



Australian Government

MEM23139 Design a basic single zone duct distribution system

Release: 1

MEM23139 Design a basic single zone duct distribution system

Modification History

Release 1. Supersedes and is equivalent to MEM23139A Design a basic single zone duct distribution system.

Application

This unit of competency defines the skills and knowledge required to use air flow and distribution principles used in heating, ventilation, air conditioning and refrigeration (HVACR) systems and to identify different system configurations to design a single, one-air distribution system and service-related system components. The system is designed to meeting environmental and cost control requirements.

A single zone duct distribution system is a basic central system which supplies a constant air volume, or a variable air volume, at low, medium or high pressure through a single duct.

The unit is suitable for people working as supervisors, technicians and HVACR draftspersons, and for those pursuing manufacturing engineering or related technical qualifications and careers.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

MEM23004 Apply technical mathematics

MEM23006 Apply fluid and thermodynamics principles in engineering

MEM30031 Operate computer-aided design (CAD) system to produce basic drawing elements

MEM30033 Use computer-aided design (CAD) to create and display 3D models

Competency Field

Engineering science

Elements and Performance Criteria

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
1. Determine design specification for basic single zone duct	1.1 Obtain and implement work health and safety (WHS) and environmental requirements for the work area

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
distribution system	1.2 Determine design requirements for the single zone duct distribution system from customer requirements, job specifications, and briefings or discussions with appropriate personnel 1.3 Identify and interpret relevant codes and standards 1.4 Prepare final specifications for the design and obtain relevant approvals 1.5 Identify sources of professional and technical assistance 1.6 Establish coordination and contingency management requirements of design work with other HVACR and building systems team members 1.7 Obtain resources required for the design task in accordance with organisational procedures
2. Design basic single zone duct distribution system	2.1 Review options for basic single zone duct distribution system design and compare against specified requirements 2.2 Select most suitable single zone duct distribution system design to meet requirements 2.3 Use 3D CAD system to design layout and other features of single zone duct distribution system against requirements 2.4 Select appropriate duct materials and duct system components, including an appropriate fan for distribution 2.5 Consult as appropriate on any design adjustments required to meet contingencies and unexpected situations 2.6 Review design for cost reductions and compliance with relevant environmental and regulatory requirements 2.7 Review final design with appropriate personnel and make any required adjustments
3. Evaluate and finalise design	3.1 Prepare final design documentation and any required construction documentation 3.2 Prepare final report according in accordance with organisational procedures

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance.

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

This field allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

WHS requirements include:	• relevant legislation • protective equipment • safety management systems, including use of safety data sheets (SDS) • hazardous substances and dangerous goods code • local safe operation procedures • WHS provisions in relevant awards and agreements.
Environmental requirements include:	• relevant legislation, regulations and codes • correct handling and disposal of liquid and solid waste • elimination or minimisation of gas, fume, vapour and smoke emissions, including fugitive emissions • dust elimination, minimisation and control • minimisation of energy and water use • elimination or control of excessive noise • use and recycling of refrigerants.
Appropriate personnel include:	• supervisor, leading hand, foreman or manager • engineer • technician • trainer or mentor • team member • customer.
Organisational procedures include:	• use of tools and equipment • operating instructions, including job sheets, plans, drawings and designs • reporting and communication • manufacturer specifications • site operational procedures • references to industry standards.
Resources include:	• reference manuals • scientific calculator

	• 3D CAD software • computer workstation and software, either stand alone or networked • test apparatus • appropriate tools of trade, equipment and materials • standard duct sizes and gauges.
Contingencies and unexpected situations include:	• cost or time overruns • unavailability of required components • changes in customer requirements after design process has started • regulatory change • site or building features not on plans or drawings • other situations not included in customer brief or normal organisational procedures.

Unit Mapping Information

Release 1. Supersedes and is equivalent to MEM23139A Design a basic single zone duct distribution system.

Links

Companion Volume Implementation Guides are available on VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b7050d37-5fd0-4740-8f7d-3b7a49c10bb2>

Assessment Requirements for MEM23139 Design a basic single zone duct distribution system

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Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy the requirements of the elements and performance criteria and include:

- implementing work health and safety (WHS) workplace procedures and practices including risk control measures
- designing basic single zone duct distribution systems to customer performance and cost requirements on at least two occasions
- selecting and sizing appropriate components, including air-diffusion, fans and duct work on at least two occasions
- communicating technical requirements to others, including preparation of required drawings, computer-aided design (CAD) files and reports
- dealing effectively with unexpected situations.

Note: Where a volume and/or frequency is not specified, demonstration must be provided at least once.

Knowledge Evidence

Evidence required to demonstrate the required knowledge for this unit must be relevant to and satisfy the requirements of the elements and performance criteria and include knowledge of:

- single zone systems
- WHS and environmental requirements
- differentiation between static, velocity and total pressure in air distribution ducts
- organisational procedures
- contingency planning
- laminar and turbulent flow
- use of Moody diagram for flow rate and pressure drop
- friction and dynamic pressure loss
- Colebrook-White formula
- sources of heat and pressure leakage and loss calculation
- environmental considerations
- noise minimisation
- fan laws
- control cost parameters
- duct design parameters including:

- standard duct sizes and gauges
- available access and space
- system performance requirements
- system sizing and balancing methods
- dual and single duct constant volume air systems
- variable volume air system
- multi-zone systems.
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Assessment Conditions

- Assessors must:
 - have vocational competency in designing a basic single zone duct distribution system at least to the level being assessed with relevant industry knowledge and experience
 - satisfy the assessor requirements in the Standards for Registered Training Organisations 2015 or its replacement and comply with the National Vocational Education and Training Regulator Act 2011, its replacement or equivalent legislation covering VET regulation in a non-referring state/territory as the case requires.
- Where possible assessment must occur in operational workplace situations. Where this is not possible or where personal safety or environmental damage are limiting factors, assessment must occur in a sufficiently rigorous simulated environment that reflects realistic operational workplace conditions that cover all aspects of workplace performance, including environment, task skills, task management skills, contingency management skills and job role environment skills.
- Conditions for assessment must include access to all tools, equipment, materials and documentation required including relevant workplace procedures, product and manufacturing specifications.
- Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.
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