# The NZ Apprenticeship in Dairy Systems (Engineering)

**Programme handbook for employers and apprentices**

Competenz
Skills for industry

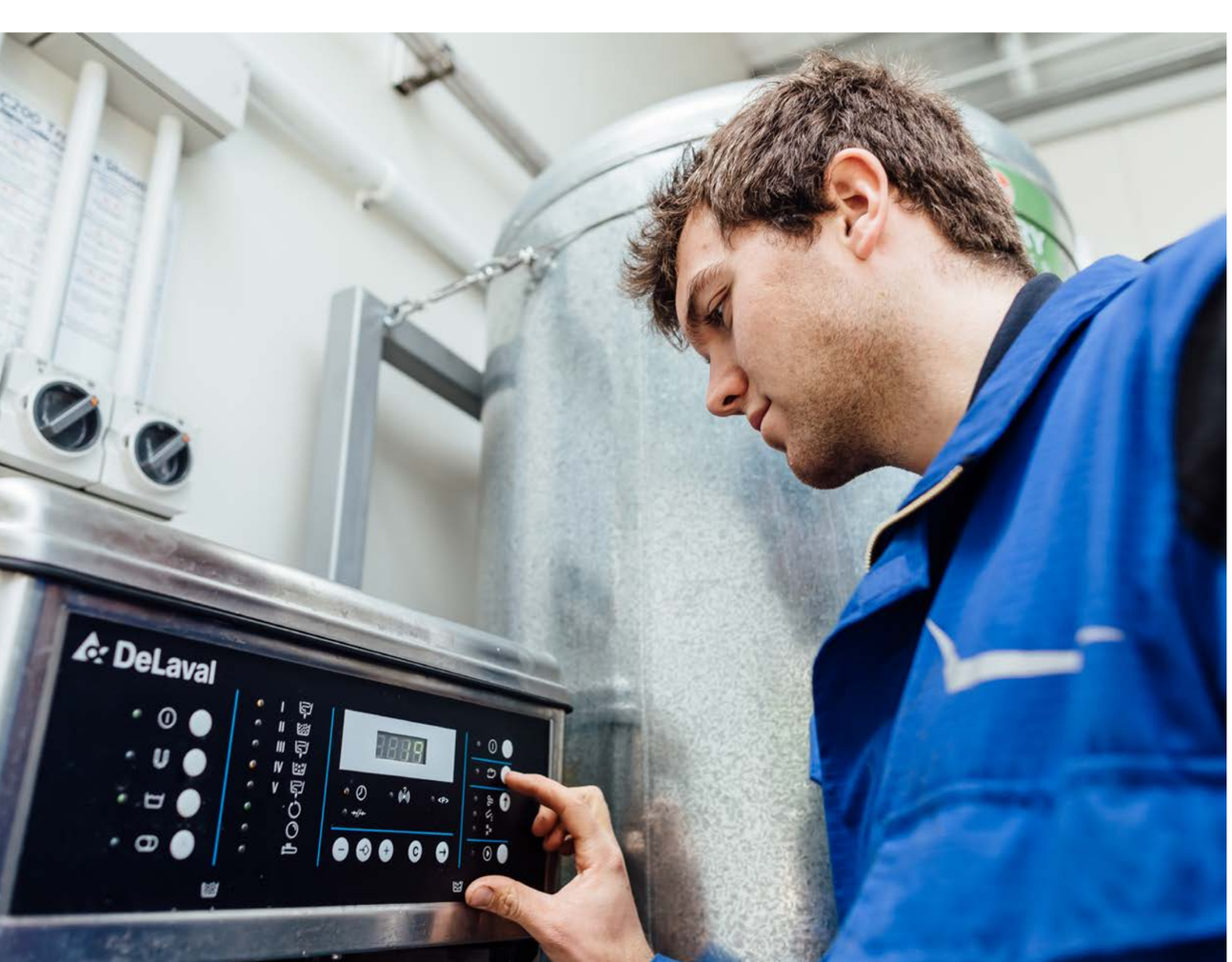
# Contents

# Building skills, careers and businesses

If you're reading this booklet, it's likely you're about to make a big decision. You may be a company investing in your people and your business by building skills in the workplace, or an apprentice embarking on a career in Dairy Systems.

In both cases, the New Zealand Apprenticeship in Dairy Systems (Engineering) will help make your decision a wise one. That's because members of your industry have designed these qualifications. They understand the skills employers and employees need to work productively and safely. They also understand that, as an apprentice, you're looking to gain skills that will help you build a rewarding career. The resulting qualifications are flexible, practical, and designed with the future in mind.

Read on to understand the skills and knowledge these qualifications deliver, the training options available to study towards them, and how Competenz will help you build skills, careers and businesses in Dairy Systems.




# About the qualifications and how to work towards them

### The purpose of the Dairy Systems qualification

This qualification provides the dairy industry with people who have the multi-disciplinary skills and knowledge needed to work independently to install and maintain milk harvesting, farm water or effluent systems.

### New Zealand Certificates: nationally recognised qualifications

This qualification is a New Zealand Certificate. New Zealand Certificates recognise skills and knowledge that meet nationally agreed standards for achievement. Employers recognise these qualifications because:

- Members of your industry have designed and endorsed them;
- The New Zealand Qualifications Authority (NZQA) has approved them and records apprentices' study towards them.

### How the Dairy Systems qualification works

The qualification is made up of core competencies and two strands – milking systems and pumping systems, which employers and their apprentices can choose between.

The qualification is level 4, and is a recognised apprenticeship. Once the training is complete, a graduate will be able to work independently and only require broad supervision.

Apprentices working towards this qualification through a Competenz training programme will complete unit standards.

The training programme contains compulsory unit standards that all apprentices must complete and has a series of optional unit standards in the final year of study that the apprentice and employer need to select to complete the balance of the programme.

The unit standards build an apprentice's skill set by progressing them from level 2 through to level 4 (trade standard).

When a apprentice completes a unit standard successfully, they receive credits which Competenz registers on their record of achievement with NZQA. To complete the qualification, a apprentice needs to be assessed on all the unit standards in their training programme.

**The training programme takes 36-42 months to complete.**

### Unit standards

Unit standards are defined skills at a given level (e.g. level 4) which indicates the degree of knowledge and skill and how it is applied; each also has a credit value that reflects how much effort goes into achieving that unit.

### Credits

Each credit represents approximately ten hours of learning.

# Qualification pathway for Dairy Systems

**Level 4**

## NZ Apprenticeship in Dairy Systems with strands in:

» **Milking Systems**

» **Pumping Systems**

No entry requirement

**Level 5**

## NZ Certificate in Mechanical Engineering (Advanced)

Entry requirement – Level 4 or equivalent skills or knowledge

**Level 6**

## NZ Diploma in Engineering

Entry requirement – NCEA Level 2 with mathematics

↓

## NZ Diploma in Engineering Practice

Entry requirement – NZ Diploma in Engineering

# On and off-the-job assesments

### On-the-job learning and assessment

Apprentices do most of their learning in the workplace. They receive textbooks to support some of the theory they learn. Apprentices also receive assessment guides that explain how their on-the-job learning will be assessed. Apprentices' skills are checked in the workplace by verifiers who have the appropriate technical knowledge and skills.

Competenz training advisors or registered workplace assessors then assess the evidence collected to determine whether the apprentice has met the required standard.

### Off-the-job learning and assessment

Off-the-job learning takes place outside the workplace. It takes multiple forms:

» **eLearning.** Apprentices use a computer with internet connection to log into an online portal. Here they receive learning materials to study and complete online tasks. In most cases assessment takes place online.

» **Block course.** This takes place at a polytechnic over a two week period. Apprentices learn how to perform tasks relevant to their qualification under a tutor's instruction. The tutor also assesses their skills.

» **Public courses.** These courses cover first aid, and the certificates that lead to an Electrical Workers Registration Board Practising Certificate, the Trainee Limited Certificate, the Electrical Appliance Serviceperson and the Electrical Service Technician.

» **Training scheme.** These are specific courses that need to be completed as part of each strand.

### Funding the apprenticeship training

Competenz receives government funding to assist in maintaining the unit standards, assessment guides and resource materials. The funding also assists in reducing the cost of block courses for our companies and their apprentices.

# How Competenz helps apprentices gain their skills

When apprentices enrol, we assign them a Competenz training advisor. Our training advisors understand the engineering industry and the challenges apprentices and businesses face. They play a vital role in helping apprentices learn and complete their training programme in the allocated time.

### The training process

#### 1. Signing a training agreement

The apprentice, company and training advisor sign a training agreement. This agreement outlines what each person or organisation is responsible for during the training. It also makes the funding available to support the company and their apprentice's training and ensures the NZQA records the apprentice's training history.

#### 2. Enrolling apprentices in a training programme

There are two training programmes towards the qualification, Pumping Systems and Milking Systems. The apprentice, their company and training advisor agree on a training plan that sets out the unit standards the apprentice needs to complete, and the order and year in which they will do this. These unit standards specify what apprentices need to know and be able to do (e.g. select, use and care for engineering hand tools).

#### 3. Supporting apprentices as they work towards completing their training programme

Apprentices receive textbooks and assessment guides to aid their learning, plus phone support is available to assist with eLearning queries too. Competenz training advisors visit companies to support this learning and review progress. They also arrange the off-the-job training needed (e.g. block courses).

#### 4. Assessing apprentices' skills

An assessment guide explains the 'evidence' the apprentice needs to gather to show the work they have performed towards gaining the unit standard. This evidence may include things like photographs, job sheets and drawings.

When apprentices are ready to be assessed in a unit standard, their Competenz training advisor or a qualified assessor in their workplace completes an assessment and confirms they have met requirements. If the apprentice is assessed as 'competent', they receive credits and the unit standard appears on their NZQA record of achievement.

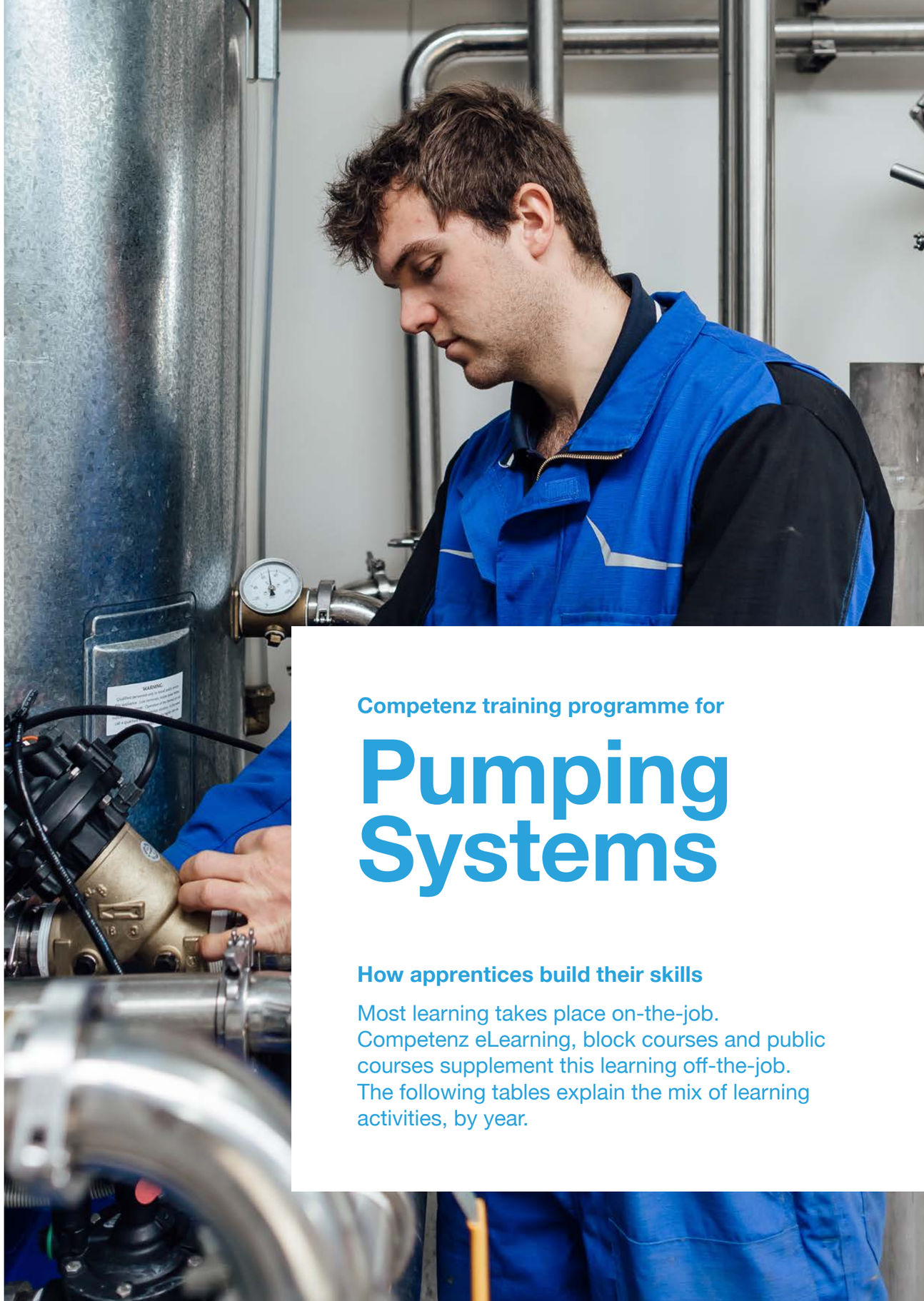
### Related qualifications to help apprentices build their skills

Competenz offers qualifications in related areas like management, sales, and health and safety. Please ask your training advisor for more information or contact our customer experience team.

### More information

If your company has a Competenz training advisor, please contact them. Alternatively, please call our customer experience team on 0800 526 1800 or visit our website: www.competenz.org.nz





Competenz training programme for

# Pumping Systems

### How apprentices build their skills

Most learning takes place on-the-job. Competenz eLearning, block courses and public courses supplement this learning off-the-job. The following tables explain the mix of learning activities, by year.

# New Zealand Apprenticeship in Dairy Systems (Engineering) – Pumping Systems – Level 4

**Credits: 210 credits**
**Duration: 36-42 months**

## Year one

**Expected compulsory units to be completed in the first year**

### Competenz Learning

| Graduates will be able to… | Unit Standard | Level | Credits |
|---|---|---|---|
| **Step 1** | | | |
| Demonstrate knowledge of safety on engineering worksites | 21911 | 2 | 2 |
| Apply safe working practices on an engineering worksite | 21912 | 2 | 2 |
| Demonstrate knowledge of health and safety when welding and thermal cutting | 29651 | 2 | 3 |
| **Step 2** | | | |
| Demonstrate knowledge of basic trade calculations and units of measure for mechanical engineering trades | 29397 | 2 | 4 |
| Demonstrate knowledge of and interpret mechanical engineering drawings and geometric tolerancing | 29654 | 2 | 3 |
| Demonstrate knowledge of safety when lifting loads in engineering installation, maintenance, and fabrication work | 29675 | 2 | 2 |
| Demonstrate knowledge of fabrication machinery, materials and processes | 29670 | 2 | 3 |
| Block Course 1 – theory assessment | BC 1 | | |
| Select, use, and care for simple measuring devices used in engineering | 4433 | 1 | 2 |
| Demonstrate and apply knowledge of the selection, use, and care of engineering hand tools | 2395 | 2 | 4 |
| Demonstrate and apply knowledge of the selection, use, and care of portable hand held engineering power tools | 2396 | 2 | 4 |
| **Step 3** | | | |
| Demonstrate basic knowledge of the mechanical properties and selection of engineering materials | 29549 | 2 | 3 |
| Demonstrate basic knowledge of common engineering metals | 29550 | 2 | 3 |
| Describe the limits of electrical work for dairy and irrigation systems workers | 31974 | 2 | 3 |
| Provide customer service | 57 | 2 | 2 |
| Demonstrate knowledge of mechanical fasteners used in mechanical engineering | 29674 | 2 | 3 |
| Demonstrate knowledge of safety, health, risk assessment, and hazard ID and control on an engineering worksite | 29652 | 3 | 3 |
| Demonstrate and apply knowledge of good work practices when servicing simple components under supervision | 29676 | 2 | 3 |

## Year two

**Expected compulsory units to be completed in the second year**

### Competenz Block Course 1 (10 days)

| Graduates will be able to… | Unit Standard | Level | Credits |
|---|---|---|---|
| Select use and care for engineering dimensional measuring equipment | 4435 | 2 | 3 |
| Select, use and care for engineering marking out equipment | 4436 | 2 | 3 |
| Demonstrate and apply knowledge of safe welding principles and quality assurance under supervision | 21907 | 2 | 4 |
| Lift loads in engineering installation, maintenance, and fabrication work | 21913 | 2 | 2 |
| Perform fabrication operations | 30263 | 3 | 10 |

# Year two

**Expected compulsory units to be completed in the second year**

## Competenz eLearning

| Graduates will be able to… | Unit Standard | Level | Credits |
|---|---|---|---|
| Demonstrate knowledge of the strength, mechanical properties, and treatment of engineering metals | 29551 | 3 | 3 |
| Manually produce engineering sketches | 29655 | 2 | 3 |
| Apply knowledge of basic trade calculations for mechanical engineering trades | 29398 | 2 | 4 |
| Demonstrate knowledge of hydraulic power systems | 20611 | 3 | 5 |
| Demonstrate knowledge of pneumatics and pneumatic power systems | 20612 | 2 | 5 |
| Demonstrate knowledge of engineering job planning and costing | 30472 | 3 | 3 |
| Demonstrate knowledge of the installation and maintenance of compressed air and vacuum systems | 2159 | 3 | 4 |

## Dairy Systems Block Course (suggested Year 2 completion)

| | | | |
|---|---|---|---|
| **Small Drinking Water Supplies** | | | |
| Demonstrate knowledge of, and evaluate, a small drinking-water supply | 29965 | 3 | 6 |
| Demonstrate knowledge of and apply principles of water safety planning for a small drinking-water supply | 29996 | 3 | 6 |
| **Backflow Prevention** | | | |
| Prepare to test, and inspect and test, water supply backflow prevention devices | 23847 | 3 | 4 |
| Describe suitability, installation, and testing of water supply backflow prevention devices, and fault identification | 23848 | 3 | 4 |
| **Selecting the Right Pump** | | | |
| Demonstrate knowledge of pumps and pump selection for rural systems | 29163 | 4 | 6 |
| Demonstrate knowledge of basic hydraulic theory for rural fluid systems | 29158 | 3 | 6 |

## Workplace/on-the-job

| | | | |
|---|---|---|---|
| Demonstrate and apply knowledge of the construction, function and application of seals in mechanical engineering | 30284 | 3 | 2 |
| Shut down, isolate and start up machines and equipment | 2401 | 3 | 3 |



# Year three

**Expected compulsory units to be completed in the third year**

## Workplace/on-the-job

| Graduates will be able to… | Unit Standard | Level | Credits |
|---|---|---|---|
| Install farm plant and equipment | 29164 | 4 | 10 |
| Weld stainless steel tube using the gas tungsten arc welding process | 2688 | 4 | 12 |

## Dairy Systems Block Courses (suggested Year 3 for completion)

| | | | |
|---|---|---|---|
| **Farm Dairy Effluent Hydraulic Design** | | | |
| Demonstrate knowledge of farm dairy effluent hydraulic design methods | 29161 | 4 | 5 |
| Apply knowledge of hydraulic design methods to design a farm dairy effluent system | 29162 | 4 | 10 |
| **Farm Water Reticulation Design** | | | |
| Demonstrate knowledge of farm water reticulation design methods | 29159 | 4 | 5 |
| Apply knowledge of design methods to design a farm water reticulation system | 29160 | 4 | 10 |

**Elective units to be completed in the third year**

Select a minimum of 10 credits from Set A and a minimum of 18 credits from Set B from the tables below

## Set A – Install and commission – select a minimum of 10 credits (on-the-job and eLearning*)

| | | | |
|---|---|---|---|
| Demonstrate knowledge of bearings used in machines and equipment | 19873* | 3 | 5 |
| Demonstrate knowledge of mechanical power transmission | 22899* | 3 | 6 |
| Demonstrate knowledge of pumps, fans, valves and static and dynamic balancing of components | 22901* | 3 | 3 |
| Level machinery and equipment | 2409 | 3 | 3 |
| Align mechanical machinery | 2408 | 4 | 6 |
| Commission mechanical engineering machinery or plant | 22915 | 5 | 15 |

## Set B – Maintain and service – select a minimum of 18 credits (on-the-job and eLearning)

| Graduates will be able to… | Unit Standard | Level | Credits |
|---|---|---|---|
| Dismantle, inspect, assemble and test components | 30438 | 3 | 6 |
| Monitor the condition of mechanical machinery | 2407 | 4 | 10 |
| Demonstrate knowledge of, and replace and test dynamic seals in machinery | 30285 | 4 | 8 |
| Demonstrate knowledge of, and replace and test static seals in machinery | 30286 | 4 | 5 |
| Carry out routine servicing of engineering machinery | 2397 | 2 | 4 |
| Service and replace bearings in machines and equipment | 19874 | 4 | 8 |
| Perform planned maintenance work on mechanical equipment | 22905 | 4 | 5 |
| Service hydraulic power system components under supervision | 2727 | 3 | 20 |
| Service hydraulic power system components | 2731 | 4 | 20 |
| Diagnose hydraulic power system faults | 2733 | 4 | 20 |
| Shut down for maintenance, and start up, a hydraulic power system | 20597 | 2 | 4 |
| Clean a hydraulic power system for service | 20599 | 2 | 4 |
| Maintain a hydraulic power system | 20613 | 3 | 7 |
| Service pneumatic power system components | 2732 | 4 | 20 |
| Shut down for maintenance, and start up, a pneumatic power system | 20598 | 2 | 4 |
| Maintain a pneumatic power system | 20614 | 3 | 7 |
| Demonstrate and apply knowledge of welding low carbon steel | 22906 | 3 | 3 |
| Demonstrate and apply knowledge of welding aluminium and stainless steel | 22907 | 3 | 3 |
| Weld steel to a general purpose industry standard using the gas metal arc welding process | 2672 | 3 | 6 |
| Weld steel in the downhand positions to a general purpose industry standard using the manual metal arc welding process | 2682 | 3 | 6 |
| Assemble and join heavy fabrication materials | 25701 | 4 | 20 |
| Cut fabrication materials using hand held power tools | 30274 | 3 | 5 |
| Cut steel using the manual gas cutting process | 30279 | 3 | 2 |
| Cut metals using the manual plasma cutting process | 30280 | 3 | 2 |
| Mark out fabrication components using geometrical methods | 30440 | 3 | 5 |
| Demonstrate and apply knowledge of keys and pins | 30666 | 3 | 5 |

### Electrical Service Technician (optional)

Only to be selected where the employer can provide ‘supervision of prescribed electrical work’.

### Statement of service

Apprentices need to gain a **Statement of Service** from their employer, confirming that they have completed 6,000 to 8,000 hours of apprenticeship.



## Competenz training programme for

# Milking Systems

### How apprentices build their skills

Most learning takes place on-the-job. Competenz eLearning, block courses and public courses supplement this learning off-the-job. The following tables explain the mix of learning activities, by year.

# New Zealand Apprenticeship in Dairy Systems (Engineering) – Milking Systems – Level 4

**Credits: 210 credits**
**Duration: 36-42 months**

## Year one

**Expected compulsory units to be completed in the first year**

### Competenz Learning

| Graduates will be able to… | Unit Standard | Level | Credits |
|---|---|---|---|
| **Step 1** | | | |
| Demonstrate knowledge of safety on engineering worksites | 21911 | 2 | 2 |
| Apply safe working practices on an engineering worksite | 21912 | 2 | 2 |
| Demonstrate knowledge of health and safety when welding and thermal cutting | 29651 | 2 | 3 |
| **Step 2** | | | |
| Demonstrate knowledge of basic trade calculations and units of measure for mechanical engineering trades | 29397 | 2 | 4 |
| Demonstrate knowledge of and interpret mechanical engineering drawings and geometric tolerancing | 29654 | 2 | 3 |
| Demonstrate knowledge of safety when lifting loads in engineering installation, maintenance, and fabrication work | 29675 | 2 | 2 |
| Demonstrate knowledge of fabrication machinery, materials and processes | 29670 | 2 | 3 |
| Block Course 1 – theory assessment | BC 1 | | |
| Select, use, and care for simple measuring devices used in engineering | 4433 | 1 | 2 |
| Demonstrate and apply knowledge of the selection, use, and care of engineering hand tools | 2395 | 2 | 4 |
| Demonstrate and apply knowledge of the selection, use, and care of portable hand held engineering power tools | 2396 | 2 | 4 |
| **Step 3** | | | |
| Demonstrate basic knowledge of the mechanical properties and selection of engineering materials | 29549 | 2 | 3 |
| Demonstrate basic knowledge of common engineering metals | 29550 | 2 | 3 |
| Describe the limits of electrical work for dairy and irrigation systems workers | 31974 | 2 | 3 |
| Provide customer service | 57 | 2 | 2 |
| Demonstrate knowledge of mechanical fasteners used in mechanical engineering | 29674 | 2 | 3 |
| Demonstrate knowledge of safety, health, risk assessment, and hazard ID and control on an engineering worksite | 29652 | 3 | 3 |
| Demonstrate and apply knowledge of good work practices when servicing simple components under supervision | 29676 | 2 | 3 |

## Year two

**Expected compulsory units to be completed in the second year**

### Competenz Block Course 1 (10 days)

| | | | |
|---|---|---|---|
| Select use and care for engineering dimensional measuring equipment | 4435 | 2 | 3 |
| Select, use and care for engineering marking-out equipment | 4436 | 2 | 3 |
| Demonstrate and apply knowledge of safe welding principles and quality assurance under supervision | 21907 | 2 | 4 |
| Lift loads in engineering installation, maintenance, and fabrication work | 21913 | 2 | 2 |
| Perform fabrication operations | 30263 | 3 | 10 |

# Year two

**Expected compulsory units to be completed in the second year**

## Competenz eLearning

| Graduates will be able to… | Unit Standard | Level | Credits |
|---|---|---|---|
| Demonstrate knowledge of the strength, mechanical properties, and treatment of engineering metals | 29551 | 3 | 3 |
| Manually produce engineering sketches | 29655 | 2 | 3 |
| Apply knowledge of basic trade calculations for mechanical engineering trades | 29398 | 2 | 4 |
| Demonstrate knowledge of hydraulic power systems | 20611 | 3 | 5 |
| Demonstrate knowledge of pneumatics and pneumatic power systems | 20612 | 2 | 5 |
| Demonstrate knowledge of engineering job planning and costing | 30472 | 3 | 3 |
| Demonstrate knowledge of the installation and maintenance of compressed air and vacuum systems | 2159 | 3 | 4 |

## Dairy Systems Block Course (suggested Year 2 completion)

| **NZ Milking Machine Testing** | | | |
|---|---|---|---|
| Competency Certificate for the NZMPTA Milking Machine Test | Training Scheme | 4 | 38 |

## Workplace/on-the-job

| | | | |
|---|---|---|---|
| Demonstrate and apply knowledge of the construction, function and application of seals | 30284 | 3 | 2 |
| Shut down, isolate and start up machines and equipment | 2401 | 3 | 3 |
| **Select a minimum of one welding unit at level 3 from the elective B section** | | | |



# Year three

**Expected compulsory units to be completed in the third year**

## Workplace/on-the-job

| Graduates will be able to… | Unit Standard | Level | Credits |
|---|---|---|---|
| Install farm plant and equipment | 29164 | 4 | 10 |
| Weld stainless steel tube using the gas tungsten arc welding process | 2688 | 4 | 12 |

## Dairy Systems Block Courses (suggested Year 3 for completion)

| **Farm Dairy Systems Management** | Training Scheme | 4 | 20 |
|---|---|---|---|

**Elective units to be completed in the third year**

Select a minimum of 12 credits from Set A and a minimum of 15 credits from Set B from the tables below

## Set A – Install and commission – select a minimum of 12 credits (on-the-job and eLearning*)

| | | | |
|---|---|---|---|
| Demonstrate knowledge of bearings used in machines and equipment | 19873* | 3 | 5 |
| Demonstrate knowledge of mechanical power transmission | 22899* | 3 | 6 |
| Demonstrate knowledge of pumps, fans, valves and static and dynamic balancing of components | 22901* | 3 | 3 |
| Level mechanical machinery | 2409 | 3 | 3 |
| Align mechanical machinery | 2408 | 4 | 6 |
| Commission mechanical engineering machinery or plant | 22915 | 5 | 15 |

## Set B – Maintain and service – select a minimum of 15 credits (on-the-job and eLearning)

| Graduates will be able to… | Unit Standard | Level | Credits |
|---|---|---|---|
| Dismantle, inspect, assemble and test components | 30438 | 3 | 6 |
| Monitor the condition of machinery and equipment | 2407 | 4 | 10 |
| Demonstrate knowledge of, and replace and test dynamic seals in machinery | 30285 | 4 | 8 |
| Demonstrate knowledge of, and replace and test static seals in machinery | 30286 | 4 | 5 |
| Carry out routine servicing of engineering machinery | 2397 | 3 | 4 |
| Service and replace bearings in machines and equipment | 19874 | 4 | 8 |
| Perform planned maintenance work on mechanical equipment | 22905 | 4 | 5 |
| Demonstrate and apply knowledge of welding low carbon steel | 22906 | 3 | 3 |
| Demonstrate and apply knowledge of welding aluminium and stainless steel | 22907 | 3 | 3 |
| Weld steel to a general purpose industry standard using the gas metal arc welding process | 2672 | 3 | 6 |
| Weld steel in the downhand positions to a general purpose industry standard using manual metal arc welding process | 2682 | 3 | 6 |
| Assemble and join heavy fabrication materials | 25701 | 4 | 20 |
| Cut fabrication materials using hand held power tools | 30274 | 3 | 5 |
| Cut steel using the manual gas cutting process | 30279 | 3 | 2 |
| Cut metals using the manual plasma cutting process | 30280 | 3 | 2 |
| Mark out fabrication components using geometrical methods | 30440 | 3 | 5 |
| Demonstrate and apply knowledge of keys and pins | 30666 | 3 | 5 |
| Service hydraulic power system components under supervision | 2727 | 3 | 20 |
| Service hydraulic power system components | 2731 | 4 | 20 |
| Diagnose hydraulic power system faults | 2733 | 4 | 20 |
| Shut down for maintenance, and start up, a hydraulic power system | 20597 | 2 | 4 |
| Clean a hydraulic power system for service | 20599 | 2 | 4 |
| Maintain a hydraulic power system | 20613 | 3 | 7 |
| Service pneumatic power system components | 2732 | 4 | 20 |
| Shut down for maintenance, and start up, a pneumatic power system | 20598 | 2 | 4 |
| Maintain a pneumatic power system | 20614 | 3 | 7 |

### Electrical Service Technician (optional)

Only to be selected where the employer can provide ‘supervision of prescribed electrical work’.

### Statement of service

Apprentices need to gain a **Statement of Service** from their employer, confirming that they have completed 6,000 to 8,000 hours of apprenticeship.

**Competenz is a multi-sector industry training organisation (ITO).**
**We help Kiwi industry grow skills, careers and businesses.**

**For more information contact us**
**0800 526 1800**
**info@competenz.org.nz**
**www.competenz.org.nz**

Competenz
Skills for industry

20065_Sept 2020