Field Engineering and Technology

Revision of *Electrical Engineering* and *Electronic Engineering* unit standards

Subfield	Domain	ID
Electrical Engineering	Core Electrical	750, 1174, 1178, 1206, 2017, 2031, 5907, 5909, 5911, 5926, 5929, 5930, 5932, 6626, 15844-15854, 15856, 15857, 15861, 15862, 15864, 16407, 18997, 18998, 19000, 20961, 22721-22725, 25070-25072
	Electric Switchboards	14970-14975, 14977-14979, 14981, 24608-24611
	Electrical Appliance Servicing	1173, 1189, 1192, 6705, 16411, 18082, 18084-18089, 22763-22767
	Electrical Equipment	23751-23754, 25337, 25338
	Electrical Installation and Maintenance	1204, 1205, 1710, 2013, 2016, 2020, 2021, 2030, 5922, 5924, 5925, 5931, 10782-10789, 15855, 15859, 15866-15871, 16408-16410, 16412, 16414, 16415, 19001, 19002, 19004, 19006, 19008, 20962, 25631, 25632, 25634-25637, 25639, 25641
	Electrical Machines	1184, 1185, 2014, 5928, 15858, 15865, 16413, 16416, 18999, 19469-19471, 24890
	Electrical Service Technicians	17798-17811, 18090, 18091
	Electrical Standards and Statutes	15860
	Electrotechnology	4993, 11569, 11576, 11582, 16971, 16973-16975, 16991, 16992, 17495, 22734-22742, 25629, 25630, 25633
Electronic Engineering	Electronics Technology	9221, 18239-18243, 26119-26123

The Skills Organisation has completed the revision of the unit standards listed above.

Date new versions published **January 2014**

Planned review date **December 2014**

Summary

The unit standards were revised to update the references to legislation, the last date for assessment against previous versions and the contact details, in order to maintain currency and allow achievement during the Sector Review process.

Main changes

- References to legislation and contact details updated, and minor edits made for clarity and consistency.
- Last date for assessment of some of the earlier versions of each standard removed.

Detailed list of unit standards – classification, title, level, and credits

Engineering and Technology > Electrical Engineering > Core Electrical

ID	Title	Level	Credit
750	Demonstrate knowledge of electrical test instruments and take measurements	2	2
1174	Disconnect and reconnect fixed wired electrical appliances or equipment	3	4
1178	Follow safe practices in an electrical workplace	2	3
1206	Demonstrate knowledge of a.c. power and power factor	4	4
2017	Describe and use complex electrical instruments	4	2
2031	Demonstrate knowledge of three-phase theory	4	4
5907	Work safely with electrical equipment	2	1
5909	Explain basic atomic principles as applied to the electrotechnology industry	1	1
5911	Explain basic magnetism and electromagnetism as applied to the electrotechnology industry	1	1
5926	Demonstrate knowledge of programmable logic controllers (PLCs)	4	5
5929	Demonstrate knowledge of hazardous areas and their electrical requirements	4	3
5930	Demonstrate knowledge of electrical equipment for use in hazardous areas	4	2
5932	Demonstrate knowledge of protection of circuits from static electricity and magnetic interference	2	2
6626	Demonstrate knowledge of electrical and electronic components	2	3
15844	Select and install flexible cords	2	3
15845	Draw and explain simple electrical diagrams	2	4
15846	Demonstrate knowledge of capacitors and semiconductor diodes	2	3
15847	Demonstrate knowledge of mathematics and mechanics for electrical trades	2	4
15848	Demonstrate knowledge of safeguards for use with portable electrical appliances	2	2
15849	Perform manual soldering and de-soldering procedures for electrotechnology work	2	2
15850	Demonstrate knowledge of single-phase transformers	3	3

ID	Title	Level	Credit
15851	Demonstrate knowledge of electrical safety and safe working practices for electrical workers	2	3
15852	Isolate and test low-voltage electrical subcircuits	2	2
15853	Demonstrate knowledge of alternating current (a.c.) theory	4	7
15854	Draw and interpret electrical diagrams	3	3
15856	Demonstrate knowledge of the New Zealand electricity supply system	3	2
15857	Demonstrate knowledge of three-phase transformers	4	3
15861	Demonstrate knowledge of direct current (d.c.) power supplies	3	3
15862	Demonstrate knowledge of industrial process control	4	3
15864	Demonstrate knowledge of semiconductor power devices	4	4
16407	Use and maintain hand and power tools for electrical work	3	4
18997	Demonstrate advanced knowledge of capacitance, inductance, and magnetism in direct current circuits	5	4
18998	Demonstrate advanced knowledge of alternating current and three-phase theory	5	10
19000	Demonstrate advanced knowledge of electrical power transformers	5	7
20961	Demonstrate knowledge of special electrical installations	4	4
22721	Demonstrate and apply fundamental knowledge of electrical circuit engineering principles	3	15
22722	Demonstrate and apply introductory knowledge of electrical circuit engineering principles	4	15
22723	Demonstrate and apply intermediate knowledge of the elements of power engineering	5	15
22724	Demonstrate and apply knowledge of electrical machines	5	15
22725	Demonstrate and apply advanced knowledge of power system engineering	6	15
25070	Explain the properties of conductors, insulators, and semiconductors and their effect on electrical circuits	2	7
25071	Demonstrate knowledge of electromotive force (e.m.f.) production	2	3
25072	Demonstrate knowledge of electromagnetism theory	2	5

Engineering and Technology > Electrical Engineering > Electric Switchboards

ID	Title	Level	Credit
14970	Demonstrate knowledge of electric switchboard components and their representation on drawings	3	30
14971	Use and maintain specialised tools and fixings for electric switchboard manufacture	3	20
14972	Assemble electric switchboards	3	30
14973	Wire electric switchboards	3	30
14974	Fabricate and install busbars in electric switchboards	3	20
14975	Install earthing systems and shrouding on electric switchboards	3	15
14977	Demonstrate knowledge of regulations relevant to the switchboard industry	3	3
14978	Demonstrate knowledge of electric switchboard testing	4	3
14979	Demonstrate knowledge of electric switchboard circuits	4	5

ID	Title	Level	Credit
14981	Modify installed electric switchboards	4	15
24608	Test electric switchboards	3	5
24609	Perform compliance testing of electric switchboards	4	20
24610	Demonstrate knowledge of busbar systems design	4	10
24611	Handle switchgear equipment and switchboards in a safe manner	3	5

Engineering and Technology > Electrical Engineering > Electrical Equipment

ID	Title	Level	Credit
23751	Demonstrate knowledge of electrical calculations and theory, test instruments, and components of electrical equipment	2	6
23752	Demonstrate knowledge of electrical cables, accessories and lamps in the electrotechnology industry	3	4
23753	Demonstrate and apply knowledge of electrical equipment storage in the electrotechnology industry	2	6
23754	Gather, package, and despatch electrical equipment and process returns in the electrotechnology industry	2	6
25337	Demonstrate knowledge of requirements for preparation of quotations for electrical equipment	3	5
25338	Demonstrate and apply knowledge of legislation relevant for electrical equipment industry	3	5

Engineering and Technology > Electrical Engineering > Electrical Appliance Servicing

ID	Title	Level	Credit
1173	Install and commission electrical appliances	4	5
1189	Service microwave ovens	4	3
1192	Fault-find, repair, and test portable electrical tools and appliances	3	2
6705	Test electrical appliances for safety	3	3
16411	Fault-find, repair, and re-commission fixed-wired electrical appliances	3	4
18082	Replace faulty motors in electrical appliances	4	4
18084	Demonstrate knowledge of refrigeration principles applicable to domestic appliances	4	6
18085	Demonstrate knowledge of the operating principles and installation requirements of domestic electrical appliances	4	7
18086	Draw and interpret diagrams of electrical appliances	3	4
18087	Exhibit customer service skills in electrical appliance servicing	3	3
18088	Demonstrate systematic fault finding techniques in electrical appliance servicing	3	3
18089	Demonstrate knowledge of domestic gas appliances for electrical appliance servicing	4	4
22763	Service electrical or electronic goods to gain electrical registration for electrical technicians and service persons	4	10
22764	Service electrical appliances	4	25
22765	Demonstrate knowledge of microwave ovens for electrical appliance servicing	4	4

ID	Title	Level	Credit
22766	Demonstrate knowledge of the operating principles of portable electrical appliances and power tools	4	7
22767	Demonstrate knowledge of operating principles and installation requirements of commercial electrical appliances	4	7

Engineering and Technology > Electrical Engineering > Electrical Installation and Maintenance

ID	Title	Level	Credit
1204	Demonstrate knowledge of earthing	3	2
1205	Demonstrate knowledge of electrical switchboards	3	3
1710	Demonstrate knowledge of electric lighting	4	3
2013	Install and commission a.c. rotating machines	4	5
2016	Install earthing systems for multiple earthed neutral installations	3	3
2020	Plan and install cable support systems	3	4
2021	Plan, install, and commission a power supply on a construction or demolition site	4	2
2030	Schedule and manage preventative maintenance for electrical equipment	5	6
5922	Use cutting tools and machines in the performance of electrical installation and maintenance	2	2
5924	Install and commission d.c. rotating machines	4	5
5925	Recognise the requirements of routine maintenance of electrical equipment	2	2
5931	Select and install electric switchboards	3	4
10782	Install, commission, and maintain battery backup and emergency lighting systems	4	3
10783	Install, commission, and maintain generating sets driven by combustion engines	5	10
10784	Overhaul electric space heating systems up to 10 kilowatts rating	4	3
10785	Overhaul electrical systems in air-conditioning and air handling equipment	4	3
10786	Overhaul electromagnetic switching devices	4	3
10787	Install and test transducers	4	2
10788	Operate industrial high voltage distribution systems	4	3
10789	Install, commission, and maintain an uninterruptible power supply (UPS) system	4	4
15855	Demonstrate knowledge of circuit protection	3	3
15859	Demonstrate knowledge of electrical cables and accessories	3	7
15866	Demonstrate procedures for examination and testing of electrical installations	4	2
15867	Install, wire, and test lights in existing installations	3	5
15868	Install, wire, and test power outlets in existing installations	3	5
15869	Install electrical equipment in damp situations	4	3
15870	Inspect and test an electrical installation for compliance with AS/NZS 3000	4	3
15871	Demonstrate knowledge of electrical installation in damp situations	4	3

ID	Title	Level	Credit
16408	Pre-wire an electrical installation	3	5
16409	Fit-off an electrical installation	3	5
16410	Plan, install, test, and commission small electrical installations	4	5
16412	Fault-find, repair, and re-commission electric lighting	3	4
16414	Carry out planned electrical maintenance work of electrical equipment	4	6
16415	Install and commission extra-low voltage equipment	4	3
19001	Demonstrate advanced knowledge of electrical circuit protection	5	3
19002	Demonstrate advanced knowledge of electrical switchgear and switchboards	5	5
19004	Demonstrate knowledge of standby power plant	5	4
19006	Design simple electric lighting installations	5	5
19008	Prepare quotations for electrical work	5	5
20962	Demonstrate knowledge of a.c. electric motor control and installation	4	8
25631	Demonstrate knowledge of and design documentation for the commissioning of significant electrical installations	5	5
25632	Demonstrate and apply advanced knowledge of the selection, use, and care of complex electrical measuring equipment	5	5
25634	Demonstrate advanced knowledge of electrical installation practice and knowledge of data communication principles	5	10
25635	Develop, implement, and review maintenance plans for electrical engineering systems	5	15
25636	Manage testing and measuring procedures within electrical engineering contexts	5	5
25637	Develop a plan for and manage an electrical engineering project	5	20
25639	Develop resource procurement options for a significant electrical project and make recommendations	5	5
25641	Demonstrate knowledge of electrical heating systems	5	4

Engineering and Technology > Electrical Engineering > Electrical Machines

ID	Title	Level	Credit
1184	Test, and locate and diagnose faults in electrical machine windings	3	2
1185	Prepare electrical machines for rewinding	4	6
2014	Overhaul a.c. rotating machines and control equipment	4	5
5928	Overhaul d.c. rotating machines and control equipment	4	5
15858	Demonstrate knowledge of a.c. motors	4	7
15865	Demonstrate knowledge of d.c. machines	4	5
16413	Fault-find, repair, and test electric motors	4	8
16416	Service bearings and seals in electrical rotating machines	2	1
18999	Demonstrate advanced knowledge of electrical machines	5	10
19469	Demonstrate knowledge of electric machine winding	4	5
19470	Rewind electric machines	4	10
19471	Reassemble and test electric machines following rewinding	4	8

ID	Title	Level	Credit
24890	Lift and transport electrical machines and associated repair equipment within a motor rewinding workshop environment	2	3

Engineering and Technology > Electrical Engineering > Electrical Service Technicians

ID	Title	Level	Credit
17798	Demonstrate knowledge of legislation and standards for electrical appliance servicepersons (EAS) and EAS (endorsed)	3	2
17799	Demonstrate knowledge of testing for electrical safety for electrical appliance servicing – single-phase	2	2
17800	Demonstrate knowledge of electrical control devices and simple electrical circuits	3	3
17801	Demonstrate knowledge of single-phase motors for electrical appliance servicing	4	3
17802	Replace fuses and plug-in miniature circuit breakers	3	1
17803	Select and connect flexible cords in single-phase plug-in and fixed wired applications	3	2
17804	Test single-phase electrical appliances	3	2
17805	Disconnect and reconnect fixed wired single-phase electrical appliances	3	3
17806	Demonstrate knowledge of protection from the harmful effects of electricity	3	2
17807	Demonstrate knowledge of legislation and standards for electrical service technicians – three-phase	4	4
17808	Isolate electrical appliances from the supply	3	1
17809	Demonstrate knowledge of single-phase and three-phase motors for electrical service technicians	4	5
17810	Connect single-phase and three-phase electrical appliances and fittings	3	3
17811	Test single-phase and three-phase electrical appliances	3	3
18090	Demonstrate knowledge of alternating current (a.c.) theory for electrical appliance servicing	4	5
18091	Demonstrate knowledge of three-phase theory for electrical service technicians	4	3

Engineering and Technology > Electrical Engineering > Electrical Standards and Statutes

ID	Title	Level	Credit
15860	Demonstrate knowledge of legislation and standards governing the work of electricians	3	2

Engineering and Technology >Electrical Engineering > Electrotechnology

ID	Title	Level	Credit
4993	Plan implementation of, manage, and review small to medium sized electrotechnology projects	5	6
11569	Demonstrate intermediate knowledge of illumination engineering	5	15
11576	Demonstrate and apply knowledge of building electrical services engineering	6	15
11582	Demonstrate advanced knowledge of illumination engineering	6	15

ID	Title	Level	Credit
16971	Plan, develop, and document a practical electrotechnology product	6	15
16973	Demonstrate and apply knowledge of electrotechnology engineering construction and testing skills	3	5
16974	Demonstrate and apply knowledge of CAD tools as used in an electrotechnology engineering environment	4	5
16975	Demonstrate and apply knowledge of software tools as used in electrotechnology industry applications	3	5
16991	Demonstrate and apply knowledge of electrotechnology engineering workshop safe practice	3	5
16992	Describe and apply knowledge of electrotechnology fault-diagnosis procedures	4	5
17495	Demonstrate advanced electrotechnology measurement and faultfinding skills	6	12
22734	Demonstrate and apply introductory knowledge of electrotechnology engineering mathematics	4	15
22735	Explain and apply information gathering methods and present reports in an electrotechnology industry	4	5
22736	Explain and apply communication skills and societal responsibilities in an electrotechnology industry	3	10
22737	Demonstrate introductory knowledge of emerging or new electrotechnology products or systems	4	15
22738	Demonstrate and apply intermediate knowledge of electrotechnology engineering mathematics	5	15
22739	Demonstrate intermediate knowledge of emerging or new electrotechnology products or systems	5	15
22740	Demonstrate knowledge of project management in an electrotechnology engineering environment	6	15
22741	Demonstrate advanced knowledge of emerging or new electrotechnology products or systems	6	15
22742	Conduct negotiated research in the field of electrotechnology engineering	6	15
25629	Demonstrate introductory knowledge of building management systems	4	5
25630	Demonstrate knowledge of and analyse energy efficiency of buildings and plant	4	5
25633	Demonstrate and apply knowledge of energy audits and emerging developments in energy efficiency	5	10

Engineering and Technology > Electronic Engineering > Electronics Technology

ID	Title	Level	Credit
9221	Demonstrate knowledge of the development of an electronic product	3	3
18239	Demonstrate introductory knowledge of circuit concepts and measurements for electronics	2	5
18240	Demonstrate knowledge of basic electronic components	2	5
18241	Demonstrate knowledge of basic electronic systems	2	5
18242	Construct a simple printed circuit	2	3
18243	Construct simple electronic products from supplied circuit schematics	2	6

ID	Title	Level	Credit
26119	Construct, and report on the performance of, a simple electronic programmable circuit	3	4
26120	Describe and construct circuits to demonstrate the operation and properties of electronic devices	3	3
26121	Plan, construct, modify, and report on an electronic prototype	3	6
26122	Demonstrate knowledge of and build circuits using digital electronic devices that interface with ADC and DAC functions	3	3
26123	Demonstrate knowledge of the practical applications of logic circuits	3	3