



HVAC Equipment Selection, Layout, and Space Planning

An Online Continuing Education Course for Engineers

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Credit: 6 Hours / 6 PDH / 6 CPD

HVAC Equipment Selection, Layout, and Space Planning

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Heating, ventilation, and air-conditioning (HVAC) systems control the overall climate and air quality in a building. Centralized chilled water and hot water systems are commonly used for cooling and heating large commercial buildings. Since centralized equipment (chillers, boilers, furnaces, air handling units, etc.) are very large and bulky, these take up significant space. You won't see the machines when you enter the building, but in practice, a significant area of the building is dedicated to the HVAC equipment.

HVAC engineers and designers work with the architectural space to make the most aesthetically pleasing, comfortable, and efficient environment to live. However, before an HVAC system can fit into a building, it's important to have the knowledge of how they properly function.

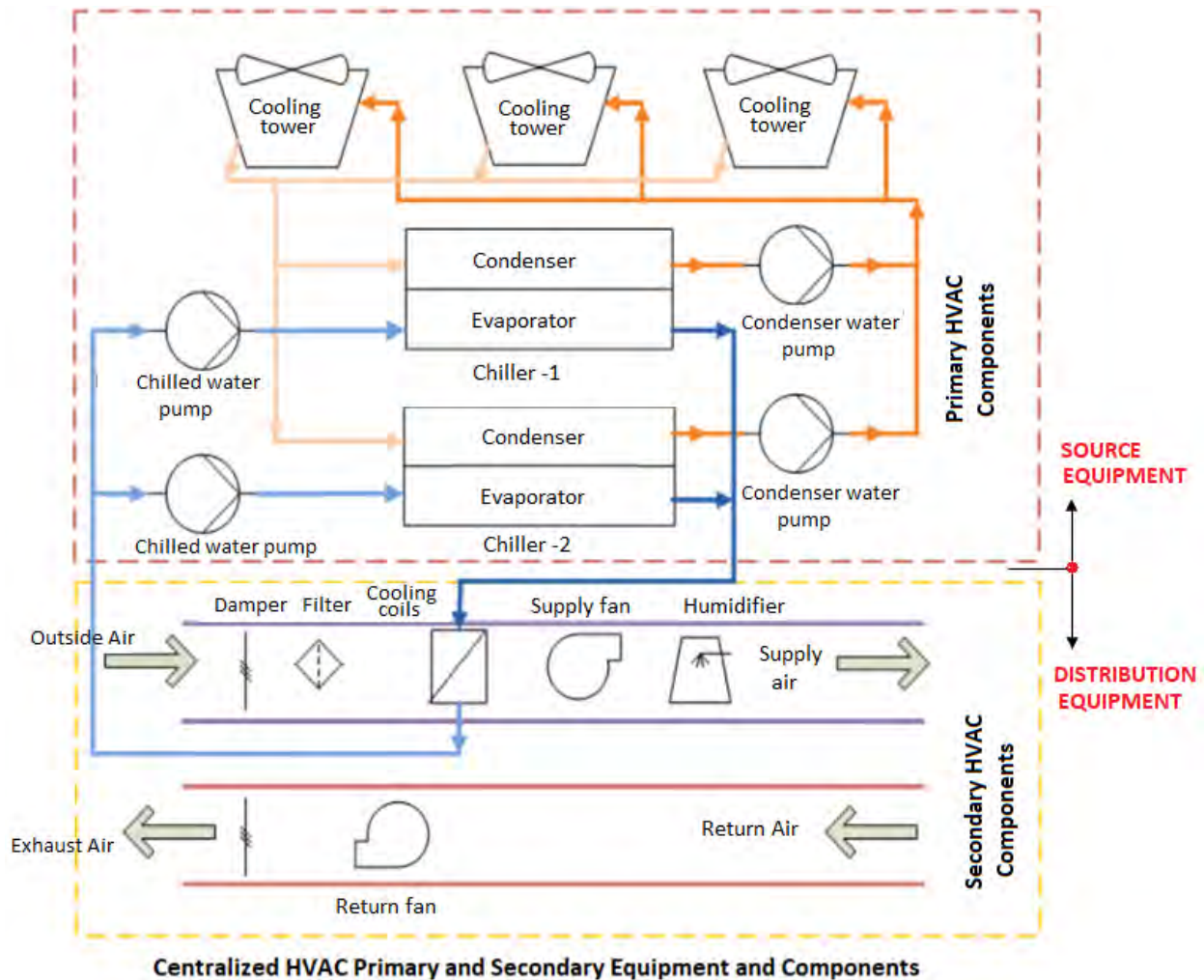
There are broadly two types of HVAC systems:

- Local DX systems
- Centralized systems

Local DX systems are designed to condition a single space (or portion of a space) from a location within or directly adjacent to the occupied space. These incorporate both the production and delivery in a single piece of equipment and therefore are very compact systems. These systems are essentially decentralized or point of use systems, and may or may not require a dedicated mechanical room. The equipment may be located on the roof, balconies, and/or the ground adjacent to the building. The system may be designed with or without ductwork. They have drawbacks of higher noise, lower reliability, inferior air quality, uneven temperature/humidity profiles, and compromised aesthetics. Split type DX systems suffer from distance limitations between indoor/outdoor units.

Centralized systems are dominant systems in large commercial buildings and are intended to condition multiple spaces in a building. These systems can be categorized into primary and secondary HVAC system equipment.

The primary equipment is sometimes referred to as source equipment and the secondary as a distribution system. Both types of components involve distribution and heat and mass transfer components. The schematic figure below shows the distinction between primary and secondary air conditioning components.



Numerous types of primary and secondary equipment and components exist with a wide range of capacities. In this 6-hr course (Part 1), we will discuss the primary source equipment.

The primary source components include the heating and cooling production equipment such as chillers, boilers, and water heaters, along with associated components such as cooling towers, air-cooled condensers, water treatment, and electrical services. The source components are typically located away from occupied areas in a central plant room in the basement, roof, or

remote independent annex to the main building. The space requirements to host heating and cooling equipment depend on the quantity, size, and weight of equipment, the installation and maintenance accesses, and the applicable safety regulations.

In a separate course (Part 2), we will discuss the secondary distribution equipment and services. This will include the design criteria for air handling units, pumps, piping, ductwork, shafts, fire dampers, and terminal units. Although the general rules related to spatial planning of source components and distribution components are similar, the main difference is that the distribution services happen within the occupied areas of the building.

Rule of thumb information and indicative dimensional details are provided in this course for simplified learning and for quick validation of end results.

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To view the remainder of the course material and to take the quiz for PDH credit, you must purchase the course.

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