**PART 1- GENERAL**

* 1. **Summary**

This section describes the active chilled beams.

**1.02 Submittals**

Submit product data for all items complete with the following information:

1. Operating weights and dimensions of all unit assemblies.

2. Performance data, including sensible and latent cooling capacities, nozzle types, primary and total supply (primary plus induced) airflow rates, chilled (and where applicable hot) water flow rates, noise levels in octave bands, air and water side pressure losses and maximum discharge air throw values.

3. Construction details including manufacturers recommendations for installation, mounting and connection.

* 1. **Warranty**

Parts-only warranty shall be 12 months from date of shipment.

**PART 2- PRODUCTS**

**2.01 General**

Materials and products required for the work of this section shall not contain asbestos, polychlorinated biphenyls (PCB) or other hazardous materials identified by the engineer or owner.

**2.02 Design**

1. Furnish and install TITUS CBAL series two slot active chilled beams of sizes and capacities as indicated on the drawings and within the mechanical equipment schedules. The quantity and length of the beams shall be as shown on the drawings, without EXCEPTION. The beams shall be constructed and delivered to the job site as single units.
2. The face of the beam shall consist of a room air induction section of 50% free area perforated (*optional linear bar type*) induction section flanked by linear supply slots. The face section shall include hinged fastening on each side that allows the face to be swung opened from either direction for coil cleaning. Faces that are designed to be lifted out are NOT ACCEPTABLE. The entire visible face section shall be finished in white powder coat paint or as specified by the architect. All visible internal surfaces shall be flat black.
3. Beams shall be provided with side and end details which will allow its integration into the applicable (nominal 12 inch wide) acoustical ceiling grid as specified by the architect.
4. The beams shall consist of a minimum 20 gauge galvanized steel housing encasing the integral sensible cooling coil and a plenum feeing a series of induction nozzles. A single duct connection shall be provided on either the side or top of the unit. The use of multiple duct connections is NOT ACCEPTABLE.
5. Each beam shall be provided with a pressure tap that may be used to measure the pressure differential between the primary air plenum and the room. Airflow calibration charts that relate this pressure differential reading with the primary and beam supply airflow rates shall be furnished with the beams.
6. Beams shall be provided with connections for either 2 or 4 pipe water connections as indicated on plans and schedules. Four pipe configurations shall require separate supply and return connections for chilled and hot water. The coils shall be mounted vertically and shall be manufactured with seamless copper tubing (½” outside diameter) with minimum .016 inch wall thickness mechanically fixed to aluminum fins. The aluminum fins shall be limited to no more than ten (10) fins per inch. A horizontal collection tray shall be furnished under each coil section to collect any condensation that might occur during brief periods of improper operation. The coil shall have a working pressure of at least 360 PSI, and be factory tested for leakage at a minimum pressure of 500 PSI. Each chilled beam shall be provided with factory integrated manual air vents. (*OPTIONAL, coil shall be provided with factory integrated drain fittings.)* Unless otherwise specified, coil connections shall be bare copper for field sweating to the water supply circuit. Connections shall face upwards, be located near the left end of the beam (when viewing into the primary air connection). (*OPTIONAL, the chilled water coil shall be provided with NPT male threaded fittings*. *These fittings must be suitable for field connection to a similar NPT female flexible hose spigot and shall be at least 1½” long to facilitate field connection (by others).*
7. Beams shall be delivered clean, flushed and capped to prevent ingress of dirt

**2.03 Performance**

1. All performance shall be in compliance with that shown on the equipment schedule. Acoustical testing shall have been performed in accordance with ASHRAE Standard 200-2015.
2. Coils shall be rated in accordance with ARI Standard 410, but their cooling and heating capacities shall be established in accordance to ASHRAE Standard 200-2015 for the specific application on the inlet side of the submitted chilled beam.
3. Chilled water flow rates to the beams shall be limited to that which results in a maximum ten (10) foot head loss. Water flow velocities through the beam shall not exceed 4 FPS.

**PART 3- EXECUTION**

* 1. **Installation**

1. Coordinate the size, tagging and capacity of the beams to their proper location.
2. Chilled beams up to six feet in length shall be independently suspended from the structure above by a four (4) threaded rods of ⅜” diameter (provided by the installing contractor). For beams beyond six feet in length, six (6) threaded rods of ⅜” diameter shall be used. The upper end of the rods shall be suspended from strut channels that are a) mounted perpendicular to the beam length and b) at least four inches wider than the beam to facilitate relocation of the threaded rods along their length. The beam shall then be positioned above the acoustical ceiling grid and lowered into the grid module by adjusting the nuts connecting the threaded rods to the beam.
3. Before connecting the supply water system(s) to the beams, contractor shall flush the piping system(s) to assure that all debris and other matter have been removed.
4. Contractor shall perform connection of beams to the chilled water circuit by method specified (hard connection using sweated connection or connection using flexible hoses).
5. Flexible connector hoses shall be furnished by others (*optionally by the manufacturer*). Hoses shall be twenty four (12, 18, or 24) inches in length and suitable for operation with a bend radius as small as five (5) inches. Connector hoses shall consist of a PTFE lined hose with a wire braided jacket. The hoses shall be suitable for operation in an environment between -40 and 200˚F, rated for a least 300 PSI and tested for leakage at a minimum pressure of 360 PSI. Contractor shall assure that the chilled water supplying the beams has been properly treated in accordance to BSRIA publication AG 2/93.
6. No power or direct control connections shall be required for the operation of the chilled beam.
   1. **Cleaning and Protection**

1. Air and water connections shall be covered before shipment and remain so until final installation. Damaged material due to improper site protection shall be cause for rejection.
2. Clean equipment, repair damaged finishes as required to restore beams to as-new appearance.