



Australian Government

Department of Education, Employment and Workplace Relations

CPCPMS5002A Design sound attenuated hydraulic services

Release: 1

CPCPMS5002A Design sound attenuated hydraulic services

Modification History

Not Applicable

Unit Descriptor

Unit descriptor	This unit of competency specifies the outcomes required to design sound attenuated hydraulic services, determine relevant installation details and prepare specifications for a range of residential, commercial and industrial buildings.
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Application of the Unit

Application of the unit	This unit of competency supports development of skills and knowledge required for competent workplace performance in a consultancy or supervisory capacity in relation to plumbing services and construction hydraulics.
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Licensing/Regulatory Information

Not Applicable

Pre-Requisites

Prerequisite units	Nil
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Employability Skills Information

Employability skills This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.

Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Evaluate design parameters.	1.1. Scope of work is established for sound attenuated hydraulic services for wide span and high-rise building projects. 1.2. Design requirements are determined from plans, specifications and client briefs. 1.3. Sound transmission categories and levels are identified from relevant Acts, codes and standards, and are evaluated for residential, commercial and industrial premises. 1.4. Sound transmission values of building and structural elements and materials are evaluated. 1.5. Cost-benefit analysis is conducted comparing a range of pipe materials and system designs. 1.6. Building Code of Australia, and statutory and regulatory requirements and Australian and New Zealand standards for the design of sound attenuated hydraulic services are analysed and applied. 1.7. Manufacturer requirements and trade and technical manuals are interpreted. 1.8. Additional research, including a desktop study, is conducted to outline design parameters. 1.9. Performance requirements are established.
2. Plan and detail system components.	2.1. Causes of noise generation in hydraulic services are identified and analysed. 2.2. Layout of sound attenuated pipework systems is planned. 2.3. System calculations are performed for a range of sound attenuated hydraulic services. 2.4. Pumped hydraulic systems are sound attenuated. 2.5. Pipe fixings are designed for a range of applications. 2.6. Approved materials and installation requirements for sound attenuated hydraulic services are specified.
3. Design and size systems.	3.1. Sound attenuated hydraulic services are designed and sized for a range of applications. 3.2. Material combinations are identified and documented to achieve sound attenuation requirements. 3.3. Pump installations are sound attenuated. 3.4. Sound attenuated hydraulic services are designed

ELEMENT	PERFORMANCE CRITERIA
	and evaluated using computer software packages.
4. Prepare documentation.	4.1. Plans are prepared for a range of sound attenuated hydraulic services. 4.2. Report on sound attenuated hydraulic services for a range of applications is prepared. 4.3. Specification for a sound attenuated hydraulic services plan is prepared. 4.4. Testing and commissioning schedule is prepared. 4.5. Operation and maintenance manual is produced.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Required skills for this unit are:

- communication skills to:
 - communicate with others to ensure safe and effective work practices
 - confirm job specifications and client requirements
 - enable clear and direct communication, using questioning to identify and confirm requirements, share information, listen and understand
 - read and interpret:
 - plans, specifications, drawings and design briefs
 - standards and manufacturer requirements and manuals
 - statutory and regulatory requirements
 - use language and concepts appropriate to cultural differences
 - use and interpret non-verbal communication, such as hand signals
- written skills to prepare documentation, including:
 - operation and maintenance manual
 - plans, specifications and schedules
- determining relevant installation details for sound attenuated hydraulic services
- innovation skills to develop creative and responsive approaches
- numeracy skills to apply measurements and calculations
- planning and organisational skills to:
 - plan and set out work

REQUIRED SKILLS AND KNOWLEDGE

- research, collect, organise and understand information relating to the design of sound attenuated hydraulic services
- take initiative and make decisions
- preparing specifications for sound attenuated hydraulic services
- problem solving skills to analyse requirements, consider options and design an appropriate system
- teamwork skills to work with others to action tasks and relate to people from a range of cultural and ethnic backgrounds and with varying physical and mental abilities.

Required knowledge

Required knowledge for this unit is:

- common terminology and definitions used in the design of sound attenuated hydraulic services for all classes of building
- drafting principles
- nature of materials used and effects of performance under various conditions
- principles of technology in the design of sound attenuated hydraulic services
- requirements of state regulatory authorities, Australian standards and manufacturer specifications, including hazards identified in relation to devices and systems used
- workplace safety requirements, including relevant statutory regulations, codes and standards.

Evidence Guide

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Overview of assessment

This unit of competency could be assessed in the workplace or a close simulation of the workplace environment providing that simulated or project-based assessment techniques fully replicate plumbing and services workplace conditions, materials, activities, responsibilities and procedures.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

A person who demonstrates competency in this unit must be able to provide evidence of:

- evaluating and documenting design parameters, including client, regulatory, manufacturer and Australian and New Zealand standard requirements for a range of sound attenuated hydraulic services
- planning and detailing system components, including:
 - clipping
 - ducts
 - insulation
 - sound attenuated pipework
- designing and sizing a range of sound attenuated hydraulic services
- preparing plans to industry standards for a range of sound attenuated hydraulic services
- preparing reports on sound attenuated hydraulic services for a range of applications
- preparing specifications for a range of sound attenuated hydraulic services
- preparing testing and commissioning schedules
- preparing operation and maintenance manuals.

Context of and specific resources for assessment

This competency is to be assessed using standard and authorised work practices, safety requirements and environmental constraints.

Assessment of essential underpinning knowledge will usually be conducted in an off-site context.

EVIDENCE GUIDE

Assessment is to comply with relevant regulatory or Australian standards' requirements.

Resource implications for assessment include:

- an induction procedure and requirement
- realistic tasks or simulated tasks covering the minimum task requirements
- relevant specifications and work instructions
- tools and equipment appropriate to applying safe work practices
- support materials appropriate to activity
- workplace instructions relating to safe working practices and addressing hazards and emergencies
- material safety data sheets
- research resources, including industry related systems information.

Reasonable adjustments for people with disabilities must be made to assessment processes where required. This could include access to modified equipment and other physical resources, and the provision of appropriate assessment support.

Method of assessment

Assessment methods must:

- satisfy the endorsed Assessment Guidelines of the Construction, Plumbing and Services Training Package
- include direct observation of tasks in real or simulated work conditions, with questioning to confirm the ability to consistently identify and correctly interpret the essential underpinning knowledge required for practical application
- reinforce the integration of employability skills with workplace tasks and job roles
- confirm that competency is verified and able to be transferred to other circumstances and environments.

Validity and sufficiency of evidence requires that:

- competency will need to be demonstrated over a period of time reflecting the scope of the role and the practical requirements of the workplace

EVIDENCE GUIDE

- where the assessment is part of a structured learning experience the evidence collected must relate to a number of performances assessed at different points in time and separated by further learning and practice, with a decision on competency only taken at the point when the assessor has complete confidence in the person's demonstrated ability and applied knowledge
- all assessment that is part of a structured learning experience must include a combination of direct, indirect and supplementary evidence.

Assessment processes and techniques should as far as is practical take into account the language, literacy and numeracy capacity of the candidate in relation to the competency being assessed.

Supplementary evidence of competency may be obtained from relevant authenticated documentation from third parties, such as existing supervisors, team leaders or specialist training staff.

Range Statement

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Scope of work:

- includes:
 - documenting layout of sound attenuated hydraulic services, including reduction of noise transfer for residential, commercial and industrial applications
 - interpreting plans and specifications
- may be for new projects or an existing structure being renovated, extended, restored

RANGE STATEMENT

	or maintained.
<i>Design requirements</i> include:	• architectural specifications • builder specifications • owner requirements • specialist applications.
<i>Cost-benefit analysis</i> includes:	• comparison of range of suitable materials and system choices available to enable cost-effective choices to be made without compromising integrity of project.
<i>Statutory and regulatory requirements and Australian and New Zealand standards</i> include:	• Acts, regulations and local and state government policies, including group and strata titling • AS/NZS3500 National plumbing and drainage set: Parts 2.1 and 2.2 • AS2200 Design charts for water supply and sewerage.
<i>Manufacturer requirements</i> include:	• analysis of sound transmission values • pump tables • sizing tables • specifications • technical and trade manuals.
<i>Desktop study</i> includes:	• collection and interpretation of existing data for design purposes from: • architectural and building plans • council plans • developer plans • other documents, including: • applications • forms • other reports as available.
<i>Performance requirements</i> include:	• pipe grades, cover, flow conditions and discharge requirements, established using Australian and New Zealand standards and local authority plans.
<i>Noise generation</i> includes:	• high velocity • linking of building compartments by pipework • loose pipework • noisy fixtures and appliances • pumped hydraulic systems • quick action valves

RANGE STATEMENT

Layout of pipework systems include:

- water hammer.
- proximity of residential compartments
- sound transmission category of building compartments.

System calculations include:

- decibel calculations
- noise insulation characteristics of materials
- sound transmission values of plumbing pipework and building materials.

Pumped hydraulic systems include:

- circulating systems
- compressed air systems
- pressurised water mains
- pump and pump installation
- pumphouse
- sanitary rising mains
- steam systems.

Pipe fixings cover fixings that do not impinge on sound attenuation of the hydraulic service and include:

- anchors
- bracket spacing
- corrosion protection
- hanging brackets
- material requirements
- saddles
- wall and ceiling brackets.

Materials include:

- cast iron
- copper
- polyethylene
- specialist sound attenuation piping materials and sound attenuating insulation materials.
- unplasticised polyvinyl chloride (PVC-U).

Installation requirements include:

- clipping
- installation details
- jointing requirements
- level of workmanship
- support.

Material combinations include:

- ducts
- floor and ceiling systems
- insulation
- plasterboard
- separation distances
- wall.

RANGE STATEMENT

Plans may include:

- axonometrics
- cross-sections
- details
- elevations
- isometrics
- schematics, which may be produced using:
 - pencil
 - Indian ink
 - pigment liner
 - computer generation
- sections.

Specification includes:

- clipping
- details of specialised components
- manufacturer requirements
- materials
- workmanship.

Testing includes:

- compliance testing
- quality assurance (QA) audit
- sound measurement (dB).
- insulation gap filling.

Commissioning schedule
includes:

**Operation and maintenance
manual** includes:

- regular maintenance requirements
- yearly inspection.

Unit Sector(s)

Unit sector Plumbing and services

Co-requisite units

Co-requisite units Nil

Functional area

Functional area