

Lecture-6-

Air handling unit and fan coil unit وحدات مناولة الهواء وملف ومروحة

Air handling unit(AHU):

An air handling unit is a device used to condition and circulate air as part of a heating , ventilating, and air conditioning (HVAC)system. Handler is a large metal box containing a blower, heating/cooling coil, filter racks, sound attenuators and dampers. Air handling unit usually connected to the ductwork that distributes the conditioned air through the building and returns it to the AHU.

Types of Air handling units:

(1) Built-up apparatus where the casing for the conditioning equipment is fabricated and installed at or near the job site;

اجهزة تصنع وتنصب في او بالقرب من موقع العمل

(2) Fan coil equipment that is manufactured and shipped to the job site, either completely or partially assembled; and

اجهزة ملف ومروحة مصنعة و مشحونة الى موقع العمل اما كليا او تجمع في الموقع

(3) Self-contained equipment which is shipped to the job site completely assembled.

اجهزة قائمة بذاتها (كاملة التصنيع ومجمعة) تشحن الى موقع العمل . مع هذا الترتيب، يمكن إتمام التثبيت بمجرد توصيل مجاري الهواء وتجميع وتركيب الملحقات

Location:

The locations of the air handling apparatus directly influence the economic and sound level aspects of any system. Locating apparatus is not recommended in the conditioned space or adjacent to areas such as conference rooms and sleeping quarters.

The upper floor equipment handles approximately the top 20 to 30 floors and the lower floor equipment is used for the lower 20 to 30 floors.

Classifications of air handling unit:

1- Air handling with combination coil

وحدة مناولة الهواء بملف مشترك

2- Air handling with dual coils

وحدة مناولة الهواء بملفين

Parts of AHU with combination coil

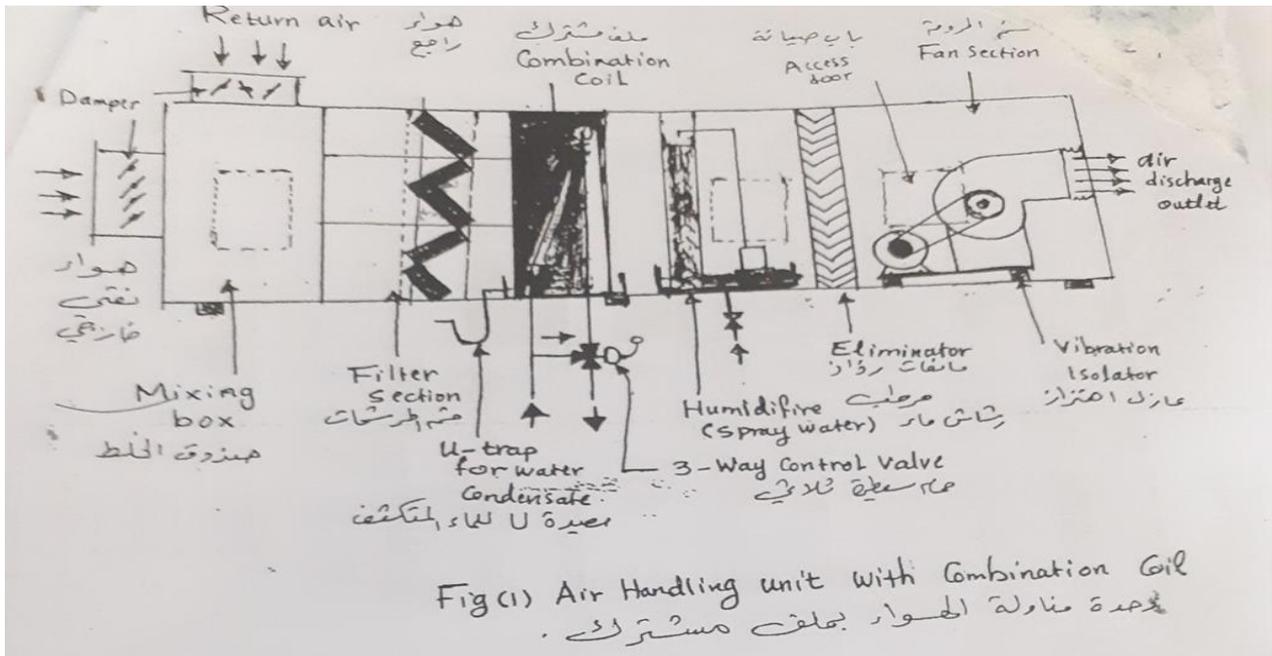
1- Mixing box

2- Filter section

3- Combination coil

4- Humidifier

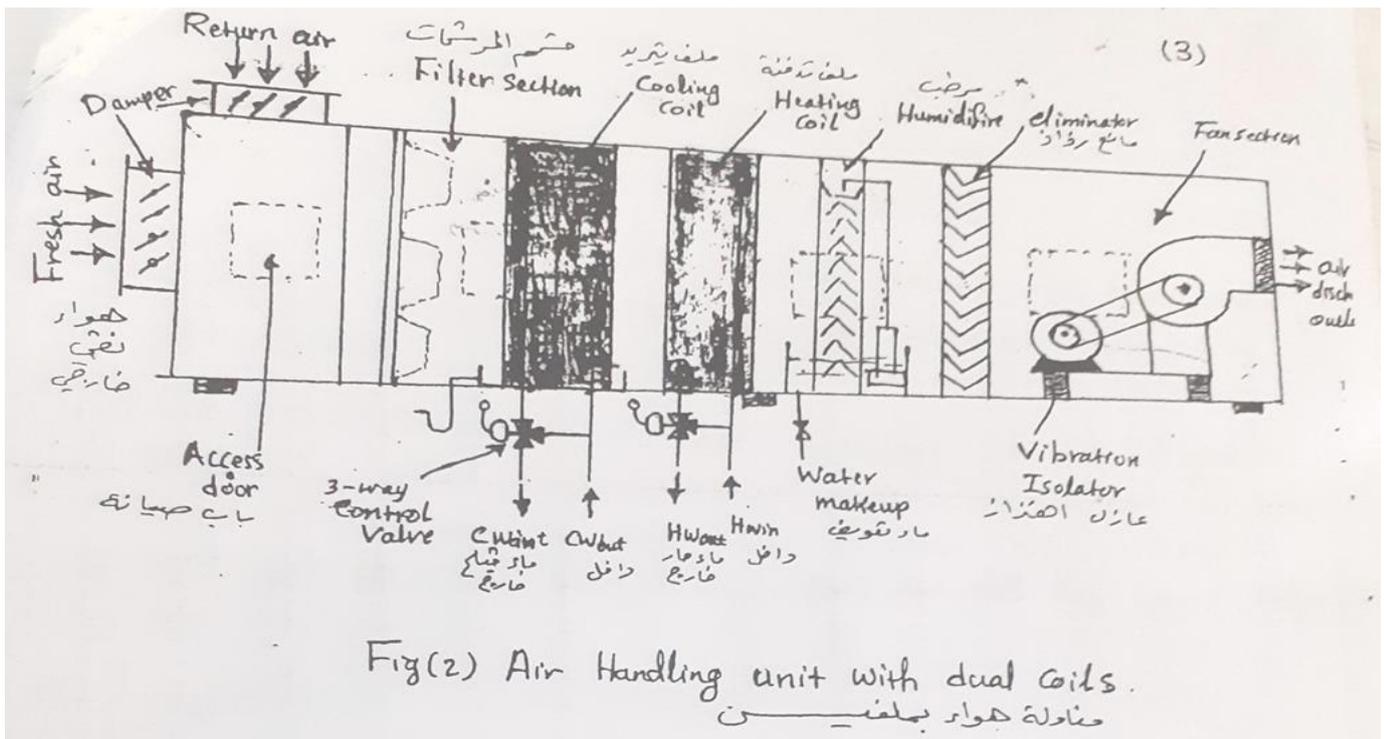
5- Fan section



Parts of AHU with dual coils

- 1- Mixing box
- 2- Filter section
- 3- Cooling coil
- 4- Heating coil
- 5- Humidifier
- 6- Eliminator
- 7- Fan section

مانعة رذاذ



Options of air handling units:

الخيارات الاضافية لمناولة الهواء

- 1-Copper fins زعانف نحاسية
- 2-Pre-coated Aluminum coils ملف الألمنيوم ابتدائي
- 3-Stainless steel drain pan حوض تجميع الماء المتكثف مصنوع من الفولاذ
- 4-Flange coil connectors موصلات الملف
- 5-Expansion valve for direct expansion coils صمام تمدد ثرموستاتيكي لملفات ذات التمدد الجاف
- 6-Noise attenuator كاتم الضوضاء
- 7- Heat recovery device اجهزة استرجاع الحرارة

Component features:-

الاجزاء مميزات

1-Casing of construction: بناء الغلاف
Structure frame is made of extruded Aluminum, that has excellent mechanical characteristics.

هيكل مصنوع من الألمنيوم المبتوق ، والذي يتميز بخصائص ميكانيكية ممتازة

2- Insulation: العزل الحراري
For best thermal and acoustical performance, all components are internally insulated with fiber glass having black glass issue facing.

للحصول على أفضل أداء حراري وصوتي ، عندما يتم عزل جميع المكونات داخليًا بألياف زجاجية تحتوي على واجهة من الزجاج الأسود.

3- Fan section مقطع المروحة
Double inlet double width centerfugal fans are standard supply. The impellers can have forward curved or backward inclined or airfoil profile depending on the requirements.

مراوح الطرد المركزي ذات المدخل المزدوج تجهز الهواء بمعدل قياسي. الريش يمكن أن تحتوي على شكل منحنى أمامي أو مائل للخلف أو مائل حسب المتطلبات.

4- Motor:- المحرك الكهربائي
The motor is mounted on adjustable base. For prevent noise and vibration transmission.

محرك مركب على قاعدة قابلة للتعديل. لمنع الضوضاء والاهتزاز. محرك المروحة مغلق تمامًا ومبرد بالمروحة

Fan coil units (FCU):-

A fan coil unit is a simple device consisting of a heating or cooling coil and fan. It is a part of an HVAC system found in residential, commercial, and industrial buildings. Typical a fan coil unit is not connected to duct work, and is used to control the temperature in the small space where it is installed, or serve multiple spaces. It is controlled either by a manual on/off switch or by thermostat.

وحدة ملف المروحة (FCU) هي جهاز بسيط يتكون من ملف تدفئة أو تبريد ومروحة. هذا النظام هو جزء من نظام HVAC الموجود في المباني السكنية والتجارية والصناعية.

Application of FCU:

FCUs are typically used in spaces such as unoccupied storage rooms, corridors, loading docks. In high-rise buildings, fan coils may be stacked, located one above the other from floor to floor and all interconnected by the same piping loop.

Type of FCU:

Fan coil units are divided into two types:

1- Two-pipe fan coil units:

Two pipe fan coil units have one (1) supply and one (1) return pipe. The supply pipe supplies either cold or hot water to the unit depending on the time of year.

2-Four pipe fan coil units

Four pipe fan coil units have two (2) supply pipes and two (2) return pipes. This allows either hot or cold water to enter the unit at any given time. Since it is often necessary to heat and cool different areas of a building at the same time, due to differences in internal heat loss or heat gains, the four (4) pipe fan coil unit is most commonly used.

Note:Fan coil units may be connected to piping networks using various topology designs, such as "direct return", "reverse return", or "series decoupled".

The parts of FCUs:

- 1-Control valve (modulating type)
- 2-Fan (usually three speeds)
- 3-Filters for the purification of the supplied air
- 4-Strainers for the filtration of chilled water
- 5-Cooling coil/Heating coil

مصفي لتصفية الماء المثلج

Unit configurations:

- a. horizontal (ceiling mounted)
- b. vertical (floor mounted).
- c. Wall mounted

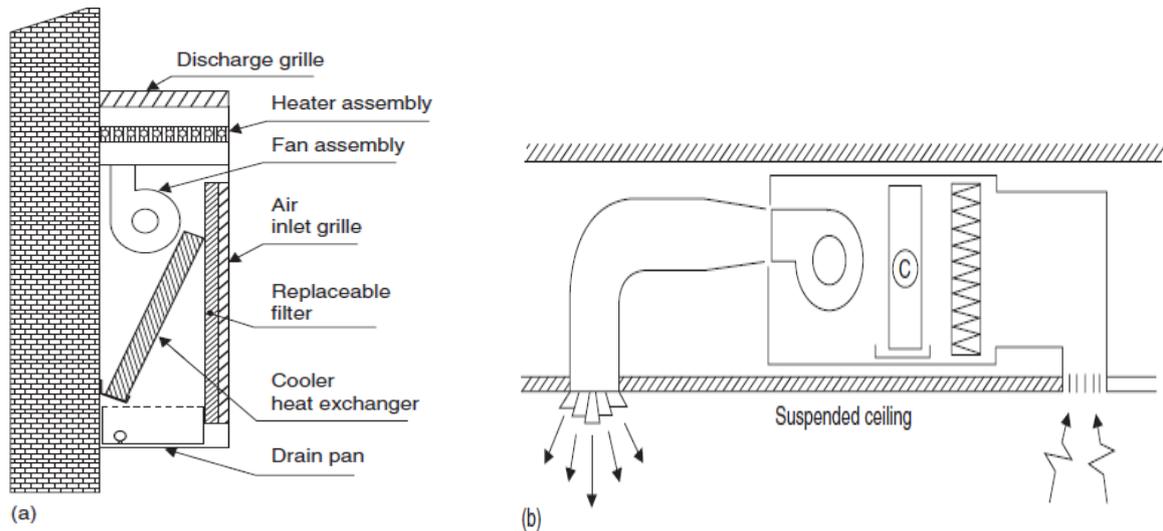


Figure: Fan coil units. (a)Wall mounted (b) ceiling mounted

The advantages of this type of system are the following:

- Individual control for zone or office, including heating in some zones and cooling in others
- Relatively low cost of standard units
- Simple control system.

The disadvantages are as follows:

- Limited flexibility with standard units – all operating parameters fixed by the manufacturer
- Limited ability to control air distribution
- Limited control of fresh air input, if any, so that advantage of free cooling cannot be taken
- Normally only simple dry bulb control is provided, although some specialist units incorporate electronic control systems and humidifiers
- Noise levels may be higher than central air handling units
- Maintenance and servicing can disrupt occupants of the room and there is a risk of damage to the room fabric by virtue of all services and connections within the room.

يمكن للصيانة والخدمة أن تعطل شاغلي الغرفة وهناك خطر تلف نسيج الغرفة بسبب جميع الخدمات والتوصيلات داخل الغرفة.

What is the difference between air handling unit and the fan coil unit?

- 1-AHU is generally a bigger system than FCU.
- 2-AHU is more complex than the FCU and that AHU are often used in bigger spaces.
- 3-AHU system usually channels air through ducts where FCU don't have any ductwork.
- 4-AHU system treats outside air while FCU system basically recycle the air.
- 5-AHU has sections for reheating and humidifying while FCU does not have any.
- 6-FCU is often observed to be noisier than the AHU.

Note: FCUs are supplied with pre-cooled air coming from fresh air handling units. To further cool the supplied air fan coil units usually use chilled water coming either from chillers or a heat exchanger.

ملاحظة: يتم تزويد وحدات FCU بهواء مبرد مسبقاً قادم من وحدات معالجة الهواء النقي . لمزيد من التبريد الإضافي ، تستخدم وحدات ملف مروحة الهواء المزودة عادةً مبردة يأتي الماء إما من المبردات أو المبادلات الحرارية.