
* NOT MEASUREMENT *

* SENSITIVE *

OO-C-2818
March 26, 1993

SUPERSEDING
MIL-C-22744E(YD)
10 August 1987

FEDERAL SPECIFICATION

CONCRETE SPRAYING MACHINE, MIX-ELEVATOR TYPE UNIT, TRAILER 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 incorporates a commercial concrete mix-elevator, diesel-engine-driven, trailer mounted unit and a concrete spraying (gunning) dry mix type machine, used for applying cement mixtures to various constructions and for wet or dry sandblasting.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

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

* Beneficial comments (recommendations, additions, deletions) and any *
* pertinent data which may be of use in improving this document should be *
* addressed to: Commanding Officer (Code 156), Naval Construction Battalion *
* Center, 621 Pleasant Valley Road, Port Hueneme, CA 93043-4300, by using *
* the Standardization Document Improvement Proposal (DD Form 1426) appearing *
* at the end of this document or by letter. *

FSC 3895

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

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Federal Specifications

PPP-B-601 - Boxes, Wood, Cleated-Plywood
PPP-B-621 - Boxes, Wood, Nailed and Lock Corner
PPP-T-60 - Tape, Packaging, Waterproof

Federal Standard

FED-STD-123 - Marking for Shipment (Civil)

Military Specifications

MIL-P-116 - Preservation, Methods of
MIL-B-121 - Barrier Material, Greaseproofed, Waterproofed Flexible
MIL-P-514 - Plate, Identification, Instruction and Marking, Blank
MIL-V-62038 - Vehicle, Wheeled, Preparation for Shipment and Storage of

Military Standards

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

2.2 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 shall be those in effect on the date of 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.)

Department of Transportation (DoT):

Federal Motor Vehicle Safety Standards and Regulations
Federal Motor Carrier Safety Regulations

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

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

2.3 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted shall be those listed in the issue of the DODISS specified in the solicitation. Unless otherwise specified, the

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issues of the documents not listed in the DODISS shall be the issue of the non-Government documents which is current on the date of the solicitation.

American Society of Mechanical Engineers (ASME):

Boiler and Pressure Vessel Code, Section VIII
Pressure Vessels, Division I

(Application for copies should be addressed to the American Society of Mechanical Engineers, United Engineering Center, 345 East 47th Street, New York, NY 10017.)

Society of Automotive Engineers, Inc. (SAE):

SAE Handbook
SAE J534 - Lubrication Fittings
SAE J697 - Safety Chain of Full Trailers or Converter Dollies
SAE J847 - Trailer Tow Bar Eye and Pintle Hook/Coupler 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., 175 Montrose West Avenue, Suite 150, Copley, OH 44321.)

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

2.3.1 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein (except for associated detail specifications, specification sheets or MS standards), the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Description. The concrete mix-elevator concrete spraying machine shall be a self-contained unit ready for operation when connected to outside air and water supply sources. The mix-elevator shall consist essentially of two hoppers (one sand and one cement) with controlled ratios of 3:1 to 7:1. By setting the ratio, the correct blend is continuous until changed; the elevator mechanism shall be mechanically, electrically or hydraulically driven of the screw type auger or other means. The gunning machine shall be single, double chambered, or rotary continuous operating type and also be capable of sandblasting. The machine shall consist essentially of an air-motor-driven feed system and an air-driven high-pressure water pump supplying the water to the mixing nozzle

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where hydration of the dry materials shall be accomplished just before leaving the nozzle (gun) for replacement.

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 Standard commercial product. The machine shall, as a minimum, be in accordance with the requirements of this specification and shall be the manufacturer's standard commercial product. Additional or better features which are not specifically prohibited by this specification but which are a part of the manufacturer's standard commercial product, shall be included in the machine 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 Construction. The machine shall be designed and constructed to facilitate field maintenance. All adjustments and replaceable accessories shall be readily accessible. Conditions which can be hazardous to personnel or deleterious to equipment shall not be permitted.

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

3.6 Safety. All parts subject to high operational temperatures, that are of such a nature or are so located as to be or become a hazard to the safety of the operating personnel, shall be insulated, enclosed, or fully guarded to the extent necessary to eliminate the hazard. The machine shall comply with OSHA regulations in effect at time of manufacture.

3.7 Performance.

3.7.1 Concrete gunning. The machine shall be capable of metering and discharging a 3:1 to 7:1 sand-cement mix ratio continuously, at the rate of not less than 4 cubic yards per hour.

3.7.2 Sandblasting. The machine shall be capable of discharging not less than 1,350 pounds of sand per hour at an air pressure of 80 pound-force per square inch (psi).

3.7.3 Air system. The air system shall be capable of operation on a minimum of 315 cubic feet of air per minute at 100 psi. Air from an outside source shall be used to propel the air motor, the pump, and the material in the hose. Air line piping shall be valved for maintenance of proper operating pressures and volumes. Lubricators for air motors and a pressure gage shall be provided. Pressure relief valves shall be installed where necessary for proper operation and to prevent damage to the unit from pressure buildup. Means shall be provided to discharge, by air pressure, the material in the hose.

3.8 Material hose and nozzle. Each machine shall be furnished with 200-feet of material hose. Material hose shall be the manufacturer's standard size and construction for the pressures and volume of the machine furnished.
Hose

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lengths shall not exceed 50-feet per section and shall be furnished with a means to connect individual hoses together, to the gunning machine, and to the nozzle. A material application nozzle(s) shall be furnished, of the type and size required for the machine furnished. Sufficient nozzles or nozzle liners shall be furnished for 200 hours of operation at maximum rated delivery.

3.9 Hoppers.

3.9.1 Sand hoppers. The sand hopper shall have a volume large enough to maintain an output of not less than 4 cubic yards per hour and shall have the capability to be loaded by a small front-end loader. Side boards may be fixed or demountable to prevent spillage of excess material.

3.9.2 Cement hopper. The cement hopper shall have a volume large enough to maintain an output of not less than 4 cubic yards per hour. The cement shall be loaded, at a working height, by a single person.

3.10 Chambers. The feed chambers shall be of welded steel construction and shall meet the ASME Boiler and Pressure Vessel Code, Section VIII, for unfired pressure vessels.

3.10.1 Doors or valves. When required for feed chamber(s), material doors or valves shall be self-cleaning, self-sealing, of the spherical, slide, or cone type. Valve controls shall be manually operated levers located on the machine's exterior.

3.10.2 Feed chamber base. The feed chamber base shall be of welded steel construction, gray iron castings or malleable iron, and shall include the feed and associated drive mechanism and feed chamber mounting.

3.10.3 Mix elevator. The elevator for supplying mix to the feed chambers shall be mechanically, electrically, hydraulically, or diesel-engine-driven. Drivers shall be protected against entry of material and foreign matter.

3.11 Diesel engine. Unless otherwise specified, the manufacturer's standard diesel engine shall have the horsepower, torque, and speed characteristics to satisfactorily meet or exceed all the equipment performance requirements specified. When specified (see 6.2), a gasoline engine shall be furnished. All accessories normally furnished to the commercial market shall be provided. The fuel tank shall have adequate capacity for a normal 6-hour operation.

3.12 Water system. The water supply system shall include piping, control valve, and a water pump. The water pump shall be air-operated with bypass and pressure relief valves, and water pressure gage.

3.13 Mounting. The unit shall be mounted on a 2-wheel, or 4-wheel (tandem), pneumatic-tired trailer. All wheels shall have bearings protected from cement dust, sand, and water. Trailers shall be equipped with a lunette conforming to SAE J847 and two safety chains conforming to SAE J697. The trailer shall conform to the requirements of DoT Federal Motor Vehicle Safety Standards and DoT Federal Motor Carrier Safety Regulations.

3.14 Height. The unit, in towing position, shall have a maximum height of 126 inches.

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3.15 Tires and rims. The tire and rim ratings shall conform to TRA recommendations for the type and size of tires furnished. Tire and rim sizes shall be the same for all wheels. Tires shall be of the wide base type. Tires shall be of rated capacity at least equal to the load imposed on each tire, measured at each wheel at the ground.

3.16 Lubrication. Means for lubrication shall be in accordance with the manufacturer's standard practice. The lubricating points shall be easily visible and accessible. Hydraulic lubrication fittings shall be in accordance with SAE J534. Where use of high-pressure lubricating equipment, 1,000 psi or higher, will damage grease seals or other parts, a suitable warning shall be affixed to the equipment in a conspicuous location.

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

3.18 Lifting and tiedown attachments. When specified (see 6.2), the machine shall be equipped with lifting and tiedown attachments. Lifting and tiedown attachments shall conform to type II or type III of MIL-STD-209. A nonferrous transportation plate shall be provided and mechanically attached to the machine. Transportation plates conforming to MIL-P-514 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 machine on the carrier when shipped.

3.19 Instruction plates. The machine shall be equipped with instruction plates suitably located, describing any special or important procedures to be followed in operating and servicing the equipment. Plates shall be of a material which will last and remain legible for the life of the equipment. Plates shall be securely affixed to the equipment with nonferrous screws or bolts of not less than 1/8-inch diameter.

3.20 Cleaning, treatment, and painting. Surfaces normally painted in good commercial practice shall be cleaned, treated, and painted as specified herein. The color of the finish coat shall be as specified (see 6.2). 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.

3.21 Workmanship.

3.21.1 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.

3.21.2 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.

3.21.3 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.

3.21.4 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 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 assuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to acceptance of defective material.

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4.1.2 Material inspection. The contractor is responsible for insuring that supplies and materials are inspected for compliance 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 machine 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 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. A quality conformance inspection shall be performed on each machine. The inspection shall include the examination of 4.3, the test of 4.4.1, and the packaging inspection of 4.5.

4.3 Examination. Each machine shall be examined for compliance with the requirements specified in section 3 of this specification. Any redesign or modification of the supplier'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 Tests.

4.4.1 Acceptance tests. Each machine shall be connected to air and water supplies. All valves and motors shall be operated a minimum of four times to determine proper operation. All seals and joints shall be checked for air and water leakage.

4.4.2 First article tests.

4.4.2.1 Concrete gunning tests.

- a. The machine shall be connected to an air supply as specified in 3.7.3 and to a water supply as specified in 3.12. The air motors shall be started and operated for 10 minutes while the machine is empty.
- b. All hose and valve connections shall be made air- and water-tight.
- c. The upper feed chamber shall be charged to capacity with an aggregate and cement mixture.
- d. The charge in the upper feed chamber shall be transferred to the lower feed chamber and the operator shall start gunning concrete. The gunning operation shall continue uninterrupted for 1 hour.

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- e. If the unit is a single chamber or rotary chamber, after material loading, the operator shall start gunning concrete. The gunning shall continue uninterrupted for 1 hour.
- f. At the end of 1 hour, the difference in quantity of charge shall be measured to determine compliance with 3.7.1.

4.4.2.2 Sandblasting tests.

- a. The machine shall be charged with common stockpile sharp silica sand having moisture content of not more than five percent.
- b. The charge of sand in the upper feed chamber shall be transferred to the lower feed chamber.
- c. Using a sandblasting nozzle as specified in 3.7.2, the operator shall start sandblasting and continue uninterrupted for 1 hour.
- d. If the unit is a single chamber using a sandblasting nozzle as specified in 3.7.2, the operator shall start sandblasting and continue uninterrupted for 1 hour.
- e. At the end of 1 hour, the difference in the quantity of charge shall be measured to determine compliance with 3.7.2.

4.4.2.3 Lifting and tying down attachments. When required, the lifting and tying down attachments shall be tested to conform to 3.18.

4.4.2.4 Road test. With the unit loaded with sand and cement, the unit shall be towed for not less than 10 miles over paved roads at speeds up to 35 miles per hour (mph), and over nonpaved roads at speeds ranging from 15-20 mph.

4.5 Preparation for delivery inspection. The inspection of the preservation, packaging, packing, and marking shall be in accordance with the requirements of section 5 of this specification. 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 timeframe required.

5. PREPARATION FOR DELIVERY

5.1 Preservation and packaging. Preservation and packaging shall be level A or commercial, as specified (see 6.2).

5.1.1 Level A.

5.1.1.1 Disassembly and matchmarking. Disassembly shall be the minimum necessary to safeguard parts known to be subject to damage or loss, and to accomplish reduction in cube. Bolts, nuts, screws, pins, and washers removed shall be reinstalled in one of the mating parts and secured to prevent their loss. When necessary to facilitate reassembly, parts removed and mating parts shall be matchmarked. Matchmarking shall be made on tags. Waterproof ink shall be used for marking information on tags.

5.1.1.2 Cleaning and drying. Prior to application of preservatives, cleaning and drying shall be accomplished in accordance with MIL-P-116.

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5.1.1.3 Preservatives. Preservatives shall conform to the applicable specifications listed in, and shall be applied in accordance with MIL-P-116.

5.1.1.4 Unpainted surfaces. Unpainted exterior metal surfaces, including threaded surfaces and surfaces exposed by disassembly, shall be coated with type P-1 preservative.

5.1.1.5 Air motors. Interior surfaces of air motors shall be coated with type P-10 preservative. The preservative shall be applied through the lubricating system, or by feeding the preservative into the air inlet, while operating the motor, until the preservative appears at the exhaust port. Air inlets and outlets shall be closed with caps or plugs, or with tape conforming to PPP-T-60, type IV.

5.1.1.6 Pumps. Interior surfaces of pumps shall be coated with type P-10 preservative in a manner which will insure thorough coating of all interior parts and surfaces. Openings into the pump interiors shall be sealed with caps or plugs, or with tape conforming to PPP-T-60, type IV.

5.1.1.7 Valves, nozzles, piping, and fittings. Interior surfaces of ferrous metal valves, nozzles, piping, and fittings shall be coated with type P-10 preservative.

5.1.1.8 Gages. Gages removed from the machine shall be cushioned and individually packaged in a fiberboard box in accordance with Method III of MIL-P-116. Gages not removed from the machine shall be adequately cushioned, wrapped in a waterproof barrier material, and heat-sealed.

5.1.1.9 Hose. Each length of hose shall be secured in a coil to a diameter which prevents deformation.

5.1.1.10 Wheels, axles, and bearings. When wheels and hubs are removed from axles, the interior bearing surfaces of the hubs and the exterior surfaces of the axles shall be coated with type P-6 preservative. The coated surfaces of the axles shall be wrapped and hub openings shall be covered with barrier material conforming to MIL-B-121, type I, grade A, class 2. The barrier shall be secured in place with tape conforming to PPP-T-60, type IV. Bearings removed from wheels shall be coated with type P-6 preservative and preserved in accordance with MIL-P-116, method IA-8 or IA-15.

5.1.1.11 Hopper and mixer openings. Openings in the machine capable of trapping free-falling water (e.g., hopper, mixer, chamber, etc.) shall be sealed with a plastic waterproof barrier to prevent the free entry of water.

5.1.1.12 Consolidated packaging. Disassembled components and accessories requiring additional protection from mechanical damage, shall be packaged in close-fitting boxes conforming to PPP-B-621, class 2; or PPP-B-601, military overseas type. The contents shall be cushioned, blocked, and braced to prevent movement within the boxes.

5.1.2 Commercial. The machine, including all components and accessories, shall be preserved and packaged in a manner to prevent deterioration and damage during shipment.

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5.2 Packing. Packing shall be level A or commercial, as specified (see 6.2).

5.2.1 Level A. The machine shall be processed in accordance with the level A (mobile) requirements of MIL-V-62038. Items packaged in accordance with 5.1.1.12 shall be positioned and secured to the machine in such a manner as not to interfere with towing or lifting of the machine with slings.

5.2.1.1 Fire-retardant materials. Fire-retardant and fire-resistant materials shall be used in lieu of non-fire-retardant materials for shipments to Navy, unless otherwise specified (see 6.2).

5.2.2 Commercial. The complete machine shall be prepared for delivery to comply with applicable carrier rules and regulations.

5.3 Marking.

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

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

6. NOTES

6.1 Intended use. The concrete spraying machine is intended for use in concrete spraying (gunning) and for wet or dry sandblasting.

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

- a. Title, number, and date of this specification
- b. When a first article sample and inspection is required (see 3.2, 4.2.1, and 6.3)
- c. When gasoline engine is required (see 3.11)
- d. When lifting and tying down attachments are required (3.18)
- e. Color of finish coat required (see 3.20)
- f. When a preproduction pack inspection is required, and the timeframe required (see 4.5)
- g. Level of preservation and level of packing (see 5.1 and 5.2)
- h. When fire-retardant materials are not required for level A (see 5.2.1.1)

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

6.4 Supersession data. This specification replaces military specification MIL-C-22744E(YD), dated 10 August 1987.

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MILITARY INTERESTS:
ACTIVITIES:

CIVIL AGENCY COORDINATING

Military Coordinating Activity

GSA-FSS - FCAE

Navy - YD

PREPARING ACTIVITY:

Custodian

Navy - YD

Navy - YD

(Project 3895-0345)

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.