SBS5311 HVACR II

http://ibse.hk/SBS5311/

Tutorial Exercise 01: Properties of Refrigerants and Refrigeration Cycles

Introduction

The basic principles of refrigeration for HVAC systems were presented during the lecture. The importance of refrigerant selection and refrigeration cycles were discussed. Through the use of software tools, this tutorial exercise allows the students to understand the properties of common refrigerants used in HVAC systems and the characteristics of refrigeration cycles.

Objectives

- To study the properties of common refrigerants used in HVAC systems
- To analyse the characteristics of the vapour compression refrigeration cycles

Methodology

1. Properties of Refrigerants

   (a) Download and install the SOLKATHERM Calculation Software http://www.solvay-media.de/refrigerants/solkane_software.zip on a computer and test the software to ensure it is running well.
   (b) Select the following refrigerants one by one to examine their properties: R12, R22, R123, R134a, R32, R407C, R410A, SES36.
   (c) Study the following information of the refrigerants: general information, physical data, safety data, environmental data, refrigerant substitutes.
   (d) Construct a typical refrigeration cycle (cycle 1, single-stage process) on the electronic P-h diagram for the refrigerants by suggesting some sample data.

2. Refrigeration Cycles

   (a) Access and open the Vapour Compression Refrigeration Cycle Calculator http://engr.usask.ca/classes/ME/227/Refrigeration/js/ on a computer.
   (b) Adjust the operating parameters including evaporator pressure (kPa), condenser pressure (kPa), compressor inlet superheat (°C), condenser exit subcooling (°C) and compressor efficiency (%).
   (c) Observe how the properties of the state points and operating conditions vary with the adjustment of operating parameters.
   (d) Study the effects on the refrigeration cycle on the P-h diagram and T-s diagram.

Results

Students should summarise the findings by presenting the data effectively on tables and organise the information clearly on diagrams and/or charts. The findings may be used in the future for revision. Students should discuss and compare the properties of refrigerants and the characteristics of the refrigeration cycles. If needed, they may exchange ideas with classmates or the lecturers. The findings should be submitted to Moodle for learning record.