



**COURSE TITLE:** AIR-CONDITIONING AND REFRIGERATION Phase 1

**COURSE DURATION :** 9 Weeks

**TARGET POPULATION :** 1<sup>st</sup> Year apprentices

**COURSE CONTENT :**

- Identify, use and maintain hand tools and measuring Instruments used in the air-conditioning, refrigeration and ventilation trades.
- Define and explain the principles of thermodynamics and carry out basic calculation involving heat.
- Demonstrate understanding of fundamentals of electricity and its application in air-conditioning, refrigeration and ventilation equipment.
- Identify, use and maintain refrigeration trade specific tools and instruments.
- Explain the operation of basic vapour compression refrigeration systems, and identify and explain the function of the components and accessories as well as their retrieval and storage procedures.
- Identify materials, piping, fittings, jointing methods and insulation materials used for air-conditioning and refrigeration installations.
- Identify refrigerant containers, explain handling procedures and discuss the use of refrigerants.
- Identify and apply fixing methods for piping, ducting and equipment used in the trade of air-conditioning, refrigeration and ventilation.
- Identify and set ON-OFF control devices as used in air-conditioning and refrigeration systems, explain their operation & discuss their application & fault finding.
- Clean air-conditioning, refrigeration and ventilation plants, components and work sites.
- Work safely and use safety equipment when carrying out mechanical or electrical work on air-conditioning, refrigeration and ventilation installations.
- Demonstrate knowledge of the OHS Act as it applies to employees in the air-conditioning, refrigeration and ventilation industries.



**SHUKELA TRAINING CENTRE**

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- Identify and state the application of belt drives, couplings, gearboxes and bearings used on air-conditioning, refrigeration and ventilation plants and recognize misaligned, mismatched and worn components.
  - Install, connect and maintain electrical cables & conductors as applied in air-conditioning, refrigeration and ventilation installations.
  - Handle refrigerant containers and transfer refrigerant into service cylinders.
  - Perform basic arc welding of metals as applicable to air-conditioning, refrigeration and ventilation.
  - Join and install refrigerant piping.
  - Sketch and construct electrical circuits applicable to single-phase air-conditioning, refrigeration and ventilation installations.



**COURSE TITLE:** AIR-CONDITIONING AND REFRIGERATION. Phase 2

**COURSE DURATION :** 12 Weeks

**COURSE CONTENT:**

- Identify, use and maintain power tools used in the air-conditioning, refrigeration and ventilation trades.
- Fault find an air-conditioning, refrigeration or ventilation plant stoppage or failure.
- Fault find, repair and maintain AC motors, circuitry and controls as applied to air-conditioning, refrigeration or ventilation installations.
- Explain the operation of the vapour compression refrigeration cycle and identify and explain the operation of the components and the associated controls, safety devices and defrost systems.
- Dismantle and assemble air-conditioning and refrigeration equipment.
- Inspect and maintain electrical control panels and circuitry as used for air-conditioning, refrigeration and ventilation systems.
- Interpret air-conditioning and refrigeration plant layout and component drawings, sketches and specifications.
- Handle and place in position equipment used within the air-conditioning, refrigeration and ventilation industries.
- Determine, define and evaluate operating parameters of a refrigeration systems and transfer refrigerant.
- Identify, handle and sample refrigeration oils for analysis, and demonstrate how oil can indicate the condition of a refrigeration system.
- List commonly applied air-conditioning systems, state their application and explain their operation.
- Carry out elementary airflow measurements and calculations.
- Demonstrate knowledge of the OHS Act as it affects experienced workers.
- Install and service power transmission systems for air-conditioning, refrigeration and ventilation equipment.



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- Remove, install and service bearings used in air-conditioning, refrigeration and ventilation equipment.
  - Determine the properties of air from a psychometric chart and carry out basic calculation involving heat and mass transfer.
  - Operate water treatment systems used for air-conditioning and refrigeration installations.
  - Identify and apply insulation methods and materials for piping and flat surfaces as applicable to air-conditioning and refrigeration.
  - Maintain safety in the handling group 1 and 2 refrigerants.
  - Sketch and construct three phase circuits as used in air-conditioning, refrigeration and ventilation installations.
  - Adhere to the legal requirements of SANS 1047 (SABS 0147) Standards when handling group 1 refrigerants.



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**COURSE TITLE:** AIR-CONDITIONING & REFRIGERATION Phase 3

**COURSE DURATION:** 7 Weeks

**COURSE CONTENT:**

- Assemble a refrigeration plant
- Use of basic hand tools
- Commissioning motor and starter
- Fault find a refrigeration plant
- Identification of components
- Shaft alignment
- Commissioning a cold rooms
- Commissioning a freezer rooms
- Testing of single phase motors
- Testing of three phase motors
- Testing efficiency of a compressor
- Copper to copper welding
- Evacuating a refrigeration plant