percent of hydraulic lifting capacity or 75 percent of tipping capacity. A load chart for the entire digging range must be shown. The excavator lifting capacity shall be measured at radius listed in 1.2 Classification, with largest bucket specified in 6.2(f). The minimum rated lift requirement shall be demonstrated at six equally spaced intervals throughout the full 360o range.

3.14 Crawler undercarriage. The undercarriage for the excavator shall be a tractor type crawler with heavy-duty frames equipped with lifetime lubricated sealed rollers and idlers, independent reversible, hydrostatic/hydraulic drive motors (each track), enclosed recoil spring, hydraulic track adjusters, sealed link track chain with heavy-duty, triple-base, semi-grouser pads, and track guides.

Grouser width: Minimum 19.2 inches.
Crawler length: Minimum 10 ft.
Overall width: Minimum 7 ft, 11 inches.

3.14.1 Brakes. Brakes shall be spring-set, automatic hydraulic release with travel, and shall hold excavator stationary on a 55-percent grade.

3.14.2 Speed. The excavator shall be capable of traveling on level at a maximum speed of not less than 1.5 miles per hour.

3.14.3 Gradeability. The excavator shall be capable of negotiating a 55-percent grade. The excavator shall be capable of crossing an obstruction such as a timber or pipeline, of not less than 10 inches in diameter, lying upon a flat surface. The excavator, with the upperstructure faced in the same longitudinal position, shall be capable of negotiating the obstruction in forward and reverse gears at not less than one mile per hour.

3.15 Engine. The excavator shall be furnished with the manufacturer's standard diesel engine as currently provided to the general public, having horsepower, torque, and speed characteristics to meet all the performance requirements specified herein. The engine shall not be modified or otherwise changed, except to meet EPA regulations, from descriptions and specifications listed in catalogs and brochures for the specific model at time of award. The engine shall start and within five minutes be ready for full load operation within 15 minutes in any ambient temperatures from -20oF to 115oF. The engine shall be equipped with a two-stage dry type air cleaner, manufacturer's standard instrument panel, hourmeter, all other accessories necessary for efficient operation and fuel of sufficient capacity to operate for not less than 8 hours at full load rating. Manufacturer's standard instrument design, such as gauges or electronic indicator lights/buzzers are acceptable, but shall include not less than high water temperature, low oil pressure, high hydraulic oil temperature warnings, battery voltage or charge indicator, and fuel level gauge.

3.15.1 Cold starting system. Excavator diesel engine shall be equipped with glow plug type or ether priming system for cold temperature engine starting. When an ether priming system is furnished, it shall be of the measured shot type with a reservoir of not less than 12 fluid ounces.

3.15.2 Battery(s). Battery(s) shall be dry charged in accordance with W-B-131, furnished without electrolyte, and provided with sealed caps to prevent the intrusion of atmospheric moisture.

3.16 Toolbox. The excavator shall be equipped with a metal toolbox normally furnished on commercial model excavators. The toolbox shall have a hinged lid with a padlock closing device less lock and key. The toolbox shall be securely fastened to the excavator in a readily accessible and a protected position.

3.17 Lifting and tiedown attachments. When specified (see 6.2), the excavator shall be equipped with lifting and tiedown attachments. Lifting and tiedown attachments shall conform to MIL-STD-209, type III. Attachments shall be indicated by a transportation plate conforming to MIL-P-514, type II, composition C, except tiedown attachments may be identified by stenciling or other suitable marking on the excavator. Tiedown marking shall clearly indicate that the attachments are intended for tiedown of the excavator on the carrier when shipped.

3.18 Instruction plates. The excavator 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.

3.19 Cleaning, treatment, and painting. Surfaces normally painted in good commercial practice 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 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. 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. Color of the finish coat shall be manufacturer's standard unless otherwise specified see (6.2). The end item, allied equipment, and attachments shall be the same color.

3.20 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 J 534. Where use of high-pressure lubricating equipment, 1,000 pound-force per square inch or higher, will damage grease seals or other parts, a suitable warning shall be affixed to the equipment in a conspicuous location. The unit shall be lubricated prior to delivery with type of lubricant specified in the operator's manual and grade of lubricant recommended for ambient temperature at the delivery point. The unit shall be conspicuously tagged to identify the lubricants and their temperature range.

3.21 Servicing and adjusting. Prior to acceptance of the excavator by the Government, the contractor shall service and adjust the excavator for immediate operational use as required in the operator's manual. The servicing and adjusting shall include at least the following:

a. Adjustment of brakes.
b. Proper functioning of all lighting and electrical systems.
c. Adjustment of engine to include tune-up.
d. Complete lubrication with grades of lubricants recommended for ambient temperature at the delivery point.
e. Cooling system filled to capacity with a clean solution of equal parts by volume of water and antifreeze (ethylene glycol).

The excavator shall be conspicuously tagged to identify the lubricants and their temperature range.

3.22 Workmanship.

3.22.1 Steel fabrication. Steel used in the fabrication of equipment shall be free from kinks and sharp bends. The straightening of material shall be done by methods that will not cause injury to the metal. Shearing and chipping shall be done neatly and accurately. All bends of a major character shall be made with controlled means in order to insure uniformity of size and shape.

3.22.2 Bolted connections. Boltholes 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.

3.22.3 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.

3.22.4 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 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 the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 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. A first article test and a first article test report is required for this equipment. The agency administering the contract shall notify the Naval Construction Battalion Center, Civil Engineer Support Office, Code 15322, Port Hueneme, CA 93043-5000, 15 days in advance of the date of inspection and test of the first article, so that attendance by personnel from this center may be arranged. One copy of the first article test report shall be forwarded to the above address for review.

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 excavator 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 first article shall be subjected to the tests specified in 4.4.1 through 4.4.4; and when provided with lifting and tiedown attachments, to the test specified in 4.4.5. Failure to pass any phase of these tests shall be cause for rejection.

4.4.1 Travel mode. The excavator shall be operated in travel mode at maximum speed for at least 2 hours to verify conformance to the requirements specified in 3.14.2. Excavator shall be checked for overheating and handling ability.

4.4.1.1 Gradeability. The excavator, with arm and bucket cradled and upperstructure locked in same longitudinal direction, shall negotiate at right angle in both directions over a timber, pipe or similar object of not less than 10 inches diameter placed upon a firm level surface. The excavator shall travel over this item a minimum of five times each, both forward and reverse, at not less than 1 mile per hour. During this test the object shall remain not less than 8 inches above either side of travel surface. Approach angle may be sloped to assist tracks with climbing object, but slope shall not exceed 24 inches to either approach (side) of object.

4.4.2 Hydraulic system test. The engine and all operating components shall be given a warmup operation for a continuous period of not less than 30 minutes, during which all of the functions enumerated in section 3 shall be checked to ascertain the reliability of the hydraulic system.

4.4.3 Operational test with accessories. The excavator, together with bucket, located in rough terrain shall be tested under full load conditions to ascertain compliance with the requirements of section 3. During these tests, observances shall be made to ascertain any instability, improper functions, leakages, and overloading in the hydraulic system of the excavator. Each accessory, furnished under the contract, shall be assembled on the boom and operated throughout its functional range under full load simulating intended service conditions. Any failure of components or distortion of parts shall be cause for rejection. The first article test excavator shall be operated for not less than 12 hours total. Each powered attachment shall be operated a minimum of 1 hour, and each nonpowered for a minimum of 15 minutes.

4.4.4 Lifting capacity and load stability tests. Load stability tests shall be conducted on the excavator in accordance with SAE J 1097. The balance point capacity in the least stable direction shall be determined at each radius specified in 3.13. Rated lifting capacities shall be determined by multiplying the balance capacities, at maximum and minimum boom lengths, by 85 percent to determine conformance to 3.13. Minimum lift capacity as specified under paragraph 1.2 classifications for type and size, shall be demonstrated at six equal spaced intervals throughout 360o, with machine parked on level, hard surface.

4.4.5 Lifting and tiedown attachment test. The excavator, when equipped with lifting and tiedown attachments, shall be tested to verify that the attachments conform to the requirements specified in 3.17. Lift and tie down attachment test may be substituted by submission of certified engineering calculations to Commanding Officer, Naval Construction Battalion Center, Code 15322, Port Hueneme, CA 93043-5000, not less than 90 days prior to first article test date for review and acceptance. Upon acceptance, copy of

calculations shall be available for Government Q.A. inspection, and included with test report.

4.4.6 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 excavator 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 operational test. Each excavator produced in fulfillment of a contract or order shall be completely assembled, adjusted, lubricated, and otherwise serviced for operation. The engine shall be started and subjected to a warmup period as recommended by the manufacturer. The excavator shall be given a run-in test and all controls operated a sufficient number of times to ascertain that all 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 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 with the level of preservation and the level of packing as specified (see 6.2).

6. NOTES

6.1 Intended use. The excavator is intended for use in digging or moving loose gravel, sand, or hardpack soil.

6.2 Acquisition requirements. Acquisition documents should specify the following:

a. Title, number, and date of this specification.
b. Type and size of excavator 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 first article is required for inspection and approval (see 3.2, 4.21, and 6.3).
e. When defroster and heater for revolving upperstructure cab is not required (see 3.9.1).
f. List of attachments required for each size of excavator (see 3.12).
g. When lifting and tiedown attachments are required (see 3.17).
h. When instruction plates will be furnished by the contracting officer (see 3.18).
i. When cleaning, treatment, and painting conforming to MIL-T-704 are not required (see 3.19).

j. Color of finish coat required (see 3.19).
k. When lubrication is other than manufacturer's standard practice (see 3.22).
l. When a preproduction pack is required and the time frame required for submission (see 4.6).
m. Level of preservation and level of packing required (see 5.1).

6.3 First article. When a first article inspection is required, the excavator will be tested and should be a first article sample 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.

Custodian:

Navy - YD

Preparing Activity:

Navy - YD

(Project 3805-0146)

Orders for this publication are to be placed with General Services Administration, acting as an agent for the Superintendent of Documents. See section 2 of this specification to obtain extra copies and other documents referenced herein.