

NOCC-A21 Electrician: Competence Package

Relevant Occupation/trade title: Electrician			SAQA ID: 91761		
Learning Area 6: Install wiring systems and accessories for low voltage in industrial & commercial buildings and premises (incl. earthing and bonding)			Total Hours:		168
Learning Project 3: Install control equipment into distribution boards and control panels (including termination and testing)			Total Hours:		40
Requisite learning areas/projects to be in place (Pre-requisite and co-requisite):		<ul style="list-style-type: none">• LA 1 (LP 2, 3, 5, 7, 9, 10)• LA 2 (LP 1-7)• LA4 (LP 1-3)• LA5 (LP 1-3)• LA6 (LP1-2)			
Learning project description: Install Industrial control equipment into distribution boards and control panels including (termination and testing)					
Activity phase	Practical Skills Modules Content	Underpinning Knowledge Module Content	Work Experience Module Content (Exposure to be given)	Didactical-methodological advice	Learning Materials / Tools and Equipment
Reference to QCTO Curriculum	PM-05-PS06 PM-06-PS01-02 PM-07-PS01-03 PM-08-PS01-05	KM-05-KT01 KM-05-KT02 KM-05-KT03	WM-01-WE01-03 WM-02-WE01-03 WM03-WE01-03		
Planning/ Preparation	<p><u>Provide access to (Given):</u> Work tasks/job cards, installation cubicles and materials and equipment as listed in last column;</p> <p><u>Apprentices must be able to do/perform the following (hard and soft) skills:</u></p> <p>Prepare layout of electrical installation circuits, control and protection devices</p> <ul style="list-style-type: none">• Determine the scope and specs of the electrical installation from work specifications	<p><u>Knowledge of:</u></p> <ul style="list-style-type: none">• Occupational health and safety requirements (OHS Act)• Electrical Machinery regulation• Accident prevention & first aid• Installation standards (SANS 10142-1)• Schematic drawings and manufacturers specifications	<p><u>Under supervision:</u></p> <ul style="list-style-type: none">• Install and wire distribution boards and control panels• Perform risk assessment before planning to wire Meter Boards and Distribution Boards• Inspect tools and equipment and check manufacturers specifications• Prepare various types and sizes of enclosures to receive equipment• Select, arrange, mount and	<ul style="list-style-type: none">• Research /Desk study• Case studies /scenarios• Technical discussions• Lecture/ instructions• Textbook work• Mind mapping	<p>Print materials, electronic files, software applications incl.:</p> <ul style="list-style-type: none">• OHS Act• SANS 10142-1• Job cards/ work requests/ maintenance schedules and work permit examples• Manufacturer's specifications• Text books• Manuals for trainers and apprentices incl.

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	<ul style="list-style-type: none"> Identify, obtain, and understand safety and other regulatory requirements to which the electrical installation shall comply Determine load requirements for individual current-using equipment from job specifications or from consultation with appropriate personnel Obtain and check material needed for the installation work against job requirements Obtain and check tools, equipment and measuring devices needed for the installation work for correct operation and safety 	<ul style="list-style-type: none"> Current carrying capacities of Conductors Rupturing capacities of Circuit Breakers Difference between a Circuit Breaker and Isolator/Switch Disconnecter Circuits that need protection on earth Leakage as per SANS 10142-1 Working principles of various types and sizes of reusable standard single and three phase protective devices/switch- and control gear incl. fuses, circuit breakers, residual current devices, earth leakage circuit breakers, contactors, relays, timers, isolators Set of various types of reusable meters (Ammeters, Voltmeters, Kilowatt-hour meters, Energy control units, Electricity dispensers) Set of various types and sizes of terminal connectors and accessories Set of various types 	<p>wire various protective devices/ switch and control gear into enclosures</p> <ul style="list-style-type: none"> Select, arrange, mount and wire different types of meters into enclosures Terminate conductors and connect protective devices/switch- and control gear and meters Conduct earthing and bonding Conduct load balancing on three phase distribution boards Install additional accessories to complete enclosure installation Label and tag circuits and place notices on the enclosure as required Engage in regular housekeeping activities, tool and equipment maintenance Store tools and equipment, record and report any defects on tools Provide work documentation, verbal and written reports as required by the company 	<ul style="list-style-type: none"> multimedia software Set of presentation aids (videos, slides) for overhead or LED/LCD projectors <p>Stationary machinery, mobile plants, transport, access and lifting equipment incl.:</p> <p>Hand- & power tools and PPE incl.:</p> <ul style="list-style-type: none"> Electrician's tool box with standard set of tools Drilling machine Drill bits Manual tap threading tool set Adjustable tap handle and reamer wrench Standard PPE <p>Measuring and testing instruments incl.:</p> <ul style="list-style-type: none"> Measuring tape Steel ruler Steel square Multi meter Continuity meter <p>Training workshop and laboratory equipment incl.:</p>
Implementation/ Execution	<p>Arrange electrical installations circuits, control and protection devices</p> <ul style="list-style-type: none"> Follow risk control measures and procedures for carrying out the work Ensure that the circuit / installation is isolated and locked out Prepare correct single and three phase board/panel layout of circuits, control and protective devices to ensure safe and functional operation of the installation Arrange and terminate earthing to comply with the protective system 			

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	<ul style="list-style-type: none"> requirements Select protective devices to meet the required switching and tripping currents, co-ordination and discrimination for overload and short-circuit protection Select residual current devices to meet the required circuit, switching and tripping currents required Select switchgear/ control gear to meet current, voltage and IP ratings and functional requirements Select correct single and three phase kilowatt hour meters, ammeters, voltmeters, energy control units and electricity dispenser/pre-paid electric meters to meet measuring requirements Prepare panel/board to accommodate control and protective devices, meters, links, safety services, and other distributor equipment Arrange and install selected protective devices, meters, switch- and control gear Terminate conductors and connect protective devices /switch- and control gear Install blanking plates Label specific circuits and notices on distribution board Conduct visual inspection Carry out Load balancing in 	<ul style="list-style-type: none"> and sizes of earthing/grounding and bonding equipment (grounding bus bars, ground bar insulators, bonding straps, couplers, clamps, ground plates, earthing rods) Circuit Breakers, Isolators/Switch Disconnectors Load Balancing Termination techniques (loose connections, Hot spots, terminal connections) Lock out Procedures <p>Techniques for installing control equipment including termination and testing</p> <ul style="list-style-type: none"> Techniques for the installation of control equipment. Techniques for termination and connection of control equipment. Techniques for the inspection and testing control equipment Inspection requirements and procedures 			<ul style="list-style-type: none"> Heavy workbench with stool, power supply and assembly vice Bench mountable interchangeable training panel frame Mountable punched hole frame and front panel frame Basic panel systems for practicing wiring installation exercises Training package for building service entry, mains systems and protective measures, control and switching system installation Set of various types of distribution boards, control and starter panels, supply boards, meter boxes, switchgear cabinets, display terminals and cable splitter boxes Accessories incl. racks, rails, brackets, doors, face plates, hinges, locking devices, weather seals, name plates and labels Set of various types and sizes of reusable standard single and three phase protective devices/switch- and control gear incl. fuses,
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	<p>accordance with Sans 10142-1 on three phase distribution boards.</p> <ul style="list-style-type: none"> Inspect and test the installation of control equipment and terminations.(insulation and earth continuity test) 				<p>circuit breakers, residual current devices, earth leakage circuit breakers, contactors, relays, timers, isolators</p> <ul style="list-style-type: none"> Set of various types of reusable meters (Ammeters, Voltmeters, Kilowatt-hour meters, Energy control units, Electricity dispensers) Set of various types and sizes of terminal connectors and accessories Set of various types and sizes of earthing/grounding and bonding equipment (grounding bus bars, ground bar insulators, bonding straps, couplers, clamps, ground plates, earthing rods)
Evaluation/ Documentation	<p>Complete the work</p> <ul style="list-style-type: none"> Follow OHS work completion risk control measures and procedures Conduct housekeeping activities Document reasons for selections made, including calculations Document electrical installation arrangement and specifications for all selected items and forward to appropriate personnel 				
Total	Hours: 40				
Specialisation additions					
Assessment guidance					

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Criteria for assessment:

- Obtaining and understanding task instructions (interpreting)
- Adhering to safety precautions before, during and after the mounting procedure
- Identifying protection devices and components to be installed as per task instructions procedures and standards
- The correct personal protective equipment (PPE) is identified as per work place procedures.
- Identifying the correct switch and control devices and components needed for the installation work
- Selecting tools and equipment according to job requirement
- Ensuring proper isolation and lock-out procedures for installation work
- Identifying correct locations for mounting of equipment
- Mounting equipment in the enclosures in accordance with specified requirements
- Terminating of conductors and cabling to control equipment and accessories.
- Checking protective devices and components for loose connections or hot spots as per work place procedures
- Complete tests on control equipment and accessories.
- Recording and reporting All defects and suspected faults are recorded and reported in line with site best practices
- Disposing waste materials as per safety and environmental standards
- Completing installation documentation in accordance with relevant procedures
- Checking, cleaning and storing all tools and equipment correctly as per work site standards and procedures