



Australian Government

MEM234017 Design exhaust, ventilation and dust collection systems

Release: 1

MEM234017 Design exhaust, ventilation and dust collection systems

Modification History

Release 1. Supersedes and is equivalent to MEM234017A Design exhaust, ventilation and dust collection systems.

Application

This unit of competency defines the skills and knowledge required to design commercial and industrial exhaust, ventilation and dust extraction systems in accordance with standards, codes and regulatory requirements. It includes consideration of fluid dynamic principles and selection of system components including ducting, fans and filters.

The client may be internal or external to the designer's organisation.

The unit applies to the design of exhaust, ventilation and dust collection systems across all forms of manufacturing and engineering and design activities and can also include reverse engineering, and design rectification or modifications of an existing design. It is suitable for exhaust, ventilation and dust collection system contractors, consultants, designers and maintenance personnel.

Individuals completing this work either already have or are developing skills and experience in the application of thermodynamic and fluid dynamic principles, mathematics and computer techniques.

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

Pre-requisite Unit

Nil

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. Clarify the design task and elaborate the specification	1.1 Establish features and performance parameters of exhaust, ventilation and dust collection plant and equipment, in consultation with the client

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
	1.2 Determine parameters of the brief or contract 1.3 Determine stakeholders to be consulted in design process 1.4 Assess work health and safety (WHS), regulatory, sustainability or environmental issues relevant to design task 1.5 Confirm design brief, including budget and schedule, and provide preliminary advice on feasibility
2. Prepare concept proposal	2.1 Use investigation and analysis to define exhaust, ventilation and dust collection plant and equipment performance parameters 2.2 Carry out required modelling, simulations and calculations using appropriate techniques, software and validation techniques 2.3 Generate exhaust, ventilation and dust collection plant and equipment solutions that respond to the brief or contract 2.4 Check feasibility and evaluate solutions against design criteria ensuring conformity to WHS, regulatory, sustainability and environmental requirements 2.5 Review concept proposals with clients and select preferred solution
3. Design exhaust, ventilation and dust collection system	3.1 Develop selected exhaust, ventilation and dust collection system designs 3.2 Provide documentation, drawings, specifications and instructions 3.3 Consult with client and stakeholders to obtain sign-off on design 3.4 Monitor installation and commissioning with stakeholders, and make any necessary modifications

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.	
Parameters of the brief include:	• the design of new equipment or fault analysis, rectification or modification to an existing design • determination of the degree of innovation and creativity expected by the client • design process limits and budgets • product cost limits and budgets • performance specifications • equipment availability, capacities and restrictions • specified administrative, communication and approval procedures • other special features and limits in the design brief.
WHS, regulatory, sustainability and environmental issues include:	• WHS acts, regulations and relevant standards • industry codes of practice • risk assessments • registration requirements • safe work practices • minimising ecological and environmental footprint of process, plant and product • maximising economic benefit of process plant and product to the organisation and the community • minimising the negative WHS impact on employees, community and customer • state and territory regulatory requirements.

Unit Mapping Information

Release 1. Supersedes and is equivalent to MEM234017A Design exhaust, ventilation and dust collection systems.

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 MEM234017 Design exhaust, ventilation and dust collection systems

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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:

- establishing required features and functions of the exhaust, ventilation and dust extraction
- confirming parameters of the brief or contract and providing initial advice based on discipline knowledge, standards, work health and safety (WHS), regulatory and risk assessment requirements
- researching latest trends and techniques in design of exhaust, ventilation and dust collection plant and equipment systems
- investigating, measuring, modelling and calculating design options
- investigating faults in existing designs and proposing solutions
- modelling and calculating system performance
- innovating and creating solutions, incorporating systems thinking, continuous improvement and constraint and contingency management
- designing exhaust, ventilation and dust collection systems on at least two occasions
- applying safe working practices and procedures
- communicating, negotiating and reviewing with stakeholders and client throughout the process to obtain agreement on proposal and sign-off on design
- documenting design with required drawings, specifications and instructions.

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:

- contemporary design methods and research and investigation approaches for exhaust, ventilation and dust collection plant and equipment
- design brief parameters
- techniques for:
 - continuous improvement
 - problem-solving and decision-making

- root cause analysis (RCA) or failure mode and effects analysis (FMEA) or design review based on failure mode (DRBFM), and Pareto analysis
- documentation, drawings, specifications and instructions required
- WHS, regulatory and environmental requirements for work areas
- standards, codes of practice, risk management and organisational procedures related to the design, installation, operation and maintenance of exhaust, ventilation and dust collection systems
- current options and trends in design, performance analysis, and modelling and simulation software, including software validation techniques
- concepts of exhaust, ventilation and dust collection
- use and validation of system analysis, 3D arrangement, manufacturing data and simulation software
- selection and application of fans
- ducting design including:
 - system sizing and balancing methods
 - air diffusers, outlet design and location
 - dust collection systems, selection and application
- system issues including:
 - air quality
 - noise attenuation and sound proofing
 - flame proofing.
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Assessment Conditions

- Assessors must:
 - have vocational competency in designing exhaust, ventilation and dust collection systems 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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