

**THERMOLINEAR**  
**CONTROLLED ENVIRONMENTAL ROOM SPECIFICATIONS**  
**SUBMITTAL DATA AND SPECIFICATION DETAILS**  
**Print and fax to 513-345-2544**

ROOM NO.	EXTERIOR SIZE	
		LONG,
		WIDE,
		HIGH

#### 1.0 GENERAL

Walk-in Controlled Environmental Rooms specified under this portion of the specifications shall be of prefabricated modular construction. They shall be designed and constructed to allow fast and easy field assembly, disassembly, relocation and enlargement of unit by the addition of like modular panels. Over all size of walk-in shall be \_\_\_\_\_ x \_\_\_\_\_ x \_\_\_\_\_

High or as shown on plans.

#### 2.0 PANEL CONSTRUCTION

Standard wall, ceiling and floor panels shall be made in 46", 34", 23" and 11" widths. Corner panels shall be 90 degrees angle, 12" x 12". All panels shall be interchangeable with like panels for fast and easy assembly. Available heights with floor are 7'0", 7'6", 8'0", 8'6", 9'0", 9'6", 10'0", 10'6", 11'0", 11'6", 12'0", 12'6", (7'6" and 8'6" are standard). State desired clear inside room heights. Available heights without floor; with standard 2" Screeds are 6'10", 7'4", 7'10", 8'4", 8'10", 9'10", 10'4", 10'10", 11'4", 11'10", 12'4", (7'4" and 8'4" standard).

All panels shall consist of metal pans formed to precise dimensions. Metal finish to be as specified. Insulation shall be "foamed-in-place" urethane to bond permanently to the complete inner surfaces of both interior and exterior metal panels to form a strong rigid unit. Panels shall not have internal wood or metal support, framing, straps, or other non-insulating members. Each panel shall be 100% urethane insulation forming tongues and grooves to assure vapor and air tight joints and to prevent preinstallation damage and deterioration of exposed urethane surfaces.

#### 3.0 FLOOR CONSTRUCTION

- A. Floor type: Panels shall be fabricated similar to other panels and designed to withstand uniformly distributed stationary loads of 600 lbs. per square foot. Floor (will, will not) be recessed. Floor (will, will not) be covered by tile and grout or concrete wearing floor.
- B. Floorless: Provide 2" high. Screed, vinyl floor screeds. Screeds shall be coved or interior and exterior side and designed to sit flat on the floor for attachment by means of nailing or lag bolting through center or screeds. Wall panels shall lock to screeds on maximum 23" centers.
- C. Floorless (foamed Screeds): Provide 4" high x 4" wide foam screeds for walk-ins when installed next to a walk-in with 4" high floor panels. 4" high screeds also are used on combinations when one room has floor and the other room is floorless, and on floorless rooms installed in a building floor.

#### 4.0 INSULATION

Insulation shall be 4" thick rigid urethane, foamed-in-place to inner surface of metal pans. Urethane foam to have a thermal conductivity (K Factor) or not more than 0.118 BTU/hr/sq.ft. per degrees Fahrenheit/inch, and an overall coefficient of heat transfer (U Factor) of not more than .029. "R" Factor shall be 34. Prefabricated urethane foam panels shall be supplied with a fire hazard classification according to ASTM-E-84 as performed by Factory Mutual Insurance System

test procedure. Panels shall have a flame spread rating of 25 or less and a smoke density of no greater than 450. Every panel shall bear a certifying Factory Mutual label.

\*This rating is not intended to reflect hazards presented by this or any other material under actual fire conditions.

#### 5.0 METAL FINISHES

All metal finishes for panel skins shall be as follows:

- A. Exterior floor and ceiling shall be .040 patterned aluminum on all walk-ins, unless otherwise specified.
- B. Exterior wall shall be (select one of the following):
  - 1. .040 Patterned Aluminum
  - 2. 26 ga. Stucco Embossed Galvanized Steel (Standard)
  - 3. 20 ga. Type 304 #3 Finish Stainless Steel
  - 4. White Baked-On Enamel (Color Available)
  - 5. .040 Mill Finish Aluminum
- C. Interior walls and ceilings shall be (select one of the following):
  - 1. .040 Patterned Aluminum
  - 2. 26 ga. Stucco Embossed Galvanized Steel (Standard)
  - 3. 20 ga. Type 304 #3 Finish Stainless Steel
  - 4. White Backed-On Enamel (Color Available)
  - 5. .040 Mill Finish Aluminum
- D. Interior floor shall be (select one of the following):
  - 1. 14 ga. Galvanized Steel (Standard)
  - 2. 16 ga. Type 304 #1B Finish Stainless Steel
  - 3. 12 ga. Mill Aluminum

#### 6.0 PANEL LOCKING ASSEMBLIES

Assembly of walk-in shall be accomplished by "Insta-Loks" consisting of cam-action hook arm assembly set in one panel and a self-aligning, self-centering, pin assembly set in the matching panel. Rotation of the cam-action hook arm shall pull and lock panels together to form airtight, vapor proof joints. No metal straps or connecting rods shall be used inside the panels. Rotation of the cam-locks shall be operated from inside the walk-in through access ports that are sealed with vinyl snap-in closures.

#### 7.0 PANEL GASKETS

NSF approved double-bead vinyl gasket shall be applied to the tongue side of all panels, on both interior and exterior. Gaskets shall be impervious to stains, grease, oils, mildew, sunlight, etc.

#### 8.0 ENTRANCE DOOR AND FRAME

Each room shall be equipped with one standard 34" x 76" hinged-type, flush mounted entrance door and mounted in a nominal 4', 5' or 6' frame. Doors and

frames shall be listed by Underwriters Laboratories and bear the UL Seal of Approval and be equipped with the following:

- A. Door shall be equipped with a one piece perimeter PVC accordion type removable gasket with magnetic core at the top and along the side perimeter of the door. An adjustable wiper gasket shall be mounted along the bottom edge of the door.
- B. Latch shall be break-a-way type with cylinder lock and inside safety release handle so the door can be opened from the inside even if locked. A positive action hydraulic door closer shall be included to ensure gentle closing action of door to opening and to ensure positive closing of door. The latch shall be of high pressure zinc die cast with highly polished chrome finish.

- C. Hinges shall be nine inch modified strap, cam-lift, self-closing design with door lift off capability of high-pressure zinc die cast with highly polished chrome finish.
- D. Door frame shall consist of heavy reinforced steel "U" channel frame to encompass entire perimeter of opening, foamed-in-place to give extra support and rigidity to frame and to prevent racking, distortion, warping and twisting. An armored anti-sweat heater cable shall be run in a breaker strip located behind a removable heavy gauge stainless steel trim for easy access to heater cable. Heater cable shall be run under threshold consisting of a heavy reinforcement "U" channel, breaker strip and heavy gauge stainless steel threshold.
- E. Each door section shall be provided with an operating toggle switch and pilot light mounted on the exterior side of the door frame for 115 volt, 60 cycle, 1 phase A.C. service. All wiring shall be in concealed rigid conduit.
- F. Standard doors are available in the following net clear opening sizes: (7'6" high walk-ins; 24" x 76", 30" x 76", 34" x 76" x 42" x 76", 48" x 76", 60" x 78", 8'6" high walk-ins; 24" x 76", 30" x 76", 34" x 76", 42" x 76", 48" x 76", 60" x 78", 60" x 84"). Architect to specify number, location, and right or left hand swing of doors.

## 8.2 HARDWARE FOR LARGE DOORS

Standard hardware for doors 42" in width shall include a positive latch, adjustable strike and inside safety release handle so that the door can be opened from inside even when locked, 21" strap cam-lift heavy duty hinges, and 2-point top and bottom latches to ensure positive top to bottom closing and sealing of door. Latch body and case shall be of steel, hinged flange of steel and hinge butt of malleable iron. Latch and hing finish shall be cadmium plated.

## 9.0 PARTITION PANELS

Construction and finish of partition panels shall be same as the walls and shall lock into wall, ceiling and floor panels with Insta-Lok assemblies. Tongue and groove foam construction shall provide the thermal breaker between adjacent compartments.

## 10.0 HEATED PRESSURE RELIEF VENT

All rooms operating below 0 degrees C shall be equipped with a two-way heated pressure relief vent to equalize pressure between interior and exterior caused by defrost cycles and opening of doors. Electrical Service to be 115V/60/1Ø.

## 11.0 PEEP WINDOW

For visual observation into a walk-in cooler or freezer a 14" x 24" view window shall be installed in the walk-in entrance door. Window shall be a three pane heated tempered safety glass to prevent frost formation and fog.

## 12.0 EXTERIOR RAMP

Due to heavy usage, roll-in traffic with standard floor application and limited storage space, the room shall be equipped with an exterior ramp. Ramp shall provide a flush entrance, have a non-skid surface and fasten to the front of the room. Ramp shall be width of door x 36" deep.

## 13.0 INTERIOR RAMP

To eliminate a step up and to accommodate light duty roll-in traffic, the room shall be equipped with an interior built-in ramp. The interior ramp shall be NSF approved, have a non-skid surface and be equipped with a threshold and heater wire on freezer applications. Interior ramp shall be width of door.

## 14.0 TRIM AND ENCLOSURES

Trim strips matching the room exterior finish and fabricated to fit building conditions shall be supplied to close all joints between room and building walls. Enclosure panels matching the room finish shall be supplied to close off space between top of room and building.

## 15.0 CONTROL AND PERFORMANCE PARAMETERS

- A. TEMPERATURE RANGE AVAILABLE (Standard)  
-20°C to 0°C; 0°C to +10°C; +10°C to +40°C to +60°C.
- B. Control of temperature:  $\pm 0.2$ °C at the temperature measurement sensor.
- C. Temperature Uniformity =  $\pm 0.5$ °C is the variation in temperature between any points in the working area of the room as measured by a multipoint strip chart recorder using a minimum of twelve thermocouples located throughout the working chamber.  
Measurements shall be made 12" away from the interior room walls and 36" below ceiling.

## 16.0 INSTRUMENTS AND CONTROL SYSTEMS

### A. CONTROL PANEL ENCLOSURE

All operating controls, instrumentation, functional switches and control system shall be located in a single control panel center mounted at operator eye level. All operating modes and functions shall be clearly indicated by pilot lights and identified by silk screened legends. The functional switches and all operational control settings shall be mounted in a recessed area of the enclosure behind a lockable, hinged, transparent cover to protect against accidental misadjustment and unauthorized tampering. The control panel section of the enclosure shall be hinged for easy opening by authorized maintenance personnel. Once this panel is swung open, all relays, contactors, and other enclosed control circuit devices shall be readily exposed for simple maintenance purposes.

### B. MAIN TEMPERATURE CONTROLLER

Shall be an all solid state, bridge type, proportional, PID electronic controller, which utilizes a precision platinum resistance temperature sensor. Automatic reset and rate functions shall be incorporated to compensate for errors due to load variations. Setpoint and actual chamber temperature will be displayed by a digital L.e.d. indicator calibrated in one tenth (.01) of a degree Celsius increments. The actual chamber temperature shall be displayed continuously and will be independent of setpoint display. The accuracy of this instrument is greater than  $\pm 0.01$ °C over the entire range.

### C. TEMPERATURE SAFETY LIMIT ALARMS

In addition to the main temperature control system described above, an over the under temperature alarm system shall also be provided on the control panel. This alarm system shall be completely independent of the main controller and shall activate in the event the room temperature control point deviates out of tolerance in either direction. Alarm circuitry is an 'always alive' circuit. Upon failure of any component or if the room is shutdown, remote contacts, the alarm will close. The system shall contain separate high and low alarm setpoint dials and the setpoint shall be displayed by a digital indicator in degrees Celsius and .1 divisions. The alarm system shall be adjustable over the full range of the room. If either high temperature or low temperature alarm is activated, an audible alarm buzzer will sound and either a 'High Temp' or 'Low Temp' indicator will be illuminated on the control panel. The alarm buzzer shall remain activated until the out-of-condition is corrected and is acknowledged by the operator by depressing a reset button. If the high alarm is activated, power to the room heaters, lights, anti-condensation heaters and forced

air exhaust blower will automatically be cut off from the conditioned space. If the low alarm is activated, refrigeration will be automatically cut off. Separate remote 'dry' contacts are provided for off-site monitoring.

### D. TEMPERATURE RECORDER

Shall be a Honeywell all solid state 10" 7 day circular chart recorder. Unit shall utilize an independent platinum resistance thermometer for sensor. Pen is a disposable fiber-tip snap-on cartridge. Unit to include an ample supply of extra charts

## 17.0 CONDITIONING PLENUMS

### A. CEILING CONDITIONING PLENUM

Room air shall be continuously conditioned in the ceiling plenum. The motor driven blowers shall recirculate the room air continuously to insure the proper temperature uniformity. The ceiling plenum shall contain finned copper tube evaporator coil, heating elements and condensate drain pan. Condensate drain line shall be stubbed to exterior of chamber. There shall be no duct work or plenums occupying any wall or floor area thus permitting full use of the chamber interior for work benches and shelving.

B. Heating element shall be non-corrosive, low watt density nichrome elements that operate in the black region of the optical spectrum.

### C. MOTOR DRIVEN BLOWERS

Shall be of the direct drive, high efficiency type with overload protection and shall be specially designed to withstand the room environment. The motor driven blower shall be an integral part of the conditioning system.

## 18.0 AIR EXCHANGE (OPTIONAL ACCESSORY)

A forced air exhaust blower (45 CFM) shall be installed to provide fresh air to the chamber interior for people and/or animals. A variable potentiometer switch shall be located on the control panel to control the exhaust systems operation. A filtered air intake shall be supplied utilizing replaceable filters. This system is supplied with manually adjustable dampers.

NOTE: Large capacity exhaust systems must be sized to occupancy level of the chamber.

## 19.0 REFRIGERATION SYSTEM

A. The refrigeration system shall be specifically designed, engineered, and manufactured of adequate capacities to achieve and maintain the individual room temperature requirements and performance and shall balance in operation with the conditioning system. The system shall be factory assembled and factory tested prior to shipment. The refrigeration system shall be of a semi-hermetic design. The air cooled refrigeration system shall consist of compressor, evaporator, sight glass, drier, safety pressure switches, suction accumulator and all required insulated piping. The system design shall provide for the compressor to run continuously, thereby eliminating radio frequency interference and providing a longer compressor life. The condensing unit shall be mounted on top of the room unless otherwise specified. Vibration eliminators and mounting pads shall be utilized to attenuate noise and vibration such that personnel can work within the room and the surrounding area in comfort.

### B. DEFROST SYSTEM(When Applicable)

A quick, electric, automatic defrost system shall be provided on all rooms operating below 8<sup>±</sup> C. an automatic, 24-hour, adjustable time clock shall control length of defrost and the time of day of defrost cycle. A timer by-pass switch and pilot light shall be included for operation above 8<sup>±</sup> C or when required. Rooms operating below 0<sup>±</sup> C shall have automatically controlled drain pan heater and condensate drain line heater.

## 20.0 LIGHTING

A. Lighting systems shall utilize cool white fluorescent lamps. Lamps and ballasts shall be enclosed in vapor-proof fixtures. The fixtures shall be U.L. approved. Light fixtures shall be surface mounted and provided in sufficient quantity for minimum intensities of 70 foot candles measured 40" above the floor at 22<sup>±</sup> C.

B. Low temperature ballasts shall be provided, when specified, for cold rooms operating below 10<sup>±</sup> C.

C. Incandescent, vapor-proof lights shall be provided for rooms operating below 0<sup>±</sup> C. Lights shall be installed to provide uniform distribution of light.

## 21.0 ACCESSORIES AVAILABLE (Specify)

1. Programmable Ramp-Soak Microprocessor Controller for Temperature and/or Humidity

2. 115 Volt or 230 Volt Vaporproof Electrical Receptacles
3. Remote Mounted Condensing Units
4. Winterized Compressors – Outdoor Installation
5. Water Cooled Compressors
6. Interior Emergency Alarms
7. Increased Capacity Refrigeration Systems
8. Supervision of Installation by Others
9. Controlled Humidification System/Dehumidification system

## 22.0 INSTALLATION

- A. Deliver to job site, uncrate, and assemble all equipment specified herein. All debris and crating materials shall be removed. Components shall not be exposed to weather.
- B. Sections shall match without distortion. Door shall close and seal without binding.
- C. Electrical:
  1. Furnishing, installation and connection of control panel, complete with disconnects for incoming service and branch circuits.
  2. Incoming service to control panel mounted disconnects from junction boxes located above the environmental room.
  3. Interlocking control wiring between control panel and remote compressors or heaters between fan/coil unit and remote compressors or heaters, where required.
  4. Provide sealing fittings to seal conduit at all penetrations of environmental room wall or roof panels.
- D. Mechanical:
  1. Service line penetrations into rooms shall be properly sealed with silicone caulking.
  2. Insulate the exhaust duct for a minimum of (6 feet x 1.8m) beyond the collar.
- E. Manufacturer's Representative shall instruct owner's staff in the operation of room including controls, after completion of room startup. The operating and maintenance manual shall indicate sequential operation, startup and shutdown, with all pertinent control data and schematics.

## 23.0 CONTROLLED HUMIDIFICATION SYSTEM

The addition of water vapor shall be introduced into the conditioning plenum and not directly into the room area. Water vapor will be generated by a low watt density vapor generator sized for load conditions and operating conditions specified. The vapor generator shall be provided with a low water safety cutoff switch for heater protection, automatic water level control valve, and a safety overflow. A timed automatic flush system shall be used to ensure reliable maintenance for operation and avoid scale build up. The vapor generator shall be manufactured from corrosion free materials. Humidity controller will be solid state, electronic, proportional type controller. Automatic reset and rate functions shall be incorporated to compensate for errors due to load variations. Controller shall utilize digits calibrated in one tenth (1/10, 0.1) of a percent R.H. increments. The actual humidity level in the room shall be displayed continuously and independent of setpoint display. The accuracy of this instrument shall be  $\pm 2\%$ . The humidity sensors for this controller will be selected depending upon load conditions and desired operation levels.

## 24.0 CONTROLLED DEHUMIDIFICATION SYSTEM

The reduction of water vapor in the room below a dewpoint of 45<sup>Ⓟ</sup> F shall be accomplished with the use of an absorption type, desiccant dehumidifier. The dehumidifier shall contain a non-metallic, bacteriostatic inert honeycomb wheel containing lithium chloride as the desiccant. Electric reactivation energy shall be the standard method of reactivation and provisions must be made for the connection of supply and exhaust reactivation air. Process air connections from the dehumidifier shall be made in the ceiling conditioning plenum. "Outdoor" air shall be utilized to accomplish a .01" WG. Room pressurization. The dehumidifier

shall be controlled by a microprocessor based controller with automatic rule and reset functions.

Controller shall utilize digital

Setpoint and digital readout of humidity level in direct percent B.H. Panel meter will utilize L.E.D. digits calibrated in one-tenth (1/10, 0.1) of a percent R.H. increments. The actual humidity level in the room shall be displayed continuously and independent of setpoint display. The accuracy of this instrument shall be  $\pm 2\%$  RH. The humidity sensor for this controller will be selected depending upon load conditions and desired operating levels.

#### 25.0 TESTING

- A. Provide all equipment and instrumentation for testing and perform the specified tests.
- B. Control Setpoint: Verify temperature control of plus or minus 0.5 degrees Celsius at the room sensor.
- C. Temperature Uniformity: Measure the temperature on a horizontal plane 40 inches above the floor and within 12 inches of walls throughout the entire room. Temperature uniformity shall be plus or minus 0.5 degrees Celsius. Measure and record uniformity using a multipoint strip chart recorder utilizing a minimum of twelve thermocouples during a continuous 24 hour test period.
- D. Temperature Gradient: Verify that maximum temperature gradient from floor to ceiling does not exceed 1.0 degrees Celsius.
- E. Recovery Test: All rooms, except freezers, shall recover preset operating temperature within 5 minutes after door has been fully opened to (75 degrees Fahrenheit x 24 degrees Celsius) ambient for a period of 1 full minute.
- F. Internal Load Test: Each room shall maintain plus or minus 1.0 degree Celsius control when operating with the number of people, amount of ventilation, and internal heat gain of lighting and equipment as shown on the Environmental Room Schedule.
- G. Provide written reports, in duplicate, of all tests. Reports shall indicate procedures followed, instruments used, and tabulation of results.
- H. Witnessing of Tests: Owner's Representative shall be given the option of witnessing and confirming test results. Notify Owner's Representative, in writing, 10 days prior to tests.

#### 26.0 WARRANTY

- A. Provide a written warranty stating the product is free from defects in material or workmanship under normal use and service. Warranty shall become effective following the acceptance date and cover the following items for the noted duration:
  1. Ten year insulated panel warranty
  2. Five year compressor warranty
  3. One year parts warranty
  4. One year labor warranty