

# AIR CONDITIONING AND REFRIGERATION Journal

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## Air Conditioning of Large Call Centres

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Call centres come under the classification of IT enabled services. Call centres are gaining ground in India especially in the metros and large cities where there is easy connectivity to the U.S. and other Western countries. Voice, accent and skills are important attributes in a call center.

Call centres work round the clock i.e. 24/7 operations and handle inbound calls and outbound calls, web based business, chat, e-mail, and a host of other services. Hence Call centres are also called “multi contact centres”.

Several major multi nationals like GE, Dell, Hongkong Bank, Citibank have their own Call centres located in India. India is the preferred location due to low labour costs, skilled manpower, dedicated professionals, relaxed statutory regulations and good connectivity.

Large Call centres are typically above 300 agents per shift and go as high as 2000 agents. Call centers (both voice and e-mail), BOP (processing back office like credit card verification, claims, data entry) and BPO (business process outsourcing like managing a complete function or process like pay roll) come under IT enabled services.

Multi national companies like GE and Hongkong Bank have their own standard guidelines for the architecture and interiors and also all services like air conditioning, fire alarm, electrical, BMS, fresh air requirements, etc. In these cases local architects, interior designers and consultants, find it relatively easy to develop similar facilities in India.

However many Indian builders and developers are leasing out their buildings to new companies or entering into this business to ride the current boom.

This article aims to lay down a basis of design as well as some technical details to be considered in the design of a HVAC system for large Call centers.

The architects/promoters/ builders brief is important and should have the following minimum information:

- Size of the building
- Occupancy levels
- Various areas besides the agents area
- Power and water availability
- Administrative and staff facilities required
- Level of sophistication required

## **Design Parameters**

### **Heat Load Estimate**

Preparation of a proper heat load of the various areas like agents areas, conference rooms, discussion rooms, server room, UPS room, back office rooms, gym, indoor games is important.

### **Temperature**

The indoor design temperature should be in the ASHRAE comfort envelope of 74-78°F for summer and 70-74°F for winter. Server rooms require a lower temperature of 70- 72°F.

### **Humidity**

Relative humidity levels should be in the range of 50 to 55%. Care should be taken to ensure that the equipment is not oversized for the required design as is it will result in a

shorter operating time with no dehumidification during the nonoperating period with a consequent increase in space humidity.

### **Lighting levels**

Large Call centres are similar to a great extent to large software development centres except for the high occupancy levels, round the clock operation and high lighting levels.

Lighting levels in the agents call areas are normally 400-450 lux which relates to 4 to 4.5 watts/sq. ft. Use of uniform lighting in the call area/halls is very essential to avoid dark spots and gray areas. Near day-light conditions in lighting have to be achieved as there should be no strain on the eyes of the agents. Use of compact fluorescent lamps, cat 2 fittings, electronic ballasts with extremely low wattage losses of less than 4 watts each and interference suppression of greater than 30 MHz is required to increase the life of lamps and lower power consumption as well as noise.

### **Equipment load**

Equipment load is important. All the agents will typically have a CPU of PIII configuration with a 17 inch monitor, head set and task light. The load per work station can be safely assumed at 200-250 watts of heat load depending on the type of equipment.

The Server room has high loads typically 4 kW of load per Server with the exchange room adding another 6-8 kW load.

The UPS room is also a high load area and a 40 kVA UPS will have a typical load of 8-10 kW.

The UPS uses SMF batteries and hence an exhaust system is not required.

### **Fresh air**

Fresh air requirement is extremely important and ASHRAE standard 62-1989 is very clear on this aspect. Normally the work station areas are non-smoking zones but due to high occupancy, fresh air at the rate of 20 cfm/person is normally considered for design purposes. Lower fresh air of 10 to 7.5 cfm/person will result in uncomfortable and stuffy environments during high occupancy periods.

A cost effective and energy efficient BMS (Building Management System) can be used to maintain the right amount of outside air intake into the conditioned area.

Use of IAQ (indoor air quality) sensor along with a variable air flow damper can maintain the desired level of maximum CO<sub>2</sub> permitted in the conditioned area.

Fresh air requirement is also important for rest rooms, gym, indoor games area and the creche.

## Specific Part Load Requirement

Call centers work round the clock and hence a 24 hour load analysis is extremely important for selection of chillers. Part loads will vary during summer and winter based on the business commitments of the call centres. Screw or centrifugal chillers are best suited for part load operations. Certain areas like back offices, administrative sections, gym, etc. are not used during night times.

Variable volume air handling units with VFDs should be used to reduce the energy consumption due to the varying load pattern. VAVs (Variable air volume units) in conjunction with a room temperature sensor and an occupancy sensor can be used for conference rooms, discussion rooms and waiting rooms. Ten to fifteen per cent bleed off even in the closed position of the VAVs is required to ensure some air movement in the area.

Use of primary and secondary chilled water systems with a variable speed secondary system along with 2 way motorized valves for the cooling coils will result in further energy conservation.

Careful analysis should be done while considering air cooled versus water cooled chillers. Water cooled chillers are now available with low power consumption of 0.5 to 0.6 kW/ton and as the heat loads in a Call center are quite high the use of a water cooled chiller will result in substantial energy saving. In the case of a water cooled machine a forced draft FRP tower should be used to conserve water losses due to driftage and spillage.

## Noise

Care should be taken to ensure that chiller pumps and other noise generating equipment is not placed too close to the work station areas. Care should also be taken to isolate noise from roof top mounted chillers by providing an acoustic shroud.

All AHU rooms and ducts should be acoustically lined to minimise noise levels. Duct velocities should not exceed 1500 fpm and accurate estimation of system static pressure is a must.

Acoustics of the work station area is very important as Call centers are mostly voice based and no echo or vibrations are permitted. Hence outside windows should have heavy drapes or double glass with shading.

## General

The kitchen and toilet areas require efficient and a high rate of ventilation and exhaust air because of the high occupancy rates. In case the gym, indoor games and creche areas are not to be air conditioned they too will require a ventilation and exhaust air system.

The Server room and UPS room should have a standby AHU or split AC to cater to the load in case of a breakdown in the main operating AHU as these areas are extremely vital.

## BMS

The technical maintenance staff is normally at the bare minimum. A simple and efficient central monitoring, control and energy management system (BMS) is therefore very important. Air conditioning consumes 30-40% of the total power in a call center and hence it is prudent to conserve energy by installing a good BMS. This can also take care of the fire alarm system, access control system, lighting control system, water and power management system.

Call centers are normally provided with a 100% DG back up facility (diesel generator). All the earlier energy conservation measures like VAVs, VFDs for AHUs, 2 way valves for AHUs, variable pumping system, screw or centrifugal chillers can be easily integrated with the help of a good Building Management System.

## Fire Safety

Air conditioning systems are generally accused of spreading fires and hence fire dampers should be installed in the supply air and return air paths and controlled by the fire alarm system. An AHU interlock to a fire alarm panel is a must. Use fire retardant insulating materials approved by TAC (tariff advisory committee) only. Pressurisation of stair case and lift shafts is a must and exhaust fans should run even in case of fire.

## Conclusion

While designing an HVAC system for a large Call centre it is essential to keep in mind the high occupancy levels, high lighting load, high equipment load, liberal fresh air intake requirement, low noise level, effective vibration dampening of all equipment, fire safety related issues and low operating cost of the air conditioning equipment.

