



REPUBLIC OF THE PHILIPPINES
Department of Science and Technology
PHILIPPINE ATMOSPHERIC, GEOPHYSICAL and
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**TERMS OF REFERENCE FOR THE SUPPLY, DELIVERY, INSTALLATION,
TESTING, AND COMMISSIONING OF BRAND NEW REDUNDANT 20TR AND
10TR PRECISION AIR-CONDITIONING UNIT FOR THE AIR-COOLED AND
WATER-COOLED ROOM OF PAGASA DATA CENTER.**

A. OVERVIEW

The PAGASA Data Center will house a high speed supercomputer in water-cooled room and computer servers in the air-cooled room that will run continuously for forecasting operational needs. These computer servers will generate a significant amount of heat that needs to be addressed properly.

This project will carry out the original design of the cooling system of the air-cooled room of having two(2) units of Precision Air-Conditioning Unit that will run alternately. This will regulate and maintain the desired amount of humidity and temperature of the room and the equipment that will prolong its lifespan and will optimize its performance.

B. APPROVED BUDGET FOR THE CONTRACT (ABC)

The approved budget for the project amounts to **Sever Million Ninety Nine thousand, Three Hundred Thirty Two Pesos and Nineteen Centavos (7,099,332.19)** inclusive of VAT and all applicable government taxes.

C. QUALIFICATIONS OF THE BIDDER

(Please refer to Section II. Instructions to Bidders, the Bid Data Sheet and Checklist of Eligibility and Technical Requirements of the Bidding Documents)

D. DELIVERY PERIOD AND PLACE OF DELIVERY

The winning bidder, after accepting the Notice to Proceed (NTP), shall deliver the hardware within the period of 120 calendar days at the PAGASA Data Center located at PAGASA WFFC Compound, BIR Road, Diliman, Quezon City.

E. BID PROPOSAL CONTENTS

Moreover, the Prospective Bidder shall submit a detailed **Engineering Plan and Block Diagram** (i.e., electrical, mechanical, cooling system) of the whole system, its power supply requirement, including but not limited to the grounding system and other accessories with complete sets of brochures.

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The prospective Bidder shall likewise clearly indicate in its bid offer the model number and specifications of the equipment and accessories referred to in **Item F. Technical Specifications** to be supplied, if awarded the contract for the Project.

To aid the Procuring Entity in its procurement planning and to ensure a sustainable and continuous operation and maintenance of the Precision Air-Conditioning Unit, the prospective Bidder shall be required to include in its bid proposal a list of recommended spare parts, both serviceable and disposable, with their corresponding prices and guarantee their availability in the market within the next five years.

F. TECHNICAL SPECIFICATIONS

The winning bidder shall supply, deliver, install, test, and commission one (1) set of minimum 20TR and 10TR Chilled High Precision Air Conditioning Unit with the following minimum specifications:

1 unit	<p>20TR Precision Air-Conditioning Unit (PACU)</p> <p>TECHNICAL SPECIFICATIONS</p> <p>Power Supply (V/Ph/Hz) : 380/3N/50</p> <p>Cooling performance (condition 1)</p> <ul style="list-style-type: none"> ▪ Total cooling capacity : 75.1 kW ▪ Sensible cooling capacity : 75.1 kW ▪ SHR : 1.00 <p>Water side (condition 1)</p> <ul style="list-style-type: none"> ▪ Water flow : 12900 Vh ▪ Total pressure drops : 50kPa <p>Cooling performance (condition 2)</p> <ul style="list-style-type: none"> ▪ Total cooling capacity : 69.2 kW ▪ Sensible cooling capacity : 60.7 kW ▪ SHR : 0.88 <p>Water side (condition 2)</p> <ul style="list-style-type: none"> ▪ Water flow : 11900 Vh ▪ Total pressure drops : 45.7 kPa <p>Fan</p> <ul style="list-style-type: none"> ▪ Air flow : 15680 m³/h ▪ N° EC fans : 2 ▪ EC fans power abs : 3.31
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	<ul style="list-style-type: none"> ▪ ESP : 20-350 Pa ▪ Sound pressure level : 66 dB(A) <p>Humidifier</p> <ul style="list-style-type: none"> ▪ Humidifying capacity : 8 kg/h ▪ Power abs. : 6 kW <p>Heaters</p> <ul style="list-style-type: none"> ▪ Steps : 3 ▪ Power abs : 18 kW <p>Width : 1550 mm Depth : 790 mm Height : 1980 mm Net weight : 385 kg</p>
1 unit	<p>10TR Precision Air-Conditioning Unit (PACU)</p> <p>TECHNICAL SPECIFICATIONS</p> <p>Power Supply (V/Ph/Hz) : 380/3N/50</p> <p>Cooling performance (condition 1)</p> <ul style="list-style-type: none"> ▪ Total cooling capacity : 46.0 kW ▪ Sensible cooling capacity : 46.0 kW ▪ SHR : 1.00 <p>Water side (condition 1)</p> <ul style="list-style-type: none"> ▪ Water flow : 7900 Vh ▪ Total pressure drops : 54kPa <p>Cooling performance (condition 2)</p> <ul style="list-style-type: none"> ▪ Total cooling capacity : 41.8 kW ▪ Sensible cooling capacity : 36.9 kW ▪ SHR : 0.88 <p>Water side (condition 2)</p> <ul style="list-style-type: none"> ▪ Water flow : 7190 Vh ▪ Total pressure drops : 50.2kPa <p>Fan</p> <ul style="list-style-type: none"> ▪ Air flow : 10200 m³/h ▪ N° EC fans : 1 ▪ EC fans power abs : 2.05 ▪ ESP : 20-350 Pa

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- Sound pressure level : 59 dB(A)

Humidifier

- Humidifying capacity : 5 kg/h
- Power abs. : 3.75 kW

Heaters

- Steps : 3
- Power abs : 15 kW

Width : 1550 mm
Depth : 790 mm
Height : 1980 mm
Net weight : 330 kg

Note:

1. Condition 1

-Return air : 30°C, RH: 30%, the temperature IN/OUT chilled water : 10°C/15°C, ESP:20Pa

Condition 2

- *Return air : 24°C, RH: 50%, the temperature IN/OUT chilled water : 7°C/12°C, ESP:20Pa*

2. Measure at 1.5m height and 2m front free field.

3. The humidifying capacity and heating capacity showed in the table is standard data, and we can enlarge the capacity in response to the customer requirement.

Standard Unit Composition

- Unit for installing inside or outside the room to be air-conditioned
- Maximum resistance to rust thanks to galvanized sheet metal structures and panels with powder-coated paint finish.
- EC inverter radial-blasé fans.
The fans are of the backward-blade type for maximum efficiency and low noise.
- Standard G4 filtering section, F5-F6 optional, under CEN-EN 779 rule with the separation degree 90.1% ASHRAE. The filter is auto extinguishing type.
- The microprocessor controls the operating alarms with the possibility of interfacing to supervisor and remote-servicing systems.
- Electrical box under IEC 204-1/EN60204-1 rules.

General

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- Units are constructed of a galvanized steel frame with galvanized steel panels and access doors
- Each unit shall be capable of providing sensible capacity of 0.86 minimum conditioned air when the return air/room air entering condition is 24°C return air condition @ 50%RH Chilled 7°C/12°C supply and return water condition.
- Eurovent Company Standards
- ISO Certified Manufacturer
- Complete line of HVAC Manufacturer the likes of Chiller, HPAC, AHU, Telecom Solutions, Hydronic Terminals, Comfort cooling and IT cooling complete range of product.
- ISO 9001-2015 Certified Distributor in the Philippines.
- CE Certified

Cabinet Construction

- The frames and panels shall be constructed of heavy gauge zinc-annealed corrosion resistant sheet steel with base section supports for maximum structural strength.
- The type of construction shall be modular such that the frame can be dismantled into sections for greater ease of handling without the need of cutting and welding. The front panels of the unit shall be removable without affecting the normal airflow through the unit.
- The cabinet shall have external powder coated paint with textured finish.
- The fan section of the unit shall be lined with a minimum of 20mm thick layer of thermal/acoustic non flammable insulation with vinyl scrim finish which should be coated so as to eliminate dust and fiber erosion.
- All materials used in the construction of the units shall be in compliance with requirements of the relevant Fire Protection Authority.
- It shall be possible to carry out all normal maintenance checks and operations with the unit in operation and all compartments affected by the air-stream shall be fitted with removable panels.
- Only front service access shall be required with a space requirement of 600mm for access and service.
- All panel and door fasteners shall be hidden with the exception of discrete flush-mounted catch at the front and all essential components shall be accessible and serviceable from the front.

Water Detector

- Two methods shall be available:

	<ul style="list-style-type: none"> ○ A solid state (probe) sensor shall be supplied loose for remote mounting on site. ○ Tape suitable for sensing water droplets shall be supplied loose for remote mounting on site. ○ Standard tape length 10m <p>Firestat</p> <ul style="list-style-type: none"> ▪ Shall be installed in the return air stream to shut down the unit in the event of an unusually high return air temperature. <p>Smoke Detector</p> <ul style="list-style-type: none"> ▪ Shall be supplied loose for remote mounting to shut down the unit and activate the alarm upon sensing the presence of smoke. <p>Phase Rotation Protection</p> <ul style="list-style-type: none"> ▪ A phase sequence relay shall be available for units containing 3 phase scroll compressors, to prevent possible damage by running the compressor in the wrong direction. <p>Chilled Water Coil</p> <ul style="list-style-type: none"> ▪ Large surface area coil(s) ideally positioned to optimise airflow and heat transfer, manufactured from refrigeration quality copper tubes with mechanically bonded aluminium fins ▪ Fins are coated with a non-stick acrylic film (hydrophilic) which provides additional corrosion protection and efficient surface water removal for improved performance. ▪ Coil headers are circuited to ensure low water pressure drops. ▪ The cooling coil is mounted over a full width stainless steel condensate tray. ▪ For control of water flow, a 3 port, raise/lower type, modulating mixing control valve is fitted as standard. ▪ Maximum operating pressure 10Bar. Factory pressure tested to 20Bar. ▪ Sweat copper pipe for brazed connection as standard. Optional threaded connections should be available. <p>Fan Section</p> <ul style="list-style-type: none"> ▪ Backward curved impellers, direct drive centrifugal fan assemblies shall be used with integral AC or EC motors. They shall be dynamically balanced for quiet operation. ▪ Fan speed, air flow and external static pressure shall be controlled by the use of a voltage controller which shall maintain optimised performance and reduce energy consumption.
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- Designed for high corrosion resistance, the impellers shall be laser welded aluminium with a galvanised rotor.
- For down flow units, the discharge air stream from the fan should pass through an internally insulated fan discharge duct immediately below the fan deck for improved air distribution and noise attenuation.
- Maximum Decibel rating of 59db and 62db for 10 and 20TR respectively.
- Minimum Air flow of 10,200m³/hr @ 2.05kW for 10TR
- Minimum Air flow of 18,000m³/hr @ 4.53kW for 20TR

Fan and Belt Assembly

- Double inlet forward curved centrifugal fan(s) with galvanised impellers and casing.
- Mild steel fan shaft with lifetime lubricated ball bearings.
- Fan and drive assembly design is based on a minimum of 25,000 hours life expectancy.
- Each fan assembly is separately driven by a high efficiency air cooled motor through a pulley and 'V' belt drive.
- The complete motor assembly is mounted on a fully adjustable platform for belt tensioning. Motor specification conforms to Efficiency Class 2 (EFF2).

Electronically Commutated (EC) Fan Motor

- Backward curved impellers, direct drive centrifugal fan assemblies with integral hub mounted motor which is statically and dynamically balanced for quiet operation.
- Designed for high corrosion resistance, the impellers are laser welded aluminium with a galvanized rotor and die cast aluminium EC power module.
- EC motors incorporate integrated electronics to convert AC power to DC for efficient and accurate speed control and are adjustable via the microprocessor display keypad.
- The fans offer maximum air flow performance while keeping sound levels to a minimum.
- It gives the flexibility of connecting to AC mains with the efficiency and simple speed control of a DC motor.
- The EC fan offers significant power reduction in comparison with equivalent AC fan at both full and modulated fan speeds
- The inbuilt EC fan control module allows for fan speed modulation from 15-100%, a standard AC fans modulating range is typically 40-100% of full fan speed.

Air Flow Switch

	<ul style="list-style-type: none"> ▪ An adjustable differential pressure switch shall activate a visual alarm at the status panel and break the power supply in the event of a fan or motor failure. <p>Dehumidification</p> <ul style="list-style-type: none"> ▪ Dehumidification is achieved by switching on selected circuits of direct expansion cooling through a split coil system. ▪ Dehumidification is achieved without the use of re-heaters or change in air volume to save energy. ▪ This should be interlocked with return air temperature to give dry bulb air temperature priority and prevent over cooling during dehumidification cycle. <p>Humidifier</p> <ul style="list-style-type: none"> ▪ Humidification shall be provided by a sealed system electrode boiler type with adjustable capacity output and high pressure valve to prevent overflow. ▪ Steam should be distributed through a pipe fitted to the coil assembly. ▪ The humidifier shall be capable of providing up to 3kg of steam per hour. ▪ Modulating capacity output control as standard, the system provides continuous modulation of steam output in response to a proportional control signal. ▪ The output control range is 20%-100% of the humidifier rated value and is designed to give an approximate steam output of +/- 3%, at the sensor, thus ensuring precise control of the conditioned space. ▪ The cylinder operating life time is automatically optimised via the integrated water controls monitors and conductivity sensor, which combined with the regulates the water refill cycle to reduce excessive salt deposits and the progressive wear of the cylinder. ▪ All humidifier parameters and alarms are accessible and adjustable via the microprocessor display keypad unit, main features include: <ul style="list-style-type: none"> ▪ Supply water conductivity (mS/cm) ▪ Actual steam output (kg/h) ▪ Required steam output (kg/h) ▪ Actual current rating (A) ▪ Required current rating (A) ▪ Status mode (Start Up, Running, Filling, Draining) <p>Water Conductivity and Water Cylinder Type</p> <ul style="list-style-type: none"> ▪ Conductivity is a measure of the ability of water to pass an electric current, measured in micro Siemens / centimetre (mS/cm).
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- 3 different cylinders are available which correspond to the supply water conductivity.
- Matching the correct cylinder type with the conductivity of the supply water ensures optimum performance and increases the life span of the cylinder

Cleanable Humidifier Cylinder

- The humidifier can be fitted with a take apart cylinder enabling the bottle and the electrodes to be cleaned and reused.
- The cylinder can typically be cleaned 3 times before replacing either the electrodes or the entire cylinder.
- The cleanable humidifier cylinders are available in 8kg and 15kg bottle sizes with standard or high conductivity levels only.

Filter Section

- Filtration shall be provided by dry media disposable filters of 20% efficiency (BSEN 779).
- The filters shall be deep pleated fabric type mounted on frames for rigidity and support.
- The filter panels should be readily removable from the front of the unit for easy replacement and inspection.
- Standard G4 filtering section, F5-F8 optional, under CENEN
- 779 rule with the separation degree 90, 1% ASHRAE
- The filter is auto extinguishing type.

Dual Power Input

- The power mains shall have two (2) independent feeds for separate source grid.
- The two power input must come from individual grid and shall function on automatic transfer from the main to alternative source in case the primary source becomes unavailable.

Chilled Water Bypass

- Bypass balancing valves can be fitted to aid commissioning and unit operation by Balancing Valves creating the same pressure drop through the bypass as through the chilled water coil.

Two Port Chilled Water Control Valve

- For systems with variable speed pumps and water flow, a 2 port control valve can be fitted in place of the standard 3 port valve.

Control System

	<ul style="list-style-type: none"> ▪ The control system shall be a microprocessor based and programmable logic controller complete with LCD backlit display for clear visibility of text and graphics. ▪ The system shall be fully menu driven with self-supporting help screens for ease of use and shall use multi-protocol data communications. ▪ Access to the controller settings shall be protected with passwords to prevent unauthorized access. ▪ The microprocessor control system MUST be in “open” architecture protocols and can easily adapt to third party interface. ▪ The control must incorporate a interface card for internet and GSM remote communication and alarm annunciation. ▪ In normal operating mode the screen should display unit number, temperature and relative humidity set points, time, and operating status. ▪ It should be able to record real time 48 hour data log of temperature and humidity updated every minute. ▪ The system configuration and default settings shall be stored in non-volatile memory. ▪ Other programmable parameters shall be stored in Read-Only-Memory backed up by a rechargeable battery in the event of power failure. ▪ The operating mode control section shall include the following: <ul style="list-style-type: none"> ◆ LCD display indicating: <ul style="list-style-type: none"> ○ Unit number ○ Date and time ○ Temperature and relative humidity set points ○ Actual temperature and relative humidity time ○ Dynamic operating modes icons – cooling, heating, humidifying and dehumidifying ○ Start button ○ Stop button ○ Audible alarm ○ Alarm mute button ○ Battery status ◆ The alarm mode section shall provide an alarm for the following: <ul style="list-style-type: none"> ○ Standard Alarms ○ High and low room temperature ○ High and low humidity ○ Compressor high and low pressure ○ Loss of airflow ○ Water and under floor ○ Low battery
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	<ul style="list-style-type: none"> ○ Low voltage ○ Service intervals – compressor, filter and humidifier ◆ System Protection Alarms <ul style="list-style-type: none"> ○ IO communications ○ Sensor malfunction ○ Date/time not set ○ Parameter corruption ○ ROM/checksum failure ▪ The controller shall be capable storing a historical alarm event log. ▪ The system shall have programmable manual or automatic restart option. <ul style="list-style-type: none"> ○ A programmable start-up time delay shall be provided for the automatic restart option allowing multiple units to restart progressively when power resume after power interruption. ▪ A microprocessor shall be equipped with high level interface via RS232 to monitor a maximum of 10 units in 4 separate zones remotely, to provide auto-changeover operation without the use of external lead/lag controller. ▪ The controller shall provide the following features: <ul style="list-style-type: none"> ○ Centralized control, allowing all operating conditions and alarms to be monitored and all set points adjusted remotely. ○ Automatic standby and duty cycle operation, such that when any alarm is detected at a duty unit is stopped and the standby unit started automatically. The duty cycle timer shall be fully adjustable and changeover fully automatic without the need for operator intervention. ○ Run time averaging will balance the operating times by sequence changing the duty units. ○ Cascading control with multiple-step control algorithm to coordinate cooling, heating, humidifying and dehumidifying operation of multiple units in a zone to achieve the best control and minimizing unit on/ff. ○ Data synchronized feature where date, time, temperature and relative humidity set points, alarm set points shall be synchronized in the network. <p>Remote On/Off</p> <ul style="list-style-type: none"> ▪ Terminals for interlocking shall be provided to enable or disable the unit remotely. <p>Fire Shut Down</p>
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	<ul style="list-style-type: none"> ▪ Terminals for interlocking shall be provided to shut down the unit in the event of fire. <p>Standard Network</p> <ul style="list-style-type: none"> ▪ As standard the FEATURES controller shall be capable of providing a platform for the following and shall be enabled on request for 2 to 10 units. <p>Networking</p> <ul style="list-style-type: none"> ▪ A Local Area Network shall be used to connect up to 10 units to offer intercommunication and Duty/Standby control. ▪ This also allows the connection of computers, printers and modems on the same communications ring. ▪ Allows WIFI connectivity. <p>Duty/Standby Operation</p> <ul style="list-style-type: none"> ▪ The controller shall enable units to operate in run/standby mode, with up to 10 units networked together, without the need for additional hardware or controllers. ▪ Standby units shall be configured to start when the run unit has a critical alarm and/or a high/low return air temperature alarm. ▪ During peak demand, the standby units shall temperature assist. <p>Duty Rotation</p> <ul style="list-style-type: none"> ▪ Networked units shall be configured to duty rotate, providing equal hours run of fans and compressors. <p>Electrical system</p> <ul style="list-style-type: none"> ▪ The control panel contains the necessary fan motor contactors and overloads, contactors, transformer, sub-circuit protection, volt free contacts, mains and interconnecting terminals. ▪ The panel is situated within the cabinet and is hinged for easy access to other components within the unit. ▪ The electrical control panels are wired to the latest standards and codes of practice. ▪ Electrical box under IEC 204-1/EN60204-1 rules. ▪ The Winning Bidder shall coordinate with the PAGASA Engineering and Technical Services Division (ETSD) regarding the electrical system before and during the implementation of the project. ▪ The winning bidder shall submit the as-built plan of the whole system upon the completion of the [project with sign and seal of a Professional Electrical Engineer (PEE).
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Note: The unit to be delivered shall be of the same brand with the existing Precision Air-Conditioning Unit.

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G. SCOPE OF WORK

This specification covers the supply, delivery, installation, testing and commissioning of a Precision Air Conditioning Unit (PACU) inclusive of the main unit and all of its accessories, power cables, communication cables, circuit breakers and panels, tubing, pipe, fittings, insulation foams, and any materials and consumables not mentioned herein but are necessitated for the completion of the project, modules, software and/or hardware licenses. All costs of such equipment are presumed already included in the bidder's price proposal. The PACU system shall have provisions for all necessary interface connections and ancillary items such that it can be easily and economically expanded at a future time with minimum disruption for increased capacity or to provide a fully redundant system.

Shutdown shall be scheduled in advance to avoid disruption of work.

H. BIDDER'S ELIGIBILITY REQUIREMENT

- a. The Bidder should have completed at least one (1) contract similar or related to the project on which the value must be equivalent to at least fifty (50%) percent of the project cost and must have a Philippine Contractors Accreditation Board (PCAB) license.
- b. For this purpose, similar contracts shall mean "installation or Supply of Precision Air Conditioning Unit" with the same or higher capacity. Copy of Purchase Order from said Proof of Customer shall be attached in the bid documents to be submitted.
- c. Bidder must provide certificate of Authorization from Manufacturer/Principal authorized to re-sell and provide technical support and consultation for product offered.
- d. Bidder must be Authorized Service Partner or Certified Service Sales Partner of the product offered to ensure of its technical expertise on the offered solution.
- e. Bidder must provide certification from the Manufacturer that equipment to be supplied is brand new and intended for Philippine market.
- f. Bidder should submit a detailed project implementation plan which shows that the offered solution shall be integrated in the existing systems.
- g. Bidder should provide certificate that has 24x7 technical support capabilities. Winning bidder should identify the person responsible for restoring service due to outages and provide his contact details i.e. contact person, position, contact numbers and email address.
- h. Bidder shall provide unlimited number of user trainings within the warranty period; Training shall include equipment, course materials, certification (for the training on installation, configuration and operations of the equipment) and meals. Training may be at either site of PAG-ASA or winning bidder preferred site; all cost relative to the conduct training shall be at the expense of the winning bidder.
- i. Bidder must have at least two (2) certified Data Center Professional and has been employed to the bidder for at least three (3) years.
- j. Bidder must have employed and assign an authorized safety officer to oversee the implementation of the project. The Bidder must be a member of Safety Organization of the Philippines (SOPI).

I. WORK SCHEDULE

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Work can be performed from Mondays to Fridays starting 8:00 a.m. up to 5 p.m.

J. WARRANTY AND MAINTENANCE

The Contractor shall provide a one (1) year warranty against factory defects and workmanship reckoned from the date of project acceptance of the Precision Air Conditioning Unit and Environmental Monitoring System.

All components, system software, and parts furnished and installed by the contractor shall be guaranteed against defects in materials and workmanship for 1 year of substantial completion. Labor to repair, reprogram, or replace these components shall be furnished by the contractor at no charge during normal working hours during the warranty period. Materials furnished but not installed by the contractor shall be covered to the extent of the product only. Installation labor shall be the responsibility of the trade contractor performing the installation. All corrective software modifications made during warranty periods shall be updated on all user documentation and on user and manufacturer archived software disks. The Contractor shall respond to the owner's request for warranty service within 24 standard working hours.