

6. SPECIFICATIONS

- **WINDOW TYPE**
- **SPLIT & CASSETTE TYPE**

***SPECIFICATION FOR
SUPPLY & INSTALLATION OF WINDOW TYPE AIR CONDITIONING UNITS &
ACCESSORIES***

**(FOR THE COOLING CAPACITY LESS THAN 36,000 BTU SPECIFIED
OPERATING POINT AS PER THE SPECIFICATION)**

WINDOW TYPE AIR CONDITIONING UNITS

**SPECIFICATION FOR INSTALLATION OF WINDOW TYPE AIR CONDITIONING
UNITS AND ACCESSORIES**

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SPECIFICATION FOR INSTALLATION OF WINDOW TYPE AIR CONDITIONING UNITS AND ACCESSORIES

1. GENERAL SPECIFICATIONS

1.1 NATURE OF BID

The Contractor shall carefully study the drawings mentioned under scope of work and fill in the price in the attached bill of quantities. It is to be distinctly understood that the total quantity Bided for is to be complete and comprehensive of all minor deficiencies if any, in the brief description. No variation or extras will be allowed except in respect of alterations, which are specially authorized in writing. No alterations shall be made without the written permission of the Engineer.

1.2 SURPLUS STOCK

No compensation shall be paid by the Board on completion of the work for any surplus stock of pipes, specials, fittings etc. and materials obtained for the purpose of this Contract. However, on completion of the Contract, the Engineer may retain any surplus stock, which would be useful for the maintenance of the above Air Conditioning Unit and pay at prices agreed upon at that time by the Engineer and the Contractor.

1.3 POWER SUPPLY

The necessary 400 / 230 V, 3 phases / single phase and neutral 50Hz electric power will be made available at the power distribution panel of the building. The power required for the distribution panel for air conditioning units shall be from the afore said electrical power distribution point and all cabling and accessories shall be provided and fixed by the Contractor.

All electrical equipment & wiring shall conform to the standards set by the I.E.E., UK as well as Sri Lanka regulations and be acceptable to the Ceylon Electricity Board, Sri Lanka.

1.4 CALIBRATION OF INSTRUMENT & METERS

All instruments & meters shall be calibrated in the Metric Units as follows;

- (a) Pressure shall be indicated in kg/ cm²
- (b) Temperature in °C.
- (c) Voltage in V.
- (d) Time shall be indicated in Hours
- (e) Amperage shall be indicated in Amperes.
- (f) Relative humidity in RH % with dry bulb temperature.

1.5 LITERATURE ON EQUIPMENT AND MATERIALS

The Bidder shall supply detailed literature and specifications from the manufacturers in respect of all equipment and materials included in his offer and give the names of all such manufacturers and the countries of origin of the materials and equipment.

1.6 LOCAL MATERIALS TO BE USED IN WORK

All materials and fittings which are manufactured locally by State sponsored Corporations and other local agencies and which are up to the required standards will not be allowed to be imported and no foreign exchange will be given for the same.

1.7 INSTALLATION, TESTING AND COMMISSIONING

Refer the specific specifications for window type Air conditioning units and Accessories.

1.8 CALCULATION OF OPERATIONAL COST

In the evaluation of bidders of the capacity more than 18,000 Btu / hr Air Conditioning units with the capacity present worth of operational cost will be considered and followings will be used in calculation of operational cost.

- a. Overall efficiency of the Air conditioning unit / COP
- b. Economic life of equipment - 07 years
- c. Annual operational hours of each unit (As per the specific specifications for Air Conditioning units and Accessories)
- d. Cost of Electrical Energy – Rs 9.30 (present rate can be used) per kWh.
- e. Discounting Rate - 12%

1.9 WARRANTY PERIOD

The supplier should provide a warranty period of minimum 05 years for trouble free operation of the Compressor. One year trouble free warranty for all equipments and accessories supplied under this contract.

During first year of warranty period all the works describe under the maintenance period have to be attended. This should include at least six free services within warranty period.

The contractor should provide required materials, labour and spare parts during the warranty period without any charged to NWS&DB. The warranty period commenced from the completion date as per the completion certificate. The contractor has to assure that he is equipped with sufficient resources to attend any maintenance or major breakdowns immediately after inform by NWS&DB.

2. SPECIFICATION FOR INSTALLATION OF WINDOW TYPE AIR CONDITIONING UNITS AND ACCESSORIES

2.1 GENERAL SPECIFICATION

The Air Conditioning Units shall be of the window type suitable for indoor installation with wall brackets, power connection, condensate water drain piping using suitable PVC piping to the nearest common drain line. The product shall be ASHREA Energy efficiency Class A with COP not less than 4.4 .

The unit shall be housed in a Galvanized steel fabricated box with acoustic, heat insulation and vibration protected painted with corrosion resistive paints suitable for Tropical climate.

This installation shall facilitate in such a way to permit the removal of the units when the repairs to be carried out.

- a. The unit shall be with fully hermetic compressor.
- b. Operate on a Refrigerant, free of halocarbons.
- c. Condenser with inbuilt fan.
- d. Evaporator with Squirrel Cage Fan.
- e. Fresh Air changing facility with facility for control for efficient operation.
- f. Remote Control device.

Original performance curves of the Air Conditioning units certified by the manufacturer should be furnished and photocopies will be accepted which are duly certified by the local agent.

A dimensioned drawing of the Air Conditioning Units complete with materials of manufacture shall be provided with the Bid.

The brand of the Compressor shall be provided with performance efficiency , power supply and capacity details.

2.2 COMPRESSOR SPECIFICATION

Compressor :

The Compressor shall be energy efficient fully hermitically sealed type rotary / reciprocating, 230 V / 400V + / - 10 % , single / three phase, 50Hz. Operating on Refrigerant R 410A.

The compressor Motor shall be suitably protected against overloading using a removable suitably sized over load protection. These shall be mounted on resilient mountings for quiet operation.

2.3 AIR CONDITION UNIT ENCLOSURE

2.3.1 General

The control panels shall be completely designed, fabricated assembled, wired, checked and tested at the factory as per standards and per descriptions given below.

Modern Architectural design arrangement and finish suitable for luxury living environment shall be elegant and workmanship shall be of a high order with flushed and concealed type front cover. The unit shall be wall mounted and locked on to the steel enclosure made out of Galvanized steel with protective paints suitable for tropical climate. The enclosure shall ensure earthing. The units and all electrical components should be suitable for the operation on 230 volts \pm 10% 01 phase 02 wire, 50Hz, AC power Supply.

2.3.2 Construction

The panels shall be of sheet metal, *wall mounted* as per the specification The design shall be totally enclosed, dust and rain splash-proof as per *IP 55* of IEC publication 34-5. The housing of the panel shall be fabricated of 14 SWG. The outer and inner surface of the panels shall be primed and painted with corrosive resist PVC ,Epoxy or plastic, marine grade special coating , colour as specified.

Access to all equipment mounted inside shall be from the front.

Switch gears and earth , main connections and auxiliary wiring shall be arranged and marked in general compliance with relevant British standards.

2.3.3. Earthing

A suitable earth terminal should be provided to facilitate the connection of the main earth. Earthing arrangement should comply with BS 7430 and earth resistance of the main earth should not exceed 5 Ω .

2.3.4 Wiring

Control wiring shall be concealed by taking through neatly arranged PVC Spiral wire protectors and all control wires shall be terminated with cable lugs or compression type terminals. All Current carrying bolts and nuts shall be of high conducting material.

2.3.5 Control Panel Equipment, Remote Controls and Protections

The equipment to be mounted on the control panel / Remote controller of Air Conditioning Unit shall consist of the following and starting method as per the specification.

- a DOL Starting of the Compressor.
- b Over Load protection for the all Motor.
- c Thermostatic expansion and flow control of the refrigerant.
- d Room temperature sensor.
- e Fan speed control, three minimum speeds.
- f Compressor loading control, high / low and economical.
- g. With facility of on / off, room temperature indication etc.

2.4 ROOM CONDITIONS

- a Please refer the room lay out and the locations suggested for the installation of the Air Conditioning units.
- b Room with out Air conditioning Temperature shall be 40° C with Relative humidity 90%

2.5 INSTALLATION TESTING AND COMMISSIONING

All installation work shall be carried out in accordance with relevant International Standards and codes of practice.

When all installation work is satisfactorily completed, the contractor shall inform the Engineer in writing that equipment are ready for handing over and the Engineer shall then fix a date for taking over.

At the taking over all equipment shall be tested for a period as per the application to determine the following.

- a Power consumption
- b Room Temperature and Relative Humidity at full load as given.
- c Vibration and Noise

If the Engineer is not satisfied with the performance of the equipment or other installation, he may refuse to take over the equipments until necessary improvements are effected. Any time necessary for this additional work will be considered as contractor's delay.

2.6 MAINTENANCE PERIOD

The Air Conditioning units and other equipment shall be satisfactorily maintained for a period of 24 months from the date of taken over. During the maintenance period, the contractor should attend to

- a. All periodical service not less than six (schedule of periodical service should be submitted with the bid)
- b. Maintain a maintenance record (format of maintenance record shall be submitted with bid)
- c. Attending to all the repairs and replacements to avoid any failure of the system within a time period not less than 05 working days from the date the contractor has been notified.
- d. In addition to the equipment which fails, the equipments that do not give satisfactory performance during the period of maintenance shall be replaced by the contractor within 3 weeks from the date the contractor has been notified.
- e. In order to cut down the down time in the event of any major failure of unit the supplied should provide the spare unit till such time the unit is replaced after repairs.

The expenses involved in this connection shall be born by the contractor who should take this in to consideration when bidding.

If the contractor is not attended to the repair within the time specified as above, the engineer has the right to rectify the fault and claim the cost thus incurred from the contractor.

2.7 TECHNICAL LITERATURE

The following technical literature for the Air conditioning units, Remote Controls, and accessories, shall be forwarded along with offer.

- a) Technical Specification of the Air conditioning units (Features, dimensions, cross Sectional drawing of the Air Conditioning unit showing materials, etc.)

2.8 SPECIFIC SPECIFICATIONS

The Air conditioning unit / units shall be provided the following room conditions and requirements

2.8.1 Number of Occupants

2.8.2 Number of Air changes per hour not less than 6 Nos

2.8.3 Floor Area - m² and room height m

2.8.4 Walls Brick / thickness –

2.8.5 Type of Ceiling / Floor Slab -.....

2.8.6 Number of Windows -

2.8.7 Electrical Equipment inside the Room and the heat out put

- a. Room Lighting
- b. Printers
- c. Computers
- d. Photo copiers
- e. Any other Heat sources.

2.8.8 Room after Air Conditioning shall be 20°C with Relative Humidity 65%

2.8.9 Noise level at full load condition shall be less than 55dB (A)

**SPECIFICATION FOR
SUPPLY & INSTALLATION OF SPLIT & CASSETE TYPE
AIR CONDITIONING UNITS & ACCESSORIES**

**(FOR THE COOLING CAPACITY LESS THAN 136,000 BTU SPECIFIED
OPERATING POINT AS PER THE SPECIFICATION)**

SPLIT & CASSETE TYPE AIR CONDITIONING UNITS

**SPECIFICATION FOR INSTALLATION OF SPLIT & CASSETTE TYPE AIR
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SPECIFICATION FOR INSTALLATION OF SPLIT & CASSETTE TYPE AIR CONDITIONING UNITS AND ACCESSORIES

1. GENERAL SPECIFICATIONS

1.1 NATURE OF BID

The Contractor shall carefully study the drawings mentioned under scope of work and fill in the price in the attached bill of quantities. It is to be distinctly understood that the total quantity Bided for is to be complete and comprehensive of all minor deficiencies if any, in the brief description. No variation or extras will be allowed except in respect of alterations, which are specially authorized in writing. No alterations shall be made without the written permission of the Engineer.

1.2 SURPLUS STOCK

No compensation shall be paid by the Board on completion of the work for any surplus stock of pipes, specials, fittings etc. and materials obtained for the purpose of this Contract. However, on completion of the Contract, the Engineer may retain any surplus stock, which would be useful for the maintenance of the above Air Conditioning Unit and pay at prices agreed upon at that time by the Engineer and the Contractor.

1.3 POWER SUPPLY

The necessary 400 / 230 V, 3 phases / single phase and neutral 50Hz electric power will be made available at the power distribution panel of the building. The power required for the distribution panel for air conditioning units shall be from the afore said electrical power distribution point and all cabling and accessories shall be provided and fixed by the Contractor.

All electrical equipment & wiring shall conform to the standards set by the I.E.E., UK as well as Sri Lanka regulations and be acceptable to the Ceylon Electricity Board, Sri Lanka.

1.4 CALIBRATION OF INSTRUMENT & METERS

All instruments & meters shall be calibrated in the Metric Units as follows;

- (a) Pressure shall be indicated in kg/ cm^2
- (b) Temperature in $^{\circ}\text{C}$.
- (c) Voltage in V.
- (d) Time shall be indicated in Hours
- (e) Amperage shall be indicated in Amperes.
- (f) Relative humidity in RH % with dry bulb temperature.

1.5 LITERATURE ON EQUIPMENT AND MATERIALS

The Bidder shall supply detailed literature and specifications from the manufacturers in respect of all equipment and materials included in his offer and give the names of all such manufacturers and the countries of origin of the materials and equipment.

1.6 LOCAL MATERIALS TO BE USED IN WORK

All materials and fittings which are manufactured locally by State sponsored Corporations and other local agencies and which are up to the required standards will not be allowed to be imported and no foreign exchange will be given for the same.

1.7 INSTALLATION, TESTING AND COMMISSIONING

Refer the specific specifications for split type Air conditioning units and Accessories.

1.8 CALCULATION OF OPERATIONAL COST

In the evaluation of bidders of the capacity more than 18,000 Btu / hr Air Conditioning units with the capacity present worth of operational cost will be considered and followings will be used in calculation of operational cost.

- a) Overall efficiency of the Air conditioning unit / COP
- b) Economic life of equipment - 07 years
- c) Annual operational hours of each unit (As per the specific specifications for Air Conditioning units and Accessories)
- d) Cost of Electrical Energy – Rs 9.30 (present rate can be used) per kWh.
- e) Discounting Rate - 12%

1.9 WARRANTY PERIOD

The supplier should provide a warranty period of minimum 05 years for trouble free operation of the Compressor One year trouble free warranty for all equipments and accessories supplied under this contract.

During first year of warranty period all the works describe under the maintenance period have to be attended. This should include at least six free services within warranty period.

The contractor should provide required materials, labour and spare parts during the warranty period without any charged to NWS&DB. The warranty period commenced from the completion date as per the completion certificate. The contractor has to assure that he is equipped with sufficient resources to attend any maintenance or major breakdowns immediately after inform by NWS&DB.

2. SPECIFICATION FOR INSTALLATION OF SPLIT & CASSETTE TYPE AIR CONDITIONING UNITS AND ACCESSORIES

2.1. GENERAL SPECIFICATION

The Air Conditioning Units shall be of the split type suitable for indoor installation unit and pot door installation unit with wall brackets where necessary in case of upper floors of a building, power connection, condensate water drain piping using suitable PVC piping to the nearest common drain line. The product shall be ASHREA Energy efficiency Class A with COP not less than 4.4 .

Considering the reduced power consumption for higher capacity units the compressor more than 15kW shall be with VVSD drives with load demand sensing operation units.

The out door unit shall be housed in a Galvanized steel fabricated box with acoustic, heat insulation and vibration protected painted with corrosion resistive paints suitable for Tropical climate.

The indoor unit shall be architecturally designed and made in elegant appearance with sound and noise protections, piping and auto, remote controls.

This installation shall facilitate in such a way to permit the removal of the units when the repairs to be carried out.

- a. The unit shall be with fully hermetic compressor,
- b. Operate on a Refrigerant free of halocarbons.
- c. Condenser with inbuilt fan.
- d. Evaporator with Squirrel Cage Fan,
- e. Air throws control facility with facility for control for efficient operation.
- f. Remote Control device.

Original performance curves of the Air Conditioning units certified by the manufacturer should be furnished and photocopies will be accepted which are duly certified by the local agent.

A dimensioned drawing of the Air Conditioning Units complete with materials of manufacture shall be provided with the Bid.

The brand of the Compressor shall be provided with performance efficiency , power supply and capacity details.

2.2 COMPRESSOR SPECIFICATION

Compressor :

The Compressor shall be energy efficient fully hermitically sealed type rotary / reciprocating, 230 V / 400 V + / - 10 %, 01 Phase, 50Hz. Operating on Refrigerant R 410A.

The compressor Motor shall be suitably protected against overloading using a removable suitably sized over load protection. These shall be mounted on resilient mountings for quiet operation. It shall be with low vibration and noise less than 60dB (A) at 3 m distance.

2.3 AIR CONDITION UNIT ENCLOSURE

2.3.1 General

The control panels shall be completely designed, fabricated assembled, wired, checked and tested at the factory as per standards and per descriptions given below.

Modern Architectural design arrangement and finish suitable for luxury living environment shall be elegant and workmanship shall be of a high order with flushed and concealed type front cover. The unit shall be wall mounted and locked on to the steel enclosure made out of Galvanized steel with protective paints suitable for tropical climate. The enclosure shall be ensured earthing. The units and all electrical components should be suitable for the operation on 230 / 400 volts \pm 10% 01 phase 02 wire/ 03 phase 4 wire , 50Hz, AC power Supply.

2.3.2 Construction

The panels shall be of sheet metal, *wall mounted* as per the specification The design shall be totally enclosed, dust and rain splash-proof as per *IP 55* of IEC publication 34-5. The housing of the panel shall be fabricated of 14 SWG. The outer and inner surface of the panels shall be primed and painted with corrosive resist PVC, Epoxy or plastic, marine grade special coating, colour as specified.

Access to all equipment mounted inside shall be from the front. Switch gears and earth, main connections and auxiliary wiring shall be arranged and marked in general compliance with relevant British standards.

2.3.3 Earthing

A suitable earth terminal should be provided to facilitate the connection of the main earth. Earthing arrangement should be complies with BS 7430 and earth resistance of the main earth should not be exceed 5 Ω .

2.3.3 Wiring

Control wiring shall be concealed by taking through neatly arranged PVC Spiral wire protectors and all control wires shall be terminated with cable lugs or compression

type terminals. All Current carrying bolts and nuts shall be of high conducting material.

2.3.5 Control Panel Equipment, Remote Controls and Protections

The equipment to be mounted on the control panel / Remote controller of Air Conditioning Unit shall consist of the following and starting method as per the specification.

- a DOL Starting of the Compressor/ incase of the compressor more than 15 kW shall be with power saving mode operations with VVSD drives and load sensing units.
- b Over Load protection for the all Motor.
- c Thermostatic expansion and flow control of the refrigerant
- d Room temperature sensor
- e Fan speed control, three minimum speeds.
- f Compressor loading control, high / low and economical
- g Incase of all VVSD drives and PLC controls all electronic equipments shall be protected with power surge, protected against short circuiting.
- h. Remote controller with LCD display shall be provided with one on / off timer, selecting fan speed (three speeds) and setup of temperature.

2.4 ROOM CONDITIONS

- a Please refer the room lay out and the locations suggested for the installation of the Air Conditioning units.
- b Room with out Air conditioning Temperature shall be 40° C with Relative humidity 90%.

2.5 INSTALLATION TESTING AND COMMISSIONING

All installation work shall be carried out in accordance with relevant International Standards and codes of practice.

When all installation work is satisfactorily completed, the contractor shall inform the Engineer in writing that equipment are ready for handing over and the Engineer shall then fix a date for taking over.

At the taking over all equipment shall be tested for a period as per the application to determine the following.

- a Power consumption

- b Room Temperature and Relative Humidity at full load as given.
- c Vibration and Noise

If the Engineer is not satisfied with the performance of the equipment or other installation, he may refuse to take over the equipments until necessary improvements are effected. Any time necessary for this additional work will be considered as contractor's delay.

2.6.1 MAINTENANCE PERIOD

The Air Conditioning units and other equipment shall be satisfactorily maintained for a period of 24 months from the date of taken over. During the maintenance period, the contractor should attend to

- a All periodical service (schedule of periodical service should be submitted with the bid)
- b Maintain a maintenance record (format of maintenance record shall be submitted with bid)
- c Attending to all the repairs and replacements to avoid any failure of the system with in a time period not less than 05 working days from the date the contractor has been notified.
- d In addition to the equipment which fails, the equipments that do not give satisfactory performance during the period of maintenance shall be replaced by the contractor with in 3 weeks from the date the contractor has been notified.
- e In order to cut down the down time in the event of any major failure of unit the supplier should provide the spare unit till such time the unit is replaced after repairs.

The expenses involved in this connection shall be born by the contractor who should take this in to consideration when bidding.

If the contractor is not attended to the repair within the time specified as above, the engineer has the right to rectify the fault and claim the cost thus incurred from the contractor.

2.7 TECHNICAL LITERATURE

The following technical literature for the Air conditioning units, Remote Controls, and accessories, shall be forwarded along with offer.

- a Technical Specification of the Air conditioning units. (Features, dimensions, cross Sectional drawing of the Air Conditioning Units showing materials, etc.)
- b In case of higher capacity compressors 15kW and more the contractor shall provide all necessary data of the VVSD , PLC and any other controls and details of protections in all electronic devises against power supply harmonics, surges etc and easy operations, catalogues.

2.8 SPECIFIC SPECIFICATIONS

The Air conditioning unit / units shall be provide the following room conditions and requirement.

- 2.8.1 Number of Occupants
- 2.8.2 Number of Air changes per hour not less than 6 Nos
- 2.8.3 Floor Area - m² and room height m
- 2.8.4 Walls Brick / thickness –
- 2.8.5 Type of Ceiling / Floor Slab -.....
- 2.8.6 Number of Windows -
- 2.8.7 Electrical Equipment inside the Room and the heat out put
 - a. Room Lighting
 - b. Printers
 - c. Computers
 - d. Photo copiers
 - e. Any other Heat sources.
- 2.8.8 Room after Air Conditioning shall be 20°C with Relative Humidity 65%
- 2.8.9 Noise level at full load condition shall be less than 55dB (A)