



Australian Government

Assessment Requirements for CPCPCM5013 Design complex (non-solar) heated water systems

Release: 2

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Modification History

Release 2 This version first released with CPC Construction, Plumbing and Services Training Package Release 5.1.

Changes to Elements and Performance Criteria 1.8.

Release 1 This version first released with CPC Construction, Plumbing and Services Training Package Release 5.0.

Supersedes and is equivalent to CPCPCM5013A Design complex (non-solar) heated water systems. Updated to meet the Standards for Training Packages 2012.

Performance Evidence

To demonstrate competency, a candidate must meet the performance criteria for this unit by:

- designing, sizing and planning the layout details for complex (non-solar) heated water systems for a high-rise mixed development building to a minimum of 29 floors inclusive of a basement, including fixtures on each level and using two methods of providing heated water:
 - one system to be gas only
 - one system incorporating an alternative energy efficient heat source, for example, a commercial heat pump with boosted system
- preparing documentation, including:
 - heat source
 - flue arrangements
 - flow and return systems
 - insulation requirements
 - manifold systems
 - provision for expansion
 - temperature control device
- applying sustainability principles and concepts throughout to achieve a star rating under the Green Building Council of Australia rating scheme
- evaluating health risks associated with heated water supplies and actioning as required within the system design.

Knowledge Evidence

To be competent in this unit, a person must demonstrate knowledge of:

- common terminology and definitions used in design of complex (non-solar) heated water systems
- application of National Construction Code (NCC), relevant Australian Standards, codes and manufacturer specifications, including:
 - Acts and regulations
 - AS/NZS 3500 Plumbing and drainage set
 - local government and health department requirements
- installation methods and hazards identified in relation to devices and systems used according to relevant Australian Standards, codes and standard operating procedures
- nature of materials used and effects of performance under various conditions
- work health and safety (WHS) requirements, including relevant statutory regulations, codes and standards
- cost–benefit analysis considerations for the selection of materials and systems:
 - enabling cost effective choices without compromising the integrity of the project
 - expected design life
 - design style
 - associated labour costs
 - material costs
 - safety factors
 - speed of installation
 - suitability of materials
 - range of system choices
- requirements from manufacturer:
 - material specifications
 - heater maintenance and servicing
 - provision for heater pressure and temperature discharge
 - pump tables
 - sizing tables
 - recommended specific fixings for pipework
 - technical and trade manuals
- sources of information to support the design process:
 - architectural and building plans
 - developer plans
 - building applications
 - brochures
 - forms
 - policies
 - other reports as available

- layout of pipework systems:
 - dead leg
 - pressurised
 - thermo convection
 - circulating
- types of fittings:
 - bends
 - tees
 - unions
- types of valves:
 - backflow prevention
 - cold water expansion
 - isolating
 - non-return, including high pressure non-return
 - pressure limiting
 - pressure relief
 - strainers
 - temperature control
- types of thermostatic mixing and tempering valves:
 - bimetallic types
 - wax capsule
- circulating heated water supply system details:
 - circulating pump specification
 - dead leg minimisation
 - flow and return pipework
 - circulation
 - pipe insulation
 - thermal convection circulating
- heat trace systems:
 - installation requirements
 - running costs
 - serviceability
- calculations for sizing water heaters:
 - coefficient of expansion
 - daily flows
 - energy consumption
 - heat losses
 - mixed temperatures
 - peak demand
 - recovery times

- size and quantity of heated water required
- standby versus continual flow
- tariffs
- water expansion
- methods for the control of expansion:
 - U-bends
 - coiled loop
 - lyre bend
 - offset bends
 - proprietary expansion control devices
- pipe supports:
 - anchors
 - bracket spacing
 - corrosion protection
 - hanging brackets
 - material requirements
 - provision for expansion
 - saddles
 - wall and ceiling brackets
- manifolded heated water units:
 - balanced flow conditions and valves
 - pressure relief requirements
- water heater inclusions:
 - continuous flow
 - heat transfer
 - pressure storage systems
 - open vented storage systems
- sources of generated heat:
 - electricity
 - gas
 - heat pump
 - solar
 - solid fuel
 - waste heat
- safe trays and overflows:
 - design
 - discharge
 - materials
 - sizes
- materials:

- pipe materials as specified:
 - copper
 - composite
 - polymer
 - other approved materials
- flue materials including stainless steel
- ancillary material:
 - air relief valve
 - heaters
 - fittings and fixtures
 - insulation
 - pumps
 - valves
- jointing methods:
 - brazing
 - compression
 - electrofusion welding
 - flaring
 - mechanical joints
 - threading
- insulation materials:
 - fibre glass
 - foam
 - metal sheathing
 - rock wool
 - other approved materials
- installation requirements:
 - fire rating of penetrations
 - level of workmanship
 - manufacturer-recommended specific fixings
 - pipe support
 - provision for expansion
 - serviceability and access
- circulating systems:
 - approved pressure pipes and fittings
 - balancing valves
 - circulating pump and controls
 - isolating valves
 - thermo cycle
 - temperature gauge

- pump sizing to meet calculated flow conditions
- methods of applying sustainability principles and concepts:
 - selecting appropriate material to ensure minimal environmental impact
 - efficient use of material
 - efficient energy usage/capital outlay comparison
 - selection of energy efficient water heater
 - water efficiency
 - consideration of the Green Building Council of Australia rating scheme
- types of plans produced using computer software and drawing equipment:
 - axonometrics
 - cross-sections
 - details
 - elevations
 - isometrics
 - schematics
 - sections
- specification:
 - support
 - jointing
 - flow requirements
 - manufacturer requirements
 - materials
 - residual pressures and temperature
 - WHS
 - specialised components
 - testing
 - valve selection
 - water treatment
 - workmanship
- testing for:
 - air pressure
 - defect inspection
 - flue operation
 - hydrostatic
 - mains pressure
 - performance
 - quality assurance (QA) audit
- commissioning schedule information:
 - balancing the system
 - checking and flushing the system

- disinfection
- flow test
- flue operation
- leak check
- pressure test
- system certification
- system defects
- system functions as per design
- system purge
- temperature setting
- valve operation
- operation and maintenance manual information:
 - as installed drawings
 - results of commissioning test
 - certification documentation
 - heater details, settings and operations
 - maintenance schedules
 - manufacturer brochures and technical information
 - valve function.

Assessment Conditions

Assessors must satisfy the requirements for assessors listed in the Standards for Registered Training Organisations.

This unit must be assessed in the workplace or a close simulation using realistic workplace conditions, materials, activities, responsibilities, procedures, safety requirements and environmental considerations.

Links

Companion volumes to this training package are available at the VETNet website -
<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=7e15fa6a-68b8-4097-b099-030a5569b1ad>