Competency Standards

For

Electrical Technician

Table of Contents

Title A: Maintain Safety

Overview: This Competency Standard identifies the competencies required to maintain safety at workplace by Electrical Technician, in accordance with the organization's approved guidelines and procedures. Trainee will be expected to maintain personal safety, Maintain Safety of Tools & Equipment, Maintain Safety of Wiring & Cables, Perform Lockout Tag out (LOTO), Maintain Safety of Workplace at all times. Your underpinning knowledge regarding maintaining safety will be sufficient to provide you the basis for your work.

Unit of Competency	Performance Criteria	Knowledge	Tools & Equipment
A1.Maintain Personal Safety	Trainee will be able to: P1. Identify hazards associated with tasks (task hazards analysis) and their removal according to standard format P2. Interpret work permit in terms of working conditions correctly. P3. Select personal protective equipment (PPEs) in terms of type and quantity according to work permit P4. Ensure normal functioning of personal protective equipment at the time of selection P5. Follow standard operating procedures while using (PPEs). P6. Ensure (PPEs) is cleaned and stored at designated place.	Trainee will be able to: K1. Explain the Henric triangle and behavior based safety K2. Identify basic hazards (e.g falling hazards, fire, slip/trip, struck by etc.) K3. Explain (PPEs) usage K4. Explain standard operating procedures (SOPs) regarding personal safety K5. Describe basics of occupational health and safety	Helmets, safety shoes, safety goggles, gloves, ear plugs, face masks, first aid kit, safety belts, overall, fire suit (if necessary), radiation films, different types of fire extinguishers, fire hydrants, fire drills (emergency response), training manuals related to Task Hazards Analysis (THA) and Henric Triangle
A2. Maintain Safety at Workplace	Trainee will be able to: P1. Perform removal of hazards according SOPs P2. Barricade work area to restrict the entry of unconcerned people P3. Keep workplace clean and tidy	Trainee will be able to: K1. Identify hazards associated with tasks (task hazards analysis) K2. Describe the 5S (sort, set in order, shine, standardize, sustain) tool K3. Identify basic hazards (e.g, fire, earthquake, lightening, chemical spillage etc.) K4. Explain usage of safety equipment and tools	Fire extinguisher, fire hydrants, smoke detectors, fire alarm, emergency exit plan, PPEs, barriers with barricading tape, earthquake detectors

Unit of Competency	Performance Criteria	Knowledge	Tools & Equipment
A3. Maintain Safety of Tools & Equipment	Trainee will be able to: P1. Select right tools specific to job P2. Clean tools and equipment after usage for inspection P3. Place tools and equipment at safe and designated location P4. Verify the readings of instruments against calibrated instrument	Trainee will be able to: K1. Identify tools according to their usage/range K2. Interpret safety instructions from manuals for inspection purpose K3. Describe the 5S (sort, set in order, shine, standardize, sustain) tool K4. Describe purpose of calibration	All tools & equipment, safety manuals, SOPs,
A4. Maintain Safety of Wiring & Cables	Trainee will be able to: P1. Select the cable according to connected load P2. Select safe route and layout for cabling P3. Joint cables according to load and surroundings P4. Ensure the earthing of cable channels	Trainee will be able to: K1. Interpret cable ampacity chart K2. Identify hazards (temperature, moisture etc) related to electrical wires and cables K3. Describe purpose of different routes for power and communication cables K4. Differentiate between control cables and power cables K5. Explain different types of insulations and sheaths K6. Describe purpose of earthing	Cable ampacity [cable& Cable] chart , thermal imager, temperature gun, megger, clamp meter, voltmeter
A5. Perform Lockout Tag out (LOTO)	Trainee will be able to: P1. Follow instructions mentioned on work permit for LOTO P2. Select relevant circuit breaker to power off the worked area P3. Use PPEs according to work requirement P4. Display work permit at visible place P5. Unlock LOTO and report to person concerned. P6. Dry run the machine after removal of LOTO	Trainee will be able to: K1. Explain SOP+ of LOTO K2.describe methods of extracting information from drawing for isolating the power source	Electrical drawing, Work permit, locks, tags, signs, PPEs

Title B: Perform Electrical Preventive Maintenance Operations (EPM)

Overview: This Competency Standard identifies the competencies required to Perform Electrical Preventive Maintenance Operations (EPM), at workplace by Electrical Technician, in accordance with the organization's approved guidelines and procedures. You will be expected to Perform sensory controls, Perform Inspection with Tools & Equipment, Fill in Preventive Performa as per Requirement, Repair / Replace Faulty Parts of Equipment, Maintain spare parts record for back up services at all times. Your underpinning knowledge regarding Electrical Preventive Maintenance Operations (EPM)will be sufficient to provide you the basis for your work.

Unit of Competency	Performance Criteria	Knowledge	Tools & Equipment
B1. Check machine condition through sensory	Trainee will be able to: P1. Use following senses to inspect the machine/equipment • Visual for gauges, motors direction • Hearing for vibration, noise • Touch for temperature, vibration • Smell for burning P2. Document the area of improvement after inspection of machine/equipment/worked areas P3. Follow the safety and procedural instructions for preventive activities	Trainee will be able to: K1. Describe normal and abnormal behavior of electrical equipment K2. Describe how to perform inspection as per inscribed instructions K3. Describe the concept of kaizen	Procedural instructions, equipment catalogs, inscribed instruction documents, PPEs
B2. Perform Inspection with Tools & Equipment	Trainee will be able to: P1. Select tools and equipment required for inspection of job P2. Evaluate previous preventive data for maintenance (machine data trouble card) P3. Carry out inspection with tools and equipment following vendor's preventive guidelines P4. Follow safety instructions and procedural guidelines for preventive measures	Trainee will be able to: K1. Describe types and use of different inspection tools and equipment K2. Describe electrical functioning of different machines and equipment K3. Explain inspection procedure for electrical equipment (e.g. motors, transformers, switch gears, valves and sensors)	Multimeter, laser temperature gun, ampere meter, megger meter, vibrometer (stethoscope), tachometer, earth resistance tester, PPEs, overload relays, CT and PTs

Unit of Competency	Performance Criteria	Knowledge	Tools & Equipment
		K4. Define overloads relays, Current transformers (CT) and potential transformers (PT)	
B3.Fill in Preventive maintenance Performa as per Requirement	Trainee will be able to: P1. Conduct why-why analysis for identifying root cause P2. Fill in the Performa for preventive maintenance according to provided format P3. Submit the performance for preventive maintenance to the concerned person for approval	Trainee will be able to: K1. Describe the basics of cause and effect for common electrical faults K2. Describe Organizational guidelines and policies regarding fill in the Performa	Preventive maintenance Performa, Multimeter, laser temperature gun, ampere meter, megger meter, vibrometer (stethoscope), tachometer, earth resistance tester, PPEs
B4.Repair / Replace Faulty Parts of Equipment	Trainee will be able to: P1. Interpret machine data trouble card to get the machine/equipment troubleshooting/maintenance history P2. Communicate (verbal) the findings of machine data trouble card to the concerned person P3. Identify the faulty part/component of the equipment as per service manual P4. Fill in the corrective maintenance performa to submit for approval P5. Repair or replace the faulty part(s) of job as per service manual P6. Apply safety rules and regulations as per SOPs	Trainee will be able to: K1. Explain electrical working of job K2. Describe purpose of data trouble card K3. Interpret the information from service manual and parts catalog K4. Describe the purpose of corrective maintenance performa	screw drivers, plier set, socket spanners, Allen Key set, ring spanners, torque rod, tong tester, avometer, service manuals, parts catalog, operation manual
B5. Maintain record of spare parts for back up services	Trainee will be able to: P1. Extract the information from machine data trouble card to maintain the inventory of parts P2. Communicate spare parts requirement to maintenance store for inventory maintenance	Trainee will be able to: K1. Define the purpose of parts catalog K2. Describe the purpose of maintenance of inventory K3. Explain methods for identifying the quality	Parts catalog, corrective maintenance card, machine data trouble card, purchase requisition (PR), ICT

Unit of Competency	Performance Criteria	Knowledge	Tools & Equipment
	P3. Check the quality of spare parts to identify original and fake products by using online and offline techniques	of parts (ICT, equipment manuals, market survey, vendor certificate etc)	

Title C: Perform Electrical Wiring

Overview: This Competency Standard identifies the competencies required to Perform Electrical Wiring at workplace by Electrical Technician, in accordance with the organization's approved guidelines and procedures. You will be expected to Read / Interpret Drawing, Arrange Resources for electrical wiring, Perform Wiring (Domestic & Industrial), termination and tagging, Perform Wire Dressing, Perform Checking & Testing of electrical wiring at all times. Your underpinning knowledge regarding electrical wiring will be sufficient to provide you the basis for your work.

Unit of Competency	Performance Criteria	Knowledge	Tools & Equipment
C1. Read / Interpret Drawing	Trainee will be able to: P1. Differentiate between control and power wiring as per job requirement P2. Perform preliminary marking before termination of cables P3. Follow drawing to perform wiring and for reporting/record purpose	Trainee will be able to: K1. Explain electrical symbols K2. Describe different types of drawings (e.g. power, control, single line etc.) K4. Describe how to prepare drawing if not available	Electrical drawing, , Computer
C2. Arrange Resources for electrical wiring	Trainee will be able to: P1. Enlist and arrange tools and material as per job P2. Arrange work permit for the wiring task P4. Arrange backup resources for lighting, power and safety purposes as per job requirement	Trainee will be able to: K1. Describe types of breakers, contactors, relays etc. K2. Describe standard tools used in wiring K3. Describe usage of back up resources including Emergency lights, ladder, safety belts etc	Emergency lights, ladder, drill machine tool kit
C3. Perform Wiring (Domestic & Industrial), termination and tagging	Trainee will be able to: P1. Perform Wiring using following methods: • Concealed • Conduit • Busway • Open	Trainee will be able to: K1. Explain different types of wiring techniques including: • Concealed • Conduit • Busway	Thimble puncher, shroud, PVC tape, HT tape, thimbles, cable knife, wire stripper, drill machine, PPE

Unit of Competency	Performance Criteria	Knowledge	Tools & Equipment
	• Duct P2. Follow procedure to remove insulation and to attach thimbles P3. Perform different types of terminations including • High tension (HT) • Low tension (LT) • Control shrouding • Sleeves P4. Perform different types of joints • High tension • Low tension • Water proof/under ground • Open P5. Attach tags or numbers to wires for identification P6. Use personal protective equipment as per job requirement	• Open • Duct K2. Describe purpose of color coding and tagging during wiring K4. Describe types and size of thimbles and use of thimble puncher K5. Explain Termination techniques for HT, LT, Control shrouding, sleeves K6.describe Jointing techniques for HT, LT	
C4. Perform Wire Dressing	Trainee will be able to: P1. Maintain distance between power, communication and control wires according to job requirements P2.perform alignment of cables as per job requirement	Trainee will be able to: K1. Describe purpose of distancing K2. Describe purpose of cable alignment	Cable tie, clamps, plier, cutter, spiral/ flexible pipes, tie base, ravel bolt, ravel plug, hilty bolt, wooden screw, PPEs
C5. Perform Checking & Testing of electrical wiring	Trainee will be able to: P1.Check continuity using line of terminal	Trainee will be able to: K1. Describe Importance of terminals	AVO meter, test lamp, earth tester, line tester, PPE, megger

Unit of Competency	Performance Criteria	Knowledge	Tools & Equipment
	P2. Perform test to identify open/close circuits P3. Perform live test for verification of wiring P5. Verify proper grounding / Panel Earthing (PE) on designated locations	K2. Describe open, close circuits and testing procedures K3. Describe Importance of controlled live test K4.Describe Importance of grounding	

Title D: Install Electrical System

Overview: This Competency Standard identifies the competencies required to Install Electrical System at workplace by Electrical Technician, in accordance with the organization's approved guidelines and procedures. You will be expected to Read / Interpret electrical layout, Arrange Resources for electrical equipment installation/dismantling, Perform Electrical Panel Installation, Perform Cable Installation / Dismantling, Perform Electrical Appliances Installation, Perform Electrical equipment Dismantling, Perform Earthing, Provide Power Supply to machine. Your underpinning knowledge regarding installation of electrical system will be sufficient to provide you the basis for your work.

Unit of Competency	Performance Criteria	Knowledge	Tools & Equipment
D1. Read / Interpret Electrical Layout	Trainee will be able to: P1. Interpret layout of the job for installations P2. Read/interpret electrical drawing for electrical wirings P3. Follow drawing to connect components of equipment	Trainee will be able to: K1. Define electrical symbols to be used in drawings K2. Describe types of drawings (civil, electrical and communication) for the job K3. Explain connection scheme of the job	Drawings, operations manuals
D2. Arrange Resources (e.g. Power Supply, Tools & Equipment) for electrical equipment installation/dismantling	Trainee will be able to: P1. Develop a list of required resources as per layout P2. Prepare purchase requisition according to job specification (quality, quantity) P3. Inspect items specifications against the purchase requisition	Trainee will be able to: K1. Explain all types of drawings (civil, electrical and communication) K2. Explain the hierarchy of the organization to rectify the issues (if occurred) K3. Describe the quality standards of original products K4. Describe the quantity of products against purchase requisition	Layouts, ICT, measuring tools (calipers, cable chart, hand hacksaw, measuring tape, laser gun for length), quality standards, vendor certificate, grinding cutter, drill machines, hammer
D3. Perform Electrical Panel Installation	Trainee will be able to: P1. Extract information from layout regarding panel installations P2. Place the panel according to layout P3. Connect input and output of cables in relevant panels as per electrical layouts	Trainee will be able to: K1. Define electrical symbols to be used in drawings K2. Describe types of drawings (civil, electrical) for machine K3. Explain handling techniques for placement	Layouts, lifters, chain-pully, jacks, sprit level

Unit of Competency	Performance Criteria	Knowledge	Tools & Equipment
		of panels	
D4. Perform Cable Installation	Trainee will be able to: P1. Interpret layouts for cable route P2. Handle cable for laying with the help of stacker P3. Tag both ends of cables for cable tracing P4. Lay cables in cable trays according to route plan P5. Perform testing of cables e.g. insulation, continuity etc	Trainee will be able to: K1. Describe all the types of drawings (civil and electrical) K2. Describe the safe handling techniques of cable routing K3. Explain the different methods of cable testing	Layouts, measuring tools, cutting tools like wire cutter, side cutter, cable cutter, thimble presser, megger,, stacker, tags, glands, shrouds, conduits, cable tray etc
D5. Perform Cable Dismantling	Trainee will be able to: P1. Interpret layouts for cable route P2. Disconnect electric supply from the job P3. Handle cable for laying with the help of stacker P4. Tag both ends of cables for cable tracing P5. Remove cables in cable trays according to route plan	Trainee will be able to: K1. Describe different the types of drawings e.g. civil and electrical etc. K2. Describe the safe handling techniques of cable routing	Layouts, cutting tools e.g. wire cutter, side cutter, cable cutter, stacker, tags etc.
D6. Perform Electrical Appliances Installation	Trainee will be able to: P1. Interpret vendor's user manual for electrical installations P2. Coordinate with concerned departments before installations for feedback P3. Connect cables with machines as per operation manual P4. Verify the connections with respect to color coding/tagging/numbering	Trainee will be able to: K1. Describe methods of installing the electrical appliances K2. Describe basic knowledge of electrical appliances (A/C, water dispensers, microwave overn etc) K3. Describe the different types of coding procedures (e.g. colour coding/tagging/numbering)	Drawing, layout, manual, fork lifter, drill machine, PPE
D7. Perform Electrical equipment Dismantling	Trainee will be able to: P1. Extract information from layouts regarding electrical equipment dismantling P2. Disconnect input/output cables of relevant	Trainee will be able to: K1. Describe different the types of drawings e.g. civil and electrical etc. K2.Enlist appropriate positions of tags for	Layouts, lifters, chain-pully, jacks, tags

Unit of Competency	Performance Criteria	Knowledge	Tools & Equipment
	equipment P3. Remove equipment from location as per SOPs P4. Handle removed equipment as per manufacturers' instructions P5. Place tags on dismantled items as per SOPs P6. Store the dismantled equipment at designated place	visual controls	
D8. Perform Earthing	Trainee will be able to: P1. Perform earthing of cables according to calculated load P2. Perform earthing of electrical appliances according to calculated load P3. Perform earth resistance test as per standards	Trainee will be able to: K1. Explain earthing and testing procedures K2. Describe working principle of earth tester	Soldering, earth tester, thimble presser, PPE
D9. Provide Power Supply to machine	Trainee will be able to: P1. Interpret electrical drawings for power supply distribution P2. Perform power distribution according to drawings P3. Perform verification of electrical supply as per operations manual P4. Perform communication with all concerned persons for electrical appliance dry-run	Trainee will be able to: K1. Explain Describe different the types of drawings e.g. civil and electrical etc. K2. Explain verification parameters according to standards K3. Explain the importance of communication with relevant persons	Drawings, multi meters, PPE

Title E: Perform Troubleshooting

Overview: This Competency Standard identifies the competencies required to perform troubleshooting at workplace by Electrical Technician, in accordance with the organization's approved guidelines and procedures. The trainee will be expected to Obtain Problem Specific Documents, Perform Fault Diagnoses of machine . Prepare Work Completion Report at all times. Your underpinning knowledge regarding installation of electrical system will be sufficient to provide you the basis for your work.

Unit of Competency	Performance Criteria	Knowledge	Tools & Equipment
E1. Obtain Problem Specific Documents (Instructional Manual, Work Order)	Trainee will be able to: P1. Perform work order assessment as per priority P2. Collect relevant documents for troubleshooting of the job P3. Collect machine data trouble card from operations department	Trainee will be able to: K1. Describe how to prioritize the multiple jobs K2. Interpret machine manual and drawings K3. Enlist and briefly describe terminologies used by machine operator K4. Describe basic functions of machine	Work order, machine manuals, electrical drawing, operator fault register
E2. Perform Fault Diagnosis of the job/machine/equipment (electrical, mechanical, instrumental)	Trainee will be able to: P1. Perform preliminary assessment based on machine data trouble card P2. Follow Original Equipment Manufacturer (OEM) Service Manual of machine/equipment for troubleshooting P3. Inspect the equipment from inside and outside using visual aids and standard lab equipment for identification of mechanical/instrumental dependent electric fault P4. Observe behavior of component/part of equipment/machine at testing terminals of electrical equipment P4. Adopt safety measures	Trainee will be able to: K1. Describe the basics of Machine operations K2. Describe physical indications of electrical faults and abnormalities K3. Describe the basic functions of Gauges, valves, belt, bearing e.g. VFDs PLCs, relays, control, motors etc K4. Interpret the service manual of relevant machine/part K5. Describe the required power and phase sequence K6. Describe the working principles of lab test bench	Machine fault register, standard tool kit, avo meter, star set, tester

Title F: Repair Electrical Equipment

Overview: This Competency Standard identifies the competencies required to repair electrical equipment at workplace by Electrical Technician, in accordance with the organization's approved guidelines and procedures. You will be expected Repair / Replace faulty components and perform testing, checking and verification of electrical equipment at all times. Your underpinning knowledge regarding repairing of electrical equipment will be sufficient to provide you the basis for your work.

Unit of Competency	Performance Criteria	Knowledge	Tools & Equipment
F1. Repair / Replace faulty Components/parts of electrical equipment/machine/ job	Trainee will be able to: P1. Verify the identified faults by: • Bypassing • Direct input jumpers • Secondary injector P2. Prepare and follow the work permit for repairing/replacing faulty parts P3. Repair /replace the defective component P4. Perform safety measures to avoid any damage to the equipment P5. Perform dry-run or jog-mode of equipment/machine/job of task after repairing/replacement as per SOPs	Trainee will be able to: K1. Explain the purpose of verification techniques including by-passing specific equipment when required, by direct input jumpers, secondary injector K2. Describe hazards involved in the repair activity K1. Describe the safety measures according to operations manual K3. Describe the different types of testing procedures	Work permit, tool kit, LOTO, PPEs , safety manuals, megger, avo meter, regulated power supply (AC and DC), clamp meter
F2. Prepare Work Completion Report	Trainee will be able to: P1. Collect relevant information on-field for reporting P2. Prepare report as per following: • Time of reporting	Trainee will be able to: K1. Describe equipment specification e.g. motor KW rate, current etc. K2. Describe how to make report both on paper/PC	Report register, PC

Unit of Competency	Performance Criteria	Knowledge	Tools & Equipment
	• Observation of operation staff • Observation of shift staff • Specification of machine • Type of fault, fault history and root cause • Details of action plan • Specification of faulty equipment • Dry run report • Remarks of operation staff P3. Communicate this report to concerned person/department via proper channel e.g shift register, SMS etc.		

Title G: Develop Professionalism

Overview: This Competency Standard identifies the competencies required to develop professionalism at workplace by Electrical Technician, in accordance with the organization's approved guidelines and procedures. You will be expected to Collect information of the task in work permit, Plan the task based on the work permit, perform task by applying SOP, evaluate quality of work, communicate with others in Urdu and English in appropriate terms, upgrade skills and knowledge at all times. Your underpinning knowledge regarding developing professionalism will be sufficient to provide you the basis for your work.

Unit of Competency	Performance Criteria	Knowledge	Tools & Equipment
G1. Plan the task based on the work permit	Trainee will be able to: P1. Coordinate with other involved departments P2. Organize PPEs P3. Identify required tools, accessories and material in terms of type and quantity.	Trainee will be able to: K1. Personal protective equipment K2. Tools to be used K3. Accessories	Work permit. Tools. PPEs
G2. Evaluate quality of work	Trainee will be able to: P1. Ensure safety measures are taken care of. P2. Select appropriate method and techniques for assessing the quality of work. P3. Check functions and achievement of parameters. P4. Perform housekeeping according to organization's procedures.	Trainee will be able to: K1. Work requirements K2. Troubleshooting procedures K3. Importance of function, dimension, safety and workplace tidiness K4. Procedures of measurement and testing.	Marking sheet / rubrics Testing tools
G3. Communicate with others in Urdu and English in appropriate terms	Trainee will be able to: P1. Use positive and clear communication with stake-holders P2. Develop effective working relationship with others P3. Convey information professionally and technically within team and with other departments.	Trainee will be able to: K1. Read, write and speak Urdu and English K2. Manners of speaking and discussing K3. 7Cs of communication K4. Coordinate well in the work environment	Language Lab

Unit of Competency	Performance Criteria	Knowledge	Tools & Equipment
G4. Upgrade professional skills and knowledge	Trainee will be able to: P1. Utilize available documentation to update knowledge. P2. Seek help and direction from supervisors / technically skilled one. P3. Analyze information and choose best solution. P4. Attend training programs and workshops. P5. Research information using computer/internet.	Trainee will be able to: K1. Means of updating knowledge and skill K2. Different training / skills development program	Computer , Internet connection, Book and manuals, Discussion

List of Tool, Equipment and Machinery

1. Plier
2. Star Kit (Screw Driver Set)
3. Combination plier
4. Side Cutter
5. Nose Plier
6. Cable Knife
7. Wire Striper
8. Hydraulic thimble presser
9. Thimble Plier
10. Hand Hold Tag Printer
11. Drill Machine Hand /Pedestal
12. Hilti Drill machine
13. Hammer
14. Hacksaw
15. L-Key Set
16. Avo Meter
17. Power factor meter
18. Ampere Meter
19. Volt meter
20. Test Lamp
21. Megger Meter
22. Phase Tester
23. Spanner Set
24. Screw Wrench
25. Measuring Tape
26. Round Plier
27. P.F Meter
28. Air Blower
29. Heater Blower
30. Bearing Puller

31. Capacitor Tester
32. Vernier Caliper
33. Wire Gauge
34. Multi Meter
35. AC & DC Motors
36. Circuit Boards
37. Generator
38. Safety belts and hinge
39. Gloves
40. Goggles
41. Ear plugs and muffs
42. Grinder
43. Wall cutters
44. Chisel
45. Hand Saw
46. Safety Helmet
47. Hydro Meter
48. RPM Meter / Techo Meter
49. Shoes
50. Soldering Iron
51. Vibro Meter / Stethoscope
52. IR Thermal Imager
53. Laser Temperature Gun
54. Stroboscope