COMPETENCY STANDARD

FOR

ELECTRICAL MACHINES INSTALLATION AND MAINTENANCE

Level: 2

(Light Engineering Sector)

Competency Standard Code: CS-LE-EMIM-L2-EN-V1

National Skills Development Authority
Prime Minister's Office
Government of the People's Republic of Bangladesh

Copyright

National Skills Development Authority
Prime Minister's Office
Level: 10-11, Biniyog Bhaban,
E-6 / B, Agargaon, Sher-E-Bangla Nagar Dhaka-1207, Bangladesh.
Email: ec@nsda.gov.bd
Website: www.nsda.gov.bd.
National Skills Portal: http:\\skillsportal.gov.bd

This Competency Standard for Occupation is a document for the development of curricula, teaching and learning materials, and assessment tools. It also serves as the document for providing training consistent with the requirements of industry in order to meet the qualification of individuals who graduated through the established standard via competency-based assessment for a relevant job.

This document has been developed by NSDA in association with Light Engineering Sector, industry representatives, academia, related specialist, trainer and related employee.

Public and private institutions may use the information contained in this standard for activities benefitting Bangladesh.

Introduction

The NSDA aims to enhance an individual's employability by certifying completeness with skills. NSDA works to expand the skilling capacity of identified public and private training providers qualitatively and quantitatively. It also aims to establish and operationalize a responsive skills ecosystem and delivery mechanism through a combination of well-defined set of mechanisms and necessary technical supports.

Key priority economic growth sectors identified by the government have been targeted by NSDA to improve current job skills along with existing workforce to ensure required skills to industry standards. Training providers are encouraged and supported to work with industry to address identified skills and knowledge to enable industry growth and increased employment through the provision of market responsive inclusive skills training program. "**Electrical Machines Installation and Maintenance**" is selected as one of the priority occupations of Light Engineering Sector. This standard is developed to adopt a demand driven approach to training with effective inputs from Industry Skills Councils (ISC's), employer associations and employers.

Generally, a competency standard informs curriculum, learning materials, assessment and certification of trainees enrolled in Skills Training. Trainees who successfully pass the assessment will receive a qualification in the Bangladesh National Qualification Framework (BNQF) under Bangladesh National Qualification Framework and will be listed on the NSDA's online portal.

This competency standard is developed to improve skills and knowledge in accordance with the job roles, duties and tasks of the occupation and ensure that the required skills and knowledge are aligned to industry requirements. A series of stakeholder consultations, workshops were held to develop this document.

The document also details the format, sequencing, wording and layout of the Competency Standard for an occupation which is comprised of Units of Competence and its corresponding Elements.

Overview

A competency standard is a written specification of the knowledge, skills and attitudes required for the performance of an occupation, trade or job corresponding to the industry standard of performance required in the workplace.

The purpose of a competency standards is to:

- provide a consistent and reliable set of components for training, recognising and assessing people's skills, and may also have optional support materials
- enable industry recognised qualifications to be awarded through direct assessment of workplace competencies
- encourage the development and delivery of flexible training which suits individual and industry requirements
- encourage learning and assessment in a work-related environment which leads to verifiable workplace outcomes

Competency standards are developed by a working group comprised of representative from NSDA, Key Institutions, ISC, and industry experts to identify the competencies required of an occupation in Light Engineering Sector.

Competency standards describe the skills, knowledge and attitude needed to perform effectively in the workplace. CS acknowledge that people can achieve technical and vocational competency in many ways by emphasizing what the learner can do, not how or where they learned to do it.

With competency standards, training and assessment may be conducted at the workplace or at training institute or any combination of these.

Competency standards consist of a number of units of competency. A unit of competency describes a distinct work activity that would normally be undertaken by one person in accordance with industry standards.

Units of competency are documented in a standard format that comprises of:

- unit title
- nominal duration
- unit code
- unit descriptor
- elements and performance criteria
- variables and range statement
- curricular content guide
- assessment evidence guide

Together, all the parts of a unit of competency:

- describe a work activity
- guide the assessor to determine whether the candidate is competent or not yet competent

The ensuing sections of this document comprise of a description of the relevant occupation, trade or job with all the key components of a unit of competency, including:

- a chart with an overview of all Units of Competency for the relevant occupation, trade or job including the Unit Codes and the Unit of Competency titles and corresponding Elements
- the Competency Standard that includes the Unit of Competency, Unit Descriptor, Elements and Performance Criteria, Range of Variables, Curricular Content Guide and Assessment Evidence Guide.

Competency Standards for National Skill Certificate, Level-1 in
Electrical Machines Installation and Maintenance in Light Engineering Sector

Level Descriptors of BNQF (BNQF 1-6)

Level & Job classification	Knowledge Domain	Skills Domain	Responsibility Domain
6-Mid-Level Manager/ Sub Assistant Engineer	Comprehensive actual and theoretical knowledge within a specific work or study area with an awareness of the validity and limits of that knowledge, able to analyse, compare, relate and evaluate.	Specialised and wider range of cognitive and practical skills required to provide leadership in the development of creative solutions to defined problems. Communicate professional issues and solutions to the team and to external partners/users.	Work under broad guidance and self-motivation to execute strategic and operational plan/s. Lead lower-level management. Diagnose and resolve problems within and among work groups.
5-Supervisor	Broad knowledge of the underlying, concepts, principles, and processes in a specific work or study area, able to scrutinize and break information into parts by identifying motives or causes.	Broad range of cognitive and practical skills required to generate solutions to specific problems in one or more work or study areas. Communicate practice-related problems and possible solutions to external partners.	Work under guidance of management and self-direction to resolve specific issues. Lead and take responsibility for the work and actions of group/team members. Bridge between management.
4-Highly Skilled Worker	Broader knowledge of the underlying, concepts, principles, and processes in a specific work or study area, able to solve problems to new situations by comparing and applying acquired knowledge.	A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying the full range of methods, tools, materials and information. Communicate using technical terminology and IT technology with partners and users as per workplace requirements.	Work under minimal supervision in specific contexts in response to workplace requirements. Resolve technical issues in response to workplace requirements and lead/guide a team/ group.
3-Skilled Worker	Moderately broad knowledge in a specific work or study area, able to perceive ideas and abstract from drawing and design according to workplace requirements.	Basic cognitive and practical skills required to use relevant information in order to carry out tasks and to solve routine problems using simple rules and tools. Communicate with his team and limited external partners upholding the values, nature and culture of the workplace	Work or study under supervision with considerable autonomy. Participate in teams and responsible for group coordination.
2-Semi Skilled Worker	Basic understanding of underpinning knowledge in a specific work or study area, able to interpret and apply common occupational terms and instructions.	Skills required to carry out simple tasks, communicate with his team in the workplace presenting and discussing results of his work with required clarity.	Work or study under supervision in a structured context with limited scope of manipulation
1 –Basic Skilled Worker	Elementary understanding of ability to interpret the underpinning knowledge in a specific study area, able to interpret common occupational terms and instructions.	Specific Basic skills required to carry out simple tasks. Interpret occupational terms and present the results of own work within guided work environment/ under supervision.	Work under direct supervision in a structured context with limited range of responsibilities.

List of Abbreviations

CS	Competency Standard
ISC	Industry Skills Council
NSDA	National Skills Development Authority
NSQF	National Skills Qualifications Framework
OSH	Occupational Safety and Health
PPE	Personal Protective Equipment's
SCVC	Standards and Curriculum Validation Committee
STP	Skills Training Provider
SOP	Standard Operating Procedure
UoC	Unit of Competency
MPS	Modular Production System

Approved by

34th Authority Meeting of NSDA

Held on 27th June 2024

Table of Contents

Competency Standards for National Skill Certificate, Level-2 in
Electrical Machines Installation and Maintenance in Light Engineering Sector

Course Structure

SL No	Unit code and Title		UOC Level	Nominal (hours)
Generic Units of Competencies				
1.	GU-01-L2-V1	Perform computations using basic mathematical concepts	2	15
2.	GU-02-L2-V1	Apply Occupational Health and Safety (OHS) Procedure in the Workplace	2	15
Sub Total				**30**
Sector Specific Units of Competencies				
3.	SU-LE-01-L2-V1	Interpret Manuals, Sketches and Drawings	2	15
4.	SU-LE-02-L2-V1	Use Hand and Power Tools for Electrical Works	2	15
Sub Total				**30**
Occupation Specific Units of Competencies				
5.	OU-EMIM-01-L2-V1	Apply Basic Concepts of Electricity	2	50
6.	OU-EMIM-02-L2-V1	Perform Installation of Motor	2	50
7.	OU- EMIM -03-L2-V1	Install Basic Control system of Motor	2	90
8.	OU- EMIM -04-L2-V1	Perform Basic Troubleshoot and Maintenance of Motor	2	50
9.	OU- EMIM -05-L2-V1	Perform Installation and Maintenance of Transformer	2	30
10.	OU- EMIM -06-L2-V1	Perform Connection of Generator	2	30
Sub Total				**300**
Total Duration				**360**

Units & Elements at Glance

Generic Competencies

Code	Unit of competency	Elements of competency	Duration (hours)
GU-01-L2-V1	Perform Computations Using Basic Mathematical Concept	1. Identify calculation requirements in the workplace 2. Select appropriate mathematical methods for the calculation 3. Use tool/instrument to perform calculations	15
GU-02-L2-V1	Apply Occupational Health and Safety (OHS) Procedure in The Workplace	1. Identify OSH policies and procedures 2. Follow OSH procedure 3. Report hazards and risks 4. Respond to emergencies 4. Maintain personal well-being	15
		Total hours	**30**

Sector specific competencies

Code	Unit of competency	Elements of competency	Duration (hours)
SU-LE-01-L2-V1	Interpret Manuals, Sketches and Drawings	1. Interpret information and specifications 2. Interpret workplace documents 3. Read and interpret sketches and drawings 4. Practice professional ethics at workplace	15
SU-LE-02-L2-V1	Use Hand and Power Tools for Electrical Works	1. Inspect hand tools and power tools for usability Prepare Electrical Circuit 2. Use hand tools 3. Operate power tools 4. Clean and maintain hand tools and power tools after use	15
		Total hours	**30**

Occupation specific competencies

Code	Unit of competency	Elements of competency	Duration (hours)
OU-EMIM-01-L2-V1	Apply basic concepts of electricity	1. Practice OSH. 2. Apply electrical concept and working principles. 3. Select cables and wires 4. Perform connection of electrical circuits	50
OU-EMIM-02-L2-V1	Perform Installation of Motor	1. List and Identify of motor type. 2. Prepare tools, equipment & materials to install the motor. 3. Perform Installation of motor. 4. Perform power and control connection of motor. 5. Perform test and operation of motor.	50
OU-EMIM-03-L2-V1	Install Basic Control System of Motor	1. Select the motor for control. **2.** Identify the controlling method 3. Prepare tools, equipment & materials. 4. Perform power and control connection for motor. **5.** Perform test and operation of motor.	90
OU-EMIM-04-L2-V1	Perform Basic Troubleshoot and Maintenance of Motor	**1.** Identify Motor coil. 2. Perform Insulation Resistance Test 3. Perform Continuity Test 4. Perform Earth/Leakage Test 5. Perform Noise Test 6. Perform Phase Sequence Test **7.** Perform repair work. **8.** Perform schedule maintenance work.	50
OU-EMIM-05-L2-V1	Perform Installation and Maintenance of Transformer	1. List and Identify of Transformer type. 2. Prepare tools, equipment & materials to install the transformer 3. Perform Installation of Transformer. 4. Perform connection of transformer 5. Perform test and operation of transformer	30
OU-EMIM-06-L2-V1	Perform Connection of Generator	1. Identify type of output of generator 2. Prepare tools, equipment & material to perform generator connection. 3. Perform connection of generator. 4. Perform Test and operation of generator.	30
		Total Hours	**300**

Generic Units of Competencies

Unit Code and Title	**GU-01-L2-V1: Perform Computations Using Basic Mathematical Concepts**
Nominal Hours	**15 Hours**
Unit Descriptor	This unit of competency requires the knowledge, skills and attitude to perform computations using basic mathematical concepts in the workplace. It specifically includes the tasks of identifying calculation requirements in the workplace, selecting appropriate mathematical method/concept for the calculation and using appropriate instruments tools to perform calculation.
Elements of Competency	**Performance Criteria** **Bold & Underlined** terms are elaborated in the Range of Variables Training Components
1. Identify calculation requirements in the workplace	1.1 Job requirements are identified 1.2 **Measurements** are selected in accordance with job requirement 1.3 Calculation requirements are identified from **workplace information**
2. Select appropriate mathematical methods for the calculation.	2.1 Mathematical methods are identified 2.2 **Appropriate method** is selected to carry out the calculation r equirements 2.3 Tolerance and clearance limits are identified and adjusted according to the job requirements
3. Use tool/instrument to perform calculations	3.1 Work instructions are confirmed and applied to the job in hand 3.2 Materials to be measured are identified as per job specification 3.3 Appropriate **tool/ instrument** is selected based on materials to be measured
Range of Variables	
Variable	**Range** (may include but not limited to)
1. Measurements	1.1 Length 1.2 Width 1.3 Weight 1.4 Tolerance
2. workplace information	2.1 Job Order 2.2 Design 2.3 Working drawing 2.4 Verbal instructions 2.5 Written Instruction
3. Appropriate method	3.1 Addition 3.2 Subtraction 3.3 Division 3.4 Multiplication 3.5 Conversion

	3.6 Percentage and ratio calculation
4. Tool/ Instrument	4.1 Calculator 4.2 Scale 4.3 Measuring tape 4.4 Marker
Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent and recent and meet the requirements of the current version of the Unit of Competency.	
1. Critical Aspects of Competency	Assessment required evidence that the candidate: 1.1 identified calculation requirements from workplace information 1.2 selected appropriate method to carry out the calculation requirements 1.3 selected measurements 1.4 selected appropriate methods 1.5 used tool/instrument 1.6 added numbers 1.7 subtracted numbers 1.8 multiplied numbers. 1.9 divided numbers. 1.10 completed calculations using appropriate tools/instruments
2. Underpinning Knowledge	2.1. Numerical concept 2.2. Basic mathematical methods such as addition, subtraction, multiplication and division and percentage. 2.3. Mathematical language, symbols and terminology. 2.4. Measuring units
3. Underpinning Skills	3.1 Interpret numerical concept 3.2 Interpret mathematical methods such as addition, subtraction, multiplication and division and percentage. 3.3 Interpret mathematical language, symbols and terminology. 3.4 Interpret measuring units
4. Underpinning Attitudes	4.1. Commitment to occupational health and safety 4.2. Environmental concerns 4.3. Eagerness to learn 4.4. Tidiness and timeliness 4.5. Respect for rights of peers and seniors in workplace 4.6. Communication with peers and seniors in workplace
5. Resource Implications	5.1. Work place Procedure 5.2. Materials relevant to the proposed activity 5.3. All tools, equipment, material and documentation required. 5.4. Relevant specifications or work instructions
6. Methods of Assessment	6.1. Written Test 6.2. Demonstration

	6.3. Oral Questioning 6.4. Portfolio
7. Context of Assessment	7.1. Competency assessment must be done in a NSDA accredited assessment center 7.2. Assessment should be done by an NSDA certified/ nominated assessor

Accreditation Requirements

Training Providers must be accredited by National Skills Development Authority (NSDA), the National Quality Assurance Body, or a body with delegated authority for quality assurance to conduct training and assessment against this unit of competency for credit towards the award of qualification under BNQF. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA.

Unit Code and Title	**GU-02-L2-V1: Apply Occupational Health and Safety (OHS) Procedure in the Workplace**
Unit Descriptor	This unit covers the knowledge, skills and attitudes required to apply occupational health and safety (OHS) procedure in the workplace. It specifically includes identifying OHS policies and procedures, following OHS procedure, reporting hazards and risks, responding to emergencies, and maintaining personal well-being.
Nominal Hours	**15 Hours**
Elements of Competency	**Performance Criteria** **Bold & Underlined** terms are elaborated in the Range of Variables
1. Identify OSH policies and procedures	1.1. **OHS policies** and **safe operating procedures** are accessed and stated 1.2. **Safety signs and symbols** are identified and followed 1.3. Emergency response, evacuation procedures and other contingency measures are determined according to workplace requirements
2. Follow OSH procedure	2.1 **Personal protective equipment (PPE)** is selected and collected as required 2.2 Personal protective equipment (PPE) is correctly used in accordance with organization OHS procedures and practices 2.3 A clear and tidy workplace is maintained as per workplace standard 2.4 PPE is maintained to keep them operational and compliant with OHS regulations
3. Report hazards and risks.	3.1 **Hazards** and risks are identified, assessed and controlled 3.2 Incidents arising from hazards and risks are reported to designated authority
4. Respond to emergencies	4.1 Alarms and warning devices are responded 4.2 Workplace **emergency procedures** are followed 4.3 **Contingency measures** during workplace accidents, fire and other emergencies are recognized and followed in accordance with organization procedures 4.4 Frist aid procedures is applied during emergency situations
5. Maintain personal well-being	5.1 OHS policies and procedures are adhered to

	5.2 OHS awareness programs are participated in as per workplace guidelines and procedures 5.3 Corrective actions are implemented to correct unsafe condition in the workplace 5.4 **"Fit to work" records** are updated and maintained according to workplace requirements
Range of Variables	
Variables	**Range** (may include but not limited to):
1. OHS policies	1.1. Bangladesh standards for OHS 1.2. Fire Safety Rules and Regulations 1.3. Code of Practice 1.4. Industry Guidelines
2. Safe operating procedures	2.1 Orientation on emergency exits, fire extinguishers, fire escape, etc. 2.2 Emergency procedures 2.3 First Aid procedures 2.4 Tagging procedures 2.5 Use of PPE 2.6 Safety procedures for hazardous substances
3. Safety signs and symbols	3.1 Direction signs (exit, emergency exit, etc.) 3.2 First aid signs 3.3 Danger Tags 3.4 Hazard signs 3.5 Safety tags 3.6 Warning signs
4. Personal Protective Equipment (PPE)	4.1 Gas Mask 4.2 Gloves 4.3 Safety boots 4.4 Face mask 4.5 Overalls 4.6 Goggles and safety glasses 4.7 Sun block 4.8 Chemical/Gas detectors
5. Hazards	5.1 Chemical hazards 5.2 Biological hazards 5.3 Physical Hazards 5.4 Mechanical and Electrical Hazard 5.5 Mental hazard 5.6 Ergonomic hazard
6. Emergency Procedures	6.1 Fire fighting 6.2 Earthquake 6.3 Medical and first aid

	6.4 Evacuation
7. Contingency measures	7.1 Evacuation 7.2 Isolation 7.3 Decontamination
8. "Fit to Work" records	8.1 Medical Certificate every year 8.2 Accident reports, if any 8.3 Eye vision certificate
Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent, recent and meet all requirements of current version of the Unit of Competency	
1. Critical aspects of competency	Assessment required evidence that the candidate: 1.1 stated OHS policies and safe operating procedures 1.2 followed safety signs and symbols 1.3 used personal protective equipment (PPE) 1.4 maintained workplace clear and tidy 1.5 assessed and Controlled hazards 1.6 followed emergency procedures 1.7 followed contingency measures 1.8 implemented corrective actions
2. Underpinning knowledge	2.1 Define OHS 2.2 OHS Workplace Policies and Procedures 2.3 Work Safety Procedures 2.4 Emergency Procedures 2.5 Hazard control procedure 2.6 Different types of Hazards 2.7 PPE and there uses 2.8 Personal Hygiene Practices 2.9 OHS Awareness
3. Underpinning skills	3.1 Accessing OHS policies 3.2 Handling of PPE 3.3 Handling cleaning tools and equipment 3.4 Writing report 3.5 Responding to emergency procedures
4. Required attitude	4.1 Commitment to occupational health and safety 4.2 Sincere and honest to duties 4.3 Promptness in carrying out activities 4.4 Environmental concerns 4.5 Eagerness to learn 4.6 Tidiness and timeliness 4.7 Respect of peers and seniors in workplace 4.8 Communicate with peers and seniors in workplace

5. Resource implications	5.1 Workplace 5.2 Equipment and outfits appropriate in applying safety measures 5.3 Tools, materials and documentation required 5.4 OHS Policies and Procedures
6. Methods of assessment	Competency should be assessed by: 6.1 Written test 6.2 Demonstration 6.3 Oral Questioning
7. Context of assessment	7.1 Competency assessment must be done in NSDA accredited assessment centre 7.2 Assessment should be done by a NSDA certified/nominated assessor

Accreditation Requirements

Training Providers must be accredited by National Skills Development Authority (NSDA), the National Quality Assurance Body, or a body with delegated authority for quality assurance to conduct training and assessment against this unit of competency for credit towards the award of qualification under BNQF. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA.

Sector Specific Units of Competencies

Unit Code and Title	**SU-LE-01-L2-V1: Interpret Manuals, Sketches and Drawings**
Nominal Hours	**15 hours**
Unit Descriptor	This unit covers the skills, knowledge and attitudes required to interpret manuals, sketches and drawings. It specifically includes interpreting information and specifications, workplace documents, reading and interpreting sketches and drawings and practicing professional ethics at workplace.
Elements of Competency	**Performance Criteria** **Bold & Underlined** terms are elaborated in the Range of Variables Training Components
1. Interpret information and specifications	1.1 Appropriate **manuals** for work activity are identified andcollected 1.2 Information and specifications in the manuals are interpretedand applied
2. Interpret workplace documents	2.1 Workplace documents are interpreted as per standard 2.2 Assistance is taken to aid comprehension when required from peers / supervisors 2.3 Visual information / symbols / signage's are understood and followed 2.4 Specific and relevant information are accessed from appropriate sources 2.5 Appropriate medium is used to transfer information and ideas
3. Read and interpret sketches and drawings	3.1 Relevant **sketches and drawings** are identified for jobrequirement 3.2 Key terms and abbreviations are identified and interpreted 3.3 Signs and symbols are identified and interpreted 3.4 Schedules, dimensions, sketches, drawings and specificationsare correctly read and interpreted
4. Practice professional ethics at workplace	4.1 Responsibilities as a team member are demonstrated and kept promises and commitments made to others 4.2 Tasks are performed in accordance with workplace procedures 4.3 Confidentiality is respected and maintained 4.4 Situations and actions considered inappropriate or which present a conflict of interest are avoided
Range of Variables	

Variable	**Range** (may include but not limited to):
1. Manuals	1.1. Buyers' specification 1.2. Compliance 1.3. Maintenance procedure 1.4. Periodic maintenance 1.5. Quality assurance 1.6. Standard operating procedure (SOP)
2. Sketches and drawings	2.1. Technical 2.2. Measurement 2.3. Design
Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent and recent and meet the requirements of the current version of the Unit of Competency	
1. Critical Aspects of Competency	Assessment required evidence that the candidate: 1.1 identified information and specifications 1.2 read and interpreted sketches and drawings
2. Underpinning knowledge	2.1. Describe Manuals 2.2. Types of manuals 2.3. Units of measurement 2.4. Units of conversion 2.5. Signs and symbols 2.6. Define Sketch 2.7. Define drawings 2.8. Define specifications
3. Underpinning Skills	3.1 Interpreting performance of workplace communication and etiquette 3.2 Interpreting workplace instructions and symbol 3.3 Interpreting workplace code of conducts is as per organizational guidelines 3.4 Interpreting workplace documents as per standard 3.5 Interpreting and implementing meeting outcomes
4. Underpinning Attitudes	4.1 Commitment to occupational health and safety 4.2 Promptness in carrying out activities 4.3 Sincere and honest to duties 4.4 Environmental concerns 4.5 Eagerness to learn 4.6 Tidiness and timeliness 4.7 Respect for rights of peers and seniors in workplace 4.8 Communication with peers and seniors in workplace
5. Resource Implications	The following resources must be provided: 5.1. Workplace (simulated or actual) 5.2. Computer/laptop/notebook

	5.3. Software 5.4. Stationary 5.5. Learning manual 5.6. Fire extinguisher
6. Methods of Assessment	Competency should be assessed by: 6.1 Written test 6.2 Demonstration 6.3 Oral Questioning
7. Context of Assessment	7.1 Competency assessment must be done in a NSDA accredited assessment centre 7.2 Assessment should be done by an NSDA certified/ nominated assessor
Accreditation Requirements Training Providers must be accredited by National Skills Development Authority (NSDA), the National Quality Assurance Body, or a body with delegated authority for quality assurance to conduct training and assessment against this unit of competency for credit towards the award of qualification under BNQF. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA.	

Unit Code and Title	**SU-LE-02-L2-V1: Use Hand and Power Tools for Electrical Works**
Nominal Hours	**15 Hours**
Unit Descriptor	This unit covers the knowledge, skills and attitudes required to use hand and power tools for electrical works. It specifically includes – inspect hand tools and power tools for usability; use hand tools; operate power tools; and maintain hand tools and power tools after use.
Elements of Competency	**Performance Criteria** **Bold and Underlined** terms are elaborated in the Range of Variables
1. Inspect hand tools and power tools for usability	1.1 Hand tools are identified 1.2 Application of tools to job requirement is interpreted 1.3 Usability of tools are checked and verified 1.4 **Hand tools** and **power tools** are prepared 1.5 Sources of power supply for power tools are identified
2. Use hand tools	2.1 Appropriate hand tool for the job is used 2.2 Proper and safe use and operation of hand tools are applied 2.3 **Safety precautions** is observed when using hand tools 2.4 Unsafe or faulty tools are identified and marked for repair
3. Operate power tools	3.1 Power supply outlet and electrical cord are inspected and confirmed safe for use in accordance with established workplace safety requirements 3.2 Proper sequence of operation is applied in using power tools 3.3 Power tools are used safely in accordance to manufacturer's operating specification
4. Clean and maintain hand tools and power tools after use	4.1 Dust and foreign matters are removed from power tools in accordance to workplace standard 4.2 Condition of tools is checked after use 4.3 Appropriate lubricant is applied after use and prior to storage 4.4 **Measuring tools** are checked and calibrated 4.5 Defective tools, instruments, power tools and accessories are inspected and corrected or replaced
Range of variables	
Variables	**Range** (may include but not limited to):

1. Hand tools	1.1 Ball peen hammer 1.2 Mallet / soft hammer 1.3 Files 1.4 Wrenches 1.5 Pliers 1.6 Scraper 1.7 Screw drivers 1.8 Hacksaw 1.9 Paint brushes 1.10 Hacksaw frame 1.11 Hacksaw blade 1.12 Table vice 1.13 Wire Striper 1.14 Allen wrenches
2. Power tools	2.1 Electric drill machine 2.2 Soldering iron 2.3 Angle grinders 2.4 Power screwdriver
3. Safety precautions	3.1 Use of appropriate PPEs 3.2 Proper hand, feet and eye coordination 3.3 Safe condition of electrical outlets, cords and lamps 3.4 Working environment 3.5 Safe operating condition of hand tools and power tools 3.6 Awareness to OHS requirements
4. Measuring Tools	4.1 Measuring tape 4.2 Steel rule 4.3 Tri-square 4.4 Sprit level 4.5 Digital Vernier caliper 4.6 Micrometer 4.7 Digital multimeter 4.8 Megger 4.9 Earth Tester 4.10 Tachometer 4.11 SWG/AWG
Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent and recent and meet the requirements of the current version of the Unit of Competency	
1. Critical aspects of competency	Assessment required evidence that the candidate: 1.1 Used hand tools as per workplace requirement 1.2 Maintained safety precaution for using hand & power tools 1.3 Maintained operation procedure of power tools

2. Underpinning knowledge	Trainee will acquire knowledge of: 2.1 Types of hand tools and their proper uses 2.2 Types of power tools, their uses and safe handling method 2.3 Procedures in the use of hand tools and power tools 2.4 Policies and procedures for occupational health and safety 2.5 Use of PPE 2.6 Reporting and documentation 2.7 Preventive maintenance methods and techniques 2.8 Storage procedures
3. Underpinning Skills	3.1 Using hand and power tools 3.2 Maintaining hand and power tools 3.3 Maintaining safety precaution for using hand and power tools 3.4 Maintaining operation procedure of power tools 3.5 Applying proper sequence of operation
4. Underpinning Attitudes	4.1 Commitment to occupational health and safety 4.2 Promptness in carrying out activities 4.3 Sincere and honest to duties 4.4 Environmental concerns 4.5 Eagerness to learn 4.6 Tidiness and timeliness 4.7 Respect for rights of peers and seniors in workplace 4.8 Communication with peers and seniors in workplace.
5. Resource Implications	The following resources must be provided: 5.1 Workplace (simulated or actual) 5.2 Different types of hand tools and power tools 5.3 Work books 5.4 Hand tools and power tools operating and maintenance manuals
6. Methods of Assessment	Methods of assessment may include but not limited to: 6.1 Written test 6.2 Demonstration 6.3 Oral questioning
7. Context of Assessment	7.1 Competency assessment must be done in a NSDA accredited assessment centre 7.2 Assessment should be done by an NSDA certified/ nominated assessor

Accreditation Requirements

Training Providers must be accredited by National Skills Development Authority (NSDA), the National Quality Assurance Body, or a body with delegated authority for quality assurance to conduct training and assessment against this unit of competency for credit towards the award of any BNQF qualification. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA.

Occupation Specific Units of Competencies

Unit Code and Title	**OU-EMIM-01-L2-V1: Apply Basic Concepts of Electricity**
Nominal Hours	**50 hours**
Unit Descriptor	This unit covers the skills, knowledge and attitudes required to apply basic concepts of electricity according to workplace requirement. It specifically includes the tasks of practicing OSH, applying electrical concept and working principles selecting cables and wires and performing connection of electrical circuits
Element of Competency	**Performance Criteria** **Bold and Underlined terms are elaborated in the range of variables**
1. Practice OSH.	1.1 Appropriate **PPE** is selected. 1.2 PPE is used as per workplace requirements.
2. Apply electrical concept and working principles.	2.1 Source of electricity is interpreted; 2.2 Use of electricity is demonstrated; 2.3 Difference between AC and DC explained; 2.4 Use of **electrical measuring units** explained; 2.5 Measurement of voltage, current, resistance, inductance, capacitance and power factor with **measuring instrument** are demonstrated; 2.6 Power and energy of a particular load is explained; 2.7 Power and energy of a particular load is calculated; 2.8 Measurement of power and energy with measuring instrument are demonstrated;
3. Select cables and wires	3.1 Difference between cables and wires are interpreted; 3.2 Types of cables and wire are interpreted; 3.3 Color of phase, neutral and earth wires are identified; 3.4 Size of wire and cables are measured by wire gauge 3.5 Cable size is selected as per load
4. Perform connection of electrical circuits	4.1 Electrical circuits are interpreted; 4.2 Series, parallel and mixed circuits are demonstrated; 4.3 Connection of series circuit by two lamps controlled by a switch is performed; 4.4 Connection of parallel circuit by two lamps controlled by two switch is performed; 4.5 Connection of series parallel circuit by three lamps controlled by two switch is demonstrated; 4.6 Connection of fan with regulator is demonstrated; 4.7 Connection of tube light is demonstrated; 4.8 Connection of calling bell is demonstrated; 4.9 Connection of relay based latched circuit is demonstrated; 4.10 Connection of magnetic contactor based latched circuit is demonstrated;

Range of Variables	
Variable	**Range**

1. Personal protective equipment (PPE)	1.1 Safety helmet 1.2 Apron 1.3 Safety shoes 1.4 Ear plugs 1.5 Safety goggles 1.6 Hand gloves 1.7 Face mask
2. Electrical measuring units.	Electrical measuring units may include but not limited to**:** 2.1 Volt (V). 2.2 Ampere (A). 2.3 Watt (W). 2.4 Kilo-Watt Hour (KWh) 2.5 Ohm (Ω). 2.6 Mili Henry (mH) 2.7 Micro-Farad (μF)
3. Electrical measuring instruments.	Electrical measuring instruments may include but not limited to**:** 3.1 Ammeters (Analog and Digital). 3.2 Voltmeters (Analog and Digital). 3.3 Wattmeter (Analog and Digital). 3.4 Ohmmeter (Analog and Digital). 3.5 AVO meter (Analog and Digital). 3.6 LCR Meter 3.7 Power Factor Meter 3.8 Wire gauge
Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent and recent and meet the requirements of the current version of the Unit of Competency.	
1. Critical aspects of competency.	1.1 Applied electrical concept and working principles. 1.2 Selected cables and wires 1.3 Performed connection of electrical circuits
2. Required underpinning Knowledge.	2.1 Concept of electrical current and measuring units. 2.2 Difference between AC and DC current. 2.3 Principles of electrical generation for AC and DC 2.4 Conversion principle of AC to DC and vice-versa. 2.5 Conductor, semiconductor and insulator 2.6 Series, parallel and mixed circuit
3. Underpinning skills.	3.1 Applying electrical concept and working principles. 3.2 Selecting cables and wires 3.3 Measuring voltage, current, power and energy. 3.4 Preparing series and parallel circuit.
4. Required attitude.	4.1 Commitment to occupational health and safety. 4.2 Environmental concerns. 4.3 Eagerness to learn. 4.4 Tidiness and timeliness.

	4.5 Respect for rights of peers, sub-ordinates and seniors in workplace. 4.6 Communication with peers, sub-ordinates and seniors in workplace. 4.7 Sincere and honest to duties.
5. Resource implication.	The following resources must be provided: 5.1 Tester and multimeter. 5.2 Cables / wire 5.3 Electrical fittings, fixtures and loads 5.4 Hand Tools 5.5 Power Tools
6. Method of assessment.	Competencies must be assessed by- 6.1 Demonstration. 6.2 Written test. 6.3 Oral questioning
7. Context of assessment.	7.1 Competency assessment must be done in NSDA accredited assessment centre 7.2 Assessment should be done by a NSDA certified/nominated assessor.
Accreditation Requirements Training Providers must be accredited by National Skills Development Authority (NSDA), the National Quality Assurance Body, or a body with delegated authority for quality assurance to conduct training and assessment against this unit of competency for credit towards the award of any BNQF qualification. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA.	

Unit Code and Title	**OU-EMIM-02-L2-V1: Perform Installation of Motor**
Nominal Hours	**50 Hours**
Unit Descriptor	This unit covers the skills, knowledge and attitude required to perform installation of motor. It includes the task of listing and identifying of motor type, preparing tools, equipment and materials to install the motor, performing installation of motor, performing power and control connection of motor and performing test and operation of motor
Elements of Competency	**Performance Criteria** **Bold and Underlined** terms are elaborated in the Range of Variables.
1. List and Identify of motor type.	1.1. Safe work practices are observed and **Personal Protective Equipment (PPE)** is used as per workplace procedures. 1.2. **Motor** principles are interpreted. 1.3. Types of motor are listed 1.4. Types of motor are identified.
2. Prepare tools, equipment and materials	2.1 Tools, equipment and materials are selected and collected as per job requirement. 2.2 Tools, equipment and materials are prepared as per job requirement.
3. Perform Installation of motor.	3.1 Motor is selected as per job requirement. 3.2 Motor is prepared as per job requirement. 3.3 Motor is installed as per diagram.
4. Perform power and control connection of motor.	4.1 **Connection type** is selected as per requirement. 4.2 **Motor starter type** is selected as per job requirement; 4.3 Power and control circuit is prepared; 4.4 Power and control circuit connection is performed
5. Perform test and operation of motor.	5.1. **Testing equipment** are selected and collected 5.2. Test of connections are performed 5.3. Operation of motor is performed
Range of Variables	
Variables	**Range** (may include but not limited to):
1. Personal protective equipment (PPE)	1.1 Safety helmet 1.2 Apron 1.3 Safety shoes 1.4 Ear plugs 1.5 Safety goggles 1.6 Hand gloves 1.7 Face mask

2. Motor	2.1. Single phase induction motor 2.2. Three phase induction motor
3. Connection Type	3.1 Star connection 3.2 Delta connection
4. Starter Type	4.1. Direct Online (DOL) Starter 4.2. Star-Delta Starter 4.3. Forward-reverse Starter 4.4. Soft starter
5. Testing Equipment	5.1 Testing Board 5.2 Megger
Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent and recent and meet the requirements of the current version of the Unit of Competency.	
1. Critical aspects of competency	Assessment required evidence that the candidate: 1.1 Listed and identified of motor type. 1.2 Prepared tools, equipment and materials to install the motor. 1.3 Performed Installation of motor. 1.4 Performed power and control connection of motor. 1.5 Performed test and operation of motor
2. Underpinning knowledge	2.1 Principles of motor operation 2.2 Types of motor 2.3 Components of motor 2.4 Connection diagram of motor 2.5 Testing procedure of motor
3. Underpinning skills	3.1 Using of tools and equipment 3.2 Performing assemble and disassemble of motor 3.3 Performing terminal connection of motor 3.4 Testing of motor
4. Underpinning attitudes	4.1 Commitment to occupational health and safety 4.2 Environmental concerns 4.3 Eagerness to learn 4.4 Tidiness and timeliness 4.5 Respect for rights of peers and seniors in workplace
5. Resource implications	The following resources must be provided: 5.1 Motor 5.2 Tools and equipment for assemble and disassemble 5.3 Testing equipment 5.4 Connection diagram 5.5 Manual 5.6 Materials

6. Methods of assessment	Competency should be assessed by: 6.1 Demonstration 6.2 Oral questioning 6.3 Written test
7. Context of assessment	7.1 Competency assessment must be done in NSDA accredited assessment centre 7.2 Assessment should be done by a NSDA certified /nominated assessor

Accreditation Requirements

Training Providers must be accredited by National Skills Development Authority (NSDA), the National Quality Assurance Body, or a body with delegated authority for quality assurance to conduct training and assessment against this unit of competency for credit towards the award of any BNQF qualification. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA.

Unit Code and Title	**OU-EMIM-03-L2-V1: Install Basic Control System of Motor**
Nominal Hours	**90 Hours**
Unit Descriptor	This unit covers the skills; knowledge and attitude required to install basic Control system of motor. It includes the task of selecting the motor for control, identifying the controlling method, preparing tools, equipment and materials, performing power and control connection for motor and performing test and operation of motor.
Elements of Competency	**Performance Criteria** **Bold and Underlined** terms are elaborated in the Range of Variables.
1. Select the motor for control.	1.1 Appropriate **PPE** is collected and used. 1.2 **Motor** is selected as per job requirement 1.3 Motor is prepared to control as per job requirement
2. Identify the controlling method	2.1 Controlling methods are interpreted 2.2 Controlling methods are selected
3. Prepare tools, equipment & materials.	3.1. **Tools, equipment** and **materials** are selected and collected as per job requirement. 3.2. Tools, equipment and materials are prepared as per job requirement.
4. Perform power and control connection for motor.	4.1 **Connection type** is selected as per job requirement. 4.2 **Motor starter type** is selected as per job requirement; 4.3 Power and control connection is performed
5. Perform test and operation of motor.	5.1 Testing equipment's are selected and collected 5.2 Test of connections are performed 5.3 Operation of motor is performed
Range of Variables	
Variables	**Range** (may include but not limited to):
1. Personal protective equipment (PPE)	1.1 Safety helmet 1.2 Apron 1.3 Safety shoes 1.4 Ear plugs 1.5 Safety goggles 1.6 Hand gloves 1.7 Face mask
2. Motor	2.1 Single phase induction motor 2.2 Three phase induction motor

3. Tools and equipment	3.1 Combination pliers 3.2 Nose plier 3.3 Flat screwdriver 3.4 Philips screwdriver 3.5 Adjustable wrench 3.6 Wire stripper 3.7 Crimping plier 3.8 Neon Tester 3.9 Lugs puncher 3.10 Pully Puller 3.11 Ball pin hammer 3.12 Soft hammer 3.13 Multimeter
4. Materials	4.1. Cable 4.2. Cable lugs 4.3. Terminal blocks 4.4. Cable cap 4.5. Insulation tape 4.6. Magnetic contactor 4.7. Timer with base 4.8. Relay with base 4.9. Push button switch 4.10. Selector switch 4.11. Indicator lamp 4.12. Emergency stop switch 4.13. MCB/MCCB/MPCB 4.14. Thermal overload relay
5. Connection Type	5.1 Star connection 5.2 Delta connection
6. Motor starter type	6.1. Direct Online (DOL) starter 6.2. Star Delta Starter 6.3. Forward reverse starter 6.4. Soft starter
Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent and recent and meet the requirements of the current version of the Unit of Competency.	
1. Critical aspects of competency	1.1 Selected the motor for control. 1.2 Identified the controlling method 1.3 Prepared tools, equipment & materials. 1.4 Performed power and control connection for motor. 1.5 Performed test and operation of motor.
2. Underpinning knowledge	2.1 Principles of motor operation 2.2 Types of motor

	2.3 Components of motor 2.4 Connection diagram of motor 2.5 Controlling diagram 2.6 Testing procedure
3. Underpinning skills	3.1 Selecting the motor for control. 3.2 Identifying the controlling method 3.3 Performing connection for motor. 3.4 Performing operation of motor.
4. Underpinning attitudes	4.1 Commitment to occupational health and safety 4.2 Environmental concerns 4.3 Eagerness to learn 4.4 Tidiness and timeliness 4.5 Respect for rights of peers and seniors in workplace
5. Resource implications	The following resources must be provided: 5.1 Motor 5.2 Tools and equipment for assemble and disassemble 5.3 Testing equipment 5.4 Connection diagram 5.5 Manual 5.6 Materials
6. Methods of assessment	Competency should be assessed by: 6.1 Demonstration 6.2 Oral questioning 6.3 Written test
7. Context of assessment	7.1 Competency assessment must be done in NSDA accredited assessment centre 7.2 Assessment should be done by a NSDA certified/nominated assessor

Accreditation Requirements

Training Providers must be accredited by National Skills Development Authority (NSDA), the National Quality Assurance Body, or a body with delegated authority for quality assurance to conduct training and assessment against this unit of competency for credit towards the award of qualification under BNQF. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA.

Unit Code and Title	**OU-EMIM-04-L2-V1: Perform Basic Troubleshoot and Maintenance of Motor**
Nominal Hours	**50 Hours**
Unit Descriptor	This unit covers the knowledge, skills and attitudes required to perform basic troubleshoot and maintenance of motor. It specifically includes the task of selecting the motor for control, identifying the controlling method, preparing tools, equipment and materials, performing power and control connection for motor and performing test and operation of motor.
Elements of Competency	**Performance Criteria** **Bold and Underlined** terms are elaborated in the Range of Variables.
1. Prepare for works	1.1. OSH practices are followed as per job requirement. 1.2. **Personal Protective Equipment (PPE)** are used as per nature of the job. 1.3. **Tools and equipment** are collected as per job requirement. 1.1 **Materials** are collected as per job requirement.
2. Identify Motor coil.	2.1 Motor is selected and collected. 2.2 Motor connection is interpreted. 2.3 Motor coil is identified 2.4 Coil connection is checked as per diagram
3. Perform Insulation Resistance Test	3.1 Insulation Resistance Test is interpreted. 3.2 Motor is selected and collected. 3.3 Required tools and equipment is selected and collected as per job requirement. 3.4 Insulation Resistance Test is performed 3.5 Test result is documented 3.6 Trouble is resolved if necessary.
4. Perform Continuity Test	4.1 Continuity Test is interpreted. 4.2 Motor is selected and collected. 4.3 Required tools and equipment is selected and collected as per job requirement. 4.4 Continuity Test is performed 4.5 Trouble is resolved if necessary.
5. Perform Earth/ Leakage Test	5.1 Earth/Leakage Test is interpreted. 5.2 Motor is selected and collected. 5.3 Required tools and equipment is selected and collected as per job requirement. 5.4 Earth/Leakage Test is performed 5.5 Trouble is resolved if necessary.
6. Perform Noise Test	6.1 Noise Test is interpreted.

	6.2 Motor is selected and collected. 6.3 Required tools and equipment is selected and collected as per job requirement. 6.4 Noise Test is performed 6.5 Trouble is resolved if necessary.
7. Perform Phase Sequence Test	7.1 Phase Sequence Test is interpreted. 7.2 Motor is selected and collected. 7.3 Required tools and equipment is selected and collected as per job requirement. 7.4 Phase Sequence Test is performed 7.5 Trouble is resolved if necessary.
8. Perform schedule maintenance work.	8.1 Maintenance schedule is prepared 8.2 Maintenance is performed as per schedule
Range of Variables	
Variables	**Range** (may include but not limited to):
1. PPE	1.1 Safety helmet 1.2 Apron 1.3 Safety shoes 1.4 Ear plugs 1.5 Safety goggles 1.6 Hand gloves 1.7 Face mask
2. Tools and equipment	2.1 Combination pliers 2.2 Nose plier 2.3 Flat screwdriver 2.4 Philips screwdriver 2.5 Adjustable wrench 2.6 Wire stripper 2.7 Crimping plier 2.8 Neon Tester 2.9 Soldering iron 2.10 Lugs puncher 2.11 Pully Puller 2.12 Ball pin hammer 2.13 Soft hammer 2.14 Multimeter 2.15 Megger 2.16 Test Board 2.17 Phase Sequence Tester 2.18 Tachometer 2.19 Air Blower

3. Materials	3.1 Cable 3.2 Cable lugs 3.3 Cable Connector 3.4 Terminal blocks 3.5 Cable cap 3.6 Insulation tape 3.7 Soldering lead 3.8 Cotton tape 3.9 Super enamel copper wire 3.10 Ampere tube 3.11 Leatheroid paper 3.12 Insulation varnish 3.13 Thinner 3.14 Cotton thread
Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent and recent and meet the requirements of the current version of the Unit of Competency.	
1. Critical aspects of competency	Assessment required evidence that the candidate: 1.1 selected the motor for control 1.2 identified the controlling method 1.3 prepared tools, equipment and materials 1.4 performed power and control connection for motor 1.5 performed test and operation of motor.
2. Underpinning knowledge	2.1. Identification of Motor coil. 2.2. Procedure of Insulation Resistance Test 2.3. Procedure of Continuity Test 2.4. Procedure of Earth/Leakage Test 2.5. Procedure of Noise Test 2.6. Procedure of Phase Sequence Test 2.7. Procedure of repair work. 2.8. Procedure of schedule maintenance work.
3. Underpinning skills	3.1 Selecting motor 3.2 Selecting control system 3.3 Performing motor connection 3.4 Performing test of motor
4. Underpinning attitudes	4.1 Commitment to occupational health and safety 4.2 Environmental concerns 4.3 Eagerness to learn 4.4 Tidiness and timeliness 4.5 Respect for rights of peers and seniors in workplace

5. Resource implications	The following resources must be provided: 5.7 Motor 5.8 Tools and equipment for assemble and disassemble 5.9 Testing equipment 5.10 Connection diagram 5.11 Manual 5.12 Materials
6. Methods of assessment	Competency should be assessed by: 6.1. Demonstration 6.2. Oral questioning 6.3. Written test
7. Context of assessment	7.1 Competency assessment must be done in NSDA accredited assessment centre 7.2 Assessment should be done by a NSDA certified/nominated assessor

Accreditation Requirements

Training Providers must be accredited by National Skills Development Authority (NSDA), the National Quality Assurance Body, or a body with delegated authority for quality assurance to conduct training and assessment against this unit of competency for credit towards the award of qualification under NSQF. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA.

Unit Code and Title	**OU-EMIM-05-L2-V1: Perform Installation and Maintenance of Transformer**
Nominal Hours	**30 Hours**
Unit Descriptor	This unit covers the knowledge, skills and attitudes required to perform installation and maintenance of transformer. It specifically includes the task of listing and identifying of transformer type, performing installation of transformer, connection of transformer and test and operation of transformer
Elements of Competency	**Performance Criteria** **Bold and Underlined** terms are elaborated in the Range of Variables.
1. Prepare for works	1.1 OSH practices are followed as per job requirement. 1.2 **Personal Protective Equipment (PPE)** are used as per nature of the job. 1.3 **Tools and equipment** are collected as per job requirement. 1.4 **Materials** are collected as per job requirement.
2. List and Identify of Transformer type.	2.1 Function of **Transformer** is Interpreted 2.2 Transformer type is listed 2.3 Transformer type is identified
3. Perform Installation of Transformer.	3.1 Transformer is prepared as per job requirement. 3.2 Transformer is installed as per job requirement.
4. Perform connection of transformer	4.1 Connection type is selected as per diagram. 4.2 Connection is performed
5. Perform test and operation of transformer	5.1 Testing equipment's are selected and collected 5.2 **Test** of Transformer is performed 5.3 Operation of Transformer is performed
6. Maintain workplace and store tools equipment	6.1 Work area is cleaned in accordance with workplace procedures. 6.2 Unused materials are stored for re-use or disposed following workplace procedures. 6.3 Waste and scrap materials are disposed with following workplace procedures. 6.4 Tools and equipment are cleaned and stored as per manufacturer's recommendation.
Range of Variables	
Variables	**Range** (may include but not limited to):
1. PPE	1.1 Safety helmet 1.2 Apron 1.3 Safety shoes

	1.4 Ear plugs 1.5 Safety goggles 1.6 Hand gloves 1.7 Face mask
2. Tools and equipment	2.1 Combination pliers 2.2 Nose plier 2.3 Flat screwdriver 2.4 Philips screwdriver 2.5 Adjustable wrench 2.6 Wire stripper 2.7 Crimping plier 2.8 Neon Tester 2.9 Soldering iron 2.10 Lugs puncher 2.11 Pully Puller 2.12 Ball pin hammer 2.13 Soft hammer 2.14 Multimeter 2.15 Megger 2.16 Air Blower
3. Materials	3.1 Cable 3.2 Cable lugs 3.3 Cable Connector 3.4 Terminal blocks 3.5 Cable cap 3.6 Insulation tape 3.7 PIB tape 3.8 Ampere tube
4. Transformer	4.1 Single phase transformer 4.2 Three phase transformers 4.3 Instrument transformer
5. Test	4.4 Continuity Test 4.5 Coil Resistance Test 4.6 Insulation Resistance 4.7 Earth/Leakage Test
Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent and recent and meet the requirements of the current version of the Unit of Competency.	

1. Critical aspects of competency	Assessment required evidence that the candidate: 1.1 Listed and identified of transformer type. 1.2 Performed installation of transformer. 1.3 Performed connection of transformer 1.4 Performed test and operation of transformer
2. Underpinning knowledge	2.1 Identification of Transformer type. 2.2 Procedure of Installation of Transformer. 2.3 Procedure of connection of transformer 2.4 Procedure of testing and operation of transformer
3. Underpinning skills	3.1 Listing and identifying of transformer type. 3.2 Performing installation of transformer. 3.3 Performing connection of transformer 3.4 Performing test and operation of transformer
4. Underpinning attitudes	4.1 Commitment to occupational health and safety 4.2 Environmental concerns 4.3 Eagerness to learn 4.4 Tidiness and timeliness 4.5 Respect for rights of peers and seniors in workplace
5. Resource implications	The following resources must be provided: 5.1 Transformer 5.2 Tools and equipment 5.3 Testing equipment 5.4 Connection diagram 5.5 Manual 5.6 Materials
6. Methods of assessment	Competency should be assessed by: 6.1 Demonstration 6.2 Oral questioning 6.3 Written test
7. Context of assessment	7.1 Competency assessment must be done in NSDA accredited assessment centre 7.2 Assessment should be done by a NSDA certified/nominated assessor

Accreditation Requirements

Training Providers must be accredited by National Skills Development Authority (NSDA), the National Quality Assurance Body, or a body with delegated authority for quality assurance to conduct training and assessment against this unit of competency for credit towards the award of qualification under BNQF. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA.

Unit Code and Title	**OU-EMIM-06-L2-V1: Perform Connection of Generator**
Nominal Hours	**30 Hours**
Unit Descriptor	This unit covers the knowledge, skills and attitudes required to perform connection of generator. It specifically includes the task of identifying type of output of generator, preparing tools, equipment & material to perform generator connection, performing connection of generator and performing test and operation of generator.
Elements of Competency	**Performance Criteria** **Bold and Underlined** terms are elaborated in the Range of Variables.
1. Prepare for works	1.1 OSH practices are followed as per job requirement. 1.2 **Personal Protective Equipment (PPE)** are used as per nature of the job. 1.3 **Tools and equipment** are collected as per job requirement. 1.4 **Materials** are collected as per job requirement.
2. Identify type of output of generator	2.1 Function of Generator is Interpreted 2.2 **Generator type** is listed 2.3 Generator type is identified
3. Prepare tools, equipment and material	3.1 Tools, equipment and materials are selected and collected as per job requirement. 3.2 Tools, equipment and materials are prepared as per job requirement.
4. Perform connection of generator.	4.1 Connection type is selected as per requirement. 4.2 Connection is performed as per diagram
5. Perform Test and operation of generator.	5.1 Testing equipment's are selected and collected 5.2 Test of connections are performed 5.3 Operation of Generator is performed
Range of Variables	
Variables	**Range** (may include but not limited to):
1. PPE	1.1 Safety helmet 1.2 Apron 1.3 Safety shoes 1.4 Ear plugs 1.5 Safety goggles 1.6 Hand gloves 1.7 Face mask

2. Tools and equipment	2.1 Combination pliers 2.2 Nose plier 2.3 Flat screwdriver 2.4 Star screwdriver 2.5 Adjustable wrench 2.6 Wire stripper 2.7 Crimping plier 2.8 Neon Tester 2.9 Soldering iron 2.10 Lugs puncher 2.11 Ball pin hammer 2.12 Multimeter 2.13 Megger 2.14 Testing Board
3. Materials	3.1 Small Generator 3.2 Cable 3.3 Cable lugs 3.4 Cable Connector 3.5 Terminal blocks 3.6 Cable cap 3.7 Insulation tape 3.8 PIB tape
4. Generator Type	4.1. DC Generator/Dynamo 4.2. AC Generator
Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent and recent and meet the requirements of the current version of the Unit of Competency.	
1. Critical aspects of competency	Assessment required evidence that the candidate: 1.1 Identify type of output of generator 1.2 Prepare tools, equipment & material to perform generator connection. 1.3 Perform connection of generator. 1.4 Perform Test and operation of generator.
2. Underpinning knowledge	2.1 Principle of generator 2.2 Major spare parts and components of generator 2.3 Difference between motor and generator 2.4 Connection procedure of small generator 2.5 Installation procedure of small generator
3. Underpinning skills	3.1 Identifying type of output of generator 3.2 Performing connection of generator. 3.3 Performing Test and operation of generator.

4. Underpinning attitudes	4.1 Commitment to occupational health and safety 4.2 Environmental concerns 4.3 Eagerness to learn 4.4 Tidiness and timeliness 4.5 Respect for rights of peers and seniors in workplace
5. Resource implications	The following resources must be provided: 5.1 Generator 5.2 Tools and equipment 5.3 Testing equipment 5.4 Connection diagram 5.5 Manual 5.6 Materials
6. Methods of assessment	Competency should be assessed by: 6.1 Demonstration 6.2 Oral questioning 6.3 Written test
7. Context of assessment	7.1 Competency assessment must be done in NSDA accredited assessment centre 7.2 Assessment should be done by a NSDA certified/nominated assessor

Accreditation Requirements

Training Providers must be accredited by National Skills Development Authority (NSDA), the National Quality Assurance Body, or a body with delegated authority for quality assurance to conduct training and assessment against this unit of competency for credit towards the award of qualification under BNQF. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA.

Development of Competency Standard

The Competency Standards for National Skills Certificate in Electrical Machine Installation and Maintenance, Level- 2 is developed by NSDA on 22-23 April 2024.

List of Members

Sl No	Name and Address	Sign
1.	Md. Sultan Ali Kazi, Deputy General Manager, Kazi Farms Ltd. Mobile: 01711-402619, Email: ksultan@kazifarms.com	Member
2.	Rakib Talukder, CEO, Automation Park Bangladesh. Mobile: 01719-484862, Email: rakibbd69@gmail.com	Member
3.	Shiful Islam, Center in Charge, Dolphin Training Center. Mobile: 01625-311799, Email: islamshiful810@gmail.com	Member
4.	Md. Masum Zakaria, Assistant Engineer, BITAC-Dhaka Mobile: 01671-037192, Email: zakariamasum2020@gmail.com	Member
5.	Jahangir Alam, Sub-Assistant Engineer, BITAC. Mobile: 01718-521432, Email: jalam1642@gmail.com	Member
6.	Md. Sakender Ali, Sub-Assistant Engineer, BITAC. Mobile: 01765-970818, Email: sakenderali889@gmail.com	Member
7.	Mufti Mahamud Al Razi, Sub-Assistant Engineer, BITAC. Mobile: 01723-108998, Email: razi.diu@gmail.com	Member
8.	Md. Abdur Razzaque, Specialist-1, NSDA. Mobile: 01742-734313, Email: razzaque159@gmail.com	Member