

# NOCC-A21 Electrician: Competence Package

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| Relevant Occupation/trade title: Electrician   |  |  | SAQA ID: 91761  |   |   |
| Learning Area 6: <b>Install wiring systems and accessories for low voltage in <u>industrial &amp; commercial buildings and premises (incl. earthing and bonding)</u></b> |  |  | Total Hours:  | 168   |   |
| Learning Project 6: <b>Maintain and upgrade low voltage systems and accessories</b>  |  |  | Total Hours:  | 32  |   |
| Requisite learning areas/projects to be in place (Pre-requisite and co-requisite):   |  | <ul style="list-style-type: none"><li>• LA 1 (LP 2, 3, 5, 7, 9, 10)</li><li>• LA 2 (LP1-7)</li><li>• LA4 (LP 1-3)</li><li>• LA5 (LP 1-5)</li><li>• LA6 (LP1-4)</li></ul>   |   |   |   |
| Learning project description: <b>Maintain and upgrade low voltage systems and accessories</b>  |  |  |   |   |   |
| 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<br>PM-06-PS01-02<br>PM-07-PS01-03<br>PM-08-PS01-05  | KM-05-KT01<br>KM-05-KT02<br>KM-05-KT03   | WM-01-WE01-03<br>WM-02-WE01-03<br>WM-03-WE01-03<br>WM-05-WE01-03  |   |   |
| Planning/<br>Preparation   | <p><b><u>Provide access to (Given):</u></b><br/>Work tasks/job cards, existing installations and materials and equipment as listed in last column;</p> <p><b><u>Apprentices must be able to do/perform the following (hard and soft) skills:</u></b></p> <p><b>Prepare for the maintenance and upgrading of industrial LV installation systems</b></p> <ul style="list-style-type: none"><li>• Obtain, identify and understand statutory requirements for a given work</li></ul> | <p><b><u>Knowledge of:</u></b></p> <ul style="list-style-type: none"><li>• Occupational health and safety requirements (OHS Act)</li><li>• Accident prevention &amp; first aid</li><li>• Installation standards (SANS 10142-1)</li><li>• Schematic drawings and manufacturers specifications</li><li>• Equipment will include, but are not limited low voltage pole mounted isolators, circuit breakers,</li></ul> | <p><b><u>Under supervision:</u></b></p> <ul style="list-style-type: none"><li>• Conduct regular OHS instructions and talks as required by law</li><li>• Obtain information about the work assignment according to instructions or breakdown reports where necessary</li><li>• Maintenance task instructions are interpreted and sequence of operations is determined and communicated to work</li></ul> | <ul style="list-style-type: none"><li>• Research /Desk study</li><li>• Case studies /scenarios</li><li>• Technical discussions</li><li>• Lecture/ instructions</li><li>• Textbook work</li><li>• Mind mapping</li><li>• Practical simulation work</li></ul> | <p><b>Print materials, electronic files, software applications incl.:</b></p> <ul style="list-style-type: none"><li>• OHS Act</li><li>• SANS 10142-1</li><li>• Text books</li><li>• Manufacturer maintenance manuals</li><li>• Training manuals for trainers and apprentices incl. multimedia software</li><li>• Fault simulation</li></ul> |

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|                                  | <p>area</p> <ul style="list-style-type: none"> <li>Identify and establish health and safety risks and follow risk control measures and procedures in preparation for the work</li> <li>Prepare maintenance and upgrade work in consultation with others affected by the work and sequence appropriately</li> <li>Determine the scope and location of the maintenance and upgrade work to be undertaken from documentation or appropriate personnel</li> <li>Verify that the scope of the design specifications are of the latest version and are confirmed with appropriate personnel</li> <li>Obtain and check material needed for the maintenance and upgrade work against job requirements</li> <li>Obtain and check tools, equipment and measuring devices needed for the maintenance and upgrade work for correct operation and safety</li> </ul> | <p>transformers, surge arrestors</p> <ul style="list-style-type: none"> <li>Maintaining and upgrading of low voltage systems and accessories.</li> <li>Steps and phases of processing customer orders</li> <li>Documentation of findings and conversation results</li> <li>Interpretation of electrical schematic drawings</li> <li>Compilation of material lists</li> <li>Required work equipment and tools</li> <li>Energy consumption of wiring systems and accessories (low voltage)</li> <li>Dimensioning, types, labelling and characteristics of wiring systems and accessories (low voltage) installation components</li> <li>Work organisation and work process planning</li> <li>Energy and resource efficiency</li> <li>Overview of applicable protective measures</li> <li>Recycling and environment protection</li> <li>Sourcing of installation materials</li> </ul> | <p>team members</p> <ul style="list-style-type: none"> <li>Assess work conditions and implement safety measures according to safe work procedures</li> <li>Ensure that the affected section of the low voltage system is isolated and prepared for maintenance and upgrading</li> <li>Select, inspect and check equipment, test instruments, tools and personal protective equipment for functionality and safety prior to commencement of tasks</li> <li>Initially perform preparatory works under direct and constant supervision of a qualified Electrician</li> <li>Undertake all preparatory installation activities without assistance but regular supervision</li> <li>Obtain access to building sites for maintaining and upgrading low voltage systems and accessories</li> <li>Ensure that the circuit/installation is isolated and locked out</li> <li>Source needed materials, personal protective</li> </ul> | <p>software for electrical installations</p> <ul style="list-style-type: none"> <li>Set of presentation aids (videos, slides) for overhead or LED/LCD projectors</li> </ul> <p><b>Stationary machinery, mobile plants, transport, access and lifting equipment incl.:</b></p> <ul style="list-style-type: none"> <li>Hoisting and lifting gear</li> <li>Ladders and scaffolds</li> </ul> <p><b>Hand- &amp; power tools and PPE incl.:</b></p> <ul style="list-style-type: none"> <li>Standard electrician's toolbox</li> <li>Electrical drilling machine/hammer with set of drill bits and chisels</li> <li>Electrical grinder</li> <li>Electrical wall chaser</li> <li>Hand conduit benders</li> <li>Electrical heat gun and bending springs</li> <li>Pipe cutter</li> <li>Safety gloves</li> <li>Protective goggles</li> </ul> <p><b>Measuring and testing instruments incl.:</b></p> |
| <b>Implementation/ Execution</b> | <p><b>Conduct maintenance and upgrading of industrial LV installation systems</b></p> <ul style="list-style-type: none"> <li>Follow risk control measures and procedures for carrying out the work</li> </ul>  | <ul style="list-style-type: none"> <li>Spectrum of basic maintenance and upgrading activities</li> <li>Types and forms of maintaining and upgrading</li> </ul>   |   |   |

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| <ul style="list-style-type: none"> <li>• Ensure that the circuit/installation is isolated and locked out</li> <li>• Evaluate current system performance against expected performance (Inspection/fault finding)</li> <li>• Maintain system equipment by using appropriate plans, drawings and instructions</li> <li>• Reset and/or carry out required adjustments to ensure equipment operates within parameters</li> <li>• Apply logical diagnostic methods to identify industrial installation system, circuit and component faults/ defects using all necessary measurements and estimations of operating parameters referenced to system operational requirements</li> <li>• Upgrade the industrial installation by extending existing and/or changing obsolete/faulty components in line with work order specifications and respective installation procedures</li> <li>• Test suspected fault scenarios as being the source of industrial LV system problems</li> <li>• Identify and appropriately document source of the fault/ defect</li> <li>• Dismantle industrial</li> </ul> | <p>low voltage systems and accessories</p> <ul style="list-style-type: none"> <li>• Testing/measuring of the low voltage electrical systems (Ocular inspection, continuity test, voltage test...)</li> <li>• Fault finding methods/ techniques</li> <li>• Preventative maintenance methods and techniques</li> <li>• Techniques and methods for repairing LV systems</li> <li>• Techniques and methods for upgrading LV systems</li> <li>• Work procedures and work documents related to the maintenance and upgrading of LV systems</li> <li>• Handing over of low voltage systems and accessories</li> </ul> | <p>devices, tools, measuring instruments and equipment</p> <ul style="list-style-type: none"> <li>• Perform maintaining and upgrading of low voltage systems and accessories in various work contexts with assistance and under direct and constant supervision until competent</li> <li>• Maintain and upgrade low voltage systems and accessories without assistance but regular supervision</li> <li>• Test and repair maintained and upgraded low voltage systems and accessories under close supervision until work can be done on a more autonomous basis</li> <li>• Conduct re-commissioning quality checks after maintenance, upgrading and necessary corrective action is taken</li> <li>• Engage in regular housekeeping activities, tool and equipment maintenance</li> <li>• Provide work documentation, verbal and written reports as required by the company</li> </ul> | <ul style="list-style-type: none"> <li>• Insulation tester</li> <li>• Phase rotation indicator/tester</li> <li>• Plug Polarity (Socket) Tester</li> <li>• Analogue and Digital Multimeter</li> <li>• Clamp meter</li> <li>• Voltage and continuity tester</li> <li>• AC Leakage current clamp meter</li> <li>• Measuring tape</li> <li>• Steel ruler</li> <li>• Steel square</li> <li>• Spirit level</li> </ul> <p><b>Training workshop and laboratory equipment incl.:</b></p> <ul style="list-style-type: none"> <li>• Heavy workbench with stool, power supply and assembly vice</li> <li>• Bench mountable interchangeable training panel frame</li> <li>• Mountable punched hole frame and front panel frame</li> <li>• Basic panel systems for practicing installation and control technology with built in fault simulator exercises</li> <li>• Modular</li> </ul> |
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|                                  | <p>installation system and components where necessary to gain access</p> <ul style="list-style-type: none"> <li>• Source and obtain materials/ replacement components required to rectify faults/defects</li> <li>• Replace, adjust and secure faulty/defect components and equipment</li> <li>• Identify and forward reusable, faulty or worn components that can be repaired to other appropriate personnel</li> <li>• Test effectiveness of industrial system repair and/or upgrade</li> <li>• Reassemble system components, finally test and prepare them to go back into service</li> </ul> |  |  |  | <p>experimental box system for practicing installation and control technology</p> <ul style="list-style-type: none"> <li>• Training packages for control technology/ switching system installations</li> <li>• Set of various industrial machines, lighting circuits and systems, socket outlet circuits, equipped distribution boards for fault finding exercises</li> </ul> |
| <b>Evaluation/ Documentation</b> | <p><b>Complete the maintenance and upgrading work of industrial installation Systems</b></p> <ul style="list-style-type: none"> <li>• Complete work and notify appropriate personnel</li> <li>• Conduct housekeeping activities</li> <li>• Clean and check tools, and equipment</li> <li>• Store tools and equipment in designated locations</li> <li>• Return to storage or dispose of any surplus resources and materials</li> <li>• Process and finalise works completion records, reports,</li> </ul>  |  |  |  |   |

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|  | modified drawing and/or documentation and information <ul style="list-style-type: none"> <li>• Hand over maintained or upgraded electrical system and components</li> <li>• Brief appropriate personnel about the undertaken system and component changes</li> <li>• Complete relevant documents</li> </ul> |  |  |  |  |
| <b>Total</b>   | Hours: 32   |  |  |  |  |
| <b>Specialisation additions</b>  |   |  |  |  |  |
| <b>Assessment guidance</b>   |   |  |  |  |  |
| <b>Criteria for assessment:</b> <ul style="list-style-type: none"> <li>• Identifying early warning signs of equipment needing attention or having potential problems</li> <li>• Identifying and analysing the range of possible causes and determining the most likely cause</li> <li>• Taking appropriate action to ensure a timely return to full performance</li> <li>• Recognising obvious problems in related system areas and making appropriate contributions to their solution</li> <li>• Interpreting a range of electrical drawings and schematics and of manufacturer specifications in order to undertake required maintenance or identified repairs/modifications to electrical systems</li> <li>• Using methodical fault finding techniques</li> <li>• Applying of correct testing technics to comply with statutory regulations and manufacturers specifications.</li> <li>• Finding and rectifying faults efficiently</li> <li>• Upgrading and replacing of system components to meet customer demands and to facilitate a sustainable and efficient system operation</li> <li>• Completing documentation correctly</li> <li>• Dealing with unplanned events</li> <li>• Cleaning and storing of tools and equipment</li> </ul> |   |  |  |  |  |