

**Modification history**

Release	Comments
Release 2	This version released with AHC Agriculture, Horticulture, Conservation and Land Management Training Package Version 4.0.
Release 1	This version released with AHC Agriculture, Horticulture, Conservation and Land Management Training Package Version 1.0.

AHCIRG410	Select and manage pumping systems for irrigation
<b>Application</b>	<p>This unit of competency describes the skills and knowledge required to identify irrigation system requirements, select pump and supervise installation, commissioning and testing of pump system, develop maintenance procedures and troubleshoot irrigation pumping systems.</p> <p>High voltage electrical work must be carried out by a qualified electrician.</p> <p>The unit applies to individuals who apply specialised skills and knowledge to the selection and management of irrigation pumping systems and have responsibility for the output of others. This includes applying and communicating non-routine technical solutions to predictable and unpredictable problems.</p> <p>No occupational licensing, legislative or certification requirements apply to this unit at the time of publication.</p>
<b>Prerequisite Unit</b>	Nil
<b>Unit Sector</b>	Irrigation (IRG)

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
1. Identify irrigation system requirements from the irrigation design	1.1 Identify the components of an irrigation pumping system 1.2 Determine the water source and height of pull for water into the system 1.3 Determine the water output for irrigation 1.4 Calculate the total friction loss of irrigation components
2. Select pump according to type, installation, range of flow rates, operating head and delivery distance	2.1 Select pump type based on pumping task and placement and the power source 2.2 Calculate total operating head requirements 2.3 Calculate pump discharge requirements based on irrigation output requirements and friction losses in the system 2.4 Determine pump motor speed and power requirements 2.5 Determine pump limiting suction lift 2.6 Interpret pump performance curves when selecting an efficient irrigation pump 2.7 Determine the size of the impeller from the pump curve
3. Supervise installation of pumps	3.1 Ensure pump is level and sited as close as possible to water source 3.2 Verify pump is properly anchored and connections are airtight 3.3 Confirm pump and motor connection are correctly aligned and motor is ventilated 3.4 Verify filters and valves are correctly fitted and orientated 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 4.2 Check delivery performance and verify power usage and water output against requirements and pump specifications 4.3 Ensure pumping system is checked for leakages and cavitation 4.4 Confirm pumping system is operating effectively

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
5. Develop maintenance procedures for the pumping system	5.1 Develop routine maintenance procedures to rectify the effects of normal wear 5.2 Develop periodic inspection checklists to assist in maintenance scheduling 5.3 Carry out pump overhaul or repairs 5.4 Keep pump maintenance records, including details of pump and 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 6.2 Investigate loss of water suction and make alterations to placement or fix leakages 6.3 Investigate cavitation in pumps and change settings or components 6.4 Investigate excessive power consumption and review design and pump selection and check for mechanical defects

### Foundation Skills

*This section describes those language, literacy, numeracy and employment skills that are essential for performance in this unit of competency but are not explicit in the performance criteria.*

Skill	Description
Reading	<ul style="list-style-type: none"> <li>Identify and interpret information regarding selecting and managing irrigation pumping systems</li> </ul>
Writing	<ul style="list-style-type: none"> <li>Develop irrigation pumping system management procedures, pre-start and start up procedures</li> <li>Develop routine maintenance procedures and periodic inspection checklists</li> <li>Record pump maintenance</li> </ul>
Numeracy	<ul style="list-style-type: none"> <li>Calculate water output, friction loss and operating head requirements</li> <li>Identify and record pump system component numbers</li> </ul>
Navigate the world of work	<ul style="list-style-type: none"> <li>Identify and describe own workplace requirements, including safety requirements, associated with own role and area of responsibility</li> </ul>

### Unit Mapping Information

Code and title current version	Code and title previous version	Comments	Equivalence status
AHCIRG410 Select and manage pumping systems for irrigation Release 2	AHCIRG410 Select and manage pumping systems for irrigation Release 1	Minor changes to performance criteria and foundation skills	Equivalent unit

Links	
	Companion Volumes, including Implementation Guides, are available at VETNet: <a href="https://vetnet.education.gov.au/Pages/TrainingDocs.aspx?q=c6399549-9c62-4a5e-bf1a-524b2322cf72">https://vetnet.education.gov.au/Pages/TrainingDocs.aspx?q=c6399549-9c62-4a5e-bf1a-524b2322cf72</a>

<b>TITLE</b>	<b>Assessment requirements for AHCIRG410 Select and manage pumping systems for irrigation</b>
<b>Performance Evidence</b>	
<p>An individual demonstrating competency must satisfy all of the elements and performance criteria in this unit.</p> <p>There must be evidence that the individual has selected and managed irrigation pumping systems on at least one occasion and has:</p> <ul style="list-style-type: none"> <li>• identified irrigation system requirements from the irrigation design</li> <li>• selected pump according to type, installation, range of flow rates, operating head and delivery distance</li> <li>• supervised installation of pumps</li> <li>• developed maintenance procedures for the pumping system</li> <li>• monitored the performance of pumps, valves and filters</li> <li>• carried out troubleshooting on pumping systems</li> <li>• calculated pumping requirements and pressure loss due to irrigation components</li> <li>• identified adverse environmental impacts of irrigation pumping activities and taken appropriate remedial action.</li> </ul>	
<b>Knowledge Evidence</b>	
<p>An individual must be able to demonstrate the knowledge required to perform the tasks outlined in the elements and performance criteria of this unit. This includes knowledge of:</p> <ul style="list-style-type: none"> <li>• advantages and disadvantages of each pump type</li> <li>• application of mechanical, hydraulic and electrical principles</li> <li>• automatic pump switches including: <ul style="list-style-type: none"> <li>• flow switches</li> <li>• irrigation controllers</li> <li>• pressure switches</li> <li>• timers</li> </ul> </li> <li>• pump cavitation, cause and effect</li> <li>• discharge and flow rates</li> <li>• environmental procedures for installing and maintaining irrigation pumping systems</li> <li>• pump installation factors including: <ul style="list-style-type: none"> <li>• adequate space, head room, ventilation and lighting</li> <li>• correct alignment procedures of pump and motor shafts with direct coupled units</li> <li>• provision for adjustment and ease of dismantling</li> <li>• levelling and alignment processes</li> <li>• overhaul or repair operations</li> <li>• properties of water including pressure and flow rates</li> <li>• pump components and their principles of operation</li> <li>• pump efficiency, performance and pressure testing</li> <li>• pump positioning (driver alignment and suction length)</li> <li>• access for routine preventative maintenance</li> </ul> </li> <li>• selection factors for pumps including: <ul style="list-style-type: none"> <li>• source of water and lift</li> <li>• the required pumping flow rate and pressure</li> <li>• the total dynamic head</li> <li>• the total suction head</li> </ul> </li> <li>• sources of information and the processes for the calculation of material requirements and flow rates</li> <li>• statutory and authority requirements related to the installation and commissioning of irrigation pumping systems</li> <li>• types of impellers and their use</li> <li>• types of pumps and application in irrigation including: <ul style="list-style-type: none"> <li>• centrifugal</li> <li>• propeller</li> <li>• submersible</li> </ul> </li> </ul>	

### Knowledge Evidence

- vertical turbine
- types of pumps suitable as booster and floating pumps
- types of valves
- workplace health and safety and environmental procedures.

### Assessment Conditions

Assessment of skills must take place under the following conditions:

- physical conditions:
  - a workplace setting or an environment that accurately represents workplace conditions
- resources, equipment and materials:
  - irrigation pumping system equipment and tools
  - irrigation pumping system measuring, and recording equipment and procedures
- specifications:
  - workplace health and safety and environmental procedures applicable to irrigation pumping systems
- timeframes:
  - according to the job requirements.

Assessors of this must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

### Links

Companion Volumes, including Implementation Guides, are available at VETNet:  
<https://vetnet.education.gov.au/Pages/TrainingDocs.aspx?q=c6399549-9c62-4a5e-bf1a-524b2322cf72>