

MIL-A-19865B(SHIPS)
 28 April 1967
 SUPERSEDING
 MIL-A-19865A(SHIPS)
 1 February 1962
 (See 6.3)

MILITARY SPECIFICATION

AIR CONDITIONER, MECHANICALLY REFRIGERATED

1. SCOPE

1.1 Scope. - This specification covers mechanically refrigerated air conditioners encased assemblies consisting of a sea water-cooled condensing unit and means for air circulation, ventilation, air cooling and dehumidification for Naval shipboard use.

1.2 Classification. - The air conditioner shall be of the sizes, shown below as specified (see 6.1):

- Size 2 - minimum capacity 24,000 British thermal units (B. t. u.) per hour.
- Size 3 - minimum capacity 36,000 B. t. u. per hour.
- Size 5 - minimum capacity 60,000 B. t. u. per hour.
- Size 7-1/2 - minimum capacity 90,000 B. t. u. per hour.

2. APPLICABLE DOCUMENTS

2.1 The following documents of the issue in effect on date of invitation for bids or request for proposal, form a part of the specification to the extent specified herein.

SPECIFICATIONS

FEDERAL

QQ-N-281 - Nickel-Copper-Alloy Bar, Plate, Rod, Sheet, Strip, Wire, Forgings, and Structural and Special Shaped Sections.

MILITARY

MIL-V-3 - Valves, Fittings, and Flanges (Except for Systems Indicated Herein); Packaging of.
 MIL-P-116 - Preservation, Methods of.
 MIL-R-196 - Repair Parts for Internal Combustion Engines, Packaging of.
 MIL-D-1000 - Drawings, Engineering and Associated Lists.
 MIL-D-1000/2 - Drawings, Engineering and Associated Lists.
 MIL-F-1183 - Fittings, Tube, Cast Bronze, Silver-Brazing.
 MIL-M-15071 - Manuals, Equipment and Systems.
 MIL-P-15137 - Provisioning Technical Documentation for Repair Parts for Electrical and Mechanical Equipment (Naval Shipboard Use).
 MIL-C-15726 - Copper-Nickel Alloy, Rod, Flat Products (Flat Wire, Strip, Sheet, Bar and Plate) and Forgings.
 MIL-B-16541 - Bronze, Valve, Castings.
 MIL-M-17059 - Motors, 60-cycle, Alternating-Current, Fractional H. P. (Shipboard Use).
 MIL-M-17060 - Motors, 60 cycle, Alternating-Current, Integral Horsepower (Shipboard Use).
 MIL-M-17413 - Motors, Direct Current, Integral H. P. Naval Shipboard.
 MIL-E-17555 - Electronic and Electrical Equipment and Associated Repair Parts, Preparation for Delivery of.
 MIL-M-17556 - Motors, Direct Current, Fractional HP (Shipboard Use).
 MIL-F-20042 - Flanges, Pipe, Bronze (Silver Brazing).
 MIL-B-24059 - Bronze, Nickel Aluminum; Rod, Flat Products with Finished Edges, Shapes and Forgings.
 MIL-I-45208 - Inspection System Requirements.

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

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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.

OFFICIAL CLASSIFICATION COMMITTEE

Uniform Freight Classification Ratings, Rules and Regulations.

(Application for copies should be addressed to the Official Classification Committee, 1 Park Avenue at 33rd Street, New York, New York 10016.)

UNITED STATES OF AMERICA STANDARDS INSTITUTE (USAS)

B9.1-1958 - Safety Code for Mechanical Refrigeration.

(Application for copies should be addressed to the American Standards Association, 10 East 40th Street, New York, New York 10016.)

NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION (NEMA)

MG1-18.078-.091 - Motors for Hermetic Refrigeration Compressors.

IC1 - Industrial Control.

KS1-1957 - Enclosed Switches.

(Application for copies should be addressed to the National Electrical Manufacturer's Association, 155 E. 44th Street, New York, New York 10017.)

UNDERWRITERS' LABORATORIES, INC. (UL)

UL-465 - Safety Air Conditioners, Central Cooling.

(Application for copies should be addressed to the Underwriters' Laboratories, Inc., 207 East Ohio Street, Chicago, Illinois 60611.)

AMERICAN SOCIETY OF HEATING, REFRIGERATION AND AIR-CONDITIONING ENGINEERS (ASHRAE)

37-60 - Standard Methods of Testing for Rating Unitary Air-Conditioning Equipment.

(Application for copies should be addressed to the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., 345 East 47th Street, New York, New York 10017.)

AIR-CONDITIONING AND REFRIGERATION INSTITUTE (ARI)

210-58 - Standard for Unitary Air-Conditioning Equipment.

(Application for copies should be addressed to Air-Conditioning and Refrigeration Institute, 1815 N. Fort Meyer Drive, Arlington, Virginia 20009.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

B61 - Stem or Valve Bronze Castings.

B143 - Tin Bronze and Leaded Tin Bronze Sand Castings.

B148 - Aluminum Bronze Sand Castings.

B150 - Aluminum Bronze Rod, Bar and Shapes.

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

3. REQUIREMENTS

3.1 Materials. - Materials, parts and components shall be in conformance with the requirements specified herein. All materials forming a part of the finished product shall be new and suitable for the purpose intended. The materials shall be free from any defects that might affect the serviceability or appearance of the finished product.

3.1.1 Corrosion protection. - Corrosion-resisting steel, copper, brass, bronze, chromium, copper-nickel and copper-nickel alloys referenced herein are considered satisfactory 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 assembled in any unit.

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3.1.1.1 Parts other than corrosion-resisting materials shall be protected against corrosion with chemicals, electrolytic processes, plating, or suitable paints and enamels. The following methods, while not restrictive are acceptable corrosion-protection methods when properly applied:

- (a) Hot-dipped galvanized.
- (b) Hot phosphate process with rust-inhibiting paint.
- (c) Electroplated cadmium followed by dichromate, or hot-phosphate treatment or water-dip lacquer.

3.1.1.2 All bolts, nuts, studs, pins, screws and such other fastenings or fittings as may be used shall be of a corrosion-resisting material, or of a material treated in a manner to render it adequately resistant to corrosion. All screws exposed in final assembly shall be corrosion-resisting material. Self tapping screws with machine screw threads may be used in the cabinet assembly. Sheet metal screws with sheet metal threads will not be permitted.

3.1.2 Thermal insulation. - The cabinet or chassis shall be provided with internal insulation where necessary to prevent dripping, running off, or blowing off of moisture under operating conditions of 80°F. dry-bulb and 75°F. wet-bulb unit-ambient-air and room air entering-air-inlet temperature (see 4.5.3.2.2). Insulation shall also be applied where necessary to minimize noise transmission.

3.1.3 Interchangeability. - Similar parts, including repair parts, or corresponding apparatus furnished on the same contract or order or built to the same drawings, shall be strictly interchangeable without the necessity of further machining or hand fitting of any kind.

3.2 General requirements. - The air conditioners covered by this specification shall conform to the standards of the Underwriters' Laboratories, Inc., regarding fire and casualty hazards. However, compliance with these requirements does not absolve the contractor from complete compliance with all requirements of this specification.

3.2.1 In the event of differences between any of the requirements of this specification and those of Underwriters' Laboratories, Inc., Air-conditioning and Refrigeration Institute and United States of America Standards Institute the requirements of this specification shall govern.

3.2.2 Reliability assurance. -

3.2.2.1 The principle of maximum reliability is paramount and no compromise of this principle shall be made with any other basic requirement of design. Where wear or corrosion is unavoidable, the parts subjected to such wear or corrosion shall be of the best material for the purpose in order to reduce these detrimental effects to a minimum.

3.2.2.2 The designer should take cognizance of the conditions under which equipment will be maintained and repaired on shipboard, and of the fact that the personnel responsible for maintenance and repair may not be seasoned mechanics. Human engineering should be considered in design to preclude or minimize possibility of failure through improper operation or poor maintenance.

3.2.2.3 The contractor shall establish and maintain an effective reliability assurance program including the items specified in 3.2.2.3.1 through 3.2.2.3.4.

3.2.2.3.1 Design reviews. - The reliability assurance program shall include provisions for the reliability review and evaluation of designs as an integral part of the contractor's engineering design procedures. Design or engineering changes occurring during development or production shall be subjected to comparable review procedures.

3.2.2.3.2 Production control and monitoring. - The reliability assurance program shall provide an economical and effective system of production control and monitoring to assure that reliability achieved in design is maintained during production (see 4.1.1).

3.2.2.3.3 Subcontractor and vendor reliability. - The reliability assurance program shall include provisions to assure subcontractor and vendor selection and performance consistent with the reliability requirements of the contract and applicable portions of this specification.

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3.2.2.3.4 Failure reporting, analysis and feedback. - The reliability assurance program shall incorporate a formalized system for recording, collecting, and analyzing all failures that occur during all 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 using activity shall be integrated into this program for trouble analysis and for experience considerations for problem solving and design improvement for future.

3.3 Assembly. - Each unit shall consist of a condensing unit, air cooling and air handling equipment, controls, and miscellaneous accessories supported in a frame and inclosed in a metal cabinet. The cabinet shall be factory assembled, complete, self-contained with the refrigeration equipment dehydrated and charged with the necessary operating quantities of refrigerant and oil. The unit shall be ready for operation after removal of shipping protection, opening of valves, adjustment of belts and connection to services. All refrigerant containing parts and controls shall be within the cabinet enclosure.

3.3.1 Valves, controls, and equipment subject to service and repair shall be readily accessible for servicing through a removable front panel. Where panels are provided for access to equipment, machine screws may be used for fastening.

3.4 Design. - The unit shall be suitable for operation under shipboard conditions of vibration, roll and pitch, and shock. The refrigerating equipment shall be designed, constructed, and assembled in accordance with the USAS B9. 1-1958 unless otherwise specified in the contract or order.

3.4.1 The equipment shall operate satisfactorily when inclined at an angle of 15 degrees each side of the vertical in each of two vertical planes at right angles to each other (see 4.5.2).

3.4.2 When maximum shipboard available space is critical it shall be as specified (see 6.1). The overall dimensions of units shall not be greater than those specified.

3.5 Condensing unit. - The refrigerant for the condensing unit shall be dichlorodifluoromethane (R-12) or monochlorodifluoromethane (R-22). The unit shall contain a compressor, water cooled condenser, controls and accessories. When an open type compressor is used a liquid receiver shall be provided.

3.5.1 Compressor. - The compressor shall be of the open or serviceable hermetic type. Provision shall be made for adequate lubrication of all rubbing and wearing surfaces including operation under shipboard conditions of inclination and rolling (see 4.5.2). The serviceable hermetic compressor shall be a type that can be disassembled in the field for replacement of wearing parts and rewinding of motors without the cutting and attendant resealing of the compressor housing or shell by brazing or welding. The compressor shall be of a design that can be disassembled in the field and wearable parts readily replaced. Complete data shall be provided identifying all materials, electrical winding data and necessary treatment for rewinding or repairing the hermetic motor. Replacement parts and special tools required for maintenance and repair of the compressor shall be available to the Government. Compressor speeds for open units shall not exceed 1800 RPM.

3.5.1.1 The open compressor shall be of the single-acting, reciprocating type. The shaft seal and main bearings shall be replaceable in their entirety without the necessity of replacing or refurbishing the crankshaft or crankcase. The suction and discharge shut-off valve connections to the compressor shall be of the flange type.

3.5.2 Condenser. - The condenser shall be water-cooled and designed for use with sea water at an entering temperature of 85°F. and 110°F. condensing temperature. Water velocities in the condenser shall not exceed 6 feet per second at design conditions. There shall be no compressor motor overload or loss of condensing capacity with sea water entering the condenser at 90°F. The condenser shall be a type in which the tubes can be mechanically cleaned and shall be installed so that the tubes may be cleaned without removing the condenser from the equipment. All parts in contact with sea water shall be made of copper-nickel (90-10) conforming to MIL-C-15726, aluminum bronze conforming to MIL-B-24059, ASTM B143 alloy 1B, ASTM B148 alloy 9D, ASTM B150 Alloy 2, or valve bronze conforming to ASTM B61 except the condenser sea water tubes shall be copper-nickel (90-10) conforming to MIL-C-15726. The condenser shall be provided with means to purge both the refrigerant and water circuits and for draining the water circuit.

3.5.3 Liquid receiver. - The liquid receiver, where provided, shall be such that it has an internal volume at least 25 percent greater than the volume of the complete refrigerant charge. The receiver shall

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contain a pressure relief device approved by the command or agency concerned for protection against excessive temperature. Where a fusible plug is furnished, the plug shall melt at a temperature not lower than 200°F. and not higher than 300°F. Where receivers are not furnished, the pressure relief device shall be incorporated in the condenser.

3.5.4 Cooling coil. - The cooling coil shall be of finned-tube construction and be composed of nonferrous metal tubes and fins. Fins shall be firmly bonded to the tube. Fittings and joints shall be brazed or welded. A suitable drip pan and drain for collecting the condensate shall be furnished. Provision shall be made for disposal of the condensate as specified herein.

3.5.5 Water-regulating valves. - A water-regulating valve shall be provided with each condenser. The valve shall be of the direct-acting or pilot-controlled type actuated by condenser gas pressure to modulate the flow of water required for the condenser. The valve shall be selected to regulate the water flow from shut-off to required capacity within a maximum operating gas pressure rise of 40 pounds per square inch (psi). The valve shall be adjustable within an operating range of 90 to 140 psi refrigerant gas pressure for R-12, or equivalent, where other refrigerants are used. The capacity of the water-regulating valve shall at least equal the water requirement of the condenser, based on available inlet water pressure of 35 psi and a pressure drop across the valve of not more than 10 psi. In any case the valve size shall be not less than 1/2 inch iron pipe size (ips). The valve shall be constructed of nonferrous or corrosion-resisting material. The valve body shall be made of valve bronze conforming to MIL-B-16541. In addition, the internal metal parts subject to corrosion or erosion shall be made of nickel-copper conforming to QQ-N-281. The valve shall have either flanged connections conforming to MIL-F-20042 or union ends conforming to MIL-F-1183. The strainer body shall be valve bronze ASTM B61, 90-10 copper-nickel, monel or other materials satisfactory to the using or procuring activity. The valve shall be constructed in such a manner as to prevent the possibility of entry of sea water to the refrigerant system in the event of derangement. A strainer of No. 20 mesh nickel-copper screen of substantial area shall be provided for the protection of the valve. The strainer basket shall be readily removable for cleaning without disassembly of connecting piping. The strainer shall be not less than 3/4 inch ips. The water regulating valve shall be located within the air conditioner cabinet so that no refrigerant piping or connections are outside the cabinet enclosure.

3.6 Piping. - All piping necessary for the satisfactory operation the equipment shall be provided up to and including fittings at each unit required for interconnection to supplementary service. Fittings shall be capped or plugged to safeguard against damage prior to installation. Piping connection shall be arranged in such a manner as not to impair the vibration-isolation properties of absorption-type mounts. All piping shall be securely supported to minimize strain and vibration. Piping connections made with soft solder will not be permitted. The water regulating valve shall be installed in the condenser water discharge line and shall be readily accessible for adjustment and maintenance. Condenser water supply piping, drain piping shall be 90-10 copper-nickel tubing unless otherwise specified herein. Pipe fittings shall be 90-10 copper-nickel, valve bronze ASTM B61 or monel. Tapered pipe threads are not permitted in the piping systems except at valves or plugs used for purging and draining systems or for test or gage connections.

3.6.1 All compressor suction lines and cold water lines within the cabinet which may form condensation and cause moisture to drip on parts or equipment other than drip pans shall be insulated to prevent condensation.

3.6.2 A disposable type dehydrator shall be provided in the refrigerant circuit. The dehydrator shall be equipped with an auxiliary screen or other protective means at the dehydrator outlet to prevent passage of the dehydrating agent in the event of rupture of the cartridge screen outlet. The desiccant shall be silica gel or activated alumina or a type satisfactory to the command or agency concerned.

3.6.3 A fine mesh strainer shall be provided upstream from the expansion device.

3.6.4 Piping systems shall withstand the pressure tests specified in 4.3.

3.7 The electrical equipment shall conform to NEMA MG1-18.076-.091 and IC1 and MIL-M-17059, MIL-M-17060, MIL-M-17413 and MIL-M-17556, as applicable, and shall be designed for operation in a 50°C ambient temperature. No portion of the electrical circuit shall be grounded. The frames or enclosures of all electrical components shall be grounded to the frame of the air conditioning unit to eliminate hazard from shorts or grounds within the equipment. The air conditioner shall be provided with a master incoming electrical power disconnect switch. The switch shall conform to NEMA KS-1, type ND, and shall open all power lines. The master disconnect switch shall be manually operated and shall be located in a common enclosure with the fan and compressor motor starters. The operating handle of the manual switch shall be outside of

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this enclosure. A warning plate or decal shall be provided on the cover of the enclosure stating that the manual disconnect switch shall be opened prior to servicing the unit. Equipment shall be drip-proof and furnished only for the following power supply as specified (see 6.1).

- (a) 440 volts, 3 phase, 60 cycles alternating current (a. c.).
- (b) 230 volt direct current (d. c.).
- (c) 115 volt d. c.

3.7.1 Hermetic motors shall conform to NEMA MG1-18.076-.091; other motors shall conform to MIL-M-17059, MIL-M-17060, MIL-M-17413 and MIL-M-17556, as applicable. Motors shall be constant speed, continuous duty with a maximum speed of 3600 RPM and shall be for the power supply specified (see 3.7 and 6.1). The temperature rise of motors conforming to NEMA MG1-18.076-.091 shall not exceed 70°C. Motors in conformance with Military Specifications shall be service C, for 50° ambient temperature, class B insulation and drip-proof enclosed. Under the conditions of overload, specified in 4.5.3.2.1, the temperature rise for motors shall not be greater than that indicated in the maximum permissible temperature rise table of the applicable motor specifications.

3.7.2 Motor starters. - The compressor motor starter shall be provided with thermal overload relays. The overload relay for hermetic units shall be a type specifically designed for protection of hermetic compressor motors and be acceptable to the command or agency concerned. Fans shall be protected with an overload relay or built in thermal protector. The control circuit shall be designed so that the compressor will not start or run unless the fan is operating and the compressor will stop if the fan stops or the fan circuit is interrupted. The controller switches shall open all power lines.

3.7.2.1 The controllers shall conform to NEMA IC1. Across the line controllers are permissible for d. c. motors rated up to 1 horsepower, provided the motor is properly designed for across the line starting and the inrush current (as determined by dividing the terminal volts by armature circuit resistance of the motor) does not exceed 10 times the motor name plate current. D. c. controllers for motors over 1 horsepower shall be reduced voltage start. A manual control to permit operation either of fan only or of fan and refrigerating equipment shall be furnished. The control shall be mounted in the cabinet. The a. c. motor starter shall be mounted in the cabinet. The d. c. motor starter may be external.

3.7.3 Wiring. - The wiring between the electrical devices (motors, motor starters, control devices) shall conform to the requirements of UL-465. The wiring shall be complete and the equipment shall be ready for connection of the incoming power cable at installation. All electrical terminals shall be adequately protected against moisture, mechanical damage, and accidental contact by personnel. The interconnection of the various electrical circuits through junction boxes or terminal blocks outside of the main disconnect and motor starter enclosure shall not be permitted. A terminal block or blocks shall be provided within the main disconnect and motor starter enclosure for the interconnection of all electrical circuits. Control switches or other electrical devices located external to the main disconnect and motor starter enclosure shall not have protruding or unprotected electrical connection lugs or terminals. Control switches requiring mechanical adjustment shall not be located within the main disconnect and motor starter enclosure unless provision is made so that the necessary adjustments can be made without removing the enclosure cover.

3.7.4 Insulation resistance. - The insulation resistance of the electrical circuit shall be not less than one megohm (see 4.3.4).

3.7.5 Dielectric strength. - The equipment shall be capable of withstanding for a period of 1 minute a dielectric a. c., root mean square (rms) test voltage of 1900 volts for the a. c. unit and 1500 volts for the d. c. unit.

3.8 Automatic refrigeration control devices. - Automatic refrigeration control devices shall be readily accessible for adjustment and servicing.

3.8.1 The automatic control of the compressor shall be accomplished by means of a temperature control switch. The switch shall have a knob adjustment for room temperature in the range of 65°F. to 85°F. plus or minus 5°F.

3.8.2 The unit shall be provided with separate pressure switches properly set to stop the compressor when the refrigerant discharge pressure rises too high, or suction pressure becomes too low.

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3.8.3 Refrigerant expansion valves shall be the thermostatic type and shall be an adequate size for the intended application. The valve shall be of the fixed superheat type and shall be single or multi-outlet type. Where multi-outlet valves or pressure type refrigerant distributors are used or where the pressure drop through the evaporator exceeds 2-1/2 pounds, an externally equalized valve shall be used.

3.9 Cabinet. - The cabinet enclosure shall be constructed of steel suitably protected against corrosion. Inlet and outlet grilles finished to harmonize with the cabinet shall be installed in each unit. The outlet grilles shall be part of the plenum and constructed to permit adjustable directional air flow in both horizontal and vertical planes. The back of the machinery compartment shall be closed with a removable heavy screen or expanded metal panel. No wood shall be used in the cabinet.

3.9.1 The frame or chassis shall be rigid and of adequate strength to support and maintain alignment of the machinery and component parts.

3.9.2 A suitable drip pan and drain for collection of the condensate shall be furnished. Multiple drain outlets shall be provided in the drip pan to permit proper drainage in the event of listing of the vessel. The drip pan shall also be provided with splash baffles, if necessary, to prevent overflow of the condensate during pitch or roll of the vessel.

3.9.3 The plenum shall be removable and shall be provided unless otherwise specified (see 6.1). Means shall be provided in the cabinet so that cool air may be discharged through an external duct system installed in the vessel. The duct system will be connected directly to the unit.

3.9.4 Provision shall be made to secure the unit to the ship's structure.

3.10 Air-circulating equipment. - Air circulating equipment shall include a fan, fan motor, drive, motor control, and air cleaners. The unit shall have the capacity for circulating air through the air conditioning unit at not less than 25 cubic feet per minute per 1000 B.t.u. per hour.

3.10.1 The unit shall be capable of delivering the amount of air specified in table I, when it is used in conjunction with an external duct system, and the additional resistance in the air stream due to this external duct system is that shown in table I.

Table I - Quantity of air.

Size	Air quantity minimum (cfm)	Minimum available external resistance inches of water
2	600	0.10
3	900	.15
5	1500	.20
7-1/2	2250	.25

3.11 Fans. - Fans shall be of the centrifugal type and be quiet in operation. They shall be adequately secured to shafts, and shall be supported by at least two self-aligning bearings. Bearings shall be self-oiling with adequate oil reservoirs, unless ball bearings are provided. Oil or grease fittings shall be readily accessible from the front or sides of the unit after removal of the service panel. Where the fan is belt-driven, belts shall be V-belt drive.

3.11.1 Fan motors shall be provided with variable pitch pulleys and adjustable base or rail where V-belt drive is used. Where the fan motor is exposed to condensate drip, proper protection shall be provided.

3.12 Air cleaner. - Air cleaners shall be provided and arranged to filter all ventilation or recirculated air before its entrance into any air-conditioning coil or into a room. Cleaners shall be replaceable and shall be of the permanent washable type. All materials used in the construction of the filters shall be rust resistant. The air filters shall be arranged so they do not come in contact with condensate from the cooling coils.

3.13 Capacity-rating conditions. - With sea water entering the condenser at 85°F., the air conditioning unit shall have a net design capacity at least equal to that specified herein, based on 80°F. dry bulb temperature and 67°F. wet bulb temperature unit-ambient-air and room air entering-air-inlet unless otherwise

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specified in the contract or order (see 4.5.3.1). The net capacity shall be exclusive of all electrical energy (heat energy) required to operate compressor, fan, etc.

3.13.1 **Cooling effect ratio.** - When operating at rating conditions the unit shall have a ratio of room sensible cooling effect to net total cooling effect of 65 to 70 percent. The net room sensible cooling effect of a unit is defined as the difference between the net total cooling effect and the dehumidifying effect, expressed in B.t.u. per hour. The net total cooling effect is the total useful capacity of the unit for removing heat from the space to be treated, expressed in B.t.u. per hour. The net dehumidifying effect is the difference between the moisture content in pounds per hour of the entering and leaving air, multiplied by 1,060, expressed in B.t.u. per hour.

3.13.2 **Performance factor.** - Under rating conditions the air conditioning unit shall have a minimum performance factor of 10.0 B.t.u. per hour per watt based on net capacity and total watts input to the unit.

3.13.3 **Overload conditions.** - The air conditioner shall be capable of continuous operation in a 100°F. dry bulb temperature and 85°F wet bulb temperature ambient air and room air entering air inlet with sea water entering the condenser at 90°F.

3.14 **Identification plates.** - Identification plates and other designating marking plates shall be nonferrous or corrosion-resisting steel. The identification plates shall be located in a conspicuous position and not on the rear of the units.

3.15 **Repair parts.** - Repair parts shall be furnished in accordance with MIL-P-15137. The number of sets shall be as specified (see 6.1). The repair parts shall consist of those specified in table II as applicable, and shall constitute one set.

Table II - Onboard repair parts.

			For quantity of onboard repair parts required per ship - Multiply the allowance factor in the applicable component column X the quantity installed in one component and round the product to the nearest whole number.					
Item	1	2	3	4	5-8	9-20	21-50	51-100
Compressor Repair Parts (as applicable)								
Valve plate assembly with valve disks	.33	.66	1.00	1.00	2.00	3.00	4.00	5.00
Set suction and discharge valve disks	.33	.66	1.00	1.00	2.00	3.00	4.00	5.00
Set pistons with rings	.20	.40	.60	.60	.80	1.50	3.00	3.50
Set connecting rods with bearings	.25	.50	.75	.75	1.00	2.50	3.50	4.00
Set connecting rod bearings	.25	.50	.75	.75	1.00	2.50	3.50	4.00
Set crankshaft bearings	.25	.50	.75	.75	1.00	2.50	3.50	4.00
Set of gaskets (each type and size)	1.00	2.00	3.00	3.00	4.00	6.00	7.00	8.00
Shaft seal assembly	.33	.66	1.00	1.00	2.00	3.00	4.00	5.00
Miscellaneous repair parts of each size and type (where used)								
Control switches (pressure and temperature)	.33	.66	1.00	1.00	2.00	3.00	4.00	5.00
Liquid strainer basket	.20	.40	.60	.60	.80	1.50	3.00	3.50
Thermostatic expansion valve	.33	.66	1.00	1.00	2.00	3.00	4.00	5.00
Water regulating valve	.33	.66	1.00	1.00	2.00	3.00	4.00	5.00
Piping system gaskets	.10	.20	.30	.30	.40	.60	1.50	2.50
Air filter sets								
Dehydrator								
Bearings fan and fan shaft	.20	.40	.60	.60	.80	1.50	3.00	3.50

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Table II - Onboard repair parts (Cont'd).

		For quantity of onboard repair parts required per ship - Multiply the allowance factor in the applicable component column X the quantity installed in one component and round the product to the nearest whole number.						
Item	1	2	3	4	5-8	9-20	21-50	51-100
Belts, sets	.50	1.00	1.50	1.50	2.50	3.50	4.50	5.50
Adaptors, charging line (where "shradet type" check valves are used in charging connections)	.01	.02	.03	.03	.04	.06	.12	.25
Electrical repair parts								
Contacts and spring set	.25	.50	.75	.75	1.00	2.50	3.50	4.00
Contact magnet coil	.50	1.00	1.50	1.50	2.50	3.50	4.50	5.50
Overload heaters sets	.25	.50	.75	.75	1.00	2.50	3.50	4.00
Transformer	.10	.20	.30	.30	.40	.60	1.50	2.50
Selector switch	.20	.40	.60	.60	.80	1.50	3.00	3.50
Motors (except hermetic compressor)	Repair parts shall be furnished as required by applicable Military Specification, except that special tools are not required.							

3. 16 Drawings. Drawings delineating the equipment shall be furnished. Drawings shall be Type II, III, or IV of MIL-D-1000/2 as applicable. The drawings shall be for intended use categories A, B, C, and II as delineated in MIL-D-1000. Separate drawings need not be furnished for each category. Parts lists, bill of material lists, etc., shall be included on equipment drawings. Certification data drawings should include diagrams and drawing lists.

3. 16. 1 Assembly drawings. Assembly drawings, Type II or IV, shall be provided for each of the following:

- (a) Compressor unit assembly.
- (b) Compressor.
- (c) Condenser.
- (d) Receiver.
- (e) Valves.
- (f) Dehydrator.
- (g) Fans.
- (h) Cooling coil/evaporator.
- (i) Controls.
- (j) Instruments.
- (k) Strainer.
- (l) Safety devices.
- (m) Motors.
- (n) Controllers.

3. 16. 1. 1 Assembly drawing. - Assembly drawings shall show the following data:

- (a) Component or unit outline dimensions.
- (b) Attached auxiliaries and foundation and mounting dimensional requirements.
- (c) Complete equipment performance curves, based on actual tests (the original submission may show design performance curves vice test curves).
- (d) Table of weights of individual components and weight of complete unit.
- (e) List of shipbuilders connections showing size, type and dimensions including methods and sizes of fastenings, dimensions and clearances as required for installation and servicing plus supplementary data as necessary to permit installation without the supplier's assistance.
- (f) Center of gravity of air conditioner.

3. 16. 1. 2 Sectional assemblies. - Sectional assemblies shall be provided for compressors, condensers, valves, dehydrators and strainers. All running clearances shall be shown. The list of material shall include every part required in the assembly, including those parts not required to be detailed. This may necessitate some side or partial views in order to show parts not otherwise shown in the main section view. The list of material shall include an indication of each part required by this specification to be furnished as

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an onboard repair part (this is not a repair parts list). Performance data may be shown on assembly drawing. The drawing shall be sufficiently complete to show compliance with equipment specification requirements. 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.

3.16.2 Certification data. - Certification data, type III, drawing(s) shall be provided. The drawing(s) shall include a reference drawing list of all the refrigerating unit assembly components, parts, control system items and ancillary components being furnished on the contract or order. Diagrams shall also be provided. The diagrams shall include a refrigerant and water piping diagram, electrical control diagram, and electrical wiring diagram. The diagrams shall show by symbolic representation all fluid piping, internal passages, pipe sizes, electrical interconnections, components, accessories, controls and associated instruments, performance characteristics as applicable, direction of flow, operating sequence, and connections required by others for operation. For example, a piping diagram will include associated units, controls, gages, thermometers, valves, piping accessories, sea water and chilled water connections, as applicable. The piping diagrams shall show the design quantities, pressures and temperatures of fluids. An electrical wiring diagram will include and show circuits between motor controllers, motors, controls, switches, and accessories as applicable for an understanding of operating sequence. All symbols used for equipment in diagram drawings shall be given a piece number and identified in the list of materials with the following information:

- (a) Piece number.
- (b) Quantity required.
- (c) Descriptive name.
- (d) Manufacturer's name.
- (e) Manufacturer's model or identifying number.
- (f) Manufacturer's drawing number.
- (g) Weight.
- (h) Characteristics.

3.16.2.1 Characteristic data. - The characteristics shall include ordering information necessary to specifically qualify or supplement data described in referenced drawing or manufacturer's model and part number. A separate table shall be used for the various components where necessary and shall include the following:

- (a) Compressor unit - Bore, stroke, number of cylinders, RPM, capacity in tons, design suction rating, condition, design condensing temperature, compressor motor rated horsepower, motor frame size number, electrical characteristics as applicable.
- (b) Condenser - Square feet tube surface, number of passes, type of surface (finned or bare), design sea water quantity (gpm), water velocity (fpm), heat rejection capacity (Btu/hr), design pressure drop (psi), design water temperature entering and leaving, design condensing temperature. Outside diameter of shell or tubes, tube length, overall length and number of tubes.
- (c) Receiver - Capacity in pounds refrigerant.
- (d) Cooling coils - Square feet of surface, type of surface (finned or bare), capacity (Btu/hr), air flow (cfm), design static pressure available, design air temperature differential, design refrigerant temperature, fan motor H. P., current characteristics.
- (e) Thermal expansion valves - Type of equalizer, capacity (tons), design pressure differential (psi), identify with connected load or coil.
- (f) Refrigerant charge - Type of refrigerant, estimated operating charge (pounds) for compressor, condenser, receiver, piping and cooling coils.
- (g) Plant, system or equipment data - In addition to the information specified in items (a) to (f), complete data for the assembly of equipment shall be provided including:
 - (1) Contractor's name.
 - (2) Model number.
 - (3) Capacity.
 - (4) Design capacity rating conditions.
 - (5) Test pressures.
 - (6) Total weight.
 - (7) Specification acceptance and first unit tests conducted (identify each test).
 - (8) Approved by.
 - (9) Date approved.
 - (10) Contract or order number.

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- (11) Technical manual NAVSHIPS number (when applicable).
- (12) Identification of ships in which installed (if known).

3.16.3 Detail drawings. Detail drawings shall be furnished of all parts and sub-assemblies necessary for 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 whose parts cannot be procured or serviced individually should be shown as a single part. Multi-detail 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.

3.16.4 Electrical or accessory component drawings. In addition to drawing requirements specified herein, the content and format of electrical component drawings shall conform to the requirements of the applicable component specification.

3.17 Manuals. - Manuals shall comply with type I of MIL-M-15071. Photo views of the equipment shall be included as a part of the general description. A section shall be provided containing reduced copies of all drawings required to amplify or illustrate the text including diagram and assembly drawings. Exploded views shall be required for open or serviceable compressors. The manual shall include all technical data required to maintain and repair the serviceable hermetic compressor. This data shall include the complete identification of all parts and materials, instructions including drawings or diagrams or both for rewinding the motor, step by step procedures required for removing and reassembling the various parts and instructions for draining and charging the compressor with oil. These procedures and instructions shall include allowable wear limits between parts and torque values for bolts, screws and studs where this is critical. Procedures for dehydrating the motor windings, as well as evacuating, dehydrating and testing the compressor shall also be provided.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. - Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own facilities or any commercial laboratory acceptable to the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Quality inspection system. - The supplier shall provide and maintain an inspection system in accordance with MIL-I-45208.

4.1.2 No instruments containing mercury shall be used in the manufacture or testing of any equipment destined for installation on a nuclear powered ship. This point shall be covered in the manufacturer's quality control manual. Test reports shall contain a certification signed by a responsible official of the manufacturer that no mercury containing instruments have been used in the manufacture or testing of the equipment.

4.2 Sampling for quality conformance inspection. -

4.2.1 Lot. - All refrigerating equipment of the same design and size offered for delivery at one time shall be considered a lot.

4.2.2 Sampling for quality conformance inspection. - Sample units shall be selected from each lot in accordance with table III and inspected for adjustment, fits, leaks, material, finish, and general conformance with this specification. Each sample unit shall be subjected to the tests specified in 4.4. If any unit fails in any test or is found nonconforming in any requirement, it shall be counted a defective unit, and if the number of such defective units in any sample exceeds the acceptance number shown in table III for that sample, the lot represented by the sample shall be rejected.

4.3 The tests specified in 4.3.1 through 4.3.6.2 shall be performed on each unit.

4.3.1 Pressure. - All refrigerant containing component parts on the high-pressure side of the refrigeration equipment shall withstand without damage an air or gas test of 300 pounds per square inch (psi) for R-22 and 235 pounds per square inch gauge (psig) for R-12. The refrigerant containing component

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parts, on the low-pressure side of the refrigerating system shall withstand without damage an air or gas test of 150 psig for R-22 and 140 psig for R-12.

Table III - Sampling for quality conformance inspection.

Lot size number of units	Sample size number of units	Defective units	
		Acceptance number	Rejection number
1 to 6	All	---	---
7 to 15	7	0	1
16 to 25	10	0	1
26 to 40	13	0	1
41 to 65	17	1	2
66 to 110	22	1	2
111 to 180	28	2	3
181 to 300	35	2	3
300 to 500	45	3	4

4.3.2 Leakage test. - The refrigerating high side and low side system shall be tested to determine tightness and resistance to leakage at a minimum gas pressure of 235 psig on the high side and not less than 140 psig on the low side for R-12 and 300 psig on the high side and not less than 150 psig on the low side for R-22.

4.3.3 The water system, including control valve, shall be tested at 150 psi hydrostatic pressure.

4.3.4 Insulation resistance test. - With the motor at ambient temperature, the insulation resistance shall be as specified in 3.7.4. The measuring of insulation shall be made by connecting the three line terminals together, manually closing the line and fan contactors and measuring the resistance between terminals and ground. The insulation resistance shall be measured with a 500 volt insulation-resistance-meter. The time of test voltage application shall be not less than 60 seconds.

4.3.5 Dielectric strength test. - With the motor at ambient temperature the dielectric strength shall be as specified in 3.7.5. The dielectric strength test shall be conducted with the three line terminals together and manually closing the line and fan contactors.

4.3.6 Operating tests. - The units shall be operated for a period of at least 1 hour with controls set for specified operating conditions. At the conclusion of this operation test, the entire refrigerant circuit connections under refrigerant pressure shall be given a halide test to determine leakage. In the event of leakage, all leaks shall be repaired and the performance test shall be repeated.

4.3.6.1 During this test it shall be verified that the controls are adjusted and functioning properly.

4.3.6.2 Under equivalent ambient temperature, the electrical power input shall be measured and compared with the input of all other units which have been tested. If any unit required 7 percent more power than the average of all the acceptable units, it shall be rejected until the cause has been found and corrected.

4.4 Quality conformance inspection. - Each sample unit selected as specified in 4.2.2, shall be examined for adjustment, fits, leaks, material, finish, and general conformance with this specification and as follows:

- (a) The compressor valve seal caps and all other seal caps in the refrigerant system shall be provided with a gasket, shall be tight for shipment and tight against freon leaks.
- (b) The external fittings shall be properly secured (see 3.6).
- (c) Bolts, nuts, and screws shall be tight; equipment and parts shall be properly fastened and secured.
- (d) No parts shall be fractured, split, torn, dented, or otherwise damaged such as to affect serviceability.
- (e) There shall be no sharp or ragged edges on the sheeting that may be injurious to personnel.
- (f) All cold lines shall be properly insulated (see 3.6.1).

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- (g) The limiting and mounting dimensions shall be in accordance with drawings (see 3.16).
- (h) The temperature control shall be properly set and functioning (see 3.8.1 and 4.3.6).
- (i) The selector switch shall operate satisfactorily.
- (j) The technical manuals shall be packed with the unit.
- (k) The insulation resistance to ground shall be satisfactory (see 3.7.4 and 4.3.4).
- (l) The refrigerant system shall be free of refrigerant leaks (see 4.3.6).
- (m) The power consumption for any unit shall not be excessive (see 4.3.6.2).
- (n) The water system shall be free of water leaks (see 4.3.3).
- (o) Dielectric strength test shall be satisfactory (see 3.7.5 and 4.3.5).
- (p) There shall not be any dripping, running, or blowing off of moisture (see 3.1.2).
- (q) The low pressure and high pressure switch shall be functioning and properly set in accordance with the manufacturer's specification (see 3.8.2 and 4.3.6.1).

4.5 First unit tests. - First unit tests shall be conducted in accordance with 4.5.2 to 4.5.4.2.1 inclusive, on the first unit of each size and design. The unit that has satisfactorily passed the tests may be used as one of the production units after correction of defects. The contractor may acquire all materials required for use on the contract prior to approval. Any final assembly work performed by the contractor on the units prior to approval shall be at the contractor's risk. At the conclusion of the first unit tests, copies of the test reports should be forwarded to the procuring activity for review and acceptance.

4.5.1 Where first unit tests have been previously conducted and approved by the Government on substantially identical units purchased to these specifications, the first unit tests will not be required upon evidence of approval and a statement certifying that units will be substantially identical and in conformance with these specification requirements.

4.5.2 Inclination test. - The unit shall be inclined at an angle of 15 degrees each side of the vertical in each of two vertical planes at right angles to each other and operated at least 1 hour in each plane with no abnormal variations in temperature.

4.5.3 Performance. - The air conditioning units shall meet the requirements of 3.13. One unit of each design shall be subjected to the tests of 4.5.3.1 and 4.5.3.2. Observations shall be taken at at least 20 minute intervals.

4.5.3.1 Capacity rating test. - The capacity rating test shall be performed in accordance with the requirements of the ASHRAE 37-01. The design capacity, cooling effect ratio and performance factor shall be at least that specified herein.

4.5.3.2 Performance test. - Each air conditioning unit to be tested shall be given the continuous-operating tests specified in 4.5.3.2.1 through 4.5.3.2.3 under the average temperature conditions as indicated with a tolerance of plus or minus 1°F. dry bulb, plus or minus 1/2°F. wet bulb and plus or minus 2°F. condenser water temperature.

4.5.3.2.1 Overload test. - The unit shall be operated with 100°F. dry bulb temperature, 85°F. wet bulb temperature unit-ambient-air and room air entering-air-inlet and 90°F. water to the condenser. The test shall be continued until steady conditions have been observed for at least 4 hours. At the conclusion of the 4-hour test, the current shall be switched off for 10 seconds and then reapplied to permit operation for an additional hour. The unit shall operate during the two phases of the test without interruption caused by tripping of motor-overload devices, without damage to motors due to overheating, and without injury to any other component part from any operational cause. When the current is reapplied after the 10-second shut-off period, the unit shall resume normal operation within 5 minutes. The temperature rise of the compressor motor winding shall be determined at the end of this test. The temperature rise shall not be greater than that specified in 3.7.1. The temperature rise of the windings shall be measured and computed by the resistance method. In addition the air conditioner shall be tested to determine actual capacity under overload conditions indicated in 3.13.3.

4.5.3.2.2 Condensation. - The unit shall be operated continuously for 4 hours with 75°F. condenser inlet water 80°F. dry bulb temperature and 75°F. wet bulb temperature unit-ambient-air and room air entering-air-inlet. The air conditioning unit shall perform satisfactorily during the test without dripping, running, or blowing-off of moisture.

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4.5.3.2.3 Air delivery. - The unit shall be provided with a means of restricting the outlet air to produce the minimum outlet resistance specified in 3.10.1. The air flow quantity shall be at least that specified.

4.5.4 Structural strength. - Before packaging, a unit shall be subjected to vibration and impact tests. Equipment required for the conduct of these tests can be that utilized by the National Safe Transit Committee. The vibration test shall be performed prior to the impact test. Failure to operate satisfactorily at conclusion of tests or evidence of breakage or disassembly shall be cause for rejection.

4.5.4.1 Vibration test. - The unit shall be placed on the table of a vibration tester; fences may be attached to the test table suitable for the unit being tested. The unit shall be vibrated so that it leaves the table momentarily at some interval during the vibration cycle. The proper vibration frequency shall be such that a 1.18 inch thick shim may be inserted between one bottom edge of the unit and the platform of the machine. The unit shall be vibrated for 2 hours.

4.5.4.2 Impact test. - An incline impact testing device similar to the Conbur machine or other equipment producing equivalent results and a shock recorder shall be used.

4.5.4.2.1 The unit shall be fastened to a base so that the air conditioner will make no physical contact with the barrier of the impact machine. The assembly shall be placed on the dolly with the face or edge of the base which is to receive the impact projecting approximately two inches beyond the forward end of the dolly. The shock recorder shall be positioned on the unit to record the maximum shock received during the impact test. The dolly shall be drawn up the incline to a position which will produce an impact reading on the shock recorder in the first quarter of the fifth zone. (The shock recorder referred to herein is a type which records the magnitude of shock on a moving tape which is graduated in zones - first through fifth zone. The fifth zone shock referred to herein is recorded when the shock is of such magnitude as to cause the recorder stylus to move through all zones and into the fifth zone. Other types of shock recording devices may be used, but the impact reading must be of a magnitude equivalent to an impact measured into the first quarter of the fifth zone of the recorders calibrated in this manner.) The test shall be repeated so that the unit receives two impacts in each of 3 planes (two vertical planes at right angles to each other and on its horizontal plane).

5. PREPARATION FOR DELIVERY.

5.1 Domestic shipment and early equipment installation and storage of onboard repair parts. -

5.1.1 Basic equipment. -

5.1.1.1 Preservation and packaging. - Preservation and packaging shall be sufficient to afford adequate protection against corrosion, leakage of refrigerant and oil, deterioration and physical damage during shipment from the supply source to the using activity and until early installation. Preservation and packaging may conform to the supplier's commercial practice when such meets the requirements specified herein.

5.1.1.2 Packing. - Packing shall be accomplished in a manner which will insure acceptance by common carrier and will afford protection against physical or mechanical damage during direct shipment from the supply source to the using activity for early installation. The shipping containers or method of packing shall conform to the Uniform Freight Classification Ratings, Rules and Regulations or other carrier regulations as applicable to the mode of transportation and may conform to the supplier's commercial practice when such meets the requirements specified herein.

5.1.1.3 Marking. - Shipment marking information shall be provided on interior packages and exterior shipping containers in accordance with the contractor's commercial practice. The information shall include nomenclature, Federal stock number or manufacturer's part number, size, contract or order number, contractor's name and destination.

5.1.2 Onboard repair parts. - Repair parts shall be preserved, packaged, packed as follows:

- (a) Mechanical repair parts. - Mechanical repair parts shall be preserved and packaged level A; packed level C and marked levels A and C respectively in accordance with MIL-R-196.
- (b) Electrical repair parts. - Electrical repair parts shall be preserved and packaged level A; packed level C and marked levels A and C respectively in accordance with MIL-E-17555.
- (c) Valves. - Valves and fittings, except refrigerant valves, shall be preserved and packaged level A; packed level C and marked levels A and C respectively in accordance with MIL-V-3.

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Refrigerant valves shall be unit-protected and packaged in accordance with Method IC of MIL-P-116 without use of contact preservative compounds.

- (d) Miscellaneous repair parts. - Miscellaneous repair parts such as strainer baskets, capillary tube assemblies, dehydrators, and so forth shall be unit-protected and packaged in accordance with Method III of MIL-P-116, without use of contact preservatives. Repair parts shall be packed level C and marked levels A and C respectively in accordance with MIL-R-198.

5.2 Domestic shipment and storage or overseas shipment. - The requirements and levels of preservation, packaging, packing and marking for shipment shall be specified by the procuring activity (see 6.1).

(5.2.1 The following provides various levels of protection during domestic shipment and storage or overseas shipment, which may be required when procurement is made.

5.2.1.1 Preservation and packaging. -

5.2.1.1.1 Level A. - Each complete unit (see 3.3) shall be unit protected and packaged in accordance with Method I of MIL-P-116 and as follows: All exterior unpainted ferrous metal surfaces shall be coated with preservative compound conforming to grade 4 of MIL-C-16173. The water cooling system shall be thoroughly drained and blown out by the application of clean, dry compressed air. All openings shall be sealed to prevent entrance of dirt and moisture. Drive belts shall be removed, exposed uncoated ferrous metal surface of pulleys and shafts cleaned and coated with primer conforming to TT-P-604 when the primer is thoroughly dry, drive belts shall be remounted in place with tension on the belts relaxed.

5.2.1.1.2 Level C. - Preservation and packing of each unit (see 3.3) shall be sufficient to afford adequate protection against corrosion, leakage of refrigerant and oil, deterioration and physical damage during shipment from the supply source to the using activity for early installation. This level may conform to the supplier's commercial practice when such meets the requirements of this level.

5.2.1.2 Packing. -

5.2.1.2.1 Level A. - Each complete unit, packaged as specified in the contract or order, shall be packed in a container conforming to any one of the following specifications at the option of the contractor:

<u>Specification</u>	<u>Classification</u>
PPP-B-601	Overseas type
PPP-B-621	Class 2
PPP-C-650	Type V, class 1 style B (covered)

Wood and wood-crested boxes shall be provided with a waterproof shroud. Wood or wood-crested boxes shall not exceed the weight limitations of the applicable box specification. Boxes shall be modified by the addition of wood skids in accordance with the applicable box specification. Blocking, bracing, anchoring and cushioning of container contents shall be in accordance with MIL-STD-1186. Shipping container closure and content waterproofing shall be in accordance with the applicable box or crate specification or appendix thereto. Waterproof materials shall conform to UU-P-271, MIL-B-13239 or L-P-378 (Minimum 4 mils).

5.2.1.2.2 Level B. - Each complete unit packaged as specified in the contract or order, shall be packed in a container conforming to any one of the following specifications at the option of the contractor:

<u>Specification</u>	<u>Classification</u>
PPP-B-601	Domestic type
PPP-B-621	Class 1
PPP-C-650	Type V, class 1, style B (covered)

Wood or wood-crested boxes shall be modified by the addition of skids in accordance with the applicable box specification. Wood or wood-crested boxes shall not exceed the weight limitations of the applicable box specification. Blocking, bracing, anchoring and cushioning of container contents shall be in accordance with MIL-STD-1186. Shipping container closure shall be in accordance with the applicable box or crate specification or appendix thereto.

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5.2.1.3 Marking. - In addition to any special marking specified (see 6.1) shipping containers shall be marked in accordance with MIL-STD-129.

5.3 Repair parts. - Repair parts shall be preserved and packaged level A or C as specified; packed level A, B or C and marked in accordance with MIL-R-196, MIL-E-17555 and MIL-V-3, as applicable.

5.4 Drawings. - Preparation for delivery shall be in accordance with MIL-D-963. Unless otherwise specified (see 6.1) packages and shipping containers shall be marked in accordance with MIL-STD-129, level C requirements.

5.5 Manuals. - Manuals shall be packaged, packed and marked for shipment in accordance with MIL-M-15071.)

6. NOTES

6.1 Ordering data. - Procurement documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Size required (see 1.2).
- (c) Maximum overall dimensions required when critical (see 3.4.2).
- (d) Power supply required (see 3.7 and 3.7.1).
- (e) Whether discharge plenum is not required (see 3.9.3).
- (f) The number of sets of repair parts to be furnished (see 3.15).
- (g) Preservation, packaging, and packing requirements if other than those required by 5.1 (see 5.2).
- (h) Marking requirements if other than as specified (see 5.2, 1.3 and 5.4).

6.2 That bidders shall submit with their bids a statement in duplicate showing:

- (a) Itemized and total weight of the shipment, including repair parts and tools.
- (b) Compressor capacity, bore of cylinders and stroke, revolutions per minute, and displacement.
- (c) Maximum air capacity and pressure.
- (d) Onboard repair parts shall be itemized and separately priced (see 3.15).

6.3 CHANGES FROM PREVIOUS ISSUE. THE EXTENT OF CHANGES (DELETIONS, ADDITIONS, ETC.) PRECLUDE THE ANNOTATION OF THE INDIVIDUAL CHANGES FROM THE PREVIOUS ISSUE OF THIS DOCUMENT.

Preparing activity:
Navy - SH
(Project 4120-N009Sh)

SPECIFICATION ANALYSIS SHEET

Form Approved
Budget Bureau No. 119-R004**INSTRUCTIONS**

This sheet is to be filled out by personnel either Government or contractor, involved in the use of the specification in procurement of products for ultimate use by the Department of Defense. This sheet is provided for obtaining information on the use of this specification which will insure that suitable products can be procured with a minimum amount of delay and at the least cost. Comments and the return of this form will be appreciated. Fold on lines on reverse side, staple in corner, and send to preparing activity (as indicated on reverse hereof). Fold on

SPECIFICATION

ORGANIZATION (of submitter)

CITY AND STATE

CONTRACT NO.

QUANTITY OF ITEMS PROCURED

DOLLAR AMOUNT

\$

MATERIAL PROCURED UNDER A

☐

DIRECT GOVERNMENT CONTRACT

☐

SUBCONTRACT

1. HAS ANY PART OF THE SPECIFICATION CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE?

A. GIVE PARAGRAPH NUMBER AND WORDING.

B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES.

2. COMMENTS ON ANY SPECIFICATION REQUIREMENT CONSIDERED TOO RIGID

3. IS THE SPECIFICATION RESTRICTIVE?

☐

YES

☐

NO IF "YES", IN WHAT WAY?

4. REMARKS (Attach any pertinent data which may be of use in improving this specification. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity)

SUBMITTED BY (Printed or typed name and activity)

DATE

DD FORM 1426
1 APR 68REPLACES NAVSHIPS FORM 4863, WHICH IS OBSOLETE
(NAVSHIPS OVPRT 12-66)

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