HEAT

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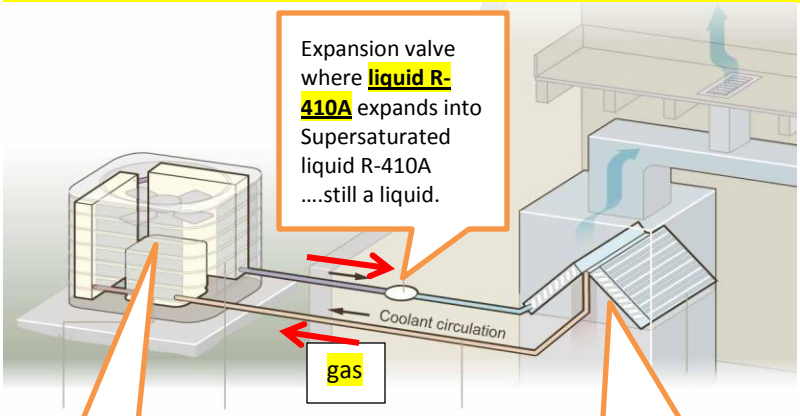
Effort to Curb Coolant Falters, Sometimes at Home

A repair technician in New Jersey removed an air-conditioning unit that uses HCFC-22, which is banned for use in new units, to install a new one that uses a different coolant, R-410A.

When Mark Spector's central air-conditioning system stopped cooling his Trumbull, Conn., home this summer, he sent an S O S to his repairman. What happened next illustrates the myriad challenges the United States faces as it tries to phase out the popular but environmentally devastating cooling gas that was in Mr. Spector's unit.The Environmental Protection Agency has tried to reduce use of this gas, HCFC-22, which depletes the ozone layer and contributes to global warming, by imposing strict quotas on its production. Since 2010, it has also banned the sale of new air-conditioning units containing the compound, and has promoted recycling of the gas from old machines so it will not be released. In the end, Mr. Spector bought an entirely new system**(((, running on R-410A, the gas that has been used in almost all new machines in the United States since 2010 and is far more energy-efficient and better for the ozone layer.)))**



Compressor and condenser where used gas is compressed into liquid R-410A

Evaporator coils where Liquid R-410A is heated by warm air from home which is cooled by providing heat for R-410A to evaporate from a liquid into a gas.

INTRODUCTION: Latent heat of vaporization of R-410A is 2.326 KJ/kg.

QUESTION: How much heat(in J)from warm air(passing evaporating coils)is needed to change 8 kg of supersaturated liquid R-410A from a liquid to a gas?

HINT: $L_{vaporization} = Q/m$

ANSWER: 18.61 KJ