Active Chilled Beams

# PART 1 – GENERAL

## RELATED DOCUMENTS

The requirements of the General Conditions, Supplementary Conditions and the following specification sections apply to all work herein:

1. (list related documents here)

## SUMMARY

Furnish and install Dadanco ACB40 (two way discharge) and/or Dadanco ACB50 (one way discharge) active chilled beam units herein specified in the lengths and quantities indicated on the Drawings.

## REFERENCE STANDARDS

ASTM-653
ASTM-B209
ASTM-C1071-05
ASTM-E84 25/50
UL 94 V-0
UL 2043
UL 181
ASHRAE 200

## SUBMITTALS AND PROPOSALS

The following submittal data shall be furnished according to General Conditions and Section 15 - - - and shall include, but not be limited to:

A. Performance Data:

1. Sensible cooling capacities based on room conditions *[BTUH]*2. Latent cooling capacities based on room conditions *[BTUH]*
3. Heating capacities *(where applicable) [BTUH]*4. Primary, induced and total airflow rates *[CFM]*
5. Airside pressure loss *[in H2O]*
6. Chilled and hot water flow rates *[GPM]*
7. Waterside pressure loss *[ft H2O]*
8. Supply air leaving temperature (primary + induced) in cooling and (where applicable) heating operation *[oF]*
9. Sound pressure levels expressed in NC including 3 dB room absorption *[NC]*
10. Sound power levels in octave bands *[125Hz – 4KHz dB]*

B. Mechanical Data

1. Unit weights and dimensions
2. Mounting bracket detail
3. Border detail for ceiling integration
4. Manufacturers recommendations for installation

## 1.05 WARRANTY

Comply with the requirements of the General Conditions and Section 15 - - -

# PART 2 - PRODUCTS

## 2.01 ACCEPTABLE MANUFACTURERS

If it complies with these Specifications, active chilled beams manufactured by one of the following manufacturers will be acceptable:

1. Dadanco

## 2.02 ACTIVE CHILLED BEAM UNITS

A. Active chilled beam units shall be as indicated on the Mechanical and Architectural Drawings and shall meet the capacity and acoustical performance requirements specified and indicated on the schedule and Contract Documents. Active chilled beam cooling and heating performance data shall be based on the specified room temperature and not an assumed temperature at the ceiling or the coil, unless specified on the schedules. Active chilled beam performance data shall be established by testing in accordance to ASHRAE standard 200.

B*.* All units shall consist of a casing manufactured from 20 GA G-60 galvanized sheet steel conforming to ASTM-653 standards. Casing shall house a water coil and a primary air plenum delivering air to a series of induction nozzles. A single round or elliptical air connection spigot shall be mounted on either side or top of the unit as indicated on the Drawings. All sheet metal joints in the primary air plenum and air connection spigot shall be sealed airtight. The overall height of the unit shall not exceed 9 ¾”.

C. The active chilled beam visible face shall comprise two linear supply air slots positioned either side of a 51% free area perforated room air induction section. Induction grille shall be released for access to the coil without the use of tools. The aesthetic appearance of both one and two way discharge chilled beams shall be identical. Induction air grille shall be manufactured from 20 GA sheet steel conforming to ASTM-653 standards. Nozzle plate shall be painted black. The entire visible face section including the supply air slots, end plates and induction grille assembly shall be painted standard white or specified color.

D. Primary air shall be discharged into the mixing chamber through multi-lobed induction nozzles. The size and quantity of nozzles shall be selected to provide the primary and secondary airflows at the inlet static pressure and noise levels specified. Nozzles shall be manufactured from UL 94 V-0 flame retardant thermoplastic.

E. Active chilled beams shall be fitted with a commissioning tube for measuring the static pressure differential between the primary air plenum and the room. The commissioning tube shall be accessible from the induction air grille and be sealed airtight with a removable plug or cap. Each active chilled beam shall be provided with an airflow calibration chart showing primary airflow rate for given nozzle configuration at different static pressures.

F. Active chilled beam borders shall be designed for flush integration in to a standard 24” wide module T-bar lay-in ceiling.

G. Secondary water coils shall be two or four pipe configuration as indicated on the schedules. The single horizontally mounted coil shall be manufactured with ½” seamless copper tubing with a minimum 0.016” wall thickness mechanically expanded into corrugated aluminum fins spaced at 10 FPI (fins per inch). Water velocity in the tubes shall be at least 50 FPM and not exceed 240 FPM. The coils shall have a maximum working pressure of no less than 300 PSI and be 100% factory tested for leakage. Coil connections shall be ½” or 5/8” O.D. bare copper for field sweating to the water circuit. Water coil connection handing shall be as shown on the Drawings.

H. Active chilled beams shall be delivered to site clean and flushed. Each unit shall be labeled with identification tagging and commissioning requirements for primary air and chilled water flow. Units shall be individually packaged in cardboard cartons and palletized on wooden skids.

I. The manufacturer shall provide the following options where marked on the Schedules and Drawings:

1. ¼” thick thermal insulation applied to the interior of the primary air plenum to prevent condensation forming on the outside of the unit casing and the interior surfaces of the primary air chamber. Thermal insulation shall be manufactured in accordance with ASTM C1071-05, UL-181 (Air Erosion) and ASTM E84 25/50 (flame spread and smoke density) standards.

2. Lint screen shall be installed within the unit casing between the air induction grille and coil and shall be removable without tools.

3. ½“ NPT male threaded connections fitted to the water coil, suitable for field connection to a ½“ NPT female flexible hose.

4. ½“ NPT female threaded connections fitted to the water coil, suitable for field connection to a ½“ NPT male flexible hose.

5. Active chilled beam borders shall be designed for integration into a 3/8” drop tegular ceiling tile in a 9/16” wide suspension grid.

6. The entire visible face including the induction grille and supply air slots shall be polyester powder coated to (specify special color)

J. The manufacturer shall provide the following accessories where specifically marked on the Schedules and Drawings:

 1. ½” Diameter, 18” long flexible hoses comprising of an EPDM lined hose with stainless steel wire braided jacket rated for a maximum operating pressure of not less than 300 PSI at 195°F. Hoses shall be 100% factory tested for leakage.

2. Galvanized steel round primary air balancing dampers with manual locking quadrant for installation upstream of the active chilled beam.

3. Trim kit to allow units to be installed in drywall or plaster ceilings. Trim kit is to be polyester powder coated color matched to the active chilled beam.

4. Provide constant airflow regulators (CAR’s) fitted upstream of the active chilled beam as shown on the Drawings and Schedules. Each regulator shall be preset and factory calibrated to the airflows indicated on the Schedules. Constant airflow regulators shall be provided as an assembly consisting of a UL 94V-0 ABS plastic body housed within a round sleeve for mounting in round duct. Each round sleeve must be fitted with a lip gasket to assure perimeter air tightness with the interior surface of the duct. All regulators must be listed per UL2043 and carry the UL mark indicating compliance. All constant airflow regulators will require no maintenance and must be warranted for a period of no less than five years.

# PART 3 – EXECUTION

## 3.01 INSTALLATION

All active chilled beam units shall be installed in accordance with the latest industry standards, per the manufacturer’s recommendations and as indicated on the Drawings.

A. Active chilled beams shall be independently suspended from the structure at four points for units up to and including six feet in length. Units longer than six feet in length shall be suspended from the structure with six support points. Units shall be suspended with either ⅜” diameter suspended rods or code approved suspension wire.

B. Air connections to the main primary air duct shall be made with flexible duct with all joints sealed and made airtight.

C. The piping system shall be flushed to remove all debris before connecting to the active chilled beams. Water connections shall be flexible hoses or hard connection using sweated fittings.

## 3.02 MOCK-UP INSTALLATION

Prior to installation of multiple active chilled beam units, the Contractor shall install a sample unit as a mock-up generally representative of a typical active chilled beam and ceiling installation. The mock-up installation shall be complete with piping, ductwork and water valves. The mock-up installation shall be located in one of the typical areas of the project. The Contractor shall advise the Engineer and Owners representative after the mock-up is complete and arrange a suitable time for inspection and review to determine any changes and modifications that need to be made for the installation to be acceptable to the Engineer and Owner. The Contractor shall provide the required modifications and additional follow-up field inspections as required without additional cost to the Owner.