Air conditioning system design manual ashrae

Home air conditioning systems come in several types, from large central systems driven by outdoor compressors to small plug-in units that stand on the floor or stand on windows. No matter what form they take, air conditioning systems have the same working components, including refrigerants, compressors, condensers, expansion valves, and evaporator coils. All this works together to transfer heat and humidity from inside your home to the outside. Window air conditioning is technically called a unit air conditioning system and consists of a self-contained air conditioning unit placed in the window or, less commonly, through holes in the exterior walls. The window air conditioner contains all the cooling components in one compact box. It releases heat from its outer side and blows cold air into the room on the indoor side. Window air conditioners come in a variety of sizes to cool any space from one room to the entire floor. Even a small house may be quite cooled by large window air conditioners, especially if it is a one-story house. This system is another version of the unitary air conditioning system. Portable air conditioning consists of a self-moving air conditioning unit that is placed on the floor indoors and emits exhaust heat using hose ventilation through exterior walls or window vents. Portable air conditioning units are slightly more noisy than other types of air conditioning systems and are usually suitable for room sizes under 500 square feet. Many people use portable air conditioners for temporary or anywhere cooling it is impractical to install units installed in windows. Like window air conditioning, the portable unit system has all the cooling components in one compact box. As the portable unit sits indoors, its evaporation fan runs constantly enough to vaporize the viscous moisture collected inside the unit. This is very different from the units installed in the windows, where viscous moisture simply drips into the ground. Split systems, also called ductless or mini-split, are commonly found in houses as well as hotels and other multi-unit buildings. It has become an increasingly popular choice for homes not served by forced air HVAC systems, such as those that have hot water heating (hydronic) or electric heating. Most of the split air conditioners are also heat pumps and offer heating and cooling functions. The split system breaks down the air conditioning system into two packages, or terminal units: The condenser unit is located on the exterior of the building and includes compressors, condensers, and condenser fans. The evaposative unit is located in the interior and handles air cooling and distribution. These are usually rectangular box units mounted high on the interior wall and contain circulating fans, expansion valves, and evaporator coils. The cooling tube passes through the wall between the condensation and evaporation units. Central air the system is the largest conventional type of air conditioner. Like a separate system, the central system consists of two units - the condensation unit and the evaporation unit - that are connected to each other with cooling tubes. The condensation unit is a large, boxy outdoor unit containing compressors, viscous coils and a viscous fan. The evaporation unit usually sits in the plenary (large living room between the furnace and the duct system) of your furnace. This means the air conditioner uses the same ducts and blower fans as your heating system. In the plenary, the evaporative unit consists of a coil evaporator and an expansion valve. Central air conditioning is usually the most effective type of air conditioner to cool the whole house. When installing a new central system, the main consideration is to make sure the system is the right size for your home. If the system is too large, it will not perform well and will not sufficiently dehumidify the interior air. If it is too small, it will not cool adequately. Proper maintenance of the central air conditioning system is also very important. In addition to knowing the cost of their energy bills, relatively few people think about what flows through the compressor coils of air conditioning units and their cooling departments. But soon, air conditioning units may be top of mind for many Americans. That's because hydrochlorofluorocarbons (HCFC-22) or R-22, cooling agents traditionally used in many air conditioners, will disappear. The R-22 is a major component of a trademark called the Freon refrigerant, but it would be inaccurate to say that Freon is leaving. That's because Freon isn't a single product. This is the brand of many products produced by Chemours Co. Now that it is cleaned, let's talk about why the R-22 will go and how it affects you. Phase-Out R-22: What You Need to Know The U.S. Government's Ban on R-22 is set to take effect on January 1, 2020. The ban is part of a phased phase initiated by the U.S. Environmental Protection Agency (EPA) to rid the United States of all ozone-depleting substances. In essence, the R-22 is harmful to the environment. Whether you ultimately need to buy a new unit, reinstall your old unit or replace some component parts to comply with the EPA ban depends heavily on several things. But first, you might want to know if your air conditioner (or your refrigerator) uses the R-22 or not. How to Know What Type of Cooler Your Unit Uses On Air Conditioning, you should be able to find out what type of cooler it uses in the following places: Owner's Manual Manufacturer website (know your model number) Contact your local hardware store and let them know your unit info and they should be able to tell you In your refrigerator, you can look for cooling labels in the following places : Manufacturer data plate On stickers above or near the condenser Outside the unit, sometimes on or near the condenser If you know your year manufactured, which can help you figure out what type of cooler your unit uses. Typically, if produced before 2010, your unit is likely to use the R-22. If you bought your air conditioning unit or refrigerator after 2010 - that is when the EPA told manufacturers to stop making R-22-friendly units - it is likely running on the R-410A, the agency said. Let's talk about the R-410A and other R-22 replacements... The R-22 Best Replacement R-410A has become the dominant choice for many air conditioning manufacturers. It has many brand names, such as Puron or Suva 410A, depending on the company. The R-454B, or Opteon, is also an emerging alternative. For refrigerators, R-404A and R-507 are among the options, according to this EPA list. Now let's answer the big question: Will consumers be asked to stop using their air conditioners and refrigerators because of the R-22 ban? The EPA answered the question quite clearly: No. You don't need to stop using HCFC-22 [on January 1, 2020], and you don't need to replace existing equipment just to switch to a new cooler. In short, regardless of the R-22 ban, the government wants you to know that your unit won't be obsolete anytime soon. When your unit needs to be repaired, the EPA says, After 2020, system services with R-22 will rely on the amount of recycling or stockpiled. More Clark.com Articles You Might Like: How home air conditioning systems work is very mystical for many of us. Furnaces are easy to understand — they heat the air and blow it around your house through channels. The boiler makes hot water or steam and moves it around your house in a pipe. But how does the air conditioning system make the air cold and unhumiified during the dog days of summer? To understand it, you have to go back to a principle you may have learned in a high school or college physics class: any gas-cooled scientific law as it develops in volume. Although a little simplification, you can think of air conditioning as an engine that takes heat from your home and throws it outside using five interconnected parts: RefrigerantCompressorCondenserExpansion valveEvaporator coils There are many types of air conditioning systems that can be used at home, including window units, portable air conditioners, air conditioners without channels, and central air conditioners Regardless of their differences, however, physics of how they work together , and they all use a direct expansion cooling process. In principle, it works very much with your home kitchen refrigerator. Coolant is pumping blood through the cooling tube in the air conditioning system. This changes the state from gas vapor to liquid as it collects heat from your home and releases heat out into the outdoors. Coolant is a unique substance because it has a very low boiling point. This means that it changes from liquid to steam at low temperatures. This is the key to making the air conditioning system work with without producing dangerous levels of heat. Tje Tje however, it does not move through its own system; compressors are needed to pump it. Think of the compressor as the heart of the system, the component that pumps the coolant through all the cooling components in a large copper circle. The refrigerant enters the compressor as a warm, low-pressure vapor and leaves it as high-pressure hot steam. This transformation will be made possible by the condenser. From the compressor, the hot-cooling steam moves to the condenser. Here, high-pressure hot cooling steam is cooled as it passes through a viscous coil. The coil has thin metal fins (similar to the structure on the front of the car radiator) that perform heat from the coil. The condenser fan blows air over the fins to speed up the cooling of the steam inside the coil. (Using a fin comb during routine maintenance helps keep these fins in shape.) When cooling cools down, it changes the state from hot steam to hot liquid at high pressure and moves to the expansion valve. Compressors, condenser coils and condenser fans are all located in a large noisy box in your backyard, which is often called a condensation unit. The expansion valve is what really does the cooling work. When the hot liquid coolant passes through a small opening at high pressure in the valve on one side, it appears as a cold low pressure fog on the other. This is the result of the natural properties of the gas: As the gas expands, it cools. The air conditioner is really nothing more than a device designed to force the cooling gas to inflate, and that's what creates its ability to cool the air by releasing its heat. The next step is where your home is completely cooled. A cold, low-pressure liquid that now leaves an outdoor expansion valve running indoors to the evaporator coil located in your furnace plenary. (Plenary is a large metal box between the furnace and the duct.) Here, warmer air inside your home blows across the evaporator coil and heats it, while at the same time the coil carrying cold and expanded cooling gas cools the air blowing across the evaporator. This cold air is then circulated through the channel. When the coolant now begins to heat up, it begins to boil and turns from a cold liquid to warm steam (evaporation process). Warm cooling steam then returns to the compressor and the outdoor condenser unit, when it expands and cools once more, continues the cooling cycle. In a typical central air conditioning unit, the cooling cycle is an ongoing cold cooling process that absorbs heat from indoor air and develops into warm gas, traveling to an outdoor unit where it releases that heat and returns to the cold liquid, then returns to the room to absorb more heat and continue the cycle. Regardless of the complexity of the visible components, the physics involved simple — the principle by which the gas always cools when it expands. Any air conditioning or cooling system is simply where the expansion and condensation of cooling gas is carefully controlled to take advantage of it's physical properties. Property.