FIELD ENGINEERING AND TECHNOLOGY

Review and reclassification of *Electrical Engineering, Electronics Technology, Industrial Measurement and Control*, and *Telecommunications* unit standards

This review report was first published in December 2006 and republished in May 2007, following a request from the ElectroTechnology Industry Training Organisation, to correctly identify unit standard 16991 in the first of the Impact on Qualifications tables.

Existing classification

Subfield	Domain	Id
Electrical Engineering	Core Electrical	11564, 11565
	Electrotechnology	11553-11556, 11558, 11559, 11561, 11569, 11570, 11576, 11582, 14140, 16970, 16971, 16973-16975, 16979, 16980, 16991, 16992
Electronics Technology	Computer Engineering	16976, 16977, 16978, 16981, 16982, 16983-16988, 16989, 16990
	Core Electronics	11566, 11571, 11572, 11573, 11579, 11580, 11581, 12593-12606, 16968, 16969, 16993
Industrial Measurement and Control	Industrial Measurement and Control - Theory	11562, 11563, 11574, 11575, 17036
Telecommunications	Communications Technology	11567, 11568, 11583, 11584, 11585, 11586

The ElectroTechnology Industry Training Organisation (ETITO) has completed the review of the unit standards listed above.

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Planned review date **December 2011**

Summary of review, consultation process, and classification change

Meetings involving ETITO, the National Electrotechnology Education Consortium (NETEC), and a broad group of industry representatives were held between 2003 and 2006, to review the National Diploma in Engineering (Level 6) with strands in Computer Engineering, Electrical Engineering, Electronics, Industrial Measurement and Control, and Telecommunications [Ref: 0846] and the related unit standards. This resulted in many unit standards being revised, replaced, or designated expiring. Some new unit standards were developed. The outcome of this consultation resulted in the development of the new National Diploma in Engineering (Electrotechnology) (Level 6), which will be registered following the registration of these unit standards.

The consultation groups were asked to consider the following:

- the currency of the unit standards and their suitability for existing and future qualifications
- the appropriateness of unit standards to their domain
- the accuracy and appropriateness of their content

- whether levels and credits were commensurate with performance outcomes and training needs
- any gaps in skills and/or knowledge that could be captured by the development of new unit standards
- the assessability of the unit standards.

Main changes resulting from the review

- Thirteen unit standards in the Electronics Technology subfield have been reclassified in the Electronic Engineering subfield.
- Unit standard 11566 was reclassified from the Core Electronics domain in the Electronics Technology subfield to the Computer Engineering domain in the Electronic Engineering subfield.
- Unit standard 11583 was reclassified from the Communications Technology domain in the Telecommunications subfield to the Computer Engineering domain in the Electronic Engineering subfield.
- The evidence requirements of unit standards 16982 and 16993 were updated and their credit allocations were changed accordingly.
- The titles of unit standards 11572, 11573, 11576, 11580, 11582, 11583, 11585, and 11586 were changed and their evidence requirements were updated.
- The titles and evidence requirements of unit standards 11566-11569, 16968, 16969, 16971, 16973-16976, 16981, 16989, and 16991-16993 were updated and the credit allocations were changed accordingly.
- Unit standards 11564, 11565, 11571, 11579, 11584, and 16988 were designated review category C and replaced by unit standards 22724, 22723, 22728, 22729, 22720, and 22717 respectively.
- Twenty-six new unit standards have been registered.
- Forty unit standards, which are either no longer used or are no longer considered fit for purpose, have been designated expiring (review category D).

Unit standards categorised as category C or D expire at the end of December 2011.

Impact on existing provider accreditations

Current Accreditation for			**Accreditation extended to**		
Nature of accreditation	Classification or Id	Level	Nature of accreditation	Classification or Id	Level
Subfield	Electronics Technology	any	Subfield	Electronic Engineering	same
Domain	Electronics Technology > Computer Engineering	any	Domain	Electronic Engineering > Computer Engineering	same
Domain	Electronics Technology > Core Electronics	any	Domain	Electronic Engineering > Core Electronics	same

Impact on Accreditation and Moderation Action Plan (AMAP)

AMAP 0003 has been updated to reflect the changes made to the standards.

Impact on existing qualifications

Changes made as a result of the review and reclassification impact on existing qualifications. Qualifications impacted fall into two categories – *Affected* or *Not materially affected*.

Affected	The qualification lists a reviewed classification (domain or subfield) in an elective set The qualification lists a standard that has changes to level or credits The qualification lists a C or D category standard
Not materially affected	The qualification lists a standard that has a new title The qualification lists a standard that has a new classification

The following ETITO qualifications are impacted by the outcome of this review and will be updated to take account of the changes when they are next reviewed. The individual unit standards and classifications that generated the *Affected* status are in **bold**.

Qualification Title	Classification or standard in the qualification
National Certificate in Electronic Engineering (Level 2) [Ref: 1092]	**16991**
National Certificate in Electronic Engineering (Level 3) [Ref: 1093]	**16991**
National Certificate in Industrial Measurement and Control (Level 5) [Ref: 0976]	**11564**, **11565**, 11573, **11579**, **16968**, **16969**
National Certificate in Telecommunications (Level 4) with strands in Bearer and Switch, Building and Data Cabling, Customer Access Network, Customer Premises Equipment, and Radio [Ref: 1002]	**16974**, **16992**
National Diploma in Engineering (Level 6) with strands in Computer Engineering, Electrical Engineering, Electronics, Industrial Measurement and Control, and Telecommunications [Ref: 0846]	**Electronics Technology**, **11562-11569**, **11571**, 11572, 11573, **11574**, **11575**, 11576, **11579**, 11580, **11581**, 11582, 11583, **11584**, 11585, 11586, **16968**-**16971**, **16973**-**16993**, **17036**

The following qualifications are also affected by the outcome of this review. The standard setting bodies (SSBs) have been advised that they require revision.

Qualification Title	Classification or Id	SSB Name
National Certificate in Electricity Supply (Technician) (Level 3) with strands in Control and Instrumentation, Power Technician, and HVDC Technician [Ref: 0922]	**16973**, **16991**	Electricity Supply Industry Training Organisation
National Certificate in Electricity Supply (Technician) (Level 4) with strands in Control and Instrumentation, Power Technician, and HVDC Technician; and an optional strand in Electrical Services [Ref: 0917]	**16975**, **16987**, **16993**	
National Certificate in Electricity Supply (Power Technician) (Level 5) [Ref: 1260]	**11579**	
National Certificate in Music Technology (Level 5) [Ref: 0603]	**Electronics Technology**	NZQA
National Certificate in Performing Arts Technology (Level 2) [Ref: 0603]	**Electronics Technology**	
National Diploma in Engineering (Process and Materials Engineering) (Level 6) [Ref: 0592]	**11562**	InfraTrain New Zealand

Summary of main changes

All changes are in **bold**. For D category unit standards, suggested alternatives are in *italics*, where appropriate.

Key to review category
A Dates changed, but no other changes are made - the replacement standard carries the same Id and a new version

number
B Changes made, but the overall outcome remains the same - the replacement standard carries the same Id and a new version number
C Major changes that necessitate the registration of a replacement standard with a new Id
D Standard will expire and not be replaced

Subfield Electrical Engineering
Domain Core Electrical

Id	Title	Level	Credit	Review Category
11564 **22724**	Describe and apply electric motor technology **Demonstrate and apply knowledge of electrical machines**	5 **5**	12 **15**	C
11565 **22723**	Describe and apply electrical power technology **Demonstrate and apply intermediate knowledge of the elements of power engineering**	5 **5**	12 **15**	C
22721	**Demonstrate and apply fundamental knowledge of electrical circuit engineering principles**	**3**	**15**	**New**
22722	**Demonstrate and apply introductory knowledge of electrical circuit engineering principles**	**4**	**15**	**New**
22725	**Demonstrate and apply advanced knowledge of power system engineering**	**6**	**15**	**New**

Domain Electrotechnology

Id	Title	Level	Credit	Review Category
11553	Build electrotechnology products	4	30	D
11554	Test electrotechnology products	5	50	D
11555	Service and repair electrotechnology products	5	30	D
11556	Identify and reduce electrotechnology quality problems	4	10	D
11558	Identify and apply industrial standards, codes, and legislation in electrotechnology applications	4	5	D
11559	Demonstrate workshop skills in an electrotechnology context	3	20	D
11561	Describe and apply manufacturing technology	5	12	D
11569	Describe and apply illumination technology **Demonstrate intermediate knowledge of illumination engineering**	5	12 **15**	B
11570	Describe and apply circuit analysis in electrotechnology	5	65	D
11576	Describe and apply electrical building services technology **Demonstrate and apply knowledge of building electrical services engineering**	6	15	B
11582	Describe and apply advanced illumination technology **Demonstrate advanced knowledge of illumination engineering**	6	15	B
14140	Demonstrate electrotechnology prototype development capability	6	35	D

Id	Title	Level	Credit	Review Category
16970 *16981*	Describe and apply compliance practices in electrotechnology hardware and software applications *Demonstrate and apply advanced knowledge of programming techniques for electrotechnology*	6 *6*	6 *15*	D
16971	Demonstrate electrotechnology hardware or software development capability **Plan, develop, and document a practical electrotechnology product**	6	18 **15**	B
16973	Demonstrate electrotechnology assembly skills **Demonstrate and apply knowledge of electrotechnology engineering construction and testing skills**	3	6 **5**	B
16974	Use and create electrotechnology drawings **Demonstrate and apply knowledge of CAD tools as used in an electrotechnology engineering environment**	4	6 **5**	B
16975	Describe and apply software packages in an electrotechnology context **Demonstrate and apply knowledge of software tools as used in electrotechnology industry applications**	3	6 **5**	B
16979	Demonstrate elementary software programming techniques in an electrotechnology context	4	6	D
16980 *22718*	Demonstrate structured programming techniques in an electrotechnology context *Demonstrate and apply intermediate knowledge of programming techniques for electrotechnology*	5 *5*	12 *15*	D
16991	Demonstrate electrotechnology workshop fabrication skills **Demonstrate and apply knowledge of electrotechnology engineering workshop safe practice**	3	6 **5**	B
16992	Demonstrate basic electrotechnology faultfinding skills **Describe and apply knowledge of electrotechnology fault-diagnosis procedures**	4	6 **5**	B
22734	**Demonstrate and apply introductory knowledge of electrotechnology engineering mathematics**	**4**	**15**	**New**
22735	**Explain and apply information gathering methods and present reports in an electrotechnology industry**	**4**	**5**	**New**
22736	**Explain and apply communication skills and societal responsibilities in an electrotechnology industry**	**3**	**10**	**New**
22737	**Demonstrate introductory knowledge of emerging or new electrotechnology products or systems**	**4**	**15**	**New**

Id	Title	Level	Credit	Review Category
22738	**Demonstrate and apply intermediate knowledge of electrotechnology engineering mathematics**	**5**	**15**	**New**
22739	**Demonstrate intermediate knowledge of emerging or new electrotechnology products or systems**	**5**	**15**	**New**
22740	**Demonstrate knowledge of project management in an electrotechnology engineering environment**	**6**	**15**	**New**
22741	**Demonstrate advanced knowledge of emerging or new electrotechnology products or systems**	**6**	**15**	**New**
22742	**Conduct negotiated research in the field of electrotechnology engineering**	**6**	**15**	**New**

Subfield Electronics Technology
Domain Computer Engineering
Subfield Electronic Engineering
Domain Computer Engineering

Id	Title	Level	Credit	Review Category
16976	Demonstrate personal computer engineering skills **Demonstrate and apply advanced knowledge of personal computer engineering**	6	16 **15**	B
16977 *11566*	Describe and apply computer operating system software in the context of computer engineering *Demonstrate and apply intermediate knowledge of personal computer engineering*	5 *5*	12 *15*	D
16978 *16981*	Describe and apply computer software engineering techniques *Demonstrate and apply advanced knowledge of programming techniques for electrotechnology*	6 *6*	16 *15*	D
16981	Demonstrate object oriented programming techniques in an engineering context **Demonstrate and apply advanced knowledge of programming techniques for electrotechnology**	6	16 **15**	B
16982	Demonstrate rapid application development software techniques in an engineering context	6	16 **15**	B
16983 *16981*	Demonstrate internet programming techniques in an engineering context *Demonstrate and apply advanced knowledge of programming techniques for electrotechnology*	6 *6*	16 *15*	D
16984 *11583* *16989*	Demonstrate small computer network administration skills from a computer engineering perspective *Demonstrate and apply advanced knowledge of local computer network engineering principles* *Describe and apply advanced knowledge of computer network engineering techniques to set up a WAN*	6 *6* *6*	16 *15* *15*	D

Id	Title	Level	Credit	Review Category
16985 *22715*	Describe and apply advanced software application functions from a computer engineering perspective *Use personal computer software to demonstrate computer programming concepts for electrotechnology*	4 *3*	6 *5*	D
16986 *16981*	Demonstrate system software programming skills *Demonstrate and apply advanced knowledge of programming techniques for electrotechnology*	6 *6*	16 *15*	D
16987 *22715*	Demonstrate advanced software programming techniques in an engineering context *Use personal computer software to demonstrate computer programming concepts for electrotechnology*	4 *4*	6 *15*	D
16988 **22717**	Describe and apply computer network concepts from a computer engineering perspective **Demonstrate and apply intermediate knowledge of computer network engineering principles**	5 **5**	12 **15**	C
16989	Describe and apply advanced computer network techniques from a computer engineering perspective **Describe and apply advanced knowledge of computer network engineering techniques to set up a WAN**	6	16 **15**	B
16990 *22712*	Describe and apply structured cabling concepts *Demonstrate and apply introductory knowledge of computer network engineering principles*	5 *4*	12 *15*	D
22712	**Demonstrate and apply introductory knowledge of computer network engineering principles**	**4**	**15**	**New**
22713	**Demonstrate and apply knowledge of computer networking infrastructure principles**	**4**	**15**	**New**
22715	**Use personal computer software to demonstrate computer programming concepts for electrotechnology**	**3**	**5**	**New**
22716	**Demonstrate and apply introductory knowledge of open computer operating systems**	**4**	**15**	**New**
22718	**Demonstrate and apply intermediate knowledge of programming techniques for electrotechnology**	**5**	**15**	**New**
22719	**Demonstrate knowledge of and install wireless local area computer networks**	**6**	**15**	**New**

Subfield Electronics Technology
Domain Core Electronics
Subfield Electronic Engineering
Domain Computer Engineering

Id	Title	Level	Credit	Review Category

Id	Title	Level	Credit	Review Category
11566	Describe and apply personal computer technology in electrotechnology applications **Demonstrate and apply intermediate knowledge of personal computer engineering**	5	12 **15**	B

Subfield Electronics Technology
Domain Core Electronics
Subfield Electronic Engineering
Domain Core Electronics

Id	Title	Level	Credit	Review Category
11571 **22728**	Describe and apply microprocessor and microcontroller technology **Demonstrate and apply intermediate knowledge of microcontroller engineering concepts**	5 **5**	15 **15**	C
11572	Describe and apply electronic signal technology **Demonstrate and apply knowledge of electronic signal technology engineering**	6	15	B
11573	Describe and apply power electronics technology **Demonstrate and apply knowledge of power electronics technology engineering**	6	15	B
11579 **22729**	Describe and apply programmable logic controller system technology **Demonstrate and apply advanced knowledge of programmable logic controller engineering applications**	6 **6**	15 **15**	C
11580	Describe and apply real time programming technology **Demonstrate and apply knowledge of real-time programming in electrotechnology engineering**	6	15	B
16968	Describe and apply electronic circuit analysis concepts **Demonstrate and apply intermediate knowledge of electronic engineering**	5	12 **15**	B
16969	Describe and apply digital systems technology **Demonstrate and apply knowledge of digital systems technology**	5	12 **15**	B
16993	Demonstrate electronic printed circuit board layout skills	4	6 **5**	B
22726	**Demonstrate and apply introductory knowledge of electronic engineering**	**4**	**15**	**New**
22727	**Demonstrate and apply intermediate knowledge of programmable logic controller engineering applications**	**5**	**15**	**New**
22730	**Demonstrate and apply advanced knowledge of microcontroller engineering concepts**	**6**	**15**	**New**

Subfield Electronics Technology
Domain Core Electronics

Id	Title	Level	Credit	Review Category
11581 *16981*	Describe and apply embedded system technology *Demonstrate and apply advanced knowledge of programming techniques for electrotechnology*	6 *6*	15 *15*	D
12593	Design printed circuit board layouts for electronic circuits	6	100	D
12594	Prepare electronic product technical information	6	40	D
12595	Supply technical support on an electronic product	6	40	D
12596	Supply technical support on the manufacture of electronic product	7	60	D
12597	Provide engineering documentation for electronic products	6	20	D
12598	Identify information requirements for electronic product technical documentation	7	40	D
12599	Plan contents of electronic product technical documentation	7	40	D
12600	Produce electronic product technical documentation	7	40	D
12601	Supply electronic equipment calibration	6	50	D
12602	Test electronic systems	7	60	D
12603	Evaluate electronic product performance	7	60	D
12604	Design electronic products to given specifications	7	120	D
12605	Install electronic systems	6	60	D
12606	Commission electronic systems	7	60	D

Subfield Electronic Engineering
Domain Electronic Manufacturing

Id	Title	Level	Credit	Review Category
22732	**Apply intermediate knowledge of electronic manufacturing**	**5**	**15**	**New**
22733	**Demonstrate advanced knowledge of electronic manufacturing process engineering**	**6**	**15**	**New**

Subfield Industrial Measurement and Control
Domain Industrial Measurement and Control - Theory

Id	Title	Level	Credit	Review Category
11562	Describe and apply control technology	5	12	D
11563 *22743*	Describe and apply instrumentation technology *Demonstrate and apply intermediate knowledge of instrumentation and control system engineering*	5 *5*	12 *15*	D
11574 *22745*	Describe and apply advanced control technology *Demonstrate and apply advanced knowledge of instrumentation and control principles*	6 *6*	15 *15*	D
11575	Describe and apply advanced measurement technology	6	15	D

Id	Title	Level	Credit	Review Category
17036 *22745*	Describe and apply process science concepts *Demonstrate and apply advanced knowledge of instrumentation and control principles*	4 *6*	6 *15*	D
22743	**Demonstrate and apply intermediate knowledge of instrumentation and control system engineering**	**5**	**15**	**New**
22744	**Demonstrate and apply knowledge of industrial automation engineering**	**6**	**15**	**New**
22745	**Demonstrate and apply advanced knowledge of instrumentation and control principles**	**6**	**15**	**New**

Subfield Telecommunications
Domain Communications Technology

Id	Title	Level	Credit	Review Category
11567	Describe and apply telecommunications technology **Demonstrate knowledge of telecommunications network structures and transmission engineering**	5	12 **15**	B
11568	Describe and apply telecommunication systems technology **Describe and apply telecommunications transmission engineering and testing techniques**	5 **6**	12 **15**	B
11584 **22720**	Describe and apply telecommunication network technology **Demonstrate and apply knowledge of telecommunications network engineering principles**	6 **6**	15 **15**	C
11585	Describe and apply radio frequency technology **Demonstrate and apply knowledge of radio frequency engineering principles**	6	15	B
11586	Describe and apply radio system technology **Demonstrate and apply knowledge of radio systems technology**	6	15	B

Subfield Telecommunications
Domain Communications Technology
Subfield Electronic Engineering
Domain Computer Engineering

Id	Title	Level	Credit	Review Category
11583	Describe and apply data communication technology **Demonstrate and apply advanced knowledge of local computer network engineering principles**	6	15	B