SPECIFICATION

ARCHIVAL STORAGE VAULTS

SECTION _____

PART 1 - GENERAL

1.01 PROVISIONS INCLUDED

A. Included Division _____ and applicable parts of Division _____ for conditions and requirements which may affect the work of this section.

1.02 DESCRIPTION

A. Work of this section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

Work of this Section consists of furnishing all labor, materials, equipment and services necessary to complete the controlled archival vault room work, including both rooms and associated equipment as shown on the drawings and specified here-in, including, but not limited to the following:

1. Prefabricated, all metal clad construction, furnished and installed as a complete self-contained unit and system, with all essential plenums, controls, balanced air circulation and all other equipment necessary to reach the environmental conditions specified herein. Refer to schedule at end of this section. (Insulated floor slab is by others)

2. Factory assembled and tested major components, including air handler, condensing unit and control panels, prior to delivery.

3. Delivery of room components to their final location, and complete assembly of rooms in place.

4. Refrigeration piping, electrical power wiring, control wiring and connections, which are an integral part of the rooms.

5. Electric outlets and lighting fixtures with rooms.

6. Dual refrigeration and dehumidification systems, including piping, shall be

installed in all areas.

7. Ducting and filters, which are an integral part of the room systems.

8. Installation of fixtures supplied by room manufacturer.

9. Integrated instrument and control systems for control of temperature and humidity in all rooms, including contacts to convey alarm status to the Owner's D.D.C. control center.

10. All required testing, piping, writing, installation, start-up, and adjustments required for a complete installation.

1.03 RELATED WORK

A. Mechanical and plumbing - Division 15.

B. Electrical - Division 16

C. Concrete - Section

D. Building insulation - Section

1.04 QUALITY ASSURANCE

Bidders' Qualifications:

A. Bidders shall have an established organization and factory with production facilities specializing in the type of equipment specified, have an experienced engineering department and an established history of similar installations of equal scope and complexity. In order to qualify as an archival vault manufacturer and installer, the vendor must prove he has been in the business for five (5) years and has a record of at least five (5) operating systems.

B. Any deviations from the Specifications, including type of finishes as set forth herein, must be listed in detail, separate from the literature furnished with the bid such that the Architect does not have to expend inordinate time in evaluating competitive bids. In bidding, manufacturers should understand that the right is reserved by the architect to waive informalities and to reject any and all bids. Any bid will rightfully be construed as being based on supplying the design, construction, and materials called for in this Section of the Specifications.

C. This bidder of rooms under this section is responsible for any alterations to the mechanical or electrical services as scheduled herein or as shown on plans which are

necessary to accommodate the manufacturer's product requirement. The bidder shall include in his bid sufficient monies to cover such alterations. No extra charge will be allowed for service alterations after receipt of bid.

D. The environmental room design and installation shall conform to applicable codes, ordinances and regulations governing the use and safety of refrigerants including, but not be limited to, ASHRAE/ANSI standard 15-70, ARI 420-77, ARI 520-78, ANSI B9.1-1971, NEMA-70.

E. SERVICE

The bidder shall be a manufacturer of archival storage vaults, which maintains factory parts and service. An extended warranty service contract shall be tendered at least one month prior to the end of the warranty period for consideration and acceptance by the owner.

F. Reference Standards: Comply with all national, state, and local codes: execute all work to highest industry standards.

All construction shall conform, as applicable, to the requirements. All panel components shall conform to the reduced CFC content regulations mandated as part of the 1989 Montreal Protocol agreement.

G. Components situated within the finished rooms or panels, including sealants, gaskets, and piping, shall not include adhesive, butyl, or other materials which outgas chemical vapors harmful to the photographic works to be stored therein. Such products shall not be used in construction, assembly, or finishing of the work.

1.04 SUBMITTALS

A. Refer to submittals - Section _____ for general requirements. Submit six copies of each item submitted.

B. Manufacturer's Literature: Submit full original manufacturer's literature for each piece of equipment and each component, when distinct.

C. Submit Shop Drawings showing general layout of the rooms in plan and section, with large scale details at floor sill, wall/floor junction, and wall/ceiling junction, and also showing layout of all ducting, equipment and lines, whether inside the rooms, above the ceiling, or in adjacent areas. Show all salient construction features and details. Clearly outline all governing parameters. Clearly show all service and other work by others. Include a complete piping diagram.

D. Submit preliminary operating manual showing control sequences, control data and schematics.

E. Submit a certified letter attesting that the vendor is qualified as outlined above and confirming that final installation will meet or surpass the requirements stated herein.

F. At time of substantial completion, furnish three complete Operating Manual for sequential operation, start-up, shut-down with pertinent control data and schematics, room arrangement, and recommended maintenance schedules and procedures.

G. Submit samples of any and all components which may of gas unacceptable chemicals, and any components requested by the Architect.

1.06 GUARANTEE

A. The equipment furnished under this section of the specifications shall be guaranteed for a period of one year from the date at which acceptance of the entire Work is certified by the Architect against defective materials, design and workmanship. Upon receipt of notice from the Owner or Architect of failure of any part of the guaranteed equipment during the guarantee period, the affected part or parts shall be replaced promptly and at the expense of this contractor. This guarantee shall also include one year's free service for all equipment and controls furnished under this section, and a five year warranty on compressors. The filter and equipment maintenance service shall be contracted for in the name of the Owner and shall be placed with a reputable service organization maintaining 24 hour service in the locality of the installation, if the vendor himself is not located within 100 miles of the project.

B. The guarantee shall be in the following form and shall be signed by an officer or Owner of the Contracting Company:

Letterhead of Contractor

Name and Address of Installation

Date

Re: (1) Cold Archive Storage Vault/Color W/Airlock
(2) Black & White Storage

Gentlemen:

The undersigned guarantees the Owner that he will be responsible for faulty materials, equipment and workmanship, and that he will remedy and defect due

thereto and pay for any damage to other work resulting there from which shall appear within a period of one year from the date at which completion of the entire work is certified by the Owner or Architect and will give five year's free warranty on compressors.

During this period, upon written notice so to do, the undersigned shall proceed with due diligence at the undersigned's expense to replace properly any defective materials and equipment and/or perform any labor necessary to correct any defect to the work. In case the undersigned fails upon reasonable notice to remedy such defects, then the Owner may furnish such materials or labor necessary to bring the work up to the standard called for, and the undersigned agrees to reimburse the Owner fully and promptly.

Name of Subcontractor

_____

Office of Signatory

Signature

Signature must be notarized.

Attest:

Name of Contractor

1.07 PRODUCT HANDLING

A. Carefully pack and load room components for shipment to project site using all reasonable and customary precautions against damage in transit.

B. Store products off ground, under cover, protected from elements and construction operations.

C. Protect products and exposed finishes during room erection against physical damage or stain.

D. Any room panels, piping, components or equipment showing signs of damage will be rejected and replaced, regardless of when discovered.

1.08 JOB CONDITIONS

A. Scheduling and Coordination: The room installer shall examine project conditions at the site with regard to access, dimensions, conditions as they exist and the general areas of work, and shall perform work in such a manner as required to deliver, install and connect the rooms in close coordination with work of other trades.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. To establish a standard of quality and design desired, Archival Vault drawings and specifications have been based on the products of Harris Environmental Systems, Inc., Andover, MA (978) 470-8600. Equal systems or similar systems will be accepted if requirements of Article 1.04 are fully satisfied.

2.02 INSTRUMENT AND CONTROL SYSTEMS

A. Main Temperature Control:

A. The primary temperature control for each space shall be Honeywell UDC-2000 digital indicating controller. It will feature an open RTD sensor for rapid response to temperature fluctuation. It will control by continuously monitoring room condition vs. setpoint and providing an output which will modify the conditioning system capacity in response to any deviation. Actual deviation from setpoint at the sensor shall be no greater than ±1°C. The range of the controller shall be established to cover the required range of the room.

B. Alternation of the redundant refrigeration systems shall be accomplished using an alternating relay. Thus, the primary temperature controller is alternately used to control the two refrigeration systems.

Alarm control shall be an override of the primary in the event of either failure of one system, or an excessive heat load in the room, thus activating the secondary system.

2.03 ALTERNATING FUNCTION ALARM (TEMPERATURE)

In the event that the temperature in the vault is not satisfied within an adjustable time limit after the secondary system has been activated, the building's D.D.C. system shall be alerted of this condition through a control relay contact closure. In the event that one of the two systems repeatedly fails to work, the building's D.D.C. system shall be alerted of this condition through a control relay contact closure (i.e., if only one system is used repeatedly).

2.04 HUMIDITY CONTROL

A. The electronic humidity control used in each room shall be Honeywell UDC-2000 using a full range 0 to 100% humidity sensor similar to the Humicap as manufactured by Vaisala. The humidity sensor shall be located in each of the rooms and shall transmit signals back to the recorder and humidity controller associated to that space. Any necessary power supply for this device shall also be supplied in the panel.

B. The humidity system will be supplied with full redundancy. The main humidity controller for each area shall be used to control both primary and secondary systems for each area. Alternation of the systems shall be automatic on a time adjustable basis.

Alarm control shall be an override of the primary in the event of either failure of one system or an excessive rise or drop in humidity within the room areas.

2.05 ALTERNATING FUNCTION ALARM (HUMIDITY)

In the event that the humidity in the vault areas is not satisfied within an adjustable time limit after the secondary system has been activated, the building's D.D.C. system shall be alerted of this condition through a control relay contact closure. In the event that one of the two systems repeatedly fails to work, the building's D.D.C. system shall be alerted of this condition through a control relay contact closure (i.e., if only one system is used repeatedly).

2.06 ALARM SYSTEM COMPONENTS

A. A thermistor sensor electronic temperature control with dual bridges and setpoint shall be used for the high and low temperature device. This unit shall have exposed setpoint in the control panel and shall provide independent high and low alarm outputs.

B. Two electronic sensor switching controllers ("Humicap" by Vaisala or approved equal) shall be used to sense high and low humidity in the room. These devices must be located in the controlled space but will be integrated with the control system in the control panel. They will provide independent high and low humidity alarms as indicated by pilot lights on the panel.

C. Provide an alarm circuit board including replaceable control relays, solid state circuiting, alarm buzzer, input/output terminations, and a remote alarm dry contact relay.

D. This system shall contain control panel mounted components including the high/low temperature setpoint mentioned above, four alarm lights, a reset switch which silences the alarm, and a control alarm bypass switch used to restart the system.

2.07 ALARM SYSTEM FUNCTIONING

In the event that neither the primary or secondary systems are able to maintain room conditions, the alarm system shall function as follows:

A. The alarm circuitry is an "always alive" circuit. Upon failure of any component or failure of power to the room, the remote alarm relay will close giving a remote signal.

B. The alarm circuit cannot be shut off. It can be made inoperative by establishing the setpoints too wide and the control portion can be bypassed but it cannot be electrically shut off when the room main power switch is on.

C. When the room rises above the high temperature setpoint, the high pilot will light, the buzzer sounds, and all heat producing devices will shut down including lights, fans, and door heat. The rest of the alarm circuit operates as noted below.

D. When the room drops below the low temperature alarm setpoint, the low pilot light lights, the buzzer sounds, and power to all cold producing components, including refrigeration solenoids, is removed. The rest of the alarm system is activated as noted below.

E. When the room humidity rises above setpoint, the high humidity pilot light lights, the buzzer sounds, but no action takes place since the dehumidifier would already be operating. The rest of the alarm system would operate as noted below.

F. When the room drops below the low humidity setpoint, the low humidity pilot light lights, the buzzer sounds, and power to the humidifier will be

interrupted. The rest of the alarm system will function as described below.

G. When, for whatever reason, the same refrigeration system is used twice in a row (i.e., whenever the alternating feature fails to occur), the buzzer sounds and the rest of the alarm system would operate as noted below.

H. When an alarm comes from any of the above noted sources it feeds the main alarm board. Here is the common buzzer for all alarms, which may be silenced by flipping the RESET switch on the panel. Here also is the remote alarm relay, which shifts position from either a normally opened or normally closed contact position. The main on/off switch also connects in and is used to bypass the alarm to get the room back into operation. Finally, when the alarm condition clears, the system will automatically reset and go back to normal control.

## 2.08 CONTROL PANEL

A. All instruments, controls, and major electrical components shall be installed in a combination control enclosure next to the room door. This control panel shall have an easy access service door for front servicing of all major electrical and instrument components. The front of the panel shall include a recessed control center with acrylic cover and lock to prevent unauthorized adjustments. In addition to control instruments, this panel shall include all circuit fusing, timers, switches, pilot lights, and the main and safety controls, alarms, and other devices required to operate the system. All control functions shall be labeled with descriptive name plates or lenses on the control panel face. A complete schematic of the entire control system shall be mounted on the interior of the control panel. The control enclosure shall be located as shown on the Architectural Drawings.

B. Control Panel Display will include readout (LCD or approved other) of Temperature and Humidity of each room, clearly marked.

2.09 TEMPERATURE AND HUMIDITY RECORDER

Each control panel shall include:

A. A 10" electronic chart recorder having a seven day chart revolution shall be provided in each control panel. Recording pens shall be felt tip "throw away" type.

B. The recorder shall be a two pen recorder with a chart range of 0 to 100. One pen shall record temperature and utilize a 100 ohm platinum sensor. The second pen shall record humidity utilizing the electronic sensor described below.

C. The electronic humidity control used for this room shall be a full range 0 to 100% humidity sensor similar to the Humicap as manufactured by Vaisala. This humidity sensor shall be located in the room and shall transmit a signal back to the recorder. Any necessary power supply for this device shall also be supplied in the panel.

2.10 ROOM SHELL MATERIALS

Foam-In-Place Isocyanurate Panels:

a. Interior and exterior skin shall be a minimum of .032" thick white painted aluminum, prepainted with two coats of white polyester or modified epoxy enamel. Panel insulation shall be foamed-in-place isocyanurate insulation providing a "K" factor of 0.118 Btu/hour/square foot/degree Fahrenheit/inch of thickness. Insulation shall bond the panel and shall have a minimum compressive strength of 28 pounds per square inch. Sections shall match without distortion and shall be aligned by tongue and groove joint, fastened by cam lock devices, maximum 46" apart. All foam shall be Class I.

b. Walls shall be a minimum of 3" thick, and a maximum of 4" thick.

c. Roof panels shall be a minimum of 3" thick, and a maximum of 4" thick.

3. Flame-Resistance Characteristics: Not exceeding a rating of 25, when tested per ASTM E84 for standard time period (10 minutes)

2.14 DOORS

A. Doors shall measure 80" high and 36" wide (clear opening) and shall be located as shown on the drawings. The basic panel construction shall be identical to wall panel construction with baked enamel finish. Perimeter and frame shall be a hard anodized aluminum with double gaskets on three sides and a wiper gasket on the bottom. On rooms operating below 50 degrees F., both door and door jamb shall be heated. Heaters shall be removable and replaceable without removing door or door jamb.

B. Doors shall be equipped with a three lite, hermetically sealed window 9" x 30" or equal, located as per approved shop drawings. Door shall utilize chrome- plated self-closing hinges, keyed magnetic latch, and inside release. Threshold shall be fitted with a flush sill approved by the Architect to cover the insulation below.

2.15 FILLERS

A. Where shown on drawings, provide filler panels on exposed faces of all units from top of unit to finished ceiling line or provide other fillers where required to furnish a neat, finished installation. The baked epoxy finish on fascias and fillers shall match the room finish.

2.16 FLOOR

A. Floor shall be 2" finished concrete over 2" rigid insulation. by others. Coordinate fully. Refer to project drawings for detail.

2.17 DESIGN OF MECHANICAL SYSTEM

A. Complete integrated system consisting of two independent systems for 100% redundancy consisting of dual air handlers, heaters and condensing units designed to operate alternately The water cooled condensing units shall be rack mounted and located in the mechanical room in locations indicated on the Drawings.

2.18 COMPONENTS OF MECHANICAL SYSTEM

A. Air Handlers

1. Air flow within the vault shall be provided using remotely located custom self contained air handler systems designed for specific applications. The air handlers shall be of double wall insulated construction and include belt-driven centrifugal blowers, DX coils, filter racks and dampers as required for the specified conditions.

Refer to all notes contained on Vault Drawing for additional information concerning capacity and layout.

B. Condensing Unit:

1. Each condensing unit shall include a semi-hermetic compressor and shall be

water cooled. All condensing units shall be spring mounted. Each condensing unit shall be equipped with high/low pressure control, vibration eliminating device on the suction and discharge line, fusible plug, liquid line dryer, moisture indicating sight glass, suction line filter, magnetic contactor on all three phase units, modulating water regulating valve, and all other safety mechanical devices. Only a non-CFC refrigerant such as R-22 or R-134 shall be used.

C. Refrigeration Piping: ACR type, hard drawn, cleaned and capped Type L copper tubing soldered with silver solder, except discharge lines which shall be silver or silfos brazed. All lines shall be installed to allow for linear expansion of copper after start-up.

1) Suction Lines: Size for velocity of 500-700 FPM on horizontal runs and show a slight pitch toward condensing unit. When condensing unit is located below evaporator, and there is no possibility of trapping oil, size vertical runs same as horizontal runs. When condensing unit is located above evaporator, size vertical runs for velocity of 1,000-1,500 FPM and install proper (shallow) "P" traps spaced not over 10' apart on all tubing risers.

2) Discharge Lines: When discharge lines are field installed remote from compressor, size tubing at same velocities and with same "P" trap requirements as specified above for suction lines.

3) Liquid Lines: Size all liquid lines for maximum 2 PSIG pressure drop.

4) Hangers: F & M ring type or Unistrut assemblies with appropriate tubing clamps to support liquid, suction, and discharge lines individually. Space hangers or clamps 8' o.c. maximum.

5) Condensate Drain Piping: 7/8" O.D., or greater, Type L copper tubing piped from evaporators and air handlers to open drain, rigidly supported at walls 3' o.c. maximum, installed in such a manner that leaves 1" clearance space between wall and drain, and equipped with cleanout tee near evaporator or air handler. Adequately pitch piping toward floor drain, carry through wall of refrigerated areas.

6) Top quality valves of sizes and types necessary will be provided for proper control and adjustment of flow to both loops of each system.

D. Insulation: All refrigeration suction lines shall be covered with Armstrong "Armaflex Insulation" or equal of not less than 1/2" wall. Insulation shall be slipped on during tubing assembly wherever possible.

2.19 DEHUMIDIFIERS

A) The dehumidifiers used for photo archive applications must be fully regenerative non-dusting desiccant continuously operating dehumidifiers. This unit, therefore, shall be a Cargocaire brand unit utilizing a silica gel wheel. It shall be electrically reactivated and shall be sized as required. Special care must be taken that the quality of the reactivation air be such that full regeneration can take place in the reactivation cycle.

B) The units shall be located as shown on drawings. Adequate access to the servicing side of the unit must be provided with all other ducted connections made to and from the room.

C) Fully integrate the dehumidifier ducting and controls with the overall room control system to achieve the required levels of humidity in both rooms.

D) Size ducts and dampers so as to allow full range of adjustment necessary. Upon start-ups, monitor humidity levels in both rooms and adjust dampers regularly according to an agreed upon schedule until both rooms achieve satisfactory humidity control using the one overall system. Automatic isolation dampers must be installed to isolate all dehumidifiers when not in use or during defrost where applicable.

2.20 HUMIDIFIER

A) Furnish redundant electric steam generators for all areas. The heating elements shall be controlled by SCR with time proportioned signal from controller. Vapor shall be distributed directly to the manifold located at the fan unit.

B) The boilers shall be constructed of stainless steel. The liquid level control (feed water device) and low water safety cut-off control shall be solid state device with no moving parts, which can jam or break. The heating element shall be a low watt density to prevent burnout and extend life expectancy.

C) The packages shall be factory wired, assembled, and tested, and equipped with full safety features, pressure control relief valve, blow down drain valve, be UL listed, compact in size.

2.21 FILTRATION SYSTEM

A. Air shall be filtered through a series of filters consisting of one 30% (ASHRAE) ultra filter and two DPCC (Dry Processed Carbon Composite) adsorbers as manufactured by Extraction Systems, Inc. The DPCC adsorbers shall consist of activated carbon particles thermally and physically bound to a synthetic fiber matrix and specifically made for the removal of physically bound to a synthetic fiber matrix and specifically made for the removal of Hydrocarbons, acid gasses, and

formaldehyde. The dehumidified air shall be filtered prior to being conditioned and supplied back to the vault. Filters shall be installed to remove additional contaminants (See mechanical layout drawings).

2.22 DUCTWORK

A. All construction shall confirm to latest SMACNA codes etc.for medium velocity duct standards.

B. All ductwork fittings and accessories to be the same material as parent duct.

C. Support ductwork as necessary with trapeze hangers minimizing penetrations of ductwork. This duct must remain airtight. Seal all screws with silicone.

D. All elbows, reducers, offsets, transitions, turning vanes, take offs, etc., wherever required must conform to latest SMACNA codes, even if not indicated on drawings.

E. Reactivation duct by others. (make up and exhaust)

F. Reheat heaters, humidifier arm, and dampers to be installed in the ductwork.

G. All dimensions to be field verified.

H. Refer to drawing details of duct connections to the room.

I. Supply and return ductwork shall be constructed of min. 22 galvanized steel.

J. All ductwork in the interior of the building shall be insulated with 1-1/2" fiberglass insulation with foil wrapper. Process air duct for drier HC150 shall be 2" thick insulation.

K. All floor/penetration on concrete for ductwork by others.

2.23 ROOM INTERIOR

A. The layout of equipment shall be designed to maximize the cubage of storage area in this space while still providing access to storage and to any mechanical equipment in this space, while also providing the best layout for optimal operation of the system.

2.26 LIGHTING

A. Fluorescent lighting shall be installed in all rooms. Lights shall be supplied in both 2'

x 4' troffer and 2' x 4' surface mounted configuration. Refer to drawings for quantity and location.

B. Color Vault fixtures shall contain low temperature ballasts.

C. All lights shall be provided with "ultra violet" light filtering lens.

D. Lighting levels within the Color Vault shall be maintained at 50 F.C.

Black and White Vault shall maintain 70 F.C. levels. Switching of lights within the Black and White Vault shall be on three separate circuits to allow for reduced lighting levels during unoccupied times.

## 2.27 ROOM SERVICES

A. Electrical

1. This is detailed on the Vault drawings. Power supply to the control panels shall be a final connection by the electrical subcontractor. Power to each of the condensing units shall be through unfused disconnects with final connections by the electrical subcontractor. Power supplies listed are guides, not design requirements. Variations are acceptable if full coordinated with other trades.

B. Chilled Water

1. Chilled water is required and shall be provided within 5 feet of those units by the plumbing H.V.A.C. subcontractor. A drain for this water discharge will again be within 10 feet of the condensing units. Another drain for the coils in the room should be provided near the room. All condensate piping shall be provided and installed under this section.

C. Exhaust

1. The dehumidifiers generate reactivation air is to be exhausted by others.

D. Supply Air

1. Refer to Vault drawings for location of supply air connections for make up and ventilation. A maximum worst case condition of supply air will be 80 degrees F, 60% RH.

## 2.28 VAULT REQUIREMENTS AND CONNECTIONS SCHEDULE

A. **Note:** The following information is based on a Harris Environmental Systems Design. Values and sizes for other manufacturers may vary. Final room dimensions shall be as shown on the Architectural Drawings with minor dimensional changes as allowed only by prior agreement with the Architect. All bidders must include a schedule in their proposal outlining all required connections. and sizes.

B. Black & White Vault:

Climate: 60°F, ±1°F, 40% RH, ±2%
Size: As indicated on drawings.

C. Color Vault:

Climate: 40°F, ±1°F, 40%, ±2%
Size: As indicated on drawings.

## PART 3 - EXECUTION

### 3.01 INSPECTION

A. Examine and verify areas and work of other trades for:

1. Correct dimensions.

2. Properly located electrical services.

B. Report any unsatisfactory conditions to Architect in writing.

C. Do not proceed with installations until unsatisfactory conditions have been corrected and conform to project requirements.

### 3.02 INSTALLATION

A. Install vaults in accordance with the accepted manufacturer's recommendations, and approved shop drawings and submittals.

B. Install all components straight, plumb level and true. Install all service lines at right angles to walls and floors, except where required to pitch to drains.

C. Seal or otherwise insure that fastenings to rooms do not compromise vapor barriers or insulation. Seal between all piping and sleeves. (See limitations on seal materials above.)

D. Execute all necessary cutting, fitting, scribing, leveling and other work necessary to leave materials in final position ready for operation when the mechanical and electrical connections have been made. All the work shall be done in a neat and workmanlike manner by qualified mechanics. Furnish all work as may be required to anchor the equipment in place.

E. Carefully execute all cutting of holes and/or openings in the equipment as may be required for the installation of the plumbing, electrical, refrigeration, connections, ventilation, fire protection, etc.

F. All items shall suit space conditions. All dimensions given are exact unless noted otherwise, and in all cases where equipment is intended to occupy fixed locations or spaces, the physical conditions and configuration of the building, or space provided are to be reviewed for suitability. Notify Architect of any unsuitable situations prior to initiating work.

G. It is the intent of the drawings and specifications to describe complete systems and items. This contractor shall furnish all appurtenances and accessories which may not be specifically mentioned in the specifications or shown on the drawings, but which are required for the proper functioning of the equipment at no additional cost to the Owner.

H Furnish and install all the materials required to completely service the equipment within the unit itself. All electrical control switches, pressure reducing valves, pressure gauges, check valves, etc. shall be furnished under and installed under this section unless specifically excluded in the bid proposal and the approved shop drawings.

I If there should be any deviation between electrical and/or mechanical connections indicated on drawings and the final mechanical and/or electrical connections required for the proper operation and function of said equipment, this contractor shall include in his base bid all extra costs for all such additions and changes as may be required.

J. Trash such as crates, boxes, packing materials, and all other similar items, etc. shall be removed from the premises.

K. It is understood that anything called for on the drawing, which is part of the equipment, but not covered in the specifications, or anything covered in the specification, but not shown on the drawings, shall nevertheless be furnished as part of this contract.

L. The published standards of the National Sanitary Foundation, National Fire Protection Assoc., American Gas Assoc., American Society of Refrigeration

Engineers: "Air Conditioning Refrigeration Data Book Design", Underwriter's Lab. Inc. Publications "Electrical Appliance and Utilization Equip. List", "Standard 199 Commercial Electric Cooking Appliances" and OSHA will be considered as minimum requirements for equipment and installation of same. All equipment shall be manufactured and installed in accordance with these standards.

3.03 PERFORMANCE AND OPERATING TESTS

A. Provide all equipment for testing and perform all tests. Tests shall confirm that rooms conform to the following requirements:

1. Temperature control of ±1°F at sensor shall be maintained at all times in all rooms except during defrosts where applicable.

2. Humidity control of ±2% at sensor shall be maintained in all areas except during defrosts where applicable.

B. Operate system for a period of one month prior to substantial completion. Make all necessary adjustments in dehumidifying dampers, etc.

C. Owner's representatives shall be given the option of witnessing and confirming test results. Notify Owner's representative prior to test in writing.

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