

# NOCC-A21 Electrician: Competence Package

Relevant Occupation/trade title: Electrician			SAQA ID: 91761		
Learning Area 4: Read and interpret engineering, schematic drawings and documents			Total Hours:		40
Learning Project 1: Identify, read and interpret engineering drawings and specifications and sketch or modify basic engineering components			Total Hours:		16
Requisite learning areas/projects to be in place (Pre-requisite and co-requisite):		• LA 1 LP10			
Learning project description: Read and interpret basic engineering drawings and specifications, select components to be used in an electrical installation environment, and produce freehand sketches and basic drawings. Drawings are limited to single components. Components may include, components of support frames, enclosures and associated devices etc.					
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-None	KM-None	WM-None		
Planning/ Preparation	<p><b><u>Provide access to (Given):</u></b> Samples of engineering drawings</p> <p><b><u>Apprentices must be able to do/perform the following (hard and soft) skills:</u></b></p> <p><b>Determine engineering drawing information and requirements</b></p> <ul style="list-style-type: none"><li>Determine work order / customer requirements for intended usage of engineering drawing</li><li>Select engineering drawings, relevant to information required</li><li>Identify product/ system/ component/ item to be processed</li><li>Identify and check correct equipment for viewing and processing engineering schematics</li></ul>	<p><b><u>Knowledge of:</u></b></p> <ul style="list-style-type: none"><li>General knowledge of the elements and principles of design and their specific application to drawing</li><li>General knowledge of different approaches to drawing</li><li>Techniques, methods and principles of technical drawing used in descriptive geometry</li><li>Intellectual property issues and legislation associated with technical drawing work</li><li>Physical properties and</li></ul>	<p><b><u>Under supervision:</u></b></p> <ul style="list-style-type: none"><li>Access, select and view engineering drawings related to a specific work scenario</li><li>Interpret basic engineering drawings to determine scope of work.</li><li>Discuss appropriateness/ correctness of engineering drawing with supervisor</li><li>Identify and interpret component requirements</li><li>Interpret dimensions, instructions, symbols</li></ul>	<ul style="list-style-type: none"><li>Instructions/Lectures</li><li>Internet research</li><li>Site visits</li><li>Observation method with checklist.</li><li>Case studies</li><li>Role play (communication with clients/staff)</li></ul>	<p><b>Print materials, electronic files, software applications incl.:</b></p> <ul style="list-style-type: none"><li>SANS 10111-1 Engineering Drawing Standards</li><li>Software to view engineering drawings</li><li>Engineering drawings required as per work specifications</li><li>Text books</li><li>Training manuals for trainers and apprentices incl.</li></ul>

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	<ul style="list-style-type: none"> <li>Identify and interpret manufacturing information, products, systems and components represented in engineering drawings</li> <li>Source additional required information from workshop manuals, customer specifications, product suppliers, designers or similar sources</li> <li>Inform appropriate personnel when given work order/ customer requirements necessitate a modification of the drawings and documents</li> <li>Clarify fully any uncertainties are discussed with responsible personnel</li> <li>Seek assistance and support as needed and obtain as required</li> </ul>	<p>capabilities of the range of materials, tools and equipment used for technical drawing work</p> <ul style="list-style-type: none"> <li>Technical drawing techniques and their application to a range of contexts and subject matter</li> <li>Technical drawing practices including current standards and conventions</li> </ul> <p><b>Engineering Drawing fundamentals including:</b></p> <ul style="list-style-type: none"> <li>Principles, purpose and classification of drawings</li> <li>Basic drawing terms and conventions</li> <li>Symbols, codes and abbreviations used drawings</li> <li>Tools and equipment used in drafting drawings</li> <li>Drawing forms; sheet size and format, metric, copy fold information</li> <li>Fundamentals of drafting documentation including contents, version control, indexing and product identification</li> <li>Drawing, line conventions and</li> </ul>	<p>and conventions</p> <ul style="list-style-type: none"> <li>Extract dimensions from engineering drawings for work to be undertaken</li> <li>Modify drawings by hand where necessary</li> <li>Use drawings to explain and communicate the information content</li> </ul>		<p>multimedia software</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, incl:</b></p> <ul style="list-style-type: none"> <li>Computer system</li> <li>Printer, plotter</li> <li>Scanner</li> <li>Photocopy machine</li> <li>Tracing light box</li> <li>Flat file cabinet for blueprints/drawings</li> </ul> <p><b>Hand tools incl.:</b></p> <ul style="list-style-type: none"> <li>A3 drawing board with small drawing head or double lock mechanism</li> <li>Set of refillable technical pens (0.18- 0.70)</li> <li>Set square with protractors and scale ruler</li> <li>Compass set with pen adaptor</li> <li>Drafting templates/stencils (architect, lettering, electrician, engineering)</li> </ul> <p><b>Measuring and testing</b></p>
<b>Implementation/ Execution</b>	<p><b>Interpret and use engineering drawings and specifications</b></p> <ul style="list-style-type: none"> <li>Interpret and check drawing compliance with work instructions and specifications</li> <li>Identify correctly the symbols, codes, legends and diagrammatic representations</li> <li>Identify material specifications/finish and dimensions/ tolerances</li> <li>Identify correctly product/ system/ component/ item represented by the drawing</li> <li>Identify manufacturing processes from drawing, and select materials</li> <li>Resolve problems in consultation with responsible personnel</li> <li>Inquire with appropriate personnel how to proceed with necessary modifications in engineering drawings</li> </ul>				

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	<p><b>Produce basic sketches and modifications of engineering components</b></p> <ul style="list-style-type: none"> <li>• Select principal axes and angles</li> <li>• Sketch isometric and non-isometric lines</li> <li>• Construct pictorial circles and arcs</li> <li>• Sketch isometric, oblique and perspective views</li> <li>• Conduct calculations, as required, to ensure correct dimensions and proportions</li> <li>• Construct and use scales for sketch</li> <li>• Apply engineering specific terminology and symbols, and include specifications, as required, to convey required information</li> <li>• Complete border and title blocks and confirm sketch is an accurate representation of component</li> <li>• Check correct application of standard drawing conventions</li> <li>• Obtain verification of completed sketches of basic engineering components by authorised personnel</li> </ul>	<p>lettering, multi- and sectional view drawings, pictorial drawings, types and application of engineering drawings</p> <ul style="list-style-type: none"> <li>• Geometric construction principles</li> <li>• Conventional representations, microfilming, descriptive geometry and revolutions</li> <li>• Measurements; types, forms, units, symbols, reading and transfer</li> <li>• Sketching techniques (e.g. freehand lettering)</li> <li>• Basic drawing layout (e.g. borders and information blocks)</li> <li>• Names and functions of material lists</li> <li>• Implications of incorrectly interpreting an engineering drawing</li> <li>• SANS 10111-1</li> </ul>			<p><b>instruments incl.:</b></p> <ul style="list-style-type: none"> <li>• Steel ruler</li> <li>• Steel square</li> <li>• Vernier calliper</li> <li>• Micrometer</li> <li>• Acrylic Rulers</li> <li>• Geometry set squares</li> <li>• Reduction scale rulers (Architect's scale)</li> </ul>
<b>Evaluation/ Documentation</b>	<p><b>Clean up work area and store files</b></p> <ul style="list-style-type: none"> <li>• Store and file drawings securely</li> <li>• Conduct housekeeping activities</li> <li>• Care for tools and equipment used to view, archive, print-out or copy drawings</li> <li>• Report work progress to appropriate personnel</li> <li>• Complete work documentation</li> </ul>	<p>Engineering Drawing Standards</p> <ul style="list-style-type: none"> <li>• Correct media and graded pencil selection to produce a freehand sketch of components</li> <li>• Application of spatial principles to achieve scale and proportion</li> <li>• Freehand drawing techniques and</li> </ul>			

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		<p>conventions in the production of sketches in pictorial, orthographic and sectional views</p> <p><b>Types and usage of drawing materials incl.:</b></p> <ul style="list-style-type: none"> <li>• Pen and ink</li> <li>• Graphite pencils</li> <li>• Graph paper</li> <li>• Cartridge paper</li> <li>• Tracing paper</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 architectural (Including electrical plans) drawings to required specifications</li> <li>• Drawing a free hand sketch to requirements/specifications</li> <li>• Understanding of symbols and standards and their application</li> <li>• Communicating by using architectural (Including electrical plans) drawings</li> <li>• Compiling material lists</li> </ul>					