

INCH-POUND  
MIL-A-23798C(SH)  
6 March 1995  
SUPERSEDING  
MIL-A-23798B(SHIPS)  
29 May 1973

## MILITARY SPECIFICATION

### AIR CONDITIONER, FAN-COIL ASSEMBLY

This specification is approved for use by the Naval Sea Systems Command, Department of the Navy, and is available for use by all Departments and Agencies of the Department of Defense.

#### 1. SCOPE

1.1 Scope. This specification covers prefabricated fan-coil assemblies for use in conjunction with a chilled water system for air conditioning spaces on board Naval surface ships.

1.2 Classification. The fan-coil assemblies should be of the following types, sizes, and capacities, as specified (see 6.2):

- Type II - Three section unit consisting of a cooling coil section, fan-motor section, and air distribution plenum section.  
Type III - Two section unit consisting of a cooling coil section and fan-motor section.

<u>Size</u>	<u>Nominal Capacity</u> <sup>1/</sup>
21	31,300 British thermal units per hour (Btu/h)
22	51,200 Btu/h
23	77,600 Btu/h
24	99,800 Btu/h
25	151,300 Btu/h

<sup>1/</sup> See 3.3.3 and table II for conditions.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, SEA 03R42, Naval Sea Systems Command, 2531 Jefferson Davis Hwy, Arlington, VA 22242-5160 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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## 2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents 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).

## SPECIFICATIONS

## FEDERAL

- FF-B-171 - Bearings, Ball, Annular (General Purpose).
- QQ-P-35 - Passivation Treatments for Corrosion-Resistant Steel.
- TT-P-645 - Primer, Paint, Zinc Chromate, Alkyd Type.
- TT-P-664 - Primer Coating, Alkyd, Corrosion-Inhibiting, Lead and Chromate Free, VOC-Compliant.
- PPP-F-320 - Fiberboard: Corrugated and Solid, Sheet Stock (Containers Grade) and Cut Shapes.

## MILITARY

- MIL-C-104 - Crates, Wood, Lumber and Plywood Sheathed, Nailed and Bolted.
- MIL-P-116 - Preservation, Methods of.
- MIL-S-901 - Shock Tests, H.I. (High-Impact) Shipboard Machinery, Equipment, and Systems, Requirements for.
- MIL-F-1183 - Fittings, Pipe, Cast Bronze, Silver-Brazing, General Specification for.
- MIL-F-1183/10 - Fittings, Pipe, Cast Bronze, Silver-Brazing; Union, Pipe.
- MIL-A-3316 - Adhesives, Fire-Resistant, Thermal Insulation.
- MIL-P-15024 - Plates, Tags and Bands for Identification of Equipment.
- MIL-P-15024/5 - Plates, Identification.
- MIL-E-15090 - Enamel, Equipment, Light-Gray (Formula No. 11).
- DOD-P-15328 - Primer (Wash), Pretreatment (Formula No. 117 for Metals). (Metric)
- MIL-L-15719 - Lubricating Grease (High-Temperature, Electric Motor, Ball and Roller Bearings).
- MIL-F-16552 - Filters, Air Environmental Control System, Cleanable, Impingement (High Velocity Type).
- MIL-M-17060 - Motors, 60-Hz, Alternating Current, Integral-Horsepower (Shipboard Use).
- MIL-I-19140 - Lumber and Plywood, Fire-Retardent Treated.
- DOD-I-24688 - Insulation Panel, Thermal and Acoustic Absorptive, Open-Cell Polyimide Foam.

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## STANDARDS

## MILITARY

- MIL-STD-129 - Marking for Shipment and Storage.
- MIL-STD-167-1 - Mechanical Vibrations of Shipboard Equipment (Type I - Environmental and Type II - Internally Excited).
- MIL-STD-167-2 - Mechanical Vibrations of Shipboard Equipment (Reciprocating Machinery and Propulsion System and Shafting) Types III, IV, and V.
- MIL-STD-248 - Welding and Brazing Procedure and Performance Qualification.
- MIL-STD-278 - Welding and Casting Standard.
- MIL-STD-1186 - Cushioning, Anchoring, Bracing, Blocking, and Water Proofing, with Appropriate Test Method
- MIL-STD-1399 - Interface Standard for Shipboard Systems, Electric Section 300 Power, Alternating Current. (Metric)
- MIL-STD-1472 - Human Engineering Design Criteria for Military Systems, Equipment, and Facilities.
- DOD-STD-2142 - Magnetic Silencing Characteristics, Measurement of.

## FEDERAL

- FED-STD-H28 - Screw Thread Standards for Federal Service.

(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.)

2.1.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

## PUBLICATIONS

## MILITARY

## NAVAL SEA SYSTEMS COMMAND (NAVSEA)

- 0901-LP-074-0010 - Naval Ships Technical Manual, Chapter 074 Volume 1, Welding and Allied Processes.
- 0900-LP-001-7000 - Piping Systems, Brazed, Fabrication and Inspection.
- 0900-LP-003-8000 - Metals Surface Inspection Acceptance Standards.

(Application for copies should be addressed to Naval Publications and Forms Center, 5801 Tabor Avenue, Code 1051, Philadelphia, PA 19120-5099.)

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2.2 Non-Government publications. The following document(s) form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation (see 6.2).

AIR MOVEMENT AND CONTROL ASSOCIATION, INC. (AMCA)  
210 - Laboratory Methods of Testing Fans for Rating.  
300 - Test Code for Sound Rating.

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

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)  
A5.1 - Specification for Covered Carbon Steel Arc Welding Electrodes.

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

AMERICAN NATIONAL STANDARD/RUBBER MANUFACTURERS ASSOCIATION (ANSI/RMA)  
1P20 - Drives using Classical V-Belts and Sheaves.  
1P25 - Drives using Variable Speed V-Belts.

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

AMERICAN SOCIETY OF HEATING, REFRIGERATION AND AIR CONDITIONING ENGINEERS (ASHRAE)  
33 - Methods of Testing Forced Circulation Air Cooling and Air Heating Coils.  
37 - Methods of Testing for Rating Unitary Air Conditioning and Heat Pump Equipment.

(Application for copies should be addressed to the American Society of Heating, Refrigeration, and Air Conditioning Engineers, 1791 Tullie Circle NE, Atlanta, GA 30329.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)  
A 123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products. (DoD adopted)  
B 6 - Standard Specification for Zinc. (DoD adopted)  
B 43 - Standard Specification for Seamless Red Brass Pipe Standard Sizes. (DoD adopted)  
B 88 - Standard Specification for Seamless Copper Watertube. (DoD adopted)  
B 633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel. (DoD adopted)

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## ASTM (Continued)

- D 3951 - Standard Practice for Commerical Packaging.
- F 593 - Standard Stainless Steel Bolts, Hex Cap Screws, and Studs.  
(DoD adopted)
- F 594 - Standard Stainless Steel Nuts. (DoD adopted)

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

(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.

### 3. REQUIREMENTS

3.1 First article. When specified (see 6.2), a sample shall be subjected to first article inspection (see 6.6) in accordance with 4.3.

3.2 Materials. The materials of construction shall be similar or equal to the applicable specifications as specified herein and shall be the same as successfully used in commercial applications. Cast iron shall not be used in the construction of the fan-coil assembly except fan and motor sheaves may be gray cast iron.

3.2.1 Corrosion protection. Corrosion-resisting steel, galvanized steel, copper, and brass referenced herein are considered corrosion-resisting materials. Corrosion-resisting steel, when fabricated by any method that tends to reduce corrosion-resisting properties, shall be normalized to restore those properties before being assembled in any unit.

3.2.1.1 Corrosion protection methods. Parts fabricated from other than corrosion-resisting materials shall be protected against corrosion after fabrication with chemicals, electrolytic processes, plating or paints. The following methods while not restrictive are considered corrosion protection methods when properly applied.

- (a) Hot-dipped galvanized in accordance with ASTM A 123 with the spelter conforming to grade 5 of ASTM B 6.
- (b) Electroplating with zinc in accordance with type LS of ASTM B 633 followed by a phosphate treatment conforming to method A of ASTM D 2092.
- (c) Hot phosphoric or chromic acid treatment, or a coating of primer in accordance with DOD-P-15328 followed by two coats of primer conforming to TT-P-664.

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3.2.1.2 Fastenings and fittings. Bolts, nuts, studs, screws, and all such fastenings or fittings used shall be of corrosion-resisting material in accordance with ASTM F 593, ASTM F 594, and FED-STD-H28 as applicable. Passivation treatment shall be in accordance with QQ-P-35. Self-tapping sheet metal screws shall not be used.

3.2.2 Dissimilar metals. Direct contact of electrolytically dissimilar materials shall be avoided to prevent destructive electrolysis.

3.2.3 Nonmagnetic material. When nonmagnetic fan-coil assemblies are specified (see 6.2), parts normally fabricated of black or galvanized steel shall be fabricated of corrosion-resisting steel which has a permeability of less than 2.0 m/u (air = 1.0) after fabrication. Permeability shall be determined in accordance with DOD-STD-2142, [test P-01] (see 4.3.4.8).

3.2.4 Recovered materials. Unless otherwise specified herein, all equipment, material, and articles incorporated in the products covered by this specification shall be new and may be fabricated using materials produced from recovered materials to the maximum extent practicable 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 is allowed under this specification unless otherwise specifically specified.

### 3.3 Design and construction.

3.3.1 Reliability and maintainability. The principle of maximum reliability is paramount and no compromise of this principle shall be made with any other basic requirement of design (see 6.3). Where corrosion or wear is unavoidable, those parts subjected to corrosion or wear shall be of the best material for the purpose in order to reduce these detrimental effects. The equipment shall operate continuously for not less than 175,000 hours except for replaceable parts such as bearings and V-belts. Replaceable parts other than the V-belts shall provide continuous operation for 35,000 hours before replacement is necessary. V-belts shall provide continuous operation for not less than 17,000 hours before replacement is necessary.

3.3.1.1 Human engineering. This equipment shall be maintainable and repairable by Navy personnel. Human engineering should be considered in accordance with MIL-STD-1472 in design to preclude or minimize possibility of failure through improper operation or poor maintenance.

3.3.1.2 Maintainability. The fan-coil assembly shall be constructed so that (see 6.3):

- (a) Fan and motor are removable through the front or side access for repair.
- (b) V-belt can be removed and replaced through the front or side access.
- (c) Fan bearing and motor bearing can be replaced.

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- (d) Air filter can be removed for servicing through front of unit.
- (e) Belt tension and sheave diameter can be adjusted through front or side access.
- (f) Cooling coil is removable through the side access for repair and is serviceable through the front access.

3.3.2 General design. Each assembly shall consist of a fan and motor, a cooling coil for chilled water, and air filters mounted on and enclosed in a metal cabinet. The metal cabinet shall be equipped with thermal insulation and treated for noise attenuation, and shall be constructed for deck mounting. The cabinet shall also incorporate a provision to enable connection to supply and return ducts in the upper portion of the assembly and ready for installation and connection to a power source, drainage, and chilled water supply and return.

3.3.2.1 General shipboard design conditions. General shipboard design characteristics shall be as follows:

- (a) Operate when permanently inclined 15 degrees from the normal horizontal position in any direction.
- (b) Perform in accordance with the requirements herein under a design:
  - (1) Entering dry bulb (DB) temperatures of 70 degrees Fahrenheit (°F) minimum to 100°F maximum.
  - (2) Entering wet bulb (WB) temperatures of 57°F minimum to 84°F maximum.
  - (3) Entering chilled water temperature of 45°F minimum (see 6.2).
  - (4) Chilled water flow rates of 2.5 gallons per minute (gal/min) per ton of refrigeration (gal/min/ton) minimum to 3.6 gal/min/ton maximum.

3.3.2.2 Shock. The fan-coil assembly shall pass the high impact shock tests specified in MIL-S-901 for grade A, class II equipment. Fan-coil assemblies to be installed on civilian ships by the Military Sealift Command shall not be shock tested.

3.3.2.2.1 Shock mounts. Internal shock and vibration mounts shall be provided in conjunction with the mounting arrangement for the fan and motor assembly.

3.3.2.3 Vibration. No damage to the fan-coil assembly or malfunction shall be caused by either internally excited vibrations, or by the environmental vibrations specified in MIL-STD-167-1 for frequencies up to and including 33 hertz (Hz).

3.3.2.4 Noise limitation. The assembly shall meet the sound power level indicated in table I. The noise level shall be measured as specified in 4.3.4.6. The measured noise level shall be the summation of deviations from the specified limit and shall be equal to zero or a negative value.

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TABLE I. Noise limitation.

Sound power level dB reference $10^{-12}$ watts									
Octave band center frequency (Hz)									
Size	31.5	63	125	250	500	1000	2000	4000	8000
21	83	80	77	74	71	68	65	63	61
22	86	83	80	77	74	71	68	66	64
23	94	91	88	85	82	79	76	74	72
24	95	92	89	86	83	80	77	75	73
25	97	94	91	88	85	82	79	77	75

3.3.3 Nominal capacity rating. The nominal capacity rating of the fan-coil assembly cooling coil shall be at least equal to that specified in table II, based on 80°F DB temperature and 67°F WB temperature entering the cabinet with 50.6°F WB temperature leaving the coil when the entering water is 45°F. The airflow at the cabinet outlet shall be within plus or minus 5 percent of the rated airflow specified in table II. The water flow through the coil shall be within plus or minus 5 percent of the rated water flow specified in table II.

TABLE II. Capacity rating (nominal).

Fan-coil assembly	Cooling coil air and water flow for rated capacity			Fan
	Sizes	Capacity (Btu/h)	Air (SCFM)	Water (gal/min)
21	31,300	620	9	1-1/2
22	51,200	1035	16	3
23	77,600	1540	23	5
24	99,800	2065	31	5
25	151,300	3080	44	7-1/2

3.3.3.1 Performance. The performance of the fan-coil assembly for a given airflow at specified DB and WB air temperatures entering the cabinet and a specific water temperature and a flow of 3.6 gal/min/ton through the cooling coil shall be as specified in tables III through VII, as applicable. Tolerances for airflow and water flow shall be as specified in 3.3.3. The entering water temperature, the entering DB temperature, and the entering and leaving WB temperatures shall be within plus or minus 0.5 degrees of that specified in the applicable table.

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TABLE III. Size 21 performance (3.6 gal/min/ton).

Chilled water (°F)	Entering air DB (°F)	Entering air WB (°F)	SCFM					
			400		3/ 620		760	
			MBH <u>1/</u>	WB	MBH	WB	MBH	WB
45	<u>2/</u> 70	<u>2/</u> 58.0	<u>2/</u> 10.7	48.0	<u>2/</u> 15.5	48.5	<u>2/</u> 18.4	49.0
		60.0	15.0	48.5	21.5	49.5	25.2	50.0
		64.0	17.5	48.5	25.3	50.0	29.7	50.5
		<u>2/</u> 66.0	<u>2/</u> 20.2	49.0	<u>2/</u> 29.3	50.0	<u>2/</u> 34.3	51.0
	<u>2/</u> <u>3/</u> 80	<u>2/</u> 62.0	<u>2/</u> 15.6	48.0	<u>2/</u> 22.8	49.0	<u>2/</u> 27.0	49.0
		<u>3/</u> 67.0	21.6	48.5	<u>3/</u> 31.3	50.0	36.7	51.0
		70.0	25.9	49.0	37.8	50.5	44.4	51.5
		<u>2/</u> 72.5	<u>2/</u> 29.8	49.0	<u>2/</u> 43.4	51.0	<u>2/</u> 51.2	51.5
	<u>2/</u> 100	<u>2/</u> 68.5	<u>2/</u> 24.4	48.0	<u>2/</u> 36.1	49.0	<u>2/</u> 40.9	51.0
76.0		35.5	49.0	51.5	51.5	61.2	52.5	
81.5		45.4	49.5	66.5	52.0	78.7	53.5	
<u>2/</u> 83.5		<u>2/</u> 49.4	50.0	<u>2/</u> 72.3	52.5	<u>2/</u> 85.8	54.0	
50	<u>2/</u> 70	<u>2/</u> 60.5	<u>2/</u> 8.6	53.0	<u>2/</u> 12.6	53.4	<u>2/</u> 14.5	54.0
		63.5	11.8	53.5	16.6	54.5	19.4	55.0
		64.5	13.1	53.5	18.6	54.5	21.6	55.0
		<u>2/</u> 66.0	<u>2/</u> 15.2	54.0	<u>2/</u> 21.7	55.0	<u>2/</u> 25.3	55.5
	<u>2/</u> <u>3/</u> 80	<u>2/</u> 64.0	<u>2/</u> 13.2	52.5	<u>2/</u> 19.5	53.5	<u>2/</u> 22.8	54.0
		<u>3/</u> 65.5	18.8	53.5	<u>3/</u> 26.9	55.0	31.5	55.5
		70.0	20.9	53.5	30.1	55.0	35.3	56.0
		<u>2/</u> 73.0	<u>2/</u> 25.5	54.0	<u>2/</u> 37.1	55.5	<u>2/</u> 43.6	56.0
	<u>2/</u> 100	<u>2/</u> 70.5	<u>2/</u> 22.5	53.0	<u>2/</u> 33.1	54.0	<u>2/</u> 39.4	54.5
77.5		37.1	54.0	48.2	56.0	56.6	57.0	
80.0		37.7	54.0	59.9	56.5	64.5	57.5	
<u>2/</u> 83.5		<u>2/</u> 44.5	54.5	<u>2/</u> 64.5	37.0	<u>2/</u> 76.6	58.0	

1/ Thousands, Btu/h.2/ Test points.3/ 620 Nominal rating point.

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TABLE IV. Size 22 performance (3.6 gal/min/ton).

Chilled water (°F)	Entering air DB (°F)	Entering air WB (°F)	SCFM					
			800		3/1035		1260	
			MBH <u>1/</u>	WB	MBH	WB	MBH	WB
45	<u>2/</u> 70	<u>2/</u> 58.0	<u>2/</u> 20.6	48.5	<u>2/</u> 25.7	49.0	<u>2/</u> 30.1	49.0
		62.0	28.7	49.0	35.1	50.0	41.0	50.5
		64.0	33.7	49.5	41.6	50.0	48.3	51.0
		<u>2/</u> 66.0	<u>2/</u> 38.9	49.5	<u>2/</u> 48.2	50.5	<u>2/</u> 56.1	51.0
	<u>2/</u> <u>3/</u> 80	<u>2/</u> 62.0	<u>2/</u> 30.1	48.5	<u>2/</u> 37.4	49.0	<u>2/</u> 44.0	49.5
		67.0	41.6	49.5	<u>3/</u> 51.2	50.5	59.9	51.0
		70.0	49.9	50.0	61.5	51.0	72.2	51.5
		<u>2/</u> 72.5	<u>2/</u> 57.4	50.0	<u>2/</u> 70.8	51.5	<u>2/</u> 83.0	52.5
	<u>2/</u> 100	<u>2/</u> 68.5	<u>2/</u> 47.4	49.0	<u>2/</u> 56.2	51.0	<u>2/</u> 67.1	51.0
		76.0	68.5	50.5	84.5	52.0	99.5	53.0
		81.5	87.4	51.5	108.5	53.0	128.2	54.0
		<u>2/</u> 83.5	<u>2/</u> 95.4	51.5	<u>2/</u> 117.9	53.5	<u>2/</u> 138.8	55.0
50	<u>2/</u> 70	<u>2/</u> 60.5	<u>2/</u> 16.4	53.5	<u>2/</u> 20.8	54.0	<u>2/</u> 23.7	54.0
		63.5	22.5	54.0	27.4	54.5	31.6	55.0
		64.5	25.0	54.0	30.5	55.0	35.3	55.5
		<u>2/</u> 66.0	<u>2/</u> 29.1	54.5	<u>2/</u> 35.4	55.0	<u>2/</u> 41.3	55.5
	<u>2/</u> <u>3/</u> 80	<u>2/</u> 64.0	<u>2/</u> 25.5	53.5	<u>2/</u> 31.7	54.0	<u>2/</u> 37.2	54.0
		<u>3/</u> 65.5	35.6	54.5	<u>3/</u> 44.1	55.0	51.5	56.0
		70.0	40.2	54.5	49.4	55.5	57.7	56.0
		<u>2/</u> 73.0	<u>2/</u> 49.3	55.0	<u>2/</u> 60.4	56.0	<u>2/</u> 70.6	56.5
	<u>2/</u> 100	<u>2/</u> 70.5	<u>2/</u> 41.7	53.5	<u>2/</u> 54.4	54.5	<u>2/</u> 60.3	56.0
		77.5	63.5	55.0	78.8	56.5	92.3	57.5
		80.0	72.1	55.5	89.5	57.0	105.3	58.0
		<u>2/</u> 83.5	<u>2/</u> 85.7	56.0	<u>2/</u> 106.1	57.5	<u>2/</u> 123.5	59.0

1/ Thousands, Btu/h.2/ Test points.3/ 1035 Nominal rating point.

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TABLE V. Size 23 performance (3.6 gal/min/ton).

Chilled water (°F)	Entering air DB (°F)	Entering air WB (°F)	SCFM					
			1000		3/1540		1880	
			MBH <u>1/</u>	WB	MBH	WB	MBH	WB
45	<u>2/</u> 70	<u>2/</u> 58.0	<u>2/</u> 26.9	48.0	<u>2/</u> 39.0	48.5	<u>2/</u> 45.6	49.0
		62.0	37.6	48.5	53.4	50.0	62.4	50.0
		64.0	44.1	48.5	62.9	50.5	63.5	50.5
		<u>2/</u> 66.0	<u>2/</u> 50.5	49.0	<u>2/</u> 72.9	50.0	<u>2/</u> 84.9	51.0
	<u>2/</u> <u>3/</u> 80	<u>2/</u> 62.0	<u>2/</u> 38.9	48.0	<u>2/</u> 56.6	48.5	<u>2/</u> 66.8	49.0
		<u>3/</u> 67.0	54.1	48.5	<u>3/</u> 77.6	50.0	90.9	51.0
		70.0	64.8	49.0	92.8	50.0	109.2	51.5
		<u>2/</u> 72.5	<u>2/</u> 74.2	49.0	<u>2/</u> 107.2	51.0	<u>2/</u> 125.3	52.0
	<u>2/</u> 100	<u>2/</u> 68.5	<u>2/</u> 60.7	46.0	<u>2/</u> 84.2	51.0	<u>2/</u> 100.7	51.0
76.0		88.2	49.5	127.5	51.5	150.5	52.5	
81.5		113.2	50.0	163.7	52.5	192.1	54.0	
<u>2/</u> 83.5		<u>2/</u> 122.5	50.5	<u>2/</u> 177.4	53.0	<u>2/</u> 203.0	55.5	
50	<u>2/</u> 70	<u>2/</u> 60.5	<u>2/</u> 21.6	53.0	<u>2/</u> 30.6	53.5	<u>2/</u> 36.4	53.5
		63.5	29.5	53.5	41.7	54.5	48.0	55.0
		64.5	32.8	53.5	46.4	54.5	53.5	55.0
		<u>2/</u> 66.0	<u>2/</u> 37.2	54.0	<u>2/</u> 53.9	55.0	<u>2/</u> 62.7	55.5
	<u>2/</u> <u>3/</u> 80	<u>2/</u> 64.0	<u>2/</u> 33.1	52.5	<u>2/</u> 47.8	53.5	<u>2/</u> 56.6	54.0
		<u>3/</u> 68.5	46.7	53.5	<u>3/</u> 66.5	55.0	77.6	55.5
		70.0	52.4	53.5	74.8	55.0	87.4	56.0
		<u>2/</u> 73.0	<u>2/</u> 63.9	54.0	<u>2/</u> 91.5	55.5	<u>2/</u> 107.5	56.5
	<u>2/</u> 100	<u>2/</u> 70.5	<u>2/</u> 54.3	53.5	<u>2/</u> 81.6	54.0	<u>2/</u> 96.5	54.5
77.5		82.5	54.0	117.9	56.0	138.5	57.5	
80.0		93.8	54.5	135.0	56.5	158.0	57.5	
<u>2/</u> 83.5		<u>2/</u> 110.2	55.0	<u>2/</u> 159.0	57.0	<u>2/</u> 187.8	58.5	

- 1/ Thousands, Btu/h.  
2/ Test points.  
3/ 1540 Nominal rating point.

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TABLE VI. Size 24 performance (3.6 gal/min/ton).

Chilled water (°F)	Entering air DB (°F)	Entering air WB (°F)	SCFM					
			1500		3/2065		2550	
			MBH <u>1/</u>	WB	MBH	WB	MBH	WB
45	<u>2/</u> 70	<u>2/</u> 58.0	<u>2/</u> 38.5	48.5	<u>2/</u> 47.7	49.5	<u>2/</u> 56.9	50.0
		62.0	52.6	49.5	67.2	50.5	78.8	51.0
		64.0	61.8	49.5	79.4	50.5	93.2	51.5
		<u>2/</u> 66.0	<u>2/</u> 72.1	49.5	<u>2/</u> 92.5	51.0	<u>2/</u> 108.7	51.5
	<u>2/</u> <u>3/</u> 80	<u>2/</u> 62.0	<u>2/</u> 56.8	48.5	<u>2/</u> 74.1	49.0	<u>2/</u> 84.1	50.5
		<u>3/</u> 67.0	76.9	49.5	<u>3/</u> 99.8	51.0	117.7	51.5
		70.0	93.0	50.0	120.7	51.5	143.1	52.0
		<u>2/</u> 72.5	<u>2/</u> 107.6	50.0	<u>2/</u> 140.0	51.5	<u>2/</u> 165.0	52.5
	<u>2/</u> 100	<u>2/</u> 68.5	<u>2/</u> 90.0	48.5	<u>2/</u> 113.8	50.5	<u>2/</u> 137.5	50.5
		76.0	128.9	50.0	168.0	52.0	197.7	53.5
		81.5	154.7	50.5	203.1	52.5	240.5	54.0
		<u>2/</u> 83.5	<u>2/</u> 180.0	51.0	<u>2/</u> 235.4	53.5	<u>2/</u> 277.8	55.0
50	70	<u>2/</u> 60.5	<u>2/</u> 30.2	53.5	<u>2/</u> 38.8	54.0	<u>2/</u> 43.7	54.5
		63.5	40.2	54.5	51.0	55.0	45.2	54.5
		64.5	45.2	54.5	57.1	55.5	65.5	56.0
		<u>2/</u> 66.0	<u>2/</u> 52.5	55.0	<u>2/</u> 56.6	55.5	<u>2/</u> 78.0	56.5
	<u>2/</u> <u>3/</u> 80	<u>2/</u> 64.0	<u>2/</u> 47.9	53.0	<u>2/</u> 62.1	54.0	<u>2/</u> 70.8	54.5
		<u>3/</u> 68.5	66.5	54.5	<u>3/</u> 85.2	55.5	99.5	56.5
		70.0	73.9	55.0	95.2	56.0	111.4	56.5
		<u>2/</u> 73.0	<u>2/</u> 81.2	55.0	<u>2/</u> 118.0	56.5	<u>2/</u> 139.2	57.0
	<u>2/</u> 100	<u>2/</u> 70.5	<u>2/</u> 82.3	53.5	<u>2/</u> 103.0	55.0	<u>2/</u> 124.5	55.5
		77.5	119.0	55.0	154.8	57.0	183.1	58.0
		80.0	135.9	55.5	176.2	57.5	209.4	58.5
		<u>2/</u> 83.5	<u>2/</u> 161.9	55.5	<u>2/</u> 211.1	57.5	<u>2/</u> 247.0	59.5

1/ Thousands, Btu/h.2/ Test points.3/ 2065 Nominal rating point.

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TABLE VII. Size 25 performance (3.6 gal/min/ton).

Chilled water (°F)	Entering air DB (°F)	Entering air WB (°F)	SCFM					
			2300		3/3080		3800	
			MBH <u>1/</u>	WB	MBH	WB	MBH	WB
45	<u>2/</u> 70	<u>2/</u> 58.0	<u>2/</u> 60.0	48.0	<u>2/</u> 75.8	48.5	<u>1/</u> 86.1	49.5
		62.0	81.5	49.5	103.0	50.0	119.4	51.0
		64.0	96.5	49.5	121.6	50.5	142.3	51.0
		<u>2/</u> 66.0	<u>2/</u> 111.4	49.5	<u>2/</u> 141.5	50.5	<u>2/</u> 165.0	51.5
	<u>2/</u> <u>3/</u> 80	<u>2/</u> 62.0	<u>2/</u> 87.6	48.5	<u>2/</u> 112.1	49.0	<u>2/</u> 126.5	50.0
		67.0	119.6	49.5	<u>3/</u> 151.3	50.5	178.4	51.5
		70.0	144.3	49.5	183.2	51.0	216.3	52.0
		<u>2/</u> 72.5	<u>2/</u> 166.5	50.0	<u>2/</u> 210.9	51.5	<u>2/</u> 248.9	52.5
	<u>2/</u> 100	<u>2/</u> 68.5	<u>2/</u> 138.9	48.5	<u>2/</u> 170.7	50.3	<u>2/</u> 206.5	50.5
		76.0	199.4	50.0	252.6	51.5	300.2	53.0
		81.5	255.7	50.5	327.4	52.5	388.8	54.0
		<u>2/</u> 83.5	<u>2/</u> 277.8	51.0	<u>2/</u> 354.8	53.0	<u>2/</u> 420.3	54.5
50	<u>2/</u> 70	<u>2/</u> 60.5	<u>2/</u> 47.0	53.5	<u>2/</u> 59.6	53.5	<u>2/</u> 69.9	54.0
		63.5	63.2	54.0	77.9	55.0	91.3	55.5
		64.5	69.9	54.5	86.5	55.5	100.8	56.0
		<u>2/</u> 66.0	<u>2/</u> 81.5	54.5	<u>2/</u> 102.8	55.5	<u>2/</u> 119.4	56.0
	<u>2/</u> <u>3/</u> 80	<u>2/</u> 64.0	<u>2/</u> 74.1	53.0	<u>2/</u> 94.3	53.5	<u>2/</u> 106.7	54.5
		<u>3/</u> 68.5	102.6	54.5	<u>3/</u> 130.1	55.0	151.5	56.0
		70.0	115.3	54.5	144.6	55.5	170.9	56.5
		<u>2/</u> 73.0	<u>2/</u> 141.7	55.0	<u>2/</u> 178.7	56.0	<u>2/</u> 209.6	57.0
	<u>2/</u> 100	<u>2/</u> 70.5	<u>2/</u> 127.1	53.5	<u>2/</u> 163.2	54.0	<u>2/</u> 185.7	55.5
		77.5	184.5	55.0	234.5	56.5	277.3	58.0
		80.0	210.6	55.0	267.8	56.5	316.6	58.0
		<u>2/</u> 83.5	<u>2/</u> 249.6	55.5	<u>2/</u> 316.7	57.5	<u>2/</u> 373.3	59.0

1/ Thousands, Btu/h.2/ Test points.3/ 3080 Nominal rating point.

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3.3.4 Type II, fan-coil assembly. The type II fan-coil assembly shall be a three-section unit consisting of a cooling coil section which shall be the base of the unit, a fan-motor section, and the air distribution plenum section. Each section shall be not greater than 25 inches in height, and when assembled together the overall height of the unit shall be not greater than 75 inches. The overall width and depth of each assembled unit shall be not greater than the dimensions shown on figure 1.

3.3.4.1 Cabinet. The cabinet enclosure of each section shall be constructed of not less than 0.074-inch steel. The cabinet frame shall be rigid and of a strength to support and maintain alignment of the assembled parts. The cooling coil section shall be fitted with at least four reinforced pads, one at each corner of the section, for securing the assembled fan-coil assembly by bolting to a structural foundation.

3.3.4.2 Cooling coil section. The cooling coil section shall consist of a cooling coil and a condensate pan with a drain of not less than 1-inch nominal pipe size (nps) on each end. Condensate pan shall be constructed to prevent slosh over when unit is tilted 15 degrees. The condensate drains shall be accessible without the removal of an access panel. The cooling coil shall be serviceable through a front access panel. Provision shall be made to permit access to and removal of the cooling coil through removable side panels. The removable side panels shall have standard features which permit making a left hand or right hand assembly of the cooling coil by the installing activity after delivery. The removable panels shall be flanged. All flanged surfaces shall be gasketed and air tight. The chilled water supply and return connections of the cooling coil shall be to the right when facing the front of the assembled fan-coil assembly. Unless otherwise specified (see 6.2), the fan-coil assembly shall be delivered with a right hand assembly of the cooling coil. Provide a tapped hole for 3/8 inch bolt on bottom right back of unit for attachment on grounding strap.

3.3.4.3 Fan-motor section. The fan-motor section shall consist of a centrifugal fan, fan drive, electric motor, fan and motor base with resilient mounts and air filters. A provision shall be made to permit access to and removal of the fan through removable side panels. The removable side panels shall be flanged. Provisions shall be made to permit access to the air filters, the fan drive and the fan-motor, service and adjust the fan belts and pulley, and remove the fan pulley and the fan motor through a hinged front panel after removal of internal air baffle. The hinged front panel shall be flanged and fasteners shall be the capture type. All flanged panels shall be gasketed and air tight.

3.3.4.4 Air distribution plenum section. The air distribution plenum section shall include a single air inlet located on top of the cabinet. Provisions shall be made in the air distribution plenum for one air outlet on the front, one on the top and one on each end. The size (inside dimensions) of the air inlet and each of the air outlets shall be as shown on figure 1. Three options are available in the air distribution plenum section: The air inlets and outlets shall have smooth flat surfaces for flanged duct connections, each air outlet shall be supplied with a grille, or a coverplate shall be supplied that harmonizes with the cabinet enclosure. The grille shall be constructed to permit adjustable directional airflow in both horizontal and vertical planes. Unless otherwise specified (see 6.2), the fan-coil assembly shall be delivered with coverplates. The covered plates shall be gasketed.

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3.3.5 Type III fan-coil assembly. The type III fan-coil assembly shall be a two-section unit consisting of a cooling coil section which shall be the base of the assembled unit and a fan-motor section. Each section shall be not greater than 25 inches in height and when assembled together, the overall height of the unit shall be not greater than 50 inches. The overall width and depth of each assembled unit shall be not greater than the dimensions shown on figure 1.

3.3.5.1 Cabinet. The cabinet shall be in accordance with 3.3.4.1.

3.3.5.2 Cooling coil section. The cooling coil section shall be as specified in 3.3.4.2.

3.3.5.3 Fan-motor section. The fan-motor section shall be as specified in 3.3.4.3, and shall contain air filters, a single air inlet, and a single air outlet located on top of the cabinet. The size (inside dimensions) of the air inlet and the air outlet shall be as shown on figure 1. The air inlets and outlets shall have smooth flat surfaces for flanged duct connections. Provisions shall be made to permit access to and the removal of the air filters through a hinged front panel.

3.4 Cooling coil. A chilled water cooling coil shall be provided having nonferrous tubes, fins, and headers. The face area of the cooling coil for each size assembly shall be not less than that shown on figure 1. The cooling coil shall be 6 rows deep in the direction of airflow. The tubes shall be seamless copper tubing not less than 5/8 inch outside diameter and shall have a minimum wall thickness of 0.025 inch. When used in the construction of the coil, hairpin tubes shall have a minimum wall thickness of 0.025 inch throughout the tube. The tubes shall be silver-brazed to the headers. The headers shall be of brass or copper and shall have a wall thickness of not less than that of type M of ASTM D 88, or equivalent size. The fins shall be of copper not less than 0.010 inch thick and shall be uniformly spaced. The tubes shall be expanded into fins to form a permanent bond. The number of fins per linear inch of tube shall be not less than 7 nor more greater than 12. To prevent wear and breakage caused by shipboard vibration or expansion and contraction of tubes, brass or copper ferrules shall be provided where tubes pass through tube sheets. The chilled water supply and return connections shall be on the same end of the coil and shall have 200-pound bronze/silver brazed ASTM B 43 union connections conforming to MIL-F-1183.

3.4.1 Vent and drain. The cooling coil shall be provided with means for venting and draining the coil. The vent shall be accessible and shall drain to the internal drain pan. Draining the coil shall be completed by a means other than breaking of the chilled water union connections.

3.5 Air filters. Air filters shall be provided for filtering all air entering the assembly. The air filters shall be in accordance with MIL-F-16552, and the size and number of filters that are required for each assembly shall be as shown on figure 1.

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3.6 Thermal insulation. All internal surfaces of the cabinet or chassis that are subject to condensation shall be provided with internal insulation to prevent dripping or a continuous flow of moisture under rated capacity conditions. The insulation shall be in accordance with DOD-I-24688, Type I faced with an aluminized polyester/aluminum foil jacket reinforced with fiberglass scrim and laminated to a light weight glass cloth. The weight of the jacket shall not exceed 14.5 oz/sq yd. A 2 mil aluminum foil septum shall be inserted mid-way through the thickness. All layers shall be bonded to each other using an adhesive which meets the fire and adhesion qualities of MIL-A-3316. All joints and seams shall be sealed with a .007" fiberglass lagging tape adhered with MIL-A-3316 lagging adhesive.

3.7 Fan. The fan used in the assembly shall be a belt driven centrifugal fan. Unless otherwise specified (see 6.2), the fan shall produce an available total discharge pressure of 2 inches of water at the outlet of the fan-coil assembly at rated CFM delivery. The fan-motor horsepower for each assembly shall not exceed that specified in table II when total discharge pressure is 2 inches of water or less.

3.7.1 Fan housing. The centrifugal fan shall be double width, double inlet, multi-blade type. The fan housing and fan wheel shall be constructed of steel or aluminum. The fan housing shall have smooth curved inlets and all rotating parts of the fan shall be designed to have a factor of safety of not less than eight, based on the ultimate tensile strength of the material involved. The fan wheel shall be mounted on a properly sized one piece shaft supported by ball bearings mounted externally to the fan housing. The ball bearing shall be either selected as follows: (1) double seal, double-row width, single row, cartridge type, normal internal fit bearing conforming to FF-B-171 and prelubricated with silicone grease in accordance with MIL-L-15719; or (2) double seal, single row, extended inner ring, spherical outer race bearing with a self locking collar in accordance with type 117 Class 2, FF-B-171 and permanently lubricated with silicon grease in accordance with MIL-G-25013. The inner race of bearing shall be extended beyond the bearing housing to provide a surface for locking the bearing to the fan shaft and to provide a mean for removal and/or replacement. The fan shaft shall be connected to the motor by means of V-belts and grooved pulley. The fan brake horsepower shall not exceed that of the motor shown on figure 1. The fan shall be statistically and dynamically balanced and tested after being installed in the assembly.

3.7.2 Fan drive. The fan drive shall be multiple V-belt drive, and shall include the fan pulley, matched V-belts, and motor pulley. V-belts, fan pulley and motor pulley shall be selected in accordance with ANSI/RMA Standards IP20 and IP25. The fan pulley shall be overhung on the fan shaft to eliminate the need for disassembling and realigning the fan if the belts must be replaced. The drive pulley shall be of the variable pitch type and adjustable to allow for at least 30 percent variation in fan speed. The adjustable drive pulley shall be positive locking so that pitch diameter will not change from the desired set point. The initial set point shall be marked on the drive pulley. The pulleys shall be machined to a finished surface and accurately balanced. The V-belts shall be selected for at least 150 percent of motor horsepower at rated capacity conditions. A positive action belt adjustment device shall be provided to permit

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adjustment of belt tension. The belt adjustment device shall consist of a sliding motor base with an adjusting bolt to change the position of the motor pulley relative to the fan pulley. To prevent loosening of the adjusting bolt, a locking nut shall be provided.

### 3.8 Electrical requirements.

3.8.1 Power requirements. The electric motors shall operate on an input of 440-volt, three-phase, 60-Hz, type I in accordance with MIL-STD-1399, Section 300.

3.8.2 Ambient temperature. All electrical components shall be designed for continuous operation in a maximum of 122°F ambient temperature.

3.8.3 Electrical motors. Motors shall be service A in accordance with "T" frame size of MIL-M-17060 with a maximum HP not to exceed HP shown in table II.

3.8.4 Cable entrance. Provisions shall be made to permit entrance of electrical cables through knockouts in the fan-motor section of the fan coil assembly.

3.9 Welding and brazing. The surfaces of all parts to be welded shall be free from rust, scale, paint, grease, and other foreign matter. All welding shall be at least equal to that required by MIL-STD-278. All brazing shall be equal to that required by NAVSEA 0900-LP-001-7000. Welding and brazing procedures and performance qualification shall be in accordance with MIL-STD-248.

3.9.1 Weld defect correction. Weld defects that exceed the parameters established by NAVSEA 0900-LP-003-8000, section V shall be corrected through:

- (a) Weld rework. A procedure that will bring the part into total compliance with the drawing and specification requirements, does not diminish the thickness of the parent metal by more than 10 percent, and does not effect the parent metal surface by more than 1/32 inch for 15 percent of the weld length or 12 inches, whichever is the least.
- (b) Weld repair. Repairs, to a Government approved procedure, are required any time any defects exceeds the rework limits above. A repair action, if successfully completed, will create a serviceable yet not fully conforming unit. Cracks shall be repaired in accordance with NAVSEA 0901-LP-074-0010. Weld repairs shall be inspected in accordance with MIL-STD-278.

3.9.2 Zinc-coated surfaces. Where zinc-coated steel is used for fabricating parts, the metallic zinc shall be removed from all joints and surfaces on which welds are to be deposited and for a distance of 1 inch from the expected toes of the welds. In areas where the metallic zinc cannot be removed and it is necessary to weld over the zinc-coated surfaces, electrode type G6010 or G6011 shall be used in accordance with ANSI A5.1. Weld shall be coated with cold galvanize compound.

3.10 Painting. All exterior surfaces of the fan-coil assembly, except those surfaces constructed of brass, copper or corrosion-resisting steel shall be thoroughly cleaned and coated as follows:

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- (a) One-quarter mil (minimum dry film thickness) to 3/4 mil (maximum dry film thickness) of pretreatment coating in accordance with DOD-P-15328.
- (b) One mil (minimum dry film thickness) of zinc chromate primer in accordance with TT-P-645 .
- (c) One mil (minimum dry film thickness) of light grey enamel in accordance with MIL-E-15090.

3.11 Identification, information, and label plates. Unless otherwise specified (see 6.2), identification and label plates shall be color style II and shall conform to type A, B, D, F, or H of MIL-P-15024 and MIL-P-15024/5 (see 6.2). Information plates shall be style VI and shall conform to types F or H of MIL-P-15024. The physical dimensions of the identification and the information plates shall not exceed the dimensions of a size 10 plate of MIL-P-15024.

3.11.1 Identification plates. Each fan-coil assembly shall be provided an identification plate which shall contain the following information:

- (a) Nomenclature.
- (b) Type and size.
- (c) National stock number (NSN).
- (d) Component identification number (CID).
- (e) Contract or order number.
- (f) Manufacturer's name and address.

3.12 Workmanship. The fan-coil assembly shall be free from defects that affect appearance and operation. The tube sheets of the cooling coil shall not crack due to punching or forming, and fin collars shall not crack when forming tubes into collars. Fin edges of the cooling coil shall be free of burrs and shall not be bent. Sharp edges, burrs and other imperfections shall be removed from all parts subject to contact with personnel to prevent cuts during repair and maintenance. Cabinet corners shall be square and fasteners shall be in place and secured.

#### 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 the specification 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 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 the manufacturing operations, is an

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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 4.3).
- (b) Quality conformance inspection (see 4.4).

4.3 First article inspection. Unless otherwise specified (see 6.2 and 6.6), one sample of each type and size fan-coil assembly shall be submitted for first article inspection. First article inspection shall consist of the examination and tests specified in 4.3.3, 4.3.3.7, 4.4, and 4.7. In addition to this inspection, the largest size of each type fan-coil assembly shall be tested as specified in 4.3.2.

4.3.1 Similar assemblies. Where a fan-coil assembly of the same design, type, and of a size larger than that submitted for tests has successfully passed the shock tests specified in 4.3.2, the high impact shock test may be extended by the Command or agency concerned.

4.3.2 High impact shock tests. The fan-coil assembly shall be shock tested on the medium-weight machine as specified for grade A shock of MIL-S-901 (see 6.3). The fan-coil assembly shall be operated at rated voltage and current, rated airflow, and a hydrostatic pressure of at least 100 pounds per square inch ( $\text{lb/in}^2$ ) gauge, shall be maintained on the cooling coil of the unit during the shock tests. Evidence of fragmentation or missile effect of parts, deformation that will cause active interference between parts, failure to operate, or leakage of the cooling coil shall be cause for rejection.

4.3.3 Performance tests. Performance tests shall be as specified in 4.3.3.1 through 4.3.3.6.

4.3.3.1 Vibration tests. The fan-coil assembly shall be subjected to type I vibration tests in accordance with MIL-STD-167-1 (see 6.3).

4.3.3.2 Capacity tests. The capacity of each type and size fan-coil assembly shall be determined at the conditions specified in 3.3.3 and at 45°F chilled water temperature for the note 2/ points on tables III through VII. The airflow through the fan-coil assembly shall be measured in accordance with ASHRAE 37. The capacity tests of the cooling coil, installed in the assembly, shall be conducted in accordance with ASHRAE 33.

4.3.3.3 Flexibility and range tests. The leaving WB temperature and capacity (BTU/HR) for each type and size fan-coil assembly shall be determined at the conditions specified in 3.7 and 4.3.3.2. Airflow measurement and cooling coil tests shall be conducted as specified in 4.3.3.2. At least one test shall be conducted with the unit inclined 15 degrees from the normal vertical position in any direction.

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4.3.3.4 Limitation tests. The maximum acceptable operating limits (see table III through VII) of each type and size of fan-coil assembly shall be established without exceeding noise limitations or without carryover of cooling coil condensate.

4.3.3.5 Sound tests. The noise level of each type and size fan-coil assembly shall be established in accordance with AMCA 210 and 300 under the following conditions:

- (a) At the airflow rate used for determining the nominal capacity rating.
- (b) Type II only: Free delivery from a 90-degree elbow attached to the air outlet connection of the unit. Face dimensions of the elbow shall be the same as the air outlet connection of the unit being tested, and the air outlet of the elbow shall extend 1 foot beyond the front of the unit being tested.
- (c) Type II only: Free delivery with the cover-plate removed from the front opening only.

4.3.3.6 Motor tests. The insulation resistance test and the dielectric strength test shall be conducted in accordance with MIL-M-17060 .

4.3.3.7 Permeability tests. A permeability test of CRES material use in construction of fan coil assembly shall be conducted in accordance with DOD-STD-2142, Test P-01.

4.4 Quality conformance inspection. Unless otherwise specified (see 6.2), quality conformance inspection shall consist of examination and tests specified in 4.4.1, 4.4.2, 4.4.3, 4.5, 4.6 and 4.8. If any sample unit fails any test or examination it shall be considered defective and shall be rejected (see 6.4).

4.4.1 Lot. A lot shall consist of all fan coil assemblies of the same type and size produced under essentially the same conditions from the same production run and offered for inspection at one time, but not consist of more than 300 at any one time.

4.4.2 Sampling. Sampling fan coil assemblies of the same type and size shall be selected at random from each production lot of units as specified in table VIII for quality conformance inspection.

TABLE VIII. Lot acceptance and rejection criteria.

Lot size number of units	Sample size number of unit
1 to 13	All
14 to 40	13
41 to 110	22
111 to 300	30

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4.4.3 General examination. Each sample fan coil assembly selected for first article and quality conformance inspections shall be subjected to general examination, after the application inspection, to confirm conformance to general specification requirements as to material, finish workmanship, safety, construction, assembly, dimensions, weight, marking and identification, and drawing requirements. The examination shall include the classification of defects delineated in table IX. This examination shall be limited to examinations that may be performance, durability, or appearance would be affected. Any unit that contains one or more defects, the entire lot shall be rejected.

TABLE IX. Classification of defects.

Categories	Defects
Critical: 1	None defined.
Major: 101	Type and size not as specified.
102	Incomplete, parts missing (fan, motor, cooling coil, air filters, V-belts, pulleys).
103	Materials defective or not as specified.
104	Limited dimensions, exceeded.
105	Welding incomplete, not free of cracks, nonfusion, heavy porosity, heavy undercut, slag inclusions.
106	Insulation, thermal or acoustical missing.
107	Condensate drain, air filter access, removable panels or coverplates (for type II assemblies) not provided.
108	Removable end panels are not interchangeable.
109	Removable panel and access plate gaskets missing or defective.
110	Grilles (as applicable) missing, nonadjustable.
111	Cable entrance knockouts missing.
112	Information or label plates (as applicable) missing.
113	Tube sheets of the cooling coil and fin collars, cracked.
114	Cooling coil fins bent or burrs not removed.
115	Sharp edges and burrs not removed from parts subject to personnel contact.
116	Cabinet corners not square.
117	Bolts, nuts, and screws not tight, missing (parts shall be properly fastened and secured).
118	Drawings not followed (when required by 6.3).
119	Painting (as applicable), nonconforming.
120	Marking, manufacturer's identification plate, not permanent, illegible or not as specified.

4.5 Tests. The leakage and operational tests shall be as specified in 4.5.1 and 4.5.2.

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4.5.1 Leakage test. The cooling coil of each fan-coil assembly shall be tested at a hydrostatic pressure of at least 300 lb/in<sup>2</sup> gauge. When tested, there shall be no cooling coil leakage in the fan-coil assembly.

4.5.2 Operational test. The fan motor of each fan-coil assembly shall be tested at rated voltage and current to determine whether the fan and motor will operate. Any fan-coil assembly in which the motor or the fan and motor, fail to operate shall not be offered for delivery.

4.6 Maintainability demonstration. The first production unit shall be examined after testing, and the capability to maintain, disassemble, and repair the unit shall be demonstrated. The demonstration shall be conducted utilizing the recommended tools and with other than expert mechanics. Evidence that maintainability of the fan-coil assembly cannot be accomplished by other than expert mechanics shall be cause for failure of the demonstration. The maintainability demonstration shall include but not be limited to the following (see 6.3):

- (a) Replacement of fan bearing.
- (b) Replacement of V-belts.
- (c) Replacement of fan-motor.
- (d) Replacement of motor bearing.
- (e) Removal of air filters for servicing and replacement.
- (f) Adjustment and locking of adjustable motor sheave.
- (g) Replacement of cooling coil.
- (h) Servicing of cooling coil.

4.7 Test schedule. The schedule for testing the fan-coil assembly shall be performed in the following order:

- (a) Motor tests (see 4.3.3.6).
- (b) Permeability tests (see 4.3.3.7).
- (c) Quality conformance inspection (see 4.5). This includes 4.5.1 and 4.5.2.
- (d) Capacity tests (see 4.3.3.2), flexibility and range tests (see 4.3.3.3) and limitation tests (see 4.3.3.4). These tests shall be conducted concurrently.
- (e) Sound tests (see 4.3.3.5).
- (f) Vibration tests (see 4.3.3.1).
- (g) High-impact shock tests (see 4.3.2).
- (h) Maintainability demonstration (see 4.6).

4.8 Inspection of packaging. Samples packages and packs, and the inspection of the preservation, packing and marking for shipment and storage shall be in accordance with the requirements of section 5 and the documents specified therein.

## 5. PACKAGING

(The packaging requirements specified herein apply only for direct Government acquisition. For the extent of applicability of the packaging or preparation for delivery requirements of referenced documents listed in section 2, see 6.9.)

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5.1 General.

5.1.1 Cleaning and preservation application. After completion of unit testing and prior to unit preservation, the water sides shall be drained and cleaned. Each unit shall be cleaned so that all surfaces are free of grease, oil, flux, loose particles, and foreign matter.

5.1.1.1 Water sides. The water sides shall be blown dry with air that is free from oil, water, and dirt. Drains shall be opened to thoroughly remove trapped water. Contact preservatives shall not be applied to surfaces that are resistant to corrosion and where dissimilar materials will not result in corrosion. Otherwise, internal surfaces shall be protected by a coating of type P-21, MIL-P-116, preservative.

5.1.1.2 Painting and lubrication. Painted surfaces on which the paint is damaged or defective shall be cleaned and repainted with the original requirements (see 3.10). Rotating joints, bearings, and similar moving items requiring lubrication for service shall be thoroughly lubricated with the required service lubricant. Excess lubricants shall be removed prior to unit preservation.

5.1.1.3 Drive belts. Drive belts shall be removed or released from tension. When drive belts are removed for unit shipment, belts shall be wrapped either individually or in sets and unit protected in a heat sealed, opaque, water, and grease-proof barrier material, marked and attached to the unit to prevent belt loss. Markings shall be clear, and resistant to water, oil and fading. Unless otherwise specified (see 6.2), pulley faces, grooves, and sheave grooves shall be coated with a light coat of clear air drying varnish. Drive belts not removed for shipment shall have strips of water and grease proof barrier material placed between the belts and pulleys after the varnish has dried. Pulleys shall be labelled "Remove barrier material before use."

5.1.1.4 Filters. Unless otherwise specified (see 6.2), air filters shall be replaced with new filters after unit testing.

5.1.1.5 Noise tested units. Units shall be mounted and shipped on resilient mounts, and other necessary precautions shall be taken to insure that the noise limitation (see 3.3.3.4) requirements are not degraded as a result of shipping, handling and storage.

5.1.1.6 Navy fire-retardant requirements.

(a) Treated lumber and plywood. When specified (see 6.2), all lumber and plywood including laminated veneer material used in shipping container and pallet construction, members, blocking, bracing, and reinforcing shall be fire-retardant treated material conforming to MIL-L-19140 as follows:

Level A and B	- Type II - weather resistant
	Category I - general use
Level C	- Type I - non-weather resistant
	Category I - general use

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- (b) Fiberboard. When specified (see 6.2), fiberboard used in the construction of interior (unit and intermediate) and exterior containers including interior packaging forms shall conform to the class-domestic/fire retardant or class-weather resistant/fire retardant material requirements as specified (see 6.2) of PPP-F-320.

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

5.2.1 Level A. Each unit shall be protected to meet the requirements of method IIa of MIL-P-116. Exterior unpainted ferrous metal surfaces shall be coated with a preservative compound conforming to P-19 of MIL-P-116. Openings to the plant and attached components shall be covered to prevent entrance of foreign materials. Gauges shall be cushioned and protected to prevent damage. The flexible barrier bag shall be fabricated from transparent material conforming to class E or G style 2.

5.2.2 Commercial. Commercial preservation shall be in accordance with ASTM D 3951.

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

5.3.1 General.

5.3.1.1 Anchoring, blocking, bracing, and cushioning. Anchoring, blocking, bracing, and cushioning of the container contents shall be in accordance with the appendix to the crate specification and MIL-STD-1186.

5.3.2 Level A. Each plant shall be packed in a sheathed crate conforming to MIL-C-104, type II, class 2, and style at the contractor's option. Crates shall be provided with inspection door(s). Door(s) shall be located to permit visual reading of the humidity indicator. Crate closure shall be in accordance with the appendix to the crate specification.

5.3.3 Commercial. Commercial packing shall be in accordance with ASTM D 3951. Plants when shipped uncrated and by an open type carrier shall be covered with a tarpaulin or reinforced plastic covering to protect equipment from damage.

5.4 Marking. In addition to any special marking required (see 6.2), and herein, packs (interior and exterior) and unpacked shipments shall be marked including bar coding in accordance with MIL-STD-129. Commercial packs and unpacked shipments shall be marked including bar coding in accordance with ASTM D 3951 and herein.

5.4.1 Special markings.

5.4.1.1 Critical close tolerance equipment. Unit packs, shipping containers and unpacked shipments of noise tested plants (see 3.3.2.4), shall be marked with the following:

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CRITICAL, CLOSE TOLERANCE  
 OPERATIONS EQUIPMENT  
 HANDLE WITH CARE  
 DO NOT DROP OR SUBJECT  
 TO SHOCKS OR JARS

Markings shall be stencilled, red color, and applied on two sides and both ends of the container or shipment, letters shall be minimum 1-1/2" high, except for small containers with insufficient space, in which case letters shall be of such size as to be legible. In addition, arrows and the word "UP", center of balance, sling or lifting point markings shall apply.

5.4.1.2 Structural markings. Structural markings of each plant's container is required and shall be in accordance with MIL-STD-129 and as specified herein. Containers specified in 5.3.2 shall be marked:

REUSABLE CONTAINER

Container markings shall include arrows and the word "UP", center of balance and the sling or lifting points.

#### 5.4.2 Instructions.

5.4.2.1 Unpacking and handling. Each packed plant shall be provided with unpacking and handling instructions. These instructions shall be placed in a sealed waterproof envelope prominently marked:

UNPACKING AND HANDLING INSTRUCTIONS

and firmly affixed to the plant, if shipped unpacked, or to the outside of the shipping container in a protected location (preferably between the cleats on the end of the container adjacent to the identification marking).

## 6. NOTES

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

6.1 Intended use. The fan-coil assembly is intended for use in lieu of a fan room with buildup system on board. It is designed for ready connection to a chilled water system, a drainage system, an air distribution system and a power source. The belt drive for the centrifugal fan is intended to permit selection of capacity to fit application depending on the use or extent of ductwork required and to keep within noise limitations. The adjustable motor pulley is specified to permit ready selection of fan speed to fit specific application.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- (a) Title, number, and date of this specification.
- (b) Type, size, and capacity required (see 1.2).

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- (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) Whether first article inspection is required (see 3.1).
- (e) When nonmagnetic material is required (see 3.2.3).
- (f) 50°F chilled water temperature (normal is 45°F) (see 3.3.2.1).
- (g) Whether left hand assembly is required (see 3.3.4.2).
- (h) Whether grilles or coverplates are required (see 3.3.4.4).
- (i) Fan pressure requirement, if other than specified (see 3.7).
- (j) Type of identification and label plates (see 3.11).
- (k) First article inspection requirements (see 4.3 and 4.3.2).
- (l) Packaging requirements (see 5.1).
- (m) When fire-retardant treated materials are required (see 5.1.1.6(a) and (b)).
- (n) Class of fire-retardant fiberboard required (see 5.1.1.6(b)).
- (o) Level of preservation and level of packing required (see 5.2 and 5.3).
- (p) Special marking required (see 5.4).

6.3 Consideration of data requirements. The following data requirements should be considered when this specification is applied on a contract. The applicable Data Item Descriptions (DID's) should be reviewed in conjunction with the specific acquisition to ensure that only essential data are requested/provided and that the DID's are tailored to reflect the requirements of the specific acquisition. To ensure correct contractual application of the data requirements, a Contract Data Requirements List (DD Form 1423) must be prepared to obtain the data, except where DoD FAR Supplement 27.475-1 exempts the requirement for a DD Form 1423.

<u>Reference Paragraph</u>	<u>DID Number</u>	<u>DID Title</u>	<u>Suggested Tailoring</u>
3.3, 6.8, 6.8.1 and appendix A	DI-DRPR-80651	Engineering Drawings	-----
3.3.1 and appendix B	DI-R-7079	Reliability Program Plan	-----
4.1.1	UDI-R-21375A	Plan, Inspection and Test	-----
4.3.2	UDI-T-23753	Reports, Equipment Shock Test	-----
4.3.3.1	UDI-T-23762	Reports, Vibration Testing	-----
4.3.3.2, 4.3.3.3, 4.3.3.4, 4.3.3.5, 4.3.3.6, 4.3.3.7	DI-T-5329	Inspection and Test Reports	-----
4.4, 4.5, 4.7(a), (b), (d), (e)			
3.3.1.2, 4.6	DI-MNTY-80822	Maintainability Program Plan	-----

The above DID's were those cleared as of the date of this specification. The current issue of DoD 5010.12-L, Acquisition Management Systems and Data Requirements Control List (AMSDL), must be researched to ensure that only current, cleared DID's are cited on the DD Form 1423.

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6.3.1 Technical manuals. The requirement for technical manuals should be considered when this specification is applied on a contract. If technical manuals are required, military specifications and standards that have been cleared and listed in DoD 5010.12-L, Acquisition Management Systems and Data Requirements Control List (AMSDL) must be listed on a separate Contract Data Requirements List (DD Form 1423), which is included as an exhibit to the contract. The technical manuals must be acquired under separate contract line item in the contract. Technical manuals should include the requirements of Appendix C.

6.4 Acceptance and rejection criteria. Lot acceptance and rejection criteria are as specified in table X. Rejected units and lot should not be offered for delivery until corrective action has been taken. Final acceptance and shipment will be withheld until a re-examination has shown that the corrective action was successful.

TABLE X. Lot acceptance and rejection criteria.

Lot size number of units	Sample size number of units	Defective units	
		Acceptance number	Rejection number
1 to 13	All	-	-
14 to 40	13	0	1
41 to 110	22	1	2
111 to 300	30	2	3

6.5 Provisioning. Provisioning Technical Documentation (PTD), spare parts, and repair parts should be furnished as specified in the contract.

6.5.1 When ordering spare parts or repair parts for the equipment covered by this specification, the contract should state that such spare parts and repair parts should meet the same requirements and quality assurance provisions as the parts used in the manufacture of the equipment. Packaging for such parts should also be specified.

6.6 First article. When first article inspection is required, the contracting officer should provide specific guidance to offerors whether the item(s) should be a preproduction sample, a first article sample, a first production item, a sample selected from the first production items, a standard production item from the contractor's current inventory (see 3.1), and the number of items to be tested as specified in 4.4. The contracting officer should also include specific instructions in acquisition documents regarding arrangements for examinations, approval of first article test results, and disposition of first articles. Invitations for bids should provide that the Government reserves the right to waive the requirement for samples for first article inspection to those bidders offering a product which has been previously acquired or tested by the Government, and that bidders offering such products, who wish to rely on such production or test, must furnish evidence with the bid that prior Government approval is presently appropriate for the pending contract. Bidders should not submit alternate bids unless specifically requested to do so in the solicitation.

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6.7 Identical assemblies. First article inspection will not be required on types and sizes of fan-coil assemblies that are identical to those which have successfully passed the first article examination and test within a period of 3 years of the date of the contract or order.

6.8 Approval. Unless drawings for each contracting fan size have been previously approved and are within 3 year time frame from the date of approval, the contractor is responsible to submit to the acquisition activity, for approval, the following: (1) two points of fan-coil assembly drawing; and (2) two prints of the motor drawing proposed for use with the fan-coil assembly.

6.8.1 Final drawings. After comments on new drawings are approved, adjudicated, or reconciled, the contractor is responsible to: (1) forward final fan-coil and motor drawings to acquisition activity; and (2) include special requirements of the contract or order prior to distribution of final drawings.

6.8.2 Identifying numbers. A national stock number (NSN) and a component identification number (CID No.) will be assigned by the Government after drawing approval. The contractor is responsible to: (1) identify these numbers in shipping papers; and (2) mark these numbers on coil fan-coil and motor identification plates.

6.9 Sub-contracted material and parts. The packaging or preparation for delivery requirements of referenced documents listed in section 2 do not apply when material and parts are acquired by the contractor for incorporation into the equipment and lose their separate identity when the equipment is shipped.

6.10 Subject term (key word) listing.

Centrifugal fan  
Chilled water  
Cooling coil  
Dehumidifying  
Heat exchanger  
Heat transfer  
HVAC  
Ventilation

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

Preparing activity:  
Navy - SH  
(Project 4130-N318)

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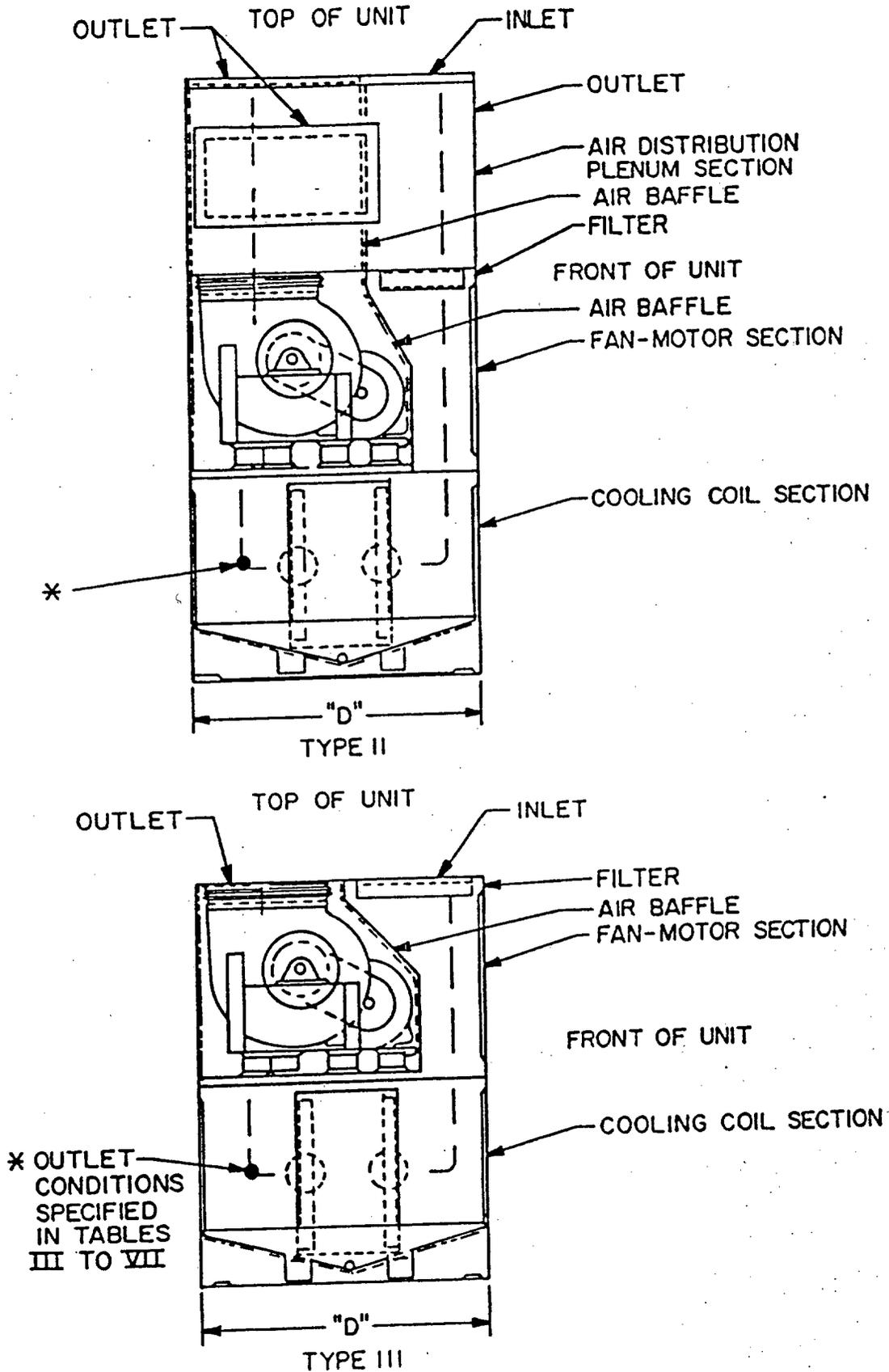
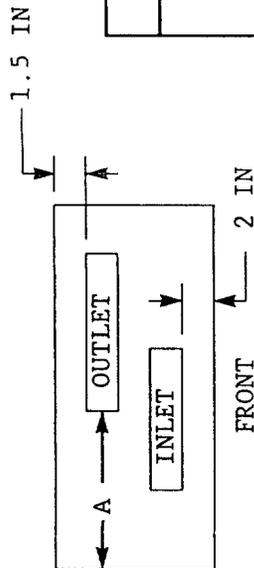


FIGURE 1. Fan-coil assemblies.

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Type II outlets to be centered in top of unit.  
 Type II and III inlets to be centered.  
 Inlets to be 2 inches in from front of unit.  
 Outlets to be 1.5 inches in from back of unit.

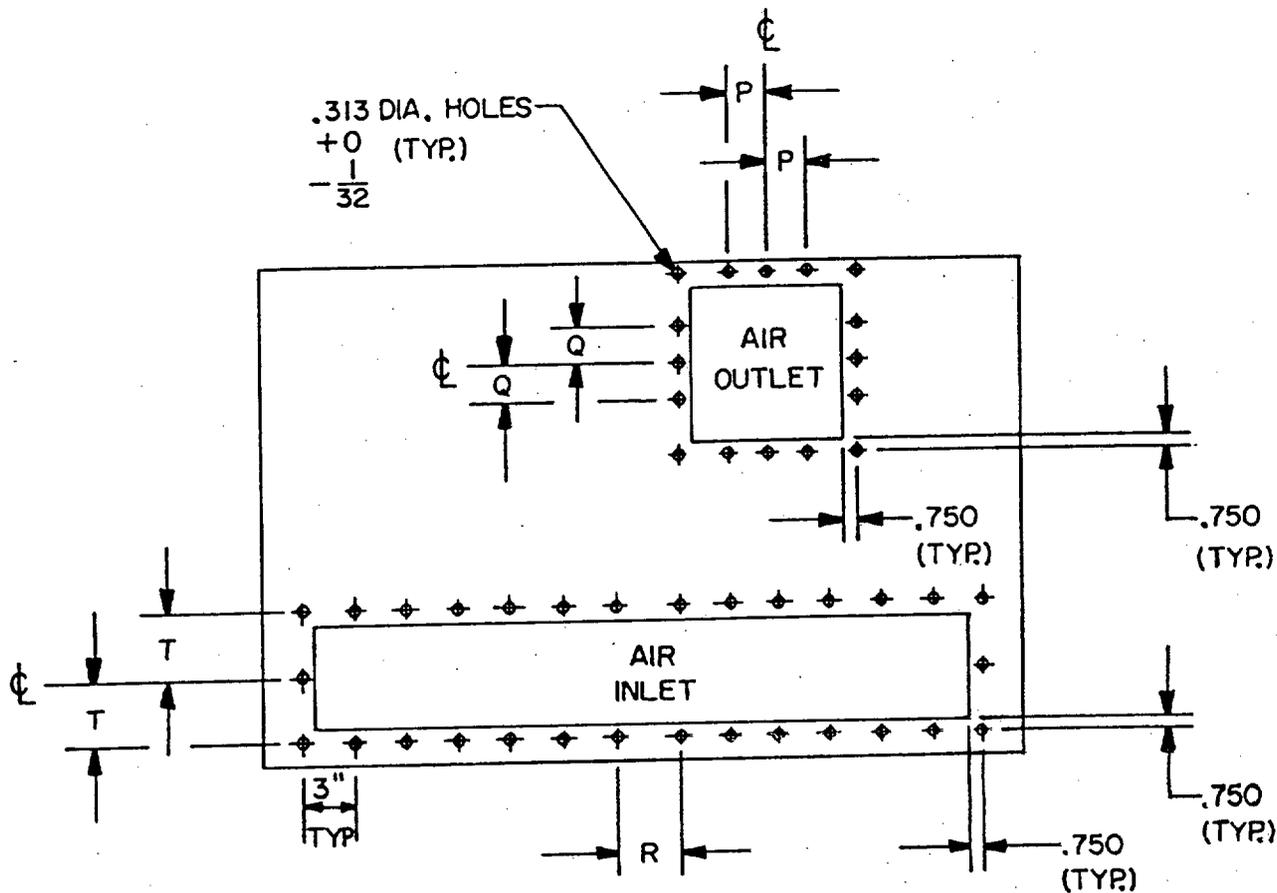


Size	21	22	23	24	25
Type III only A (inches ± 1/8)	24 3/8	23 9/16	24 3/4	23 1/8	25 5/8

Physical data											
Fan-coil assembly	Maximum cabinet dimensions (inches)		Inlet/outlet dimensions (inches ± 1/8)						Filters		Minimum face area (square feet)
			Type II outlets		Type III outlets		Type II, III inlets				
Sizes	Width	Depth (D)	Top	Ends	Top	Top	Top	Top	Size	No.	Cooling coil
21	44	28	36 by 10	14 by 10	9-1/4 by 8-5/8	38 by 6	11AF	3	1.5		
22	44	28	36 by 10	14 by 10	10-7/8 by 10-3/8	38 by 6	11AF	3	2.5		
23	48	32	42 by 10	18 by 10	12-1/2 by 10-3/8	29-3/4 by 12	12AF	3	3.7		
24	51	37	44 by 12	24 by 10	16-3/4 by 12	40-9/16 by 12	12AF	4	4.2		
25	56	37	48 by 12	24 by 10	16-3/4 by 12	39-3/8 by 17-1/2	15AF	2	6.2		

FIGURE 1. Fan-coil assemblies - Continued.

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TOP VIEW — BOLTING PATTERNS  
(SIZES 21 & 22)

Size of unit	Dimensions (inches $\pm 1/16$ )			
	P	Q	R	T
21	2.375	2.063	3.500	3.750
22	3.188	2.938	3.500	3.750
23	2.000	2.938	3.625	3.750
24	3.125	3.750	3.031	3.750
25	3.125	3.750	2.438	3.500

FIGURE 1. Fan-coil assemblies - Continued.



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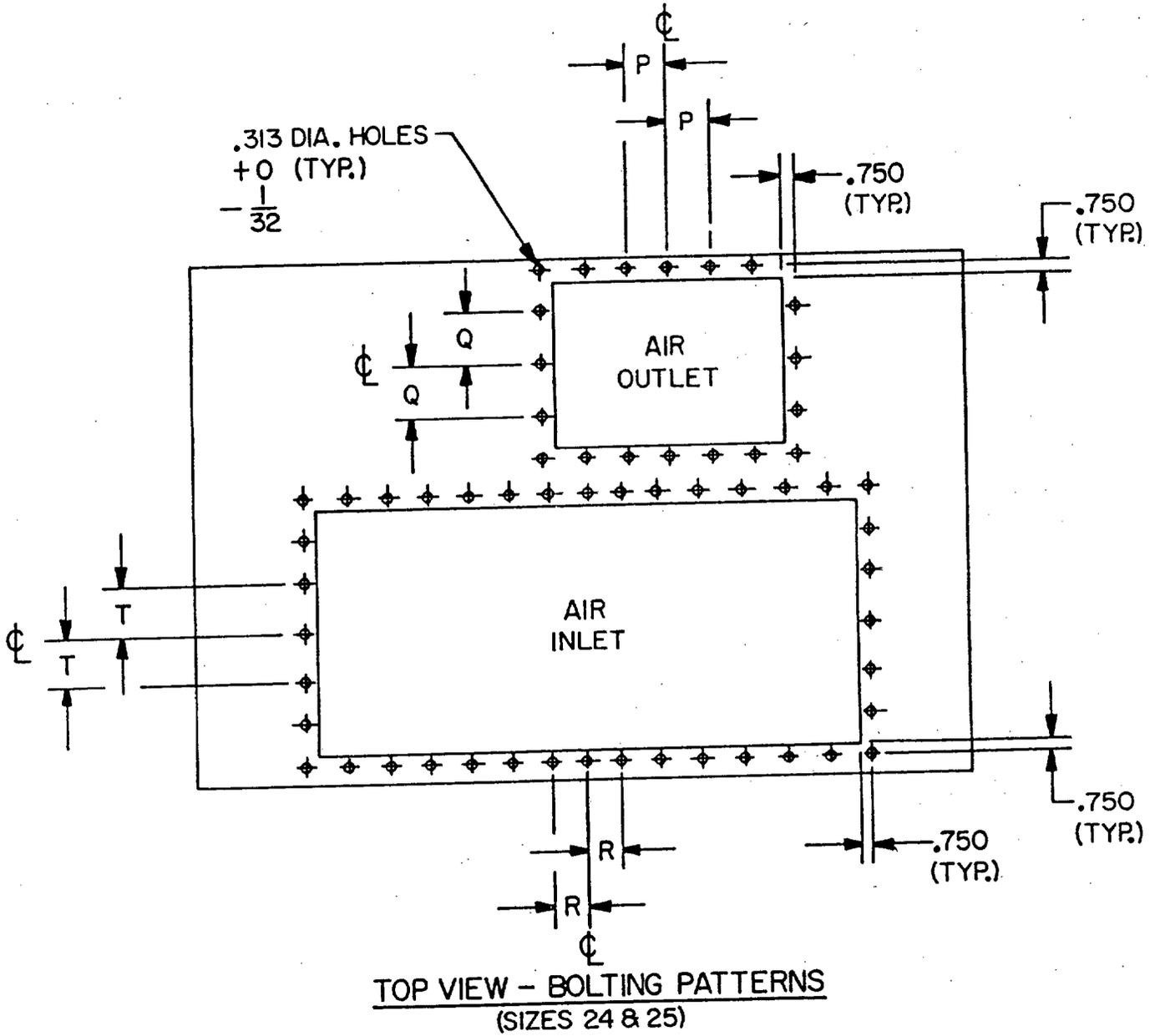


FIGURE 1. Fan-coil assemblies - Continued.

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## APPENDIX A

## ENGINEERING DRAWINGS TECHNICAL CONTENT REQUIREMENTS

## 10. SCOPE

10.1 Scope. This appendix covers the technical requirements that should be included on drawings when required by the contract or purchase order. This appendix is mandatory only when data item description DI-DRPR-80651 is cited on the DD Form 1423.

## 20. APPLICABLE DOCUMENTS

## 30. DRAWINGS

30.1 Drawings. Drawings shall contain parts lists, bill of materials list and the following additional information:

30.2 Assembly drawings. Assembly drawings shall be furnished for the complete fan-coil assembly, the cooling coil, the fan, and the motor. The assembly shall show the following information:

- (a) Outline.
- (b) Mounting.
- (c) Attachment and connection dimensions including methods and sizes of fastenings and clearances for installation and servicing plus supplementary data necessary to permit shipyard installation without supplier's assistance.
- (d) Illustration of design, construction, operation, identity of parts, and total weight of the assembled parts.
- (e) The drawing shall be complete to show compliance with requirements contained in the specification. Where necessary to illustrate compliance, details may be included on the assembly drawing or provided as separate drawings. Sub-assembly drawings shall be furnished where assembly drawings do not adequately describe and identify sub-assembly parts and components.

30.3 Fan drawings. The assembly drawing for the fan shall include the fan characteristics curves. The characteristic curves should show total pressure at fan outlet from free delivery to no delivery, static pressure, brake horsepower required, efficiency of the fan, and rpms available with sheave supplied.

30.4 Motor drawings. The assembly drawing for the electrical motor should contain all the information required by the applicable motor specification as specified.

30.5 Detail drawings. Detail drawings shall be furnished of all parts and sub-assembly necessary to evaluation of the equipment and all parts necessary for maintenance and overhaul of the equipment. Drawings shall show all essential fabrication details including welding requirements and symbols. Sub-assemblies

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whose parts cannot be procured or serviced individually should be shown as a single part. Multi-detailed drawings are preferred, but mono-detail drawings may be used. Drawings are not required for those parts which are in common commercial use and can be referenced to commercial standards.

30.6 Electrical diagrammatic drawings. Electrical diagrammatic drawings shall be furnished and shall include elementary, detail schematic and connection diagrams. Each diagram shall show by symbolic representation all electrical wiring and connections, component accessories, controls, and associated instruments. Size and type of all wiring shall be indicated on the drawing. All electrical components shall be identified by a piece number of the bill of material list in addition to a detailed explanation of the operation of the system. All electrical connections that must be made by the installing activity shall be indicated by special symbols.

30.7 Outline installation drawings. Outline installation drawings shall be provided for each type and each size fan-coil assembly. Contents of each outline drawing shall be as follows:

- (a) Dimensional front and plan views and sufficient additional views showing overall and principal dimensions in sufficient detail to establish the limits of space in directions required for installation and servicing exclusive of space required for personnel. Include the amount of clearance required to permit opening of removable access panels and any other operations necessary to obtain access to the equipment. The clearances for withdrawal of parts or assemblies shall also be included.
- (b) All information necessary for preparation of foundation plans including mounting plate details and drilling plans with dimensions and tolerances and information as to optional mounting methods. Center of gravity shall be indicated.
- (c) Location, type, and dimensions of chilled water connections, condensate drain connections, duct connections, access panels, air filter access, and electrical service entrance shall be indicated.
- (d) Schematic diagrams for duct work, condensate removal and piping of the chilled water to and from the unit.
- (e) Performance data, table form, capacities of Btu/hr, and leaving WB temperatures for the following conditions:
  - (1) Entering DB temperatures, 70 to 100°F at 5 degree intervals.
  - (2) Entering WB temperatures, 57 to 84°F and 1 degree intervals as applicable (see 3.3.3.1).
  - (3) Airflow, standard cubic feet per minute (SCFM), at airflows in accordance with 3.3.3.1 of MIL-A-23798C(SHIP) for specific unit size.
  - (4) Chilled water temperature at 45°F and 50°F.
  - (5) Chilled water flow rate at 2.5 and 3.6 gpm/T of refrigeration.
- (f) Weight of complete assembly (uncrated)(wet and dry).
- (g) Any special instructions for hoisting, alignment, initial lubrication, installation or assembly, as necessary.

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APPENDIX A

30.8 Certification data. Certification data drawings for the complete fan-coil assembly shall be furnished for review by the contracting activity in accordance with 6.8 of MIL-A-23798C(SHIPS). The drawing shall include the following information:

- (a) Type and size designation.
- (b) Weight.
- (c) Electrical characteristics.
- (d) Elementary diagram (electrical).

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## APPENDIX B

## RELIABILITY

## 10. SCOPE

10.1 Scope. This appendix covers the information and procedures necessary to ensure that the reliability requirements of this specification are met. This appendix is a mandatory part of the specification. The information contained herein is intended for compliance.

## 20. APPLICABLE DOCUMENTS

This section is not applicable to this appendix.

## 30. RELIABILITY DATA

30.1 Reliability analysis. Reliability analysis shall be performed by manufacturers to determine that the equipment meets the Integrated Logistic Support (ILS) requirements of 3.2.2. Manufacturers shall maintain record data to indicate degree of conformance to ILS requirements. The reliability analysis shall include:

- (a) A list of parts, which according to experience and judgement, are subject to wear, material deterioration, and service failures.
- (b) Design features employed to attain the required service life of the parts, with consideration to shipboard environmental and resultant conditions. Design features include: choice of materials, compatibility of materials, repairability and accessibility, hardness, surface finishes, fits and clearances, corrosion control, equipment protection fail-safe features, internal and external operating temperatures, and suitability of the materials at these temperatures.
- (c) Preventive maintenance and servicing requirements necessary for the achievement of reliable equipment. Any unusual steps or precautions necessary in carrying out maintenance and servicing requirements shall be pointed out.

30.2 Failure reporting, analysis, and feedback. The reliability assurance program shall incorporate a formalized system for recording, collecting, and analyzing all failures that occur during testing, installation, and operation through the tenure of the contract. Analysis shall be fed back to contractor's engineering, management, and production activities on a timely basis. Failure reports received from the using activity shall be integrated into this program for trouble analysis and for experience considerations for future design review.

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## APPENDIX C

## MANUAL TECHNICAL CONTENT REQUIREMENTS

## 10. SCOPE

10.1 Scope. This appendix covers the technical requirements that shall be included in the manuals for the fan-coil assembly. This appendix is a mandatory part of the specification. The information contained herein is intended for compliance.

## 20. APPLICABLE DOCUMENTS

20.1 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 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.

## SPECIFICATIONS

## MILITARY

- MIL-M-15071 - Manuals, Technical: Equipment and Systems Content Requirements for.
- MIL-M-38784 - Manuals, Technical: General Style and Format Requirements.
- MIL-M-85337 - Manuals, Technical: Quality Assurance Programs; Requirements for.

(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.)

## 30. TECHNICAL MANUALS

30.1 Manuals. When required by the contract or purchase order, manuals shall comply with type I, commercial of MIL-M-15071 for technical content, MIL-M-38784 for format and style, and MIL-M-85337 for quality assurance as specified in a NAVSEA technical manual contract requirement (TMCR) and shall contain the following information:

- (a) Description of systems operation, maintenance, and installation instructions.
- (b) Isometric installations of the equipment shall be included as part of the general description.
- (c) Reduced copies of all drawings required to amplify or illustrate the text including diagrams, assembly drawings, and detail drawings of repair parts.
- (d) The technical manuals shall be reviewed by NAVSEA or the agency concerned.
- (e) Where identical technical manuals have been distributed to addressees, additional technical manuals need not be furnished except for two technical manuals packaged with the equipment and for the quantity of technical manuals specified for naval stock.

## STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

## INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the comment number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of this form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:

1. DOCUMENT NUMBER

MIL-A-23798C(SH)

2. DOCUMENT DATE (YYMMDD)

950306

3. DOCUMENT TITLE

AIR CONDITIONER, FAN-COIL ASSEMBLY

4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME (Last, First, Middle Initial)

b. ORGANIZATION

c. ADDRESS (include Zip Code)

d. TELEPHONE (Include Area Code)

(1) Commercial

(2) DSN

(if applicable)

7. DATE SUBMITTED (YYMMDD)

8. PREPARING ACTIVITY

a. NAME Technical Point of Contact (TPOC)

MR. S. JOHNSON, SEA 03V21

ADDRESS ALL CORRESPONDENCE AS FOLLOWS:

b. TELEPHONE (Include Area Code)

(1) Commercial:

DSN:

TPOC: 703-602-9108 EXT 214 8-332-9108

IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT:

c. ADDRESS (Include Zip Code)

COMMANDER, NAVAL SEA SYSTEMS COMMAND

ATTN: SEA 03R42

2531 JEFFERSON DAVIS HIGHWAY

ARLINGTON, VA 22242-5160

Defense Quality and Standardization Office

5203 Leesburg Pike, Suite 1403

Falls Church, VA 22041-3466

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