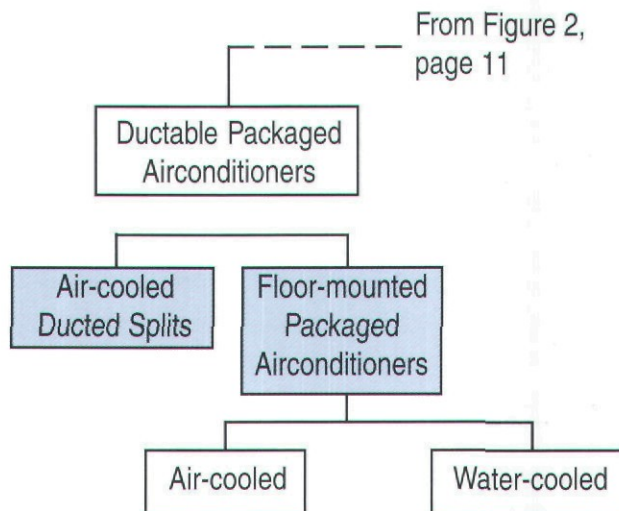




# Ductable Packaged Airconditioners

Ductable Packaged Airconditioning systems can be broadly classified as:

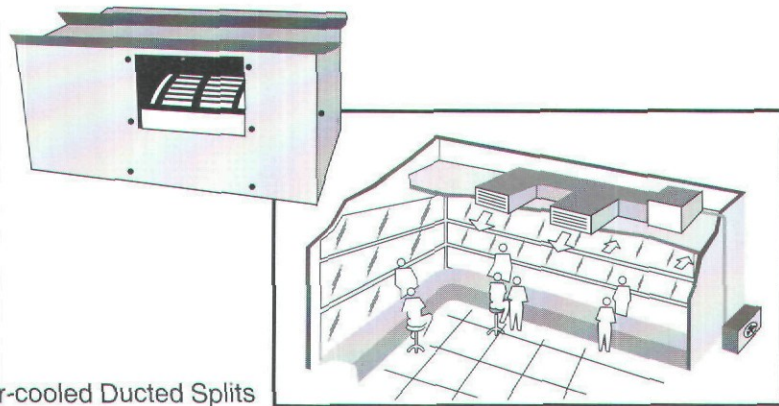
- Air-cooled Ductable Splits and
- Floor-mounted Packaged Airconditioners



**Fig. 11.** Branches of Ductable Systems

## Air-cooled Ductable Splits

The indoor portion of these units are located above the false ceiling and connected to the ducting. Consequently they do not occupy floor space. Currently in India they are available in 3, 5, 7.5 & 8.3 Ton capacities. Since the indoor unit is located above the false ceiling the space available limits the capacity to 8.3 Tons per unit.

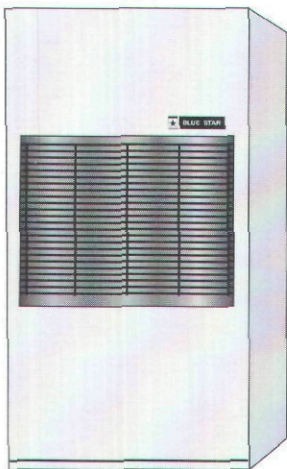


**Fig. 12.** Air-cooled Ducted Splits

Great care must be taken to select the location of the indoor units. Ideally, they must be located in corridors, above lofts, etc., where accessibility is not a problem. If the units are located in the conditioned area, attending to the machines can cause disturbance to the working area. False ceilings in the decorated interior areas may look aesthetically unappealing due to the trap door provided for maintenance.

## Floor-mounted Packaged units

These are shaped like cupboards and are typically placed in a small enclosure adjacent to the conditioned area. Inside this 'cupboard' like enclosure is housed the Compressor, Evaporator and the Evaporator blower. Currently in India these units come in capacities from 5 to 16.5 Ton Machines. Higher capacities (20 Tons and above) can be expected in the coming years.



**Fig. 13.** Floor Standing Packaged unit



These floor standing packaged airconditioners come in both the **Air-cooled** and the **Water-cooled** models.

- **Water-cooled units** require water. This water is used to cool the refrigerant in the condenser. Water is pumped through the shell & tube condenser which is a part of the packaged unit. This water is then sent into a 'cooling tower' outside the airconditioned room where the heat is dissipated to the atmosphere. Water-cooled units give higher capacity and are more energy efficient due to lower operating pressure.
- **Air-cooled models** are especially suitable for places where water is scarce or of 'hard' quality, or where there is no space for installing a cooling tower. The heat is removed by way of an air-cooled condenser with a fan blowing through it. This condensing unit is mounted outside the building on a sunshade or a terrace.

Though they require a small plant room, floor-mounted packaged units offer some clear advantages:

- They are service friendly because of easy accessibility.
- They can handle longer ducts by virtue of having more powerful fans.
- Large tonnages can be handled with less units.
- Interiors are clean and undisturbed since the machines are located in a separate plant room.





## Electronic controls

In recent times, many manufacturers of Ductable Packaged ACs offer electronic controls on their machines. As we saw in the case of non-Central Plant products, electronic controls offer the advantages of:

- Added energy-efficiency
- More reliability
- Better precision

Some manufacturers have gone further and offer **microprocessor control** on their Packaged ACs. Microprocessor controls provide hitherto unseen advantages in a Packaged AC.

Packaged ACs with larger capacities operate with multiple compressors. All compressors run only during 'full-load' conditions. At other times, one or more of the compressors switch off. With conventional controllers, the sharing of load amongst compressors is not uniform, resulting in excessive strain on some compressors. The micro-controller ensures uniform sharing of load, thus protecting early compressor burn-out, and increasing efficiency.



## Applications for Ductable Packaged ACs

In summary, Ductable Packaged AC products are:

- Air-cooled Ducted Splits
- Air-cooled Packaged ACs
- Water-cooled Packaged ACs

As we did with the non-Central Plant products, here too, let us study some typical applications of the above products.

### Air-cooled Ducted Splits

Ducted Splits can be characterised by the following positive and negative features :

#### Positives:

- Ceiling-mounted, hence no real-estate needed
- Available in lower tonnages (from 3 TR onwards)
- Ducts can carry cool air to every corner/room of the space that needs cooling
- Fresh air can be injected

#### Negatives:

- Tonnages are limited on the higher side (less than 10 TR)
- Service and maintenance inconvenient
- Mounting of the IDU requires careful planning. If located above pantry or wash areas, smells may be inducted into cooled space. If located above executive cabins, service may become a problem
- Removal of condensate water may cause problems



**Keeping these attributes in view, ducted splits are best suited for:**

- Offices, restaurants, banks, showrooms, clinics, bars, which are
  - Concerned about fresh air induction and removal of smells
  - Medium sized (500 to 1500 square feet)
- Larger spaces (using multiple units) which do not have the plant room space that a Packaged AC will need

### **Why?**

Medium sized restaurants and bars may not be able to provide a separate plant room for a Packaged AC. Also, the tonnage required may be within the range available among ceiling-mounted Ducted Splits.

At the same time, Ducted Splits can remove the food smell in a restaurant, and smoke and alcohol in the air of a bar, which a simple Mini-split or Window AC cannot.

Mid-sized spaces also need more fresh air than the simple opening and closing of a front door can provide. Hence, the Ducted Split is the best choice for such applications.



## Packaged ACs

Packaged ACs, both air-cooled and water-cooled, can be characterised by the following features:

### Positives:

- Larger tonnage range (5 to 16.5 TR)
- Multiple units can aircondition much larger spaces
- Conveniently located in separate plant room
- Can service and maintain without troubling inmates
- Fresh air is best circulated using these machines
- Drainage of condensate water poses no problem

### Negatives:

- Requires a separate plant room dedicated for the machine

### Keeping these in view, Packaged ACs are best suited for :

- Offices, showrooms, hospitals, clinics, restaurants, shopping malls, banks which are
  - Large spaces (over 2000 square feet)
  - Critically concerned about fresh air and constant 'air changes'
  - Needing ducting to carry cooled air to various rooms and even floors within the cooled space





## Why?

When it comes to airconditioning shopping malls, mega showrooms, large offices, mini hospitals, hotels – in other words any large spaces other than multi-storied complexes like five star hotels and sprawling structures like airports – Packaged ACs are an ideal solution.

The plant room that Packaged ACs require is not really a major constraint for such applications where space is available. The advantages outweigh this small disadvantage.

Fresh air is a major advantage that Packaged ACs offer. These AC systems can be designed for several 'air changes' per hour, whereby the system literally replaces the entire air within the space with fresh air from outside every so many minutes or hours as the application demands.

Air distribution within the space can also be designed to perfectly suit the interiors when using ducted Packaged AC systems.