

INDUSTRIAL ELECTRICIAN

Credential Issued:

ITA Certificate of Trade Qualification (Industrial Electrician)
Inter-Provincial Red Seal Endorsement (Industrial Electrician)
(Persons completing a formal apprenticeship also receive a Certificate of Apprenticeship)

Occupational Description:

“Industrial Electrician” means a person who inspects, installs, tests, troubleshoots, repairs, and services industrial electrical equipment and associated electrical and electronic controls. Service includes calibration and preventive/predictive maintenance. Industrial electricians are employed by maintenance departments of plants, mines, smelters, oil and gas rigs as well as platforms, mills, shipyards, factories and other industrial establishments. Some are employed by electrical contractors.

Program Duration & Structure:

The program may be delivered in a variety of formats combining in-school and work-based training, all designed to meet the competency standards and profile defined by the industry, and will generally take 4 years (299 credits) to complete.

The program includes:

- In-school: 40 weeks* (approximately 10 weeks per level)
- Work-based: 6,000 hours
*The in-school / technical training requirement is typically met through block release training delivered by an ITA approved training provider. It can also be met through approved alternative training models (e.g. distance education, part-time) and / or level challenge exam where these options are available.

Program Completion Requirements:

- Completion of 6,000 workplace hours:
Sponsor Attestation
- Completion of 161 core theory credits of technical training: (Requirement can be met through challenging a level exam where available)
 - Level 1: Practical assessment and written level examinations
 - Level 2: Practical assessment and written level examinations
 - Level 3: Practical assessment and written level examinations
 - Level 4: Practical assessment and written level examinations
- Completion of 103 core workplace credits
Evaluation by certified assessors
- Completion of 25 Section A advanced credits
Evaluation by certified assessors
- Completion of 10 Section B advanced credits
Evaluation by certified assessors
- Inter-Provincial Red Seal Examination

Program Challenge Requirements:

- 9,000 documented hours of directly related work experience required to challenge Inter-Provincial Red Seal examination.

Program Prerequisites:

- Recommended Education - Grade 12 or equivalent education including English 12, Mathematics 12 and Physics 11.

Assessment Methods:

- In-school assessments (practical and written examination)
- Work-based assessments (practical)
- Final Assessment (Inter-Provincial Red Seal written examination)
- Levels 1 and 2 exams available for challenge.

Linkages to Other Credentials:

Theory Modules	Cross Program Credit		
	<ul style="list-style-type: none"> ▪ Construction Electrician: The holder of a BC Certificate of Qualification in Construction Electrician may bridge to Industrial Electrician by completing the following theory and practical (workplace) modules. 		
	IE147-4TC	Demonstrate and apply knowledge of network diagnostic tools	On site
	IE148-4TC	Demonstrate and apply knowledge of communication protocols	On site
	IE152-4TC	Demonstrate knowledge of the installation and maintenance of high voltage circuits	On site
	IE156-4TC	Demonstrate knowledge of installation and maintaining HVAC equipment	On site
	IE158-4TC	Demonstrate knowledge of pumps	On site
	IE160-4TC	Demonstrate knowledge of power generation equipment	On site
	IE164-4TC	Describe co-generation principles and operations	On site
	IE165-4TC	Demonstrate knowledge of portable generator and portable electric welding equipment	On site
	IE168-4TC	Demonstrate knowledge of controls	On site
	IE176-4TC	Demonstrate knowledge of the installation and maintenance of robotic control systems	On site
	IE188-4TC	Demonstrate knowledge of crane control systems	Distance
	IE190-4TC	Demonstrate knowledge of boiler furnace system monitors and controls	Distance
	IE194-4TC	Demonstrate knowledge of installing and terminating fibre optic conductors	Distance
	IE210-4TC	Demonstrate knowledge of electrolytic cell technology and safety considerations as used in mining and smelting	On site
	IE123-3TC	Write technical documents	Distance
	IE124-3TC	Demonstrate knowledge of leading teams	Distance
	IE135-3TC	Demonstrate and apply knowledge of communication buses and PLC interfaces	On site
	IE138-3TC	Demonstrate knowledge of programming language and of installation and maintaining PLC software	On site
	IE219-1TC	Describe principles of pulp and paper technology maintenance and production	Distance
	IE221-1TC	Describe basic operation of mill machinery and processes	Distance
	IE224-1TC	Describe principles of oil and gas processing	Distance
IE229-1TC	Describe principles of mining and smelting	Distance	

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Practical (Workplace) Modules	IE127-3WC	Apply knowledge of analytical troubleshooting techniques
	IE130-3WC	Use phase rotation meter
	IE136-3WC	Install and maintain PLC hardware
	IE137-3WC	Install and maintain PLC networks
	IE151-3WC	Install and maintain AC motors
	IE196-3WC	Use a computerized maintenance management system
	IE119-4WC	Design and draw electrical and electronic drawings including schematics, maintain documentation and produce as-built drawings
	IE155-4WC	Install and maintain motor control, voltage control and power distribution centres
	IE179-4WC	Install and maintain variable frequency drives (VFD)

- Holders of a military certificate in Marine Electrician, MT #331 / 332, and who are QL 5 or higher are eligible to challenge the Industrial Electrician Inter-Provincial Red Seal examination.

Prior Learning Assessment:

An apprentice engaged in the Construction Electrician program who decides instead to pursue the Industrial Electrician trades qualification may apply for PLAR.

Program Standards Documentation:

- National Occupational Analysis (2008) www.red-seal.ca
- Program Outline
- Logbook

Industry Program Standards Mechanism:

Resource Industry Training Organization (RTO) info@rtobc.com

Program Providers:

Institution-based component of the program is delivered by post-secondary institutions see www.educationplanner.bc.ca/apprenticeship.cfm for a list of schools), private training institutions, and secondary schools that have been approved by ITA.

COMPULSORY COMPETENCY STANDARDS:

Note: While it is generally expected that competency standards will be completed in the level they are assigned to; completion and reporting of credit may be delayed due to use of naturally occurring evidence. This does not affect entry into the next level of the qualifications, but any prerequisite competency standards must be completed before assessment of subsequent competency standards.

LEVEL 1

Compulsory Theory Competency Standards delivered and assessed by a training provider Intercessional Delivery		
LEVEL ONE PROVIDES THE FUNDAMENTAL SKILLS AND KNOWLEDGE REQUIRED FOR INDUSTRIAL ELECTICIAN APPRENTICES TO BEGIN WORKING SAFELY.		
Code	Title	Credit
IE101-1TC	Demonstrate knowledge of safe working practices for electrical workers	2
IE107-1TC	Demonstrate knowledge of electrical safety	2
IE112-1TC	Perform electrical math calculations	4
IE120-1TC	Demonstrate knowledge of workplace communications standards	1
IE121-1TC	Demonstrate knowledge of professional behaviour	1
IE219-1TC	Describe principles of pulp and paper technology maintenance and production	1
IE221-1TC	Describe basic operation of mill machinery and processes	1
IE224-1TC	Describe principles of oil and gas processing	2
IE229-1TC	Describe principles of mining and smelting	2
Compulsory Theory Competency Standards delivered and assessed by a training provider		

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Classroom and Lab Delivery		
Code	Title	Credit
IE110-1TC	Demonstrate knowledge of electricity and magnetism	15
IE113-1TC	Describe and access the Canadian Electrical Code and wiring standards	2
IE117-1TC	Demonstrate knowledge of electrical and electronic drawings	3
IE118-1TC	Demonstrate knowledge of manuals and manufacturer specifications	1
IE126-1TC	Demonstrate knowledge of analytical troubleshooting techniques	1
IE128-1TC	Demonstrate and apply knowledge of basic test equipment	3
IE131-1TC	Demonstrate knowledge of installing electrical equipment	2
Compulsory Workplace Competency Standards assessed using the assessment guides in the Workplace Logbook		
Code	Title	Credit
IE102-1WC	Comply with health and safety regulations	2
IE103-1WC	Follow safe working practices in an electrical workplace	2
IE106-1WC	Respond to fire emergencies	1
IE108-1WC	Apply basic knowledge of electrical safety	2
IE114-1WC	Use hand and power tools	4
IE115-1WC	Demonstrate safe and proper use of pneumatic and hydraulic tools	2
IE116-1WC	Demonstrate and apply knowledge of PC hardware and software	4

LEVEL 2

Compulsory Theory Competency Standards delivered and assessed by a training provider Intercessional Delivery LEVEL TWO PROVIDES APPRENTICES WITH MORE IN DEPTH ASSESSMENT OF WORKPLACE ACTIVITIES AND FURTHER DEVELOPMENT OF THEIR UNDERSTANDING OF ELECTRICAL THEORY.		
Code	Title	Credit
IE140-2TC	Demonstrate knowledge of computerized maintenance management systems and electronic log books	2
Compulsory Theory Competency Standards delivered and assessed by a training provider Classroom and Lab Delivery		
Code	Title	Credit
IE133-2TC	Demonstrate knowledge of alternating current (AC) and direct current (DC) theory	7
IE141-2TC	Demonstrate knowledge of the installation and maintenance of low voltage circuits	3
IE145-2TC	Demonstrate knowledge of lighting systems and design	3
Compulsory Workplace Competency Standards assessed using the assessment guides in the Workplace Logbook		
Code	Title	Credit
IE122-2WC	Communicate technical information clearly and check for understanding	2
IE132-2WC	Install electrical equipment	20
IE146-2WC	Install lighting controls and equipment	5

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LEVEL 3

Compulsory Theory Competency Standards delivered and assessed by a training provider Intercessional Delivery		
LEVEL THREE PROVIDES APPRENTICES WITH MORE COMPLEX UNDERSTANDING OF THE RELATIONSHIP BETWEEN ELECTRICAL THEORY AND ITS APPLICATION IN THE WORKPLACE.		
Code	Title	Credit
IE123-3TC	Write technical documents	3
IE124-3TC	Demonstrate knowledge of leading teams	2
Compulsory Theory Competency Standards delivered and assessed by a training provider Classroom and Lab Delivery		
Code	Title	Credit
IE111-3TC	Demonstrate knowledge of electronics	6
IE129-3TC	Demonstrate knowledge of three-phase theory	6
IE134-3TC	Demonstrate and apply knowledge of PLC operation, installation and maintenance	2
IE135-3TC	Demonstrate and apply knowledge of communication buses and PLC interfaces	2
IE138-3TC	Demonstrate knowledge of programming language and of installing and maintaining PLC software	3
IE143-3TC	Demonstrate knowledge of installation and maintenance of transformers	6
IE144-3TC	Calculate power factor correction	4
IE150-3TC	Demonstrate knowledge of AC motors	7
IE192-3TC	Demonstrate knowledge of DC motors	3
IE227-3TC	Demonstrate knowledge of AC motor controls	6
IE228-3TC	Demonstrate knowledge of semiconductor power devices	4
Compulsory Workplace Competency Standards assessed using the assessment guides in the Workplace Logbook		
Code	Title	Credit
IE127-3WC	Apply knowledge of analytical troubleshooting techniques	4
IE130-3WC	Use phase rotation meter	1
IE136-3WC	Install and maintain PLC hardware	7
IE137-3WC	Install and maintain PLC networks	7
IE142-3WC	Install and maintain low voltage circuits	12
IE151-3WC	Install and maintain AC motors	9
IE196-3WC	Use a computerized maintenance management system	3

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LEVEL 4

Compulsory Theory Competency Standards delivered and assessed by a training provider		
Intercessional Delivery		
LEVEL FOUR PROVIDES APPRENTICES WITH OPPORTUNITIES FOR CONSOLIDATING AND PERFECTING THEIR KNOWLEDGE AND SKILLS.		
Code	Title	Credit
IE185-4TC	Demonstrate knowledge of safety and security systems	3
IE188-4TC	Demonstrate knowledge of crane control systems	2
IE190-4TC	Demonstrate knowledge of boiler and furnace system monitors and controls	3
IE194-4TC	Demonstrate knowledge of installing and terminating fibre optic cables	2
Compulsory Theory Competency Standards delivered and assessed by a training provider		
Code	Title	Credit
IE147-4TC	Demonstrate and apply knowledge of network diagnostic tools	2
IE148-4TC	Demonstrate and apply knowledge of communications protocols	2
IE152-4TC	Demonstrate knowledge of the installation and maintenance of high voltage circuits	3
IE156-4TC	Demonstrate knowledge of installing and maintaining HVAC equipment	3
IE158-4TC	Demonstrate knowledge of pumps	2
IE160-4TC	Demonstrate knowledge of power generation equipment	2
IE164-4TC	Describe co-generation principles and operations	2
IE165-4TC	Demonstrate knowledge of portable generator and portable electric welding equipment	1
IE168-4TC	Demonstrate knowledge of control systems	6
IE176-4TC	Demonstrate knowledge of the installation and maintenance of Robotic Control Systems	3
IE178-4TC	Demonstrate knowledge of variable speed drive (VSD) and starting systems	3
IE181-4TC	Demonstrate knowledge of back up power equipment, UPS, battery banks and battery charging systems	3
IE210-4TC	Demonstrate knowledge of electrolytic cell technology and safety considerations as used in mining and smelting	2
IE225-4TC	Demonstrate knowledge of measurement and calibration test equipment	2
IE226-4TC	Design and demonstrate knowledge of motor controls and motor control programs	3
Compulsory Workplace Competency Standards assessed using the assessment guides in the Workplace Logbook		
Code	Title	Credit
IE119-4WC	Design and draw electrical and electronic drawings including schematics, maintain documentation and produce as-built drawings	4
IE155-4WC	Install and maintain motor control, voltage control and power distribution centres	5
IE179-4WC	Install and maintain variable frequency drives (VFD)	7

ADVANCED COMPETENCY STANDARDS

Advanced Competency Standards may be completed at any stage – as long as any prerequisite competency standards are completed first.

Advanced Competency Standards offer choice for differing sectors and workplaces, and are selected in discussion between apprentice and employer.

A minimum of 35 credits are required from advanced competency standards – theory or workplace.

A minimum of 25 credits is required from Section A.

A minimum of 10 credits is required from Section B.

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SECTION A

A MINIMUM OF 25 CREDITS IS REQUIRED FROM SECTION A

Advanced Theory Competency Standards delivered and assessed by a training provider		
Code	Title	Credit
IE207-9TA	Demonstrate knowledge of maintenance of arc and induction furnaces	2
IE214-9TA	Demonstrate knowledge of gas metering installation and maintenance	2
IE216-9TA	Demonstrate knowledge of installation and maintenance of analytical measurement equipment	2
IE222-9TA	Demonstrate knowledge of the principles of scanning and optimization equipment	2
Advanced Workplace Competency Standards assessed using the assessment guides in the Workplace Logbook		
Code	Title	Credit
IE104-9WA	Use safe lifting and rigging techniques	1
IE105-9WA	Follow safe procedures for working in confined spaces	1
IE109-9WA	Use jumpers and forces safely	3
IE125-9WA	Lead teams and manage electrical installation and maintenance projects	3
IE139-9WA	Read and write programming language and install and maintain PLC software	5
IE149-9WA	Install and maintain computer networks	3
IE153-9WA	Install and maintain high voltage circuits	12
IE157-9WA	Install and maintain HVAC equipment	3
IE159-9WA	Install and maintain pumps	2
IE161-9WA	Troubleshoot and maintain power generation prime movers	5
IE166-9WA	Maintain portable generators	3
IE167-9WA	Maintain portable electric welding equipment	3
IE169-9WA	Install and maintain servo and proportional valve control loops	3
IE172-9WA	Install and maintain process control hardware	3
IE174-9WA	Install and maintain hydraulic or pneumatic controls	3
IE182-9WA	Install and maintain power supplies	9
IE183-9WA	Install and maintain a UPS system	4
IE184-9WA	Install and maintain batteries	3
IE186-9WA	Install and maintain detection and alarm systems	9

SECTION B

A MINIMUM OF 10 CREDITS IS REQUIRED FROM SECTION B

Advanced Workplace Competency Standards assessed using the assessment guides in the Workplace Logbook		
Code	Title	Credit
IE162-9WA	Install and maintain power generation controls	9
IE163-9WA	Install and maintain power generator protective relays	9
IE170-9WA	Install and maintain encoders	3
IE171-9WA	Install and maintain numeric controllers	3
IE173-9WA	Install and maintain data and process monitoring systems	3
IE177-9WA	Install and maintain Robotic Control Systems	3
IE180-9WA	Install and maintain DC drive systems	9
IE187-9WA	Install and maintain video monitoring systems	4
IE189-9WA	Maintain crane control systems	4
IE191-9WA	Install and maintain boiler furnace system monitors and controls	6
IE193-9WA	Install and maintain DC electric motors	9
IE195-9WA	Maintain electronic precipitators	5
IE197-9WA	Use powder actuated tools	1
IE198-9WA	Operate personnel lifting devices	1
IE199-9WA	Use liquid-fuel powered tools	1
IE200-9WA	Install and maintain wound rotor drives	7
IE201-9WA	Install and maintain wireless radio controllers	4
IE202-9WA	Maintain portable switch houses	4
IE203-9WA	Demonstrate knowledge of line installation, maintenance, and repair procedures	3
IE204-9WA	Install and maintain wheel motors	9
IE205-9WA	Make-up and repair trailing cable (4160 – 13.8kV) (2300 – 600V)	3
IE206-9WA	Install and maintain a Global Positioning System (GPS)	3
IE208-9WA	Maintain electric arc furnace	3
IE209-9WA	Maintain induction furnace	3
IE211-9WA	Access and comply with mining electrical regulations	2
IE212-9WA	Install and maintain gas detection equipment	4
IE213-9WA	Install and maintain controls for liquid separation and refractionation	4
IE215-9WA	Install and maintain gas metering equipment	4
IE217-9WA	Install and maintain analytical measurement equipment	4
IE218-9WA	Demonstrate and apply knowledge of onshore pipeline regulations	2
IE220-9WA	Maintain recovery boiler control systems	3
IE223-9WA	Install and maintain scanning and optimization equipment	4

IP Exam Competencies: NOA 2008

Occupational Skills 15%
 Wiring and Lighting Systems 15%
 Power Distribution and Generating Systems 16%
 Electrical Equipment 22%
 Emergency and Standby Systems 7%
 Communication Systems 6%
 Process Control Systems 13%
 Building and Environmental Control Systems 6%

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