UEE11 Electrotechnology

Training Package

UEENEEJ104A Establish the Basic Operating Conditions of Air Conditioning Systems

Learner Resource Manual

Version 1

Training and Education Support

Industry Skills Unit

Meadowbank

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Section 1 – The air conditioning industry

Purpose

In this section you will learn about the various areas of specialisation in the air conditioning industry. Many air conditioning mechanics and technicians will only ever work in one of these specialised areas throughout their working lives.

Topics

- Industry classifications (domestic, commercial, industrial and transport)
- Applications (shopping centres, housing, offices) and typical equipment used in each classification (split systems, central plant, chemical production, etc.)

Learning Objectives

At the end of this section you should be able to:

- Describe the distinguishing features of the four main classifications of air conditioning
- Systems, that is domestic, commercial, industrial and transport
- List applications within each of these classifications
- Provide examples of the main features of some of the equipment used in each application.

References

The following references will be of assistance with this section:

- ARAC, 4th Edition, Volume 2, Chapter 20, Self contained air conditioning systems.

Learner Exercises

Skill Practice 1.1: Identifying Air Conditioning systems

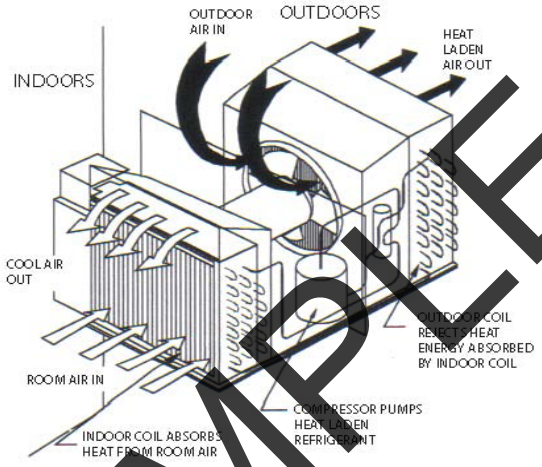
1.1 Types and uses of air conditioning

Reference:

• ARAC, 4th Edition, Volume 2, Chapter 20

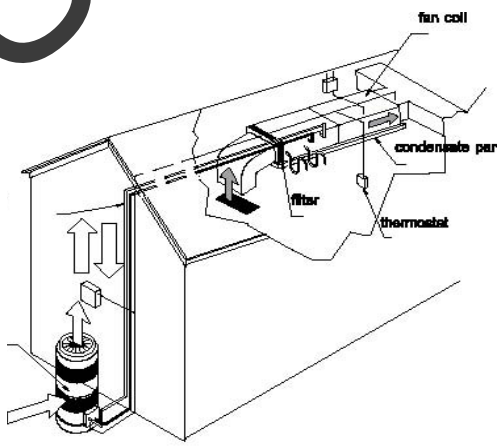
The main types of air conditioning and their uses are listed below:

Room air conditioners (RACs) are used mainly in single rooms in domestic areas or small offices for comfort conditions. They are unique in that they have an in built fresh air intake. This means that they automatically introduce some fresh air into the conditioned space whenever they are running.



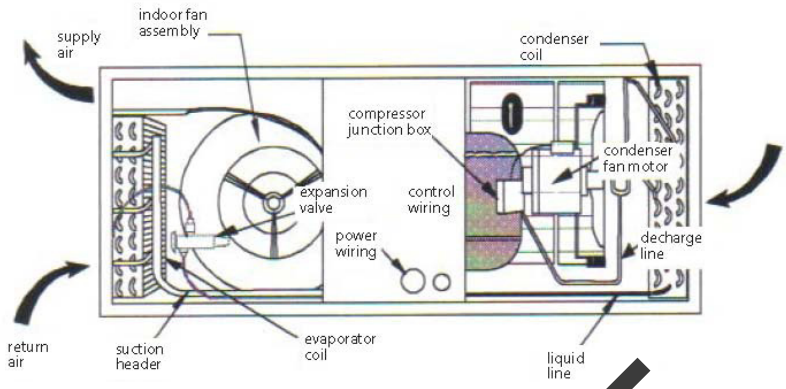
Room air conditioner (RAC)

Split system air conditioners are used in single rooms or groups of rooms, mainly for domestic and small office use to create comfort conditions.



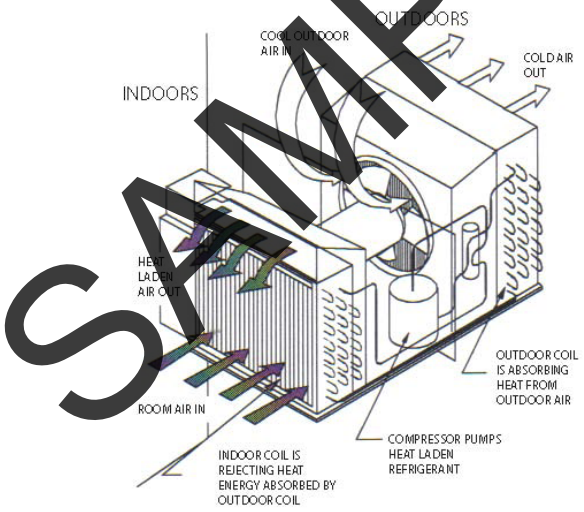
Split system air conditioner

Packaged air conditioners are used in larger spaces, e.g. restaurants and offices. With a tighter control system, they can be used in industrial areas or for comfort conditions.



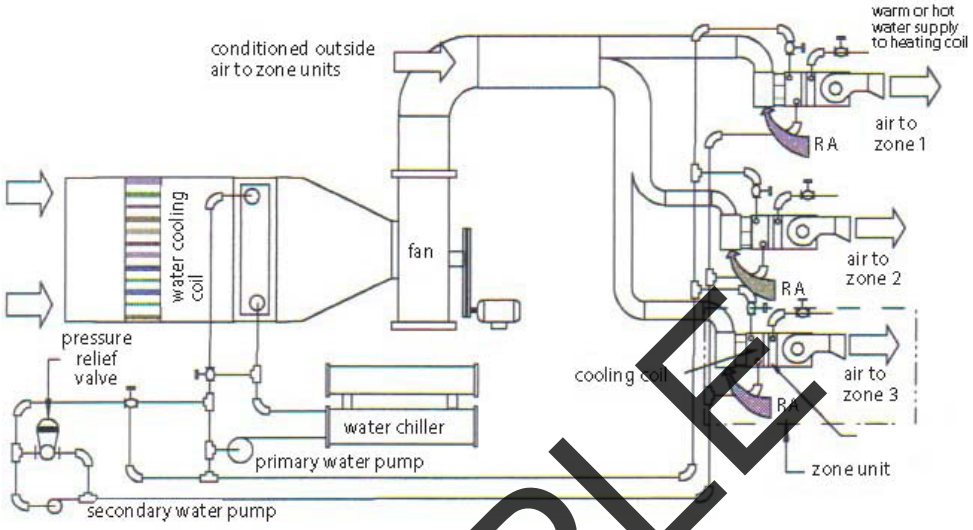
Packaged air conditioner

Heat pump reverse cycle air conditioners are a variation where the refrigeration system is used for heating, for all applications listed above.



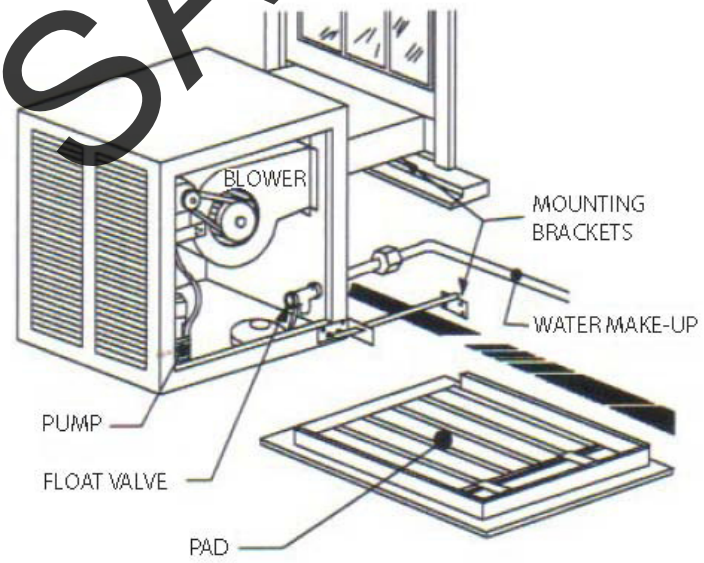
Heat pump reverse cycle air conditioner

Chiller set and direct expansion are used in large commercial office spaces and industrial areas, e.g. operating theatres, chocolate factories, art galleries for comfort and industrial conditions.



Chiller set and direct expansion system

Evaporative coolers are used in areas with a low moisture content in the air.



Evaporative cooler

Skill practice 1.1:
Identifying Air Conditioning systems.

Task

Identify systems from the four main classifications of air conditioners

Objectives

At the completion of this skill practice, you should be able to:

- Describe the features of systems form the four main areas of air conditioners
- List applications for these systems

Planning the Skill Practice

Equipment

Various systems within the workshop or college.

Safety

Remember:

- Work safely at all times.
- Observe correct isolation procedures.
- Equipment can start without warning - be careful when working near operating machinery.

Risk Assessment

Identify any hazards, list the supervision level (D, G or B), list the risk class (A, B or C) and list control measures required in the table below:

Hazard Identification	Supervision Level	Risk Class	Control Measures

Carrying Out the Skill Practice

Procedures

Identifying the various types of systems in the workshop.

- **System 1**

- Features

- Application/s

- **System 2**

- Features

- Application/s

- **System 3**

- Features

- Application/s

- **System 4**

- Features

- Application/s

Completion of the Skill Practice

1. List and describe any safety hazards which were arose during the skill practice that were NOT identified during the risk assessment and the actions used to control the risk.

2. List and describe any unforeseen event that occurred during the skill practice.

3. Describe the key points you have learnt while carrying out this skill practice.

Review questions

These questions will help you revise what you have learnt in this topic.

1. What are the four major classifications of equipment in the Air Conditioning industry?

   (a) _____

   (b) _____

   (c) _____

   (d) _____

2. What are the major uses for a room air conditioner type system?

   (a) _____

   (b) _____

3. List an advantage of the room air conditioner type system that is not a feature of any other type of air conditioning system.

   _____

   _____

4. List a disadvantage of the room air conditioner type system.

   _____

   _____

5. List a use for the split system type of air conditioner.

   _____

   _____

6. What is the most common problem of a "zoned" split ducted system when it is used in a domestic application?

7. What is the major advantage of a packaged unit?

8. What is a typical use for a chiller set and direct expansion system?

9. When is it sensible to use an Evaporative Cooler?

10. Match the terms below listed with the correct definitions A-J by putting the matching letter in the box.

- Psychrometric ☐
- Metabolic rate ☐
- Occupied zone ☐
- Standard air conditions ☐
- Ventilation ☐
- Comfort conditions ☐
- Return air ☐
- Supply air ☐
- Fresh air ☐
- Air conditioning ☐