Title	**Locate faults in power cables**		
Level	**4**	**Credits**	**5**

Purpose	People credited with this unit standard are able to: prepare to locate faults in power cables; set up test equipment to locate faults in power cables; conduct fault location tests on power cables; and interpret test results and complete documentation.

Classification	Electricity Supply > Electricity Supply - Testing

Available grade	Achieved

Prerequisites	Unit 14287, *Use and maintain test instruments used in the high voltage electricity supply industry*, or demonstrate equivalent knowledge and skills.

Guidance Information

1 Evidence presented for assessment against this unit standard must be consistent with safe working practices and be in accordance with applicable legislative and industry requirements.

2 Legislation, regulations and/or industry standards relevant to this unit standard include but are not limited to the current version of the Health and Safety at Work Act 2015; Electricity Act 1992; Electricity (Safety) Regulations 2010; and any subsequent amendments and replacements; Electricity supply industry codes of practice and documented enterprise procedures, including *Safety Manual – Electricity Industry* (SM-EI) (2015) Wellington: Electricity Engineers' Association, available at www.eea.co.nz.

3 Definitions
Asset owner refers to a participant who owns or operates assets used for generating or conveying electricity.
Industry requirements include all asset owner requirements; manufacturers' specifications; and enterprise requirements which may include the documented workplace policies, procedures, specifications, business, and quality management requirements relevant to the workplace in which assessment is carried out.

4 The range of this unit standard is limited to locating faults in underground power cables, above ground power cables, ducted cables, and submarine power cables normally associated with electricity supply substations and cable termination sites.

5 The following terms and abbreviations relate to this unit standard:
TDR = *Time Domain Reflectometry*

POPIE = *Pole of potential in earth*
AF = *Audio frequency.*

6 It is recommended people achieve Unit 14700, *Apply and remove safety measures in an electricity supply environment*; Unit 12296, *Apply earths to and remove earths from electrical conductors, plant and equipment,* or demonstrate equivalent knowledge and skills, before being assessed against this unit standard.

Outcomes and performance criteria

Outcome 1

Prepare to locate faults in power cables.

Performance criteria

1.1 The relevant cable specifications and standards, cable route data, history, and characteristics are identified and interpreted for planning cable fault investigation.

Range may include but are not limited to – cable ageing effects, test voltage derating velocity of propagation, insulation, screened, armoured, burial status drawings, network diagrams, maker's installations, cable age and/or service history.

1.2 The known details of the fault are researched and interpreted.

Range tripping data, relay operations, loss of supply time and date, public reports, voltage loading at time of fault.

1.3 Range of cable fault test procedures are identified and selected that meet the nature of the cable fault.

Range may include but are not limited to – TDR, differential TDR radar, digital arc reflection, differential digital arc reflection, current impulse test (Thumper test), differential current impulse, decay, differential decay, POPIE, Murray loop test, radio detection, Varley loop test, capacitance inductance test;
identification and selection of five procedures from the list of recognised power cable fault test procedures is required.

1.4 The fault cable and/or power circuit is removed from service, and the requested 'access to test' permit or approved equivalent is obtained.

Outcome 2

Set up test equipment to locate faults in power cables.

Performance criteria

2.1 The appropriate test equipment is assembled and checked for calibration status.

Range may include but is not limited to the calibration certificates for test equipment being current and valid for – AF signals, bridges, pulse echo techniques, capacitors, seismophone, POPIE.

2.2 Any hazards associated with the testing are identified and safety measures are applied.

Range may include but are not limited to – environmental, traffic, chemical, fuel gas, warning notices, water or gas flooding, test voltages, public barriers.

2.3 The cable fault location test plan is prepared to take into account the range of testing required.

Range may include but is not limited to – the order in which testing will be applied, from where tests are to be applied, communication arrangements and who will be directing the tests.

Outcome 3

Conduct fault location tests on power cables.

Performance criteria

3.1 The cable fault location test plan is carried out following the selected test procedures.

Range may include but is not limited to – internationally recognised standard test methods, client requirements.

3.2 The results of the tests are recorded in accordance with client requirements.

Outcome 4

Interpret test results and complete documentation.

Performance criteria

4.1 The documented test results are interpreted, and the indicated cable fault location is determined.

Range may include but is not limited to – physical location notes, depth, distance.

4.2 The actual fault location and likely cause is documented.

Range may include – reports and test data, within how many metres of the measured position the fault was actually located, relationship between type of fault and possible cause, location and protection relay operations, known events related to the fault.

4.3 Recommendations for correcting the cable fault are provided that meet client requirements.

Range may include but is not limited to – providing recommendations for corrective action, preventative action.

Planned review date	31 December 2025

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	27 April 1998	31 December 2020
Revision	2	11 February 2004	31 December 2020
Review	3	21 November 2008	31 December 2020
Review	4	22 October 2010	31 December 2020
Review	5	24 January 2019	31 December 2020
Review	6	27 February 2020	N/A

Consent and Moderation Requirements (CMR) reference	0120

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

Comments on this unit standard

Please contact Connexis – Infrastructure Industry Training Organisation qualifications@connexis.org.nz if you wish to suggest changes to the content of this unit standard.