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SUPERSEDING
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FEDERAL SPECIFICATION

CRANES, HYDRAULIC, CARRIER MOUNTED

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-engine-driven, truck mounted, full revolving, hydraulically operated cranes.

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 specification 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).

SPECIFICATIONS

FEDERAL

- W-B-131 - Battery, Storage, Vehicular, Ignition, Lighting, and Starting.
- VV-F-800 - Fuel Oil, Diesel.

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 3810

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

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MILITARY

MIL-C-3580 - Crane, and Crane-Shovels, Truck, Crawler, and Wheel Mounted, Full-Revolving, and Their Attachments, Packaging of.

STANDARD

MILITARY

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 specification 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.)

DEPARTMENT OF TRANSPORTATION (DoT)

Motor Carrier Safety Regulations.

(Application for copies should be addressed to the Superintendent of Documents, 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 a specific issue is identified, the issue in effect on date of invitation for bids or request for proposal shall apply.

AMERICAN NATIONAL STANDARDS INSTITUTE, INC. (ANSI)

Safety Standards for Mobile Hydraulic Cranes.

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

MOBILE HYDRAULIC CRANE STANDARDS

PCSA Standard.

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(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.J159 - LOAD MOMENT SYSTEM
SAE.J375 - RADIUS OF LOAD OR BOOM ANGLE
SAE.J376 - LOAD INDICATING DEVICES
SAE.J534 - LUBRICATING FITTINGS
SAE.J551 - LEVELS AND METHODS OF MEASUREMENTS OF ELECTROMAGNETIC
SAE.J765 - CRANE LOAD STABILITY TEST CODE
SAE.J931 - HYDRAULIC POWER CIRCUIT FILTRATION
SAE.J1063 - CANTILEVERED BOOM CRANE STRUCTURES
SAE.J1152 - BRAKING PERFORMANCE

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

TIRE AND RIM ASSOCIATION, INC. (TRA)

TRA Yearbook.

(Application for copies should be addressed to the Tire and Rim Association, Inc., 3200 West Market Street, Akron, OH 44313.)

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

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

3. REQUIREMENTS

3.1 Description. The crane shall be a commercial model, revolving superstructure with cab and a powered hydraulic telescoping boom, mounted on a pneumatic tired, diesel-engine-driven carrier. The crane shall comply with the requirements of the current mobile hydraulic crane standards.

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

3.3 Standard commercial product. The crane 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 crane 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.

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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 Identical items. All units of the same classification furnished under a specific contract shall be physically and mechanically identical. Parts, accessories, assemblies, and components are included in this requirement. Written approval for deviations must be obtained in advance from the contracting officer.

3.6 Maintainability. The crane 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 crane.

3.6.1 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.

3.7 Safety. The crane shall comply with OSHA regulations and current ANSI standards. 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 principal platform walking surfaces shall be of an anti-skid type. Ladders, steps, and handholds shall be provided in such quantity and of such size on the sides of the crane cab or superstructure that entrance thereto and exit therefrom may be unhampered and nonhazardous. Engine cooling fans shall have heavy grille or ring type guards. The crane counterweight, boom point and hook block cheek plates shall be painted with stripes applied to the basic color (see 6.1). Stripes shall be 2 inches wide, with 2-inch spacing extending at a 45 degree angle. Stripes shall be black.

3.8 Stress requirements. Design of the completely assembled crane shall be such that the maximum stress imposed will not exceed the minimum strength margins contained in SAE J1063. Tests, in accordance with SAE J1063, shall have been performed on the model crane being provided and of the configuration to meet or exceed the specified load requirements of this procurement. These test results shall be made available for government review at the time of first article tests.

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3.9 Performance. The crane shall be capable of independently and simultaneously lifting and rotating at a speed of not less than 2 revolutions per minute. The crane, without load, shall be capable of attaining and maintaining a travel speed, on level paved roads, of not less than 40 miles per hour (mph). The crane, without load, shall be capable of traveling on unimproved roads found on construction sites, shall travel up not less than a 20 percent grade on paved roads or hard-packed surfaces without engine stall; and shall be capable of negotiating 15 percent side slopes.

3.9.1 Lifting capacities. The crane shall have lifting capacities of not less than those specified at the radii and boom lengths specified (see 6.1).

3.9.2 Stability. With lubricating and cooling systems full, fuel tank(s) at least half full, with crane resting on firm, level, and uniform supporting surface, with outriggers unsupported, with the boom fully retracted the crane shall conform to the following requirements.

- a. With the longitudinal axis of the rotating superstructure of the crane at 90 degrees to the longitudinal axis of the carrier, the boom retracted and set at the minimum recommended radius, the total load on all wheels on the side of the carrier under the boom shall not be less than 15 percent of the total weight of the crane.
- b. With the longitudinal axis of the rotating superstructure of the crane in line with the longitudinal axis of the carrier, in either direction, the boom retracted and set at the minimum recommended radius, the total load on all wheels under the lighter loaded end of the carrier shall not be less than 15 percent of the total weight of the crane.

3.9.3 Power load lowering. Power load lowering by hydraulic control shall be provided for the main and auxiliary hoists to facilitate controlled load lowering or lifting at any boom lengths or elevation. The power load lowering means shall provide positive control of a single line load equal to the maximum rated crane capacity divided by the recommended number of parts of hoist line reeving.

3.9.4 Hoist and rotation. The available line pull and speed shall be as rated in accordance with PCSA Standard for the operational requirements of the crane hoisting drums. The power transmission system used to rotate the superstructure shall be a hydraulic mechanical arrangement with a continuous swing rotation angle of not less than 360 degrees. Swing speed within this range shall be smooth and constant, and adequate control shall be provided in the hydraulic circuit to insure smooth starting and stopping. The crane shall simultaneously lift and rotate throughout the rated working area. The main hoist which shall be of a two speed type. The auxiliary winch shall be manufactures standard . An auxiliary boom point sheave shall be furnished.

3.9.5 Rated load capacities chart. A permanent chart indicating all the rated load capacities on each boom reach and radii over the side and over the rear, with outriggers, shall be posted in the crane cab near the operator and also on the outside of the crane to be legible from ground level. The rated load capacity chart shall reflect the manufacturer's standard commercial rating for the size and model crane furnished, and not be limited to the minimum required capacities specified.

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3.10 Crane. The crane assembly, designed for the carrier mounting, shall consist of a fully revolving superstructure with boom support, hydraulically operated telescoping type boom, main and auxiliary winches with wire rope, hook block, cab, controls, and necessary accessories.

3.10.1 Superstructure. The superstructure shall be mounted on the carrier and shall be designed to withstand the forces caused by lifting, swinging, and traveling with the safe loads. The superstructure shall provide stable retention of the boom in all positions and, with its base, shall rotate on ball or roller bearings of sufficient number, size, and capacity to support working loads.

3.10.2 Boom. The boom shall be of alloy steel and of the hydraulically operated telescoping type, consisting of a base section and sliding section(s). The boom shall be capable of elevation from the horizontal to a vertical angle of not less than 72 degrees. A digital or dial type boom angle indicator shall be furnished. An anti two-block device with audio-visual warning and function lockout shall be installed to prevent the hook block from contacting the boom tip.

3.10.2.1 Boom drift. Boom drift, the vertical dropping of the boom due to inadvertent retraction of the boom hoist and/or boom extension cylinders, shall be kept to a minimum. Drift shall take place in gradual, imperceptible steps or degrees. The crane load, under all operating conditions, shall not drop in a sharp or sudden manner at any time during crane operation.

3.10.3 Boom jib. A self-storing boom jib or swing away boom extension shall be provided. Length of the boom jib or extension shall be as specified (see 6.1). Boom Jib shall be provided with the necessary risers, overhaul ball with swivel hook, and ropes. Boom jibs shall be readily attachable to the tip of boom with the capability of withstanding the maximum jib load without malfunctions.

3.10.4 Hook block. The rated capacity of the crane hook block shall be not less than the rated capacity of the crane for which it is furnished. The hook shall be of the forged steel, swivel type with an ultimate breaking strength at least four times the maximum rated capacity of the crane and shall include a safety latch. The block assembly shall have adequate weight to insure payout of the hook in any position. The hook block shall permit disassembly for visual and nondestructive testing. The hook shall not be painted.

3.10.5 Rope. Load hoist ropes shall be improved plow steel, IWRC, independent wire rope center, with a safety factor of not less than 3.5. The main and auxiliary winches shall be furnished with the manufacturer's standard length rope. The contractor shall provide a signed certification with each crane identifying the crane serial number, wire rope manufacturer, type of wire rope construction, type of wire rope material, and the minimum breaking strength of the wire rope provided.

3.10.6 Sheaves. Sheaves shall have a pitch diameter at least 18 times the rope diameter. The hook block pitch diameter shall be at least 16 times the rope diameter. Sheaves shall be adequately guarded to prevent the wire rope from leaving the sheave during operation. All sheaves shall be smooth and the

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nominal groove diameter shall not exceed the nominal diameter of the wire rope furnished by more than one-tenth inch. Steel sheaves shall be furnished.

3.10.7 Hydraulic system. The hydraulic system shall include pump(s), hydraulic rams, rods, full flow filter, reservoir, pressure relief valve, and all necessary lines, lockouts, restrictor, and control valves to insure positive control of boom hoist and rope hoist in all operations or loss of hydraulic power due to ruptured hoses. Hydraulic line circuit and filtration shall be in accordance with SAE J931. The pump(s) shall be driven by the crane engine and shall have sufficient capacity to operate all hydraulically powered components as specified herein. Means shall be provided in the hydraulic system for bleeding all air trapped in the system. All rods, which will be exposed during operation, shall have a hard chromium plating. All pressure hydraulic hoses and fittings shall be capable of withstanding a minimum burst pressure of four times the maximum operating pressure, and a proof pressure of at least two times the maximum operating pressure.

3.10.8 Load moment device. A load indicating and warning device of the load moment type shall perform the following functions while on outriggers.

- a. Provide a dial or digital reading of hook load in pounds.
- b. Provide a dial or digital reading of radius in feet.
- c. provide a dial reading of load moment as a percentage of rated capacity.
- d. Provide a visual warning (amber light) when load moment reaches 90 percent of capacity and visual (red light) and audible warning at 100 percent of capacity.
- e. Provide function kickout (load may be lowered but not raised) when load moment reaches 100 percent of rated capacity.

The device shall be capable of manually selecting parts of line and boom length. The device shall conform to SAE J159, J375, and J376.

3.11 Cabs. The cabs shall be fabricated from sheet steel or fiberglass, having sufficient windows and glazed doors to permit at least 270 degree vision for the driver or operator in normal position. All glass shall be safety type, and held in place by rubber or metal channels for easy replacement. Windows shall be arranged for easy opening and removal when required. All cab doors, whether of the sliding or swinging type, shall be adequately restrained from accidentally opening or closing when the crane is traveling or operating. All doors shall be provided with means for securely locking in the closed position. Adjustable and comfortable seats shall be provided in each cab and located for maximum unobstructed visibility of the operator. Both cabs shall be equipped with diesel and or hot water heater, defroster, and air or electric operated wind shield wiper. Electric or air horn, hand or foot operated, shall be provided in both cabs. A positive swing lock for traveling shall be provided. The carrier cab shall be provided with West Coast type outside rearview mirrors on each side.

3.12 Controls. All hoist, and crane controls, lockouts, and indicators shall be located within easy reach of the operator in the crane cab, and shall be readily accessible under all conditions of operation. All controls shall be clearly marked as to the use and function.

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3.13 Carrier. Carrier frame shall be of the heavy steel fabrication type with necessary braces and reinforcements to provide rigid support for the revolving superstructure, hoisting drums, ropes, hook block, and jib, under maximum load, when the telescopic boom is extended at minimum through maximum radii at any position within the full working range. The revolving super-structure shall be so positioned in a location on the carrier frame permitting maximum efficiency for all purpose crane operations. Unless otherwise specified (see 6.1), the crane carrier shall be the manufacturer's standard width for the capacity crane furnished. The number of axles shall be the manufacturer's standard for the capacity crane furnished with all rear axles to be driven. All wheels shall be equipped with pneumatic tires of compatible size for the load imposed. Power assisted steering for the front wheels shall be provided. If crane furnished has more than two rear axles, not less than two rear and one front axle shall be driven.

3.13.1 Transmission. The crane carrier shall be equipped with the manufacturer's standard transmission for the size crane specified. The transmission shall be equipped with a neutral safety start switch.

3.13.2 Brakes. The crane carrier shall be provided with the manufacturer's standard, foot controlled, service brakes applied to all wheels. The service brakes shall be capable of bringing the crane to a complete safe stop within the distance specified in SAE J1152. A parking brake capable of holding the crane, on a longitudinal slope of not less than 20 percent without slippage, shall be provided.

3.13.3 Tires. Tires shall be of the tube or tubeless type with traction type tread. Tires shall have a rated capacity at least equal to the load imposed on each tire, measured at each wheel, at the ground, with the crane loaded with the maximum safe load. Tire ratings shall conform to TRA recommendations for the type and size of tires furnished. When specified (see 6.1), tires shall be high flotation type.

3.13.4 Lights and reflectors. The following lights and reflectors shall be furnished and installed and shall be powered by a 12V electrical system:

- a. The sealed beam headlights (mounted on carrier).
- b. Taillights.
- c. Stoplights.
- d. Clearance lights.
- e. Turn signal lights.
- f. Instrument panel light (both cabs).
- g. A weatherproof automotive type of spotlight or floodlight.
- h. Emergency 4-way flashing lights.
- i. Interior dome lights (both cabs).

All carrier lights, reflectors, and wiring shall conform to DoT Motor Carrier Safety Regulations.

3.13.5 Engine(s). The crane engine(s) furnished, single or dual, shall be of the diesel type having horsepower, torque, and speed characteristics to meet satisfactorily all the crane performance requirements specified herein. The engine(s) shall be capable of meeting the performance requirements using diesel fuel conforming to VV-F-800. The diesel engine(s) shall start within 5 minutes

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and be ready for full load operation within 15 minutes in any ambient temperature from +120 degrees Fahrenheit (oF) to -20 oF. When a fluid priming system is required, it shall be of the measured shot type with storage capacity of at least 12 fluid ounces. The engine(s) shall be furnished complete with at least the following accessories:

- a. An instrument panel complete with a lubricating oil pressure gage, a fuel oil gage, a cooling liquid-temperature indicator, a voltmeter or ammeter, a tachometer, an hour meter (may be located in engine compartment), and a speedometer with recording odometer.
- b. Fuel tank(s) with sufficient capacity for 8 hours normal operation.
- c. 12V or 24V electric cranking system.
- d. When specified (see 6.1) battery(s) shall be dry charged in accordance with Federal Specification W-B-131, without electrolyte, with sealed caps to prevent the intrusion of atmospheric moisture.
- e. Charging alternator(s) with a capacity rating compatible to the system.
- f. Cooling-liquid high temperature safety device of the warning type.
- g. Lubricating oil safety device.
- h. Fuel oil level gage.
- i. An engine housing so designed as to facilitate the maintenance of engine.
- j. Transmission temperature gage (automatic transmission only).

3.13.6 Outriggers. Not less than four hydraulically powered outriggers, capable of being extended not less than 3 inches below ground level, shall be furnished. The outriggers shall have sufficient strength to accept full stability, under all rated loading conditions, including the ability to raise the truck cranes off the ground from travel position, when necessary to compensate for ground surfaces having irregular contours. Vertical outrigger cylinders shall have check valves as a part of or attached to the cylinder. Horizontally extended, hydraulic cylinders shall be enclosed within outrigger boxes. Outriggers in the stowed position, ready for travel, shall not exceed maximum allowable overall width. Devices to accurately determine when the cranes are level shall be installed in a position convenient to the outrigger controls. All hydraulic hoses shall be enclosed or routed to preclude external damage. A front mounted outrigger shall be furnished on all cranes 30 tons and larger.

3.14 Attachments. The following attachments in type and size shall be furnished as specified (see 6.1):

- a. Clamshell bucket and tagline.
- b. Towing hook.
- c. Towing winch.

3.15 Radio noise suppressors. When specified (see 6.1), the crane shall be equipped with radio noise suppressors. Electro-magnetic radiation from the crane shall be within the limits of SAE J551.

3.16 Lifting and tiedown attachments. The crane 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 crane. Transportation plates shall

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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. Tying down attachments may be identified by stenciling or other suitable marking. Tiedown marking shall clearly indicate that the attachments are intended for the tie down of the crane on the carrier when shipped.

3.17 Fungus resistance. When specified (see 6.1), electrical components and circuit elements, including terminal and circuit connections, shall be coated with varnish conforming to MIL-V-173, except that:

- a. Components and elements inherently inert to fungi or in hermetically sealed enclosures need not be coated.
- b. Current-carrying contact surfaces, such as relay contact points, shall not be coated.

3.18 Identification-plate. As instructed by the procuring activity.

3.19 Instruction plates. The crane 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, and shall be securely affixed thereto with nonferrous screws, rivets or bolts of not less than 1/8-inch diameter.

3.20 Stenciling. The gross weight of each crane, with equipment, shall be stenciled on each side of the crane in such a manner as to be readily discernible to dock and military personnel. The prescribed tire pressure shall be stenciled on the carrier fenders by block or stencil-type letters not more than 1-inch high.

3.21 Lubrication. Lubrication shall be in accordance with the manufacturer's standard practice. The lubricating points shall be easily visible and accessible. All parts requiring lubrication shall be lubricated as specified in section 5. Hydraulic lubrication fittings shall be in accordance with SAE J534. Where use of high pressure lubricating equipment, 1,000 pounds-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.

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 6.1). 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

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the entire surface. The paint shall be free from runs, sags, orange peel, or other defects.

3.23 Workmanship.

3.23.1 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 insure uniformity of size and shape.

3.23.2 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.

3.23.3 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.

3.23.4 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.

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

3.24 Special tools and toolbox. A closed compartment or toolbox shall be provided to carry tools and accessories. Those specific tools that are unique to the crane furnished and are required for operation shall be furnished. Toolbox, when furnished to hold tools and accessories, shall be made of sheet steel having a nominal thickness of 0.0747 inch (U.S. Standard Gage No. 14). The toolbox shall have a hinged lid and a trunk drawbolt of a type that will keep the lid closed when the toolbox is subjected to vibration. The toolbox shall be securely fastened to the unit in a protected and accessible location.

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 there such

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inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items must meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification 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 one crane when a first article is required (see 3.2 and 6.1). This inspection shall include the examination of 4.3, the tests of 4.4, and, when specified, the preproduction pack inspection of 4 (see 4.6 and 6.1). 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 4.3, the tests of 4.5, and the packaging inspection of 4.6.

4.3 Examination. Each crane 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. When a first article is required, the first article shall be subject to the tests specified in 4.4.1 through 4.4.13, and when equipped with load indicating device, lifting and tying down attachments, and radio noise suppressors, to 4.4.10, 4.4.11, and 4.4.12, as applicable. Failure to pass any phase of the test shall be cause for rejection.

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4.4.1 Crane safe load capacity test. The crane shall be completely serviced and subjected to the manufacturer's recommended break-in. The safe load capacity test shall be performed on a level, paved surface by connecting a Baldwin SR4 load cell or equal, between the lifting hook and a dead weight or the direct use of calibrated weights. The crane shall then lift the safe loads specified in the least stable direction. The crane, with safe load raised, shall be rotated through the rated working range. Actual tipping loads, where tipping load is the controlling factor, for each of the load conditions shall be determined in accordance with SAE J765. Eighty-five percent of each determined tipping load shall be compared with the applicable safe load. If the crane manufacturer has previously conducted this test on an identical model crane, the certified test records shall be made available to the Government inspector and the Contracting Officer during the first article testing and may be acceptable in lieu of conducting the test.

4.4.2 Speed tests. Speed tests shall be taken over a 0 percent grade on a paved road. Time shall be recorded with a stopwatch accurate to 1 second. The average speed shall be recorded for the unit. Maximum average speed not less than that specified in 3.9 when calculated by the following formula shall be attained:

$$V = \frac{0.682 \times D}{T}$$

Where: V = speed in mph
 D = distance in feet
 T = time in seconds

A fifth wheel type recorder may be used.

4.4.3 Gradeability. The crane unit shall be tested for gradeability in compliance with 3.9. The crane unit, without load and with mounted attachments, shall negotiate a 20 percent grade on paved road without engine stall.

4.4.4 Power load lowering test. General inspection of the powerdown system shall be made for adequate lubrication, ease of operation of controls, safety precautions, and for good manufacturing practices. The power load lowering system shall be tested as follows to determine conformance to 3.9.3.

- a. With the crane equipped with a boom of a length as specified in 3.9.1, and with outriggers set, position the revolving super-structure in the most stable craning position and assemble a single line load equal to the maximum rated load divided by the recommended number of parts of hoist line reeving.
- b. Position the boom angle for the minimum working radius.
- c. Hoist the load 20 feet above the ground level, +/-3 inches, or until interference with the crane boom is obvious.
- d. Prepare the crane for powerdown operation on the load line.
- e. Operate the power load lowering system in accordance with manufacturer's instructions, and lower the load under power. Vary the speed of the load.

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- f. When the load reaches the ground, immediately repeat operations c., d, and e. These operations shall be repeated until 20 cycles have been completed.
- g. Repeat the above tests using the jib and auxiliary hoist.

4.4.5 Road test. The crane shall be given a road test for a distance of not less than 10 miles at a speed of 40 mph over paved roads; 4 miles over uneven roads with rough terrain at not less than 3 mph; and 1 mile over unpaved surface composed of sandy or loose soil or both.

4.4.6 Travel control test. To demonstrate workability of the travel controls when furnished, (see 3.12), the crane shall be operated forward and backward in two figure-8 patterns with hard right and left turns.

4.4.7 Service brake test. Service brakes of the crane shall be tested for compliance with 3.13.2. On a concrete roadway, the crane shall be accelerated to the speed required by SAE J1152. The service brakes shall be applied bringing the crane to a complete halt to determine conformance to 3.13.2. Immediately after the crane comes to a halt, this test cycle shall be repeated for four additional cycles. All shoes, drums, and other brake components where there is indication of damage shall be disassembled and examined.

4.4.8 Parking brake test. The parking brake shall be tested for compliance with 3.13.2.

4.4.9 Crane hook test. The crane hook shall be given a wet or dry ferro-magnetic particle test to determine surface or subsurface cracks or discontinuities. Either method of test used shall show clearly visible particles defining existing discontinuities. Any discontinuities shall be cause for rejection.

4.4.10 Load indicating device test. When the crane is equipped with the device, the load indicating device shall be tested to determine conformance to 3.10.8.

4.4.11 Lifting and tying down attachment tests. When required, the lifting and tying down attachments shall be tested to conform to 3.16.

4.4.12 Measurement of electromagnetic radiation. When required, to determine conformance to 3.15, electromagnetic radiation shall be measured in accordance with SAE J551. When suppressed to conform to 3.15, the manufacturer may, upon approval of the contracting officer, furnish a certification in lieu of the test that the crane meets the requirements, together with a list of the suppression devices installed. The list shall be sufficiently detailed to allow visual determination that the devices are installed.

4.4.13 Boom Drift Test. The crane boom shall be tested as follows to determine conformance to 3.10.2.1:

- a. With outriggers set, assemble a safe load of at least 1,000 lbs.
- b. Extend and retract the boom several times or until the crane hydraulic fluid is a minimum of 130 oF.
- c. Boom up angle of 70 degrees.
- d. Extend boom to 3/4 of its fully extended length.

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- e. Hoist the load approximately four feet above ground level.
- f. For a period of not less than 20 minutes, observe crane for sudden uncontrolled dropping of the load, any perceptible sudden dropping of the boom/load shall be cause for rejection.

4.4.14 Test records. Contractor's records of all first article tests and inspections, giving the results of said tests and inspections to determine compliance with the requirements of this specification, shall be kept complete and available to the Government's representative and the contracting officer. Test and inspection records shall be signed and approved by a person specifically assigned by the contractor. Contractors not having laboratory testing facilities satisfactory to the Government shall engage the services of a commercial testing laboratory, satisfactory to the Government, capable of conducting required tests to determine compliance with all the requirements of this specification.

4.4.15 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 crane 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 production crane shall be completely assembled, adjusted, lubricated, or otherwise serviced for operation. The engine shall be started and subjected to a warmup period as recommended by the manufacturer. The crane shall be given a run-in test and all controls operated a sufficient number of times to ascertain that the components and mechanisms actuated by the controls operate promptly, fully, and without restrictions or malfunction. The manufacturer's standard production tests shall then be conducted on each production crane.

4.6 Packaging inspection. The inspection of the preservation, packing, and marking shall be in accordance with the requirements of section 4 of MIL-C-3580. The inspection shall consist of the quality conformance inspection; and, when specified (see 6.1), a preproduction pack shall be furnished for examination and test within the time frame required (see 6.1).

5. PACKAGING

5.1 Preservation, packing, and marking. Preservation, packing, and marking shall be in accordance with the requirements of MIL-C-3580 with the level of preservation and the level of packing as specified (see 6.1).

6. NOTES

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

6.1 Ordering data. Acquisition documents should specify the following:

- a. Title, number, and date of this specification.

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- b. When a first article is required for inspection and approval (see 3.2, 4.2.1, and 6.3).
- c. Crane lifting capacities, with out without outriggers, at specific radii, and boom lengths required (see 3.9.1).
- d. Length of boom jib or extension required (see 3.10.3).
- e. When load indicating and warning device is required (see 3.10.8).
- f. When carrier width shall be other than manufacturer's standard (see 3.13).
- g. When tires shall be high flotation type (see 3.13.3).
- h. When battery(s) are to be dry charged (see 3.13.5(d)).
- i. Specify attachments required (see 3.14).
- j. When radio noise suppressors are required (see 3.15).
- k. When fungus resistance is required (see 3.17).
- l. When cleaning, treatment, and painting shall be other than that specified (see 3.22).
- m. Color of the finish coat required (see 3.22) and color of stripping (see 3.7).
- n. When a preproduction pack inspection is required and time frame required for submission (see 4.2.1 and 4.6).
- o. Level of preservation and level of packing required (see 5.1).

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

6.3 Key word listing.

Diesel engine driven
Full revolving
Telescopic boom

MILITARY INTERESTS:

Custodian:

Navy - YD

User Activity:

Navy - MC

Preparing Activity:

Navy - YD

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