
INCH-POUND

W-F-2793

July 2, 1992

SUPERSEDING

MIL-F-18523C

24 August 1981

FEDERAL SPECIFICATION

FANS, CENTRIFUGAL, DRAFT, FORCED AND INDUCED

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 defines the engineering, logistics, quality assurance and procuring requirements for centrifugal fans used in low-pressure boilers (less than 15 pounds per square inch (psi) operating pressure) and in medium and high pressure (greater than 15 psi operating pressure) (coal, oil and gas fired) power boiler plant systems.

1.2 Classification. The fan shall be of the following types and styles, as specified (see 6.2):

Type I - Backward-curved blades

Type II - Radial-tip blades

Type III - Forward-curved blades

Type IV - Backward-inclined

Type V - Airfoil

Type VI - Radial blades

Style 1 - Forced draft

Style 2 - Induced draft

1.2.1 Definitive part number. The military specification part number for items described in this specification will be identified as shown in 6.7.2.

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 4140

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

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2. APPLICABLE DOCUMENTS

2.1 Government documents.

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

Federal Standards

FED-STD-123 - Marking For Shipment (Civil Agencies)
FED STD-595 - Colors Used In Government Procurement

Military Specifications

MIL-V-173 - Varnish, Moisture and Fungus Resistant (for Treatment of Communications, Electronics, and Associated Electrical Equipment)
MIL-T-704 - Treatment and Painting of Materiel
MIL-T-13867 - Treatment, Moisture and Fungus Resistant for Fire Control Electrical and Electronic Instruments and Equipment
MIL-E-16298 - Electric Machines Having Rotating Parts, Accessories and Associated Support Items: Packaging of
MIL-T-17286 - Turbines and Gears, Shipboard Propulsion and Auxiliary Steam; Packaging of
MIL-I-24092 - Insulating Varnishes and Solventless Resins for Application By the Dip Process

Military Standards

MIL-STD-129 - Marking For Shipment And Storage
MIL-STD-130 - Identification Marking Of U.S. Military Property
MIL-STD-461 - Electromagnetic Emission and Susceptibility Requirements for the Control of Electromagnetic Interference
MIL-STD-462 - Electromagnetic Interference Characteristics, Measurement of

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Standardization Documents Order Desk, Bldg. 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

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Air Movement And Control Association (AMCA):

AMCA Publication No. 99 - Standard Handbook
AMCA Publication No. 801 - Power Plant Fans Specification Guidelines
AMCA Standard No. 210 - Laboratory Methods of Testing Fans for Rating

(Application for copies should be addressed to Air Movement and Control Association, 30 West University Drive, Arlington Heights, IL 60004.)

American National Standards Institute, Inc. (ANSI):

ANSI B15.1 - Mechanical Power - Transmission Apparatus, Safety Code for

(Applications for copies should be addressed to the American National Standards Institute, Inc., 11 West 42nd Street New York, NY 10036.)

American Welding Society (AWS):

AWS D1.1 - Structural Welding Code Steel
AWS D14.6 - Welding of Rotating Elements of Equipment,
Specification for

(Application for copies and specific recommendations should be addressed to the American Welding Society, 550 N.W. LeJune Road, P.O. Box 351040, Miami, FL 33135.)

National Electrical Manufacturers Association (NEMA):

NEMA ICS-1 - General Standards for Industrial Controls and Systems
NEMA ICS-2 - Industrial Control Devices, Controllers and Assemblies
NEMA ICS-6 - Enclosures for Industrial Controls and Systems
NEMA MG-1 - Motors and Generators
NEMA SM-23 - Steam Turbines for Mechanical Drive Service

(Application for copies should be addressed to the National Electrical Manufacturers Association, 2101 L Street, N.W., Washington, DC 20037.)

SOCIETY OF AUTOMOTIVE ENGINEERS, INC. (SAE)

SAE J534 - Lubrication Fittings

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

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

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

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3. REQUIREMENTS

3.1 Description. The unit shall consist of an electrical motor driven or a steam turbine driven centrifugal fan, a housing (scroll and side plates), controls, guards, and accessories. All components shall be attached to a common base which shall include provisions for fastening to a foundation. The unit shall be completely assembled, ready for installation and operation. Style 1 and style 2 units shall be suitable for continuous boiler draft operation (see 6.1.1).

3.2 First article. When specified in the contract or purchase order (see 6.2), the contractor shall furnish a fan assembly of the type and style as required for first article inspection and approval (see 4.2.1 and 6.4).

3.3 Standard commercial product. Each fan of the same classification 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 unit 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. Unless otherwise specified, none of the above shall be interpreted to mean that the use of used or rebuilt products are allowed under this specification.

3.5 Identical items. All fans of the same classification, furnished under any specific contract, shall be physically and mechanically identical. This requirement includes parts, assemblies, components, and accessories. No deviation will be acceptable without prior written approval of the contracting officer.

3.6 Standards compliance. Fans shall meet the requirements of AMCA Standard No. 210 prior to approval of the first article, if one is specified, or prior to approval of the first shipment. If a first article is not specified, the supplier shall submit to the contracting officer satisfactory evidence that the fan he proposes to furnish meets the requirements of AMCA Standard No. 210. Acceptable evidence of meeting the requirements of this standard will be the AMCA Certified Rating Seal, or a certified inspection report from an independent testing laboratory indicating that the fan conforms to the requirements of AMCA Standard No. 210.

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3.7 Design. The fans shall be designed to operate in air or flue gas at a temperature of degrees Fahrenheit (oF), density pounds per cubic foot (pcf), and inlet and outlet resistance (inches of water gage) as specified (see 6.2). The design of the equipment and accessories shall permit accessibility for maintenance and service in the field and be such as to prevent conditions hazardous to personnel or deleterious to equipment. The fan assembly shall be built in accordance with AMCA Publication No. 99. In addition to the requirements specified herein, the design information necessary to meet the system requirements as outlined in Section 8 of AMCA Publication No. 801 shall be supplied to the contractor as specified (see 6.2).

3.8 Fan. The fans shall be of the single- or double-width centrifugal type as specified (see 6.2). When the fan is a double-width centrifugal type, it shall have a double inlet. The direction of fan rotation and discharge, and the position of inlet boxes shall be as specified (see 6.2), and shall be in accordance with the applicable standard designations of AMCA No. 99.

3.8.1 Capacity and performance. The fan rating shall be based on standard air at 70oF; 29.92 inches barometric pressure (0.075 pcf). The fan shall deliver at its standard rating, its rated capacity in cubic feet per minute (cfm) as specified (see 6.2) and at a static pressure as specified (see 6.2). The fans shall have a static efficiency of not less than that specified in table I in standard air at best efficiency point.

TABLE I. Fans static efficiency.

* Type	Static efficiency	*
* I	70 Percent	*
* II	70	*
* III	60	*
* IV	70	*
* V	80	*
* VI	60	*

3.8.2 Fan wheel and shaft. The fan wheel (rotor) shall be of the backward-curved, forward-curved radial-tip blade backward inclined or airfoil type, and be constructed of steel or aluminum as specified (see 6.2). The shaft shall be turned, ground, and polished. The fan wheel and shaft assembly shall be balanced statically and dynamically. The complete rotating assembly of the fan shall be dynamically balanced within the limits of the following formula:

$$\text{Vibration displacement} = \frac{1,620}{\text{revolutions per minute}}$$

mills-peak-to-peak

3.8.3 Fan noise. Fan noise shall not exceed 90 decibels (dB) on the "A" scale of a standard sound level meter at 3-foot stations at a height of 4.5 feet. The fan noise shall drop at least 10 dB when measured at a distance of 25 feet and 4.5 feet in height. Equipment which cannot comply with an 80 dBA limit at a 3-foot station shall be identified with appropriate documentation. Such documentation shall include the quantitative descriptions of the sound output of the equipment and also the quantitative information on the sound transmission between the source and the listener at 3-foot station and

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the 25-foot station. Upon notification by the contractor that the fan cannot comply with the noise requirements of this specification, the contracting officer shall furnish to the contractor one Hazardous Noise label for each fan, (8 inch x 10-1/2 inch), NSN 0105-00-212-6010. The contractor shall affix the label to the fans at the inlet scroll side or at the top of the scroll housing (see 6.1.2).

3.8.4 Fan housing. Unless otherwise specified (see 6.2), the housing shall be carbon steel sheet of a nominal thickness not less than that reflected in table II.

TABLE II. Housing gages.

Nominal fan diameter in inches	Sides	Scroll
up to 23	10 gage	10 gage
24-72	7 gage	7 gage
73-over	1/4 inch	1/4 inch

3.8.5 Fan housing components. Scroll and sideplate joints shall be continuously welded. The housing shall be reinforced with steel member to provide a rigid structure and to minimize vibration. When specified (see 6.2) a threaded drain connection to accommodate a 1-inch standard pipe shall be located at the lowest point in the scroll. A flush-type access door shall be included in the scroll and held by quick-release clamps, and located as specified (see 6.2). Inlet and outlet duct connections shall be flanged. The base shall be suitable for anchorage to a foundation.

3.8.6 Inlet box. When specified (see 6.2), the inlet of the style 2 fan shall be equipped with an inlet box of the same steel thickness as the housing. Each inlet box shall have an access door and drain similar to that provided in the housing (see 3.8.5). Seals shall be provided to minimize leakage where the shaft passes through the housing or inlet box.

3.8.7 Inlet guard. The inlet opening of the style 1 fan shall have a screen guard of heavy gage galvanized wire with mesh not greater than 2 inches and not less than 1/2 inch.

3.9 Bearing. The fan shall be equipped with: (1) precision anti-friction bearings, that meet the requirements for a minimum rating life of 100,000 hours; or (2) the self-aligning sleeve type; or (3) roller bearings mounted in suitable pillow blocks as specified (see 6.2). When specified (see 6.2), bearing for style 2 fans shall have provisions for water cooling. Air balanced pillow blocks or auxiliary seals shall be provided to prevent the aspiration of oil from oil slinger type bearings. The oil reservoir shall be provided with heat slingers for control of air movement over the bearing housing in order to prevent a buildup of ambient temperature.

3.10 Controls. Unless otherwise specified (see 6.2), the style 1 fan shall be equipped with a constant-speed driving unit and with adjustable inlet radial vanes. Unless otherwise specified (see 6.2), the style 2 fan shall be equipped with variable inlet dampers for regulation of the air output volume. When specified (see 6.2), style 1 and style 2 fans shall have a variable speed

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reducer with percent reduction speed as specified (see 6.2). The vane, vane actuator, and damper assemblies shall be constructed to withstand the force of the air developed by the fan. The air volume control adjusting device shall terminate in a single control lever.

3.11 Power Unit. The fan shall be driven by a steam turbine or electric motor as specified (see 6.2). The power unit rating shall be sufficient for handling of the fan load at the fan capacity specified.

3.11.1 Turbine. The steam turbine shall conform to NEMA SM-23 and accommodate sufficient steam to meet conditions and information in Part 9, Steam Turbine Inquiry Guide as specified (see 6.2).

3.11.2 Electric motor. The electric motor shall conform to NEMA MG-1 and be operable on electrical current with characteristics as specified (see 6.2). Unless otherwise specified (see 6.2), the motor control shall be the across-the-line magnetic type with thermal overload and low voltage protection. Enclosures for the motor shall be totally enclosed fan-cooled (TEFC) or explosion-proof as specified (see 6.2). Motor control devices and systems shall conform to NEMA ICS-1 and NEMA ICS-2 as applicable. Enclosures for motor control devices or systems shall conform to NEMA ICS-6, NEMA type 1 or type 12 as specified (see 6.2).

3.12 Drive. The fan wheel shall be mounted on the motor shaft, be driven through a suitable coupling by the motor or turbine, or be driven by means of single or multiple V-belts as specified (see 6.2). The coupling shall be capable of compensating for misalignment and expansion of the coupled shafts. Detachable safety guards shall be provided over the coupling(s) and the V-belt(s) in accordance with ANSI B15.1.

3.13 Lubrication. Unless otherwise specified (see 6.2), means for lubrication shall be provided in accordance with the manufacturer's standard practice. Parts requiring lubrication shall be so located as to make the lubricating points easily visible and accessible. Hydraulic lubrication fittings shall be in accordance with SAE J534. Where use of high-pressure lubricating equipment, 1,000 pound-force per square inch (psi) or higher, will damage grease seals or other parts, a suitable warning shall be affixed to the equipment in a conspicuous location. All parts requiring lubrication shall be properly lubricated before delivery.

3.14 Fungus resistance. When specified (see 6.2), electric components and circuit elements including terminal and circuit connections shall be treated for moisture and fungus resistance in accordance with MIL-T-13867 as specified herein. Electrical components with a temperature rise of 40 degrees Celsius (oC) or less shall be coated in accordance with Type II of MIL-T-13867 with fungus resistant varnish conforming to MIL-V-173. Components with a temperature rise exceeding 40oC shall be coated in accordance with Type III or IV of MIL-T-13867 with varnish conforming to MIL-I-24092 with grade and class of varnish dependent on the component, class of insulation above 40oC and the recommendations of the manufacturer of the equipment.

3.15 Cleaning, treatment and painting. Unless otherwise specified (see 6.2), surfaces normally painted in good commercial practice shall be cleaned, treated, and painted as specified herein. When specified (see 6.2),

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the unit shall be cleaned, treated, and painted in accordance with MIL-T-704, type A or C. The color of the finish coat shall be as specified (see 6.2) in accordance with FED-STD-595. Surfaces to be painted shall be cleaned and dried to insure that they are free from contaminants such as oil, grease, welding slag and spatter, loose mill scale, water, dirt, corrosion product, or any other contaminating substances. As soon as practicable after cleaning, and before any corrosion product or other contamination can result, the surface 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.

3.16 Electromagnetic interference suppression. When specified (see 6.2), the equipment shall conform to the electromagnetic interference suppression requirements and test limits for class C3, Group III equipment as specified in MIL-STD-461.

3.17 Identification markings. Equipment, assemblies, and parts shall be marked for identification with item name, manufacturer's name, model, serial number, capacity, year of manufacture and overall weight. The nomenclature of the item shall be FAN, CENTRIFUGAL. Identification markings shall be in accordance with MIL-STD-130.

3.18 Dissimilar metals. Metals dissimilar with respect to the galvanic scale shall not be used unless separated by an insulating material which will avoid electrolytic corrosion.

3.19 Technical manuals. The contractor shall provide technical manual(s) conforming to the Data Item Description(s) (DID) listed on the Contract Data Requirements List (CDRL) (DD Form 1423) (see 6.3).

3.20 Workmanship. The fan shall be clean, free from scale, smooth, round, straight, and of proper dimensions. Also, the fan shall be free from injurious grooving, indentations, racks, flaws, slivers, spilly metal, or other harmful defects which would interfere with use of the item in the application for which it is intended.

3.20.1 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.

3.20.2 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.

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3.20.3 Weldings. The surfaces or parts to be welded shall be free of oxide, loose mill scale, paint, grease, or other foreign matter. Welds shall be continuous, sound, smooth, and free from porosity, slag inclusions, cracks, incomplete fusion, or deformation of material. All scale or flux deposits (when flux is used) shall be removed from the finished welds. Weld penetration shall provide transference of maximum design stress through the base metal juncture. Fillets shall be provided where necessary to reduce stress concentration. Welding shall be in accordance with AWS D1.1 for housings, and AWS D14.6 for the wheel.

3.20.4 Castings. Castings shall be sound and free from patching, misplaced coring, warping, or other defects that may render the casting unsound for use. Repair processes, such as welding, peening, plugging, or filling with cold solder or metallic paste shall not be attempted without authorization of the contracting officer.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements (examinations and tests) as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in this document where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items shall meet all requirements of sections 3 and 5. The inspection set forth in this document shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in this document shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

4.2 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).
- c. Packaging requirement (see 4.6).

4.2.1 First article inspection. The first article inspection shall be performed on one complete fan when a first article is required (see 3.2 and 6.4). This inspection shall include the examination of 4.4, and the tests of 4.5. 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.

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4.2.2 Quality conformance inspection. Quality conformance inspection shall be performed on the units as specified herein. This inspection shall include the examination of 4.4 and the operational test of 4.5.2.

4.3 Inspection lot. All units of the same description offered to the Government at one time shall be considered a lot for the purpose of inspection.

4.4 Examination. The first article, when furnished, and each fan shall be examined for compliance to the requirements of Section 3. Any redesign or modification of the contractor 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.

4.5 Tests. The first article, when furnished, and each unit shall be tested, as required; and any unit failing to pass the following tests shall be rejected. Tests shall be conducted as outlined in the referenced documents and as herein specified.

4.5.1 Capacity test. The fan shall be subjected to air volume and pressure tests in accordance with AMCA Standard No. 210. The test shall be performed as outlined in the test's standard. Presentation of AMCA certification (see 3.6) may be made in lieu of performing the capacity test.

4.5.2 Operational test. The fan unit shall be connected to the specified power source and operated for 15 minutes. The fan wheel, controls, motor or turbine, and accessories shall be inspected during the test for vibration, noise, overheating, and loose parts.

4.5.3 Electromagnetic interference suppression tests. To determine conformance to 3.16, the first article shall be subjected to the tests in accordance with MIL-STD-462. When suppressed to conform to 3.16, the manufacturer upon approval of the contracting officer may furnish a certification (see 6.4) in lieu of the test that the fan unit 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.

4.6 Preparation for delivery inspection. The inspection of the preservation, packaging, packing, and marking shall be in accordance with the requirements of section 4 of MIL-E-16298 or MIL-T-17286, as applicable. The inspection shall consist of the quality conformance inspection and, when specified (see 6.2), a preproduction pack inspection shall be furnished for examination and test within the time frame required (see 6.2). When specified (see 6.2), a rough-handling test shall be required as part of the preproduction pack inspection.

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5.1 Preservation, packaging, and packing. Preservation, packaging, and packing shall be in accordance with the requirements of MIL-E-16298 for electric motor driven units, and MIL-T-17286 for steam turbine driven units. The level of preservation, packaging, and the level of packing as specified (see 6.2).

5.2 Marking.

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

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

6. NOTES

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

6.1 Intended use. Centrifugal draft fans are intended to develop drafts for use in power plant service. Fans may create either forced or induced draft (or both in a balanced draft system), depending on requirements.

6.1.1 Fans operating temperatures. Style I fan assemblies are obtainable to handle preheated air at temperatures up to 250oF. Style 2 fan assemblies are obtainable to handle flue gases having temperatures up to 800oF.

6.1.2 Noise level. The noise levels specified herein are levels of noise normally produced by power plant fans. Some fans may not exceed 80 dBA at the 3-foot station. Fans that do exceed the 80 dBA should have engineering controls applied to the installation to reduce the noise level to 80 dBA or have personnel wear personal protective devices to reduce the exposure to the hazardous noise levels during operation and maintenance.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and data of this specification.
- b. Type and style of fan 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 a first article is required (see 3.2).
- e. When fan shall operate in air or flue gas and at inlet temperature and density, and inlet or outlet resistance (see 3.7).
- f. When style 1 fan assemblies shall be designed for 250oF preheated air (see 3.7).
- g. Information required in section 8 of AMCA Publication 801 (see 3.7).
- h. Whether fan shall have single or double inlet, direction of rotation and discharge, and position of inlet boxes (see 3.8 and 6.5).
- i. Required rating capacity and static pressure at standard rating (see 3.8.1).
- j. Type of wheel (rotor) for fan, and whether wheel shall be constructed of aluminum or steel (see 3.8.2).
- k. When fan housing material shall be different (see 3.8.4).

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- l. When drain is required: location of access door (see 3.8.5).
- m. When inlet box is required in style 2 fan (see 3.8.6).
- n. Type of bearings and whether bearings for style 2 fan shall be water-cooled (see 3.9).
- o. When the driving unit for the style 1 fan and controls for fans shall be different; when inlet dampers are to be different for style 2 fan. When variable speed is required and type of speed reducer with percent of reduction of speed (see 3.10).
- p. Type of drive (steam turbine or electric motor); steam conditions and required information in Part 9, Steam Turbine Inquiry Guide of NEMA SM-23; or electrical current characteristics; whether motor control shall be different; type of enclosures for motor and motor control and whether NEMA type 1 or 12 (see 3.11, 3.11.1 and 3.11.2).
- q. Type of fan wheel drive (see 3.12).
- r. When lubrication shall be different (see 3.13).
- s. When fungus resistance is required (see 3.14).
- t. When treatment and painting shall be different (see 3.15).
- u. When treatment in accordance with MIL-T-704 is required (see 3.15).
- v. Color required in accordance with FED-STD-595 (see 3.15).
- w. When electromagnetic interference suppression is required (see 3.16).
- x. If number of fans to be tested is other than specified (see 4.6).
- y. When a preproduction pack is required and the time frame required for submission of the preproduction pack (see 4.6).
- z. When a rough-handling test is required (see 4.6).
- aa. Level of preservation and packaging and level of packing required (see 5.1).

6.3 Contract data requirements. When this specification is used in an acquisition which incorporates a DD Form 1423 and invokes the provisions of paragraph 7-104.9(n) of the Defense Acquisition Regulations (DAR), the data requirements will be developed as specified by an approved Data Item Description (DD Form 1664) and delivered in accordance with the Contract Data Description (DD Form 1423) incorporated into the contract. When the provisions of DAR 7-104.9(n) are not invoked, the data shall be delivered in accordance with the contract requirements.

6.4 First article. When a first article is required, it shall be tested and approved under the appropriate provisions of paragraph 7-104.55 of the DAR. The first article should be a first production item consisting of one complete fan unit or it may be a standard production item from the contractor's current inventory as specified in 4.2.1. The contracting officer should include specific instructions in all acquisition instruments regarding arrangement for examinations, tests, and approval of the first article.

6.5 Direction of rotation and discharges. The direction of rotation should be specified as clockwise or counterclockwise as determined from the drive side of the fan. The direction of discharge should be specified as one of the following:

Top horizontal	Top angular up
Top angular down	Up blast
Down blast	Bottom angular up
Bottom angular down	Bottom horizontal

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Further information on rotation and discharge may be obtained from AMCA Standard 2406-66 in AMCA Bulletin 99.

6.6 Engineering design conference. The following information should be included in the invitation for bid:

"Within ten days after award of contract and prior to any work on the first article, including ordering of materials, the supplier may request the contracting officer, in writing, to arrange an engineering design conference for discussion of any questions concerning the details of instructions, and technical requirements of this specification. This conference is to assist the supplier in interpretation of the specification and agreements made shall neither obligate the Government to accept equipment that is not in accordance with this specification nor relieve the supplier of his obligation to supply the equipment specified."

6.7 Part or Identifying Number (PIN). The PIN to be used for fans acquired to this specification are created as follows:

	W-F-2793	X
	*	*
Specification No. -----*		*
Type and Style Code Letter -----*		*

6.7.1 Type and style. The type and style of fans (see 1.2) are identified by a single alphabetic character as shown in table III.

TABLE III. Code letter to type and style.

* Style	I	II	III	IV	V	VI	* Type *
* 1	A	C	E	G	I	L	*
* 2	B	D	F	H	J	M	*

6.7.2 Part numbers. The PIN procedure is for Government purposes and does not constitute a requirement for the contractor.

6.8 Improved design and material. It is not the intent of this specification to prohibit the procurement of fans incorporating newly developed designs and materials having greater reliability, less maintenance, and longer life than those specified herein, provided that such designs and materials have been evaluated and approved for use in fans.

6.9 Supersession data. This specification supersedes MIL-F-18523C dated 24 August 1981.

6.10 Subject term (key word) listing.

Air
Boiler
Fans
Flue Gas
Power Plant

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MILITARY INTERESTS:

Military Coordinating Activity

Navy - YD

Custodian

Navy - YD

Review Activity

DLA - GS

CIVIL AGENCY COORDINATING ACTIVITIES:

GSA - FSS

PREPARING ACTIVITY:

Navy - YD

(Project 4140-0073)

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