

## STATEMENT OF WORK

### INTRODUCTION

To be considered, any model offered must have between 65,000 and 99,999 or 100,000 and 135,000 Btu/h of capacity and meet all of the minimum specification requirements listed below. From among those that meet these requirements, several winners will be selected based on their anticipated life-cycle cost. Life-cycle cost will be the sum of the initial price offered and the present value of the operating costs over 15 years, discounted at 10% per year, as follows:

$$LCC = P + 7.61 \times E$$

Where LCC is life-cycle cost, P is the unit price offered in response to this solicitation, and E is annual electricity cost. E is derived from a Simulated Energy Calculation Form, by multiplying the Total Annual Energy Use in kWh by \$0.06.

For purposes of evaluation and comparison among proposals, LCC will be scaled by the total capacity of the unit, yielding a normalized life-cycle cost in dollars per thousand Btu per hour. Products will be selected separately for the representative city climate characteristics corresponding to the Simulated Energy Calculation Forms mentioned above.

As indicated in the Specifications, the offered model's cooling efficiency must at a minimum meet or exceed Consortium for Energy Efficiency (CEE) Tier II levels: Energy Efficiency Ratio (EER) = 11.0; Integrated Part Load Value (IPLV) = 11.4. These levels represent minimum requirements, and Battelle is seeking efficiencies that substantially exceed them.

The models offered must also be compatible with direct digital control and remote diagnostic systems. Requirements listed in the Statement of Work, Specifications (below) include capability to interface with major manufacturer control systems, and availability of specific equipment sensing parameters at a "signal access interface."

### SPECIFICATIONS

The successful Offeror shall provide a detailed description of the air conditioner model offered for sale in response to this RFP. The following are the minimum specifications that must be met by any air conditioner delivered under the BOA. Offers that do not meet the minimum technical specifications will be deemed unresponsive and will be automatically rejected. In addition to meeting the minimum specifications, the successful Offeror(s) shall be responsible for having complied with all applicable federal and state standards, regulations and laws governing these types of air conditioners. This includes compliance with all applicable safety and environmental standards.

**General:**

Unit(s) shall be a single package air-to-air DX mechanical cooling system with capacity of between 65,000 to 135,000 Btu/h [19 kW to 39.5 kW].

Unit(s) shall be capable of discharging downward or horizontally.

Unit shall be capable of starting and running at 125°F [51.6°C] ambient outdoor conditions.

The single package unit shall be a product of a firm regularly engaged in the manufacture of heating/cooling equipment.

The manufacturer shall have parts and service available throughout the U.S. and Canada.

Unit(s) shall be shipped completely factory assembled, pre-charged, piped and wired internally ready for field connections.

Unit(s) shall be 100% run tested by the manufacturer with a copy of the run test report shipped with the unit.

**Performance:**

Unit(s) cooling capacities shall be in accordance with and tested to ARI Standard 210/240-94 or 340/360-93.

Unit(s) cooling efficiency shall meet or exceed Consortium for Energy Efficiency (CEE) Tier II levels:

Energy Efficiency Ratio (EER) 11.0

Integrated Part Load Value (IPLV) 11.4

**Sound Ratings:**

Unit(s) shall be sound rated in accordance with ARI Standard 270-95.

Unit(s) shall have a sound rating of 9.2 BELS or lower.

**Approvals:**

All electrical components shall have UL/C-UL, ETL and CGA listing.

All wiring shall be in compliance with NEC and CEC.

Unit(s) shall be UL listed and labeled, classified in accordance with UL 1995/CAN/CSA No. 236-M90 for Central Cooling Air Conditioners.

Unit(s) shall be designed to conform to ANSI/ASHRAE 15 and 62 (latest edition).

Unit(s) shall be safety certified by UL/C-UL, ETL, or CSA to UL 1995 and ANSI Z21.47 standards.

Unit(s) nameplate shall carry the label of the certification agency.

Unit(s) shall conform to ISO 9002 manufacturing quality control.

**Casing/Cabinet:**

Enclosure sheet metal shall be a minimum of 18 gauge [1.2 mm] steel with anti-corrosion coating.

Unit shall be capable of withstanding ASTM B117 500-hour Salt Spray Test.

Cabinet shall be thermally and acoustically insulated.

Cabinet panels where conditioned air is handled shall be fully gasketed to prevent air leakage and prevent moisture from entering the cabinet under all operating and non-operating conditions.

Cabinet panels where conditioned air is handled shall be fully insulated to prevent condensation and minimize sound transmission.

Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke development.

Unit shall have a factory installed internal condensate drain connection and sloped condensate pan capable of preventing standing water.

Unit(s) shall be provided with lifting holes for rigging.

Unit(s) shall have decals to indicate unit lifting-rigging, service areas, and caution areas.

Unit(s) shall have Installation and Maintenance manuals supplied with each unit in the control access section.

Unit(s) shall be provided with a Wiring Diagram laminated in plastic and permanently fixed to the control compartment door.

#### **Service Access:**

Access to compressor(s), controls, filters, heating section, and other items needing periodic checking or maintenance shall be through hinged access doors with “tool-less” latches.

Blower assembly shall slide out of the unit for ease in servicing.

#### **Air Filters:**

Units shall be factory equipped to accommodate a minimum of two (2) inch media type filters.

Filters shall be of commercially available sizes.

#### **Compressors:**

Intent is to not restrict technology employed, therefore type of compressor is not specified.

Compressor(s) shall be protected against high pressure discharge, loss of charge and low voltage.

Compressor(s) shall be provided with overload and phase protection.

Compressor(s) shall be equipped with vibration isolators.

Automatic cycle timers shall prevent short cycling.

Multiple compressors shall be staged by means of a time delay.

#### **Refrigerant Circuits:**

Intent is to not restrict technology employed, therefore type of refrigerant is not specified.

Refrigerant circuits shall be limited to one (1) compressor per circuit and shall not be interconnecting.

Separate expansion devices shall be provided for each compressor circuit.  
Refrigerant charging valves and connections, and pumpdown valves shall be provided for each circuit.

Filter drier shall be provided in each liquid line.

### **Air to Refrigerant Coils:**

Intent is to not restrict technology employed, therefore type and construction of coil is not specified.

Coils shall be leak tested at the factory to ensure pressure integrity.

Each coil shall be dehydrated and sealed after testing and prior to evaluation and testing.

The evaporator coil and condenser coil shall be leak tested to 200 psig and pressure tested to 450 psig.

Each unit shall be provided with a factory operating charge of refrigerant and oil.

A condensate removal system shall be provided.

### **Outdoor Fans/Condenser Fans:**

Intent is to not restrict technology employed, therefore type of fan is not specified.

Fan(s) shall be statically and dynamically balanced.

Fan motor(s) shall be thermally protected.

Motor(s) shall be EPart compliant.

Fan(s) shall have safety guard(s).

### **Indoor Fan:**

Intent is to not restrict technology employed, therefore type of fan is not specified.

Motor(s) shall be thermally protected.

Motor mount base shall permit ease of changeover and belt tension adjustment.

Oversized motors shall be available for high static operating conditions.

Blowers, drives and motors shall be dynamically balanced.

Motor(s) shall be EPart compliant.

### **Outside Air:**

Unit(s) shall be capable of functioning with a demand control ventilation strategy.

Unit(s) shall be provided with a manually adjustable outdoor air damper and hood.

Unit(s) shall have the option of a motorized damper.

Unit(s) shall have the option of a fully modulating economizer control based on dry bulb temperature.

Unit(s) shall have the option of a fully modulating economizer control based on single enthalpy.

Unit(s) shall have the option of a fully modulating economizer control based on double (differential) enthalpy.

Unit(s) may have the option of an energy recovery ventilator (ERV).

## **Controls and Power:**

### **Thermostatic Controls (standard):**

Unit(s) shall be internally pre-wired with a 24 volt control circuit powered by an internal transformer.

Unit(s) shall be equipped with a control circuit which will modulate dampers to provide 100% outside air while locking out compressors.

Unit(s) shall be compatible with the following:

Single zone standard mechanical thermostat

Single zone electronic with night set-back

Single zone electronic with night set-back & integrated modulating economizer function.

Night set-back, time of day & day of week function other than above

VAV electronic controller

VVT electronic controller

### **Direct Digital Controls Interface (required option):**

Unit shall be capable of interfacing with major manufacturer control systems.

Equipment sensing parameters shall be available at a "signal access interface."

Unit shall have sensors for diagnostic/control capabilities including, but not limited to:

CO<sub>2</sub> level

supply air temperature

return air temperature

mixed air temperature

outdoor ambient air temperature

fan status

heat status

cool status

return air enthalpy

outdoor ambient air enthalpy

static pressure increase (dirty filter)

### **Power**

Unit(s) shall be provided with factory installed and wired through the panel disconnect switch.

Unit(s) shall be provided with factory installed fusing.

Terminal blocks shall be provided for power wiring and external control wiring.

Unit(s) shall be equipped with a phase rotation and unbalance protection.

Unit(s) shall have the option of a factory installed and field wired 115v, 15 amp ground fault service receptacle.

### **EQUIPMENT WARRANTY**

Unit(s) shall carry warranties covering all defects in material and workmanship, unless the unit fails due to neglect, failure of the equipment owner to perform preventative maintenance, or an act of God. The period of the warranty shall be at least five (5) years

for parts and one (1) year for parts and labor. It must be renewable, at the owner’s option and expense, each year until the equipment is ten (10) years old.

**DELIVERY**

Offeror(s) shall offer delivery to Buyers in the 48 contiguous United States at prices specified in response to this solicitation. Shipment must be within seven (7) days from receipt of any order for fewer than five (5) units. Delivery of five (5) units or more shall be scheduled by mutual agreement between Buyers and Successful Offeror(s). For all orders under this solicitation, delivery shall be between the hours of 8:00 am and 4:30 pm local time, Monday through Friday, holidays excluded.

**PRICE**

The Offeror shall provide the unit models listed in the resulting BOA at the prices listed in the BOA. Note that these are **maximum** prices. If later circumstances warrant, the Offeror is free to reduce any price in response to this solicitation.

**ACCEPTANCE TEST**

The Offeror shall certify that the air conditioners offered meet or exceed the Specifications set forth above, and that their electric energy consumption is as represented in the Offeror’s proposal, based on the following test procedures:

**Standards**

Units shall be rated for energy consumption and efficiency in accordance with ARI Standard 210/240-94.

Units shall be sound rated in accordance with ARI Standard 270-95.

**Air Distribution**

**Indoor-Side Air Quantity:** Equipment with indoor fans intended for use with field installed duct systems shall be rated at the indoor-side air quantity (not to exceed 37.5 scfm per 1,000 Btu/h [60.4 SL/s per 1000 W] of rated capacity) when operating against the minimum external resistance specified in Table 1 or a lower indoor air quantity if so specified by the manufacturer.

**Minimum External Pressure:** Indoor air moving equipment intended for use with field installed duct systems shall be designed to operate against, and tested at not less than the minimum external pressure shown in Table 1 when delivering the rated capacity and air quantity specified in indoor-side air quantity.

<b>Minimum External Pressure (Table 1)</b>			
<b>Standard Capacity Ratings</b>		<b>Minimum External Resistance</b>	
<b>(Thousands of Btu/h)</b>	<b>[kW]</b>	<b>(Inches of Water)</b>	<b>[kPa]</b>
<b>71 thru 105</b>	<b>20.8 thru 30.8</b>	<b>0.25</b>	<b>62.3</b>
<b>106 thru 134</b>	<b>31.1 thru 39.3</b>	<b>0.30</b>	<b>74.7</b>

## **RESPONSIBILITIES OF THE PARTIES**

### **Method of Supply**

Successful Offeror(s) will be required to provide Battelle with toll-free telephone and fax numbers, which Battelle will make available to Buyers. Successful Offeror(s) will also be encouraged, but not required, to provide an Internet link and product information sufficient for web site display. Battelle will maintain a web site for the products available through this solicitation, including toll-free telephone and fax numbers of the selected suppliers. If a supplier provides a link for direct Internet ordering, Battelle will include that link and related information on its web site.

### **Program Promotion**

Battelle will promote this program at the national level through news releases, publications and presentations and will feature the roles of Successful Offeror(s) in these promotional materials.

DOE plans to promote federal purchases of the selected air conditioners through its Federal Energy Management Program and non-federal purchases through its Buildings Technology, State and Community Programs. Besides the federal government, the Consortium for Energy Efficiency has expressed interest in promoting air conditioners selected pursuant to this solicitation with rebates and other incentives offered by its members, which include utilities and state and regional energy market transformation programs. In addition, several large private purchasers, including national accounts and energy service companies, have encouraged DOE and DLA to proceed in the interest of making more efficient equipment available in the marketplace, and they have expressed a strong interest in considering the selected air conditioners for purchase.

DLA intends to list the selected air conditioners in its catalogs for federal buyers and to promote these units through their Maintenance, Repair and Operations and other programs for federal facilities. DLA also plans to offer all federal government customers the option of leasing these units to help defray any additional up front costs associated with the installation of air conditioners selected through this solicitation.

### **Reporting**

For the purpose of evaluating the program's effectiveness in saving energy and costs, suppliers will be required to report the volume of sales under this program to Battelle on a regular basis. The details of such a reporting scheme will be negotiated by Battelle and the successful Offeror(s) prior to award.

### **Purchases**

**Neither DOE nor Battelle intends to purchase air conditioners for delivery to others. Buyers will purchase directly from suppliers under this program.**

## **SUBSTITUTIONS AND ADDITIONS**

After BOA award to successful Offeror(s), suppliers will be allowed to offer additional models of high-efficiency air conditioners or to substitute new models for models previously offered. Battelle will determine whether to permit these additions or substitutions based on whether the substitutions or additions appear to be in the best interest of the Buyers and on the supplier's past performance under the agreement (e.g. experience with the supplier's product performance, delivery record and related services). To be in the Buyers' best interest, the new product must score at least as well on the evaluation criteria as existing products in the program, and it must meet all other requirements set forth in this solicitation, as determined by Battelle.

ATTACHMENT A  
REFERENCE ORGANIZATIONS, STANDARDS AND GLOSSARY

**ANSI** refers to the American National Standards Institute, Inc., 11 West 42nd Street, New York, NY 10036  
Phone (212) 642-4900 Fax (212) 398-0023, Internet [www.ansi.org](http://www.ansi.org)

**ARI** refers to the Air Conditioning and Refrigeration Institute, 4301 N. Fairfax Dr., Arlington, VA 22203 Phone (703) 524-8800 Fax (703) 528-3816, Internet [www.ari.org](http://www.ari.org)  
ARI 210/240 (1994) Unitary Air-Conditioning and Air-Source Heat Pump Equipment  
ARI 270 (1995) Sound Rating of Outdoor Unitary Equipment  
ARI 340/360 (1993) Commercial and Industrial Unitary Air-Conditioning and heat pump Equipment

**ASHRAE** refers to the American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc., 1791 Tullie Circle, N.E., Atlanta, GA 30329 Phone (404) 636-8400 Fax (404) 321-5478, Internet [www.ashrae.org](http://www.ashrae.org)  
ASHRAE 15 (1994) Safety Code for Mechanical Refrigeration  
ASHRAE 62 (1989) Ventilation for Acceptable Indoor Air Quality

**ASTM** refers to the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken PA 19428-2959 Phone (610) 832-9585 Fax (610) 832-9555, Internet [www.astm.org](http://www.astm.org)  
ASTM B117 500-hour Salt Spray Test

**CEC** refers to the Canadian Electric Code

**CGA** refers to the Compressed Gas Association, 1725 Jefferson Davis Highway, Suite 1004, Arlington, VA 22202-4102 Phone (703) 412-0900 Fax (703) 412-0128, Internet [www.cganet.com](http://www.cganet.com)

**CSA** refers to the Canadian Standards Association, 178 Rexdale Boulevard, Etobicoke, ON M9W 1R3, Phone (416) 747-4000 Fax (416) 747-4149, Internet [www.csa-international.org](http://www.csa-international.org)

**ETL-** Electrical Testing Laboratories Inc., ITS/ETL, 3933 U.S. Route 11, Cortland, NY 13045-0950 Phone (800) 345-3851 Fax (607) 758-6645, Internet [www.etl.com](http://www.etl.com)

**ISO** refers to the International Organization for Standardization , 1, rue de Varembe, Case postale 56, CH-1211 Genève 20 Switzerland, Phone + 41 22 749 01 11 Fax + 41 22 733 34 30, Internet [www.iso.ch](http://www.iso.ch)  
ISO 9002 Manufacturing Quality Control

**NEC** refers to the National Electric Code

**NEMA** refers to the National Electric Manufacturers Association, 1300 N 17<sup>th</sup> Street, Suite 1847, Rosslyn, VA, 22209 Phone (703) 841-3200, Internet [www.nema.org](http://www.nema.org)

**NFPA** refers to the National Fire Protection Association<sup>1</sup>, Batterymarch Park, Quincy, MA 02269-9101 Phone (617) 770-3000, Internet [www.nfpa.org](http://www.nfpa.org)  
NFPA 90A (1996) Installation of Air-Conditioning and Ventilating Systems

**SMACNA** refers to the Sheet Metal and Air Conditioning Contractors National Association, Inc., 4201 Lafayette Center Drive, P.O. Box 221230, Chantilly, VA 20153-1230 Phone (703) 803-2980 Fax (703) 803-3732, Internet [www.smacna.org](http://www.smacna.org)

**UL** refers to Underwriters' Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096 Phone (847) 272-8800 Fax (847) 272-8129, Internet [www.ul.com](http://www.ul.com)  
UL 1995/CAN/CSA No. 236-M90 for Central Cooling Air Conditioners

## **GLOSSARY**

**EER – ENERGY EFFICIENCY RATIO:** the ratio of net equipment cooling capacity in Btu/h to total rate of electric input in watts under designated operating conditions.

**IPLV – INTEGRATED PART LOAD VALUE:** is based on ARI Standard 210/240 or 360. Units are rated at 80°F entering dry bulb and 67°F entering wet bulb at ARI rated cfm.

**UNITARY COOLING AND HEATING EQUIPMENT:** One or more factory-made assemblies which include an evaporator or cooling coil, a compressor and condenser combination and may include a heating function as well. Where such equipment is provided in more than one assembly, the separate assemblies shall be designed to be used together.