

Domain AIR CONDITIONING AND REFRIGERATION**Title: Install refrigeration systems****Level: 3****Credits: 12****Purpose**

This unit standard specifies the competencies required to install refrigeration systems. It includes plan and prepares for work; install refrigeration unit; installing pipes; perform wiring and perform do 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 install one freezer room and one cold room

3. Assessment evidence may be collected from a real workplace or a simulated real 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.
- "*Workplace procedures*" refers to documents that include worksite rules, code and practice; equipment operating instructions; production specifications; documented quality management systems.
- "*Refnet (Reference network)*" refers to is a Y branch copper fitting which is used for connecting VRF (Variable refrigerant flow) and VRV (Variable refrigerant volume) systems.
- "*Tactile*" refers to physical assessment of any object or surface by touch.

6. Regulations, legislation and standards 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.
 - Import and Export control act, 1994.
 - NAMS 5149-3: 2021 (ISO 5149-3: 2014
 - ISO 17583: 2022
 - NAMS/ESI LVEIWS 001: ED 1.0 2021
 - 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 oxy-acetylene gas; welding set; swaging and flaring tool set; concrete blade; hammer; hack saw; spirit level; bending spring; pipe bender; pipe cutter multimeters; square; vacuum pump; manifold gauge; and recovery machine.

Materials may include but not limited to drainpipe; fischer plugs; insulation tape poly filler; screws; bolt and nuts; tubes, armaxflex; cable ties; soldering rods; trunking; couplings; saddle; polyvinyl chloride (PVC) glue; glands; and solder flux.

Refrigeration service power tools may include but not limited to air blow gun, drill machine, arc welding machine, and grinder.

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: Install refrigeration units

Range

Refrigeration system components may include but not limited to compressors, condenser, evaporator, metering devices, elbows, access fittings, filter driers, sight glasses, anti-vibration devices, line heat exchangers, receivers, pressure regulating valves, check valves, shut valve, pressure relief valve, oil temperature valve, hand expansion valve, float regulators, defrost controls, and refnet.

Ancillary connections may include but are not limited to water, electricity, and plumbing.

Performance Criteria

- 2.1 Procedures and information required for installing air conditioning unit are outlined in line with job specifications.
- 2.2 Site Inspection is carried out in line with the job specifications.
- 2.3 Drawings, schedule of materials and instructions are checked against site conditions and confirmed to suit site conditions in line with job specifications.
- 2.4 Ancillary service connections are set up and verified in line with workplace procedures.
- 2.5 Integrity of building penetrations is confirmed in line with the workplace procedures.
- 2.6 Measurements are carried in line with job specifications.
- 2.7 Installation of the unit is carried in line with job specifications.

Element 3: Install pipes

Range

Tools may include but not limited to flaring kit, pipe benders, and pipe cutters.

Equipment may include but not limited to oxy-acetylene, fire extinguisher, and pipe marking machine.

Consumable materials may include but not limited to brazing rods, nitrogen gas, insulation material, trunking, and flux.

Performance Criteria

- 3.1 Procedures and information required for installing pipe work are outlined in line with job specifications.
- 3.2 Pipe layout is carried out in line with job specifications.
- 3.3 Pipe installation is carried out in line with job specifications.
- 3.4 Leak test is performed in line with job specifications.

Element 4: Perform wiring

Range

Electrical wires may include but not limited to two, three, four, five, and six core cables.

Tools may include but not limited to pliers, screw drivers, crimping tool, multimeter, cable knife, wire stripper, spring bender, hacksaw, allen keys, adjustable wrenches, pliers, and screw drivers crimping tool.

Material may include but not limited to flux, insulation tape, glands, saddle, cable ties, PVC pipe, PVC glue, PVC coupling, elbows, and heat shrink.

Inspection of refrigeration may include but not limited to vacuum, tighten electrical wires, open low- pressure valve, and high-pressure valve.

Performance Criteria

- 4.1 Procedures and information required for carrying out electrical wiring is outlined in line with job specifications.
- 4.2 Wiring is performed in line with job specifications.
- 4.3 Electrical test is performed in line with job specifications.
- 4.4 Unit commissioning is performed in line with job specifications.

Element 5: Perform housekeeping

Range

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

Performance Criteria

- 5.1 Work area is cleared of waste, cleaned, restored and secured in line with job specifications.
- 5.2 Reusable materials are collected and stored in line with job specifications.
- 5.3 Equipment used are cleaned, checked, maintained and stored in line with job specification/work instructions.

Registration Data

Subfield:	Mechanical Engineering
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