

## **AIB 1 & 2 WAY BLOW ACTIVE CEILING MOUNTED INDUCTION BEAMS**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. This section describes Active Overhead Induction Beams.
- B. Model AIB1 (one-way blow) or AIB2 (two-way blow) – Size 24” x 24”, 48” x 24”, and 72” x 24”

#### **1.02 SUBMITTALS**

- A. Submit as specified herein.
- B. Submit for review product data for all items. Data shall be complete with the following information:
  - a. Operating weights and dimensions of assembled units.
  - b. Performance data, including water-tube, airflow, water pressure drop, and air-side pressure drop, noise and air velocities.
  - c. Construction details, including materials of construction and fastening methods.
  - d. Certified test data for air and sound for each beam.

#### **1.03 WARRANTY**

- A. Units shall be warranted against failures on parts for a period of 18 months from shipment or 12 months from startup, whichever occurs first. The on-board heating and cooling coil shall carry a 1 year limited warranty on equipment failure.
- B. In-warranty labor shall be the responsibility of the installing contractor within the in-warranty period.

### **PART 2 - PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. NuClimate units shall be as manufactured by Zehnder Rittling, Model AIB1 or AIB2 supplied with diffusers to fit 24” wide by 24”, 48” or 72” long ceiling grid spaces as specified on drawings.
- B. Considering the innovative technology utilized to engineer and manufacturer the applied equipment specified for this project the following substitution considerations shall apply to any manufacture requesting prior approval:
- C. Fifteen day prior to bid date any manufacturer who would like to be considered shall submit the following information via certified mail to the design professional.

- a. Audited financial statements demonstrating the capital strength of the manufacturer to be considered given the nature of the owners' resource in the event of any product application challenges.
- b. Detailed organization chart listing all degreed engineers with resumes documenting their experience directly relating to high performance low pressure heat transfer systems.
- c. Company documentation of their channel of distribution for the manufacturer listing the local representative and the projects that the local representative has completed utilizing this specific technology.
- d. Complete listing of all installation the manufacturer has shipped nationally including building name, engineering firm, construction manager and contacts.
- e. Submittal documentation for every product proposed including schedule and performance date for each with physical and thermal calculations.
- f. Control sequence recommendations and guidelines to eliminate all indoor air quality concerns.
- g. Service organization credential listing all service technicians their location and experience servicing these specific technology systems.
- h. Any and all costs associated with using a substituted product shall be the responsibility of the Mechanical Contractor. This includes but is not limited to redesign fees, additional piping, and ductwork and controls required.

## **2.02 GENERAL**

- A. It is the design intent of these specifications to provide a fully integrated HVAC system with all parts working together. These induction beams need clean, dehumidified primary air from a dedicated outdoor air unit, hot and chilled water from a boiler and chiller, piping, and controls to coordinate each component to perform as intended. In addition to the items mentioned above that are specified on other sections in division 15, wiring and power requirements in division 16 may also be impacted. Changes, modifications, or substitutions on any component will impact all the other parts of the system and can not be made without a careful review of all related specifications.
- B. Induction beam unit shall be primary air flow units designed to induce a secondary airflow within the conditioned space using the primary conditioned air supply. Units shall be designed for ceiling installation with factory supplied hanging brackets. Hanger rods or other approved hanging system to be field supplied and installed in the field by installing contractor.
- C. Units shall be equipped with a 6" round duct primary air intake, one air plenum with air induction nozzles, chilled/hot water coil(s), supply and a return chilled water piping connections, supply and return hot water piping connections, one internally sloped 1 ½" deep drainable condensate pan with a ¾" condensate drain connection, and one combination supply / return air grille suitable for 1-way or 2-way coanda effect room air distribution. The grille shall have a hinged core to provide full access to the return air side of the coil. The unit shall be capable of inducing the secondary airflow within the conditioned space using the velocity pressure of the primary airflow. This secondary air must flow directly from the room to the unit and shall not use the ceiling as a return air plenum. Induction beams using the ceiling plenum as a return air path are not acceptable.
- D. Primary air plenum tubes shall be one piece. The primary air intake connection shall have the ability for rearrangement in the field by the installing contractor. Each unit shall have an end cap for the primary air plenum tube supplied by the factory.

- E. A static pressure port is factory supplied on the aerodynamic inlet tube so the balancing contractor can read via a pressure airflow gauge the inlet pressure to the induction beam and set the proper pressure to meet the airflow schedules on the drawings.
- F. Each AIB unit shall be equipped with a multiple row water coil for chilled water and hot water. Latent conditioning of the primary air supplied to the space shall be performed at the Dedicated Outdoor Air unit and controlled by exhaust air humidity sensors. Humidity within the building envelope is to be controlled to not exceed 55% relative humidity.
- G. All AIB units have one drain pan and one drain pan connection. This drain pan shall be 1 ½" in depth and sloped internally in the direction of the condensate connection. The drain pan should have an 1/8" slope in the direction of the drain pan outlet along the entire length of the drain pan to minimize the chance of standing water. The drain pan outlet connection shall be a ¾" copper FNPT fitting. The drain pan connection shall always be on the same side of the unit as the chilled water connections.
- H. When the Induction beam is being used for latent conditioning the drain pan shall be connected to a building drainage system by the installing contractor. For sensible only, non drainable applications, the sloped 1 ½" deep drainable condensate pan shall be provided with a plenum rated UL 501 approved safety float switch shipped loose for field installation by the installing contractor. Wiring of the float switch is to be done by the contractor in the field and connected to the DDC controls by the ATC.
- I. The AIB unit shall contain an integral factory supplied supply/return diffuser to evenly distribute the mixed primary air in a linear 1-way or 2-way blow coanda effect air distribution pattern. The diffuser shall incorporate a single slot in each direction (2-way blow) or double slot in one direction (1-way blow) for the supply air to the space. The diffuser shall fit into a standard ceiling grid. The grille return section shall be perforated. The grille shall be hinged for easy access to the interior of the unit. It shall have tool-less entry. Access to the unit interior shall occur through the grille face from within the occupied space. Grille latches and hinges shall be concealed. When AIB units are being used in surface mount applications such as gypsum board the manufacturer shall provide a surface mount trim kit. Surface mount trim kit shall be the same gauge and paint color as the beam grille. For exposed application Coanda wings shall be provided to maximize the room air throw.
- J. A test report showing the velocities within the space and the throw values shall be included in the approval process. Noise levels shall be certified below NC35 at 0.8" primary air inlet pressure. The primary air connection is a single 6" diameter aerodynamic inlet tube, which directs the primary air to the nozzles.

### **2.03 CASINGS**

- A. The entire unit shall be constructed of 20 gauge galvanized sheet metal. The exterior casing shall be powder coated white. The primary air plenum and nozzles shall be designed and configured to provide uniform air distribution with low noise operation to all nozzles.

## **2.04 INDUCTION NOZZLES**

- A. Induction nozzles shall be aerodynamically designed and made of DuPont Hytrel 4069 Engineering Polymers with a temperature range of -40 – 122 degrees and tested and rated by test method UL94 and UL746. Each nozzle shall incorporate a tapered design allowing the airflow to enter the nozzle more effectively and perform more efficiently without dirt build up.

## **2.05 WATER COIL ASSEMBLY**

- A. Coils shall be of the hot and chilled water type utilizing aluminum fins and copper tubes. Coils shall be two or four pipe configuration as scheduled. Coils shall be mounted vertically not horizontally. Coil connections shall be sweat connections or as indicated on the drawings. On 2-pipe units' coil connections shall be available on the right or left hand end of the unit. On 4-Pipe units' cold water connection shall be available on the right or left end of the unit and hot water connections shall be located on the opposite end as the chilled water connections.
- B. Each coil must be one flat plate assemblies with no interconnecting joints to minimize leakage. Coils shall be built of minimum ½" seamless copper tubing. Copper tube wall shall be a minimum .016 thickness. Coils shall be factory leak tested at 350 PSI water. Each coil shall be of the fin plate design surrounding the copper tube wall via fin spacing of 8 fins per inch. Fins shall be mechanically bonded to copper tubes. Each coil shall be enclosed on the ends with sealed flanges to eliminate leakage around the coil.
- C. A water coil assembly shall consist of a two row thick copper tube with aluminum fin coil(s) for cooling and heating. A drainable condensate pan shall be provided to collect any condensate that forms. Drip trays are unacceptable as a drain pan.
- D. Control valves for cooling and heating can control one or more induction unit in a given zone. Control valves for the units shall be supplied by the Automatic Temperature Control Contractor.

## **2.06 QUALITY ASSURANCE**

- A. All Induction Beams shall be tested for performance, throws, and sound levels. Test reports shall be submitted with contractor submittals.

## **2.07 CONTROL SYSTEM**

- A. All controls shall be provided by the Automatic Temperature Control Contractor.

## **2.08 OPTIONAL - ADDITIONAL HEIGHT FOR GRAVITY DRAINING**

- A. To accommodate long drain line runs the Induction Beam cabinet can be provided with an additional 3" of height. The additional height allows the drain pan connections to be 6" above the ceiling line instead of the standard 3".

## 2.09 OPTIONAL – EXTERIOR CABINET INSULATION

- A. The exterior of the beam cabinet and the primary air tube shall be insulated at the factory with Armacell model AP sheet insulation. Insulation shall be ¼” or ½” thick and shall meet the following criteria:
1. Thermal conductivity of 0.27 BTU-in/hr. ft<sup>2</sup> F per ASTM C 177 or C 518.
  2. Water vapor permeability of 0.08 (1.16 x 10<sup>-9</sup>) per ASTM E 96
  3. Water absorption % by volume of 0.2% per ASTM E 84
  4. Flame spread rating shall be 25 or less per ASTM E 84
  5. Smoke spread rating shall be 50 or less per ASTM E 84
  6. Upper temperature limit shall be 220F/105C
  7. Lower temperature limit shall be 70F/57C
  8. Specific compliance shall include ASTM C 534 Type II sheet grade 1, ASTM E 84, NFPA 255, UL 723, CAN/ULC S-102, UL94 5V-A, V-0, File E 55798, NFPA 90A, 90B, ASTM D 1056, 2B1, Mil-P-15280J Form S, Mil-C-3133C (Mil Std 670B) Grade SBE 3, MEA 107-89-M, City of Los Angeles – RR 7642, CGSB Can 2-51.40-M80, ASTM C 1534

## 2.10 OPTIONAL – LINT FILTERS

- A. Lint filters shall be supplied by the beam manufacturer as washable or disposable type.
- B. Washable filters are ½” in depth and have an aluminum frame with woven nylon mesh media.
- C. Disposable panel filters are ½” in depth and have fiberglass media. Disposable filter complies with UL 217V.

## PART 3 - EXECUTION

### 3.01 INSTALLATION - GENERAL

- A. Follow manufacturer’s installation instructions and recommendations for all equipment.
- B. Install Induction beams in ceiling in such a manner as to allow easy access to all controls.
- C. Use the hanging brackets on each unit which are supplied by the manufacturer. Induction beams shall be supported using field supplied threaded rod or other secure hanging systems.
- D. Provide primary supply air connection and seal with duct sealer after installation. A volume control balancing damper shall be installed at the branch takeoffs for each induction beam for the air balancing contractor. A static pressure port is factory supplied on the aerodynamic inlet tube so the balancing contractor can read via a pressure airflow gauge the inlet pressure to the induction beam and set the proper pressure to meet the airflow schedules on the drawings.
- E. Provide water supply / return connection and install shut off valves and temperature control valves.
- F. Connect the condensate drain to available building drains if required on plans. Connect and wire safety float switch if specified.