

Title	Demonstrate knowledge of electrical and electronic components		
Level	2	Credits	3

Purpose	<p>This unit standard and covers basic knowledge about resistors and capacitors, the use of capacitors for suppression of radio interference, and the identification of components widely used in the electrical and electronic industries.</p> <p>People credited with this unit standard are able to:</p> <ul style="list-style-type: none"> – explain terminology used in conjunction with electrical and electronic components – demonstrate knowledge of linear resistance and resistors – demonstrate knowledge of non-linear resistors – demonstrate knowledge of capacitance and capacitors – demonstrate knowledge of the use of capacitors for suppression of radio and television interference – identify electrical and electronic components.
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Classification	Electrical Engineering > Core Electrical
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Available grade	Achieved
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Guidance Information

- 1 This unit standard has been developed for learning and assessment off-job.
- 2 For assessment purposes
 - a Use of a calculator during assessment is permitted.
 - b Candidates are expected to express calculated values in the relevant Système International (SI) units, including multiples and sub-multiples (pico, nano, micro, milli, kilo, mega, etc) and be able to convert between them.
 - c Charts of resistor and capacitor colour codes may be referred to during assessment.

Outcomes and performance criteria

Outcome 1

Explain terminology used in conjunction with electrical and electronic components.

Performance criteria

- 1.1 The meanings of terms describing components are explained.
- Range terms – tolerance, preferred values, stability, power rating, voltage rating, current rating.
- 1.2 The meaning of the word *dissipation* is explained in terms of its association with power ratings.

Outcome 2

Demonstrate knowledge of linear resistance and resistors.

Performance criteria

- 2.1 The unit of resistance, its multiples, and sub-multiples are defined, and symbols and terms are stated.
- 2.2 Factors affecting resistance are explained.
- Range length, cross-sectional area, resistivity of material, temperature.
- 2.3 Resistance is calculated from resistivity, length, and cross-sectional area.
- 2.4 Constructions of resistors are described.
- Range film-type, wire-wound, slider and rotary variable resistors.
- 2.5 One application for each type of resistor is described in terms of control of voltage and current in electrical and electronic circuits.
- Range film-type, wire-wound, slider and rotary variable resistors.
- 2.6 Terminal connections of variable resistors are explained in terms of connection into a circuit.
- 2.7 Values of resistance, rating, and tolerance are determined from resistor markings.

Outcome 3

Demonstrate knowledge of non-linear resistors.

Range negative temperature co-efficient (NTC), positive temperature co-efficient (PTC), voltage dependent resistor (VDR), light dependent resistor (LDR).

Performance criteria

- 3.1 Characteristic curves are identified.
- 3.2 Drawing symbols are identified.

- 3.3 One application is described for each type in terms of its function in a simple circuit.

Outcome 4

Demonstrate knowledge of capacitance and capacitors.

Performance criteria

- 4.1 The unit of capacitance, its multiples, and sub-multiples are defined, and symbols and terms are stated.
- 4.2 Factors affecting capacitance are explained.
- Range area, distance between plates, dielectric permittivity.
- 4.3 Capacitance is calculated from charge and terminal voltage.
- 4.4 The constructions of different types of capacitors are described, and one application stated for each.
- Range air, paper, mica ceramic, electrolytic, solid dielectric.
- 4.5 Methods of connecting capacitors into a circuit are described with reference to polarity.
- 4.6 Capacitance and voltage rating are determined by inspection of capacitor markings.

Outcome 5

Demonstrate knowledge of the use of capacitors for suppression of radio and television interference.

Performance criteria

- 5.1 The use of capacitors in radio and television interference suppression is explained in terms of construction and application.
- 5.2 Reasons are given for the requirements regarding the use of capacitors for interference suppression.
- Range requirements – capacitance connected to exposed metalwork not to exceed 0.005mf; interference suppression devices may not be connected in the earth-continuity conductor; replacement suppression capacitors for use in 230 volt appliances must be rated at least at twice the minimum voltage.

Outcome 6

Identify electrical and electronic components.

Range candidates are required to identify 15 different components, either by inspection of given components, or by selection from a physical or pictorial display. Manufacturers' data may be used to assist the identification. The following is a list of typical components:

- resistors – film, wire-wound, fixed, variable, light dependent resistor (LDR), voltage dependent resistor (VDR), temperature dependent resistor (TDR), positive temperature co-efficient (PTC), and negative temperature co-efficient (NTC)
- capacitors – paper, plastics, ceramic, electrolytic; fixed, variable, pre-set variable;
- chokes – iron or ferrite-cored, air-cored
- diodes – rectifier, zener, light-emitting
- transistors – bipolar junction transistor (BJT), field effect transistor (FET)
- electron tubes – cathode ray tube (CRT), thermionic diode and other vacuum tubes, ignitron, thyratron, magnetron
- thyristor devices – diac, triac, silicon controlled rectifier (SCR), light activated silicon controlled rectifier (LASCR)
- transformers – power, interstage, output, centre-tapped
- photo-devices – photo-cells, photo-diodes, photo-transistors, photo-couplers, heat sinks
- integrated-circuit packages
- inductors.

Performance criteria

- 6.1 Components are identified as to type.
- 6.2 One common application is stated for each component.

Planned review date	31 December 2028
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Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	23 April 1996	31 December 2013
Review	2	10 February 1999	31 December 2013
Revision	3	3 April 2001	31 December 2013
Review	4	26 May 2005	31 December 2025
Rollover and Revision	5	15 March 2012	31 December 2025
Revision	6	15 January 2014	31 December 2025
Rollover and Revision	7	28 January 2021	31 December 2025
Review	8	28 March 2024	N/A

Consent and Moderation Requirements (CMR) reference

0003

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

Comments on this unit standard

Please contact Waihanga Ara Rau Construction and Infrastructure Workforce Development Council qualifications@WaihangaAraRau.nz if you wish to suggest changes to the content of this unit standard.