



Australian Government

CPCPMS5012A Design sound attenuated hydraulic services

Release 1

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Modification History

Changes to performance criteria, required skills and knowledge, range statement and critical aspects

Not equivalent to CPCPMS5002A

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.

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.

Licensing/Regulatory Information

In some jurisdictions, this unit of competency may form part of accreditation, licensing, legislative, regulatory or certification requirements.

Pre-Requisites

Nil

Employability Skills Information

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

Elements and 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 relevant Australian standards, codes, plans, specifications and client brief.
		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	National Construction Code, statutory and regulatory requirements and Australian 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	Factors that contribute to quality, safety and time efficiency are determined.
		1.9	Additional research, including a desktop study , is conducted to outline design parameters.
		1.10	Performance requirements are established, considering safety of system users or building occupants.
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 supports** 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 and evaluated using calculations and computer software packages.
 - 3.5 **Sustainability principles and concepts** are applied throughout the design process.
- 4 Prepare documentation.
 - 4.1 Client brief of the desired design is prepared.
 - 4.2 **Plans** and **specifications** are prepared for a range of sound attenuated hydraulic services.
 - 4.3 Report on sound attenuated hydraulic services for a range of applications is prepared.
 - 4.4 **Testing** and **commissioning schedule** is prepared.
 - 4.5 **Operation and maintenance manual** is produced, including information on how to properly and safely maintain the system.

Required Skills and Knowledge

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

Required skills

- 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
 - use language and concepts appropriate to cultural differences
 - use and interpret non-verbal communication, such as hand signals
- literacy skills to:
 - prepare written documentation, including:
 - operation and maintenance manual
 - plans, specifications and schedules
 - read and interpret:
 - plans, specifications, drawings and design briefs
 - standards and manufacturer requirements and manuals
 - statutory and regulatory requirements
- initiative and enterprise skills to develop creative and responsive approaches
- numeracy skills to apply measurements and calculations
- planning and organising skills to:
 - plan and set out work
 - research, collect, organise and understand information relating to the design of sound attenuated hydraulic services
 - take initiative and make decisions
- 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
- technical skills to:
 - determine relevant installation details for sound-attenuated hydraulic services
 - prepare specifications for sound attenuated hydraulic services
- technology skills to:
 - access and understand site-specific instructions in a variety of media
 - use mobile communication technology

Required knowledge

- application of relevant Australian standards and codes, National Construction Code, manufacturer specifications, and other relevant standard operating procedures relevant to the sector
- 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
- work health and safety (WHS) requirements, including relevant statutory regulations, codes and standards

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 as a minimum, provide evidence of the ability to:

- design and document the details for sound-attenuated hydraulic services installation, including a specification for a high-rise mixed development building; using an approved sanitary plumbing and domestic drinking water system to a minimum of 29 floors.
- evaluate and document design parameters, to relevant Australian standard and codes, and regulatory, client and manufacturer requirements for a range of sound-attenuated hydraulic services
- components must include:
 - clipping
 - pipe enclosures
 - insulation
 - sound-attenuated pipework
- prepare reports on sound-attenuated hydraulic services for a range of applications
- prepare specifications for a range of sound-attenuated hydraulic services
- prepare testing and commissioning schedules
- apply sustainability principles and concepts throughout the design process
- communicate with others to ensure safe and effective work site operations.

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.

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

- 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

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:

- must include:
 - 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 or maintained.

Design requirements must include:

- architectural plans
- building specifications
- acoustic performance of fixtures, fittings and equipment

- building construction materials
- fire rating of penetrations
- owner requirements
- pipe enclosures
- pipework identification
- specialist applications.

Cost-benefit analysis:

- compares the range of suitable materials and system choices available to enable cost-effective choices to be made without compromising integrity of project
- may include:
 - design styles
 - energy costs
 - expected design life
 - labour costs
 - material costs
 - safety factors
 - speed of installation
 - suitable materials
 - system choices.

Statutory and regulatory requirements and Australian standards may include:

- Acts, regulations and commonwealth, state or territory, and local government requirements
- National Construction Code
- AS/NZS3500 National plumbing and drainage
- AS2200 Design charts for water supply and sewerage
- other relevant Australian standards.

Manufacturer requirements may include:

- analysis of sound transmission values
- acoustic performance of fixtures, fittings and equipment
- specifications
- technical and trade manuals.

Desktop study may include collection and interpretation of data for design purposes in:

- architectural and building plans
- developer plans
- manufacturer data
- documents, which may include:

- applications
- brochures
- forms
- policies
- other reports as available.

Performance requirements may include:

- flow, velocity, pressure and discharge requirements established using relevant Australian standards, codes and local government authority plans
- noise rating of habitable areas.

Noise generation must include:

- acoustic performance of fixtures, fittings and equipment
- high velocity
- high pressure
- linking of building compartments by pipework
- loose pipework
- pumped hydraulic systems
- system design
- quick action valves
- water hammer.

Layout of pipework systems:

- must include:
 - concealed pipework
 - pipe enclosures
 - exposed pipework
 - fire-rated pipework
- should have principles of economy, serviceability, durability and fit for use applied
- should not unduly affect building integrity and aesthetic appeal.

System calculations must include:

- sound criteria for habitable rooms
- noise insulation characteristics of materials
- sound transmission values of plumbing pipework and building materials.

Pumped hydraulic systems may include:

- circulating systems
- compressed air systems

- pressurised water mains
- pump and pump rising mains
- pumphouse
- sanitary rising mains
- steam systems.

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

- anchors
- bracket spacing
- hanging brackets
- manufacturer-recommended specific fixings
- material requirements
- provision for expansion
- separation and insulation between pipework, supports and building structure.

Materials may include:

- expanded foam rubber
- glasswool
- rockwool
- lead vinyl
- other approved materials.

Installation requirements:

- may be for:
 - sanitary plumbing
 - drinking and non-drinking water supply
 - alternative water supply
 - stormwater drainage
 - siphonic stormwater systems
 - pumping systems
- must include:
 - fire rating
 - level of workmanship
 - manufacturer installation requirements
 - pipe support
 - serviceability and access.

Material combinations may include:

- pipe enclosures
- floor, wall and ceiling systems
- separation and insulation distances.

Sustainability principles and concepts:

- cover the current and future social, economic and environmental use of resources
- may include:
 - efficient use of material
 - efficient energy usage/capital outlay comparison
 - consideration of the Green Building Council of Australia rating scheme
 - selecting appropriate components to ensure minimal environmental impact.

Plans:

- may include:
 - axonometrics
 - cross-sections
 - details
 - elevations
 - isometrics
 - sections
- schematics, which may be produced using:
 - computer generation
 - drawing equipment.

***Specification* may include:**

- jointing
- manufacturer requirements
- materials
- performance criteria
- safety (WHS)
- selection of suitable acoustic rated fixtures, fittings and equipment
- separation and insulation between pipework, supports and building structure
- support
- workmanship.

***Testing* may include:**

- compliance testing
- quality assurance (QA) audit
- performance
- sound measurement (dB).

Commissioning schedule must include:

- system certification
- insulation gap filling
- system defects
- system functions as per design.

Operation and maintenance manual may include:

- as installed drawings
- results of commissioning test
- certification documentation
- maintenance schedules
- manufacturer brochures and technical information.

Unit Sector(s)

Functional area

Unit sector Plumbing and services

Custom Content Section

Not applicable.