Competency Standard (CS)

Electrical Installation & Maintenance

Level-3

Construction Sector

Competency Standard Code: CS-CON-EIM-L3-EN-V1

National Skills Development Authority
Chief Adviser's Office
Government of the People's Republic of Bangladesh

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This Competency Standard for **Electrical Installation & Maintenance** 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 qualifications 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 Construction Sector, industry representatives, academia, related experts of trainer and related employers.
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 competencies 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 reports.

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 institutes skills training program. "Electrical Installation & Maintenance" is selected as one of the priority occupations of Construction Sector. This standard is developed to adopt a demand driven approach to training with effective inputs from Industry Skills Councils (ISC's), employee associations and employers.

Generally, a competency standard defines curriculum, learning materials, assessment and certification of trainees enrolled in Skills training. Trainees who successfully pass the assessment will receive a qualification in the National Skills Qualification Framework (NSQF) 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.

This document also details the format, sequencing, wording and layout of the Competency Standard for an occupation which is comprised of Units of Competencies 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 competence
- 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 NSCA, Key Institutions, IEC, and industry experts to identify the competencies required of an occupation in Construction 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 opening 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.

Level Descriptors of Skills Sector, BNQF Level 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 analyze, compare, relate and evaluate.	Specialized 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 plans. 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 formulate 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 parties.	Work under guidance of management and self-direction to resolve specific issues. Lead and take responsibility for the work and actions of group 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 in 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 a small group.
3-Skilled Worker	Moderately broad knowledge in a specific work or study area, able to perceive ideas and concepts from drawings 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 Abbreviation:

CS	-	Competency Standard
ISC	-	Industry Skills Council
PPE	-	Post, Primal and Second
CONSIC	-	Construction Industry Skills Councils
NSDA	-	National Skills Development Authority
MKE	-	Motor, Kilogram and Second
BNQF	-	Bangladesh National Qualification Framework
OSH	-	Occupational Safety and Health
PPE	-	Personal Protect in Equipment
SCVC	-	Standards and Curriculum Validation Committee
STP	-	Skills Training Provider
SOP	-	Standard Operating Procedure
UoC	-	Unit of Competency
EDI	-	Electrical Installation & Maintenance
4 IR	-	4th Industrial Revolution

Approved by
42th Authority meeting of NIDA
Held on 22.04.2025

Table of Contents

Competency Standards for National Skill Certificate – I in
Electrical Installation & Maintenance
Course Structure

SL	Unit Code and Title		TVC Level	Nominal Hours
Generic Units of Competencies				**40**
1.	[illegible]	Practice Vegetation Skill	1	20
2.	[illegible]	[illegible]	1	20
Occupation Specific Units of Competencies				**300**
3.	[illegible]	Install Earthing System	1	60
4.	[illegible]	Perform Internal Emergency Service Wiring	1	90
5.	[illegible]	Perform Installation and Operation of Motor Controller	1	90
6.	[illegible]	Perform Motor Servicing	1	60
Learning Hours				340
Workplace Visit				20
Total Nominal Hours				360

Units & Elements at a Glance

Generic Units of Competencies (40 hours)

Code	Unit of Competency	Elements of Competency	Duration (Hours)
[illegible]	Practice Negotiation Skill	1. Plan negotiations 2. Participate in negotiations	20
[illegible]	Lead small team	1. Provide team leadership 2. Assign responsibilities 3. Set performance expectations for team members 4. Supervise team performance	20
Total Hours			40

Occupation Specific Units of Competencies (300 Hours)

Code	Unit of Competency	Elements of Competency	Hours
[illegible]	Install Earthing System	1. Prepare for works 2. Install earthing (wiring) system 3. Install Earth Leakage Circuit Breaker (ELCB/RCCB) 4. Install lightning / surge arrester 5. Maintain workplace, tools, equipment and materials	80
[illegible]	Perform Internal Emergency Service Wiring	1. Prepare for works 2. Install CCTV system 3. Install change over switch 4. Perform generator supply 5. Install solar home system 6. Connect Instant Power Supply (IPS) Line 7. Maintain workplace, tools, equipment and materials	[illegible]
[illegible]	Perform Installation and Operation of Motor Controller	1. Prepare for work 2. Install protective devices 3. Install and connect motor controller 4. Perform motor testing 5. Maintain workplace, tools, equipment and materials	[illegible]
[illegible]	Perform Motor Servicing	1. Prepare for works 2. Detect motor fault 3. Carry out servicing 4. Carry out final test	[illegible]

		7. Record the test result 8. Maintain workplace, tools, equipment and materials	
Total Hours			80

Generic Units of Competencies

Unit Code and Title	GU-02-L3-V1: Practice Negotiation Skills
Unit Descriptor	This unit covers the knowledge, skills and attitudes required to practice negotiation skills. It specifically includes - planning negotiations and participating in negotiations.
Nominal Hours	20 Hours
Elements of Competency	Performance Criteria **Bold & Underlined** terms are elaborated in the Range of Variables Training Components
1. Plan negotiations	1.1 Information on preparing for negotiations is identified and included in the plan; 1.2 Information on creating non-verbal environments for positive negotiating is identified and included in the plan; 1.3 Information on active listening is identified and included in the plan; 1.4 Information on different questioning techniques is identified and included in the plan; 1.5 Information is checked to ensure it is correct and up-to-date.
2. Participate in negotiations	2.1 Criteria for successful outcome are agreed upon by all parties; 2.2 Desired outcome of all parties is considered; 2.3 Appropriate language is used throughout the negotiation; 2.4 A variety of questioning techniques are used; 2.5 The issues and processes are documented and agreed upon by all parties; 2.6 Possible solutions are discussed and their viability assessed; 2.7 Areas for agreement are confirmed and recorded; 2.8 Follow-up actions is agreed upon by all parties.
Range of Variables	
Variable	Range (May include but not limited to)
1. Preparing for negotiation	1.1 Background information on other parties to the negotiations 1.2 Good understanding of topic to be negotiated 1.3 Clear understanding of desired outcome/s 1.4 Personal attributes 1.4.1 Self esteem 1.4.2 Self esteem 1.4.3 Objectivity 1.4.4 Empathy 1.4.5 Respect for others 1.5 Interpersonal skills • Listening /reflecting

	• Non-verbal communication • Assertiveness • Behavior labeling • Testing understanding • Seeking information • Self-disclosure 1.6 Analytic skills • Observing differences between content and process • Identifying bargaining information • Applying strategies to manage process • Applying steps in negotiating process • Strategies to manage conflict • Steps in negotiating process 1.7 Options within organization and externally for resolving conflict
2. Non-verbal environment	2.1 Friendly reception 2.2 Warm and welcoming room 2.3 Refreshments offered 2.4 Lead in conversation before negotiation begins
3. Active Listening	3.1 Attentive 3.2 Don't interrupt 3.3 Good posture 3.4 Maintains eye contact 3.5 Reflective listening
4. Questioning techniques	4.1 Direct 4.2 Indirect 4.3 Process Open-ended

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 evidences that the candidate: 1.1 demonstrated sufficient knowledge of the factors influencing negotiation to achieve agreed outcomes 1.2 participated in negotiation with at least one person to achieve an agreed outcome.
2. Underpinning knowledge	2.1 Codes of practice and guidelines for the organization. 2.2 Organizational policy and procedures for negotiations. 2.3 Decision making and conflict resolution strategies procedures. 2.4 Problem solving strategies on how to deal with unexpected questions and attitudes during negotiation. 2.5 Flexibility

	4.4 Empathy
5 Underpinning skill	5.1 Interpersonal skills to develop rapport with other parties. 5.2 Communication skills (verbal and listening) 5.3 Observation skills 5.4 Negotiation skills
6 Required attitude	6.1 Commitment to occupational health and safety 6.2 Environmental concerns 6.3 Eagerness to learn 6.4 Tidiness and neatness 6.5 Respect for rights of peers and seniors in workplace 6.6 Communication with peers and seniors in workplace
7 Resource implication	The following resources MUST be provided: 7.1 Workplace (actual or simulated) 7.2 Human resources (supervisor).
8 Methods of assessment	Methods of assessment may include but not limited to: 8.1 written test 8.2 demonstration 8.3 oral questioning 8.4 portfolio
9 Context of assessment	9.1 Competency assessment must be done in NIDA accredited assessment centre. 9.2 Assessment should be done by a NIDA certified assessment 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	CU-04-L3-V1: Lead Small Team
Unit Descriptor	This unit covers the knowledge, skills and attitudes required to lead small team. It specifically includes – provide team leadership, assign responsibilities, set performance expectations for team members, and supervised team performance.
Nominal Hours	20 Hours
Elements of Competency	**Performance Criteria** Bold & Underlined terms are elaborated in the Range of Variables
1. Provide team leadership	1.1 Work requirements are identified and presented to team members; 1.2 Reasons for instructions and requirements are communicated to team members; 1.3 Team members' queries and concerns are recognized, discussed and dealt with.
2. Assign responsibilities	2.1 Duties, and responsibilities are allocated having regard to the skills, knowledge and attitudes required to properly undertake the assigned task. 2.2 Duties are allocated having regard to individual preferences, domestic and personal considerations, wherever possible.
3. Set performance expectations for team members	3.1 Performance expectations are established based on client needs and according to assignment requirements. 3.2 Performance expectations are based on individual team members' duties and area of responsibility; 3.3 Performance expectations are discussed and directed to implement in the workplace.
4. Supervise team performance	4.1 Monitoring of performance are taken place against defined performance criteria and / or assignment instructions and corrective action taken if required; 4.2 Team members are provided feedback, positive support and advice on strategies to overcome any deficiencies. 4.3 Performance issues which cannot be rectified or addressed within the team are referenced to appropriate personnel. 4.4 Team members are kept informed of any changes in the priority allocated to assignments or tasks which might impact on clients' / customers' needs and satisfaction. 4.5 Team operations are monitored to ensure that employer / client needs and requirements are met. 4.6 Follow-up communication is provided on all issues affecting the team. 4.8 All relevant documentation is completed.

Range of Variables	
Variable	**Range** (may include but are not limited to):
1. Work requirements	1.1 Client Profile 1.2 Assignment instructions
2. Team member's queries and concerns	2.1 Roster 2.2 Shift details
3. Monitoring of performance	3.1 Formal process 3.2 Informal process
4. Feedback	4.1 Formal process 4.2 Informal process 4.3 Sandwich process
5. Performance issues	5.1 Work output 5.2 Work quality 5.3 Team participation 5.4 Compliance with workplace protocols 5.5 Safety 5.6 Customer service
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	1.1 Maximized or improved individuals and / or team performance given a variety of possible contexts 1.2 Assessed and monitored team and individual performance against set criteria 1.3 Represented concerns of a team and individual to next level of management or appropriate specialist and to negotiate on their behalf 1.4 Allocated duties and responsibilities, having regard to individual's knowledge, skills and attitude and the needs of the tasks to be performed 1.5 Set and communicated performance expectations for a range of tasks and duties within the team and provided feedback to team members.
2. Underpinning knowledge	2.1 Company policies and procedures 2.2 Relevant legal requirements 2.3 How performance expectations are set 2.4 Methods of Monitoring Performance 2.5 Client expectations 2.6 Team members' duties and responsibilities
3. Underpinning skills	3.1 Informal performance counselling skills 3.2 Team building skills 3.3 Negotiating skills

4. Required attitudes	4.1 Commitment to occupational health and safety 4.2 Promptness in carrying out activities 4.3 Honesty and honest to duties 4.4 Environmental concerns 4.5 Exposure to harm 4.6 Tolerance and truthfulness 4.7 Respect for rights of peers and seniors in workplace 4.8 Communicate with peers and seniors in workplace.
5. Resource implications	The following resources must be provided: 5.1 Workplace (actual or simulated) 5.2 Tools, equipment and facilities appropriate to processes or activity 5.3 Materials relevant to the proposed activity 5.4 Equipment and outfits appropriate in applying safety measures 5.5 Relevant drawings, manuals, codes, standards and reference material.
6. Methods of assessment	Methods of assessment may include but not limited to: 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 NSDA accredited assessment centre. 7.1 Assessment should be done by NSDA certified 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 ZNQF. 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	[illegible]: **Install Earthing System**
Unit Descriptor	This unit covers the knowledge, skills and attitudes required to install earthing system. It includes preparing for works, installing earthing (bonding) system, Earth Leakage Circuit Breaker (ELCB), lightning / surge arrester and maintaining workplace, tools, equipment and materials.
Nominal Hours	[illegible] Hours
Elements of Competency	Performance Criteria **<u>Bold & Underlined</u>** terms are elaborated in the Range of Variables
1. Prepare for works	1.1 <u>Safe work practices</u> are observed throughout work [illegible]. 1.2 <u>Personal Protective Equipment (PPE)</u> are collected and worn as per job requirement. 1.3 Workplace is prepared as per job requirement. 1.4 <u>Tools, measuring instruments</u> and <u>materials</u> are selected & collected as per job requirement.
2. Perform earthing [illegible]	2.1 Hole is [illegible] of the dimension into the ground as per requirement. 2.2 <u>Earth continuity conductor</u> terminal is fixed with the earth electrode as required. 2.3 Earth electrode is installed with earth continuity conductor into the ground as per diagram. 2.4 Charcoal and salt are mixed and refilled the hole with layers of sand / soil & compact the soil using rammer as required. 2.5 Cable lugs are punched with Earth Continuity Conductor (ECC) and connected with earthing bus bar of MDB as per diagram. 2.6 Connections are re-checked as per circuit diagram & the earth resistance is measured using earth tester.
3. Install Earth Leakage Circuit Breaker (ELCB/RCCB)	3.1 ELCB is fixed on the din rail of the MDB. 3.2 Insulation is removed of cable terminal using wire striper followed by OSH. 3.3 Cable terminal is connected (phase and earth) with the input and output of ELCB to sub circuit bus bar as per diagram. 3.4 Connection is rechecked as per diagram. 3.5 Performance is checked by supplying power.

4. Install lightning surge arrester	4.1 Hole points are marked into the roof of top floor and the hole is made to the mark point using drill machine. 4.2 Swivel bolt is put into the hole & the surge arrester is fixed with swivel bolt. 4.3 Copper conductor is connected with the terminal point of surge arrester. 4.4 Copper conductor is connected between lightning arrester and earthing terminal as per instruction. 4.5 Continuity is checked of lighting arrester using continuity testing device as per standard procedure.
5. Maintain workplace, tools, equipment and materials	5.1 Work area is cleaned in accordance with workplace procedures; 5.2 Unused materials are stored for re-use or disposed following workplace procedures; 5.3 Waste and scrap materials are disposed with following workplace procedures; 5.4 Tools and equipment are cleaned and stored as per manufacturer's recommendation in appropriate location.

Range of Variables

Variable	Range (may include but not limited to)
1. Safe work practices	1.1 Use PPE 1.2 Use fire extinguisher 1.3 Response emergency situation 1.4 Identify hazard 1.5 Control hazards 1.6 Maintain risk 1.7 Use first aid 1.8 Report uncontrolled hazards
2. Personal Protective Equipment (PPE)	2.1 Hand gloves 2.2 Helmet 2.3 Safety shoes 2.4 Goggles 2.5 Apron 2.6 Mask
3. Tools and measuring instrument	3.1 Screwdrivers (Flathead & Phillips) 3.2 Wire Strippers 3.3 Pliers • Nose pliers • Diagonal cutting pliers • Combination pliers 3.4 Electrician's Knife 3.5 Cable Cutters 3.6 Crimping Tool

	1.1 Measuring tape 1.2 Multimeter 1.3 Hammer 1.4 Spirit Level 1.5 Allen Key 1.6 Open ended wrench 1.7 Testing Instruments • Earth tester • Insulation resistance tester
2. Materials	2.1 Earth electrode • Copper plate • GI pipe • GI plate • Aluminium plate • GI Rod • Copper rod • Copper coil 2.2 Potential electrode 2.3 Current electrode 2.4 Copper conductor 2.5 Charcoal 2.6 Salt 2.7 Bus-bar 2.8 Cable
3. Earth continuity conductor	3.1 Copper wire 3.2 GI wire 3.3 Aluminium wire
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 aspect of competency	Assessment required evidence that the candidate: 1.1 demonstrated understanding / interpretation on diagrams and work instructions 1.2 kept the range of earth resistance within 1 to 5 Ohm 1.3 joined copper mesh earth continuity wire with the end part of 1st installed GI pipe as required the copper wire is kept conductive free & reducing oxidet 1.4 used to each joint of GI pipe as standard 1.5 prepared and selected materials tools and equipment commensurate with specification 1.6 selected type of earthing 1.7 dug earth as required 1.8 filled earthing and filled earth as required 1.9 connected earth lead and earth continuity conductor.
2. Underpinning knowledge	2.1 quality of earthing materials. 2.2 Function and types of earthing 2.3 Types of tools equipment required for earthing work 2.4 quantities of materials 2.5 procedure of earth digging. 2.6 installation of earthing plate or pipe or sheet. 2.7 earth lead and earth continuity conductor connection.
3. Underpinning skills	3.1 Maintaining safety procedure 3.2 Using tools and materials for earthing 3.3 Digging earth 3.4 Installing earthing plate or pipe or sheet 3.5 Earth filling 3.6 Earthing connection
4. Required attitudes	4.1 Commitment to occupational safety and health 4.2 Promptness in carrying out activities 4.3 Sincere and honest to duties 4.4 Eagerness to learn 4.5 Tidiness and cleanliness 4.6 Environmental concerns 4.7 Respect for rights of peers and seniors at workplace 4.8 Communication with peers and seniors at workplace
5. Resource implication	The following resources must be available 5.1 workplace (actual or simulated) 5.2 materials and equipment relevant to the proposed activity or task workplace 5.3 tools and equipment appropriate to joint and connection process 5.4 drawings and specifications relevant to the task

6. Methods of assessment	Methods of assessment may include but not limited to: 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 SSDA accredited assessment centre. 7.2 Assessment should be done by a SSDA certified assessor/assessors.

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 qualifications under SSQF. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA.

Unit Code and Title	OC-CON-EEM-02-L3-V1: Perform Internal Emergency Service Wiring
Unit Descriptor	This unit covers the knowledge, skills and attitudes required to perform internal emergency service wiring. It includes preparing for works, installing CCTV System, installing change over switch, performing generator supply connection, installing solar home system, connecting Server Power Supply (PS) line and maintaining workplace, tools, equipment and materials.
Nominal Hours	80 Hours
Elements of Competency	Performance Criteria Bold & Underlined terms are elaborated in the Range of Variables
1. Prepare for works	1.1 Safe work practices are followed throughout the work process 1.2 Personal Protective Equipment (PPE) is used. 1.3 Workplace is prepared as per job requirement. 1.4 Tools, equipment and materials are selected & collected as per job requirement.
2. Install CCTV system	2.1 Power and signal cable are connected to CCTV camera and DVR/NVR as per drawing. 2.2 DVR/NVR is connected with monitor. 2.3 Performance of the system is checked as per standard procedure.
3. Install change over switch	3.1 Installation areas are marked as per drawing and layout. 3.2 Switch is installed between mains and generator power source as per drawing. 3.3 Change over switch performance is checked as per SOP.
4. Perform generator supply connection	3.1 Installation area is marked on the wall surface according to the drawing and layout. 3.2 Insulation of cable is removed as per requirement. 3.3 Cable lug is punched as per work requirement. 3.4 Cable is laid according to the drawing. 3.5 Generator supply is connected with the changeover switch. 3.6 All connections are checked according to the drawing. 3.7 Connections are checked as per standard operating procedure.

5. Install solar home system	4.1 Solar panel installation area is marked and panel is installed in **required angle** as per sunrise to sunset flow; 4.2 Power cable is connected between solar panel and charge controller; 4.3 Charge controller and battery are connected as per drawing; 4.4 Battery and inverter are connected as per drawing; 4.5 Loads are connected as per drawing; 4.6 All connections are checked according to the drawing; 4.7 Performance of the solar home system is checked.
6. Connect Instant Power Supply (IPS) Line	5.1 The cable is laid as per diagram; 5.2 The cable is connected with the IPS system; 5.3 Performance of the installed instant power supply (IPS) is checked as per standard operating procedures.
7. Maintain workplace, tools, equipment and materials	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 Inventory of tools, equipment are conducted and recorded as per checklist; 6.5 Tools and equipment are cleaned and stored as per manufacturer recommendation in appropriate location.

Range of Variables

Variable	**Range** (may include but not limited to)
1. Safe work practices	1.1 Use PPE 1.2 Use fire extinguisher 1.3 Response emergency situation 1.4 Identify hazard 1.5 Control hazards 1.6 Measure risk 1.7 Give first aid 1.8 Report uncontrolled hazards
2. Personal Protective Equipment (PPE)	2.1 Hand gloves 2.2 Helmet 2.3 Safety shoes 2.4 Goggles 2.5 Apron 2.6 Mask

3. Tools	3.1 Multimeter 3.2 Insulation resistance tester 3.3 Pliers set 3.4 Screwdrivers set 3.5 Adjustable wrenches 3.6 Wire splicers 3.7 Knives 3.8 Neon tester 3.9 Hammer 3.10 Mallet
4. Equipment	4.1 Solar panel 4.2 Charge controller 4.3 Battery 4.4 Inverter
5. Materials	5.1 Socket 5.2 Switch 5.3 PVC tape 5.4 Cable
6. Emergency power source	6.1 Generator 6.2 Solar home system 6.3 IPS
7. Required angle	7.1 35° Winter 7.2 17° Spring 7.3 5° Summer 7.4 30° Autumn 7.5 23° in an average
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 aspect of competency	Assessment required evidences that the candidate: 1.1 install change over switch 1.2 perform generator supply 1.3 install solar home system 1.4 connect instant power supply (ips) line 1.5 maintain workplace, tools, equipment and materials 1.6 connected the cable with the load as per power required
2. Underpinning knowledge	2.1 Function and uses of tools and materials 2.2 Different type of cable and their functions 2.3 Emergency service wiring 2.4 Materials used for emergency connection 2.5 Function and uses of change over switch, generator, instant power supply system, solar home system 2.6 Functions and uses of battery, inverter, charge controller in solar home system 2.7 Required angle for solar home system

3. Underpinning skills	3.1 Interpreting drawing and details. 3.2 Preparing materials. 3.3 Using hand tools. 3.4 Splicing cables 3.5 Drawing of cables. 3.6 Terminating cables 3.7 Interpreting products technical manual. 3.8 Laying out the cables.
4. Required attitudes	4.1 Commitment to occupational safety and health. 4.2 Promptness in carrying out activities. 4.3 Initiative and honest to duties. 4.4 Eagerness to learn. 4.5 Tidiness and cleanliness. 4.6 Environmental conscious. 4.7 Respect for rights of peers and seniors at workplace. 4.8 Communicate with peers and seniors at workplace.
5. Resource implication	The following resources must be available: 5.1 workplaces (actual or simulated) 5.2 materials relevant to the proposed activity or task in the workplace 5.3 tools and equipment appropriate to your and consistent in process 5.4 drawings and specifications relevant to the task
6. Methods of assessment	Methods of assessment may include but not limited to: 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 NSDA accredited assessment centre. 7.2 Assessment should be done by a NSDA certified accredited 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 BSQF. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA.

Unit Code and Title	**OC-CON-EIM-03-L2-V1: Perform Installation and Operation of Motor Controller**
Unit Descriptor	This unit covers the knowledge, skills and attitudes required to perform motor connection. It specially includes preparing for work, installing protective devices, installing and connecting motor controller, performing motor testing and maintaining workplace, tools, equipment and materials.
Nominal Hours	**50 Hours**
Elements of Competency	**Performance Criteria** **<u>Bold and Underlined</u>** terms are elaborated in the Range of Variables
1. Prepare for work	1.1 <u>Safe work practice</u> is followed. 1.2 <u>PPE</u> is collected and worn as per job requirement. 1.3 <u>Manuals</u> of controlling and protective devices are collected. 1.4 <u>Drawings</u> and <u>symbols</u> of controlling and protective devices are noted. 1.5 <u>Motor Controller</u> and <u>protective devices</u> for motor connection are identified and selected. 1.6 <u>Tools</u>, <u>equipment</u> and <u>materials</u> are identified and collected. 1.7 Tools, Equipment and Materials are checked for usability.
2. Install protective devices	2.1 Protective devices are selected and collected according to the need of the operation; 2.2 Protective devices are installed according to the layout plan; 2.3 Protective devices are connected as per drawing and instruction.
3. Install and connect motor controller	3.1 Direct on-line starter is prepared and connected with the motor; 3.2 Manual Forward-reverse starter is prepared and connected with the motor; 3.3 Automatic Star-delta starter is prepared and connected with the motor; 3.4 Connections of each controller are checked and confirmed.
4. Perform motor testing	4.1 Continuity test is performed. 4.2 Ground test is carried out. 4.3 Insulation resistance test is carried out. 4.4 Operating performance of motor is checked as per

	standard operating procedure.
7. Maintain workplace, tools, equipment and materials	7.1 Work area is cleaned in accordance with workplace procedures. 7.2 Unused materials are stored for re-use or disposed following workplace procedures. 7.3 Waste and scrap materials are disposed only in locating workplace procedures. 7.4 Inventory of tools equipment are conducted and recorded as per checklist. 7.5 Tools and equipment are cleaned and stored as per manufacturer recommendations in appropriate location.

Range of Variable

Variable	**Range** (may include but not limited to)
1. Safe work practices	1.1 Use PPE 1.2 Use fire extinguisher 1.3 Response emergency situations 1.4 Identify hazard 1.5 Control hazards 1.6 Minimize risk 1.7 Use first aid 1.8 Report uncontrolled hazards
2. PPE	2.1 Hand gloves 2.2 Apron 2.3 Goggles 2.4 Mask 2.5 Safety shoe
3. Manuals	3.1 Manufacturer's specification manual 3.2 Repair manual 3.3 Maintenance procedure manual 3.4 Periodic maintenance manual 3.5 Quality manual 3.6 Manual of instructions
4. Drawings	4.1 Technical drawing 4.2 Sketch 4.3 Electrical drawings 4.4 Connection diagrams
5. Symbols	5.1 Drawing symbols 5.2 Connection symbol 5.3 Load symbol 5.4 Socket symbol 5.5 Main switch symbol

	5.6 Supply symbol 5.7 Danger symbol 5.8 Switch board symbol 5.9 Contact symbol 5.10 Starter symbols 5.11 Protective device symbol 5.12 Motor symbol
6. Motor controller	6.1 Direct on line starter 6.2 Forward reverse starter 6.3 Star-delta starter
7. Protective devices	7.1 MCB 7.2 MPCB 7.3 Thermal over load Relays 7.4 Phase failure relay 7.5 ELCB 7.6 RPCB
8. Tools	8.1 Hand Tools • Adjustable wrench • Wire stripper • Mallet • Hammers (i) Ball pin (ii) Claw • Measuring tapes 8.2 Combination Pliers 8.3 Side cutting pliers 8.4 Diagonal cutting pliers 8.5 Long nose pliers 8.6 Screwdrivers 8.7 Wire gauge/ micrometer 8.8 Neon tester 8.9 Wire stripper 8.10 Power tools • Electric drill machine • Nail gun • Electric grinder 8.11 Soldering iron
9. Equipment	9.1 Multi Meter 9.2 Insulation resistance tester 9.3 Tachometer 9.4 Clamp meter

10. Materials	10.1 Glands 10.2 Connector 10.3 Distribution board 10.4 Motor 10.5 Main switch 10.6 Starter 10.7 Cables 10.8 Cable lug 10.9 Conduit 0.10 Flexible conduit 0.11 Saddle 0.12 Rawl plug 0.13 Wooden screw 0.14 Insulating tape
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 motor controller and protective devices for motor connection 1.2 installed protective devices 1.3 installed and connected motor controller 1.4 performed motor testing 1.5 conducted inventory of tools, equipment and materials as per checklist.
2. Underpinning Knowledge	2.1 Motor starter types 2.2 Diagram of starter connection 2.3 Diagram of protective and controlling devices 2.4 Classification of protective devices and motor controllers 2.5 Drawings, symbols and materials 2.6 Techniques of motor connection 2.7 Motor testing procedures.
3. Underpinning Skills	3.1 Checking suitability of tools and equipment 3.2 Installing and connecting protective devices 3.3 Preparing motor controller 3.4 Checking and confirming connections of motor controllers 3.5 Performing motor tests.

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 thoroughness 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 Materials, tools and equipment needed for the activity 5.3 Drawing, specification and instruction manual.
6. Methods of Assessment	Methods of assessment may include but not limited to: 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 NSDA accredited assessment centre. 7.2 Assessment should be done by NSDA certified assessor.

Accreditation Requirement:

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 qualifications under BSQF. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA.

Unit Code and Title	OC-CON-EEM-04-L3-V1: Perform Motor Servicing
Unit Descriptor	This unit covers the knowledge, skills and attitudes required to perform motor servicing. It includes preparing for works, detecting motor fault, carrying out servicing, carrying out final test, recording the test result and maintaining workplace, tools, equipment and materials.
Nominal Hours	80 Hours
Elements of Competency	**Performance Criteria** **Bold & Underlined** terms are elaborated in the Range of Variables
1. Prepare for works	1.1 Personal Protective Equipment (PPE) is collected and worn as per job requirement; 1.2 Workplace is prepared as per job requirement; 1.3 Tools, materials and equipment are selected and collected as per job requirement.
2. Detect motor fault	2.1 Physical checks of the motor are performed; 2.2 The motor is dismantled as per Standards Operating Procedures (SOP); 2.3 Associated accessories faults are checked as per manufacturer data and actual drive; 2.4 Faults are detected and noted down for reporting and servicing.
3. Carry out servicing	3.1 Stator, rotor, and other parts are cleaned as per instruction manual; 3.2 Dust and grease are removed; 3.3 Replace or repair damaged parts are replaced or repaired as per requirement; 3.4 Components are assembled in correct order and alignment; 3.5 Bearings position and lubrication are secured.
4. Carry out final test	4.1 Continuity test is performed; 4.2 Ground test is carried out; 4.3 Insulation resistance test is carried out; 4.4 Rotor free movement is checked; 4.5 Conduct no-load and load testing to verify performance; 4.6 Measure electrical parameter using measuring instrument; 4.7 static and dynamic balance test of rotor is carried out.
5. Record the test result	5.1 Test result is documented in the relevant recorded sheet; 5.2 Test reports are prepared.

4. Maintain workplace, tools, equipment and materials	4.1 Work area is cleaned in accordance with workplace procedures; 4.2 Unused materials are stored for re-use or disposed following workplace procedures; 4.3 Waste and scrap materials are disposed with following workplace procedures; 4.4 Tools and equipment are cleaned and stored as per manufacturer's recommendation/appropriate location.
Range of Variables	
Variable	**Range** (may include but not limited to)
1. Personal Protective Equipment (PPE)	1.1 Hand gloves 1.2 Helmet 1.3 Goggles 1.4 Safety shoes 1.5 Safety belt 1.6 Apron 1.7 Safety harness
2. Tools	2.1 Adjustable wrench 2.2 Wire stripper 2.3 Hammer 2.4 Combination plier 2.5 Screwdriver 2.6 Neon tester 2.7 Screw jump 2.8 Bearing puller 2.9 Circlip plier
3. Materials	3.1 Wire 3.2 Connector 3.3 Cables 3.4 Insert 3.5 Plug
4. Physical checks	4.1 Noise test 4.2 Temperature test
5. Motor	5.1 Single-phase induction motor 5.2 Three phase induction motor
6. Associated accessories	6.1 Bearings 6.2 Couplings 6.3 Motor starters 6.4 Capacitors 6.5 Cooling fans 6.6 Terminal boxes

	6.7 Measuring beam or brackets 6.8 Shaft seals
7. Damaged parts	7.1 Winding 7.2 bearings 7.3 Insulation 7.4 Cooling Fins 7.5 Terminal Box 7.6 Terminal connection 7.7 Capacitor 7.8 Capacitor boxes
8. Electrical Parameter	8.1 Voltage 8.2 Current 8.3 Speed 8.4 temperature rise
9. Measuring Instrument	9.1 Multimeter 9.2 Wattmeter 9.3 Insulation resistance tester 9.4 Clip on meter 9.5 Tachometer 9.6 Thermometer

Evidence Guide

The evidence must be authentic, valid, sufficient, reliable, consistent, current and meet all requirements of current version of the Unit of Competency.

1. Critical aspect of competency	Assessment required evidence that the candidate: 1.1 prepared workplace as per job requirement 1.2 identified the motor fault 1.3 carried out servicing 1.4 carried out final test 1.5 recorded the test result 1.6 maintained workplace, tools, equipment and material
2. Underpinning knowledge	2.1 Function and type of tools and instrument. 2.2 Procedure of using electrical measuring instrument 2.3 Types of Electric Motors 2.4 Motor Nameplate Details 2.5 Types and causes of the motor faults. 2.6 Types of tests 2.7 Resistance (R) 2.8 Inductance (L) 2.9 Insulation resistance (IR test) 2.10 Voltage drops 2.11 Capacitor Ratings (for single-phase motors) 2.12 Motor Accessories 2.13 Control devices and protective devices
3. Underpinning skills	3.1 Handling Tools and measuring instrument.

	3.2 Dismantling motor components 3.3 Identifying fault 3.4 Repairing fault 3.5 Checking and testing 3.6 Assembling motor components.
4. Required attitudes	4.1 Commitment to occupational safety and health 4.2 Promptness in carrying out activities 4.3 Interest and accent to duties 4.4 Eagerness to learn 4.5 Tidiness and neatness 4.6 Environmental concerns 4.7 Respect for rights of peers and seniors at workplace 4.8 Communication with peers and seniors at workplace.
5. Resource implication	The following resources must be available: 5.1 workplace (actual or simulated) 5.2 tools, equipment and materials appropriate to work activities 5.3 drawings and 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 6.4 portfolio.
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 accredited assessment 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 qualifications under SNQF. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA.

Reference:

- CO of Bangladesh Technical Education Board (BTEB)
- CO of National Skills Development Authority (NSDA)

Development of Competency Standard

The Competency Standards for National Skills Certificate Level-[illegible] in Electrical Installation & Maintenance is developed by NSDA on 13 April, [illegible].

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Validation of Competency Standard

The Competency Standards for National Skills Certificate Level-[illegible] in Electrical Installation & Maintenance is reviewed and validated by [illegible] on [illegible] April, 20[illegible]

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