

Domain**AIR CONDITIONING AND REFRIGERATION****Title:****Replace air conditioning and refrigeration
system components****Level: 3****Credits: 12****Purpose**

This unit standard specifies the competencies required to replace air conditioning and refrigeration system components. It includes plan and prepare for work; use of manifold gauges; pump down the system; recover refrigerant; replace components and perform housekeeping.

This unit standard is intended for those who works as air conditioning and refrigeration artisans.

Special Notes**1. Entry information:****Prerequisite**

- *Unit 1157 – Demonstrate basic knowledge of workplace health and safety.*

2. To demonstrate competence, at minimum evidence is required to replace any three (3) electrical and 3 mechanical components.**3. Assessment evidence may be collected from a real workplace or a simulated workplace or an appropriate simulated realistic environment in which air conditioning and refrigeration operations are carried out.****4. All inspection, operation and maintenance procedures associated with the use of tools and equipment shall comply with manufacturers' specifications and/or company's guidelines and instructions.****5. Glossary of terms:**

- *"Specifications"* refers to any, or all of the following: manufacturers' specifications and recommendations, workplace specific requirements.
- *"Refrigerant"* refers to is the working fluid that circulate through the system and produce both cooling and heating as it changes phases.

- “*Pump down*” refers to the process in which the refrigerant within the cooling or refrigeration system is pumped out or transferred to the storage location or refers to sucking back of the refrigerant into the liquid receiver.
 - “*Refrigerant*” recovery refers to the transfer of the refrigerant from the system into the recovery cylinder.
 - “*Manifold gauge*” refers to the tool that analyses the system. Or is a tool in air conditioning and refrigeration system that is used to measure and display various temperature and pressure.
 - “*Evacuation*” refers to the process of removing air and moisture from the system using a vacuum pump.
6. Regulations, legislation and standard relevant to this unit standard include the following:
- Labour Act, No. 11, 2007
 - Occupational Health and Safety Regulations No. 18, 1997 and all subsequent amendments.
 - Occupational Health and Safety Regulations No. 101, 1992 (act 6,1992)
 - Importing and Exporting Control Act, 1994.
 - NAMS 5149-3: 2021 (ISO 5149-3: 2014)
 - NAMS 5149-4: 2021 (ISO 5149-4: 2014)
 - ISO 17584: 2022
 - SANS 10147: 2014
7. Performance of all elements in this unit standard must comply with industry standards.
8. This unit standard applies to single-phase and three-phase air conditioning and refrigeration systems.

Quality Assurance Requirements

This unit standard and others within this subfield may be awarded by institutions which meet the accreditation requirements set by the Namibia Qualifications Authority and the Namibia Training Authority and which comply with the national assessment and moderation requirements. Details of specific accreditation requirements and the national assessment arrangements are available from the Namibia Qualifications Authority and the Namibia Training Authority. All approved unit standards, qualifications and national assessment arrangements are available on the Namibia Training Authority website www.nta.com.na.

Elements and Performance Criteria

Element 1: Plan and prepare for work

Range

Tools and equipment may include but not limited to multimeter, spanners, screw drivers, manifold gauges, ratchet wrench, side cutter, water pump pliers, and shifting.

Performance Criteria

- 1.1 Work instructions including job cards, specifications and operational details are interpreted and confirmed.
- 1.2 Workplace inspection is carried out in line with safety standards.
- 1.3 Safety requirements are applied in line with safety and workplace policies.
- 1.4 Tools and equipment are selected in line with the job requirements.
- 1.5 Material required are selected and obtained in line job specifications.
- 1.6 Calibration requirements for tools, instruments and equipment are carried out in line with job requirements.
- 1.7 Environmental protection requirements are outlined and followed in line with environmental legislative requirements.

Element 2: Use manifold gauges

Range

Manifold Gauge may include but not limited to digital gauges, and analog gauges.

Performance Criteria

- 2.1 Procedures and information required for using a manifold gauge are outlined in line with job specifications.
- 2.2 Procedures for using manifold gauge are applied in line job specifications.
- 2.3 Connect manifold gauge to the system with a service and Schrader valves are applied in line with job specifications.

Element 3: Pump down the system

Range

Terminologies may include but not limited to automatic pump down, and manual pump down.

Equipment may include but are not limited to manifold gauges, leak testing equipment, and safety goggle.

Tools may include but not limited to valve ratchet, shifting spanner, allen keys, screw drivers, and solenoid tester.

Component may include but not limited to filter drier, solenoid valve, sight glass, expansion valve, accumulator, regulator, compressor, and evaporator.

Performance Criteria

- 3.1 Terminologies are explained.
- 3.2 Procedures required for pumping down the system are outlined in line with job specifications.
- 3.3 Pump down is performed in line with job specifications.

Element 4: Recover refrigerant

Range

Equipment may include but are not limited to refrigerant recovery, recycling unit, charging scale, and acid test kit.

Information may include but not limited to classification of refrigerant such as CFCs, HCFCs, HFOs and HCs.

Tools may include but not limited to valve ratchet, shifting spanner, allen keys, screw drivers, and solenoid tester.

Performance Criteria

- 4.1 Procedures and information required for recovering refrigerant are outlined in line with job specifications.
- 4.2 Recovery of refrigerant is performed in line with job specifications.
- 4.3 Recycling of refrigerant is performed in line with job specifications.
- 4.4 Refrigerant is stored in line with job specifications.

Element 5: Replace components

Range

Components may include but is not limited to driers, sight glass, compressor, pressure switch, evaporator fan motor, condenser fan motor, solenoid valve, thermostat, defrost timer, expansion valve, evaporator coil, condenser coil, liquid receiver, defrost elements, transducers, vibration eliminator, accumulator, oil separator, high side float valve, oil regulator, non-return valve regulator, pressure regulator, and oil pressure switch.

Performance Criteria

- 5.1 Procedures and information required for replacing a component are outlined in line with job specifications.
- 5.2 Component is replaced in line with industrial standards.
- 5.3 Leak test is performed in line with industrial standards.
- 5.4 Evacuation is performed in line with industrial standards.
- 5.5 System is charged and returned to normal operation in line with industrial standards.
- 5.6 Commissioning is applied in line with industrial standards.

Element 6: Perform housekeeping

Range

Work completion details may include but are not limited to job card, and sign-out form for equipment.

Performance Criteria

- 6.1 Work area is cleared of waste, cleaned, restored and secured in line job specifications.
- 6.2 Reusable materials are collected and stored in line with workplace procedures.
- 6.3 Equipment used are cleaned, checked, maintained, and stored in line job specifications/work instructions.

Registration Data

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