

Domain**AIR CONDITIONING AND REFRIGERATION****Title:****Install air conditioning systems****Level: 3****Credits: 11****Purpose**

This unit standard specifies the competencies required to install air conditioning systems. It includes plan and prepares for work; install air conditioning unit install pipes; perform wiring; 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 a minimum, evidence is required to install and commission one (1) air condition unit.
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:
 - *"A/C"* refers to air conditioning systems or air conditioning unit.
 - *"Air conditioning"* refers to the process of treating air so as to control simultaneously its temperature, humidity, cleanliness, and distribution within an interior space such as a room or building.
 - *"Commissioning"* refers to carry out all the necessary test and procedures required by industrial standards.
6. Regulations, legislation and standards relevant to this unit standard include the following:
 - Labour Act, No. 11, 2007
 - Occupational Health and Safety Regulations No. 101, 1992 (Act 6,1992)
 - SANS 10140-3 identification of colour marking.

- SANS 1422 filters for use in air conditioning and general ventilations
 - 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 17584: 2022
 - NAMS 5149-2: 2021 (ISO 5149-2: 2014)
 - IEC 60335-2-40: 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](http://www.nta.com.na) 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; drill machine; swaging and flaring tool set; grinder machine; concrete blade; hammer; hack saw; spirit level; bending spring; pipe bender; pipe cutter multimeters; and square.

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

Air conditioning (A/C) system may include but is not limited to cassette, split, window, and ceiling type air conditioners.

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 Air conditioning unit

Range

Tools and equipment may include but are not limited to standard tools box; oxy-acetylene gas welding set; drill machine; swaging and flaring tool set; grinder machine; concrete blade; hammer; hack saw; spirit level; bending spring; pipe bender; pipe cutter multimeters and square; ladder; and scaffold.

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

Safety equipment may include but not limited to fire extinguisher, safety harness, and PPE

Air conditioning (A/C) system may include but is not limited to cassette, split, window, and ceiling type air conditioners.

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 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 System is purged in line with industrial standards.
- 3.5 Leak test is performed in line with job specifications.

Element 4: Perform wiring

Range

Electrical wires may include but are 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, and adjustable wrenches.

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

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

Performance Criteria

- 4.1 Procedures and information required for carrying out 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

Housekeeping may include but not limited to work completion; cleaning; arranging; and storing of tools and equipment.

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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