



**Australian Government**

# **AHCIRG410 Select and manage pumping systems for irrigation**

**Release: 1**

# AHCIRG410 Select and manage pumping systems for irrigation

## Modification History

| Release Number | TP Version | Comments        |
|----------------|------------|-----------------|
| 1              | AHCv1.0    | Initial release |

## Application

This unit of competency describes the skills and knowledge required to operate and maintain irrigation pumping systems.

High voltage electrical work must be carried out by a qualified electrician.

It applies to individuals who analyse information and exercise judgement to complete a range of advanced skilled activities and demonstrate deep knowledge in a specific technical area. They have accountability for the work of others and analyse, design and communicate solutions to a range of complex problems. All work is carried out to comply with workplace procedures.

No occupational licensing, legislative or certification requirements are known to apply to this unit at the time of publication.

## Pre-requisite Unit

Nil.

## Unit Sector

Irrigation (IRG)

## Elements and Performance Criteria

| Element                                                               | Performance criteria                                                                                                                                                                                                                                          |
|-----------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Elements describe the essential outcomes.                             | Performance criteria describe the performance needed to demonstrate achievement of the element.                                                                                                                                                               |
| 1. Identify irrigation system requirements from the irrigation design | 1.1 Identify the components of an irrigation pumping system<br>1.2 Determine the water source and height of pull for water into the system<br>1.3 Determine the water output for irrigation<br>1.4 Calculate the total friction loss of irrigation components |

| Element                                                                                                   | Performance criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2. Select pump according to type, installation, range of flow rates, operating head and delivery distance | 2.1 Select the basic type of pump based on the pump task and placement and the power source<br>2.2 Calculate the total operating head required<br>2.3 Calculate the required discharge for the pump based on the irrigation output required and friction losses in the system<br>2.4 Determine the speed and power requirements of the pump motor<br>2.5 Determine the limiting suction lift of the pump<br>2.6 Interpret pump performance curves when selecting an efficient irrigation pump<br>2.7 Determine the size of the impeller from the pump curve |
| 3. Supervise installation of pumps                                                                        | 3.1 Ensure pump is sited as close as possible to water source and is level<br>3.2 Verify pump is properly anchored and connections are airtight<br>3.3 Confirm pump and motor connection are correctly aligned and motor is ventilated<br>3.4 Verify filters and valves are correctly fitted and orientated<br>3.5 Check pump is connected to the irrigation controller if required                                                                                                                                                                         |
| 4. Oversee commissioning and testing of pumping system                                                    | 4.1 Develop pre-start and start up procedures<br>4.2 Check delivery performance and verify power usage and water output against requirements and pump specifications<br>4.3 Ensure pumping system is checked for leakages and cavitation<br>4.4 Determine that pumping system is operating effectively                                                                                                                                                                                                                                                      |
| 5. Develop maintenance procedures for the pumping system                                                  | 5.1 Develop routine maintenance procedures to rectify the effects of normal wear<br>5.2 Develop periodic inspection checklists to assist in maintenance scheduling<br>5.3 Carry out pump overhaul or repairs<br>5.4 Keep pump maintenance records, including details of the pump and all pumping system components for ordering                                                                                                                                                                                                                             |
| 6. Carry out troubleshooting on pumping systems                                                           | 6.1 Investigate lack of discharge or pressure and change settings or components<br>6.2 Investigate loss of water suction and make alterations to placement or fix leakages<br>6.3 Investigate cavitation in pumps and change settings or components<br>6.4 Investigate excessive power consumption and review design and pump selection and check for mechanical defects                                                                                                                                                                                    |

## Foundation Skills

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

## Range of Conditions

## Unit Mapping Information

This unit is equivalent to AHCIRG410A Select and manage pumping systems for irrigation.

## Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=c6399549-9c62-4a5e-bf1a-524b2322cf72>

# Assessment Requirements for AHCIRG410 Select and manage pumping systems for irrigation

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## Performance Evidence

The candidate must be assessed on their ability to integrate and apply the performance requirements of this unit in a workplace setting.

The candidate must provide evidence that they can:

- identify irrigation system requirements from the irrigation design
- select pump according to type, installation, range of flow rates, operating head and delivery distance
- supervise installation of pumps
- develop maintenance procedures for the pumping system
- monitor the performance of pumps, valves and filters
- carry out troubleshooting on pumping systems
- calculate pumping requirements and pressure loss due to irrigation components
- identify adverse environmental impacts of irrigation pumping activities and take appropriate remedial action

## Knowledge Evidence

The candidate must demonstrate knowledge of:

- advantages and disadvantages of each pump type
- application of mechanical, hydraulic and electrical principles
- automatic pump switches including:
  - flow switches
  - irrigation controllers
  - pressure switches
  - timers
- cavitation - cause and effect
- discharge and flow rates
- environmental procedures for installing and maintaining irrigation pumping systems
- installation factors including:
  - adequate space, head room, ventilation and lighting

- correct alignment procedures of pump and motor shafts with direct coupled units
- provision for adjustment and ease of dismantling
- levelling and alignment processes
- overhaul or repair operations
- properties of water including pressure and flow rates
- pump components and their principles of operation
- pump efficiency, performance and pressure testing
- pump positioning (driver alignment and suction length)
- routine preventative maintenance
- selection factors for pumps including:
  - source of water and lift
  - the required pumping flow rate and pressure
  - the total dynamic head
  - the total suction head
- sources of information and the processes for the calculation of material requirements and flow rates
- statutory and authority requirements related to the installation of commissioning of irrigation pumping systems
- types of impellers and their use
- types of pumps and application in irrigation including:
  - centrifugal
  - propeller
  - submersible
  - vertical turbine
- types of pumps suitable as booster and floating pumps
- types of valves
- work health and safety legislation

## Assessment Conditions

Assessors must satisfy current standards for RTOs.

## Links

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