



Australian Government

**CPCLOC3004 Locate using
electromagnetic field (EMF) locator and
auxiliary locating equipment**

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Modification History

Release	Comments
1	This unit of competency was first released in CPC Construction, Plumbing and Services Training Package Release 11.0.

Application

This unit describes the skills and knowledge required to use an electromagnetic field (EMF) locator and auxiliary locating equipment, including sondes, trace rods and transponders for underground services.

It applies to those working in operational roles in utility location work. They generally work under supervision and hold some responsibility for the use of an EMF locator and auxiliary equipment to locate and protect underground services.

Licensing, legislative and certification requirements that apply to this unit can vary between states, territories and utility operators. It is a requirement to check with the relevant body before applying this unit.

Licensing/Regulatory Information

A White Card must be attained when working on a construction site.

Pre-requisite unit(s)

No pre-requisite units

Competency field(s)

Utility Locating

Unit sector(s)

Construction

Elements and Performance Criteria

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>

1. Prepare EMF locator and auxiliary locating equipment.	1.1 Identify and observe work health and safety (WHS) requirements associated with the use of an EMF locator and auxiliary locating equipment. 1.2 Access required personal protective equipment (PPE) and ensure that PPE is in good condition and fit for purpose. 1.3 Check the functionality of the EMF locator and auxiliary locating equipment to ensure they are within manufacturer calibration requirements. 1.4 Determine how to charge/change batteries on the transmitter, receiver and sonde. 1.5 Select and activate different EMF locator modes to ensure functions are activated. 1.6 Test direct connect leads for continuity and conduct an audio test on the induction clamp. 1.7 Test internal transmitter induction with receiver in accordance with manufacturer specifications. 1.8 Test passive modes to ensure that they can be activated on the receiver to find an available signal.
2. Determine electromagnetic locating requirements.	2.1 Identify how an electromagnetic field is created using an EMF locator. 2.2 Determine effects on current of far end earthing. 2.3 Determine the effects different conductive materials have on the EMF signal. 2.4 Determine the limitations of the different methods of applying current to a service. 2.5 Determine the position and orientation of the different antennas in the EMF locator to identify which antennas are used by the different modes. 2.6 Determine an appropriate connection method and an appropriate frequency for initial transmitter setup on each utility. 2.7 Determine current at the transmitter taking into account resistance and voltage for a direct connection.
3. Utilise an EMF locator	3.1 Assess the signal strength at the receiver in an electromagnetic field generated by the transmitter. 3.2 Check for EMF distortion using different antenna modes in accordance with workplace requirements.

	3.3 Identify the current reading on the receiver and monitor it throughout the locate taking into account EMF distortion in accordance with workplace requirements. 3.4 Trace and monitor signal strength, EMF distortion, current and depth along the length of the asset in accordance with workplace requirements. 3.5 Trace signal to a visual and logical end point to confirm identification of service. 3.6 Discuss requirements with relevant person(s) and produce a plan of the services identified at the locate site in accordance with work requirements.
4. Outline the reasons for locating unknown services in worksite area.	4.1 Outline why locating unknown and abandoned services is a crucial part of the locating process. 4.2 Outline passive and active sweep methods using an EMF locator and display those methods in the locate site. 4.3 Outline the limitations of passive and active sweep modes.
5. Use auxiliary locating equipment on a locate site.	5.1 Outline the correct transmitter setup to reliably create a detectable signal on trace rods to the relevant person. 5.2 Identify and observe WHS requirements, including PPE associated with the use of traceable rods, sondes and transponders. 5.3 Test the required auxiliary locating equipment in accordance with manufacturer specifications. 5.4 Test trace rods for correct functionality in accordance with manufacturer specifications. 5.5 Outline how capacitance effect relates to locating trace rods to relevant person and demonstrate two methods to improve or eliminate capacitance. 5.6 Detect a sonde transmitter with a locator receiver and outline how many peak signals are typically transmitted by a sonde transmitter to a relevant person. 5.7 Use a locator receiver to detect the location of a transponder in accordance with manufacturer specifications.
6. Complete documentation.	6.1 Document each service in the plan as required in accordance with workplace procedures. 6.2 Document each detected unknown service and incorporate in the plan and report to relevant person.

Foundation skills

Skill	Description
Numeracy	Calculates tolerances to determine the requirements of the location worksite
Oral communication	Acquires details and reports problems and/or hazards to a supervisor or service and/or utility owner
Reading	Identifies and interprets information from at times complex workplace procedures, documentation, legislation and regulations
Writing	Records information relating to EMF locating results

Range of conditions

N/A

Assessment Requirements for CPCLOC3004 Locate using electromagnetic field (EMF) locator and auxiliary locating equipment

Performance Evidence

The candidate must demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including evidence of the ability to:

- access and interpret calibration documentation and use electromagnetic field (EMF) locating equipment in a locate site using:
 - an electromagnetic field (EMF) locating on two occasions for two sites with different conditions
 - sondes, trace rods and transponders, each one on two occasions for two sites with different conditions.
- During the above, the candidate must:
 - outline two methods of applying voltage via the transmitter to the target which results in a current that creates the electromagnetic field (the signal)
 - describe the relationship between resistance, current and voltage and the effects they can have on one another
 - access plans and identify scope and assets and use plans to identify assets shown in the locate site
 - describe the quality level attainable by the electromagnetic locator for each of the assets shown in the assessment area on utility plans
 - observe work health and safety (WHS) requirements
- use reliable techniques to create a signal on a target utility, incorporating:
 - an appropriate method for applying current to a service
 - appropriate frequency and power output settings used on transmitter
 - appropriate placement of the induction clamp or direct connect leads and earth
- use reliable techniques to detect a signal created by a locator transmitter, incorporating:
 - matching receiver frequency to transmitter output frequency
 - performing an initial sweep around the connection point to determine the signal strength, distortion and current
 - determining the most appropriate method to determine the signal path/s of the most likely target signal and effective method/s as a final check to determine that the generated signal has stayed in the target line and is functioning correctly
 - performing passive and active sweeps to determine unknown services

- implement the requirements, procedures and techniques to use EMF locators and auxiliary equipment, including:
 - communicate to clarify instructions and information
 - complete required documentation including producing two plans that show services in accordance with Australian standards.

Knowledge Evidence

The candidate must be able to demonstrate knowledge to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including knowledge of:

- safety features of personal protective equipment (PPE), and when and how it should be used
- work health and safety (WHS) requirements associated with the use of an EMF locator and auxiliary equipment
- key details of identified utility to be documented including:
 - pipe size
 - material
 - quality level achieved in locate
- processes for planning and organising work activities
- key risks relating to underground utility services when using an EMF locator and auxiliary equipment, including those associated with:
 - traffic
 - confined spaces
 - falls
 - locating near other works in progress
 - manual handling
- reasons why locating unknown and abandoned services is a crucial part of the locating process
- key standards, policies and procedures, legislation and established requirements for identifying, locating and protecting underground services with the use of an EMF locator and auxiliary equipment, including:
 - obtaining and preparing the required information from the appropriate membership organisation
 - damage to services and utilities
- communication processes in utility locating when using an EMF locator and auxiliary equipment, including:
 - pre-field communication with relevant person to test the equipment

- on-site communication to coordinate practices, clarify instructions and observe safety issues
 - reporting and documentation
- methods to look for unknown services:
 - EMF locating
 - other non-metallic technologies
 - ground penetrating radar (GPR)
- key factors affecting work activities, including:
 - types of services, utilities and providers
 - working in a road reserve
 - equipment types, characteristics, technical capabilities and limitations
 - observing equipment and operational requirements to ensure accuracy
- manufacturer specifications for an EMF locator and auxiliary equipment including specifications for:
 - transponders
 - trace rods
 - sondes
- plans that detail:
 - services identified on plans
 - services identified as part of an EMF locate
 - the highest quality level achieved on each individual asset
 - a legend outlining how attributes are labelled and drawn, compass orientation, date and author
- key accessories in auxiliary locating equipment, including:
 - safety barriers
 - clamp extension pole
 - gas detector
- EMF locating device different functions and modes:
 - low medium and high matching frequency for transmitter (tx) and receiver (rx) peak, null and sonde modes for receiver (rx.)
 - passive modes including power and radio
 - power output levels on transmitter (tx)
- different frequency transponders typically found in conjunction with services
- additional equipment, including:
- marking equipment

- safety equipment.

Assessment Conditions

Assessors are responsible for ensuring that the candidate demonstrating competency has access to:

- Australian Standards
- underground utility standards and calibration documentation
- appropriate documents, equipment and personal protective equipment (PPE) currently used in industry
- requirements of workplace policies, procedures and plans.

Mandatory Workplace Requirements

Assessment of performance evidence may be in a workplace setting or an environment that accurately represents a real workplace.

Unit Mapping Information

Previous Code and Title	Equivalence	Comments
	Newly created	This unit has been created to address a skill or task required by industry that is not covered by an existing unit of competency

Links

Companion volumes, including implementation guides, are found on the national training register - <https://training.gov.au/training/details/CPC>.