



International Conference on Recent Advancement in Air Conditioning and Refrigeration, RAAR  
2016, 10-12 November 2016, Bhubaneswar, India

## "Effect of various parameters on working condition of chiller"

Anil Kumbhar<sup>a</sup>, Nitin Gulhane<sup>b</sup>, Sachin Pandure<sup>a,b,\*</sup>

<sup>a</sup>Research & Development Center, Voltas Limited, Thane 400 601, India

<sup>b</sup>Department of Mechanical Engineering, Veermata Jijabai Technological Institute, H. R. Mahajani Marg, Matunga, Mumbai 400 019, India

---

### Abstract

The present work aims to find out the effect of various parameters on evaporator, compressor and condenser in vapour compression cycle using “high performance tube manufacturer’s software” for evaporator and condenser and using “compressor selection software of a reputed manufacturer” for compressor. The present work includes the effect of number of tubes, number of passes and fouling factor on saturated refrigerant temperature (SST), tube side velocity, pressure drop and temperature approach in evaporator and condenser. Effect of SST on power input to compressor, cooling capacity, condenser capacity and coefficient of performance (COP) and also effect of condensing temperature on power input to compressor, cooling capacity and condenser capacity is studied using software.

© 2017 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Peer-review under responsibility of the organizing committee of RAAR 2016.

*Keywords:* vapour compression cycle; COP; SST; SCT

---

### 1. Introduction

Vapour compression system is one of the most widely used system for air-conditioning and domestic refrigerator. It consists of four main components namely evaporator, compressor, condenser and expansion valve as shown in fig.1 [1].

---

\* Corresponding author. Tel.: +91 9967231356  
E-mail address: [sachinpandure513@gmail.com](mailto:sachinpandure513@gmail.com)

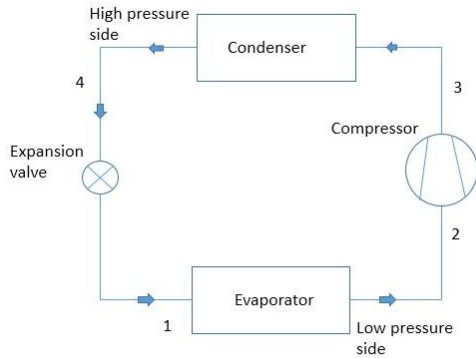


Fig.1 Vapour compression cycle

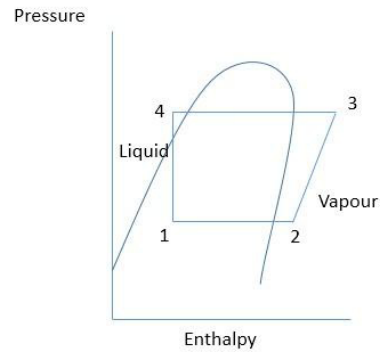


Fig. 2 p-h diagram

In evaporator refrigerant will absorb the heat from the space to be cooled and enters into the compressor. In compressor refrigerant pressure is increased from evaporator pressure to condenser pressure. In condenser heat rejection will take place to atmosphere or by circulating cooling water and the condensed refrigerant is expanded in expansion valve which full further enter into the evaporator. The cycle is represented on pressure-enthalpy chart in Fig.2.

In present study evaporator and water cooled condenser used are shell and tube type. SST is the saturation suction temperature at which refrigerant will absorb heat from water, which is to be cooled in evaporator. Temperature approach is the temperature difference between chilled water outlet temperature from the evaporator and SST. For present study evaporator used is flooded type (refrigerant is shell side and water to be cooled is tube side). In present work we have considered a chiller operating on simple vapour compression cycle and studied the effect of various parameters on other operating parameter using software.

### Nomenclature

Condenser capacity	(kW)
Cooling capacity	(kW)
COP coefficient of performance	
Power input	(kW)
Pressure drop	(kPa)
SST saturated refrigerant temperature	(°C)
SCT saturated condensing temperature	(°C)
Velocity	(m·s <sup>-1</sup> )

## 2. Effect of various parameters

The present work aims to find out the effect of various parameters like effect of suction temperature, condensing temperature, number of tubes and number of passes on COP, power input, pressure drop and velocity. The effect of various parameter is analyzed using the “high performance tube manufacturer’s software” [2] and “compressor selection software of a reputed manufacturer” [3]. As a first step, simulations can provide valuable insight on the system performance, since parametric analysis using experimental data has high time and cost requirements.

Download English Version:

<https://daneshyari.com/en/article/5446042>

Download Persian Version:

<https://daneshyari.com/article/5446042>

[Daneshyari.com](https://daneshyari.com)