

Title	Demonstrate knowledge of farm dairy effluent hydraulic design methods		
Level	4	Credits	5

Purpose	<p>This unit standard is for people employed in the design and installation of farm dairy effluent systems design. It includes the underpinning knowledge required to design a farm dairy effluent system and leads on to unit standard 29162.</p> <p>People credited with this unit standard are able to: demonstrate knowledge of sprinkler and irrigator systems, their principals of operation and applications; design methods of a FDE hydraulic system, pump selection for FDE systems.</p>
----------------	--

Classification	Mechanical Engineering > Dairy Systems Engineering
-----------------------	--

Available grade	Achieved
------------------------	----------

Recommended skills and knowledge	29158, <i>Demonstrate knowledge of basic hydraulic theory for rural fluid systems</i> or equivalent knowledge and skills.
---	---

1 References

New Zealand Food Safety Council

NZCP1: Code of Practice for the Design and Operation of Farm Dairies. Available at:

<http://www.foodsafety.govt.nz/elibrary/industry/dairy-nzcp1-design-code-of-practice/amdt-2.pdf>

Farm Dairy Effluent (FDE) Design Code of Practice, available at

<http://www.dairynz.co.nz/publications/environment/farm-dairy-effluent-fde-design-code-of-practice/>.

Farm Dairy Effluent (FDE) Design Standards, available at

<http://www.dairynz.co.nz/publications/environment/farm-dairy-effluent-fde-design-standards/>.

2 Definitions

Farm Dairy Effluent (FDE) system refers to an installation of apparatus or components, which captures and applies FDE to land to maximise the beneficial use of nutrients for plant growth, and minimises contamination of groundwater and surface water bodies.

3 Assessment

Candidates are encouraged to refer to and use relevant literature and text such as training manuals, relevant industry codes of practice, standards, Standard New Zealand/Australia farm water tables, graphs, and data.

Outcomes and evidence requirements

Outcome 1

Demonstrate knowledge of sprinkler and irrigator systems, their principals of operation, and applications.

Evidence requirements

- 1.1 The two main factors affecting sprinkler droplet size are described.
- 1.2 The formation of a wetted doughnut distribution pattern of a travelling irrigator is explained.
- 1.3 Factors that affect sprinklers and irrigators are identified and their effects on irrigation outlined.

Range factors include – nozzle velocity, droplet size, wetted diameter, application rate, applied depth, upper quartile distribution uniformity (DUuq), nozzle size, irrigator pressure, travelling speed, irrigator flowrate.
- 1.4 Situations where low nozzle angle and high nozzle angle are beneficial to a system are described.
- 1.5 Nozzle size, wetted diameter, and DUuq of a travelling irrigator are calculated from given data.
- 1.6 Potential problems and recommended actions for improvement are described for a given a distribution pattern of an irrigator.

Outcome 2

Demonstrate knowledge of design methods of a FDE hydraulic system.

Evidence requirements

- 2.1 Typical farm related and site related information required for the design of a FDE hydraulic system are listed.
- 2.2 FDE flow velocity is calculated from given data for a given system.
- 2.3 Lamont's equation is used to calculate headloss and rate of headloss from given system data.
- 2.4 Draghose and pipe are selected for a given system.
- 2.5 Movable lateral lines are designed for a given system and the advantages and disadvantages of reducing sprinkler spacing are stated.

Outcome 3

Demonstrate knowledge of pump selection for FDE systems.

Evidence requirements

- 3.1 The four main categories of impeller design found in FDE system centrifugal pumps, and the range of FDE solids that each category operates best within are listed.
- 3.2 The duty point is determined for a given system.
- 3.3 Impeller trimming and corresponding pump power is calculated for a given system.

Planned review date	31 December 2020
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	15 October 2015	N/A

Consent and Moderation Requirements (CMR) reference	CMR 0013
--	----------

This CMR can be accessed at <http://www.nzqa.govt.nz/framework/search/index.do>.

Please note

Providers must be granted consent to assess against standards (accredited) by NZQA, before they can report credits from assessment against unit standards or deliver courses of study leading to that assessment.

Industry Training Organisations must be granted consent to assess against standards by NZQA before they can register credits from assessment against unit standards.

Providers and Industry Training Organisations, which have been granted consent and which are assessing against unit standards must engage with the moderation system that applies to those standards.

Requirements for consent to assess and an outline of the moderation system that applies to this standard are outlined in the Consent and Moderation Requirements (CMR). The CMR also includes useful information about special requirements for organisations wishing to develop education and training programmes, such as minimum qualifications for tutors and assessors, and special resource requirements.

Comments on this unit standard

Please contact the Competenz qualifications@competenz.org.nz if you wish to suggest changes to the content of this unit standard.