Relevant Occupation/trade title: Electrician	**SAQA ID:** 91761	
Learning Area 5: Install wiring systems and accessories (low voltage) in domestic buildings and premises (incl. earthing and bonding)	**Total Hours:**	**128**
Learning Project 3: Install protection and control equipment into distribution boards	**Total Hours:**	**16**
Requisite learning areas/projects to be in place (Pre-requisite and co-requisite):	• LA 5 LP 1+2	
Learning project description: Install protection and control equipment into single phase distribution boards		

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-PS01, PM-05-PS02, PM-05-PS04, PM-05-PS05, 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 WM-03-WE01-03		
Planning/ Preparation	**Provide access to (Given):** Work tasks/job requests, existing distribution boards and material and equipment as specified in last column; **Apprentices must be able to do/perform the following (hard and soft) skills:** **Prepare to arrange electrical installation circuits, control and protection devices** • Determine the scope and required devices/components of the electrical installation from the work specifications • Identify and understand safety and other regulatory	**Knowledge of:** **Safety principles to which electrical systems in building and premises shall comply (SANS 10142-1):** • Safety principles given in the Wiring Rules • Compliant methods for providing protection • Requirements for installation design and selection of equipment **Circuit and control arrangements incl.:** • Reason for dividing electrical installations into circuits	**Under supervision:** • Be actively involved in work processes where Apprentice needs to select the correct DB for the work task at hand • Perform risk assessments on installing DBs • Install control and protection devices in single phase DBs • Connect control and protection devices in single phase DBs • Perform continuity tests on DBs	Lecture, presentations DVDs, audio-visual Group work Simulation Practical installations	**Print materials, electronic files, software applications incl.:** • OHS Act • SANS 10142-1 • Text books • Manuals for trainers and apprentices incl. multimedia software • Set of presentation aids (videos, slides) for overhead or LED/LCD projectors **Hand- & power tools and PPE incl.:** • Screwdrivers

	requirements to which the electrical installation shall comply and conduct a risk assessement • Understand regulations concerning ratings of control and protection devices • Plan layout of distribution board devices • Draft a work plan	• Factors that shall be considered in determining the number and type of circuits required for an installation • Diagrams/ schedules of circuits for given installations **Protection against overload and short circuit current incl.:** • Overload current or fault currents in an electrical installation • Methods and devices that comply with the Wiring Rules for providing protection against the damaging effects of overload and fault current • Requirements for connection between protective devices and conductors **Devices for control of an electrical installation and circuits incl.:** • Switch types, current and voltage ratings and IP rating and where these apply • Switching requirements for isolation, emergency, mechanical maintenance and functional control **Devices for automatic disconnection of supply incl.:** • Operating principles of thermal/magnetic circuit breakers	• Record and report any defects on DBs		• Wirestripper • Sidecutter • Combination pliers • Utility knife **Measuring and testing instruments incl.:** • Insulation resistance tester • Multimeter **Training workshop incl.:** • Installation cabins/ cubicles • Reusable flush or surface-mounted standard PVC and metal distribution boxes in various size • Various types and sizes of reusable standard protective devices, residual current devices, switch- and control gear • Various types and sizes of earthing and bonding conductors
Implementation/Execution	**Arrange electrical installation circuits, control and protection devices** • Prepare correct DB 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 requirements • Select protective devices to meet the required switching and tripping currents, co-ordination and discrimination for overload and short-circuit protection as per SANS requirements • Select switchgear/control gear to meet current, voltage and IP ratings and functional requirements • Prepare distribution board to accommodate control and protective devices, links, safety services, and other distributor equipment				

	• Arrange and install selected protective devices and switch- and control gear • Terminate conductors and connect protective devices and switch- and control gear • Install blanking plates • Label specific circuits and notices on distribution board • Conduct visual inspection and test for continuity and circuit functionality	• Operating principles of residual current devices - RCD (earth leakage device) • Time/current curves tripping characteristics of various types of circuit breakers that comply with the requirements of the Wiring Rules. • Time/ current curves tripping characteristics of various types of RCDs that comply with the requirements of the Wiring Rules • Drawing of a single phase distribution board wiring arrangements **Distribution boards:** • Purpose, types and applications • Physical and circuit arrangements of main switches, circuit protection devices, fault-current limiters • Compliance requirements (includes location and access, identification and labelling of circuits, wiring) **Earthing and bonding incl.:** • Principals and terminology: earthing systems • Parts of an earthing system and the purpose of each • Specifications, characteristics, types and sizes of bonding components • Bonding techniques			

		• Requirements for equipotential bonding in a range of installation situations • Arrangements of protective earthing conductors that comply with SANS 10142-1 • Installation of an earthing system for a single installation			
Evaluation/ Documentation	**Complete the work** • Conduct housekeeping activities • Document electrical installation arrangement and specifications in a wiring diagram				
Total	Hours: 16				
Specialisation additions					

Assessment guidance

Criteria for assessment:

- Distribution board selected and installed according to manufacturers specifications and complies with SANS-10142-1
- Protection and control devices selected and installed according to manufacturers specifications and complies with SANS-10142-1
- Protection and control devices connected according to manufacturers specifications and complies with SANS-10142-1
- Circuits correctly connected, mechanically tight and neatly loomed to protection and control devices
- Relevant tools and equipment were used according to job specifications and statutory requirements
- All devices correctly labelled
- Worksite was left neat and tidy