

INSTALL, SERVICE AND REPAIR AIR CONDITIONING UNITS

UNIT CODE: ENG/OS/RAC/CR/02/5/A

UNIT DESCRIPTION

This unit covers the competencies required to safely install, service and repair air conditioning units. It includes competencies for conducting survey for air conditioning unit, installation of the unit as well as testing and commissioning the installed unit.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT These describe the key outcomes which make up workplace function.	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. <i>Bold and italicized terms are elaborated in the Range</i>
1. Conduct site survey	1.1. <i>Site conditions</i> and <i>installation requirements</i> are assessed according to manufacturer's specification 1.2. <i>Tools, equipment</i> and <i>materials</i> needed for installation are determined according to site conditions and site installation requirements 1.3. Survey report is prepared in accordance with work place policies and procedures 1.4. Safety procedures are adhered to according to OSHA
2. Install electrical wiring for air conditioning unit	2.1. Electrical cabling and <i>wiring devices</i> are selected and safely installed in line with manufacturer's instructions and IEE regulations 2.2. Electrical circuit is tested in accordance with IEE regulations
3. Install air conditioning unit	3.1. Tools equipment and materials are assembled according to work place procedures 3.2. <i>Unit</i> and components are prepared based on work place procedures 3.3. Brackets, hangers and frames are installed in accordance with manufacturer's specifications 3.4. Unit is positioned and leveled in line with manufacturer's specifications 3.5. <i>Sealing materials</i> are installed in line with manufacturer's instructions and specifications 3.6. <i>Condensate drain</i> is installed in accordance with manufacturer's instructions and specifications

	3.7. Safe handling techniques are employed in line with manufacturer's specifications and OSHA
4. Service air conditioning unit	4.1. Tools, equipment and materials are selected as per standard operating procedures (SOPs) 4.2. Air conditioning unit components are serviced and maintained according to manufacturer's specifications
5. Identify and repair faults in air conditioning units	5.1 Appropriate diagrams, charts and manuals are interpreted in line with the job requirements 5.2 Safe working practices are observed throughout the task as per work place procedures 5.3 Tools, equipment and instruments are selected and used in line with job requirements 5.4 Components are tested following manufacturer's manuals 5.5 Faulty components are repaired or replaced in line with manufacturer's manuals 5.6 Refrigerant recovery/recycling is performed according to manufacturer's manuals 5.7 Retrofitting/conversion is performed according to manufacturer's manuals where applicable 5.8 Housekeeping is performed 5.9 Work is completed in line with workplace procedures and environmental legislations
6. Test-run the installed/ repaired unit	6.1. Voltage and current are checked according to unit rated requirements. 6.2. Temperature and velocity of air are measured based on unit specifications. 6.3. Sound and vibration are checked based on unit specifications 6.4. Housekeeping is performed 6.5. System is handed over to user as per work place procedures 6.6. Report is prepared in line with work place procedures.

RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

VARIABLE	RANGE
1. Site conditions may include but not limited	<ul style="list-style-type: none"> • Availability of power source and unit's electrical provisions

to:	<ul style="list-style-type: none"> • Wall and floor finishing provisions • Drainage provisions • Air circulation/ ventilation provisions
2. Installation requirements may include but not limited to:	<ul style="list-style-type: none"> • Location • Wall and floor finishing • Electrical requirements <ul style="list-style-type: none"> • A/C plug and outlet • Wire size • Protection devices • Earthing
3. Tools and equipment may include but not limited to:	<ul style="list-style-type: none"> • Measuring tools • Spirit levels • Plumb lines • Clear/transparent water hose • Screw drivers • Pliers • Multi meters • Clamp meters • Anemometers • Chisels • Hammers (claw and ball pein) • Hacksaws • Files • Grinders • Electric drills • Drill bits • Cross cut saws • Rip saws • Arc welding equipment • Brazing equipment • Lok ring tools • Masonry tools (e.g. trowel, spade, level, etc.) • Refrigerant identifier • System analyzer
4. Materials may include but not limited to:	<ul style="list-style-type: none"> • Expansion bolts • Brazing rods • Welding electrodes

	<ul style="list-style-type: none"> • Sealants • Electrical cables • Convenience outlets • Conduits and trunkings • Circuit breakers • Switches • Masonry materials (e.g. cement, sand)
5. Wiring devices may include but not limited to:	<ul style="list-style-type: none"> • Service earthing • Socket outlets • Top plugs
6. Unit may include but not limited to:	<ul style="list-style-type: none"> • Window type air conditioner • Split type air conditioner
7. Sealing materials may include but not limited to:	<ul style="list-style-type: none"> • Rubber gasket • Armaflex • Foam • Plastic • Silicone • Fibre glass
8. Report may include but not limited to:	<ul style="list-style-type: none"> • Installation report • Inspection report • Testing report • Commissioning report

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Communicating effectively
- Interpreting plans and details

- Preparing materials
- Proper handling of tools and equipment
- Working safely
- Installing window-type and split-type air-conditioning units
- Testing power supply
- Connecting power circuit
- Operating window-type and split-type air-conditioning unit

Required Knowledge

The individual needs to demonstrate knowledge of:

- Personal protective equipment/safety gears
- Handling of tools, equipment and accessories
- Safety signs and symbols
- Good housekeeping
- Linear measurements
- Ratio and proportion
- Unit conversion
- Electrical plans, symbols and abbreviations
- Types of sealant
- Types of insulation
- Types of wires, conduits and fittings
- Types of wiring devices
- Basic refrigeration cycle
- Air conditioning components
- Electrical installation systems
- Basic masonry
- Basic carpentry
- Basic plumbing
- Basic arc welding
- Preventive maintenance
- Relevant legislations

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical aspects of competency	<p>Assessment requires evidence that the candidate:</p> <ol style="list-style-type: none"> 1.1. Adhered to safety procedures 1.2. Identified tools, equipment and materials 1.3. Assessed site conditions for air conditioning system 1.4. Installed electrical wiring for air conditioning system 1.5. Installed air conditioning system 1.6. Serviced air conditioning units 1.7. Repaired a faulty air conditioning unit 1.8. Tested air conditioning system 1.9. Commissioned air conditioning system 1.10. Carried out housekeeping
2. Resource implications	<p>The following resources must be provided:</p> <ol style="list-style-type: none"> 2.1 Work place location/installation area 2.2 Tools and equipment appropriate for the task 2.3 Materials relevant to the task 2.4 Drawings, manuals and specifications relevant to the task
3. Methods of assessment	<p>Competency may be assessed through:</p> <ol style="list-style-type: none"> 3.1. Demonstration 3.2. Direct observation with oral questioning 3.3. Written tests 3.4. Portfolio 3.5. Third party reports
4. Context for assessment	<p>Competency may be assessed individually on the job, off the job or a combination of these. Off the job assessment must be undertaken in a closely simulated workplace environment or during industrial attachment.</p>
5. Guidance information for assessment	<p>Holistic assessment with other units relevant to the sector, workplace and job role is recommended.</p>