

<b>Title</b>	<b>Demonstrate practical skills required for Electrical Service Technicians – A</b>		
<b>Level</b>	<b>3</b>	<b>Credits</b>	<b>3</b>

<b>Purpose</b>	<p>'Electrical Service Technician – A' (EST – A) refers to a class of electrical registration for people who need to service electrical appliances and equipment designed to connect to a single-phase supply by flexible cord and plug, and rated at no more than 230 volts, 10 amps. Registration is the responsibility of the Electrical Workers Registration Board.</p> <p>People credited with this unit standard are able to:</p> <ul style="list-style-type: none"> <li>–identify electrical fittings, cables, and flexible cords;</li> <li>–demonstrate electrical safety and safe working practices;</li> <li>–select and replace fuses;</li> <li>–connect and test single-phase flexible cord fittings;</li> <li>–terminate flexible cords;</li> <li>–connect lamp switching and control circuits;</li> <li>–test single-phase electrical appliances;</li> <li>–connect and test metal framed appliances; and</li> <li>–connect and test single phase motors.</li> </ul>
----------------	--

<b>Classification</b>	Electrical Engineering > Core Electrical
-----------------------	--

<b>Available grade</b>	Achieved
------------------------	----------

### Guidance Information

- 1 This unit standard has been developed for learning and assessment off-job.
- 2 This unit standard, together with Unit 10933, *Demonstrate knowledge of electrical theory for Electrical Service Technicians – A*, 10934, Unit *Demonstrate knowledge of safety, protection, and testing for Electrical Service Technicians – A*, and Unit 10935, *Demonstrate knowledge of regulations and codes of practice for Electrical Service Technicians – A*, and their prerequisites, are designed to meet the *safety instruction, theory examination, and practical assessment* requirements for registration as an Electrical Service Technician 'A' (EST – A). For details of additional registration requirements, that is, work experience, candidates should contact the Electrical Workers Registration Board, PO Box 10156, Wellington, telephone: 0800 661 000.
- 3 Training courses designed to prepare candidates for credit in this unit standard must meet the requirements of the *Electricity Regulations 1997, Schedule 2*, and the *Teaching Guidelines for Electrical Service Technician 'A'*, issued by the Electrical Workers Registration Board.

- 4 Assessment against this unit standard must be in accordance with the associated Assessment Guide issued by The Skills Organisation, and must be conducted by, or in conjunction with, a Supervisor of Electrical Work (as defined in the Electricity Act 1992) who holds electrical registration appropriate to the nature of the work.
- 5 Definition  
*Industry practice* – practice used and recommended by organisations involved in the electrotechnology industry.
- 6 References  
Electricity Act 1992;  
Electricity Regulations 1997;  
AS/NZS 3000:2007, *Electrical installations (known as the Australian/New Zealand Wiring Rules)* (AS/NZS 3000:2007);  
AS/NZS 3760:2003A1, *In-service safety inspection and testing of electrical equipment: Amendment 1* (AS/NZS 3760:2003A1);  
AS/NZS 3008.1.2:1998, *Electrical installations – Selection of cables – Cables for alternating voltages up to and including 0.6/1 kV – Typical New Zealand installation conditions*;  
The New Zealand Electrical Codes of Practice (Ministry of Economic Development, ISSN 0114-0663);  
and all subsequent amendments and replacements.
- 7 Recommended: Unit 750, *Demonstrate knowledge of electrical test instruments and take measurements*, Unit 15849, *Perform manual soldering and de-soldering procedures for electrotechnology work*, or demonstrate equivalent knowledge and skills.

---

## Outcomes and performance criteria

### Outcome 1

Identify electrical fittings, cables, and flexible cords.

### Performance criteria

- 1.1 Cables and flexible cords are identified by name, and at least one application for each is stated, in accordance with AS/NZS 3000:2007 and AS/NZS 3008.1.2:1998.
- |       |   |
|-------|---|
| Range | twin and three core, twisted, parallel, and circular construction, tough rubber sheath (TRS), tough plastic sheath (TPS), polychloroprene compound (PCP), heat and oil resisting and flame retardant (HO-FR), polyvinyl chloride (PVC);<br>for purposes of assessment, identification could be by any one of the following – description, pictorial display, physical display, abbreviations, recall. |
|-------|---|
- 1.2 Fittings and components are identified by name, and at least one application for each is stated, in accordance with industry practice.

Range	fittings and components – toggle, rocker, push-button, pull-cord, single-pole, double-pole, intermediate, one-way and two-way switches, timers, time delay switches, light dimmers, one-gang, two-gang, horizontal and vertical mounting wall plates and boxes, permanent connection unit, junction box, connector, mounting block, single-phase plugs, sockets, and cord-connectors, watertight, hose-proof, or weather-protected accessories, lamp holders (bayonet-cap and Edison-screw), ceiling roses, fluorescent lamp starters; for purposes of assessment, identification could be by any one of the following – description, pictorial display, physical display, recall.
-------	---

## Outcome 2

Demonstrate electrical safety and safe working practices.

### Performance criteria

2.1 Safe working practices are demonstrated in accordance with industry practice.

2.2 Demonstration includes isolation procedure for electrical appliances prior to commencing repairs or maintenance.

Range	locate and operate isolator, remove plug, test-prove-test, warning notice attached, person in charge informed.
-------	--

2.3 Demonstration includes actions to be taken in the event that complete isolation is not achieved.

Range	the circuit must not be worked on, a registered electrician must be called to rectify the situation.
-------	--

## Outcome 3

Select and replace fuses.

Range	rewirable, high-rupturing capacity (HRC).
-------	---

### Performance criteria

3.1 Faulty circuit is identified and fuse carrier withdrawn in accordance with industry practice.

3.2 Blown fuse element is removed from the carrier to allow for replacement.

3.3 Replacement fuse wire is selected for a rewirable fuse, and installed in accordance with industry practice.

Range	selection – current rating, wire size; installation – ends of fuse wire not exposed to touch, tortuous path followed.
-------	--

- 3.4 Replacement fuse cartridge is selected for an HRC fuse, and installed in accordance with industry practice.
- Range selection – current rating, cartridge diameter, length, physical appearance, mounting holes (where used), identifying markings, colour codes;  
installation – clamps, screws, or other securing mechanism tightened.
- 3.5 The cause of overloading or short-circuit is investigated, and any faulty equipment is removed and tagged, or reported for further action.
- 3.6 Fuse carrier is replaced and circuit made live when free of faults, in accordance with industry practice.

#### **Outcome 4**

Connect and test single-phase flexible cord fittings.

Range fittings – three-pin plug and cord connector, appliance connector, bayonet-cap lamp-holder, Edison-screw lamp-holder.

#### **Performance criteria**

- 4.1 Flexible cord is selected to match the fitting in accordance with AS/NZS 3000:2007, AS/NZS 3008.1.2:1998, and industry practice.
- Range length, current rating, number of cores, outside diameter, shape, insulation quality to suit voltage, operating temperature, requirement for rigidity or flexibility.
- 4.2 Fittings are connected to the flexible cord in accordance with industry practice.
- Range phasing and colours, conductors follow designed path within the fitting, strands are not cut from the wire, no stray strands protruding, strands are twisted and doubled over where necessary, terminal screws are tightened, earth conductor installed so that it will suffer least (or last) under cord tension, fabric covered cords are sleeved or whipped, cord clamp arrangement is secured so that conductors are not strained, cord protector shroud is replaced.
- 4.3 Cord sets are tested and documented in accordance with AS/NZS 3760:2003A1.

#### **Outcome 5**

Terminate flexible cords.

Range terminations – soldered joint, solder lug, crimp link, crimp lug;  
connections to – pill terminals, screw-and-washer, set-screw.

**Performance criteria**

5.1 Terminations are made in accordance with the Electricity Regulations and industry practice.

Range link or lug hardware matches conductor size, strands are not cut from the wire, no stray strands protruding, strands are twisted and doubled over where necessary, terminal screws are tightened, earth conductor installed so that it will suffer least (or last) under cord tension, flexible cord insulation integrity is maintained.

5.2 Termination is tested in accordance with the Electricity Regulations and industry practice.

Range visual check, physical check for tightness, tests for conductor continuity and correct polarity.

**Outcome 6**

Connect lamp switching and control circuits.

Range lamp switching circuits – one-way, two-way, double-pole switches; control circuits – three-heat switch, energy regulator control.

**Performance criteria**

6.1 Electrical connections and terminations are made and secured in accordance with the Electricity Regulations, Codes of Practice, relevant standards, and manufacturer's recommendations.

6.2 Circuit operation is verified according to industry practice.

**Outcome 7**

Test single-phase electrical appliances.

Range at least three single-phase plug-in appliances, each with a maximum rating of 230 volts 10 amps are to be tested, and the results recorded and retained for the purposes of electrical registration.

**Performance criteria**

7.1 Tests are completed and documented in accordance with AS/NZS 3760:2003A1.

7.2 Appliance operation is checked against operating instructions, and voltage and current are verified against name plate specification.

**Outcome 8**

Connect and test metal-framed appliances.

**Performance criteria**

- 8.1 Appliance is connected via a flexible cord to the electricity supply in accordance with industry practice.
- 8.2 Appliance is tested and documented in accordance with AS/NZS 3760:2003A1.
- 8.3 Appliance operation is checked against operating instructions, and voltage and current are verified against name plate specification.

**Outcome 9**

Connect and test single-phase motors.

Range at least two of – universal, shaded pole, standard split-phase, capacitor-start, capacitor-start-and-run, permanently split.

**Performance criteria**

- 9.1 Motor is connected to the electricity supply in accordance with industry practice.
- 9.2 Tests are completed and documented in accordance with AS/NZS 3760:2003A1.
- 9.3 Motor operation is checked, and voltage and current are verified against name plate specification.

Range live rated-voltage test, no-load and full-load current tests, direction of motor rotation, smooth and quiet running.

**This unit standard is expiring. Assessment against the standard must take place by the last date for assessment set out below.**

**Status information and last date for assessment for superseded versions**

Process	Version	Date	Last Date for Assessment
Registration	1	25 June 1997	31 December 2022
Revision	2	3 April 2001	31 December 2022
Revision	3	14 August 2002	31 December 2022
Rollover and Revision	4	25 February 2008	31 December 2022
Review	5	28 January 2021	31 December 2022

<b>Consent and Moderation Requirements (CMR) reference</b>	0003
--	------

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