Unit of Competency CPCPPS5001 Design industrial gas systems

Application

This unit specifies the skills and knowledge required to design industrial gas fuel systems including the design of valve trains, interlocks, pipework and equipment in compliance with regulatory requirements.

The unit covers determining installation requirements, preparing plans and system specifications, producing testing and commissioning schedules and creating operation and maintenance manuals.

The role may involve interaction with architects, builders, suppliers, clients and relevant planning authorities and requires a sound understanding of applicable legislation including work health and safety (WHS).

This unit is suitable for experienced tradespeople such as hydraulic design consultants or persons in a supervisory capacity in relation to gas and plumbing services.

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

Prerequisite Unit

Nil.

Elements and Performance Criteria

1. Evaluate design parameters.	1.1 Establish scope of work for industrial gas systems. 1.2 Establish system performance requirements. 1.3 Determine design requirements from plans, specifications and client brief. 1.4 Review and analyse statutory and regulatory requirements and Australian and New Zealand Standards for the design of industrial gas systems. 1.5 Conduct research including a desktop study to identify a range of system options. 1.6 Interpret manufacturer requirements and trade and technical manuals for industrial gas systems. 1.7 Determine factors that contribute to quality, safety and time efficiency. 1.8 Conduct a cost-benefit analysis to compare a range materials and system designs.
2. Plan and design system components.	2.1 Plan layout of pipework systems including type and location of fittings and valves. 2.2 Plan and specify valve trains for a range of industrial gas installations. 2.3 Plan and detail interlocks and accessories and analyse, select and locate components. 2.4 Select methods of protection from combustion air systems, harsh environments, heat and vibration. 2.5 Specify and design air systems, burner systems and controls, appliances and closed loop systems. 2.6 Detail remote filling systems and pipework and design. 2.7 Perform system calculations for a range of industrial gas installations. 2.8 Specify approved materials, jointing methods, pipe fixings and installation requirements.

	2.9 Design and size industrial gas systems for a range of applications.
3. Prepare documentation.	3.1 Prepare system plans. 3.2 Prepare system specifications. 3.3 Prepare system testing and commissioning schedule. 3.4 Produce operation and maintenance manual including information on how to correctly and safely maintain the system.

Foundation skills

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

Unit Mapping Information

Supersedes and is equivalent to CPCPPS5001B Design industrial gas systems.

Links

Companion Volume Implementation Guide:
https://vetnet.education.gov.au/Pages/TrainingDocs.aspx?q=7e15fa6a-68b8-4097-b099-030a5569b1ad

Assessment Requirements for CPCPPS5001 Design industrial gas systems

Performance Evidence

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

- planning, detailing, designing and sizing three of the following industrial gas systems:
    - drying and treatment of solvents
    - specialist atmospheres
    - heat exchanger transfers
    - air heating

  and include the following components in each system design:
    - burners
    - controls
    - regulators
    - gas piping systems operating at greater than 200 KPa
    - gas tightness testing for piping volumes greater than 30 litres
    - appliances that include solvent or dust atmospheres
    - dual fuel appliances
    - flue and exhaust requirements for forced draught burners
- ensuring the systems:
    - meet all regulatory, manufacturer and Australian and New Zealand Standard requirements
    - are completed to client specifications
    - are presented in a professional manner using computer aided design and word-processing programs.

Knowledge Evidence

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

- Australian Standards, codes, statutory and regulatory requirements:
    - AS/NZS 5601.1 Gas installations - General installations
    - AS/NZS1596 The storage and handling of LP gas
    - AS 3814 Industrial gas-fired appliances
    - AS 1375 Industrial fuel fired appliances
    - AS 61508 Functional safety
    - AS 31000 – Risk management
    - National Gas Law (NGL)
    - National Construction Code (NCC)

    - Acts, regulations and local and state government policies, including group and strata titling
- manufacturer specifications, including hazards identified in relation to devices and systems used
- other codes or standard operating procedures
- common terminology, symbols and definitions used in the design of industrial gas systems
- principles of technology in the design of industrial gas systems
- workplace safety requirements, including relevant statutory regulations, codes and standards
- cost-benefit analysis
- inclusions for establishing scope of work:
    - interpreting plans and specifications
    - sizing and documenting layout of industrial gas systems:
        - characteristics
        - compatibility
        - dimensions
        - location
        - patterns
        - quantities
        - sizes
        - surfaces
        - types of product and service
- design requirements:
    - architectural specifications
    - builder specifications
    - owner requirements
    - specialist use applications
- manufacturer requirements:
    - material specifications
    - pump tables
    - sizing tables
    - technical and trade manuals
- types information collected during desktop study for design purposes:
    - council plans
    - developer plans
    - applications
    - architectural and building plans
    - other reports as available
- performance requirements including pipe grades, cover, flow conditions and discharge requirements, established using Australian and New Zealand Standards and local authority plans
- layout of pipework systems:
    - principles of economy, serviceability and durability
    - not unduly affecting building integrity and aesthetic appeal

- fittings and valves:
    - meters
    - regulators
    - relief valves
- valve trains:
    - analysing the operation of valve components
    - sizing and selecting components using manufacturer data
- system calculations to determine:
    - explosion relief
    - purge times
    - flow and consumption
    - information in design charts and tables
    - pipe sizing
    - operating pressures greater than 200 KPa
    - expansion and anchorage provisions for pipework
    - overpressure protection systems
- materials:
    - copper (Cu)
    - fittings and appliances including measures to prevent the spread of fire
    - high density polyethylene (HDPE)
- jointing methods:
    - brazing
    - gluing
    - mechanical joints
    - solvent cement welding
    - threading
- pipe fixings:
    - anchors
    - bracket spacing
    - corrosion protection
    - hanging brackets
    - material requirements
    - saddles
    - wall and ceiling brackets
- installation requirements:
    - clipping
    - installation details
    - jointing requirements
    - level of workmanship.

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

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https://vetnet.education.gov.au/Pages/TrainingDocs.aspx?q=7e15fa6a-68b8-4097-b099-030a5569b1ad