



Australian Government

CPCPGS4023B Install, commission and service Type B gas appliances

Release 1

CPCPGS4023B Install, commission and service Type B gas appliances

Modification History

This version first released with CPC08 Construction, Plumbing and Services Training Package Version 9.

- Reference to standards updated in required knowledge section and range statement Equivalent to CPCPGS4023A Install, commission and service Type B gas appliances

Unit Descriptor

This unit of competency specifies the outcomes required to install, commission and service Type B gas appliances, from the gas isolation valve and electrical isolation switch to the flue spigot on the appliance, according to current and relevant standards.

Application of the Unit

This unit of competency supports the needs of appropriately qualified experienced persons with a responsibility for interpreting and applying pre-existing design specifications; gaining approvals from authorities; preparing for work; installing gas system components and associated electrical or electronic components and controls; testing, adjusting, commissioning and servicing Type B gas appliances; and completing work finalisation processes, including formal recording and reporting requirements.

Licensing/Regulatory Information

Before satisfying this unit, the candidate requires a restricted electrical licence or equivalent to connect and disconnect appliances according to the requirements of the particular State or Territory.

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

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|---|--|---|
| 1 | Obtain authority to undertake work on Type B gas appliances. | <p>1.1 <i>Design specification</i> for <i>Type B gas appliance</i> to be installed and commissioned is accessed, analysed, interpreted and confirmed through a detailed site inspection.</p> <p>1.2 Design specification matters requiring clarification are resolved through liaison with designer and gas authorities.</p> <p>1.3 Formal authority to proceed with installation and commissioning is obtained before commencing work, according to <i>regulatory and code of practice requirements</i>.</p> <p>1.4 Regulatory and code of practice recording and reporting requirements are satisfied at appropriate times throughout the work sequence.</p> |
| 2 | Prepare for work. | <p>2.1 <i>Work health and safety</i> (WHS) requirements associated with the workplace environment and installing, commissioning and servicing Type B gas appliances are accessed, interpreted and followed throughout the work.</p> <p>2.2 Gas system components, electrical or electronic components and controls, and other required installation materials are identified from the design specification and obtained for the work.</p> <p>2.3 Component specifications and manufacturer servicing manuals are obtained for planned work activity.</p> <p>2.4 Tasks are planned in conjunction with others involved in</p> |

- or affected by the work.
- 2.5 **Tools and equipment**, including personal protective equipment, are selected consistent with installation, commissioning and servicing needs and checked for serviceability, and any faults are rectified or reported.
 - 2.6 **Quality assurance requirements** for the work sequences are identified and followed.
 - 2.7 Work area is prepared to support efficient installation, commissioning and servicing of Type B gas appliance.
 - 2.8 Gas system and electrical safety checks and isolation procedures are completed and recorded to manufacturer and other authorities' requirements before commencing work.
 - 2.9 **Sustainability principles and concepts** are observed when preparing for and undertaking work process.
- 3 Install Type B gas appliances.
 - 3.1 Appliance components, including **valve trains, burners** and associated pipework and flue systems, are installed according to approved design specifications.
 - 3.2 Ventilation systems are installed according to approved design specifications.
 - 3.3 Electrical components, including terminations, are installed according to design specifications and regulatory requirements.
 - 3.4 Electrical wiring and wiring enclosures are installed according to design specifications and regulatory requirements.
 - 3.5 Installations are visually inspected at each stage of the work to ensure compliance with specifications and absence of damaged or faulty equipment and materials.
 - 4 Commission and test Type B gas appliances.
 - 4.1 **Testing and servicing** equipment appropriate to the requirement is selected, checked and prepared for use.
 - 4.2 Gas and electrical safety checks and isolation procedures, including purging, are completed and recorded to manufacturer and other authorities' requirements before testing and commissioning are

- commenced.
- 4.3 ***Operational parameters of individual components*** are tested and adjusted to conform to specifications.
- 4.4 Appliance operations are tested first without and then with fuel, adjustments are completed as necessary and results recorded according to approving authorities' requirements.
- 4.5 Flue gases are analysed according to recognised industry practice and other authorities' requirements.
- 5 Service Type B gas appliances.
- 5.1 Nature and possible cause of faults or out of specification performance are identified from defect reports or operational records.
- 5.2 Electrical and gas safety checks and isolation procedures are completed and recorded to manufacturer and other authorities' requirements before servicing work is commenced.
- 5.3 Plans and diagrams are read and correctly interpreted to identify potential gas system and electrical fault pathways and locations.
- 5.4 Appropriate testing techniques, procedures and equipment are selected and applied to diagnose system faults or discrepancies.
- 5.5 Cause of fault or out of specification performance is identified and confirmed.
- 5.6 Options for correction are thoroughly analysed and most appropriate corrective action is selected.
- 5.7 Repair, replacement or adjustment is made according to manufacturer specifications or service manuals.
- 5.8 Appliance is assessed to ensure compliance with relevant standards and manufacturer specifications prior to recommissioning and returning to service.

- 6 Clean up work area.
 - 6.1 Work area is cleared and materials disposed of, reused or recycled according to commonwealth, state and territory legislation and workplace procedures.
 - 6.2 Tools and equipment are cleaned, checked, serviced and stored according to manufacturer recommendations and workplace procedures.
 - 6.3 Information is accessed and documentation completed according to workplace requirements.

Required Skills and Knowledge

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

Required skills

- communication skills to:
 - access information
 - determine requirements
 - enable clear and direct communication, using questioning to identify and confirm requirements, share information, listen and understand
 - follow instructions
 - liaise with designer and authorities
 - use language and concepts appropriate to cultural differences
 - use and interpret non-verbal communication, such as hand signals
- initiative and enterprise skills to identify and report to appropriate personnel any faults in tools, equipment or materials
- literacy skills to:
 - complete workplace documentation, including recording test results
 - read and interpret:
 - defect reports
 - design specification
 - documentation from a variety of sources
 - operational records
 - submit work notices
- numeracy skills to interpret and apply mathematical information
- planning and organising skills to plan work with others
- technical skills to:
 - follow safe work procedures relating to the installation, commissioning and servicing of Type B appliances
 - interpret information, including:
 - charts and hand drawings
 - plans, sketches and graphics
 - instructions issued by authorised organisational or external personnel
 - job drawings
 - manufacturer specifications and instructions
 - maps
 - material safety data sheets (MSDS)
 - memos

- organisation work specifications and requirements
- plans, diagrams and specifications
- signage
- verbal or written and graphical instructions
- work bulletins
- work schedules
- technology skills to:
 - access and understand site-specific instructions in a variety of media
 - use mobile communication technology

Required knowledge

- Australian standards, including the use of tables:
 - AS3814 (AG501) Industrial and commercial gas appliances
 - AS5601 (AG601) Gas installations/AS/NZS5601
 - relevant aspects of AS3814 Industrial fuel fired appliances, AS2593 Boilers – Unattended and limited attendance and AS/NZS3000 Electrical installations
- basic electrical theory, including:
 - Ohm's law
 - current flow
 - conduction
 - insulation
 - ignition systems
 - characteristics of fuses, circuit breakers, residual current devices and earthing systems
 - characteristics of electromotive force (EMF)
 - electrical safety, including isolation procedures and requisite precautions
 - electrical terminology and conventional symbols
- flue gas analysis techniques and processes
- gas terminology and conventional symbols
- gas safety, including:
 - isolation procedures
 - combustion characteristics and effects
- job safety analysis (JSA) and safe work method statements (SWMS)
- programmable logic controller (PLC) systems, including remedial programming techniques
- purging requirements, techniques and critical calculation processes
- SI system of units
- sources of information and processes for the calculation of material requirements
- types and properties of fuel gas, including pressure and flow rates
- types, characteristics, uses and limitations of electrical and electronic componentry and

control systems

- types, characteristics, uses and limitations of Type B gas appliance components
- ventilation techniques and calculation processes
- workplace and equipment safety requirements

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.

It may be assessed on its own or as part of an integrated assessment activity involving planning and conducting the installation of at least one significant Type B gas appliance.

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:

- locating interpreting and applying relevant information, standards and specifications to determine requirements of and maintain Type B appliances
- applying safety requirements throughout the work sequence, including:
 - using personal protective clothing and equipment
 - isolating appliances from gas and electrical services
 - planning and conducting installation of at least one significant Type B appliance, which includes:
 - application of sustainability principles and concepts
 - obtaining required authorities

- planning work
- installing gas, ventilation and electrical componentry
- installing electrical control system
- completing all required tests and sequences
- commissioning the appliance
- completing all required documentation
- communicating and working effectively and safely with others.

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 work 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.

Design specification may include:

- air controls
- combustion air blowers
- flame safe guards
- gas pressure regulation
- gas valve trains
- manual shut-off valves
- markings and instructions
- materials
- over-pressure protection systems
- process controls
- safety shut-off valve systems.

Type B gas appliances:

- include those above 10 megajoules (MJ) for which a certification scheme does not exist
- may use:
 - combination fuels
 - liquefied petroleum gas
 - natural gas
 - tempered liquefied petroleum gas
- may have special requirements for design and operation, including:
 - after burners – process
 - air gas mixing machines and mixing blowers
 - atmosphere generators and special atmospheres
 - direct gas fired air heaters
 - high input gas fired appliances
 - incinerators and generators
 - multi-fuel firing systems
 - ovens – direct fired
 - smoke ovens – direct fired
 - stationary gas engines and turbines
 - steam and heated water boilers
 - water heaters
- Type B appliance operation specifications will include:
 - flame establishment periods
 - interlocks
 - operation of gas appliance and burners
 - operational sequences
 - start gas rates

- planning installation of a Type B gas appliance will include determination of site suitability and confirmation of the appropriateness of:
 - electrical supply
 - gas supply and sizing
 - proposed appliance security and lighting measures
 - proposed component handling and positioning measures
 - proposed foundation and supports
- commissioning procedure for a Type B appliance, including:
 - preliminary inspection
 - activation run without fuel
 - activation run with fuel
 - operation and completion stages.

Regulatory and code of practice requirements include:

- statutory and regulatory authorities' requirements that may include:
 - statutory plumbing authority
 - statutory gasfitting authority
- state or territory and local statutory regulatory authority and legislative requirements, particularly those pertaining to:
 - building codes
 - WHS and environmental requirements
 - plumbing and/or gasfitting authority regulations
- environmental regulatory requirements may include:
 - air pollution
 - clean-up protection
 - waste management
- relevant Australian standards, including:
 - AS3814 Industrial fuel fired appliances
 - AS2593 Boilers - Unattended and limited attendance
 - AS/NZS3000 Electrical installations
 - AS/NZS4836 Safe working on low-voltage electrical installations
 - AS5601 (AG601) Gas installations/AS/NZS5601

- AS3814 (AG501) Industrial and commercial gas appliances.

Work health and safety is to be according to commonwealth, state and territory legislation and regulations and may include:

- handling of materials, including hazardous materials and substances
- hazard control
- personal protective clothing and equipment prescribed under legislation, regulations and workplace policies and practices
- safe operating procedures, including recognising and preventing hazards associated with:
 - electrical components and safety
 - gas fires and explosions
 - service lines
 - surrounding structures and facilities
 - trip hazards
 - use of tools and equipment
 - work site visitors and the public
 - working at heights
 - working in proximity to others
- use of firefighting equipment
- use of first aid equipment
- workplace environment and safety.

Tools and equipment may include:

- hand tools, such as wrenches and spanners
- measuring equipment
- power tools
- testing equipment and instruments, including:
 - manometer
 - multi-meter
 - dual probe voltage tester
 - flue gas analysis equipment
 - hand pump pressure kit
 - Pitot tube
 - insulation resistance tester
 - megohmmeter
 - power point tester
 - neon tester
 - volt stick
- lifting and load shifting equipment, including:

- hand trolleys
- rollers
- forklifts
- chain blocks
- hoists and jacks.

Quality assurance requirements may include:

- Australian Gas Association (AGA) requirements
- Environment Protection Authority
- internal company quality assurance policy and risk management strategy
- International Standards Organisation
- site safety plan
- workplace operations and procedures.

Sustainability principles and concepts:

- cover the current and future social, economic and environmental use of resources
- may include:
 - efficient energy use
 - efficient use and recycling of material
 - correct handling of hazardous materials
 - disposing waste material to ensure minimal environmental impact
 - selecting appropriate components to ensure minimal environmental impact.

Valve trains include:

- flow and ratio controls
- gas pressure regulators and controllers
- manual isolation valves
- safety shut-offs.

Burners include:

- atmospheric
- nozzle
- oxygen enhanced
- packed power
- pre-mix.

Testing and servicing of Type B gas appliances will require:

- use of a hand-held programmer to monitor circuit conditions and to edit program (to make minor changes)

- materials that comply with appropriate standards for the maintenance of Type B gas appliances.

Operational parameters of individual components include:

- air flows
- all safety and operating controls
- combustion conditions
- gas rates
- purge times.

Unit Sector(s)

Plumbing and services

Custom Content Section

Not applicable.