

INCH POUND

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## PERFORMANCE SPECIFICATION

### REFRIGERATION SYSTEM, ADVANCED DESIGN

This specification is approved for use by the Department of the Air Force, and is available for use by all Departments and Agencies of the Department of Defense.

#### 1. SCOPE

1.1 Scope. This specification covers the performance requirements for an Advanced Design Refrigeration (ADR) system consisting of an Insulated Container (IC) and an electrically driven Refrigeration Unit (RU).

#### 2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or those recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in sections 3 and 4 of this specification, whether or not they are listed.

#### 2.2 Government documents

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

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: HQ, AFSVA/SVOSR, 10100 Reunion Place, Suite 401, San Antonio, TX 78216-4138 by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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### STANDARDS

#### DEPARTMENT OF DEFENSE

MIL-STD-209 - Slinging and Tiedown Provisions for Lifting and Tying Down Military Equipment

MIL-STD-461 - Requirements for the Control of Electromagnetic Interference Emissions and Susceptibility

MIL-STD-462 - Measurement of Electromagnetic Interference Characteristics

MIL-STD-810 - Environmental Test Methods and Engineering Guidelines

MIL-STD-1474- Noise Limits for Army Materiel (Metric)

MIL-STD-1791- Designing for Internal Aerial Delivery In Fixed Wing Aircraft

(Unless otherwise indicated, copies of the above standards are available from the Standardization Documents Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094).

2.2.2 Other Government documents. The following other Government documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those listed in the solicitation (see 6.2).

#### DEPARTMENT OF DEFENSE

AFSC DH 1-11 - AFSC Design Handbook 1-11, Air Transportability

(Application for copies should be addressed to ASD/ENESS, Wright-Patterson AFB, OH 45433).

#### DEPARTMENT OF TRANSPORTATION (DOT)

Code of Federal Regulations

Title 49 CFR - Transportation, Parts 450-451

(Application for copies should be addressed to the Department of Transportation, Superintendent of Documents, Government Printing Office, Washington, DC 20440).

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2.3 Non-Government publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of 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).

### NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

Standard No. 70 - National Electrical Code

(Application for copies should be addressed to the National Fire Protection Association, One Battery March Park, Quincy, MA 02269-9101).

### NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

Standards Publication No. 250 - Enclosures for Electrical Equipment

(Application for copies should be addressed to the National Electrical Manufacturers Association, 1300 No. 17th Street, Suite 1847, Rosslyn, VA 22209).

### UNDERWRITERS LABORATORIES INC. (UL)

Standard 207 - Refrigerant Containing Components and Accessories, Nonelectrical  
Standard 486 - Wire Connectors and Solder Lugs

(Application for copies should be addressed to the Underwriters Laboratories, Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096).

2.4 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 in accordance with 4.1.1.

3.2 Operating requirements. The ADR system shall satisfy the following functional, operational and performance requirements.

3.2.1 4-hour operation. The RU shall operate properly with suction and discharge pressures safely controlled.

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3.2.2 Heat leakage. Heat infiltration or loss through the IC shall be minimized with an overall U factor not exceeding 15 Btu/hr/°F.

3.2.3 Refrigeration capacity. The RU shall have minimum net capacities of 3,000 Btu/hr at a thermostat setting of 0°F and 5,000 Btu/hr at a thermostat setting of 35°F.

3.2.4 Heating capacity. The gross heating capacity of the RU shall not be less than 700 watts at a thermostat setting not less than 45°F.

3.2.5 Moisture content and refrigerant leakage. The moisture content of the refrigeration system shall be kept to a minimum to maintain proper operation of the RU and refrigerant containing components shall be gastight.

3.2.6 Defrosting. The RU shall have a defrost cycle terminated by temperature and automatically initiated by a time control adjustable between 4 and 24 hours. The defrost system shall produce no less than 6 pounds of condensate within 30 minutes. The defrost system shall have provisions for manual defrost override.

3.2.7 Safety. The IC shall minimize flammability, and operational, toxic and personnel hazards.

3.2.8 Air circulation. The interior of the IC shall facilitate cold air circulation underneath and around items stored in the IC.

3.2.9 Drainage and watertightness. The IC shall be watertight and capable of being drained with the door open.

3.2.10 Pressure relief. The IC shall maintain internal pressure equal to outside pressure.

3.2.11 Door. The door shall open outward and shall be flush with the IC exterior when closed. The door opening shall be a minimum 78 inches in height and 36 inches in width. External hardware shall be protected from damage. Means shall be provided to hold the door in the full open position.

3.2.12 Door handle and latch. The door shall have an external handle which shall operate a heavy duty locking device which shall securely hold the door in the closed position during all modes of shipment and rough handling. The latch shall have provisions to accept a padlock. With the padlock in place, the door shall be incapable of being opened from the outside. The door shall have an internal release handle to allow the door to open from the inside to permit a person in the IC to exit when the IC is padlocked on the outside. The handle and latch shall be protected from damage during shipping.

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3.2.13 Interior light. The IC shall have a vapor proof lighting fixture mounted on the interior of the IC. The fixture shall have a protective cover which is shatterproof and removable without tools for bulb replacement. The fixture shall accept and be supplied with a 100 watt, 120-volt incandescent light bulb. The switch for the light shall be located inside and adjacent to the door and shall be vapor tight and protected from damage.

3.2.14 Pilot light. The IC shall be furnished with a pilot light enclosed in a vapor tight housing which illuminates red when the interior light switch is in the "on" position. The pilot light shall be located externally, adjacent to the door, and shall be protected from damage.

3.2.15 Temperature indicator. A temperature indicator shall be provided and mounted with the face on the exterior front of the IC adjacent to the walk-in door and protected from damage. The sensing element shall be located to give an approximate mean temperature of the IC interior. The temperature indicator shall be capable of providing readings for all temperature ranges encountered during operation of the IC unit as a refrigerator.

3.2.16 Control panel. The IC shall have a recessed control panel located in an accessible location on the outside of the IC. The control panel shall consist of a start and stop control, operation indicator, refrigerator temperature control, hour meter, high and low side pressure indicators, refrigerator interior temperature indicator, manual defrost control, defrost operation indicator, heating cycle operation indicator, refrigeration cycle operation indicator and power supply circuit breaker.

3.2.17 Refrigerant. The refrigerant shall be commercially available, non-ozone depleting, and environmentally safe. Class I ozone-depleting substances, as determined by the Environmental Protection Agency (EPA), shall not be contained in, and shall be prohibited from use during the fabrication of the ADR system (see 6.6).

3.2.18 Power. Unless otherwise specified (see 6.2), the RU unit shall operate on a 208/230 volt, 3 phase, 50/60-Hertz (Hz), 30 amp, 5-wire power supply. A manually resettable 3-pole circuit breaker shall be wired at the incoming power connection.

3.2.19 Power supply cable and cable connector. The RU shall be supplied with a 25-foot power cable permanently attached to the outside of the RU, which shall be storable within the envelope dimensions of the ADR system. The cable shall have a power supply connector as specified in the contract (see 6.2).

3.2.20 Temperature control. The selected temperature of the ADR system shall be controlled automatically. The temperature control shall allow incremental selection of normal refrigerator temperatures. When temperatures below 20°F are selected, the heating mode shall not operate.

3.2.21 Temperature recorder. When specified (see 6.2), a temperature recorder shall be provided that will record the mean interior temperature of the IC for a minimum of 7 days. The recorder shall operate with or without electrical power to the RU.

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3.3 **Support or ownership requirements.** The ADR system shall meet the following requirements.

3.3.1 **Weight and internal dimensions.** The empty weight of the ADR system, including shelving, shall not exceed 3200 pounds and the minimum interior volume shall be 330 cubic feet with the RU in place.

3.3.2 **Structural requirements.** The ADR system shall be structurally suitable for conveyance by road, rail, sea, and air as an internal load on fixed wing aircraft and as an external load on helicopters, including interchange among these forms of transportation. The ADR system shall be compatible with the 463L air cargo material system for handling cargo on the ground and in C-130, C-141, C-5A and C-17 aircraft. The base of the IC shall interface with the rail system used aboard the said aircraft for securing the ADR system during flight. The base shall be constructed as an integral part of the IC and each protruding edge of the base shall be capable of being removed for replacement when damaged.

3.3.3 **Cargo tie-downs.** The interior floor shall have tie-down provisions.

3.3.4 **Shelving.** The IC shall contain shelving with a minimum total storage area of 120 square feet. Each shelf shall be capable of supporting a load of 600 pounds and the shelving system shall be capable of holding six human cadavers in body bags without contacting one another. Shelving shall be removable to facilitate cleaning and shall be capable of being positioned on any one or all walls of the IC except the wall with the door. Shelving shall be capable of being secured in the IC to withstand all transport and dynamic requirements.

3.3.5 **Finish.** The ADR system, except where detrimental to proper operation, shall have a nontoxic chemical agent resistant finish (see 6.8.1). The word "CARC" together with the month and year of finishing, shall be stencilled near the identification plate in block letters not less than 1 inch high using lusterless chemical agent resistant paint (see 6.8.2). All paint shall be properly applied. The color of the finish paint and stencilling paint shall be as specified in the contract or order (see 6.2).

3.3.6 **Sanitary requirements.** The interior surface of the IC shall facilitate cleaning.

3.3.7 **Interchangeability.** Component parts of the ADR system which are replaceable shall be interchangeable with the same parts of other ADR systems furnished under the same contract.

3.3.8 **Service and maintenance.** All major components shall be accessible for adjustment, maintenance, servicing, and replacement without removing any other major component. All other components and assemblies shall be designed for ease of installation and replacement and shall be accessible for maintenance, service, and replacement with minimum disturbance to other components. No special tools shall be needed for any maintenance, repair, service, installation or replacement action. Condenser and evaporator fins shall be protected from any damage that might occur during service and maintenance actions. Operating personnel shall be able to visually check the moisture content of the refrigeration system and oil levels. All points requiring lubrication shall be equipped with standard fittings and shall be

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accessible from the outside of the unit. Each unit shall have the fittings or location tagged to indicate the temperature and grade of lubricant used and recommended frequency of lubrication. The RU shall be equipped with forklift pockets to facilitate removal from the IC.

3.3.9 Marking. Identification, instruction, control, and gage plates shall be of corrosion resistant material permanently attached to the outside of the ADR system. Numbering and lettering shall be permanently inscribed and shall be no less than 1/16 inch high. All plates shall blend with the enclosure finish and shall have a nonreflective finish.

3.3.9.1 Identification plate. The identification plate shall contain the following information:

1. U.S.
2. Model number and nomenclature
3. National Stock Number (NSN)
4. Serial number
5. Contract number
6. Manufacturer's name and address
7. Manufacturer's model number
8. Commercial and Government Entity (CAGE) number
9. Technical manual number, if applicable (see 6.2 and 6.5)
10. Weight
11. Refrigerant used

3.3.9.2 Instruction plates. The RU instruction plates shall consist of the procedures for start-up, operation, defrosting, shutdown and preventive maintenance. They shall also include the wiring diagram and refrigerant cycle diagram. The IC instruction plates shall outline instructions for tie-down and lifting for all modes of transport.

3.3.9.3 Control and gage nameplates. All controls and gages shall have adjacently placed identifying nameplates.

3.3.9.4 Electrical wiring. All electrical wiring shall be marked and coded for easy identification with the wiring diagram.

3.3.10 Design reliability. The RU shall be reliable and designed to operate without failure when subjected to the design reliability test.

3.4 Environmental requirements. The ADR system shall operate under the following environmental conditions.

3.4.1 Weatherproof. The ADR system and all internal and external electrical components shall not permit water intrusion.

3.4.2 Corrosion resistance. The IC interior and exterior and RU shall withstand exposure to a salt fog atmosphere.

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3.4.3 High temperature. The RU shall start and operate in ambient temperatures up to 125°F.

3.4.4 Storage. The ADR system shall start and operate after storage in temperatures of minus 65°F to plus 155°F.

3.4.5 Electromagnetic compatibility. When electromagnetic compatibility is required, (see 6.2), the RU shall not exceed radiated emission (RE) 102 limits for ground applications (Navy fixed and AF) over a range of 2 megahertz (MHz) to 400 MHz or conducted emission (CE) 102 limits. Short duration interference shall be exempt.

3.4.6 Sand and dust. The ADR system shall remain operable in sand and dust conditions.

3.4.7 Ice and freezing rain. The ADR system shall remain operable in ice and freezing rain conditions.

3.4.8 Shock and vibration. The RU shall operate properly after being subject to shock and vibration.

3.4.9 Noise level. The noise level at personnel "operator's" and "servicing" positions shall not damage personnel hearing.

3.4.10 Solar radiation (sunshine). Unless otherwise specified (see 6.2), the RU when connected to the IC, shall remain operable after exposure to solar radiation.

### 3.5 **Interface and interoperability requirements**.

3.5.1 Envelope dimensions. The envelope dimensions of the ADR system shall conform to the design requirements specified for C-130 aircraft, including safety aisle requirements.

## 4. VERIFICATION

4.1 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. First article inspection (see 4.1.1)
- b. Conformance inspection (see 4.1.2)

4.1.1 First article inspection. When a first article inspection is required (see 3.1 and 6.2) a sample shall be examined for all the verifications listed in table I.

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TABLE I. Verification methods

Title	Requirement	Verification	Title	Requirement	Verification
<b>Operating requirements</b>	3.2	4.3.2	<b>Support or ownership requirements</b>	3.3	4.3.3
4-hour operation	3.2.1	4.3.2.1	Weight & dimensions	3.3.1	4.3.3.1
Heat leakage	3.2.2	4.3.2.2	Structural requirements	3.3.2	4.3.3.2
Refrigeration capacity	3.2.3	4.3.2.3 and 4.3.2.4	Cargo tie-downs	3.3.3	4.3.3.3
Heating capacity	3.2.4	4.3.2.5	Shelving	3.3.4	4.3.3.4 and 4.3.3.2.8
Moisture content and refrigerant leakage	3.2.5	4.3.2.1	Finish	3.3.5	4.3.3.5
Defrosting	3.2.6	4.3.2.6	Sanitation	3.3.6	4.3.3.6
Safety	3.2.7	4.3.2.7	Interchangeability	3.3.7	4.3.3.7
Air circulation	3.2.8	4.3.2.8	Service and maintenance	3.3.8	4.3.3.8
Drainage and watertightness	3.2.9	4.3.2.9	Marking	3.3.9	4.3.3.9
Pressure relief	3.2.10	4.3.2.10	Design reliability	3.3.10	4.3.3.10
Door	3.2.11	4.3.2.11	<b>Environmental requirements</b>	3.4	4.3.4
Door handle and latch	3.2.12	4.3.2.12	Weatherproof	3.4.1	4.3.4.1
Interior light	3.2.13	4.3.2.13	Corrosion resistance	3.4.2	4.3.4.2
Pilot light	3.2.14	4.3.2.14	High temperature	3.4.3	4.3.4.3
Temperature indicator	3.2.15	4.3.2.15	Storage	3.4.4	4.3.4.4
Control panel	3.2.16	4.3.2.16	Electromagnetic compatibility	3.4.5	4.3.4.5
Refrigerant	3.2.17	4.3.2.17	Sand and dust	3.4.6	4.3.4.6
Power	3.2.18	4.3.2.18	Ice & freezing rain	3.4.7	4.3.4.7
Power supply cable and cable connector	3.2.19	4.3.2.19	Shock and vibration	3.4.8	4.3.4.8 and 4.3.4.9
Temperature control	3.2.20	4.3.2.20	Noise level	3.4.9	4.3.4.10
Temperature recorder	3.2.21	4.3.2.21	Solar radiation (sunshine)	3.4.10	4.3.4.11
			<b>Interface and interoperability</b>	3.5	4.3.5
			Envelope dimensions	3.5.1	4.3.5.1

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4.1.2 Conformance inspection. Conformance inspection of the ADR system shall consist of all the verifications listed in table I except the verification testing specified for the requirements of paragraphs 3.2.2 through 3.2.6, 3.2.9, 3.2.10, 3.3.2, 3.3.10 and 3.4.1 through 3.4.10 shall not be done and the cargo tie-down strength test portion of 3.3.3 and the shelving 600 pound and cadaver loading portions of 3.3.4 shall also be excluded. Conformance inspection shall be done on all production units.

4.2 Order of verifications. Verifications listed in table I can be performed in any order except verification tests listed in table II shall be conducted in the order shown. The weatherproof test shall be conducted first on the ADR system before the application of the finish or undercoating to the IC. All other verifications listed in the table I shall be done after finishing and undercoating is completed. A second weatherproof test shall be done after completion of all other testing as indicated in table II.

TABLE II. Verification test sequence

Sequence	Requirement Paragraph	Characteristic	Verification Paragraph
1	3.4.1	*Weatherproof	4.3.4.1
2	3.2.1	4-hour operation	4.3.2.1
3	3.2.10	Pressure	4.3.2.10
4	3.2.6	Defrosting	4.3.2.6
5	3.4.3	High temperature	4.3.4.3
6	3.4.8	Shock	4.3.4.8
7	3.4.8	Vibration	4.3.4.9
8	3.3.2	Structural strength	4.3.3.2
9	3.4.7	Ice and freezing rain	4.3.4.7
10	3.4.6	Sand and dust	4.3.4.6
11	3.4.5	Electromagnetic compatibility	4.3.4.5
12	3.4.4	Storage	4.3.4.4
13	3.4.9	Noise	4.3.4.10
14	3.4.2	Corrosion resistance	4.3.4.2
15	3.4.10	Solar radiation (sunshine)	4.3.4.11
16	3.2.2	Heat leakage	4.3.2.2
17	3.2.3	Refrigeration capacity	4.3.2.3 & 4.3.2.4
18	3.2.4	Heating capacity	4.3.2.5
19	3.3.10	Design reliability	4.3.3.10
20	3.4.1	Weatherproof	4.3.4.1

\*See paragraph 4.2

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4.3 Verification methods. Verification methods can include visual examination, measurement, testing, simulation, modeling, engineering evaluation, component properties analysis, certification, and similarity to previously-approved or previously-qualified designs.

4.3.1 Verification alternatives. The contractor may propose alternative test methods, techniques, or equipment, including application of statistical process control, tool control, or cost-effective sampling procedures to verify performance (see 6.4).

4.3.2 Operating requirements verification. All operating requirements shall be verified as follows.

4.3.2.1 4-hour operation test. The RU evaporator shall be installed in the IC or other insulated structure. All RU components shall be in place and all doors and panels shall be closed. The RU shall be operated for 4 hours to determine that all mechanical and electrical components are functioning as intended and all controls are in calibration. The RU shall have a heat load applied to the IC or insulated structure so that the RU operates more than 50 percent of the test time and cycles on automatic controls 3 or more times per hour. Suction pressure at the compressor shall be verified to be within the established guidelines of the compressor manufacturer. Prior to completion of the test, the air flow to the condenser shall be blocked off and the RU operated until automatic shutdown of the RU is verified when the compressor discharge pressure limit is exceeded. During normal operation, the discharge pressure shall be observed to be not less than that recommended by the compressor manufacturer for the refrigerant used.

After a minimum operating time of 1 hour with the thermostat set at 0°F, the moisture indicator shall be observed to verify that the moisture content as shown by the component manufacturer's color chart data is not greater than 25 parts per minute. A check for refrigerant leakage shall also be performed, with the unit inoperative, with a leak detector having a maximum sensitivity of 0.40 oz per year. Verify that leakage is no greater than 0.50 oz per year. Verify that the compressor shaft seal leakage is no greater than 3 oz per year if an open type compressor is used.

4.3.2.2 Heat leakage test. The RU shall be installed in the IC for this test. The ADR system shall have a minimum clearance of 5 feet between the surrounding room walls. The overall heat leakage shall be determined as follows:

a. An electric fan, of sufficient capacity to insure that no uncirculated air pocket will exist, shall be installed inside the IC. The electrical energy of the fan motor shall be measured by watt-hour meter with a scale of 0.1 kilowatt-hour or less and this heat equivalent shall be added to other sources of heat added to the IC.

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- b. Four thermocouples, shielded from the effects of radiant heat, shall be installed inside the IC and positioned within 6 inches of the ceiling and floor at two opposite corners. The interior temperature shall be taken as the average of the four thermocouples.
- c. Heating elements shall be installed approximately in the center of the IC. Electrical heat input shall be measured by a watt-hour meter with a scale increment of 0.1 kilowatt-hour or less.
- d. Eight thermometers or thermocouples, shielded from the effects of radiant heat, shall be installed approximately 18 inches from each corner of the IC in the room where it is placed. The ambient temperature shall be taken as an average of these eight thermocouple readings.
- e. All openings in the IC shall be sealed, and the IC shall remain undisturbed throughout the test.
- f. The ambient temperature shall then be maintained constant within  $\pm 2^\circ\text{F}$ . Sufficient, steady, non-varying heat shall be added to the interior of the IC to maintain a minimum of  $60^\circ\text{F}$  and a maximum of  $100^\circ\text{F}$  temperature difference between the interior and exterior of the IC.
- g. The test shall be considered concluded when eight consecutive half-hourly readings indicate that:
1. The ambient temperature has been maintained constant within  $\pm 2^\circ\text{F}$ .
  2. The temperature inside the IC has been maintained constant within  $\pm 1^\circ\text{F}$ .
- h. The overall heat leakage coefficient  $U$  of the IC is given by:

$$U = \frac{H_1}{(T_1 - T_2)}$$

$H_1$  = Sum of all electrical heat energies added to the IC (Btu/hr)

$T_1$  = Average interior temperature of the IC ( $100^\circ\text{F}$  to  $155^\circ\text{F}$ )

$T_2$  = Average ambient temperature ( $60^\circ\text{F}$  to  $100^\circ\text{F}$ )

- i. The heat leakage coefficient shall be 15 Btu/hr/ $^\circ\text{F}$  or less.

4.3.2.3 0 $^\circ\text{F}$  refrigeration capacity test. To calculate the RU capacity the heat leakage coefficient and setup from 4.3.1 shall be used. The capacity for the RU unit shall be verified to be no less than 3,000 Btu/hr using the method described below. Recorded data shall be required and shall include all specified temperature readings, electrical heat input, suction and discharge pressures, and complete calculations. All panels and doors of the ADR system shall be in the normally closed position.

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- a. All accessories and appurtenances shall be in their proper place.
- b. Thermocouples, shielded from radiant heat, shall be installed in the air streams entering the evaporator and leaving the evaporator section.
- c. Shielded thermocouples shall be located at the approximate center of four equal areas of the condenser face. The condenser inlet temperature will be taken as an average of these four temperatures.
- d. Recording pressure gages shall be used for the compressor suction and discharge pressures.
- e. The procedures described in 4.3.2.2 b, c, d, and e shall be followed for this test.
- f. The RU shall then be operated with air surrounding and entering the condenser section at  $110^{\circ}\text{F} \pm 2^{\circ}\text{F}$ , and sufficient steady, non-varying heat shall be added to the interior of the IC to maintain  $0^{\circ}\text{F}$  temperature of air entering the evaporator  $\pm 1^{\circ}\text{F}$ . A watt-hour meter with scale increments of 0.1 kilowatt-hour or less shall be used to indicate the quantity of electrical energy added. Air velocity shall not exceed 100 feet per minute (FPM) any point 3 feet from the ADR system.
- g. The test shall be considered concluded when eight consecutive half-hourly readings indicate that:
  1. The average surrounding ambient temperature  $T_3$ , has been maintained at a steady state of  $110^{\circ} \pm 2^{\circ}\text{F}$ .
  2. Return air temperature entering the evaporator,  $T_4$ , has been maintained at  $0^{\circ}\text{F} \pm 1\text{F}^{\circ}$ .
  3. The net refrigeration capacity shall be considered as the sum of the electrical energy in Btu/hr added during this test plus the heat leakage gain in Btu/hr as calculated from the calibration specified in 4.3.2.2.

The net refrigeration capacity is given by:

$$Q = U(T_3 - T_4) \cdot H_2$$

Q = Net refrigeration capacity (Btu/hr)

U = Overall heat leakage coefficient (Btu/hr/ $^{\circ}\text{F}$ )

$T_3$  = Average ambient temperature ( $^{\circ}\text{F}$ ) surrounding the RU

$T_4$  = Return air temperature ( $^{\circ}\text{F}$ ) entering the evaporator

$H_2$  = Sum of all heat energy added to the IC (Btu/hr) from f above

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4.3.2.4 35°F refrigeration capacity test. The procedure specified in 4.3.2.3 shall be followed with the following exceptions, to verify the high temperature net capacity of the RU is no less than 5000 Btu/hr with the compressor discharge within safe operating temperature.

a. In paragraph 4.3.2.3 f, sufficient heat shall be added to maintain  $35^{\circ}\text{F} \pm 1^{\circ}\text{F}$  temperature of air entering the evaporator in place of the  $0^{\circ}\text{F}$  temperature specified.

b. In paragraph 4.3.2.3 g, temperature of the air entering the evaporator shall be maintained at  $35^{\circ}\text{F} \pm 1^{\circ}\text{F}$  in place of the  $0^{\circ}\text{F}$  temperature specified.

4.3.2.5 Heating capacity test.. With the RU mounted in the IC the following procedures shall be conducted:

a. The interior temperature of the IC shall be  $30^{\circ}\text{F} \pm 5^{\circ}\text{F}$ .

b. With fans running, the ambient temperature or temperature immediately surrounding the condensing section shall be minus  $20^{\circ}\text{F}$ .

c. A wattmeter shall be attached to read the wattage of the heater.

d. The thermostat shall be set at a minimum of  $45^{\circ}\text{F}$ .

e. The RU shall be turned on and a watt reading taken when the IC reaches  $40^{\circ}\text{F}$ .

The wattmeter shall read not less than 700 watts.

4.3.2.6 Defrost test. With the RU operated in a maximum ambient temperature of  $20^{\circ}\text{F}$  and the IC maintained at  $0^{\circ}\text{F} \pm 10^{\circ}\text{F}$ , the evaporator shall be frosted by spraying water on the coil surface. After the coil is frosted, the RU shall be set on the defrost cycle and the condensate collected and weighed. Verify that the unit operates through a complete defrost cycle, that no less than 6 pounds of condensate is produced in 30 minutes, that no overloading of the compressor motor occurs, that there is no damage to the compressor due to lack of lubrication or refrigerant slugging and that no condensate enters the food storage area when the refrigerant cycle begins again. Verify that there is no ice on the coil at the end of the defrost cycle and that there are provisions for manual defrost override.

4.3.2.7 Safety certification and inspection. Safety requirements shall be verified as follows.

4.3.2.7.1 Container certification. A Convention for Safe Containers (CSC) plate shall be applied for and obtained from a designated approval authority and attached and displayed as required by the convention in accordance with CFR 49, parts 450 and 451.

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4.3.2.7.2 Wiring certification. Wiring practices used in the ADR system shall be certified as conforming to NFPA Standard No. 70 by submission of the manufacturer's certification, a certified test report or appropriate labels or listing marks.

4.3.2.7.3 Electrical components and enclosure certification. Electrical components shall be certified as conforming to the requirements of UL Standard 486 and electrical enclosures (junction boxes, control boxes, etc.) shall be certified as conforming to the watertightness requirements of NEMA Standards Publication No. 250 by submission of the manufacturer's certification, a certified test report or appropriate labels or listing marks.

4.3.2.7.4 Refrigerant containing components certification. Refrigerant containing components used in the RU shall be certified as conforming to UL Standard 207 by submission of the manufacturer's certification, a certified test report or appropriate labels or listing marks.

4.3.2.7.5 Personnel safety inspection. Visually verify that a plate indicating "Danger, Rotating Fan" has been permanently attached to both sides of the condenser section when applicable.

4.3.2.8 Air circulation inspection. Visually inspect IC interior walls and floor for corrugation or other means to facilitate airflow around cartons of food and cargo stored in the IC.

4.3.2.9 Drainage and watertightness test. Verify watertightness with the door shut by completely covering the floor with water to a depth of not less than 3 inches. Duration of the test shall not be less than 8 hours. Upon completion of test, there shall be no evidence of water leakage. Verify complete drainage can be accomplished to the outside through the IC door when open, with the IC located on a level surface.

4.3.2.10 Pressure relief test. Perform test of MIL-STD-810, Method 500.0, procedure I using minimum compartment pressure of C-130 aircraft equivalent to an altitude of 15,000 ft. Verify interior pressures in the IC equalize with exterior pressures. Verify pressure relief valve operates after internal pressure differentials of 8.3 psi in 0.5 seconds or less without damage. After pressure test, verify the ADR system remains operable.

4.3.2.11 Door inspection. Visually inspect door area to verify that the door is flush with the IC exterior in the closed position. Verify hardware does not extend beyond the IC maximum dimensions. Verify the door opens outward and has a means to hold the door in an open position. Measure door opening to verify a minimum 78 inches of height and 36 inches in width.

4.3.2.12 Door handle and latch inspection. Visually inspect for the presence of a door handle and latch which accepts a padlock. Verify that the door cannot be opened externally with the latch closed and the lock in place. Verify that the door can be opened internally when both locked and unlocked on the outside. Verify strength of door locking device by verifying that the door does not open by

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itself during any rough handling or dynamic testing specified herein. Verify handle and latch do not extend beyond the IC maximum dimensions.

4.3.2.13 Interior light inspection. Verify the presence of an interior light fixture with a vapor proof protector which can be removed without tools. Verify the switch is in an accessible internal location near the door and that the switch operates the 100 watt, 120-volt incandescent light bulb when the IC is connected to a 120-volt power source. Verify the switch is protected from damage.

4.3.2.14 Pilot light inspection. Verify the presence of a pilot light enclosed in a vapor tight housing. Verify that the light illuminates red when the interior light switch is in the "on " position with 120-volt power connected to the IC. Verify the pilot light is protected from damage, and located externally, adjacent to the door.

4.3.2.15 Temperature indicator inspection. Verify the presence of a temperature indicator located in an accessible location near the IC door. Visually inspect to verify temperature indicator has a range of minus 25°F to plus 125°F and, operates properly.

4.3.2.16 Control panel inspection. Inspect the control panel for ready accessibility on the front of the IC and that it does not protrude outside the frame work of the IC. Verify ICs have all necessary gages and controls and that they work properly during the 4-hour operation test.

4.3.2.17 Refrigerant inspection. Visually check publication SD-14 (see 6.6) to verify that the refrigerant used in the ADR system is not prohibited.

4.3.2.18 Power inspection. Verify that the RU performs all operations specified herein on a 208/230 volt, 3-phase, 50/60 Hz, 30 amp, 5-wire power supply. Verify the presence of a manually resettable 3-pole circuit breaker wired at the power supply.

4.3.2.19 Power supply cable and cable connector. Visually inspect the RU for a 25-foot power supply cable permanently attached to the outside of the RU which mates with a 208/230 volt, 3-phase, 50/60 Hz, 5-wire power supply and is storable within the envelope dimensions of the ADR system. Verify that a power supply cable connector has been furnished and is of the type specified.

4.3.2.20 Temperature control inspection. Visually inspect the manual temperature control for selection of temperatures between minus 10°F and plus 50°F in no less than 1°F increments and no greater than 2°F increments. Verify lockout of heating cycle by operating the RU in the IC with the thermostat set for 18°F in an ambient temperature of 50°F or above. When the temperature inside the IC reaches 18°F, lower the ambient temperature of the test chamber and let the interior temperature of the IC drop below 18°F and verify the heating cycle does not operate.

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4.3.2.21 Temperature recorder inspection. When required, verify that the IC has a temperature recorder capable of recording for a minimum of 7 days, and that it operates with or without electrical power to the RU.

4.3.3 Support or ownership requirements verification. All ownership and support requirements shall be verified as follows.

4.3.3.1 Weight and dimensional inspection. Verify, by weighing, that the empty ADR system, including shelving, weighs no more than 3200 pounds. Verify, by measurement, that the interior volume is a minimum of 330 cubic feet.

4.3.3.2 Structural tests. The Structural requirements shall be verified as follows. All structural testing shall be conducted with the ADR system having a uniformly distributed load and a Gross Weight (GW) of 10,000 pounds.

4.3.3.2.1 Helicopter external air transport certification. Certification that the ADR system meets requirements for movement by helicopter as an external load shall be obtained from the U. S. Army Natick Research, Development and Engineering Center, Attn: SSCNC-UAS, Natick, MA 01760-5017.

4.3.3.2.2 Internal air delivery in fixed wing aircraft certification. Certification that the ADR system meets requirements for movement by fixed wing aircraft as an internal load shall be obtained from Hq, ASC/ENFC, Building 560, 2530 Loop Road West, Wright-Patterson Air Force Base, Ohio 45433-7101.

4.3.3.2.3 Rail delivery certification. Certification that the ADR system meets requirements for movement by rail shall be obtained from the Director, Military Traffic Management Command (MTMTTEA), Attn: MTTE-DPE, 720 Thimble Shoals Road, Suite 130, Newport News, VA 23606-0276.

4.3.3.2.4 Tie-down test. The ADR system shall undergo a tie-down test in accordance with MIL-STD-209, Class 2 tie-down provisions. Forces shall be applied in all directions in accordance with MIL-STD-1791. Upon completion of test, verify that the ADR system has no damage which will render it unsuitable for use.

4.3.3.2.5 463L air cargo transport test. The ADR system shall transverse a roller conveyor having 2-inch diameter by 3.5 inch long rollers spaced on 10-inch centers, with rows of conveyors located along each side and in the center. The ADR system shall be tested for transversing parallel to both its length and width for a minimum of 10,000 feet. The ADR system shall be tested for omnidirectional transversing a grid of 1-1/4 inch diameter steel, spring loaded type ball casters, spaced 5 inches on center. The ADR system shall transverse in the longitudinal direction for a

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minimum of 1,500 feet and the transverse direction for a minimum of 1500 feet in minimum increments of 10 feet. The ADR system shall be tested for cresting on the roller system where the entire load of the ADR system is resting on one set of lateral rollers. Upon completion of test, verify that the IC has no damage which will render it unsuitable for use and that protruding edges of the base are removable. In addition, verify that the ADR system is in compliance with the internal air delivery requirements of AFSC DH 1-11.

4.3.3.2.6 Forklift pockets test. The ADR system shall be lifted, transported and placed in position by a forklift truck without securing the unit in any way to the truck. During the transport, the truck shall be driven a minimum of 100 feet over a paved surface and over a 4-inch by 4-inch board so either the two left or two right tires go over the board. This cycle shall be repeated so that all four sides undergo the lifting, transporting and positioning. Upon completion of this testing, verify the ADR system has no damage which will render it unsuitable for use. Verify dimensions of the forklift tunnels to be 3.5 inches by 12 inches spaced 42 inches on center and located symmetrically about the center line on each side. Verify continuous cross-section of tunnels and that tunnel openings are reinforced.

4.3.3.2.7 Rail impact test. The ADR system shall undergo the rail impact test of MIL-STD-810, Method 516.4, procedure VIII. Upon completion of test, verify that the ADR system has no damage which will render it unsuitable for use.

4.3.3.2.8 Munson road test. The ADR system shall undergo the road test of MIL-STD-810, Method 514.4 procedure II, category 2 with all shelving in place and each shelf loaded with a uniformly distributed weight of 300 pounds. Upon completion of the test, verify that the ADR system and shelving have no damage which would render them unsuitable for use and that the shelving remained in place.

4.3.3.3 Cargo tie-down inspection. Verify the presence of cargo tie-down rings conforming to Class 4 of MIL-STD-209 except that they shall be located 8 inches from the diagonal on all four corners. Test strength in accordance with method and load requirements of MIL-STD-209.

4.3.3.4 Shelving examination. Visually inspect the shelving system to verify that shelves can be located on any one or all three walls, except the wall with the door, and that they are removable. Measure the shelving system to verify that there is a minimum of 120 square feet of storage area. Load each shelf with a uniformly distributed load of 600 pounds for not less than 5 minutes and visually verify that there is no permanent deformation after the load is removed. Simulate loading the shelves with 6 human cadavers in body bags and visually verify that there is no contact among the cadavers.

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4.3.3.5 Finish certification and examination. The contractor shall certify that the ADR system's finish is nontoxic and chemical agent resistant meeting Government requirements. Painted surfaces shall be visually examined to verify that there are no streaks, crops, pinholes, checks, cracks or missed areas.

4.3.3.6 Sanitary requirements inspection. Visually inspect the interior of the IC to verify that there are no open seams, pits, narrow crevices or any areas which cannot be cleaned by conventional cleaning methods. Verify that there are no materials inside the IC that would be adversely affected by such cleaning methods as steam cleaning or detergents normally used.

4.3.3.7 Interchangeability certification. The contractor shall certify that all component parts of the ADR system which are replaceable shall be interchangeable with the same parts of other units furnished under the same contract.

4.3.3.8 Service and maintenance simulation. A simulated demonstration shall be accomplished verifying that all major RU components are accessible for adjustment, maintenance, servicing and replacement without the removal of any other major component or need for special tools. The simulation shall also illustrate that the condenser and evaporator fins have guards or other protection, and that all other components and assemblies are accessible for maintenance, repair, service, or replacement and require no special tools for those actions. Verification shall be made that the moisture content of the RU and the compressor crankcase oil can be visually determined. Inspect lubrication fittings for tags identifying date of last service, temperature and grade of lubricant and recommended frequency of lubrication. Verify adequacy of RU forklift pockets and handles for removal of RU from IC.

4.3.3.8.1 Alternative service and maintenance analysis. When a technical manual is furnished as part of the contract, it can be analyzed for proper service and maintenance procedures in lieu of the simulation specified in 4.3.3.8.

4.3.3.9 Marking inspection. Visually identify that all identification, instruction, control and gage plates are corrosion resistant and are permanently attached to the outside of the ADR system, lettering is permanently inscribed, legible, and not less than 1/16 inch high, and plates have a nonreflective surface.

4.3.3.9.1 Identification plate inspection. Visually identify that all information is complete and accurate.

4.3.3.9.2 Instruction plate inspection. Visually identify that all information is complete and accurate. Verify that lifting and tie-down instructions are in accordance with MIL-STD-209.

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4.3.3.9.3 Control and gage nameplates inspection. Visually verify that all controls and gages have nameplates located adjacent to the control or gage they identify.

4.3.3.9.4 Electrical wiring inspection. Visually verify that all wiring is marked to allow for identification on the wiring diagram.

4.3.3.10 Design reliability test. The 2500-hour RU design reliability test shall be conducted as follows:

a. A maximum of two RUs shall be used for this test. When two RUs are used, each RU shall be tested for a minimum of 1000 operating hours and the combined time between the two units shall equal 2500 operating hours. Operating hours for the RU shall be the hours the compressor is operating.

b. The RU shall be connected to the IC.

c. A heat load shall be imposed on the unit so the compressor will cycle with a running time of approximately 75 percent when the condenser air entering temperature is 110°F.

d. The air entering the condenser and surrounding the condenser section shall be maintained at a minimum of 110°F for 90 percent of the operating hours and 125°F for 10 percent of the operating hours.

e. The defrost control shall be set for two defrost cycles per 24 hours of operating time.

f. The RU shall be operated with the thermostat set at 0°F for 36 hours, then 40°F for 36 hours. This cycle shall be repeated until all operating hours have been completed.

During the test, suction and discharge pressures, air temperature entering the condenser, IC temperature, and compressor operating hours shall be recorded every hour with automated data recording instruments.

g. Failure of the RU to maintain the temperature of the IC, failure to start and operate, failure to defrost, or any mechanical or control failure that requires more than 30 minutes to repair, shall be defined as an RU failure. A malfunction that can be repaired in less than 30 minutes shall be classified as an incident.

h. When a failure occurs, the failure shall be analyzed, correction made, and the test started from time zero. All failures, analyses, and corrective actions shall be recorded.

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i. The test shall be successfully completed when the RU(s) have reached 2500 hours without failure and with no more than 5 incidents total.

**4.3.4 Environmental requirements verification.** All environmental requirements shall be verified as follows.

4.3.4.1 Weatherproof test. The RU shall be mounted to the IC and fresh water shall be sprayed at no less than 3 inches per hour at an average downward angle of 45 degrees to simulate rainfall on exposed surfaces of the ADR system. All sides and the top of the ADR system shall be individually sprayed for 30 minutes while not operating with the spray applied perpendicular to the surfaces. The RU shall then be started and operated for 30 minutes while the spray continues. A visual verification shall be done to ensure that no water intrusion occurred in the evaporator section, electrical control or junction boxes, or the food storage area of the IC.

4.3.4.2 Corrosion resistance test. The ADR system shall be tested for resistance to the effects of a salt fog atmosphere having a salt concentration of 5 percent  $\pm$ 1 percent. The ADR system shall be tested in accordance with MIL-STD-810, Method 509.3, with the IC subjected to 24 hours of salt fog exposure followed by 24 hours of drying time in an ambient temperature of  $70^{\circ}\text{F} \pm 5^{\circ}\text{F}$ , followed by 3 more cycles of 24-hour exposure and 24-hour drying time. The IC shall be tested with the door in the open position. Upon completion of testing, visually inspect to verify that there are no signs of corrosion. The RU shall then be operated for 1 hour to verify proper operation.

4.3.4.3 High temperature test. The RU shall be heat soaked for a minimum of 6 hours at  $125^{\circ}\text{F}$  minimum temperature. With air entering and surrounding the condenser and condenser section at  $125^{\circ}\text{F}$  minimum, the RU shall be started and operated for a minimum of 1 hour with the control set at  $40^{\circ}\text{F}$ , then shut off. After 2 minutes, restart the RU and operate for 1 hour. This procedure shall be followed for a total of 4 hours with the RU continuing to start and operate.

4.3.4.4 Storage test. The ADR system shall be subjected to a temperature of  $155^{\circ}\text{F}$  for 4 hours, then the room temperature shall be brought to  $70^{\circ}\text{F} \pm 5^{\circ}\text{F}$  and the RU operated for 1 hour. The RU shall then be subjected to a temperature of minus  $65^{\circ}\text{F}$  for 4 hours, then the room temperature increased to  $70^{\circ}\text{F} \pm 5^{\circ}\text{F}$  and the unit operated for 1 hour. Verify that there has been no permanent set or loss of resiliency of packing or gaskets, congealing of lubricants, discoloration, cracking, bulging, checking or crazing.

4.3.4.5 Electromagnetic compatibility test. The RU shall be tested in accordance with MIL-STD-462. The RU shall meet the RE102 and CE102 limits of MIL-STD-461.

4.3.4.6 Sand and dust test. The ADR system shall be subjected to blowing sand testing in accordance with MIL-STD-810, Method 510.3, procedure II. Subject all four sides for 30 minutes each. The velocity of the sand stream shall be 3540 to 5700 ft/min, and the concentration shall be

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2.2 ± 0.5 g/m<sup>3</sup>. Upon completion of the test, the ADR system shall be operable for 1 hour. The ADR system shall then be tested for blowing dust in accordance with Method 510.3, procedure I for 6 hours at 70°F and 6 hours at 120°F. The velocity shall be 300 to 1750 ft/min imposed on the RU side of the ADR system. The ADR system shall be operable for 1 hour after the test at 70°F and again for 1 hour after completion of the 120°F test.

4.3.4.7 Ice and freezing rain test. The ADR system shall be tested in accordance with MIL-STD-810, Method 521.1, procedure I. The ADR system shall remain operable during and after testing.

4.3.4.8 Shock test. While operating, the RU shall be raised 1 inch above the floor and dropped onto a concrete surface 50 times. Continue operation of the unit for 2 hours, including 1 defrost cycle. Verify that there is no refrigerant leakage, distortion or malfunction of any component.

4.3.4.9 Vibration test. The RU shall undergo the vibration test of MIL-STD-810 Method, 514.4, procedure I, category 1 for a minimum of 4 hours. Upon completion of test, verify that the RU has no damage which will render it unsuitable for use.

4.3.4.10 Noise test. The RU shall be tested for noise levels as specified in MIL-STD-1474. The noise category shall be "D". The "operator's" position shall be 10 feet in front of the unit and 5 feet above ground level. The "servicing" position shall be 2 feet in front of the control panel and 4 feet above ground level. The noise level shall be less than 85 decibels.

4.3.4.11 Solar radiation (sunshine) test. The ADR system shall be loaded with a uniformly distributed load and have a GW of 10,000 pounds. It shall undergo the solar radiation (sunshine) test of MIL-STD-810, Method 505.3, Procedure I for hot-dry conditions for a minimum of 5 cycles. Upon completion of test, verify that the ADR system has no damage which will render it unsuitable for use.

#### 4.3.5 **Interface and interoperability requirements verification.**

4.3.5.1 Envelope dimension inspection. Verify that the envelope dimensions of the ADR system, including safety aisle dimensions, conform to the design requirements specified for C-130 aircraft in AFSC DH 1-11.

### 5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or purchase order (see 6.2). When actual packaging of materiel is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Department of Defense Agency, or within the Military Department's System Command. Packaging data retrieval is available from the managing Military

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Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

## 6. NOTES

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

6.1 Intended use. The ADR system is intended for use in the transportation and storage of food, medical supplies, human cadavers, and other temperature sensitive items requiring controlled temperature.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number and date of this specification.
- b. Issue of DoDISS to be cited in the solicitation, and, if required, the specific issue of individual documents referenced (see 2.2.1, 2.2.2, and 2.3)
- c. When a first article is required (see 3.1, 4.1.1 and 6.3)
- d. When power requirements are other than specified (see 3.2.18)
- e. The type of power supply cable connector required (see 3.2.19)
- f. When a temperature recorder is required (see 3.2.21)
- g. Colors required for finish paint and stencilling paint (see 3.3.5)
- h. Technical manual number when required (see 3.3.9.1)
- i. When electromagnetic compatibility is required (see 3.4.5)
- j. When solar radiation (sunshine) testing is not required (see 3.4.10)
- k. Packaging requirements (see 5.1)

6.3 First article. When requiring first article inspection, contracting documents should provide specific guidance to offerors. This guidance should cover whether the first article is a first article sample, a first production item, or the number of test items. These documents should also include specific instructions regarding arrangements for examinations, approval of first article test results, and disposition of first articles. Pre-solicitation documents should provide Government waiver rights for samples for first article inspection to bidders offering a previously-acquired or tested product. Bidders offering such products who wish to rely on such production testing must furnish evidence with the bid that prior Government approval is appropriate for the pending contract.

6.4 Verification alternatives. Contracting documents should provide guidance to offerors regarding the submission and approval of alternatives to specified verification methods (see 4.3.1).

6.5 Technical manuals. The requirement for technical manuals should be considered when this specification is applied on a contract. If technical manuals are required, specifications and standards that have been cleared and listed in DoD 5010.12-L, Acquisition Management Systems and Data

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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 a separate contract line item in the contract.

6.6 Ozone-depleting substances. A listing of ozone depleting substances prohibited from use can be found in publication SD-14, Listing of Toxic Chemicals, Hazardous Substances, and Ozone-Depleting Chemicals. It is available from the Standardization Documents Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.

6.7 Recycled, recovered or environmentally preferable materials. Recycled, recovered or environmentally preferable materials should be used to the maximum extent possible, provided that the material meets or exceeds the operational and maintenance requirements and promotes economically advantageous life cycle costs.

6.8 Finish.

6.8.1 Paint, finish. Treatment and painting in accordance with MIL-C-53072 or type F or G of MIL-T-704 have been used to satisfy this requirement (see 3.3.5).

6.8.2 Paint, stencilling. Paints in accordance with MIL-C-53039 or types III or IV of MIL-C-46168 have been used to satisfy this requirement (see 3.3.5).

6.9 Subject term (key word) listing.

Container, insulated  
 Food, preservation, field  
 Refrigerator, field  
 Storage, food  
 Storage, human cadavers  
 Storage, medical supplies

## Custodians:

Army - GL  
 Air Force - 99

## Preparing activity:

Air Force - 35

## Review activity:

Air Force 82

(Project 4110-0526)

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**STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL****INSTRUCTIONS**

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document 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 the 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-PRF-32017

2. DOCUMENT DATE (YYMMDD)  
97-12-01

3. DOCUMENT TITLE Refrigeration System, Advanced Design

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)

b. TELEPHONE (Include Area Code)  
(1) Commercial  
(2) AUTOVON  
(If applicable)

7. DATE SUBMITTED  
(YYMMDD)

a. NAME

U.S. Army Natick RD&E Center

b. TELEPHONE (Include Area Code)  
(1) Commercial  
508-233-5175

(2) AUTOVON  
256-5175

c. ADDRESS (Include Zip Code)

Commander, U.S. Army Natick RD&E Center  
Attn: SSCNC-WEF  
Natick, MA 01760-5018

IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT:  
Defense Quality and Standardization Office  
5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466  
Telephone (703) 756-2340 AUTOVON 289-2340