



Module Outline

Welcome to the AIRAH 'Fans in HVAC&R and Industrial Ventilation module'

The purpose of this module is to provide participants with the information required to assist in the selection and installation of fans for heating, ventilation, and air conditioning systems as well as industrial ventilation applications. Some prior knowledge and/or experience in selecting fans will help ensure participants gain optimum benefit from the course.

This module defines fan types and characteristics within an air system and the considerations and calculations necessary for fan selection. It also looks at how deficient fan/system performance is created and discusses ways to prevent and/or rectify this.

How to Work Through this Course:

You are able to navigate through the course content by using the navigational arrows in the course content or the table of contents in the side bar. You can return to the main menu at any time by using the link provided in the table of contents

Assessment overview etc

For every one of the Topics in this module, there is a self-assessment section. You need to complete this assessment (which may entail reading articles, visiting websites or referring to one of the reference texts), to demonstrate your knowledge and competency. There are multiple self-assessments methods used including:

- Multiple choice questions
- Drop and Drag to diagram
- Labelling diagrams and other images
- Performing calculations
- Matching statements with answers

Introduction

This module is designed to familiarise you with the application of Fans in HVAC&R and industrial ventilation in buildings.

This module covers the following topics.

Topic 1: Fan systems

- The functions of a fan in an air handling system
- How fans work and the main components
- The primary characterisation of fan 'type'
- Fan performance

Topic 2: Fan types and characteristics

- Types of fans
- Characteristics of generic fan types
- Types of fan drives
- Characteristics of electric motor drives for fans
- Fan accessories and performance effects

Topic 3: Fan performance rating

- standards and codes for rating fan performance
- installation configuration, fan performance and application
- fan performance data and fan selection
- fan selection aids/tools

Topic 4: Fan laws, system resistance and pressure

- fan laws and predicting performance changes
- system resistance curve, fan performance curve and fan selection
- regions of fan instability and how to avoid them
- tools and techniques used for measuring pressure in fan systems

Topic 5: Fan control and series and parallel operation

- controlling air movement in a fan
- assessing control methods
- apply fans in series and parallel

Topic 6: Fans and systems interaction

- best practice design process for fan systems
- system resistance calculations, system effect and safety factors
- refine and right-size fan selections
- match fan performance to system resistance
- causes and prevention of deficient performance

Topic 7: Noise from fan systems

- human hearing, the decibel scale and loudness
- describe the characteristics of fan noise for different fan types
- noise considerations during fan selection, system design and installation
- common methods for noise attenuation

Topic 8: Fan specification or enquiry

- essential and additional selection information
- essential fan selection considerations
- standard fan arrangements

Learning Outcomes

The purpose of this course is to provide participants with the information required to assist in the selection and installation of fans for heating, ventilation, and air conditioning systems as well as industrial ventilation applications. This module defines fan types and characteristics within an air system and the considerations and calculations necessary for fan selection. It also looks at how deficient fan/system performance is created and discusses ways to prevent and/or rectify this.

At the completion of this course participants will be able to:

- Explain the function of a fan within an air handling system
- Identify the main components of air handling system
- describe how a fan works
- identify the main components of a fan
- differentiate between types of fan impellers
- Describe the four standard fan installation categories
- identify the five main types of fans
- describe the characteristics and distinct types of axial fans
- describe the characteristics and distinct types of centrifugal fans
- describe the characteristics of jet fans, mixed-flow fans, roof mounted fans, cross-flow/tangential-flow fans, smoke spill fans and industrial fans
- identify and describe types of fan drive
- identify and describe the various types of electric motors used for fans
- explain motor ventilation and protection
- Identify fan accessories and their effects on fan performance
- identify the relevant standards and codes to follow when rating fan performance
- understand how installation configuration will affect fan performance
- list the installation category for common fan applications
- list the additional test requirements for smoke spill (smoke exhaust) fans
- understand how fan performance data is presented
- describe how fan performance data is used to assist in fan selection
- outline common fan selection aids/tools
- describe how to interpret fan performance curves
- list the circumstance where fan performance data may need to be de-rated
- explain the fan laws and how they are simplified for practical use
- explain how fan laws are used to predict performance changes
- identify when to apply fan laws
- explain system resistance and how system resistance curves are developed
- outline the role of the system resistance curve and the fan performance curve in fan selection
- explain system best operating point and its relationship to fan best efficiency point
- identify regions of fan instability and how to avoid them during fan selection
- identify ways to remedy system resistance
- define the types of pressure measured in fan selection
- describe the tools and techniques used for measuring pressure in fan systems

- identify ways of controlling air movement in a fan
- follow the assessment criteria for choosing an air movement control method
- differentiate between series operation and parallel operation
- apply fans in series and parallel
- approach fan design using a systems perspective
- identify a best practice design process to develop optimised solutions
- describe pressure losses in a ducted system as defined by system resistance calculations
- discuss the 'system effect' and provide advice on how to avoid it
- calculate a system resistance curve
- apply safety factors to design pressure loss calculations
- refine fan selections and right-size fan selections
- match fan performance to system resistance to determine the system operating point
- select fans based on best efficiency point
- identify methods to alter fan operating performance to match system duty
- identify methods to alter system duty to match fan operating performance
- identify the causes of deficient performance of the fan/system combination
- list precautions to prevent deficient performance of the fan/system combination
- describe the characteristics of human hearing and the decibel scale
- relate specific decibel A ratings to typical sound loudness
- describe the characteristics of fan noise
- identify the types of noises associated with different fan types
- describe the fan selection factors that affect fan noise
- describe the noise considerations of system design
- describe the noise considerations of system installation
- list the common methods for noise attenuation in air handling systems
- identify the information necessary for the assessing, selecting and supplying fan equipment
- list the essential fan selection considerations
- explain standard fan arrangements