



# Air Conditioning for Play & Preschools

*Creating Masterminds of Tomorrow*

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There are around eight million Indian children and young people between the age of 6 to 14 years who are out-of-school as per UNESCO 2010 Education for All-Global Monitoring Report. On 1<sup>st</sup> April 2010, India joined a group of a few countries in the world, by enacting a historic law making education a fundamental right of every child. This will mean making elementary education an entitlement for children in this age group which will make it obligatory for state governments and local bodies to ensure education in a school in the neighborhood.

Government statistics reveal that almost ten million children go to schools for their preliminary education. A growing middle class, the growth in tier II and III cities, more job opportunities in various business sectors such as IT, retail, hotels, restaurants, automobile, finance and banking has made parents aware of the

importance of good education in job prospects for their children, and increased the demand for more, bigger and better educational institutions of all types. A great opportunity has now opened up for the private sector to build new schools, training institutes, colleges and universities to engage in the business of imparting education.

## **The Lack of Air Conditioning in Old Schools**

All or the majority of the existing schools and colleges, in the large cities including the very respected names, are not air conditioned, as they were designed and built years ago with thick walls, high ceilings and good cross ventilation for comfort. Some of the old, prestigious schools are located in hill stations at an altitude such as Musoorie, Dehradun, Nainital, Ooty, where the climate conditions are very favourable even during the peak

summer months of March, April and May, without the need of air conditioning or even ceiling fans.

## **Present Day Trends**

Today, school building designs and aesthetics have changed and great importance is being given to eco-friendly layouts with better lighting, ventilation and a temperature controlled environment. Play and Preschools, meant for children from 2 to 6 years are no exception,

## **About the Author**

**Anil Maheshwari** is an engineer with 41 years of HVAC experience and as an entrepreneur, he noticed the lack of adequate Play and Pre-Schools in the fast growing NOIDA area, where he lives and works and decided to enter the education field at this elementary level. With his education, experience and some research in school design, he built his first school that has now been functioning for almost a year. This article is based on this experience and is probably typical of many such schools in the country.

even though in some quarters, there is a strong belief that such schools should not be air conditioned due to fear of spread of allergies, coughs and colds that are quite common in young children. However, as lifestyles keep improving, air conditioning of schools is inevitable and it is important to understand the various possibilities that exist in the selection of an air conditioning system for such private promoters.

#### **Individual Air Conditioners**

Most schools find it very convenient and economical to install individual Window ACs in each classroom and where the installation of such units is not feasible, to opt for Split ACs of the High Wall type. In such installations, there is no provision whatsoever for a minimum fresh air requirement for the health of the students. Assuming at least 20-22 children in one room, it is important to introduce at least 150-200 CFM of fresh air to the room. Ceiling mounted Cassette Split ACs are an excellent substitute, at a slightly higher cost, as they have an in-built fresh air entry point in the casing of the air conditioner. Starting/stopping of such individual ACs has to be carried out at each unit, without a central control point, which may be a small disadvantage for large schools.

#### **Ducted Split Air Conditioners**

Such ACs are available in larger capacities up to 15/20 tons and one or two units can be connected to several classrooms at a lower cost than multiple Split ACs. However, the author does not recommend these, because of the danger of cross contamination between classrooms due to a common supply and return air ducted system.

#### **VRF Systems**

This type is relatively new and is popular because it combines the advantage of a central system with individual fan coil units for each classroom without cross contamination between rooms, and provides individual temperature control in each room. It avoids the high cost of chilled water piping required with a central chilled water system. The individual fan coil units and the temperature control feature can help take care of fewer students in a class due to absentees on a particular day, change the temperature setting if needed and completely switch off the unit, whenever diversity demands this. For instance, while most schools observe a five-day week for students, teachers are required to attend on Saturdays and some Day-Care Play and Preschools must operate longer working hours.

Independent TFA (Treated Fresh Air) units must be installed in the system to maintain fresh air ventilation standards and Heat Recovery Units can be added to reduce the capacity of the AC plant.

The school built by the author has such a system



*VRF and split units installed on the school terrace*

#### **Air conditioning related data for a Play School being run by the author in Noida**

Summer/Monsoon indoor temperature: 25°C.

Winter indoor temperature: 18°C - 20°C

Total electricity consumption cost is around Rs 15,000/month with 5 working days and Rs 6/unit of power

Total built up area : 1500 sq.m

Area air conditioned : 1000 sq.m

No. of class rooms and activity rooms: 8

Day Care capacity: 35 children

Class room capacity: 160-176 children

Auditorium: 150 sq.m, with seating capacity of 100

Type of plant: VRF system; Heat Pump: 1x16 HP and 2x14 HP

Air-to-air heat recovery systems: 5

Indoor units: 10 hide away ceiling units for class rooms, 5 cassette units for office area and 2 ceiling mounted concealed ductables for auditorium

Day Care has an independent 6 ton Split system using 2 cassette units with heating arrangements due to longer working hours. Also, local air purifiers are installed in Day Care to clean the indoor air

installed in it, with concealed type horizontal ceiling suspended fan coil units. More details of the systems are furnished in the box above.

#### **Winter Heating**

In north India, the winter season is very critical for young children in Play and Preschools, because this is the season for coughs and colds. It is strongly recommended that provision for winter heating be provided either by using a Heat Pump option in the case of VRF systems or electric heaters in ductwork or indoor air units, with suitable safety measures. Use of local electric heaters or convectors is not recommended from the safety point of view. With winter heating, the relative humidity will be reduced to around 30%, resulting in some health problems for young children and hence reliable humidifiers must be added into the system design.

#### **Air Purifiers**

If schools are located in congested urban areas or adjoining roads with heavy vehicular traffic, it is important to install and maintain air purifiers in each classroom to remove dust, exhaust fumes and other air pollutants, which tend to play havoc with a young child's breathing system.

#### **Building Design**

Though the school's architect is responsible for the building design, it

does not hurt to give him a few hints on how to build into the design some features that can help reduce the heat load on the air conditioning plant, reduce the capital cost to some extent and more importantly to save recurring cost of electric energy consumption. These are:

- Locate all windows so that they face the north with large glass areas to allow natural lighting in the classrooms and other functional areas during the day.
- Build 'double walls' with an air gap in between, facing the south and west sides with very little glass area and plan a corridor on these two sides between the class rooms and the outer wall to reduce solar heat.
- A terrace garden on the roof top can reduce heat transmission to the top floor class rooms.
- Use air-tight doors and window. UPVC windows are a good alternative since they are lead free. Double glass windows can be an additional advantage not only to reduce heat gain but also to cut down noise from the outside. Turn and tilt windows are safe for use by children.

### **Conclusion**

Squeezed between rising aspirations of young parents, mounting costs on all fronts and competitive pressures for better teachers and facilities, today's Play and Preschools must plan wisely for tomorrow's generation of toddlers, with proper environmental control of temperature, humidity and air quality. ❖

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