



Australian Government

Assessment Requirements for MEM29004 Analyse and problem solve a PLC based industrial control system

Release: 1

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Modification History

Release 1. New unit.

Performance Evidence

There must be evidence the candidate demonstrated the ability to:

- analyse complex information and documentation from at least two sources for PLC application requirements
- install at least two PLCs according to manufacturer's specifications and PLC application requirements including:
 - installing required modules, connectors, and other equipment
 - installing PLC protection equipment including:
 - over-voltage and over-current
 - physical shielding
 - magnetic shielding
 - physical security and access barriers/equipment
 - using appropriate testing equipment for PLC applications
 - taking accurate measurements during set up and implementation of at least two PLC-based industrial control systems
 - documenting PLC programs and function tests
- install, test and debug PLC code for at least one local and one cloud-based PLC
- research technology developments in PLC based industrial control systems for own area of responsibility
- locate hardware and software faults in at least two already installed PLCs
- produce logic flow diagrams and state diagrams.

Note: Where a volume and/or frequency is not specified, demonstration must be provided at least once.

Knowledge Evidence

There must be evidence the candidate has knowledge of:

- work health and safety (WHS) requirements relevant to PLC-based industrial control systems
- sources of technical information relating to PLC-based industrial control systems including manufacturer's specifications, workplace procedures and other relevant sources
- features of programmable controllers including:
 - relay control, static logic control and programmable control
 - programmable controller block diagram (inputs and outputs)

- programmable controller symbols
- programmable controller functions
- numbering systems start-up procedures
- special units
- advantages of distributed control PLCs in Industry 4.0 including:
 - shorter communication loops
 - facilitation of redundancy and backup
 - increased opportunity for incremental improvement to operations
- types of local and remote PLC connectivity including:
 - sensor-PLC
 - PLC – supervisory control and data acquisition (SCADA) system
 - PLC – enterprise resource planning system (ERP)
 - PLC – human machine interface
 - PLC – non-manufacturing-based programs
- ethernet and WiFi protocols relevant to PLCs
- relay logic circuits including:
 - series
 - parallel
 - combination of series and parallel
 - interlocking
- programmable logic including:
 - on state instruction
 - series equivalent circuits
 - parallel equivalent circuits
 - combination series/parallel
 - off state instruction
- control relay logic conversion
- fail safe including:
 - identifying need for fail safe
 - programming fail safe
 - hardware fail safe
 - program editors
 - Graftet
 - statement list
 - ladder
 - graphical
- advanced logic concepts including:
 - move
 - block transfer
 - compare

- block compare
- and words
- mask
- maths function
- scaling and unscaling
- shift register
- multiplexing
- sequencer encompassing:
 - application
 - event
 - time driven
- Boolean algebra
- counters and timers
- bit operations
- data protocols
- cyber-security procedures and protocols relevant to PLCs
- diagnostic and troubleshooting procedures for PLC-based industrial control systems and their components
- procedures for documenting and reporting PLC program and test outcomes.
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Assessment Conditions

- Assessors must:
 - have vocational competency in problem solving PLC based industrial control system at least to the level being assessed with relevant industry knowledge and experience
 - satisfy the assessor requirements in the *Standards for Registered Training Organisations 2015* or its replacement and comply with the *National Vocational Education and Training Regulator Act 2011*, its replacement or equivalent legislation covering VET regulation in a non-referring state/territory as the case requires.
- Where possible, assessment must occur in operational workplace situations. Where this is not possible or where personal safety or environmental damage are limiting factors, assessment must occur in a sufficiently rigorous simulated environment that reflects realistic operational workplace conditions that cover all aspects of workplace performance, including environment, task skills, task management skills, contingency management skills and job role environment skills.
- There must be access to all tools, equipment, materials and documentation required, including relevant workplace procedures, product and manufacturing specifications.
- Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.
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Links

Companion Volume Implementation Guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b7050d37-5fd0-4740-8f7d-3b7a49c10bb2>