

1. Module details

Module name

REFRIGERATION SYSTEM OPERATION

Nominal duration

One module
It is anticipated that students will achieve the competencies specified in 35 to 40 hours.

Module codes

NR009

Discipline code

2. Module purpose

To provide the student with the knowledge and skills in the operation of compressors and total system balance through capacity control.

3. Prerequisites

NR004 - Refrigeration System Components.

4. Relationship to competency standards

TBA

5. Content

1. Function of the pressure enthalpy
 - chart
 - zones represented on chart
 - sub-cooled
 - latent
 - superheated
 - interpretation of chart lines
 - plotting system cycle
 - calculation of specific values from chart information
 - refrigeration effect
 - flow rate
 - specific volume
 - system capacity
 - discharge temperature
 - total heat rejection
 - heat of compression
2. Methods of system capacity control
 - oil pressure
 - refrigerant bypass
 - air flow
 - water flow
 - multiple units
 - compressor speed
3. Compressor calculations
 - piston displacement
 - compressor displacement
 - compression ratio

6. Learning outcome details

Learning outcome 1

Assessment criteria

- compressor efficiency
 - need for good heat exchange design
 - heat exchange calculation
4. Types of motor drives
- belt drive
 - direct drive
 - calculation of speed vs pulley size
 - alignment requirements
 - belt drive
 - direct coupling

On the completion of this module, the learner will be able to:

Construct a pressure-enthalpy diagram representative of the vapour-compression cycle.

- 1.1 Explain the function of a pressure enthalpy chart.
- 1.2 Identify the different zones of the pressure-enthalpy chart.
- 1.3 Interpret refrigerant properties of pressure, temperature, specific volume, density, enthalpy and entropy.
- 1.4 Construct a pressure-enthalpy diagram for plotting specific given points.
- 1.5 Explain pressure/temperature relationships.
- 1.6 Calculate refrigeration effect, refrigeration flow rate, compressor displacement given system capacity and operation conditions.

Learning outcome 2

Assessment criteria

Explain principles and operating methods of system capacity control.

- 2.1 Identify the different methods of system capacity control as used on compressors, condensers, evaporators and cooling towers.
- 2.2 Explain the operation of the different types of capacity control systems as used in industry.

Learning outcome 3

Assessment criteria

Determine operating capacity and system efficiency.

- 3.1 Determine compressor volumetric efficiency compression ratio, piston displacement, swept volume flow rate, theoretical and actual capacity from given operation conditions.
- 3.2 Test compressor efficiency.
- 3.3 Determine the requirements for good heat exchange design.

Learning outcome 4	3.4 Calculate heat exchange capacity from given operation condition.
Assessment criteria	<p>Explain the selection principles of drives and couplings.</p> <p>4.1 Identify the different drive methods as used in refrigeration and air conditioning.</p> <p>4.2 Calculate change in speed with different sizes of motor drives.</p> <p>4.3 Explain proper alignment techniques and tolerances.</p>
7. Assessment Strategies	<p>Written tests. Multiple choice questions. Practical test.</p>
8. Module Delivery Strategies	<p>Delivery strategies must be suitable for both theoretical and /or practical learning and module purpose.</p> <p>It recommended that learning and assessment be facilitated in a holistic manner which may require a learning outcome sequence other than that indicated in the body of this module.</p> <p>Also, an integrated theory/practice approach should be used where students learn by practical exercises and through research and workshop reports.</p>
9. Resource Requirements	<p>Appropriate practical equipment, service manuals, schematic diagrams test equipment.</p> <p>Useful references include:</p> <p>Australian Refrigeration and Air Conditioning, Volumes I & II, A CR & D Project Trust Publication.</p> <p>Dossat R.J., Principles of Refrigeration, Second Edition, SI Version, John Wiley and Sons, New York. Latest Edition.</p> <p>ASHRAE Handbook, Refrigeration Systems and Applications., SI Version, ASHRAE, Atlanta.</p>
10. Occupational health and safety requirements	<p>A safe and healthy environment will be provided for students in regards to classroom and workshop safety.</p>