

Construction Electrician LV - NSQF LEVEL: 4

CURRICULUM / SYLLABUS – Duration: 68 Hours Bridge Course

Qualification Pack Name & Reference ID. - CON/Q0603

Aim: This program is aimed at training candidates for the job of a “Construction – Electrician-LV” in the “Construction” Sector/Industry and aims at building the following key competencies amongst the learner

Pre-requisites to Training

Preferably 10th Standard with Low Voltage electrical work license from recognized licensing authority with 9 years site experience in same occupation for Trained worker/ 3 years site experience as a certified Assistant Electrician L3 for Non trained worker

After completing this programme, participants will be able to:

- Lay (single/ three phase) cable and install equipment at construction sites – Introduction to standard practices of cable laying at construction sites and
- Inspect and maintain construction equipment as per requirement – Detailed concept about components of common construction equipment’s and their electrical maintenance
- Carry out LV electrical wiring and assist in building electrification works – Concept of domestic wiring and installation of electrical fixtures as part of wiring
- Work effectively in a team to deliver desired results at the workplace: - Organised working procedure within a team at site
- Plan and organize work to meet expected outcomes: - Prioritizing activities and organising resources to meet desired outcome.
- Work according to personal health, safety and environment protocol at construction site: - Importance of Health & Safety aspects & measures to be followed while working.

S.No.	Module	Key Learning Outcomes	Equipment Required
1	Introduction Theory Duration (hh:mm) 2:00 Practical Duration (hh:mm) 00:00	<ul style="list-style-type: none"> • Role description/ functions of the job role • Expected personal attributes from the job role • Brief description about course content, mode of learning and duration of course • Future possible progression and career development provisions on completion of the course <p>Theory:-</p> <ul style="list-style-type: none"> • Ohm’s Law - Simple electrical circuits and problems • Resistors -Laws of Resistance. Series, parallel and combination circuits • Effect of variation of temperature on resistance. • Different methods of measuring the values of resistance. • Types & properties of resistors • Specific Resistance 	<p><u>Infrastructural requirements</u></p> <p>Seating arrangement for</p> <ol style="list-style-type: none"> 1. participants capacity of 30 trainees 2. Black/White board 3. Projector/LED Monitor 4. Computer/Laptop

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		<ul style="list-style-type: none"> • Magnetism - classification of magnets, methods of magnetising, magnetic materials • Principle of electro-magnetism ☑Maxwell's corkscrew rule • Fleming's left and right hand rules • Magnetic field of current carrying conductors • loop and solenoid • MMF, Flux density, reluctance • B.H. curve, Hysteresis, Eddy current • Electrostatics: Capacitor - Different types, functions and uses. • Types of drills and description of drilling machines, proper use, care and maintenance. Description of taps and dies, • Use of thread gauge <p>Demonstration/ Practical (D/P): -</p> <ul style="list-style-type: none"> • Demonstration of Ohm's Law, • Demonstration of laws of series, parallel and combination circuits • Identification of different types of Capacitors. • Charging and discharging of capacitor, Testing of Capacitors using DC voltage and lamp 	
2	<p>Lay (single/ three phase) cable and install equipment at construction sites</p> <p>Theory Duration (hh:mm) 2:00 Practical Duration (hh:mm) 11:00</p> <p>Corresponding NOS Code CON/N0608</p>	<p>Theory:-</p> <ul style="list-style-type: none"> • Introduction to applicable Indian standard code of practice (electrical works) • Introduction to wiring symbols used in single and tree phase electrical diagrams • Concept regarding correct techniques of interpreting electrical diagrams regarding electrical circuits and manufacturer's instructions • Concept of electrical diagram and quantity estimation of required resources from details provided • Voltage grading of different types of Insulators, Temp. Rise permissible • Applicable safety and environmental norms to LV electrical works at construction sites which include • Safety procedures while laying and joining cables • Safety procedures related to electrical isolation • Safety procedures related to termination of cable • Standard method of electrical cable laying at construction site and activity sequences to be followed which includes, • Checking and selection of materials, fixtures, tools and equipment's to be deployed • Acceptance criteria to be followed while selecting materials, fixtures or tools for cable laying 	<p>Hand tools: -</p> <ol style="list-style-type: none"> 1. screw drivers 2. wire cutters 3. wire strippers 4. pliers 5. hammers 6. hacksaws 7. chisels 8. spanners (set) 9. wrenches <p>Measuring Instruments</p> <ol style="list-style-type: none"> 10.measuring tape 11.spirit level 12.plumb-bob 13.mason's line 14.Measuring Devices 15.multi-meter 16.voltage tester <p>Power Tools</p> <ol style="list-style-type: none"> 17.drilling machine 18.hand cutting machine <p>Materials and Fixtures</p> <ol style="list-style-type: none"> 19.Cables 20.Wires 21.Sockets 22.switches 23.lights 24.conduits (flexible and rigid) 25.raceways 26.Equipment 27.Vibrators

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		<ul style="list-style-type: none"> • Method of selecting cable laying path/ inspecting work area (safety and aspects to be considered while laying cable) • Key preparatory works to be completed before commencing laying of cable • Activities involved in cable laying and their sequence • Type of cables (single/ 3 phase) used as per electrical load • Sequence to be followed while undertaking cable laying work in a construction site • Standard practice of safeguarding installed electrical equipment's from external damaging effects • Selection and use of electrical fixtures such as circuit breakers, starters, relays etc. and their power rating as per circuit voltage requirement • Selection of method and type of electrical earthing to be adopted for installed electrical equipment's • Selection of electrical testing to be undertaken during inspection and trial run of the installed equipment • Selection of electrical testing/ diagnostic devices as per tests to be undertaken • Selection and use of safety gears provided with equipment's by manufacturer <p>Demonstration/ Practical : -</p> <ul style="list-style-type: none"> • Reading and interpretation of electrical cable laying arrangement • Demonstration and identification of types of cables. • Demonstration and practice on using standard wire gauge & micrometre. • Practice on crimping thimbles, Lugs. • Deciding cable laying method to be adopted and resource required for the activities involved in the same keeping following • Determining quantity and listing of required electrical materials/ consumables for cable laying activity along with their electrical specification • Deciding time requirement for cable laying activity • Describing key safety aspects to be inspected before cable laying • Obtaining required material, tools and electrical fixtures according to the plan of laying • Confirming completion of preparatory works and all relevant safety procedures • Carry out electrical isolation as per laid down working practices • Conducting cable laying as per plan ensuring all quality and safety aspects 	<p>28.bar cutting machine 29.bar bending machine 30.water pumps</p>
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		<ul style="list-style-type: none"> • Practice joining of cable by straight through joint using appropriate tools • Connecting electrical equipment by cables and perform termination of cable as per standard practice • Install electrical fixtures and protective devices as per job requirement • Connecting electrical cable to the power source and terminate the cable using appropriate cable termination fixtures • Check equipment for installed safety gears and devices and ensure their safe condition and proper functioning 	
3.	<p>Inspect and maintain construction equipment as per requirement</p> <p>Theory Duration (hh:mm) 2:00</p> <p>Practical Duration (hh:mm) 12:00</p> <p>Corresponding NOS Code CON/N0609</p>	<p>Theory:-</p> <ul style="list-style-type: none"> • Common construction equipment's used in construction sites which includes • Pumps o Motors • Bar Bending machine • Bar shearing machine • Vibrators • Temporary electrical panels • Details of power rating of electrical circuits and manufacturers guidelines provided • Respective use of such equipment's and possible hazards involved in their operations • Introduction to key mechanical and electrical components of mentioned equipment's • Power rating of electrical components and fixtures used in mentioned equipment's • Type of connections and tests to be carried out in capacitive, inductive AC and DC circuits • Concept of different types of motors, their uses and working principles • concept of star, delta connection and their uses in electrical circuits • concept and working principle of various type of starters used in DC motors such as 3point, 4 point etc. • Concept and working principle of various type of starters used in 3 phase squirrel cage induction motors such as DOL, Star-Delta etc. • Working principle of different types 3 phase transformers, connections (star- star, delta-delta, delta-star) and their components • Basic concept of application of respective transformers and relevant terminologies like magnetic flux, winding, current and voltage ratio, core and shell construction etc. • Different methods of earthing including measurement of earth resistance by earth tester, testing of earth Leakage by ELCB and relay, etc. • Use of MCB, RCCB and ELCB in equipment, their working principles and power ratings 	<p>Hand tools: -</p> <ol style="list-style-type: none"> 1. wall chasing chisel 2. hammer 3. hacksaw 4. marking tools 5. table vice 6. Stock and die set 7. Pipe cutter to cut pipes 8. Hand brooms 9. Shovels 10. Screw driver set <p>Measuring Instruments</p> <ol style="list-style-type: none"> 11. measuring tape 12. spirit level 13. plumb bob <p>Power Tools</p> <ol style="list-style-type: none"> 14. cutting machine 15. drilling machine 16. power source <p>Materials</p> <ol style="list-style-type: none"> 17. rigid conduits 18. flexible conduit 19. clamps for conduits 20. screws <p>PPEs & safety equipment's</p> <ol style="list-style-type: none"> 21. helmet 22. safety shoes 23. safety belt 24. cotton hand gloves 25. goggles 26. Reflective jackets 27. Safety message boards 28. Fire extinguishers 29. Sand buckets

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		<ul style="list-style-type: none"> • Procedure of preparing inspection report sheet as per standard procedure <p>Demonstration/ Practical :-</p> <ul style="list-style-type: none"> • Demonstrate electrical circuit diagrams related to electrical equipment • Calculate/ interpret electrical power rating of electrical circuits installed in the equipment's • Demonstrate features of RCL circuits, inductive DC, AC circuits, details of capacitors, inductors and their actions in DC, AC circuits • Demonstrate functions and features of electrical components of motors • Demonstrate functions and features of electrical components of a transformer • Determining quantity and listing of required electrical materials/ consumables for maintenance along with their electrical specification • Inspecting an equipment of above kind to detect its fault and rectify the same, using necessary diagnostic devices 	
4	<p>Carry out LV electrical wiring and assist in building electrification works</p> <p>Theory Duration (hh:mm) 2:00</p> <p>Practical Duration (hh:mm) 12:00</p> <p>Corresponding NOS Code CON/N0610</p>	<p>Theory:-</p> <ul style="list-style-type: none"> • Guidelines provided in Indian Standard code of practice applicable to electrical wiring works • Statutory guidelines provided by ISI for LV wiring operations • Common electrical wiring Accessories, their specifications in line with NEC – Explanation of switches, lamp holders, plugs and sockets • Concept of drawings, circuit diagrams and/or related schematics for single and three phase LV house wiring system • Method of estimation of required material quantity from electrical drawings • Applicable manufacturer's guidelines/ specifications for use of hand and power tools and measuring devices • Applicable manufacturer's guidelines/ specifications for use of electrical fittings and fixtures • Method of determining use of 3 phases, single phase connections as per electrical drawing, specifications • Concept of specification, colour coding of cables to be used in wiring system according to load on circuit • Concept of properties of different components used in electrical earthing work • Size and shape of battens • Size and shape of raceways • Size of conduits (Flexible/rigid) • Standard practices of cable laying through conduits 	<p>Hand Tools & materials</p> <ol style="list-style-type: none"> 1. Trowel 2. pointing Trowel 3. Shovel 4. mortar Pan 5. spade 6. pick axe 7. GI bucket 5L capacity 8. wheel Barrow 9. lime powder 10. wooden pegs 11. hammer 12. hard broom 13. source of water 14. Ladder <p>Measuring tape</p> <ol style="list-style-type: none"> 15. mason's line 16. Equipment 17. hand roller 18. plate vibrator 19. power source <p>PPEs & safety equipment's</p> <ol style="list-style-type: none"> 20. Helmet 21. safety shoes 22. cotton hand gloves 23. goggles 24. Reflective jacket 25. Safety message boards

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		<ul style="list-style-type: none"> • Concept of different methods of earthing i.e. pipe, plate, etc. • Method of measurement of Earth resistance by earth tester • Method to test of Earth Leakage by ELCB and relay • Concept of area of application & specification of protective devices like fire alarm, MCB, ELCB, MCCB • Planning method of lighting arrangement which may enable maximum use of natural lights • Idea of current tentative market rate of common electrical items • Information about common electrical brands and their products • Concept of standard house wiring procedure and best practices • Right procedure of handling of electrical fixtures • Use of ladders, scaffolds, PPEs, shock resistance gloves during working/ performing tests in a live circuit • Use of power drill machine and selection of drill bit for drilling works • Use of different common electrical hand and power tools like different pliers, earth tester, tong tester, voltage tester, multimeter, etc. • Standard procedure of storing, stacking electrical material, tools and equipment at workplace • Use of different common electrical hand and power tools like different pliers, earth tester, tong tester, voltage tester, multimeter, etc. • Standard procedure of storing, stacking electrical material, tools and equipment at workplace <p>Demonstration/ Practical : -</p> <ul style="list-style-type: none"> • Practice cable laying through conduits • Practice installation of conduits, race ways, switch boards, distribution boards, lights, fans and lighting fixtures • Carry out electrical isolations to the circuit prior to undertake • Carry out inspections on installed electrical circuits to trace out leakage in the circuits, resistance in the circuits, short circuit (if any), • Carry out earthing of the installed electrical circuit as per standard practice 	
5.	Work effectively in a team to deliver desired results at the workplace	<p>Theory:-</p> <ul style="list-style-type: none"> • Method of oral and written communication skills with co-workers, trade seniors while 	

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	<p>Theory Duration (hh:mm) 01:00</p> <p>Practical Duration (hh:mm) 7:00</p> <p>Corresponding NOS Code CON/N8001</p>	<p>handling and carrying out visual checks on materials, electrical fixtures, lights, tools and devices</p> <ul style="list-style-type: none"> • Reading and interpretation of electrical works formats, permits, protocols, checklists • How to interpret scope of electrical activities, material/ tools handling by adhering to instructions or consulting with seniors • Method of providing instruction to subordinates or reporting to seniors clearly and promptly • Seek necessary support and complete assigned tasks within stipulated time duration • Keep good relation and maintain well behaviour with co-workers <p>Demonstration/ Practical : -</p> <p>The skills will be developed and practiced while carrying out following trade related activities in a predictable and familiar working condition</p> <ul style="list-style-type: none"> • Selection of materials, tools or devices for defined purpose under • Handling electrical material, fixtures and device • Carrying out conduit laying and cable laying • Carrying out assembling of temporary panel/ distribution board • Undertaking electrical tests by using measuring devices • Selection and handing over of desired/ appropriate tools/ materials while assisting trade senior 	
6.	<p>Plan and organize work to meet expected outcomes</p> <p>Theory Duration (hh:mm) 01:00</p> <p>Practical Duration (hh:mm) 07:00</p> <p>Corresponding NOS Code CON/N8002</p>	<p>Theory:-</p> <ul style="list-style-type: none"> • To plan electrical activities within defined scope of work • Basic concept of productivity, sequence of working and implementation of safety and organizational norms while working • Upkeep, storing and stacking methods of tools, materials used for domain specific works • Requisition of resources, reporting for requirement of resources orally and in written to concerned authority <p>Demonstration/ Practical (D):-</p> <ul style="list-style-type: none"> • The skills will be developed and practiced while carrying out following trade related activities in a predictable and familiar working condition Selection of materials, tools or devices for defined purpose in an optimum manner • Handling electrical tools, material, fixtures and device 3. Prioritize all works/ activities 4. Planning conduit laying and cable laying as per scope 5. Carrying out assembling of temporary panel/ distribution board 6. Optimum use of 	

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		resources while performing task 7. Adherence to stipulated timelines for completion of electrical activities/ tasks	
7.	<p>Work according to personal health, safety and environment protocol at construction site</p> <p>Theory Duration (hh:mm) 02:00</p> <p>Practical Duration (hh:mm) 7:00</p> <p>Corresponding NOS Code CON/N9001</p>	<p>Theory:-</p> <ul style="list-style-type: none"> Types of hazards involved in construction sites Types of hazards involved in electrical works Emergency safety control measures and actions to be taken under emergency situation <p>Concept of :-</p> <ul style="list-style-type: none"> 1. First Aid process 2. Use of fire extinguisher 3. Classification of fires and fire extinguisher 4. Safety drills 5. Types and use of PPEs as per general and electrical safety norms Reporting procedure to the concerned authority in emergency situations Standard procedure of handling, storing and stacking material, electrical fixtures and accessories What is safe disposal of waste, type of waste and their disposal Type of electrical protective devices, their power ratings and area of application basic ergonomic principles as per applicability <p>Demonstration/ Practical(D/P) :-</p> <p>The skills will be developed and practiced while carrying out following trade related activities in a predictable and familiar working condition.</p> <ul style="list-style-type: none"> Selection of PPEs and use them appropriately as per working need of electrical operations, handling, storing, stacking and shifting of electrical fixtures, light units, tools and devices Selection of PPEs and use them appropriately as per working need of cutting conduit, drilling in walls, termination at the main power source Analysis of hazards involved to electrical circuits/ connections by external effects and taking necessary steps or informing to seniors Identification of locations, situations/ circumstances, malpractices which can be hazardous for general or electrical works Selection of fire extinguisher based on classification of fire, standard practice of storing & stacking fire fighting equipments/ materials at work locations Disposal of waste materials as per their nature and effects on weather 	<p>PPEs & Safety Equipments</p> <ol style="list-style-type: none"> helmet safety shoes safety belt cotton rubber gloves 5. ear plugs 6. reflective jackets 7. safety message boards 8. message board displaying Do's and Don'ts at construction sites 9. Fire extinguishers 10. Sand buckets infrastructural requirements 11. Classroom having sitting capacity of 30 trainees 12. Blackboard 13. LCD monitor 32" 14. Laptop
	<p>Total Duration</p> <p>Theory Duration 12:00</p>	<p>Unique Equipment Required:</p> <p>Hand tools:-</p> <p>wall chasing chisel, hammer, hacksaw, file, marking tools , table vice, Stock and die set, Pipe cutter to cut pipes, Hand brooms, Shovels, Screw driver set</p>	

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	Practical Duration 56:00	<p><u>Measuring Instruments</u> measuring tape, spirit level, plumb-bob , mason's line</p> <p><u>Power tools</u> cutting machine, drilling machine, power source, Materials rigid conduits, flexible conduit, clamps for conduits, screws</p> <p><u>PPEs & safety equipment's</u> elmet , safety shoes , safety belt, cotton hand gloves, goggles Reflective jackets, Safety message boards, Fire extinguishers, Sand buckets</p> <p><u>infrastructural requirements</u> classroom having sitting capacity of 30 trainees, blackboard, LCD monitor 32", Laptop</p>
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Grand Total Course Duration: 68 Hours 0 Minutes