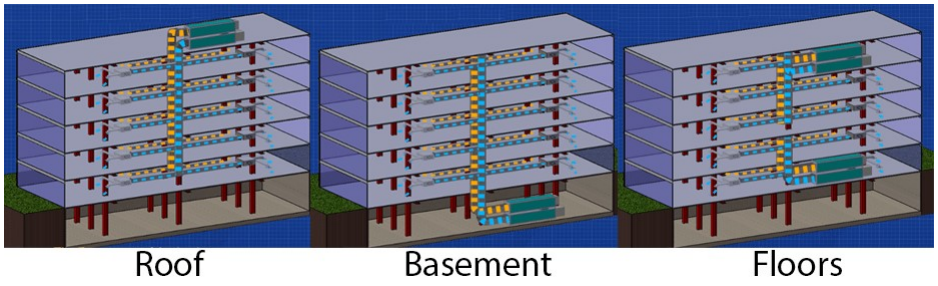
Materials and components of Air Handling Units (AHUs)

AHUs

What is a AHU?

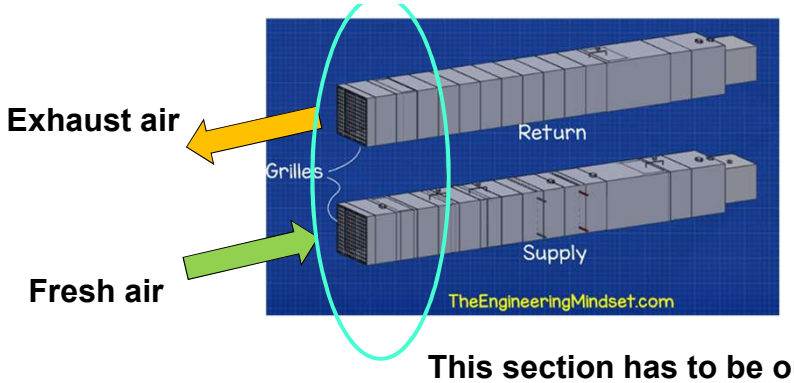
It is a box which contains all the sub-systems which allow the air to enter in certain conditions (design conditions) inside of a building. Also to extract the polluted air and pull it out of the building.

Position of an AHU



https://theengineeringmindset.com/air-handling-units-explained/

External sections and grilles:

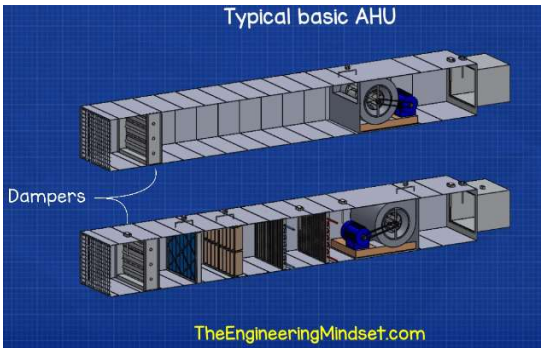


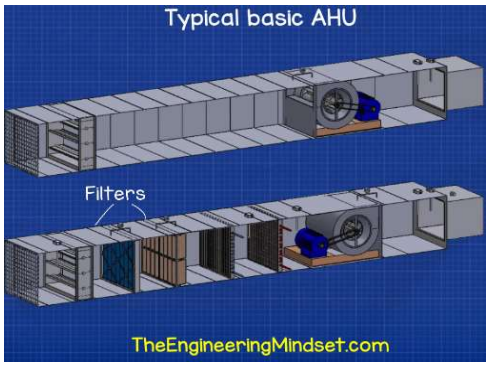
This section has to be outside

At the very front on the inlet and outlet of each housing we have a grille to prevent objects and wild life entering into the mechanical components inside the AHU

Dampers

The dampers are multiple sheets of metal which can rotate, controlling the amount of air entering





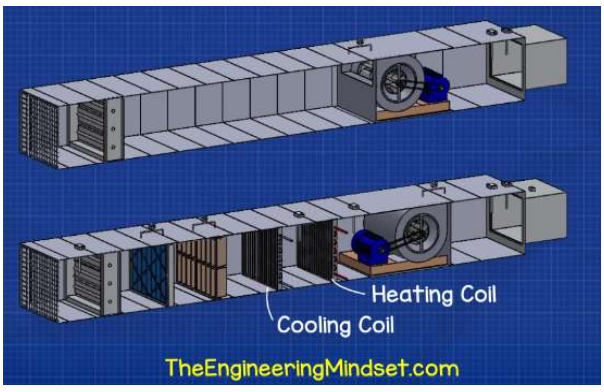
Filters

After the dampers there are some filters. These are there to try and catch all the dirt and dust etc.
from entering the AHU and the building.
Typically, we have some panel filters or pre-filters to catch the largest dust particles. Then we have some bag filters to catch the smaller dust particles

5

Cooling coil and heating coil

The next thing we find are the cooling and heating coils. These are there to heat or cool the air. This needs to be at a designed temperature to keep the people inside the building comfortable. Inside a hot or cold fluid, usually heated or chilled water, refrigerant or steam.



Depending on the type of plant (full-air or air and water based solution) the coils have to heat, cool and dehumidify the air

6

Adiabatic humidifier

Source: Condair

Adiabatic/evaporative humidification systems which use mechanical energy to generate water particles and/or evaporate water to/from media

Isothermal humidifier

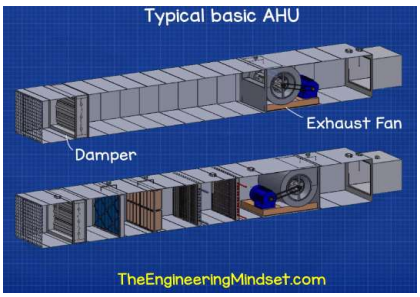
Source: Carel

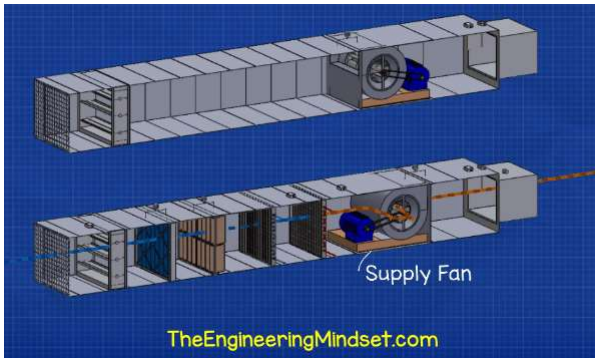
Isothermal/steam humidification systems which use electricity or fuel as an external heat source to change water to steam.

7

Supply Fan

This is going to pull the air in from outside and then through the dampers, filters and coils and then push this out into the ductwork around the building. Centrifugal fans are very common in old and existing AHU's but EC fans are now being installed and also retrofitted for increased energy efficiency.



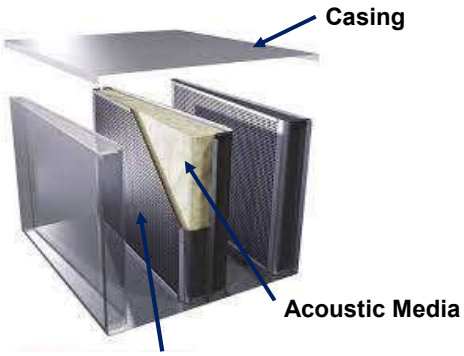


Exhaust Fan

The return AHU in its simplest form has just a fan and damper inside. The fan is pulling the air in from around the building and then pushing it out of the building.

8

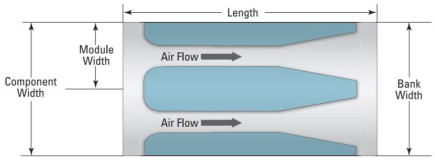
Rectangular silencers



Circular silencers

Source: Price Industries

Multiple Module, Single Component Silencer

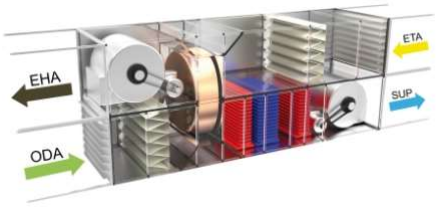


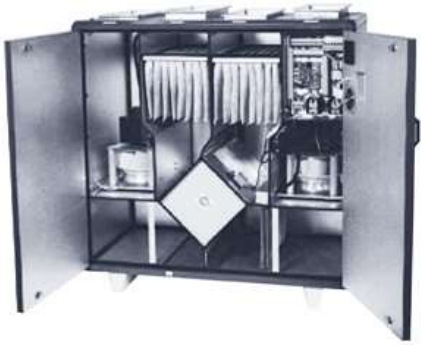
9

A very common configuration uses a duct sit in between the exhaust and the fresh air intake. This allows some of the exhaust air to be recirculated back into the fresh air intake, to offset the heating or cooling demand. This may be done when the required air flow rate in the building is high compared to the fresh air.

10

Possible AHU configurations





11

Technical figures for a heating/cooling coil:

BATTERIE DI RISCALDAMENTO AD ACQUA

Tubi in rame, alette in alluminio, 2 ranghi, passo alette non inferiore a 2 mm.
Attacchi filettati Gas. Telaio in lamiera zincata.
Flangia da 30 mm su entrambe le facce per il collegamento ai canali.
Condizioni nominali: aria entrante +5 °C - acqua 80-70 °C

MODELLO	PORTATA m3/h	POTENZA Kw	H x L mm	DP aria Pa	Peso Kg
BAAC 1319	1200	8,9	300 x 500	15	8
BAAC30	1800	13,0	360 x 600	16	10
BAAC41	2600	17,3	420 x 600	24	12
BAAC36	3600	27,6	480 x 700	41	13
BAAC50	5000	41,8	540 x 800	56	15

BATTERIE DI RAFFREDDAMENTO AD ACQUA

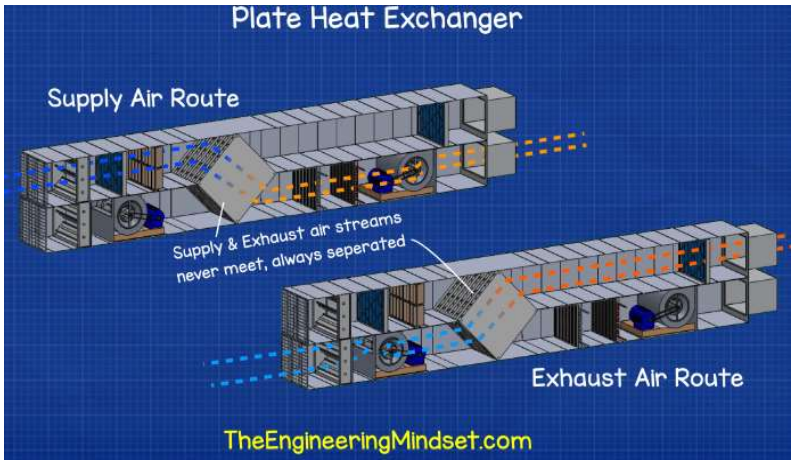
Tubi in rame diametro 6 mm, alette in alluminio, 6 ranghi, passo alette non inferiore a 2,5 mm.
Attacchi filettati Gas. Telaio in lamiera zincata. Flangia da 30 mm su entrambe le facce per il collegamento ai canali. Condizioni nominali: aria entrante 32 °C - 50% U.R. Acqua 7 - 12 °C

MODELLO	PORTATA m3/h	POTENZA Kw	H x L mm	DP aria Pa	Peso Kg
BAAF12	1200	12,7	300 x 500	110	16
BAAF18	1800	17,5	360 x 600	115	20
BAAF26	2600	23,6	420 x 600	160	22
BAAF36	3600	33,2	480 x 700	170	27
BAAF50	5000	47,6	540 x 800	190	32

Heat recovery units

13

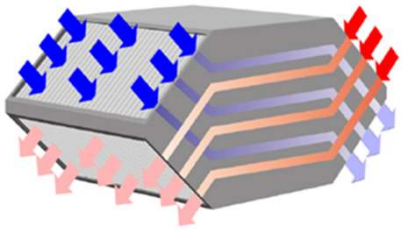
Plate heat exchanger



The most common and widely used system (efficiency around 50%)

14

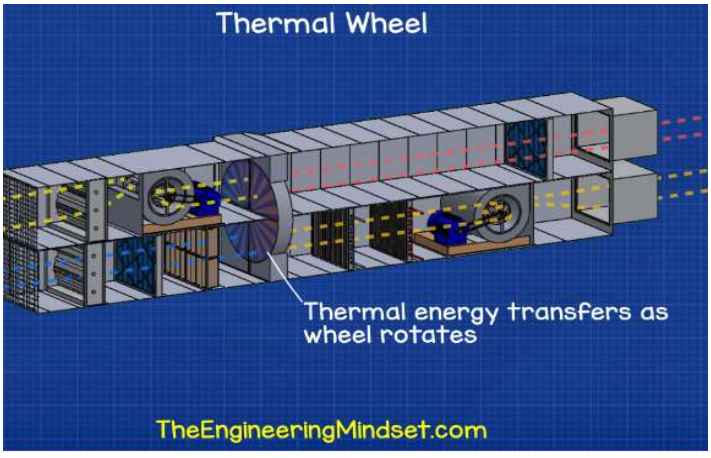
Counter-flow plate heat exchanger



- High efficiency (nominally up to 93%)
- Solution for small and medium air volumes (residential or commercial applications)
- It could be made of plastic or aluminium

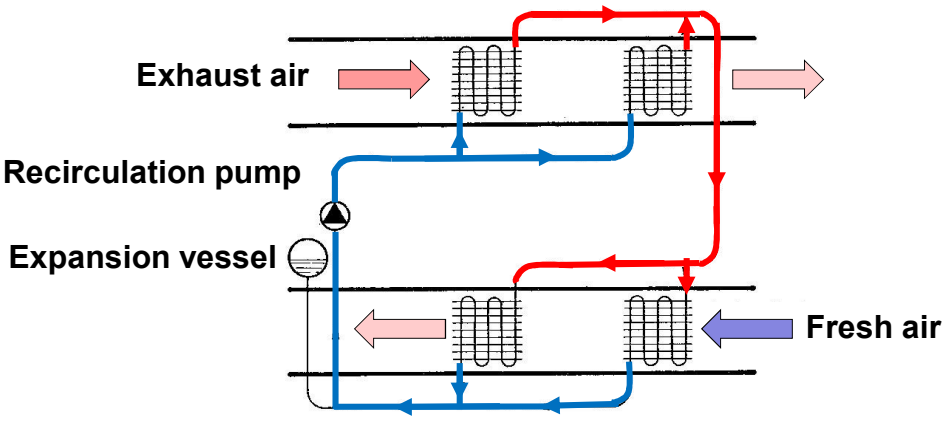
15

Thermal wheel



16

Run around coil

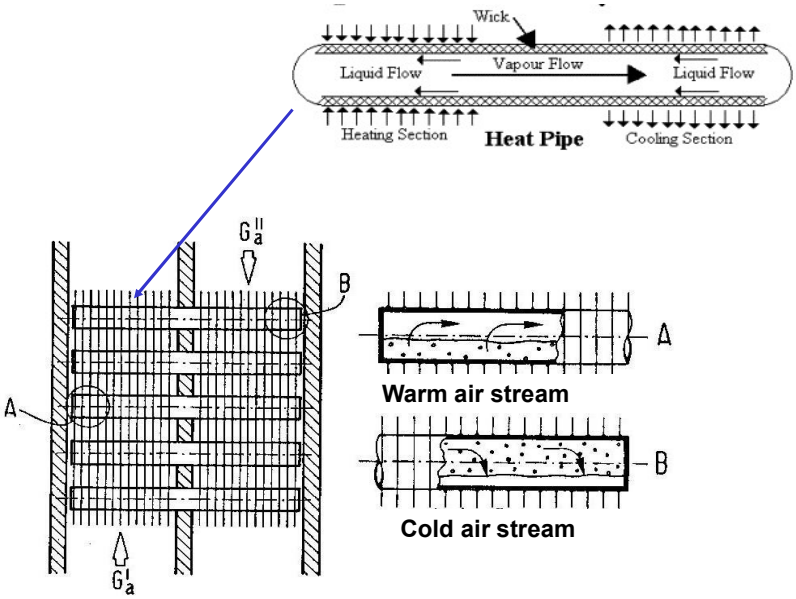


Commonly used:

- **when exhaust and fresh ari are distant**
- **pump for water or glycol-water mixture**
- **to avoid cross contamination odf air streams (operating theatres)**
- **heat recovery from exhaust from WCs**

17

Heat pipe



18

Heat recovery via a heat pump (thermodynamic heat recovery)

- It is basically a heat pump
- The heat moves from the exhaust to the fresh air via compression
- No cross contamination
- Without a plate heat exchanger the heat can be used for heat recovery and supply air at temperature > 20°C. Considering just the heat recovery (from outdoor air to 20°C the efficiency is about 50%
- Originally it has been proposed as solution without the heat recovery. Today a plate heat exchanger is also proposed by some manufacturers