

Programme of Industry Training Details

NZQA has approved the programme of industry training in line with NZA requirements.			
ITO name	Competenz	MoE number	8104
Programme of Industry Training Title	New Zealand Apprenticeship in Mechanical Building Services (Trade) (Level 4)	Programme ID	123618-3
Level	4	Credits	280
NZSCED code and classification			
030799	Engineering and Related Technologies > Mechanical and Industrial Engineering and Technology > Mechanical and Industrial Engineering & Technology not elsewhere classified		
Qualification to which the programme leads			
New Zealand Certificate in Mechanical Building Services (Trade) (Level 4) [Ref: 2717-1].			
Aim of Programme of Industry Training			
<p>The purpose of this programme is to provide the construction and infrastructure sectors with skilled tradespeople who are able to safely and independently fabricate, assemble, install, commission, and maintain mechanical service systems.</p> <p>Mechanical service systems may include: environmental control systems; air conditioning and heating systems; specialist ventilation and fluid conveyancing systems; non-potable water systems; medical and laboratory gas systems.</p> <p>This programme is designed for people working in the industry and will typically be achieved in a workplace environment whilst completing a New Zealand Apprenticeship.</p> <p>The 'Mechanical Building Services' industry was formerly known as the 'Heating, Ventilating and Air Conditioning' industry.</p>			

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Entry Requirements

It is recommended, but not required, that people enrolling in a programme leading to this qualification will hold the National Certificate in Education Achievement (NCEA) Level 2 [Ref: 0973] or equivalent.

People enrolling in this programme must hold a relevant position in a Mechanical Building Services organisation. The position should ensure that the qualification graduate profile outcomes can be met.

There must be an apprenticeship training agreement between the trainee, the Transitional Industry Training Organisation, and the Employer.

Learning outcomes and programme outline

This programme of industry training has been developed to meet the qualification graduate outcomes.

The learning outcomes will develop on the job, in response to the learner journey.

This programme will enable apprentices to gain technical knowledge and skills relevant to their role in the Mechanical Building Services industry.

The relevant skills and knowledge are defined by the graduate outcomes of the qualification. Unit standards have been assigned to meet the graduate profile outcomes and all conditions specified within the qualification. Employers are encouraged to support apprentices to complete the unit standards in the sequence identified, however it is recognised that this may vary as operational requirements of the employer may result in apprentices acquiring skills and knowledge in a different order.

It is expected that fundamental health and safety awareness will be a focus at the start of the programme through the completion of the health and safety unit standard and further embedded in all on-job and off-job learning throughout the duration of the programme.

It is also expected that employers comply with all relevant employment, health and safety, privacy and human rights legislation. This is achieved through provision of an adequate induction into the job, appropriate supervision and a safe working environment for the apprentice.

This programme is delivered over four years, and during that period the training will prepare apprentices for the achievement of all outcomes at Level 4. Apprentices undertake lower level unit standards towards the start of their training as the foundation of their apprenticeship. These standards contain the underpinning knowledge and skills that are fundamental to their development and support the later achievement of the more specialised

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technical skills and knowledge.

By the time the apprentice has completed their apprenticeship they will be applying these skills and knowledge to satisfactorily perform all of the competencies required at the level of the qualification.

NZQA Rules Group Setup

To allow for the transition of graduates of the New Zealand Certificate in Mechanical Engineering (Level 3) [Ref: 2715] from learning outcome/component-based programmes, into this unit standard based apprenticeship, the NZQA Rules group for Qual Checking [Ref: 2717] has had unit standards totalling 60 credits removed.

The unit standards were determined by Competenz on 30/07/2018, and are listed here:



2717 - Unit Standards.docx

Competenz must confirm that these unit standards **or** the New Zealand Certificate in Mechanical Engineering (Level 3) [Ref: 2715] have been achieved by all trainees, prior to requesting an NZQA Qual Check verification for [Ref: 2717].

Please note that this has reduced the overall credits required in the overarching conditions for the [Ref: 2717] Rules Group to 220, rather than 280 credits as per the listed qualification.

Assessment standards aligned with qualification outcomes

Some unit standards in this programme apply to more than one outcome. These unit standards will provide partial credit to each applicable outcome, totalling the value of the unit standard. The credit value is **not** counted in full against each outcome it applies to.

A unit standard and its credits can only be counted once towards the programme. The unit standards with partial credits are denoted in both the Assessment standards number and Credit columns in the table below.

Core Outcomes	Assessment standards	Level	Credit	
Outcome 1 Apply an understanding of the relevant Health and Safety legislation and workplace safety culture in	21911	Demonstrate knowledge of safety and health on engineering worksites	2	2
	21912 (also in outcome 4)	Apply safe working practices on an engineering worksite	2	(partial credit of 1)

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order to work safely and meet responsibilities in a commercial mechanical building services environment Credits 15	29650	Demonstrate knowledge of the safe use of powered equipment in a mechanical engineering or fabrication workshop	2	2
	29651	Demonstrate knowledge of health and safety when welding and thermal cutting	2	3
	29652	Demonstrate knowledge of safety, health, risk assessment, and hazard ID and control on an engineering worksite	3	3
	29670 (also in outcome 2)	Demonstrate knowledge of fabrication machinery, materials, and processes	2	3 (partial credit of 1)
	29675 (also in outcome 4)	Demonstrate knowledge of safety when lifting loads in engineering installation, maintenance, and fabrication work	2	2 (partial credit of 1)
	31141 (also in outcome 4)	Demonstrate knowledge of organisations and compliance systems relevant to mechanical building services industry	3	3 (partial credit of 1)
Outcome 2 Interpret drawings and/or specifications and select and use the appropriate engineering materials, processes, tools and equipment for the mechanical building services task being undertaken. Credits 80	4433	Select, use, and care for simple measuring devices used in engineering	1	2
	4435	Select, use, and care for dimensional measuring equipment	2	3
	4436	Select, use, and care for engineering marking-out equipment	2	3
	26331	Read and interpret HVAC system drawings	3	3
	26335 (also in outcome 3)	Demonstrate introductory knowledge of mechanical building services	3	8 (partial credit of 5)
	26336 (also in outcome 4)	Demonstrate knowledge of the components used in heating, ventilating, and air conditioning systems	3	8 (partial credit of 4)
	29397	Demonstrate knowledge of basic trade calculations and units of measure for mechanical engineering trades	2	4
	29398	Apply knowledge of basic trade calculations for mechanical	2	4

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		engineering trades		
	29399	Demonstrate and apply knowledge of trade calculations to solve problems for mechanical engineering trades	3	4
	29549	Demonstrate basic knowledge of the mechanical properties and selection of engineering materials	2	3
	29550	Demonstrate basic knowledge of common engineering metals	2	3
	29551	Demonstrate knowledge of the strength, mechanical properties, and treatment of engineering metals	3	3
	29654	Demonstrate knowledge of and interpret mechanical engineering drawings and geometric tolerancing	2	3
	29655	Manually produce engineering sketches	2	3
	29670 (also in outcome 1)	Demonstrate knowledge of fabrication machinery, materials, and processes	2	3 (partial credit of 2)
	29674	Demonstrate knowledge of mechanical fasteners used in mechanical engineering	2	3
	30263	Perform fabrication operations	3	10
	30472 (also in outcome 6)	Demonstrate knowledge of engineering job planning and costing	3	3 (partial credit of 2)
	30582	Demonstrate knowledge of seismic restraint of HVAC systems and components	3	5
	3239 (also in outcome 4)	Install duct-work for mechanical building services	4	10 (partial credit of 4)
	26327 (also in outcomes 3 & 4)	Demonstrate knowledge and plan installation of pipe-work and ducting for HVAC systems	3	7 (partial credit of 2)
	29157	Demonstrate knowledge of the fundamentals of passive fire protection systems	3	4
Outcome 3	26327 (also in outcomes	Demonstrate knowledge and plan installation of pipe-work	3	7 (partial

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Apply a basic knowledge of sustainability and the refrigeration cycle as they relate to the building services industry and the significance of refrigerants to the industry and the environment Credits 20	2 & 4)	and ducting for HVAC systems		credit of 2)
	26334 (also in outcome 4)	Install pipe-work for mechanical building services	4	20 (partial credit of 10)
	31142	Demonstrate knowledge of refrigerants, classification, and environmental effects for mechanical building services	3	3
	26335 (also in outcome 2)	Demonstrate introductory knowledge of mechanical building services	3	8 (partial credit of 3)
Outcome 4 Apply trade engineering skills and knowledge to plan, fabricate, assemble, install, test, and maintain a range of mechanical building services plant and systems Credits 120	2395	Demonstrate and apply knowledge of the selection, use, and care of engineering hand tools	2	4
	2396	Demonstrate and apply knowledge of the selection, use, and care of portable hand held engineering power tools	2	4
	22906	Demonstrate and apply knowledge of welding low carbon steel	3	3
	21907	Demonstrate and apply knowledge of safe welding principles and quality assurance under supervision	2	4
	3239 (also in outcome 2)	Install duct-work for mechanical building services	4	10 (partial credit of 6)
	26334 (also in outcome 3)	Install pipe-work for mechanical building services	4	20 (partial credit of 10)
	21913	Lift loads in engineering installation, maintenance, and fabrication work	2	2
	29675 (also in outcome 1)	Demonstrate knowledge of safety when lifting loads in engineering installation, maintenance, and fabrication work	2	2 (partial credit of 1)
	9184	Erect and dismantle non-notifiable prefabricated frame scaffolding up to five metres in height	3	5
	26328 (also	Integrate heating, ventilating,	3	7

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	in outcome 5)	and air conditioning system components		(partial credit of 5)
26333		Install external insulation to pipe-work and ducting for mechanical building services	3	3
3244		Install specialised components for heating, ventilating, and air conditioning systems	3	6
26329 (also in outcome 5)		Pre-commission mechanical building services under supervision	3	10 (partial credit of 7)
26332		Integrate mechanical building services equipment and components	4	20
30080		Join ferrous and non-ferrous metal components by torch brazing	3	6
26336 (also in outcome 2)		Demonstrate knowledge of the components used in heating, ventilating, and air conditioning systems	3	8 (partial credit of 4)
26337 (also in outcome 5)		Demonstrate advanced knowledge of mechanical building services	4	12 (partial credit of 6)
31141 (also in outcome 1)		Demonstrate knowledge of organisations and compliance systems relevant to mechanical building services industry	3	3 (partial credit of 2)
26327 (also in outcomes 2 & 3)		Demonstrate knowledge and plan installation of pipe-work and ducting for HVAC systems	3	7 (partial credit of 3)
21912 (also in outcome 1)		Apply safe working practices on an engineering worksite	2	2 (partial credit of 1)
To achieve 280 credits for the programme, the learner must choose from the following unit standards in any specific area listed at any level.				
Mechanical				
3236		Install stainless steel pipe-work for mechanical building services	4	12
26340		Service mechanical building services	5	20

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	22707	Install commercial refrigeration and/or air conditioning systems	4	20
	22442	Install and commission split system air conditioning in a training environment	3	8
	22443	Install and commission split system air-conditioning in a training environment	3	20
	28967	Fabricate, assemble, and install refrigeration and air conditioning components under supervision	2	6
	26338	Maintain mechanical building services	4	25
	3841	Commission commercial refrigeration and/or air conditioning systems rated below 50 kilowatts	4	20
	29653	Manually produce third angle orthographic drawings of simple engineering objects incorporating plane geometric shapes	3	3
Refrigeration				
	28950	Meet requirements for Approved Filler Test Certificate for refrigerants	3	3
	29563	Demonstrate knowledge of flammable refrigerants used in refrigeration and air conditioning industries	3	2
Electrical				
All the below unit standards plus 18 months supervised prescribed electrical work on a Trainee Limited Certificate (TLC) are required for obtaining an Electrical Workers Registration Board (EWRB) Electrical Service Technician (EST) practicing license.				
	15852	Isolate and test low-voltage electrical subcircuits	2	2
	30658	Demonstrate knowledge of fundamental electrical safety in the workplace	2	2
	27351	Demonstrate knowledge of theory and legislation for registration of electrical appliance servicepersons	3	3
	27349	Demonstrate knowledge of theory and legislation for registration of electrical service technicians	3	3
Welding				

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	2672	Weld steel to a general purpose industry standard using the gas metal arc welding process	3	6
	2675	Weld aluminium to industry standard in downhand positions using the gas metal arc welding process	3	6
	2676	Weld stainless steel sheet to industry standard using the gas tungsten arc welding process	3	6
	2677	Weld aluminium to industry standard in the downhand positions using the gas tungsten arc welding process	3	6
	2680	Join metals using the resistance welding process	3	4
	30280	Cut metals using the manual plasma cutting process	3	2
	30279	Cut steel using the manual gas cutting process	3	2
	2688	Weld stainless steel tube using the gas tungsten arc welding process	4	12
	2692	Repair non-ferrous metal components using welding processes	4	10
	2693	Repair ferrous metal components using welding processes	4	10
	2695	Weld steel pressure pipe using the gas tungsten arc and manual metal arc welding processes	4	15
	2696	Weld steel or stainless steel pressure pipe in all positions using the gas tungsten arc welding process	4	12
	2697	Weld aluminium pipe in all positions using the gas tungsten arc welding process	4	12
	23959	Prepare and purge braze piping for refrigeration and air conditioning	3	4
	Fabrication			
	25698	Form light fabrication materials	4	20
	25700	Assemble and join light fabrication materials	4	20
	30272	Cut fabrication materials using	4	10

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		machines		
	30274	Cut fabrication materials using hand held power tools	3	5
	25704	Develop fabrication patterns manually for simple three-dimensional objects	3	5
	25705	Develop fabrication patterns manually for complex three-dimensional objects	4	10
Outcome 5	26339	Pre-commission mechanical building services	4	15
Commission basic installations and work with specialists in the commissioning of the full range of complex mechanical building services plant and systems	26337 (also in outcome 4)	Demonstrate advanced knowledge of mechanical building services	4	12 (partial credit of 6)
Credits 25	26328 (also in outcome 4)	Integrate heating, ventilating, and air conditioning system components	3	7 (partial credit of 2)
	26329 (also in outcome 4)	Pre-commission mechanical building services under supervision	3	10 (partial credit of 3)
Outcome 6	29560 (also in outcome 7)	Demonstrate knowledge of efficient and effective workplace procedures in mechanical engineering or fabrication	2	3 (partial credit of 2)
Apply an understanding of effective and efficient processes and principles, and quality systems to the production of components and/or provision of mechanical building services.	29561	Demonstrate knowledge of efficient and effective processes in mechanical engineering or fabrication	3	3
Credits 5	29562	Demonstrate and apply knowledge of process or task improvement in mechanical engineering or fabrication	4	3
	30472 (also in outcome 2)	Demonstrate knowledge of engineering job planning and costing	3	3 (partial credit of 1)
Outcome 7	29560 (also in outcome 6)	Demonstrate knowledge of efficient and effective workplace procedures in mechanical engineering or fabrication	2	3 (partial credit of 1)
Practise effective communication within own mechanical building services team and the wider workplace.	30665	Demonstrate and apply knowledge of workplace communication in mechanical engineering trades	3	2
Credits 10	The achievement of this outcome is also met across multiple workplace unit standards that have already been given credit in other			

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	<p>outcomes.</p> <p>The following unit standards have been identified as contributing to this outcome: 21907, 30263, 29561, 26327, 26329, 26333, 3244, 26334, 26332, 26339.</p>
<p>Outcome 8</p> <p>Recognise the limits of own ability and the importance of working with integrity and maintaining currency in the mechanical building services field.</p> <p>Credits 5</p>	<p>There are no specific unit standards aligned to this graduate profile outcome, however the following unit standards have been identified as contributing to this outcome:</p> <p>29560, 29561, 29562, 30665, 30472, 26337, 21912, 21907, 29157, 30582, 31141, 29670, 30472</p> <p>The relevant evidence requirements or performance criteria set against the specific condition are noted in the programme matrix.</p>
<p>Training arrangements and support</p>	
<p>This programme is recognised as a New Zealand Apprenticeship, and as such Competenz carries out an assessment of the company and apprentice to ensure the right skills and knowledge are learnt in a supportive environment by a motivated apprentice.</p> <p>Apprentice compatibility and requirements:</p> <ul style="list-style-type: none"> - A Competenz Training Advisor will engage in a conversation with the apprentice to ensure they understand their responsibilities, where to go for help and the importance of progressing at a steady rate to complete within the timeframe required. - The apprentice will be required to complete a 15 to 20-minute test with a Competenz Account Manager which assesses the apprentices reading, writing and comprehension ability. This test includes mechanical aptitude, reasoning and number skills. It identifies areas of weaknesses so that extra support can be offered where it is required. Extra support may include advising the employee and employer of Literacy and Numeracy Providers that can offer specialist support. <p>Company compatibility and requirements:</p> <ul style="list-style-type: none"> - Employers will need to provide access to the equipment required to allow on-the-job learning and assessment to take place. If the employer does not have the required equipment on site, an agreement can be put in place for the apprentice to complete the unit standards elsewhere. - The apprentice will need to have access to eLearning via use of a mobile device, personal computer or laptop within their workplace or their home environment. - Employers are required to support their apprentices throughout the training programme. Initially this is achieved through workplace tasks and on-job training by a designated trainer. This is followed by completion of tasks under close supervision in the workplace. The level of supervision will be adjusted as apprentices develop their 	

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skills, knowledge and confidence through the programme. This programme requires the apprentice to operate under broad supervision prior to any assessment. Employers have access to real-time data on their learner’s progress through the programme via an Employer Portal.

Competenz supports the apprentice and employer by:

- Organising block courses and distance learning.
- Competenz Training Advisors actively manage the progress of apprentices. This is supported by visits to the workplace to ensure that apprentices are steadily progressing through the programme to meet the training plan milestones. The training plan is developed in collaboration with industry. The frequency of visits is dependent on the apprentice’s capability and the employer’s ability to support their progression and is adjusted as appropriate throughout the apprenticeship.
- Providing assessment material for all on-job components.
- Providing an eLearning platform with study guide resources and assessment functions.

Transition Arrangements

The following exemptions are available for those who need to transfer to the qualification to which this programme leads. The table includes exemptions arising from earlier replacement of standards or equivalent standards.

Credit For	Exempt From
2430	29655
2431, 2432	29653
4797	29551
20799	29550
20917	29549
21909	29674
21910	29654
25075	29670, 30263
21905, 21908	29397

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21905, 21908, 16955, 16956	29398, 29399
25702	30272, 30274
25703	30272,30274

Learning and Assessment methods

Learning Methods

Learning will take place on job by completing day-to-day tasks under supervision, by attending off-job training with a training provider, the use of workbooks or a combination of all three methods.

- On-job training enables apprentices to develop job-related skills by watching colleagues, emulating their behaviours and practicing under supervision. It also involves mentoring from supervisors, workplace trainers, or other personnel delegated by the employer.
- Block courses with structured and approved courses give apprentices the opportunity to develop new skills they can take back into the workplace. Courses provide all apprentices with the same skill set regardless of their workplace experience and ensure all learners have relevant and transferable skills. Courses may be a combination of classroom tuition and workshop practice with the emphasis on development of technical skills and the embedding of learning.

Assessment Methods

Assessment of unit standards can be achieved by:

- Completing theory questions, providing evidence (such as job cards, photographs, designs, videos, etc.), the apprentice being observed by an assessor or verifier completing a task(s) or a combination of these.
- Assessment evidence can be captured through assessment guides, via an on-line portal, through eLearning, and block courses.

Consistency of Graduate Outcomes

Competenz will monitor the performance of graduates in the real world to demonstrate the consistency of graduate outcomes by:

- ensuring programmes continue to meet current industry needs through ongoing consultation at the Sector and Technical Advisory group levels.
- utilising Industry Subject Matter Experts in our Product development and review

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processes <ul style="list-style-type: none"> - operating systematic and robust quality assured assessment practices - collecting workplace evidence including both graduate and employer feedback, through the use of surveys demonstrating that graduates meet the graduate profile outcomes - any other relevant evidence as appropriate. 	
Indicative duration of Programme of Industry Training	
Number of months	48
Total learning hours	2800