WAIHANGA ARA RAU
Construction and Infrastructure
Workforce Development Council

# ELECTROTECHNOLOGY INDUSTRIES

## SKILLS FRAMEWORK FOR CONSULTATION

DISCUSSION DOCUMENT | 2025

# CONTENTS

# 1. PURPOSE OF THIS DOCUMENT

This document presents the **Draft Electrotechnology Skills Framework** (Framework) and is intended to support stakeholder engagement and feedback. It outlines early thinking around the skills required across electrotechnology trades and we invite input from stakeholders to help shape these.

# 2. INTRODUCTION TO ELECTROTECHNOLOGY: PHASE 1

Waihanga Ara Rau is working towards a **coherent set of skill standards** that recognise core, transferable, and specialist skills (from new starters to qualified tradespeople and beyond) across the electrotechnology trades.

These standards aim to:

- Ensure consistency across all credentials in the pathway.
- Provide transparency about learner progress and outcomes.
- Clarify what individuals know and can do upon completing electrotechnology qualifications and credentials.

This work also responds to industry feedback and provides an opportunity to improve the qualification pathway in line with emerging technologies and workforce needs.

## PHASE 1: STAKEHOLDER ENGAGEMENT

Phase 1 is an opportunity for industry stakeholders to share their views on the skills within the current suite of qualifications and standards, and to tell us about new and emerging skills required in across the trades, including broader development needs across electrotechnology trades.

### INITIAL SURVEY INSIGHTS

An initial survey was conducted as part of Phase 1. Several key recommendations have emerged, and a **summary report** of this feedback will be available in **June 2025.**

### DRAFT ELECTROTECHNOLOGY SKILLS FRAMEWORK (FRAMEWORK)

The **Framework** outlines a high-level view of the skills identified by industry, drawing from:

- Existing qualifications and standards.
- Feedback from the initial survey.

The Framework identifies skills that are both specific to and shared across electrotechnology trades.

This Framework will inform priorities and development of skill standard development, which can then be grouped to form new or updated qualification/s and/or micro-credentials. The skills or groups of skills may contribute to one or more skill standards.

### TARGETED CONSULTATION HUI

From **Mid-May and through June**, Waihanga Ara Rau are hosting a series of online consultation hui. These hui will:

- Introduce the draft Framework.
- Provide space to wānanga (discuss and reflect).
- Gather feedback from stakeholders and industry groups.

### ELECTROTECHNOLOGY PHASE 1 – PROJECT STEERING GROUP

A Steering Group, of external stakeholder representatives has been established is to provide guidance and oversight for Phase 1 to ensure the work aligns with industry needs and aspirations.

## WE INVITE YOUR FEEDBACK

We welcome feedback from tāngata whai mana (stakeholders) to help shape the continued development of this Framework.

To share your thoughts, ask questions, or arrange a meeting, please contact:

**Emily Reeves**
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# 3. SKILLS FRAMEWORK

The Framework identifies a range of skill categories (Skill Blocks), each comprising a series of skills that reflect increasing levels of responsibility and capability. **Where skills relate to more than one category**, they have been included only in one Skill Block.

Further details related to each Skill Block has been collated in a subsequent document, ***Electrotechnology Skills Framework – Skill Blocks Unpacked***. Information includes learning outcome topics along with examples of indicative learning and assessment information.

## SKILL BLOCKS (CATEGORIES)

| | |
|---|---|
| Health and Safety | Theory |
| Supervision | Energy flow & charge |
| Communication & Planning | Materials |
| EWRB Licencing | Design |
| Tools and equipment | Installation |
| Calculations | Testing |
| Legislation | Renewable energy |
| Other | Integration with premises |

## SKILL PROGRESSIONS

| | |
|---|---|
| New starter | Skills learned early in electrotechnology training (i.e. basic skills and safety measures) |
| Intermediate | Foundational skills and knowledge required to complete "common tasks" to industry standards. |
| Trade competent | Skills that encompass a broad body of underpinning knowledge, and critical thinking to independently complete tasks to industry standards. |
| Specialist | Advanced skills in a specific area of electrotechnology. |

## DEFINITIONS

| | |
|---|---|
| ESI | Electricity Supply Industry - generation, transmission, distribution, and retail of electricity |
| Core electrotechnology | Is essential and common across all electrotechnology trades, regardless of specialisation. |
| Electrical | A technical skill specific to the installation, maintenance, testing, or repair of electrical systems and equipment. |
| Electronic | A technical skill specific to the design, assembly, testing, maintenance, and repair of electronic systems and devices. |
| Communication technology | A technical skill related to the installation, configuration, testing, and maintenance of systems that enable data, voice, and video communication. |
| EWRB Licencing | The skill aligns with EWRB Licencing requirements (Including Teaching Guidelines) |
| New & Emerging | The evolving capabilities required to work with innovative technologies and industry changes. |

## PROVIDING FEEDBACK

We welcome your insights to ensure the framework is accurate, relevant, and future-focused. When reviewing the draft, please consider the following areas:

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### 1. MISSING SKILLS

- Are there any important skills that are not currently included?
- Are there emerging or future-focused skills that should be added?
- Are there industry-specific or niche skills that are relevant but overlooked?

*Example prompt*:
"I noticed that skills related to [e.g., cybersecurity in smart systems] are not included. These are becoming increasingly important in our field."

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### 2. DUPLICATION OR OVERLAP

- Are there any skills that appear to be duplicated or too similar?
- Could some skills be combined or streamlined for clarity?
- Are there repetitive descriptions across different levels or categories?

*Example prompt*:
"Skill X and Skill Y seem to describe the same capability. Could these be merged?"

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### 3. SKILLS RELATED TO OTHER AREAS

- Are there skills listed that might belong in another trade or domain?
- Should any skills be reclassified as core, transferable, or specialist?
- Are there interdisciplinary skills that need clearer placement?

*Example prompt*:
"This skill seems more aligned with mechanical trades than electrotechnology—should it be moved or reframed?"

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### 4. LEVEL APPROPRIATENESS

- Are the skills pitched at the right level (e.g., beginner, intermediate, advanced)?
- Should any skills be moved to a different qualification level?
- Are the descriptors appropriate for the level of responsibility or complexity?

*Example prompt*:
"This skill feels too advanced for new starter—could it be moved to Level intermediate?"

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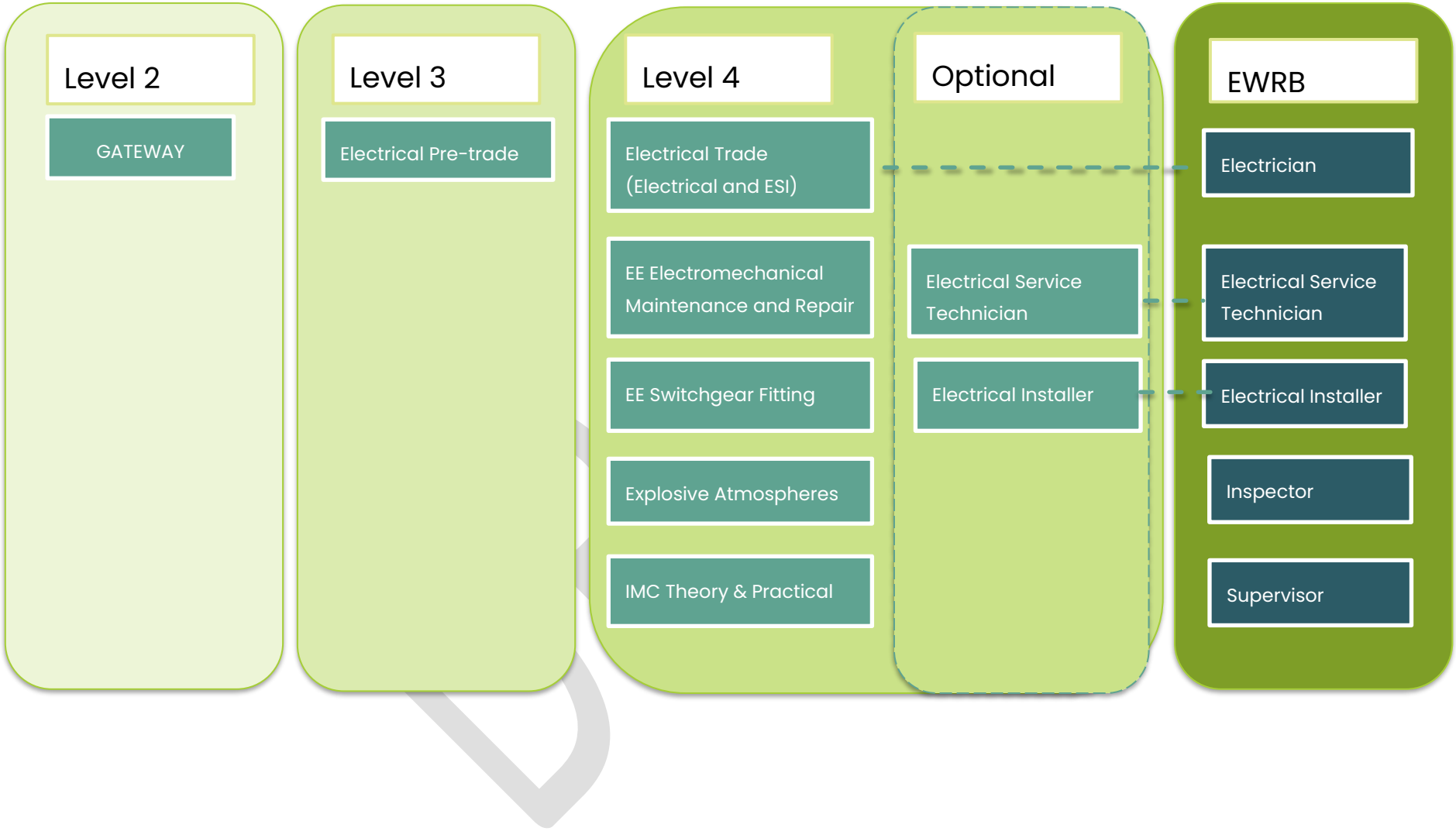
### 5. GENERAL SUGGESTIONS

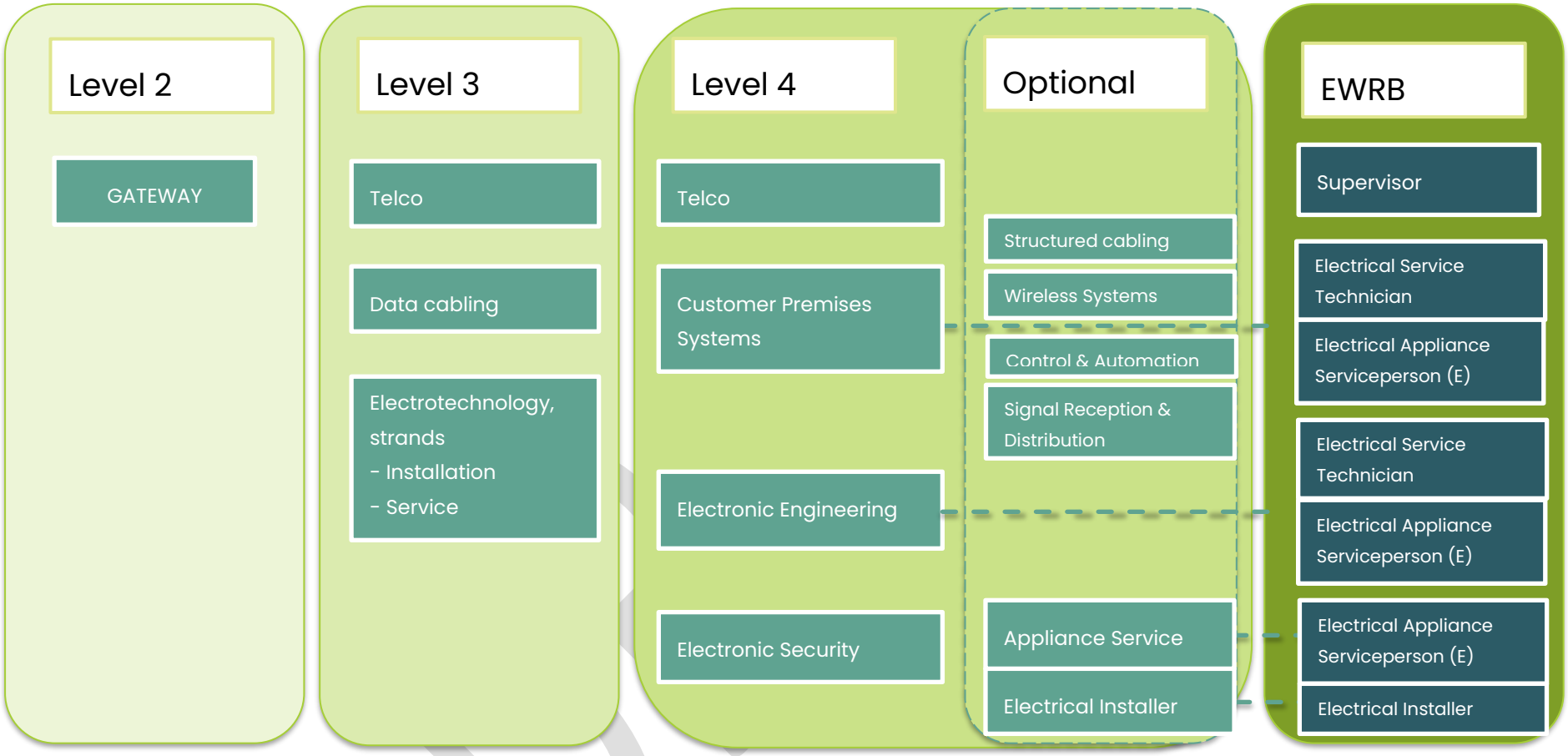
- Are there opportunities to modernise terminology or align with current industry language?

## 4. EXISTING QUALIFICATIONS

The qualifications included in the review include:

- New Zealand Certificate in Electrical Pre-Trade (Level 3) [4316] (**2025**)
- New Zealand Certificate in Electronic Engineering (Level 4) [2981] (**2025**)
- New Zealand Certificate in Electronic Security (Level 4) with optional strands in Electrical Appliance Serviceperson (Endorsed), and Electrical Installer [3818] (**2025**)
- New Zealand Certificate in Telecommunications (Level 4) [3970] (**2025**)
- New Zealand Certificate in Electrical Trade (Level 4) with strands in General Electrical, and Electricity Supply [4204] (**2025)**
- New Zealand Certificate in Electrical Engineering (Electromechanical Maintenance and Repair) (Level 4) with optional strand in Electrical Service Technician (EST) [2565] (**2025**)
- New Zealand Certificate in Telecommunications (Level 3) with strands in Copper Network Maintenance, Optical Fibre Network, and Transmission [3767] (2026)
- New Zealand Certificate in Customer Premises Systems (Level 4) with strands in Structured Cabling, Control and
- Automation, Signal Reception and Distribution, and Wireless Systems [2769] (2026)
- New Zealand Certificate in Electrical Equipment in Explosive Atmospheres (Level 4) [3614] (2027)
- New Zealand Certificate in Electrotechnology (Level 3) with strands in Installation, and Service [2767] (2028)
- New Zealand Certificate in Electrical Engineering (Switchgear Fitting) (Level 4) with optional strand in Electrical Installer [3470] (2028)
- New Zealand Certificate in Data Cabling (Level 3) [5057] (2029)


Level 2
GATEWAY
Level 3
Electrical Pre-trade
Level 4
Electrical Trade (Electrical and ESI)
EE Electromechanical Maintenance and Repair
EE Switchgear Fitting
Explosive Atmospheres
IMC Theory & Practical
Optional
Electrical Service Technician
Electrical Installer
EWRB
Electrician
Electrical Service Technician
Electrical Installer
Inspector
Supervisor


Level 2
GATEWAY
Level 3
Telco
Data cabling
Electrotechnology, strands
- Installation
- Service
Level 4
Telco
Customer Premises Systems
Electronic Engineering
Electronic Security
Optional
Structured cabling
Wireless Systems
Control & Automation
Signal Reception & Distribution
Appliance Service
Electrical Installer
EWRB
Supervisor
Electrical Service Technician
Electrical Appliance Serviceperson (E)
Electrical Service Technician
Electrical Appliance Serviceperson (E)
Electrical Appliance Serviceperson (E)
Electrical Installer

# 5. SKILL BLOCKS

## TABLE 1: LEGISLATION – DRAFT

| TECHNICAL SKILLS | Core Electrotechnology | Electrical | Electronic | Communication technology | EWRB Licensing | New & emerging | Stage |
|---|---|---|---|---|---|---|---|
| Summarise the role of the Electrical Workers Registration Board (EWRB) for electrical workers | ✓ | | | | | | New starter |
| Summarise the role of regulatory bodies for Electronic Security | | | ✓ | | | | New starter |
| Identify the purpose of the legislative framework and governing bodies for electrical work (fundamentals) | | ✓ | | | ✓ | | New starter |
| Outline the health and safety legislative requirements for electrotechnology work | ✓ | | | | | | New starter |
| Use NEMA motor standard to locate information for electrical machine nameplates | ✓ | | | | | | New starter |
| Describe the ESI industry in Aotearoa | | ✓ | | | ✓ | | New starter |
| Describe the telecommunications industry in Aotearoa | | | | ✓ | | | New starter |
| Outline regulatory requirements for telecommunication installations | | | | ✓ | | | New starter |
| Identify standards and codes of practice relevant to electrotechnology work | ✓ | | | | | | New starter |
| Explain the relevance of AS/NZS 3000 for electrical work (fundamentals) | ✓ | | | | ✓ | | New starter |
| Outline regulatory requirement relevant to site conditions for electrotechnology installations or work | ✓ | | | | | | Intermediate |
| Outline the health and safety legislative requirements for electrotechnology work | ✓ | | | | ✓ | | Intermediate |
| Outline regulatory requirements for extra-low and low voltage systems (CPS) | | | | ✓ | | | Intermediate |
| Implement regulatory requirements on complex telecommunication worksites | | | | ✓ | | | Trade competent |
| Implement regulatory requirements for the switchboard industry | | ✓ | | | | | Trade competent |
| Implement regulatory requirements for explosive atmospheres | | ✓ | | | | | Specialist |
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## TABLE 2: HEALTH AND SAFETY – DRAFT

| TECHNICAL SKILLS | Core Electrotechnology | Electrical | Electronic | Communication technology | EWRB Licensing | New & emerging | Stage |
|---|---|---|---|---|---|---|---|
| Identify common hazards and risk for electrical work | ✓ | | | | ✓ | | New starter |
| Implement safeguards for electricity/electrical equipment | ✓ | | | | ✓ | | New starter |
| Identify fundamental safe practices relevant to alternative energy sources | | ✓ | | | ✓ | | New starter |
| Implement safe working practices | ✓ | | | | ✓ | | New starter |
| Implement safeguards for hazardous substances | | ✓ | | | ✓ | | New starter |
| Handle electric machines and equipment in a workshop | ✓ | | | | | | New starter |
| Implement safeguards for arc flash | | ✓ | | | | | New starter |
| Implement safeguards for radio frequency equipment | | | | ✓ | | | Intermediate |
| Implement requirements for safe SELV and PELV installations | | ✓ | | | | | Intermediate |
| Identify and control hazards and risk in a high voltage environment | | ✓ | | | | | Intermediate |
| Implement safeguards for special hazards (including fire hazards) | ✓ | | | | ✓ | | Intermediate |
| Identify transformer safety requirements | ✓ | | | | | | Intermediate |
| Perform a rescue in an electrical environment | ✓ | | | | | | Intermediate |
| Implement safeguards for industrial machinery | | ✓ | | | | | Trade competent |
| Establish new sites for electrical work | | ✓ | | | ✓ | | Trade competent |
| Explain principles of explosion protection for explosive atmospheres | | ✓ | | | ✓ | | Specialist |
| Explain the suitability of explosion-protection techniques | | ✓ | | | ✓ | | Specialist |
| Report integrity of explosion-protected electrical apparatus in explosive atmospheres | | ✓ | | | ✓ | | Specialist |
| Determine the explosion-protection requirements for an explosive atmosphere | | ✓ | | | ✓ | | Specialist |
| Undertake work in an explosive atmosphere | | ✓ | | | ✓ | | Specialist |
| Identify requirements for gas detection equipment in explosive atmospheres | | ✓ | | | ✓ | | Specialist |
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## TABLE 3: SUPERVISION – DRAFT

| TECHNICAL SKILLS | Core Electrotechnology | Electrical | Electronic | Communication technology | EWRB Licensing | New & emerging | Stage |
|---|---|---|---|---|---|---|---|
| Explain responsibilities to supervise prescribed electrical work | ✓ | | | | ✓ | | Trade competent |
| Explain the principles that apply to supervising other workers | ✓ | | | | ✓ | | Trade competent |
| Outline EWRB policies and guidelines relevant to supervision practices | ✓ | | | | ✓ | | Trade competent |
| Supervise non-electrical workers | ✓ | | | | ✓ | | Trade competent |
| Outline risk management practice to maintain safety of others | ✓ | | | | ✓ | | Trade competent |
| Implement site or job management practices to maintain safety of others | ✓ | | | | ✓ | | Trade competent |

## TABLE 4: TOOLS AND EQUIPMENT – DRAFT

| TECHNICAL SKILLS | Core Electrotechnology | Electrical | Electronic | Communication technology | EWRB Licensing | New & emerging | Stage |
|---|---|---|---|---|---|---|---|
| Use hand and power tools for electrotechnology work | ✓ | | | | ✓ | | New starter |
| Use PPE and safeguards for electrical or electronic works | ✓ | | | | ✓ | | New starter |
| Handle, store and transport electronic equipment | | | ✓ | | | | New starter |
| Use oscilloscopes to observe and analyse the waveform of electronic signals | ✓ | | | | | | New starter |
| Use test instruments for electrical or electronic works | ✓ | | | | | | New starter |
| Use specialist tools for electrical installation and repairs | | ✓ | | | | | Intermediate |
| Use and maintain specialised tools for switchboard assembly | | ✓ | | | | | Intermediate |

## TABLE 5: COMMUNICATION AND PLANNING – DRAFT

| TECHNICAL SKILLS | Core Electrotechnology | Electrical | Electronic | Communication technology | EWRB Licensing | New & emerging | Stage |
|---|---|---|---|---|---|---|---|
| Use electrotechnology terminology to communicate work progress | ✓ | | | | | | New starter |
| Respond to the work environment when interacting with others | ✓ | | | | | | New starter |
| Maintain professional relationships with stakeholders and external customers | ✓ | | | | | | Intermediate |
| Interpret and mark-up working drawings for installations and maintenance work | ✓ | | | | ✓ | | Intermediate |
| Respond to the cultural values of others in an electrotechnology environment | ✓ | | | | | ✓ | Intermediate |
| Plan and monitor electrotechnology work | ✓ | | | | ✓ | | Trade competent |
| Demonstrate behaviours expected of a commercially competent electrical worker | | ✓ | | | | | Trade competent |
| Update network records and technical documentation for telecommunications work | | | | ✓ | | | Trade competent |
| Contribute to work practice improvements for the provision and delivery of complex network systems and services | | | | ✓ | | | Trade competent |
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## TABLE 6: CALCULATIONS – DRAFT

| TECHNICAL SKILLS | Core Electrotechnology | Electrical | Electronic engineering | Communication technology | EWRB Licensing | New & emerging | Stage |
|---|---|---|---|---|---|---|---|
| Calculate the total resistance in circuit configurations | ✓ | | | | | | New starter |
| Calculate resistive voltage dividers | ✓ | | | | | | New starter |
| Measure and calculate electrical values using OHM's law | ✓ | | | | ✓ | | New starter |
| Analyse resistive circuits using Kirchhoff's Laws | ✓ | | | | | | New starter |
| Take measurements for DC circuits and interpret the results | ✓ | | | | ✓ | | New starter |
| Interpret AC generation calculations and waveforms in relation to impedance | ✓ | | | | ✓ | | New starter |
| Problem solve using measurements and calculations | ✓ | | | | | | New starter |
| Measure mechanical quantities (motors) | | ✓ | | | | | New starter |
| Use a multimeter | ✓ | | | | | | New starter |
| Calculate real power and apparent power | ✓ | | | | ✓ | | Intermediate |
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## TABLE 7: EWRB LICENSING – DRAFT

| TECHNICAL SKILLS | Core Electrotechnology | Electrical | Electronic | Communication technology | EWRB Licensing | New & emerging | Stage |
|---|---|---|---|---|---|---|---|
| Safety Training (referenced in Health & Safety and Testing) | ✓ | | | | ✓ | | New starter |
| Outline and justify initial response to incidents involving electricity | | ✓ | | | ✓ | | New starter |
| Know theory and practice requirements for registration of electrical workers (stage 1) | | ✓ | | | ✓ | | Intermediate |
| Explain theory and legislation required for electrical appliance servicepersons (endorsed) | ✓ | | | | | | Trade competent |
| Undertake work of an electrical appliance servicepersons | ✓ | | | | ✓ | | Trade competent |
| Explain theory and legislation required for electrical service technicians | ✓ | | | | ✓ | | Trade competent |
| Undertake work of an electrical service technician | ✓ | | | | ✓ | | Trade competent |
| Explain theory and legislation required for electrical installers | | ✓ | ✓ | | ✓ | | Trade competent |
| Know electrical legislation, New Zealand Codes of Practice, and Standards | | ✓ | ✓ | | ✓ | | Trade competent |
| Explain electrical theory for registration of electricians | | ✓ | | | ✓ | | Trade competent |
| Know theory and practice requirements for registration of electrical workers (stage 2) | | ✓ | | | ✓ | | Trade competent |
| Know theory and practice requirements for registration of electrical workers (stage 3) | | ✓ | | | ✓ | | Trade competent |
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## TABLE 8: THEORY – DRAFT

| TECHNICAL SKILLS | Core Electrotechnology | Electrical | Electronic | Communication technology | EWRB Licensing | New & emerging | Stage |
|---|---|---|---|---|---|---|---|
| Identify electrical and electronic components | ✓ | | | | | | New starter |
| Describe basic electronic components | | | ✓ | | | | New starter |
| Explain radio systems for extra-low voltage applications and installations | | | ✓ | ✓ | | | New starter |
| Compare satellite and terrestrial signal reception and distribution | | | ✓ | ✓ | | | New starter |
| Analyse non-complex domestic control and automation systems | ✓ | | | | | | New starter |
| Analyse interconnecting devices through TCP/IP networks | ✓ | | | | | | New starter |
| Analyse electronic security installations to confirm connections and adjustment requirements | | | ✓ | | | | New starter |
| Describe lever systems and mechanical drives for electromechanical engineering | | ✓ | | | | | New starter |
| Explain how the control systems influence the behaviour of appliances | | ✓ | ✓ | | | | Intermediate |
| Explain how the construction and connections in motors influence the operation of appliances | | | ✓ | | | | Intermediate |
| Explain how components interact in the refrigeration process | | | ✓ | | | | Intermediate |
| Analyse fundamental principles of alternative energy generation | | ✓ | | | ✓ | | Intermediate |
| | | | | | | | |
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## TABLE 9: ENERGY FLOW AND CHARGE – DRAFT

| TECHNICAL SKILLS | Core Electrotechnology | Electrical | Electronic | Communication technology | EWRB Licensing | New & emerging | Stage |
|---|---|---|---|---|---|---|---|
| Describe fundamental electrical principles (conductors, insulators, current and resistance) | ✓ | | | | ✓ | | New starter |
| Interpret capacitance calculations and curves to practical applications | ✓ | | | | ✓ | | New starter |
| Explain the atomic structure of semiconductor materials | ✓ | | | | | | New starter |
| Test semiconductor diodes to determine serviceability | | ✓ | | | | | New starter |
| Analyse and confirm RC circuits in practical applications | | ✓ | | | | | New starter |
| Justify measurements and sketches of resistor-diode behaviours | ✓ | | | | | | New starter |
| Apply laws of repulsion and attraction to create a magnetic field | ✓ | | | | | | New starter |
| Compare waveforms of alternators and generators to determine electrical output | ✓ | | | | ✓ | | New starter |
| Sketch atomic structures to explain electrical charges and movement | | ✓ | | | | | New starter |
| Outline the relationship between OSI model and telecommunication networks | | | | ✓ | | | New starter |
| Compare the operation and services of radio network services | | | | ✓ | | | New starter |
| Compare structured cabling networks and data communications | | | | ✓ | | | New starter |
| Explain e.m.f production in relation to operation and safety requirements of batteries | ✓ | | | | | | New starter |
| Explain the effects of electrical characteristics on a telecommunications transmission | | | | ✓ | | | New starter |
| Explain hydraulic and pneumatic energy transfer in common devices | | ✓ | ✓ | | | | New starter |
| Explain circuit reactance and impedance using calculation | | ✓ | | | ✓ | | Intermediate |
| Sketch and analyse three-phase electrical circuits | | ✓ | | | ✓ | | Intermediate |
| Identify the construction, operation and uses of common electromagnets | ✓ | | | | | | Intermediate |
| Identify methods to generate e.m.f and eliminate static electricity. | | | ✓ | ✓ | | | Intermediate |
| Describe behaviours of electromagnetic waves and their applications in wireless communication systems | | | | ✓ | | | Intermediate |
| Describe behaviours of electromagnetic waves and their applications in electromechanical maintenance and repair | | ✓ | | ✓ | | | Intermediate |

| TECHNICAL SKILLS | Core Electrotechnology | Electrical | Electronic | Communication technology | EWRB Licensing | New & emerging | Stage |
|---|---|---|---|---|---|---|---|
| Compare key features of modern communication systems | | | | ✓ | | | Intermediate |
| Explain the characteristics of components in complex networks in telecommunications | | | | ✓ | | | Trade competent |
| | | | | | | | |

## TABLE 10: MATERIALS – DRAFT

| TECHNICAL SKILLS | Core Electrotechnology | Electrical | Electronic engineering | Communication technology | EWRB Licensing | New & emerging | Stage |
|---|---|---|---|---|---|---|---|
| Handle and fix chords and cables (up to and including 0.6/1 kV) | ✓ | | | | ✓ | | New starter |
| Confirm suitability of common electrical fittings and accessories | ✓ | | | | ✓ | | New starter |
| Select common cable support systems | ✓ | | | | ✓ | | Intermediate |
| Select cables for installation in different environments | ✓ | | | | ✓ | | Intermediate |
| Describe the impact of insultation used in electric or electronic equipment | ✓ | | | | | | Intermediate |
| Manage switchgear equipment and switchboards | | ✓ | | | | | Intermediate |
| Confirm suitability of switchboard components | | ✓ | | | | | Intermediate |
| Evaluate new and advanced electrical components and systems | | ✓ | | | | | Trade competent |
| Confirm suitability of cables for explosive atmospheres | | ✓ | | | | | Specialist |
| Confirm suitability of equipment, wiring and accessories for explosive atmospheres | | ✓ | | | | | Specialist |
| | | | | | | | |

## TABLE 11: DESIGN – DRAFT

| TECHNICAL SKILLS | Core Electrotechnology | Electrical | Electronic | Communication technology | EWRB Licensing | New & emerging | Stage |
|---|---|---|---|---|---|---|---|
| Draw diagrams for electronic circuits | ✓ | | | | | | New starter |
| Identify information from electrical diagrams | ✓ | | | | ✓ | | New starter |
| Draw simple electrical circuits | ✓ | | | | ✓ | | New starter |
| Relate the OSI model to the operation of digital network services | | | | ✓ | | | New starter |
| Interpret the design and function of switching circuits | | ✓ | | | | | New starter |
| Interpret electrical diagrams to identify design features of machine winding | | ✓ | | | | | Intermediate |
| Identify the requirements for bushbar design | ✓ | | | | | | Intermediate |
| Plan layout for simple lighting systems | | ✓ | | | ✓ | | Intermediate |
| Implement the fundamental design and layout of circuit protection for electrical installations | ✓ | | | | ✓ | | Intermediate |
| Explain the requirements for the design of distribution board wiring | | ✓ | | | ✓ | | Intermediate |
| Identify requirements for the design and construction of switchboards | | ✓ | | | ✓ | | Intermediate |
| Explain the requirements and uses for alternative earthing systems | | ✓ | | | ✓ | | Intermediate |
| Interpret switchboard drawings and schematics | | ✓ | | | | | Intermediate |
| Identify advantages and disadvantages of coil winding methods (for machine types) | | | ✓ | | | | Trade competent |
| Identify mitigation strategies for factors that can degrade complex network systems and services | | | | ✓ | | | Trade competent |
| Outline the technologies and architectures for complex networks in telecommunications | | | | ✓ | | | Trade competent |
| Interpret specifications and layout diagrams for electrical installation and maintenance in explosive atmospheres | | ✓ | | | | | Specialist |
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## TABLE 12: INSTALLATION – DRAFT

| TECHNICAL SKILLS | Core Electrotechnology | Electrical | Electronic | Communication technology | EWRB Licensing | New & emerging | Stage |
|---|---|---|---|---|---|---|---|
| Manually solder and de-solder | ✓ | | | | | | New starter |
| Create a simple printed circuit | | ✓ | | | | | New starter |
| Construct a simple electronic product | | | ✓ | ✓ | | | New starter |
| Terminate extra-low voltage power cables | ✓ | | | | | | New starter |
| Identify use of DC power in electrotechnology industries | | | ✓ | ✓ | | | New starter |
| Install non-complex cables | ✓ | | | | ✓ | | New starter |
| Conductor jointing/splicing - power | ✓ | | | | | | New starter |
| Install electrical fittings | | ✓ | | | ✓ | | New starter |
| Repair fittings | | ✓ | | | | | New starter |
| Terminate common cords and cables | ✓ | | | | | | New starter |
| Maintain fittings | | ✓ | | | | | Intermediate |
| Install switching circuits and a PLC control programme | ✓ | | | | ✓ | | Intermediate |
| Implement requirements for electrical installations in damp areas | ✓ | | | | ✓ | | Intermediate |
| Modify installed switchboards | | ✓ | | | | | Intermediate |
| Install cabling and cable support systems | ✓ | | | | | | Intermediate |
| Install flush boxes in building structures | | ✓ | | | | | Intermediate |
| Install equipment for basic telecommunication systems | | | | ✓ | | | Intermediate |
| Joint underground telecommunication (copper) cables | | | | ✓ | | | Intermediate |
| Install cables or ducting in the ground | | | | ✓ | | | Intermediate |
| Install telecommunication cables | | | | ✓ | | | Intermediate |
| Splice optical fibre cables | | | | ✓ | | | Intermediate |
| Evaluate suitability of alarm monitoring systems | | | ✓ | ✓ | | | Intermediate |

| TECHNICAL SKILLS | Core Electrotechnology | Electrical | Electronic | Communication technology | EWRB Licensing | New & emerging | Stage |
|---|---|---|---|---|---|---|---|
| Install and maintain telecommunication transmission equipment | | | | ✓ | | | Intermediate |
| Identify the requirements for maintenance and repair of DC motors | | ✓ | | | | | Trade competent |
| Compare the speed, supply current and torque characteristics of single-phase asynchronous induction motors | | ✓ | | | | | Trade competent |
| Identify construction and operating principles of special AC motors | | ✓ | | | | | Trade competent |
| Install a complete electrical installation | | ✓ | | | ✓ | | Trade competent |
| Check, repair and maintain electrical installations | | ✓ | | | | | Trade competent |
| Install an electrical switchboard | | ✓ | | | ✓ | | Trade competent |
| Install switchboard automation and control systems | | ✓ | | | | | Trade competent |
| Install fixings in switchgear assembly | | ✓ | | | | | Trade competent |
| Assemble switchboards | | ✓ | | | | | Trade competent |
| Fabricate and install bushbars in switchboards | | ✓ | | | | | Trade competent |
| Install electrical distribution boards | | ✓ | | ✓ | ✓ | | Trade competent |
| Install wireless systems and fittings | | | | ✓ | | | Trade competent |
| Install structured cables for complex network systems and services | | ✓ | | | | | Trade competent |
| Install earthing systems, bonding, shrouding and access control for switchboards | | ✓ | | | | | Trade competent |
| Install and terminate cables and wires in switchboards | | ✓ | | | | | Trade competent |
| Terminate cables in medium to large environments | | ✓ | | | ✓ | | Trade competent |
| Connect enterprise network equipment and field devices | | | | ✓ | | | Trade competent |
| Joint (complex?) telecommunication network cables | | | | ✓ | | | Trade competent |
| Cutover telecommunications cable systems | | | | ✓ | | | Trade competent |
| Install and maintain (complex?) telecommunication network cables | | | | ✓ | | | Trade competent |
| Confirm requirements for installation of complex network systems and services | | | | ✓ | | | Trade competent |
| Complete routine maintenance and restore faults in complex network systems | | | | ✓ | | | Trade competent |
| Install and configure complex network systems and services | | | | ✓ | | | Trade competent |

| TECHNICAL SKILLS | Core Electrotechnology | Electrical | Electronic | Communication technology | EWRB Licensing | New & emerging | Stage |
|---|---|---|---|---|---|---|---|
| Install and secure data cabinets and open racks | | | | ✓ | | | Trade competent |
| Prepare electric machines for rewinding | | ✓ | | | | | Trade competent |
| Rewind electric machines | | ✓ | | | | | Trade competent |
| Reassemble electric machines | | ✓ | | | | | Trade competent |
| Install electric motors and a variable frequency drive | | ✓ | | | ✓ | | Trade competent |
| Overhaul a.c. rotating machines and control equipment | | ✓ | | | | | Trade competent |
| Prepare for electrical installation and maintenance in explosive atmospheres | | ✓ | | | | | Specialist |
| Inspect and maintain electrical equipment in explosive atmospheres | | ✓ | | | | | Specialist |
| Terminate cables in explosive atmospheres | | ✓ | | | | | Specialist |
| Install explosion-protection equipment | | ✓ | | | | | Specialist |
| Maintain electrical equipment for explosive atmospheres | | ✓ | | | | | Specialist |
| Repair breakdowns in explosive atmospheres | | ✓ | | | | | Specialist |
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## TABLE 13: TESTING – DRAFT

| TECHNICAL SKILLS | Core Electrotechnology | Electrical | Electronic | Communication technology | EWRB Licensing | New & emerging | Stage |
|---|---|---|---|---|---|---|---|
| Test low-voltage electrical subcircuits | ✓ | | | | | | New starter |
| Test basic appliances and equipment | ✓ | | | | | | New starter |
| Determine suitability of testing equipment and methods for diagnosing faults in different applications | ✓ | | | | | | New starter |
| Identify basic faults | ✓ | | | | | | New starter |
| Protect circuits using RCDs | ✓ | | | | | | New starter |
| Complete basic commissioning and decommissioning | ✓ | | | | ✓ | | New starter |
| Diagnose and repair basic faults for appliance service and installation | | | ✓ | | | | New starter |
| Commission customer premises systems | | | | ✓ | | | New starter |
| Commission telecommunication systems | | | | ✓ | | | New starter |
| Diagnose and repair basic faults for telecommunication networks | | | | ✓ | | | Intermediate |
| Diagnose and repair faults in telecommunications optical fibre network | | | | ✓ | | | Intermediate |
| Diagnose and repair faults in telecommunications customer copper network | | | | ✓ | | | Intermediate |
| Diagnose and repair routine faults for telecommunication transmission systems and services | | | | ✓ | | | Intermediate |
| Diagnose and repair basic extra-low voltage and low voltage systems | | ✓ | | | | | Intermediate |
| Test and diagnose faults in electrical machine windings | | ✓ | | | | | Intermediate |
| Commission telecommunication transmission technology and services | | | | ✓ | | | Intermediate |
| Test terminated data cables and repair basic faults | | | | ✓ | | | Trade competent |
| Test electric machines to verify performance | | ✓ | | | | | Trade competent |
| Test radio frequency | | | | ✓ | | | Trade competent |
| Test installation of electrical distribution boards | | ✓ | | | | | Trade competent |
| Analyse build and plant energy efficiency | | ✓ | | | | | Trade competent |

| TECHNICAL SKILLS | Core Electrotechnology | Electrical | Electronic | Communication technology | EWRB Licensing | New & emerging | Stage |
|---|---|---|---|---|---|---|---|
| Diagnose and repair wireless systems | | | | ✓ | | | Trade competent |
| Diagnose and repair faults for electrical installations | | ✓ | | | | | Trade competent |
| Test switchboards | | ✓ | | | | | Trade competent |
| Diagnose and repair faults for electrical or electronic goods | | | ✓ | | | | Trade competent |
| Diagnose and repair faults for electric motors | | ✓ | | | | | Trade competent |
| Commission wireless systems | | | | ✓ | | | Trade competent |
| Commission and decommission electrical installations | | ✓ | | | ✓ | | Trade competent |
| Test electrical installations in explosive atmospheres | | ✓ | | | | | Specialist |
| Test parallel generating systems | | ✓ | | | | | Specialist |
| Test installation of explosion-protection apparatus in explosive atmospheres | | ✓ | | | | | Specialist |
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## TABLE 14: RENEWABLE ENERGY – DRAFT

| TECHNICAL SKILLS | Core Electrotechnology | Electrical | Electronic | Communication technology | EWRB Licensing | New & emerging | Stage |
|---|---|---|---|---|---|---|---|
| Test solar installations | | ✓ | | | | | Intermediate |
| Assess site suitability for grid-connected photovoltaic (PV) systems | | ✓ | | | ✓ | | Specialist |
| Create a load vs PV profile for consumers | | ✓ | | | ✓ | | Specialist |
| Select suitable components for a grid-connected photovoltaic (PV) systems | | ✓ | | | ✓ | | Specialist |
| Design a grid-connected PV system | | ✓ | | | ✓ | | Specialist |
| Install a grid-connected PV system | | ✓ | | | ✓ | | Specialist |
| Commission and fault-find grid-connected PV systems | | ✓ | | | ✓ | | Specialist |
| Assess site suitability for grid-connected battery storage systems | | ✓ | | | ✓ | | Specialist |
| Determine grid-connected battery storage technologies for user profiles | | ✓ | | | ✓ | | Specialist |
| Design a grid-connected battery storage system | | ✓ | | | ✓ | | Specialist |
| Install a grid-connected battery storage system | | ✓ | | | ✓ | | Specialist |
| Commission and fault-find grid-connected battery storage systems | | ✓ | | | ✓ | | Specialist |
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## TABLE 15: INTEGRATION WITH PREMISES – DRAFT

| TECHNICAL SKILLS | Core Electrotechnology | Electrical | Electronic | Communication technology | EWRB Licensing | New & emerging | Stage |
|---|---|---|---|---|---|---|---|
| Outline requirements for electrotechnology work on construction and demolition sites | ✓ | | | | ✓ | | New starter |
| Manage impact on environment when undertaking electrotechnology work | ✓ | | | | | | Intermediate |
| Identify cable pathways in relation to building structures and services | ✓ | | | | | | Intermediate |
| Install thermoplastic-sheathed (TPS) cables | ✓ | | | | ✓ | | Intermediate |
| Pre-wire timber-framed buildings with cavities | ✓ | | | | ✓ | | Intermediate |
| Pre-wire a complex structure | | ✓ | | | ✓ | | Trade competent |
| Protect building structures from environmental conditions | ✓ | | | | | | Trade competent |
| Manage the impact of environmental factors when undertaking electrotechnology work | ✓ | | | | | | Trade competent |
| Maintain building structures and premises after electrotechnology works | ✓ | | | | | | Trade competent |
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## TABLE 16: OTHER – DRAFT

| TECHNICAL SKILLS | Core Electrotechnology | Electrical | Electronic | Communication technology | EWRB Licensing | New & emerging | Stage |
|---|---|---|---|---|---|---|---|
| Reduce material use during electrotechnology work | ✓ | | | | | ✓ | New starter |
| Identify the fundamental requirements for working in the electrical trades (yr 1) | | ✓ | | | | | New starter |
| Renewable energy solutions | ✓ | | | | | ✓ | New starter |
| Technology advancements - energy storage systems | ✓ | | | | | ✓ | New starter |
| Use common computer operating and file management systems | ✓ | | | | | ✓ | New starter |
| Identify the intermediate requirements for working in the electrical trades (yr 2) | | ✓ | | | | ✓ | Intermediate |
| Optimise energy production/use for sustainable energy solutions | ✓ | | | | | ✓ | Trade competent |
| Adaptability and continuous learning | ✓ | | | | | ✓ | Trade competent |
| Utilise the integration of iSmart systems to enhance connectivity and efficiency | ✓ | | | | | ✓ | Trade competent |
| Utilise the integration of robotics to enhance processes and precision | ✓ | | | | | ✓ | Trade competent |
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SKILL CLARITY

- Are the skill descriptors clear?
- Are the descriptors appropriate for the level of responsibility or complexity?
- Are there opportunities to modernise terminology or align with current industry language?

# 6. APPENDIX 1: QUALIFICATIONS AND SKILLS

## NEW ZEALAND CERTIFICATE IN ELECTRICAL PRE-TRADE (LEVEL 3) [4316]

| CATEGORY | TECHNICAL SKILLS |
|---|---|
| Health and Safety | Identify common hazards and risk for electrical work |
| | Implement safe working practices |
| | Basic first aid/CPR |
| | First aid/CPR Level 2 |
| Supervision | Recognise responsibilities as a worker under supervision |
| Communication & Planning | Respond to the work environment when interacting with others |
| | Respond to the cultural values of others in an electrotechnology environment |
| | Use electrotechnology terminology to communicate work progress |
| Legislation | Outline the health and safety legislative requirements for electrotechnology work |
| | Explain the relevance of AS/NZS 3000 for electrical work (fundamentals) |
| | Identify the purpose of the legislative framework and governing bodies for electrical work (fundamentals) |
| EWRB Licencing | Explain theory and legislation required for electrical service technicians |
| | Safety Training (referenced in Health & Safety and Testing) |
| Tools and equipment | Use hand and power tools for electrotechnology work |
| | Use PPE and safeguards for electrical or electronic works |
| | Use basic power tools |
| Calculations | Problem solve using measurements and calculations |
| | Measure and calculate electrical values using OHM's law |
| | Take measurements for DC circuits and interpret the results |
| | Interpret AC generation calculations and waveforms in relation to impedance |
| Theory | Use basic protective devices |
| Energy flow & charge | Describe fundamental electrical principles (conductors, insulators, current and resistance) |
| | Measure and calculate electrical values using OHM's law |
| | Take measurements for DC circuits and interpret the results |
| | Identify the construction, operation and uses of common electromagnets |
| | Interpret AC generation calculations and waveforms in relation to impedance |
| Design | Identify information from electrical diagrams |
| Materials | Confirm suitability of common electrical fittings and accessories |
| | Handle and fix chords and cables (up to and including 0.6/1 kV) |
| Installation | Repair fittings |
| | Implement requirements for electrical installations in damp areas |
| | Terminate common cords and cables |
| Testing | Test low-voltage electrical subcircuits |
| | Test basic appliances and equipment |
| | Identify basic faults |
| | Diagnose and repair basic extra-low voltage and low voltage systems |
| | Protect circuits using RCDs |
| | Complete basic commissioning and decommissioning |
| Renewable energy | Test solar installations |
| Integration with premises | Pre-wire timber-framed buildings with cavities |
| | Install thermoplastic-sheathed (TPS) cables |

## NEW ZEALAND CERTIFICATE IN ELECTRICAL TRADE (LEVEL 4) [4204]

WITH STRANDS IN GENERAL ELECTRICAL & ELECTRICITY SUPPLY

| CATEGORY | TECHNICAL SKILLS |
|---|---|
| **Health and Safety** | Identify common hazards and risk for electrical work |
| | Implements requirements for safe SELV and PELV installations |
| | Identify and control hazards and risk in a high voltage environment |
| | Implement safe working practices |
| | Basic first aid/CPR |
| | First aid/CPR – Level 2 |
| | Establish new sites for electrical work |
| | Identify fundamental safe practices relevant to alternative energy sources |
| | Implement safeguards for industrial machinery |
| | Implement safeguards for arc flash |
| **Communication & Planning** | Respond to the work environment when interacting with others |
| | Respond to the cultural values of others in an electrotechnology environment |
| | Use electrotechnology terminology to communicate work progress |
| | Plan and monitor electrotechnology work |
| | Maintain professional relationships with stakeholders and external customers |
| **Legislation** | Describe the ESI industry in Aotearoa |
| | Identify standards and codes of practice relevant to electrotechnology work |
| | Outline regulatory requirements for extra-low and low voltage systems (CPS) |
| | Summarise the role of the Electrical Workers Registration Board (EWRB) for electrical workers |
| | Explain the relevance of AS/NZS 3000 for electrical work (fundamentals) |
| | Identify the purpose of the legislative framework and governing bodies for electrical work (fundamentals) |
| **Calculations** | Calculate real power and apparent power |
| | Measure and calculate electrical values using OHM's law |
| | Analyse resistive circuits using Kirchhoff's Laws |
| | Take measurements for DC circuits and interpret the results |
| | Interpret AC generation calculations and waveforms in relation to impedance |
| | Problem solve using measurements and calculations |
| **Tools and equipment** | Use hand and power tools for electrotechnology work |
| | Use PPE and safeguards for electrical or electronic works |
| | Test instruments |
| | Use specialist tools for electrical installation and repairs |
| | Use basic power tools |
| | Use and maintain specialised tools for switchboard assembly |
| **Theory** | Describe lever systems and mechanical drives for electromechanical engineering |
| | Explain how the control systems influence the behaviour of appliances |
| | Explain how the construction and connections in motors influence the operation of appliances |
| | Explain radio systems for extra-low voltage applications and installations |
| | Compare satellite and terrestrial signal reception and distribution |
| | Analyse non-complex domestic control and automation systems |

| CATEGORY | TECHNICAL SKILLS |
|---|---|
| | Analyse interconnecting devices through TCP/IP networks |
| | Analyse electronic security installations to confirm connections and adjustment requirements |
| | Analyse fundamental principles of alternative energy generation |
| | Prospective short circuit current |
| | Basic protective devices |
| | Advanced protective devices |
| **Energy flow & charge** | Describe fundamental electrical principles (conductors, insulators, current and resistance) |
| | Interpret capacitance calculations and curves to practical applications |
| | Explain the atomic structure of semiconductor materials |
| | Explain circuit reactance and impedance using calculation |
| | Sketch and analyse three-phase electrical circuits |
| | Identify the construction, operation and uses of common electromagnets |
| | Compare waveforms of alternators and generators to determine electrical output |
| **Design** | Identify information from electrical diagrams |
| | Interpret electrical diagrams to identify design features of machine winding |
| | Interpret the design and function of switching circuits |
| | Plan layout for simple lighting systems |
| | Implement the fundamental design and layout of circuit protection for electrical installations |
| | Explain the requirements for the design of distribution board wiring |
| | Identify requirements for the design and construction of switchboards |
| | Explain the requirements and uses for alternative earthing systems |
| **Materials** | Confirm suitability of common electrical fittings and accessories |
| | Handle and fix chords and cables (up to and including 0.6/1 kV) |
| | Select common cable support systems |
| | Select cables for installation in different environments |
| **Installation** | Construct a simple electronic product |
| | Install non-complex cables |
| | Install switching circuits and a PLC control programme |
| | Implement requirements for electrical installations in damp areas |
| | Install a complete electrical installation |
| | Check, repair and maintain electrical installations |
| | Install electrical switchboard |
| | Install electrical distribution boards |
| | Terminate common cords and cables |
| | Create a simple printed circuit |
| | Identify the requirements for maintenance and repair of DC motors |
| **Testing** | Test low-voltage electrical subcircuits |
| | Test basic appliances and equipment |
| | Test electric machines to verify performance |
| | Test installation of electrical distribution boards |
| | Identify basic faults |
| | Diagnose and repair faults for electrical installations |
| | Protect circuits using RCDs |

| CATEGORY | TECHNICAL SKILLS |
|---|---|
| | Complete basic commissioning and decommissioning |
| **Renewable energy** | Test solar installations |
| **Integration with premises** | Pre-wire timber-framed buildings with cavities |
| | Pre-wire a complex structure |
| | Install thermoplastic-sheathed (TPS) cables |

☑ MISSING SKILLS

- Are there any important skills that are not currently included? Particularly relevant to the strands
- Are there emerging or future-focused skills that should be added?
- Are there industry-specific or niche skills that are relevant but overlooked?

## NEW ZEALAND CERTIFICATE IN ELECTROTECHNOLOGY (LEVEL 3) [2767]

WITH STRANDS IN INSTALLATION & SERVICE

| CATEGORY | TECHNICAL SKILLS |
|---|---|
| **Health and Safety** | Identify common hazards and risk for electrical work |
| | Implement safeguards for electricity/electrical equipment |
| | Implement safe working practices |
| | Implement safeguards for special hazards (including fire hazards) |
| | Basic first aid/CPR |
| **EWRB Licencing** | Outline and justify initial response to incidents involving electricity |
| **Communication & Planning** | Maintain professional relationships with stakeholders and external customers |
| **Legislation** | Describe the ESI industry in Aotearoa |
| | Outline regulatory requirements for extra-low and low voltage systems (CPS) |
| **Tools and equipment** | Use hand and power tools for electrotechnology work |
| | Use PPE and safeguards for electrical or electronic works |
| | Test instruments |
| | Handle, store and transport electronic equipment |
| | Use oscilloscopes to observe and analyse the waveform of electronic signals |
| **Theory** | Describe lever systems and mechanical drives for electromechanical engineering |
| | Explain how the control systems influence the behaviour of appliances |
| | Explain how the construction and connections in motors influence the operation of appliances |
| | Explain how components interact in the refrigeration process |
| | Explain radio systems for extra-low voltage applications and installations |
| | Compare satellite and terrestrial signal reception and distribution |
| | Analyse non-complex domestic control and automation systems |
| | Analyse interconnecting devices through TCP/IP networks |
| | Analyse electronic security installations to confirm connections and adjustment requirements |
| **Energy flow & charge** | Describe fundamental electrical principles (conductors, insulators, current and resistance) |
| | Calculate the total resistance in circuit configurations |
| | Measure and calculate electrical values using OHM's law |
| | Analyse resistive circuits using Kirchhoff's Laws |
| | Interpret capacitance calculations and curves to practical applications |
| | Explain the atomic structure of semiconductor materials |
| | Test semiconductor diodes to determine serviceability |

| CATEGORY | TECHNICAL SKILLS |
|---|---|
| | Identify the construction, operation and uses of common electromagnets |
| | Apply laws of repulsion and attraction to create a magnetic field |
| | Explain e.m.f production in relation to operation and safety requirements of batteries |
| | Interpret AC generation calculations and waveforms in relation to impedance |
| | Compare waveforms of alternators and generators to determine electrical output |
| | Compare structured cabling networks and data communications |
| | Explain hydraulic and pneumatic energy transfer in common devices |
| **Installation** | Install cabling and cable support systems |
| | Install customer premises systems |
| **Testing** | Determine suitability of testing equipment and methods for diagnosing faults in different applications |
| | Diagnose and repair basic faults for appliance service and installation |
| | Commission customer premises systems |
| | Diagnose and repair basic extra-low voltage and low voltage systems |
| **Integration with premises** | Protect building structures from environmental conditions |
| | Maintain building structures and premises after electrotechnology works |

☑ MISSING SKILLS

- Are there any important skills that are not currently included? Particularly relevant to the strands
- Are there emerging or future-focused skills that should be added?
- Are there industry-specific or niche skills that are relevant but overlooked?

## NEW ZEALAND CERTIFICATE IN CUSTOMER PREMISES SYSTEMS (LEVEL 4) [2769]

WITH STRANDS IN STRUCTURED CABLING, CONTROL AND AUTOMATION, SIGNAL RECEPTION AND DISTRIBUTION, AND WIRELESS SYSTEMS

| CATEGORY | TECHNICAL SKILLS |
|---|---|
| **Health and Safety** | Identify common hazards and risk for electrical work |
| | Implement safeguards for electricity/electrical equipment |
| | Implement safe working practices |
| | Implement safeguards for special hazards (including fire hazards) |
| | Basic first aid/CPR |
| **Supervision** | Explain responsibilities to supervise prescribed electrical work |
| **Communication & Planning** | Maintain professional relationships with stakeholders and external customers |
| | Plan and monitor electrical work |
| **Legislation** | Describe the ESI industry in Aotearoa |
| | Outline regulatory requirements for extra-low and low voltage systems (CPS) |
| **EWRB Licencing** | Explain theory and legislation required for electrical service technicians |
| | Undertake work of an electrical service technician |
| | Explain theory and legislation required for electrical appliance servicepersons (endorsed) |
| | Undertake work of an electrical appliance servicepersons |
| | Outline and justify initial response to incidents involving electricity |
| **Tools and equipment** | Use hand and power tools for electrotechnology work |
| | Use PPE and safeguards for electrical or electronic works |
| | Test instruments |
| | Use specialist tools for electrical installation and repairs |
| | Use basic power tools |
| | Handle, store and transport electronic equipment |

| CATEGORY | TECHNICAL SKILLS |
|---|---|
| | Use oscilloscopes to observe and analyse the waveform of electronic signals |
| **Theory** | Analyse interconnecting devices through TCP/IP networks |
| **Energy flow & charge** | Describe fundamental electrical principles (conductors, insulators, current and resistance) |
| | Calculate the total resistance in circuit configurations |
| | Measure and calculate electrical values using OHM's law |
| | Analyse resistive circuits using Kirchhoff's Laws |
| | Interpret capacitance calculations and curves to practical applications |
| | Explain the atomic structure of semiconductor materials |
| | Test semiconductor diodes to determine serviceability |
| | Identify the construction, operation and uses of common electromagnets |
| | Apply laws of repulsion and attraction to create a magnetic field |
| | Explain e.m.f production in relation to operation and safety requirements of batteries |
| | Interpret AC generation calculations and waveforms in relation to impedance |
| | Compare waveforms of alternators and generators to determine electrical output |
| | Describe behaviours of electromagnetic waves and their applications in wireless communication systems |
| | Compare key features of modern communication systems |
| **Design** | Draw simple electrical circuits |
| **Installation** | Install cabling and cable support systems |
| | Install customer premises systems |
| **Testing** | Test radio frequency |
| | Diagnose and repair basic faults for appliance service and installation |
| | Diagnose and repair basic extra-low voltage and low voltage systems |
| | Diagnose and repair faults for electrical or electronic goods |
| | Commission customer premises systems |
| **Integration with premises** | Protect building structures from environmental conditions |
| | Maintain building structures and premises after electrotechnology works |

☑ MISSING SKILLS

- Are there any important skills that are not currently included? Particularly relevant to the strands
- Are there emerging or future-focused skills that should be added?
- Are there industry-specific or niche skills that are relevant but overlooked?

## NEW ZEALAND CERTIFICATE IN ELECTRICAL ENGINEERING (LEVEL 4) [2565]

(ELECTROMECHANICAL MAINTENANCE AND REPAIR)

| CATEGORY | TECHNICAL SKILLS |
|---|---|
| Health and Safety | Identify common hazards and risk for electrical work |
| | Implement safeguards for electricity/electrical equipment |
| | Implement safe working practices |
| | Implement safeguards for special hazards (including fire hazards) |
| | Implement safeguards for hazardous substances |
| | Handle electric machines and equipment in a workshop |
| | Implement safeguards for industrial machinery |
| | Basic first aid/CPR |
| Communication & Planning | Maintain professional relationships with stakeholders and external customers |
| | Demonstrate behaviours expected of a commercially competent electrical worker |
| | Use electrotechnology terminology to communicate work progress |
| Legislation | Summarise the role of the Electrical Workers Registration Board (EWRB) for electrical workers |
| | Use NEMA motor standard to locate information for electrical machine nameplates |
| Tools and equipment | Use hand and power tools for electrotechnology work |
| | Test instruments |
| Energy flow & charge | Calculate the total resistance in circuit configurations |
| | Measure and calculate electrical values using OHM's law |
| | Analyse resistive circuits using Kirchhoff's Laws |
| | Interpret capacitance calculations and curves to practical applications |
| | Take measurements for DC circuits and interpret the results |
| | Explain circuit reactance and impedance using calculation |
| | Sketch and analyse three-phase electrical circuits |
| | Identify the construction, operation and uses of common electromagnets |
| | Apply laws of repulsion and attraction to create a magnetic field |
| | Explain e.m.f production in relation to operation and safety requirements of batteries |
| | Identify methods to generate e.m.f and eliminate static electricity. |
| | Interpret AC generation calculations and waveforms in relation to impedance |
| | Compare waveforms of alternators and generators to determine electrical output |
| Design | Identify information from electrical diagrams |
| | Interpret electrical diagrams to identify design features of machine winding |
| | Identify advantages and disadvantages of coil winding methods (for machine types) |
| Materials | Describe the impact of insultation used in electric or electronic equipment |
| Installation | Identify use of DC power in electrotechnology industries |
| | Identify the requirements for maintenance and repair of DC motors |
| | Compare the speed, supply current and torque characteristics of single-phase asynchronous induction motors |
| | Identify construction and operating principles of special AC motors |
| | Prepare electric machines for rewinding |
| | Reassemble electric machines |
| | Overhaul a.c. rotating machines and control equipment |
| Testing | Test low-voltage electrical subcircuits |
| | Test basic appliances and equipment |
| | Test electric machines to verify performance |
| | Test and diagnose faults in electrical machine windings |
| | Diagnose and repair faults for electric motors |
| OPTIONAL STRAND IN ELECTRICAL SERVICE TECHNICIAN | |
| EWRB Licencing | Explain theory and legislation required for electrical service technicians |
| | Undertake work of an electrical service technician |
| Supervision | Explain responsibilities to supervise prescribed electrical work |
| Energy flow & charge | Analyse and confirm RC circuits in practical applications |

## NEW ZEALAND CERTIFICATE IN ELECTRONIC SECURITY (LEVEL 4)

| CATEGORY | TECHNICAL SKILLS |
|---|---|
| Health and Safety | Identify common hazards and risk for electrical work |
| | Implement safeguards for electricity/electrical equipment |
| | Implement safe working practices |
| | Basic first aid/CPR |
| | First aid/CPR - Level 2 |
| Communication & Planning | Maintain professional relationships with stakeholders and external customers |
| Legislation | Describe the ESI industry in Aotearoa |
| | Identify standards and codes of practice relevant to electrotechnology work |
| | Outline the health and safety legislative requirements for electrotechnology work |
| | Summarise the role of regulatory bodies for Electronic Security |
| | Identify the purpose of the legislative framework and governing bodies for electrical work (fundamentals) |
| Calculations | Calculate the total resistance in circuit configurations |
| | Measure and calculate electrical values using OHM's law |
| | Analyse resistive circuits using Kirchhoff's Laws |
| | Interpret AC generation calculations and waveforms in relation to impedance |
| EWRB Licencing | Safety Training (referenced in Health & Safety and Testing) |
| Tools and equipment | Use hand and power tools for electrotechnology work |
| | Test instruments |
| | Use specialist tools for electrical installation and repairs |
| Energy flow & charge | Describe fundamental electrical principles (conductors, insulators, current and resistance) |
| | Interpret capacitance calculations and curves to practical applications |
| | Explain the atomic structure of semiconductor materials |
| | Test semiconductor diodes to determine serviceability |
| | Identify the construction, operation and uses of common electromagnets |
| | Apply laws of repulsion and attraction to create a magnetic field |
| | Explain e.m.f production in relation to operation and safety requirements of batteries |
| | Compare waveforms of alternators and generators to determine electrical output |
| Design | Draw simple electrical circuits |
| Testing | Diagnose and repair basic faults for appliance service and installation |
| | Diagnose and repair faults for electrical or electronic goods |
| | Diagnose and repair basic extra-low voltage and low voltage systems |
| OPTIONAL STRAND IN ELECTRICAL APPLIANCE SERVICEPERSON (ENDORSED) | |
| EWRB Licencing | Explain theory and legislation required for electrical appliance servicepersons (endorsed) |
| | Undertake work of an electrical appliance servicepersons |
| Supervision | Explain responsibilities to supervise prescribed electrical work |
| OPTIONAL STRAND IN ELECTRICAL INSTALLER | |
| EWRB Licencing | Explain theory and legislation required for electrical installers |
| | Know electrical legislation, New Zealand Codes of Practice, and Standards |
| Supervision | Explain responsibilities to supervise prescribed electrical work |

☑ MISSING SKILLS

- Are there any important skills that are not currently included? Particularly relevant to the strands
- Are there emerging or future-focused skills that should be added?
- Are there industry-specific or niche skills that are relevant but overlooked?

## NEW ZEALAND CERTIFICATE IN DATA CABLING (LEVEL 3) [5057]

| CATEGORY | TECHNICAL SKILLS |
|---|---|
| Health and Safety | Identify common hazards and risk for electrical work |
| | Implement safe working practices |
| | Basic first aid/CPR |
| Tools and equipment | Use hand and power tools for electrotechnology work |
| Materials | Select common cable support systems |
| | Select cables for installation in different environments |
| Installation | Install cabling and cable support systems |
| | Install flush boxes in building structures |
| | Terminate common cords and cables |
| | Terminate cables in medium to large environments |
| | Connect enterprise network equipment and field devices |
| | Install and secure data cabinets and open racks |
| Testing | Test terminated data cables and repair basic faults |
| Integration with premises | Identify cable pathways in relation to building structures and services |

## NEW ZEALAND CERTIFICATE IN TELECOMMUNICATIONS (LEVEL 3) [3767]

| CATEGORY | TECHNICAL SKILLS |
|---|---|
| Health and Safety | Identify common hazards and risk for electrical work |
| | Implement safeguards for electricity/electrical equipment |
| | Implement safeguards for radio frequency equipment |
| | Implement safe working practices |
| | Implement safeguards for special hazards (including fire hazards) |
| | Basic first aid/CPR |
| EWRB Licencing | Outline and justify initial response to incidents involving electricity |
| Communication & Planning | Maintain professional relationships with stakeholders and external customers |
| | Use electrotechnology terminology to communicate work progress |
| | Interpret and mark-up working drawings for installations and maintenance work |
| Legislation | Describe the ESI industry in Aotearoa |
| | Describe the telecommunications industry in Aotearoa |
| | Outline regulatory requirements for telecommunication installations |
| | Outline the health and safety legislative requirements for electrotechnology work |
| | Outline regulatory requirements for extra-low and low voltage systems (CPS) |
| Tools and equipment | Use hand and power tools for electrotechnology work |
| | Use PPE and safeguards for electrical or electronic works |
| | Use test instruments for electrical or electronic works |
| | Use specialist tools for electrical installation and repairs |
| Calculations | Calculate the total resistance in circuit configurations |
| | Measure and calculate electrical values using OHM's law |
| | Analyse resistive circuits using Kirchhoff's Laws |
| | Interpret AC generation calculations and waveforms in relation to impedance |
| Theory | Explain radio systems for extra-low voltage applications and installations |
| | Compare satellite and terrestrial signal reception and distribution |
| Energy flow & charge | Describe fundamental electrical principles (conductors, insulators, current and resistance) |
| | Interpret capacitance calculations and curves to practical applications |
| | Explain the atomic structure of semiconductor materials |
| | Test semiconductor diodes to determine serviceability |

| CATEGORY | TECHNICAL SKILLS |
|---|---|
| | Identify the construction, operation and uses of common electromagnets |
| | Apply laws of repulsion and attraction to create a magnetic field |
| | Explain e.m.f production in relation to operation and safety requirements of batteries |
| | Compare waveforms of alternators and generators to determine electrical output |
| | Explain the effects of electrical characteristics on a telecommunications transmission |
| | Outline the relationship between OSI model and telecommunication networks |
| | Compare the operation and services of radio network services |
| **Design** | Relate the OSI model to the operation of digital network services |
| | Outline the operation and service requirements for TCP/IP networks |
| | Plan layout for simple lighting systems |
| **Materials** | Select common cable support systems |
| | Select cables for installation in different environments |
| **Installation** | Terminate extra-low voltage power cables |
| | Install cabling and cable support systems |
| | Terminate common cords and cables |
| | Terminate cables in medium to large environments |
| | Install equipment for basic telecommunication systems |
| | Joint underground telecommunication (copper) cables |
| | Install cables or ducting in the ground |
| | Splice optical fibre cables |
| | Evaluate suitability of alarm monitoring systems |
| | Install and maintain telecommunication transmission equipment |
| **Testing** | Diagnose and repair basic faults for appliance service and installation |
| | Diagnose and repair basic faults for telecommunication networks |
| | Diagnose and repair faults in telecommunications optical fibre network |
| | Diagnose and repair faults in telecommunications customer copper network |
| | Diagnose and repair routine faults for telecommunication transmission systems and services |
| | Diagnose and repair wireless systems |
| | Commission customer premises systems |
| | Commission telecommunication systems |
| | Commission telecommunication transmission technology and services |
| **Integration with premises** | Protect building structures from environmental conditions |
| | Maintain building structures and premises after electrotechnology works |

## NEW ZEALAND CERTIFICATE IN TELECOMMUNICATIONS (LEVEL 4) [3970]

| CATEGORY | TECHNICAL SKILLS |
|---|---|
| **Health and Safety** | Identify common hazards and risk for electrical work |
| | Implement safeguards for electricity/electrical equipment |
| | Implement safe working practices |
| | Implement safeguards for special hazards (including fire hazards) |
| | Basic first aid/CPR |
| **EWRB Licencing** | Outline and justify initial response to incidents involving electricity |
| | Undertake work of an electrical service technician |
| **Communication & Planning** | Maintain professional relationships with stakeholders and external customers |
| | Interpret and mark-up working drawings for installations and maintenance work |
| | Update network records and technical documentation for telecommunications work |
| | Contribute to work practice improvements for the provision and delivery of complex network systems and services |
| | Plan and monitor electrotechnology work |
| | Describe the ESI industry in Aotearoa |

| CATEGORY | TECHNICAL SKILLS |
|---|---|
| **Legislation** | Describe the telecommunications industry in Aotearoa |
| | Outline regulatory requirements for telecommunication installations |
| | Implement regulatory requirements on complex telecommunication worksites |
| | Outline the health and safety legislative requirements for electrotechnology work |
| | Outline regulatory requirements for extra-low and low voltage systems (CPS) |
| **Tools and equipment** | Use hand and power tools for electrotechnology work |
| | Use PPE and safeguards for electrical or electronic works |
| | Use test instruments for electrical or electronic works |
| | Use specialist tools for electrical installation and repairs |
| **Calculations** | Calculate the total resistance in circuit configurations |
| | Measure and calculate electrical values using OHM's law |
| | Analyse resistive circuits using Kirchhoff's Laws |
| | Interpret AC generation calculations and waveforms in relation to impedance |
| **Energy flow & charge** | Describe fundamental electrical principles (conductors, insulators, current and resistance) |
| | Interpret capacitance calculations and curves to practical applications |
| | Explain the atomic structure of semiconductor materials |
| | Test semiconductor diodes to determine serviceability |
| | Explain circuit reactance and impedance using calculation |
| | Justify measurements and sketches of resistor-diode behaviours |
| | Identify the construction, operation and uses of common electromagnets |
| | Apply laws of repulsion and attraction to create a magnetic field |
| | Explain e.m.f production in relation to operation and safety requirements of batteries |
| | Compare waveforms of alternators and generators to determine electrical output |
| | Explain the effects of electrical characteristics on a telecommunications transmission |
| | Outline the relationship between OSI model and telecommunication networks |
| | Compare the operation and services of radio network services |
| | Compare structured cabling networks and data communications |
| **Design** | Relate the OSI model to the operation of digital network services |
| | Outline the operation and service requirements for TCP/IP networks |
| | Identify mitigation strategies for factors that can degrade complex network systems and services |
| | Outline the technologies and architectures for complex networks in telecommunications |
| **Materials** | Select common cable support systems |
| | Select cables for installation in different environments |
| **Installation** | Terminate extra-low voltage power cables |
| | Install cabling and cable support systems |
| | Install structured cables for complex network systems and services |
| | Terminate common cords and cables |
| | Terminate cables in medium to large environments |
| | Connect enterprise network equipment and field devices |
| | Joint underground telecommunication (copper) cables |
| | Joint (complex?) telecommunication network cables |
| | Install cables or ducting in the ground |
| | Splice optical fibre cables |
| | Evaluate suitability of alarm monitoring systems |
| | Install and maintain telecommunication transmission equipment |
| | Cutover telecommunications cable systems |
| | Install and maintain (complex?) telecommunication network cables |
| | Complete routine maintenance and restore faults in complex network systems |
| | Install and configure complex network systems and services |
| | Install and secure data cabinets and open racks |
| **Testing** | Test terminated data cables and repair basic faults |
| | Test radio frequency |

| CATEGORY | TECHNICAL SKILLS |
|---|---|
| | Diagnose and repair basic faults for appliance service and installation |
| | Diagnose and repair basic faults for telecommunication networks |
| | Diagnose and repair faults in telecommunications optical fibre network |
| | Diagnose and repair faults in telecommunications customer copper network |
| | Diagnose and repair routine faults for telecommunication transmission systems and services |
| | Diagnose and repair wireless systems |
| | Commission customer premises systems |
| | Commission wireless systems |
| | Commission telecommunication systems |
| | Commission telecommunication transmission technology and services |
| **Integration with premises** | Protect building structures from environmental conditions |
| | Maintain building structures and premises after electrotechnology works |
| | Manage the impact of environmental factors when undertaking electrotechnology work |

## NEW ZEALAND CERTIFICATE IN ELECTRICAL EQUIPMENT IN EXPLOSIVE ATMOSPHERES (LEVEL 4) [3614]

| CATEGORY | TECHNICAL SKILLS |
|---|---|
| **Health and Safety** | Identify common hazards and risk for electrical work |
| | Implement safe working practices |
| | Implement safeguards for industrial machinery |
| | Basic first aid/CPR |
| | First aid/CPR - level 2 |
| | Explain principles of explosion protection for explosive atmospheres |
| | Explain the suitability of explosion-protection techniques |
| | Report integrity of explosion-protected electrical apparatus in explosive atmospheres |
| | Determine the explosion-protection requirements for an explosive atmosphere |
| | Undertake work in an explosive atmosphere |
| | Identify requirements for gas detection equipment in explosive atmospheres |
| **Legislation** | Implement regulatory requirements for explosive atmospheres |
| **EWRB Licencing** | Safety Training (referenced in Health & Safety and Testing) |
| **Tools and equipment** | Use hand and power tools for electrotechnology work |
| **Design** | Interpret specifications and layout diagrams for electrical installation and maintenance in explosive atmospheres |
| **Materials** | Confirm suitability of common electrical fittings and accessories |
| | Confirm suitability of cables for explosive atmospheres |
| | Confirm suitability of equipment, wiring and accessories for explosive atmospheres |
| **Installation** | Prepare for electrical installation and maintenance in explosive atmospheres |
| | Inspect and maintain electrical equipment in explosive atmospheres |
| | Terminate cables in explosive atmospheres |
| | Install explosion-protection equipment |
| | Maintain electrical equipment for explosive atmospheres |
| | Repair breakdowns in explosive atmospheres |
| **Testing** | Test low-voltage electrical subcircuits |
| | Test installation of explosion-protection apparatus in explosive atmospheres |
| | Test electrical installations in explosive atmospheres |

☑ MISSING SKILLS

- Are there any important skills that are not currently included?
- Are there industry-specific or niche skills that are relevant but overlooked?

## NEW ZEALAND CERTIFICATE IN ELECTRICAL ENGINEERING (SWITCHGEAR FITTING) (LEVEL 4) [3470]

| CATEGORY | TECHNICAL SKILLS |
|---|---|
| Health and Safety | Identify common hazards and risk for electrical work |
| | Implement safeguards for SELV and PELV installations |
| | Implement safe working practices |
| | Basic first aid/CPR |
| | First aid/CPR - level 2 |
| | Establish new sites for electrical work |
| Communication & Planning | Respond to the work environment when interacting with others |
| | Respond to the cultural values of others in an electrotechnology environment |
| | Use electrotechnology terminology to communicate work progress |
| | Plan and monitor electrotechnology work |
| Legislation | Describe the ESI industry in Aotearoa |
| | Implement regulatory requirements for the switchboard industry |
| | Explain the relevance of AS/NZS 3000 for electrical work (fundamentals) |
| | Identify the purpose of the legislative framework and governing bodies for electrical work (fundamentals) |
| Calculations | Measure and calculate electrical values using OHM's law |
| | Analyse resistive circuits using Kirchhoff's Laws |
| | Take measurements for DC circuits and interpret the results |
| | Interpret AC generation calculations and waveforms in relation to impedance |
| | Calculate real power and apparent power |
| EWRB Licencing | Safety Training (referenced in Health & Safety and Testing) |
| Tools and equipment | Use hand and power tools for electrotechnology work |
| | Use specialist tools for electrical installation and repairs |
| | Use basic power tools |
| | Use and maintain specialised tools for switchboard assembly |
| Theory | Explain how the control systems influence the behaviour of appliances |
| | prospective short circuit current |
| | protective devices - basic |
| | protective devices - advanced |
| Energy flow & charge | Describe fundamental electrical principles (conductors, insulators, current and resistance) |
| | Interpret capacitance calculations and curves to practical applications |
| | Explain the atomic structure of semiconductor materials |
| | Explain circuit reactance and impedance using calculation |
| | Sketch and analyse three-phase electrical circuits |
| | Identify the construction, operation and uses of common electromagnets |
| | Compare waveforms of alternators and generators to determine electrical output |
| Design | Identify information from electrical diagrams |
| | Interpret electrical diagrams to identify design features of machine winding |
| | Implement the fundamental design and layout of circuit protection for electrical installations |
| | Explain the requirements for the design of distribution board wiring |
| | Identify the requirements for bushbar design |
| | Interpret switchboard drawings and schematics |
| | Identify requirements for the design and construction of switchboards |
| | Explain the requirements and uses for alternative earthing systems |
| Materials | Confirm suitability of common electrical fittings and accessories |
| | Handle and fix chords and cables (up to and including 0.6/1 kV) |
| | Select common cable support systems |
| | Manage switchgear equipment and switchboards |
| | Confirm suitability of switchboard components |

| CATEGORY | TECHNICAL SKILLS |
|---|---|
| **Installation** | Construct a simple electronic product |
| | Install non-complex cables |
| | Implement requirements for electrical installations in damp areas |
| | Install electrical switchboard |
| | Install switchboard automation and control systems |
| | Install fixings in switchgear assembly |
| | Assemble switchboards |
| | Fabricate and install bushbars in switchboards |
| | Install electrical distribution boards |
| | Install earthing systems, bonding, shrouding and access control for switchboards |
| | Install and terminate cables and wires in switchboards |
| **Testing** | Test low-voltage electrical subcircuits |
| | Test installation of electrical distribution boards |
| | Identify basic faults in electrical circuits |
| | Diagnose and repair faults for electrical installations |
| | Test switchboards |
| | motors - basic |
| | Protect circuits using RCDs |
| | Complete basic commissioning and decommissioning |
| | Commission and decommission electrical installations |
| OPTIONAL STRAND IN ELECTRICAL INSTALLER | |
| **Supervision** | Explain responsibilities to supervise prescribed electrical work |
| **EWRB Licencing** | Know electrical legislation, New Zealand Codes of Practice, and Standards |
| | Explain electrical theory for registration of electricians |
| | Know theory and practice requirements for registration of electrical workers (stage 1) |
| | Know theory and practice requirements for registration of electrical workers (stage 2) |
| | Know theory and practice requirements for registration of electrical workers (stage 3) |
| **Health and Safety** | Modify installed switchboards |

☑ MISSING SKILLS

- Are there any important skills that are not currently included? Particularly relevant to the strands
- Are there emerging or future-focused skills that should be added?
- Are there industry-specific or niche skills that are relevant but overlooked?

## RAIL SIGNALLING

| CATEGORY | TECHNICAL SKILLS |
|---|---|
| Health and Safety | Identify common hazards and risk for electrical work |
| | Implement safeguards for electricity/electrical equipment |
| | Identify and control hazards and risk in a high voltage environment |
| | Implement safe working practices |
| | Basic first aid/CPR |
| | First aid/CPR - Level 2 |
| Communication & Planning | Maintain professional relationships with stakeholders and external customers |
| Tools and equipment | Use hand and power tools for electrotechnology work |
| | Use test instruments for electrical or electronic works |
| | Use specialist tools for electrical installation and repairs |
| Energy flow & charge | Network infrastructure |
| | Compare structured cabling networks and data communications |
| Design | Identify information from electrical diagrams |
| Materials | Confirm suitability of common electrical fittings and accessories |
| | Select common cable support systems |
| Installation | Check, repair and maintain electrical installations |
| | Install cabling and cable support systems |
| | Install electric motors and a variable frequency drive |
| Testing | Test low-voltage electrical subcircuits |
| | Test basic appliances and equipment |
| | Analyse build and plant energy efficiency |
| | Identify basic faults in electrical circuits |
| | Diagnose and repair faults for electric motors |
| | Complete basic commissioning and decommissioning |

☑ MISSING SKILLS

- Are there any important skills that are not currently included?
- Are there emerging or future-focused skills that should be added?
- Are there industry-specific or niche skills that are relevant but overlooked?