

NOCC-A21 Electrician: Competence Package

| Relevant Occupation/trade title: Electrician   |  |  |  | SAQA ID: 91761  |  |
|--|--|--|--|---|--|
| Learning Area 5: <b>Install wiring systems and accessories (low voltage) in domestic buildings and premises (incl. earthing and bonding)</b> |  |  |  | Total Hours:  | 128  |
| Learning Project 2: <b>Install cables and conductors into wire ways</b>  |  |  |  | Total Hours:  | 16   |
| Requisite learning areas/projects to be in place (Pre-requisite and co-requisite):   |  | LA5 – LP 1   |  |   |  |
| Learning project description: <b>Install cables and conductors into wireways and test (continuity and insulation resistance test)</b>        |  |  |  |   |  |
| Activity phase   | Practical Skills<br>Modules Content  | Underpinning Knowledge<br>Module Content   | Work Experience<br>Module Content<br>(Exposure to be given)  | Didactical-<br>methodological<br>advice   | Learning materials/<br>Tools and Equipment   |
| Reference to<br>QCTO<br>Curriculum   | PM04-PS01-03,<br>PM-05-PS01, PM-05-PS02, PM-05-PS04, PM-05-PS05, PM-05-PS06,<br>PM-06-PS01-02<br>PM-07-PS01-03<br>PM-08-PS01-03  | 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  |   |  |
| Planning/<br>Preparation   | <p><b>Provide access to (Given):</b><br/>Work tasks/job requests and material and equipment as specified 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 installation of cable and conductors</b></p> <ul style="list-style-type: none"> <li>Identify, obtain and understand OHS procedures for given instruction</li> <li>Identify health and safety risks and follow established risk control measures and procedures in preparation for the work</li> </ul> | <p><b><u>Knowledge of:</u></b></p> <p><b>General requirements applicable to the installation of wiring systems incl.:</b></p> <ul style="list-style-type: none"> <li>Statutory and regulatory requirements associated with the installation of electrical conductors and cables</li> <li>Wiring support and/or protection requirements and specifications</li> <li>Relevant manufacturer requirements</li> <li>Specifications and methods for installation of</li> </ul> | <p><b><u>Under supervision:</u></b></p> <ul style="list-style-type: none"> <li>Plan the layout of wireways as per work requirements</li> <li>Draw in cables and conductors</li> <li>Secure conductors and cables</li> <li>Perform continuity and installation resistance tests on existing installations</li> <li>Report results of testing to supervisor and discuss</li> </ul> | <ul style="list-style-type: none"> <li>Lecture</li> <li>Group discussion</li> <li>Videos</li> <li>Simulations</li> <li>Practical tasks</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>Manuals for trainers and apprentices incl. multimedia software</li> <li>Set of presentation aids for overhead or LED/LCD projectors</li> </ul> <p><b>Stationary machinery, mobile plants, transport, access and lifting equipment incl.:</b></p> |

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|  | <ul style="list-style-type: none"> <li>• Prepare and sequence installation of cables and conductors in consultation with others affected by the work</li> <li>• Determine the scope and location of the work to be undertaken</li> <li>• Plan wiring within the constraints of the installed wireways and given requirements</li> <li>• Identify appropriate method for installing cables and conductors</li> <li>• Determine correct cable and conductor type, size and quality</li> <li>• Identify material needed for the wiring work against job requirements</li> <li>• Identify tools, equipment and testing devices needed for the wiring work</li> <li>• Check that preparatory work has not caused any damage and complies with requirements</li> </ul> | <ul style="list-style-type: none"> <li>conductors and cables</li> <li>• Wiring support techniques and alternatives</li> <li>• Marking, tagging and labelling requirements for cables, wires, conductors and connections</li> <li>• Tests for wiring and connections</li> <li>• Cable and conductor types, sizes and quality (as per SANS 10142-1)</li> <li>• Calculation of estimated load and volt drop as per SANS 10142-1</li> <li>• Use and application of personal protective equipment for installation of conductors and cables</li> </ul> <p><b>Techniques for installing cables, conductors and wiring systems incl.:</b></p> <ul style="list-style-type: none"> <li>• Types of wire ways through buildings, structures and premises (incl. maintaining fire rating integrity)</li> <li>• Methods of mechanical protection and support of cables and conductors</li> <li>• Application of wiring accessories</li> <li>• Drawing-in, placing and fixing of cables and conductors</li> <li>Inspecting and testing installed cables and</li> </ul> |  |  | <ul style="list-style-type: none"> <li>• Ladders and scaffolds</li> </ul> <p><b>Hand- &amp; power tools incl:</b></p> <ul style="list-style-type: none"> <li>• Wire and cable strippers</li> <li>• Cable/wire cutters</li> <li>• Crimp tools</li> <li>• Soldering iron</li> <li>• Cable/wire pulling tools, fish tape</li> <li>• Cable/wire dispenser</li> <li>• Utility/cable knife</li> <li>• Hacksaw</li> <li>• Screw drivers</li> <li>• Pliers</li> </ul> <p><b>PPE incl</b></p> <ul style="list-style-type: none"> <li>• Hand gloves</li> <li>• Safety clothing</li> </ul> |
| <p><b>Implementation/Execution</b></p> | <ul style="list-style-type: none"> <li>• Follow OHS risk control measures and procedures for carrying out the work</li> <li>• Install cables, conductors and accessories with sufficient excess to affect terminations</li> <li>• Adjust and fix all accessories (brackets, clamps, holders etc.) to specifications</li> <li>• Fit and secure glands and retaining devices</li> <li>• Prepare cable/cord and conductor end to suit</li> </ul>  | <ul style="list-style-type: none"> <li>• Drawing-in, placing and fixing of cables and conductors</li> <li>Inspecting and testing installed cables and</li> </ul>   |  |  | <p><b>Measuring and testing instruments incl.:</b><br/>Tape measure<br/>Insulation resistance tester<br/>Continuity tester</p> <p><b>Training workshop and laboratory equipment incl.:</b></p> <ul style="list-style-type: none"> <li>• Installation cabins/cubicles with solid brick walls or</li> </ul>   |

NOCC-A21 Electrician: Competence Package

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|  | <p>connector/lug without causing any damage to insulation or conductor</p> <ul style="list-style-type: none"> <li>• Identify mark/tag and label all cables, wires, conductors, circuits and connections to specification</li> <li>• Carry out cable and conductor installation without unnecessary waste of materials or damage to equipment, circuits or the surrounding environment</li> </ul> | <p>conductors to ensure they comply with continuity and insulation resistance and are safe to connect to the supply</p> <p><b>Cable and conductor protection and support methods and accessories incl.:</b></p> <ul style="list-style-type: none"> <li>• Requirements to protect and support cables and conductors adequately - against mechanical damage, adverse temperatures, humidity and corrosion and protection from magnetic fields that may affect the performance</li> <li>• Cable support and protection devices, accessories and typical applications - metallic and non-metallic conduits, duct and trunking, cable ladder and tray, cable clips and ties and related accessories</li> </ul> <p><b>Types of cables and conductors used in the industry and their application incl.:</b></p> <ul style="list-style-type: none"> <li>• Structural components of cables and their purpose - conductors and conductor material; insulation;</li> </ul> |  | <p>interchangeable plaster-/chip board walls or punched hole grid panels (potentially covering wall, ceiling and under floor installations)</p> <ul style="list-style-type: none"> <li>• Set of reusable concealed and surface mounted standard enclosures incl. distribution boards, switch boards, panels, junction boxes and related accessories</li> <li>• Set of consumables consisting of various standard types of wire enclosures and fittings e.g. PVC and metal conduits, (RMC/GRC/IMC/EMT) cable trays, metal and fibreglass framing channels, PVC/metal trunking and ducts, ceiling support grids, arc floor trunking, Pipe tube and conduit clamps, box connectors, couplings etc.</li> <li>• Set of consumables consisting of various standard types and sizes of connectors, lugs and glands</li> <li>• Set of consumables</li> </ul> |
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NOCC-A21 Electrician: Competence Package

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|   |  | <p>sheathings and servings</p> <ul style="list-style-type: none"> <li>• Application of various cable and conductor types</li> <li>• Cable varieties - flexible cables, flexible cords, shielded cables, armoured cables, etc.</li> <li>• Typical characteristics and use of power circuit cables and control circuit cables</li> </ul>  |  |  | <p>consisting of various reels/drums of standard types and sizes of cables and conductors</p> |
| <p><b>Evaluation/ Documentation</b></p> | <ul style="list-style-type: none"> <li>• Conduct continuity and installation resistance tests on installed wiring systems and conductors</li> <li>• Rectify defects revealed through inspection and tests</li> <li>• Perform housekeeping on completion of task</li> </ul> | <p><b>Installing cables in buildings, structures and premises incl.:</b></p> <ul style="list-style-type: none"> <li>• Prohibited cable and conductor locations and restricted zones around baths, showers, fixed water containers, pools etc.</li> <li>• Selecting equipment suitable for installation in damp locations</li> <li>• Protection of cables and conductors against and from other services</li> <li>• Cable and conductor separate circuit requirements</li> </ul> <p><b>Circuit purpose incl.:</b></p> <ul style="list-style-type: none"> <li>• Consumers mains</li> <li>• Sub-mains</li> <li>• Alternative supply</li> <li>• Lighting</li> <li>• Socket outlets</li> </ul> <p>Single phase fixed appliance</p> <ul style="list-style-type: none"> <li>• Single phase motor</li> <li>• Three phase motor</li> </ul> |  |  |   |

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|  |           | <ul style="list-style-type: none"> <li>• Controls</li> </ul> <p><b>Terminal connector types:</b></p> <ul style="list-style-type: none"> <li>• Screw</li> <li>• Stud</li> </ul> <p><b>Terminal lug types:</b></p> <ul style="list-style-type: none"> <li>• Crimp and compression</li> <li>• Soldering</li> <li>• Solder-less</li> </ul> |  |  |  |
| <b>Total</b>   | Hours: 16 |  |  |  |  |
| <b>Specialisation additions</b>  |           |  |  |  |  |
| <b>Assessment guidance</b>   |           |  |  |  |  |
| <p><b>Criteria for assessment:</b></p> <ul style="list-style-type: none"> <li>• Reading and interpreting drawings related to cable and conductor layouts, cable schedules and equipment locations</li> <li>• Planning cable and conductor routes</li> <li>• Selecting and obtaining appropriate tools, cables, conductors and accessories</li> <li>• Sequencing the installation effectively with others affected by the work</li> <li>• Routing, installing and securing cables and conductors in compliance with requirements</li> <li>• Placing and securing accessories accurately and maintaining fire integrity</li> <li>• Glanding of cables to comply with requirements</li> <li>• Undertaking inspection and testing of installed cables and conductors</li> <li>• Rectifying any defects revealed through on-going inspection and testing</li> <li>• Cleaning worksite</li> <li>• Notifying completion of work using established procedures</li> </ul> |           |  |  |  |  |