

INVITATION FOR BIDS **PROCUREMENT OF NEW** **TWO (2) TON CASSETTE** **TYPE AIRCONDITIONERS** **ALONGWITH ITS INSTALLATION,** **TESTING, COMMISSIONING IN** **KARACHI OFFICE**

National Engineering Services Pakistan (Pvt.) Limited (NESPAK), invites sealed bids from the active GST and NTN registered manufacturers, suppliers, firms, authorized dealers having at least 15 years proven experience in supply, installation, testing and commissioning of Cassette Type Air Conditioners in Pakistan.

Single stage - one envelope open competitive bidding procedure shall be followed. Bid data Sheet containing specifications including other terms and conditions etc. are attached herewith to acquaint the bidders with the details on the bidding process.

The sealed bids shall be submitted on or before **July 01, 2024** up to **1100 hours** along with bid security equivalent to 2% of their bid price (Refundable) in form of pay order/demand draft in the name of NESPAK at the office address given below. Bids will be opened on the same day at **1130 hours** in presence of committee and representatives of interested bidders. The bidding data sheet along with special provisions and technical specifications, is available on **NESPAK** (www.nespak.com.pk) and **PPRA** (www.ppra.org.pk) website. NESPAK reserve the right to accept or reject any or all bids without mentioning any reason in accordance with PPRA rules. The Bidders are required to mention clearly the title of bid on the right side of sealed envelope.

MANAGER ADMINISTRATION/SECRETARY PROCUREMENT

13th Floor, NICL Building, Abbasi Shaheed Road

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BID DATA SHEET
**PROCUREMENT OF NEW CASSETTE TYPE TWO (2) TON AIRCONDITIONERS ALONG WITH ITS INSTALLATION,
TESTING AND COMMISSIONING IN KARACHI OFFICE**

Sr. No.	ITEM DESCRIPTION AND SPECIFICATIONS	Unit	Quantity	Rate (PKR)	Amount (PKR)	COMPLIANCE Y/N
1	Supply, Installation, Testing and Commissioning of Cassette Split inverter type AC units, Four Way or Round type, complete with supports, refrigerant charge (environmental friendly refrigerant having zero ODP), thermostat, drain pumps, controls, mounting brackets. Refrigerant copper piping for Split type AC units complete with refrigerant charge, pipe insulation, embedded uPVC round pipe sleeve (where required), all power and control cabling / wiring alongwith conduit, Condensate drain uPVC piping including pipe insulation, insulation protection, fittings, supports, hangers, embedded uPVC round pipe sleeve (where required), fixing and other accessories as per site requirements, and all related civil works etc. complete in all respects. AC Units shall be suitable to operate and perform satisfactory at T3 conditions without tripping					
	Ceiling Recessed Cassette Type:					
a)	Code : AC/CU 1-1 to AC/CU 1-4 Nominal Cooling Capacity : 2.0 TR (24,000 Btu/hr)	No.	4			
b)	Refrigerant Copper Piping with insulation Code : AC/1-1 to AC/1-4	R.ft.	330			
c)	Electrical works Code : AC/1-1 to AC/1-4	No.	4			
d)	Condensate Drain uPVC Piping with insulation Nominal Dia. : 20 mm (3/4")	R.ft.	40			
	Add: GST @ 18% or as per applicable Govt. taxes					
	Total Cost inclusive of all taxes					

Terms & Conditions:

- All bids shall be accompanied with bid security @ 2% of their bid price (refundable) in form of Pay Order/ Demand Draft in the name of NESPAK. Interested Bidders must attach GST & NTN certificates copies along with bids otherwise bid will not be entertained.
- Sealed bids should be submitted on Company Letter Head on or before June 27, 2024 upto 11:00 hours in the Office of Manager Administration/Secretary, Procurement, NESPAK, Karachi. 13th Floor, NICL Building, Off Abbasi Shaheed Road, Karachi which will be opened at 11:30 hours on the same day in presence of procurement committee and representatives of interested bidders.
- All applicable taxes shall be deducted from the invoice of successful bidder as per rules.
- NESPAK reserves the right to accept or reject any/all bids without mentioning any reason.
- The prospective bidder is required to conduct a site visit to understand the site conditions and scope of works before the submission of the bid.
- Payment will be made according to the actual verified works completed after the successful installation, testing and commissioning of the Project.
- For further details, refer to Specification, Drawings and List of Recommended Manufacturer.

Date: _____.

Signature: _____

Bidder's Name: _____

Address & Tel No. _____

CNIC No. _____

NESPAK KARACHI OFFICE
12th & 13th FLOOR, NICL BUILDING, KARACHI

LIST OF RECOMMENDED MANUFACTURERS OF EQUIPMENT/ MATERIAL

(to be filled in and signed by the Bidder)

1 Qualifications of Manufacturers of Equipment and Material

The local and imported equipment offered by the Tenderers shall be of reputed manufacturers who have at least 10 (ten) years of proven experience in the design and manufacture of such equipment and have all testing facilities for testing of equipment strictly in accordance with the laid down standards and specifications.

2 Brand Names

Equipment and materials specified with a Brand Name have been named in order to establish a standard of performance and do not necessarily indicate a preference for a particular manufacturer or material.

3 List of Recommended Manufacturers and as Offered

The names of manufacturers given below are to indicate the level of quality and performance anticipated by the Engineer/Employer. Other makes may be considered for review provided the quality and performance of such equipment in the sole opinion of the Engineer are at least equal to or better than the equipment offered by the recommended manufacturer listed hereunder. The equipment/material offered by these manufacturers will be subject to the compliance of offered models with the specification and required capacities. The country of manufacture of these equipment shall be USA, Western Europe, Japan or unless mentioned otherwise against the recommended make:

S.No.	Equipment/ Material	Recommended Manufacturers	Country of Origin	Offered Manufacturer by the Bidder with Country of Origin
1	AIR COOLED SINGLE SPLIT AIR CONDITIONING UNITS	i LG	i KOREA / THAILAND	
		ii DAIKIN	ii MALAYSIA / THAILAND	
		iii SAMSUNG	iii THAILAND / KOREA	
		iv APPROVED EQUIVALENT		
2	CONDENSATE DRAIN PIPING U-PVC	i IIL	i PAKISTAN	
		ii DADEX ETERNIT	ii PAKISTAN	
		iii AGM PIPES	iii PAKISTAN	
		iv HEPWORTH	iv U.A.E.	
		v PAK ARAB	v PAKISTAN	
		vi APPROVED EQUIVALENT		
3	INSULATION FOR CONDENSATE DRAIN & REFRIGERANT PIPING	i AEROFLEX	i THAILAND	
		ii SUPERLON	ii THAILAND	
		iii ARMAFLEX	iii K.S.A.	
		iv AEROFOAM	iv U.A.E.	
		v FLEXI CELL	v U.A.E.	
		vi APPROVED EQUIVALENT		
4	HVAC EQUIPMENT, DUCT, PIPING & CONDUITING SUPPORT / HANGING SYSTEM, FIXING BOLTS	i HILTI	i EUROPE	
		ii FISHER	ii EUROPE	
		iii SIKLA	iii EUROPE	
		iv WALRAVEN	iv EUROPE	
		v INDEX,	v EUROPE	
		vi APPROVED EQUIVALENT		

S.No.	Equipment/ Material	Recommended Manufacturers	Country of Origin	Offered Manufacturer by the Bidder with Country of Origin
5	REFRIGERANT COPPER PIPE AND FITTINGS	i MUELLER	i U.S.A.	
		ii CAMBRIDGE-LEE	ii MEXICO	
		iii APPROVED EQUIVALENT		
6	DURA DUCT	i ADAMJEE	i PAKISTAN	
		ii APPROVED EQUIVALENT		
7	ELECTRICAL CABLES	i PAKISTAN CABLES	i PAKISTAN	
		ii NEWAGE, PAKISTAN	ii PAKISTAN	
		iii FAST CABLES, PAKISTAN	iii PAKISTAN	
		iv COPPERGET	iv PAKISTAN	
		v APPROVED EQUIVALENT		
8	AIR CIRCUIT BREAKERS (A.C.B.)/ MOLDED CASE CIRCUIT BREAKERS (M.C.C.B.)/ MINIATURE CIRCUIT BREAKERS	i SIEMENS	i EUROPE	
		ii SCHNEIDER ELECTRIC	ii EUROPE	
		iii TERASAKI	iii JAPAN	
		iv A.B.B.	iv EUROPE	
		v APPROVED EQUIVALENT		
9	AIR BREAK MAGNETIC CONTACTORS	i SCHNEIDER ELECTRIC	i EUROPE	
		ii TOGAMI	ii JAPAN	
		iii FUJI	iii JAPAN	
		iv APPROVED EQUIVALENT		
10	VOLTMETER/ AMMETER	i REVALCO	i ITALY	
		ii PANTACE	ii EUROPE	
		iii SACI	iii SPAIN	
		iv APPROVED EQUIVALENT		
11	C.T. (CURRENT TRANSFORMER)	i REVALCO	i ITALY	
		ii FICO	ii PAKISTAN	
		iii CIRCUTOR	iii SPAIN	
		iv APPROVED EQUIVALENT		
12	AUTO-OFF-MANUAL SELECTOR SWITCHES/ A.S.S./ V.S.S	i BRETER	i ITALY	
		ii KRAUS & NAIMER	ii NEW ZEALAND	
		iii BREMAS	iii ITALY	
		iv APPROVED EQUIVALENT		
13	CONTROL & PROTECTION RELAY	i ZAHRA	i GERMANY	
		ii FINDER	ii ITALY	
		iii EMIRAL	iii ITALY/ EUROPE	
		iv APPROVED EQUIVALENT		
14	P.F.I. (POWER FACTOR IMPROVEMENT) CAPACITORS	i SHIZUKI	i JAPAN	
		ii NOKIAN	ii FINLAND	
		iii AMBER	iii PAKISTAN	
		iv APPROVED EQUIVALENT		

S.No.	Equipment/ Material	Recommended Manufacturers	Country of Origin	Offered Manufacturer by the Bidder with Country of Origin	
15	POWER FACTOR CONTROLLER	i	NOKIAN	i	FINLAND
		ii	LOVATO	ii	ITALY
		iii	CIRCUTOR	iii	SPAIN
		iv	APPROVED EQUIVALENT		
16	H.R.C (HIGH REPTURING CAPACITY) FUSES	i	DF ELECTRIC	i	SPAIN
		ii	KALE PORSELEN	ii	TURKEY
		iii	E.T.I.	iii	EUROPE
		iv	APPROVED EQUIVALENT		
17	INDICATION LIGHTS/ ON/OFF PUSH BUTTONS/ LOCKABLE MUSHROOM SWITCHES	i	SCHNEIDER ELECTRIC	i	EUROPE
		ii	MARUYASU	ii	JAPAN
		iii	LOVATO	iii	ITALY
		iv	APPROVED EQUIVALENT		
18	AUTOMATIC TIME SWITCHES	i	PANASONIC	i	JAPAN
		ii	FUJI	ii	JAPAN
		iii	APPROVED EQUIVALENT		
19	SURGE ARRESTORS	i	DEHN	i	GERMANY
		ii	SCHNEIDER ELECTRIC	ii	EUROPE
		iii	APPROVED EQUIVALENT		
20	LIGHT CONTROL SWITCHES/ FAN DIMMERS/ SWITCH SOCKET OUTLETS/ SPUR	i	CLIPSAL (SCHNEIDER ELECTRIC)	i	ASIA
		ii	M.K.	ii	U.K.
		iii	APPROVED EQUIVALENT		
21	BACK BOXES/ FAN HOOK	i	HUSSAIN & CO.	i	PAKISTAN
		ii	JEI	ii	PAKISTAN
		iii	APPROVED EQUIVALENT		
22	PVC and uPVC CONDUITS / SLEEVES & ACCESSORIES/ uPVC PIPES & ACCESSORIES	i	DADEX	i	PAKISTAN
		ii	GALCO	ii	PAKISTAN
		iii	CIVIC	iii	PAKISTAN
		iv	APPROVED EQUIVALENT		
23	MEDIUM DUTY G.I. CONDUITS & ACCESSORIES	i	(I.I.L) INTERNATIONAL INDUSTRIES LIMITED	i	PAKISTAN
		ii	STEELEX	ii	PAKISTAN
		iii	APPROVED EQUIVALENT		
24	PLATE TYPE EARTH ELECTRODES/ EARTH CONNECTING POINTS	i	FURSE	i	U.K.
		ii	ERICO	ii	U.S.A.
		iii	APPROVED EQUIVALENT		
25	G.I. PERFORATED CABLE TRAY/ G.I. CABLE LADDER/ G.I. SOLID BOTTOM CABLE	i	EZZI ENGINEERING	i	PAKISTAN
		ii	J.E.I.	ii	PAKISTAN
		iii	WELDER INTERNATIONAL	iii	PAKISTAN
		iv	APPROVED EQUIVALENT		
26	UNDER RAISED FLOOR DUCT / FLOOR OUTLET BOXES	i	M.K.	i	U.K.
		ii	CLIPSAL (SCHNEIDER ELECTRIC)	ii	ASIA
		iii	APPROVED EQUIVALENT		

Authorized Signature and official Seal: _____
Name: _____
Date: _____

SECTION - 8810
SPECIAL PROVISIONS

1.0 HVAC SYSTEM CONCEPT

Office Room and Hall of office Building are provided with cassette Split Air-conditioning Units Inverter type.

2.0 SCOPE OF WORK

2.1 Related Works

All works are related to HVAC system, whether specifically mentioned or not. These related works shall include, but not limited to:

- a) Electrical Works as specified.
- b) Cooling coil condensate disposal.
- c) Cutting, patching and repairing of civil works.

3.0 DRAWINGS, EQUIPMENT SUBMITTALS, INFORMATION MANUALS, SAMPLES & OTHER SUBMISSIONS

3.1 General

Equipment submittals, information manuals, samples and other information shall be supplied to the Engineer free of cost.

3.2 Samples

These samples shall be submitted for approval:

- i) Refrigerant and drain piping with fittings.
- ii) Pipe insulation.
- iii) Insulation adhesives and tapes.
- iv) Power and Control Cables.
- v) Anchor bolts studs, threaded rods, hangers and supports, etc. for hanging and supports arrangements.

4.0 STANDARDS AND CODE REQUIREMENTS

4.1 All equipment and materials under HVAC Scope of Works shall be furnished in conformity with latest edition of applicable Standards of ASME, ASHRAE, AHRI, SMACNA, TIMA, AMCA, NEMA, IEC etc. and applicable Government and Local Codes governing the same. In case of conflict, the stricter requirements shown/specified shall govern. All equipment shall be rated and tested as per standards listed in ASHRAE Handbook (Latest Edition).

5.0 STANDARDS OTHER THAN THOSE SPECIFIED

Where the specifications provide requirements for material or equipment by specifying a standard such as for example, one of the American Society of Heating, Refrigerating and

Air conditioning Engineers, which has its origin in one country, it is not the intention to restrict the requirements solely to that standard and that country. Other standard, including standards of other countries, will be accepted provided the requirements thereof, in the sole opinion of the GOS / Independent Engineer are atleast equal to the requirements of the standards specified.

6.0 TESTS AT SITE

Contractor shall arrange all labor, materials, electricity, fuel, stores, transportation, apparatus, machines and instruments as may be necessary to carry out tests.

*** End of Section 8810 ***

SECTION - 8965

TECHNICAL SPECIFICATIONS

1.0 GENERAL REQUIREMENTS

1.1 Materials

All materials shall be of the highest grade, free from defects and imperfections, of recent manufacture and unused, and the classification and grades designated, conforming to the requirements of the latest issue of the appropriate specifications cited herein. All materials, supplies, and articles forming part of major equipment and not fabricated by the manufacturer of the equipment shall be the products of the recognized reputable manufacturers.

1.2 Workmanship

Workmanship and general finish shall be of the highest grade, in accordance with the requirements specified herein, and the best latest standard practice and to the satisfaction of the Engineer.

1.3 Equipment

- a) All equipment shall be manufactured by companies which have had at least ten years of previous experience in the design and manufacture of equipment of comparable type, capacity and operating conditions, unless otherwise approved by the Engineer.
- b) All equipment shall be of latest manufacture, not older than the year in which this contract is awarded.

1.4 Chases and Openings

The Contractor shall provide templates or details for chases and openings to be left in walls, floor and roof slabs and partitions to accommodate work under HVAC scope of works

1.5 Protection

All fixtures, apparatus, or equipment damaged including damaged shop coats of paint shall be restored to original conditions prior to Commissioning and also again prior to Final Acceptance. All bright finished shafts, Tubes, Fins, Pipes, bearing housings and similar items shall be protected until in service. No rust will be permitted.

1.6 Tropical Treatment

All HVAC equipments, materials, electrical panels / distribution boards, controllers, sensors, cables, support and hanging system and other components of HVAC system to ensure adequate protection against severe hot and humid weather/climate conditions and protection against corrosion through the use of non-corrosive or corrosion resistant material where practical and through the proper treatments of materials susceptible to corrosion due to highly aggressive corrosive coastal environment, hot and humid, exposed to salt-spray, condensation and rain, etc.

2.0 EQUIPMENT

2.1 General

All equipment shall be capable to operate and perform satisfactory at 50°C ambient temperature without tripping.

All equipment shall be rated and tested according to the applicable standards listed in ASHRAE Handbooks (Latest Edition) or approved equal.

2.2 DX – Single Split Air-Conditioning Units

These shall be self-contained cassette split inverter type , factory assembled, factory refrigerant charged, wired and tested units with air flow capacities . AC Units shall be complete with all accessories required for field installation and satisfactory completion and operation of works.

Units shall be of such overall dimensions, weights, configuration, so that these may be located where shown. All inter-connecting refrigerant piping with insulation, refrigerant charge for unit and piping and all safety controls shall be included. Units shall be with latest technology inverter based variable speed compressors, refrigerant cooled inverter boards, variable speed BLDC fan motor (except Floor Standing type which should preferably be BLDC type), quiet, space saving, efficient low profile, washable filters, durable heat exchangers, wide operating range of temperatures, self-diagnostic control board and quiet variable speed blowers. The units shall be charged with environment friendly refrigerant having ozone depletion factor of 0.00 (except Floor Standing type which should preferably be with ozone depletion factor of 0.00). Units shall be specifically design and labeled to operate and perform satisfactory at T3 conditions.

Replacement Warranty and After Sales Service

Contractor shall provide three (03) years replacement warranty of the compressor and one year replacement warranty of parts/accessories from the date of issuance of Taking over Certificate (TOC).

All specialist suppliers must be taking care of after sales service and troubleshooting within their quote to the contractor, without any additional/extra cost.

i) Air Cooled Condensing Units (CUs)

The condensing unit shall be of the vertical/horizontal discharge, air cooled type, suitable for outdoor installation and sized to deliver the required capacity matched to relevant DX-type indoor unit at specified ambient temperature.

The condensing unit shall be of same manufacturer as that for the Indoor A.C. Unit.

The unit casing shall be constructed from galvanized sheet steel, zinc-phosphated and with a stoved enamel finish. All access panels and the unit casing shall be provided with thermal and acoustic insulation. All moving components such as compressors and condenser fan motors shall be anti-vibration mounted to minimize the transmission of vibration and noise. Special coating shall be provided for each condensing unit casing, parts and Coils to protect it against corrosion as per project location.

Condenser coils shall be made of seamless copper tubes mechanically expanded into aluminum fins and additionally protected with acrylic/epoxy coating along with special coating for protection against corrosion.

Coils shall be pressure tested to test pressure as per standards at factory.

Condenser fans shall be of direct drive with BLDC type variable speed fan motor (except

Floor Standing type) statically and dynamically balanced propeller type. Weatherproof fan motors suitable for outdoor use, permanently lubricated and provided with built-in thermal overload protection shall be used. Fans shall be mounted on rubber vibration dampers. All condensing units shall be weatherproof and capable of operating satisfactorily at high and low outdoor temperatures at full load.

Compressor, shall be of latest technology inverter based variable speed type, (except Floor Standing type) fully hermetic high-efficiency type, with high and low pressure safety switches, motor overload protection, crankcase heaters and oil pump. The compressor shall be mounted on resilient mounting for vibration isolation. The refrigerant circuit shall include adjustable thermostatic expansion valve, sight glass, liquid line dryer and other safety and controls devices for complete operation. The unit shall be of the air-cooled type with direct driven propeller fan, safety guards and heavy duty motor. Casing shall be weather proof, of steel construction finished with corrosion resistant paint, and shall be suitable for outdoor installation. The unit coil shall be constructed of seamless copper tubes with mechanically bonded aluminum fins. Inverter board shall be cooled by refrigerant circuit.

Internal overload protection located in the motor windings shall be provided.

The units shall be complete with refrigerant piping consisting of insulated copper pipes as per the details given elsewhere in technical specifications HVAC works and all necessary valves and filter driers from the unit to the air cooler. Suction and discharge pipes shall be equipped with pipe vibration dampers. Condensing units shall be factory pressure tested, evacuated and dehydrated.

The units shall be charged with environment friendly refrigerant having ozone depletion factor of 0.00 and installed on steel brackets of adequate strength fixed to the walls with expansion bolts or at locations as shown on drawings.

Compressor refrigerant holding capacity and amount of refrigerant shall be based on actual piping routes and selection shall be made accordingly.

Adequate protection for outdoor AC units from direct Sun light such as by providing corrugated G.I sheet, shall be installed as approved by the Engineer. Fan and Condenser Coil Sections shall have safety guards.

ii) Indoor Unit (AC-Units)

The DX-type Indoor units shall be elegant, and of the type and capacities as mentioned in the description.. All component parts shall be selected, manufactured and assembled by the same manufacturer as for outdoor Condensing unit.

Each unit shall be constructed so as to prevent drumming, distortion and vibration and shall enable ease of handling and replacement of sections.

The units shall include the following sections:

- Washable filters conforming to ASHRAE Standard 52 latest edition
- DX-type cooling coil
- Supply air fan and motor (variable speed type)
- Thermostat microprocessor type with digital display and set point adjustment
- Automatic air swing mechanism
- Supply air plenum with adjustable grille
- Condensate drain pump (for units other than wall mounted type)

The casing frame shall comprise of galvanized sheet steel, zincphosphated, with a stoved enamel finish and shall be provided with decorative cover with supply and return air grilles. The decorative cover and grille shall be of ABS thermoplastic polymer with smooth finish in approved colour.

Fan shall be statically and dynamically balanced centrifugal type with backwardly included or airfoil blades to suit the pressure and operating characteristics specified.

Fan housings shall be constructed from galvanized steel sheet. The casing shall be constructed to a truly volute form.

Shafts shall be cold finished, turned, and polished steel. Bearings shall be self aligning, permanently lubricated ball bearings.

All parts of fans and motors liable to deterioration shall be protected by paint or grease before delivery to site.

Cooling coils shall be manufactured from solid drawn seamless copper tube staggered in the direction of airflow. Tube return bends shall be copper and brazed to tube ends.

Coils shall be pressure tested to test pressure as per standards at factory.

Fins shall be of continuous aluminum protected with acrylic / epoxy coating having extended collars for spacing and bonding mechanically to the tube.

Tubes shall be expanded onto the fin collar by hydraulic pressure only.

No part of the coil tube ends or headers shall be external to the section. Coils shall be suitably sealed with grommets where connections pass through the unit casing.

The Indoor AC Unit shall incorporate a galvanized and sloped drain pan with integral insulation. The pan shall be fitted with galvanized drain socket connections for attachment to drain points. A manometric trap should be supplied and installed by the installing contractor.

The coil shall be easily removable from the unit for maintenance and cleaning purposes. The coil shall include a thermostatically controlled expansion valve. Shut-off valves at supply and return connection in indoor units shall be provided. Micro-processor based thermostat with fan speed selector shall be supplied as part of the units.

2.3 Refrigerant Piping and Specialties

The copper pipe/tube used shall be of HVACR quality (ACR Grade), complying to ASTM B280 or approved equivalent. Copper fittings shall comply with B16.15, B16.18, B16.22, B16.24, B16.50, B1.20.1, WROT fitting meets NSF 61G. Bends shall be used of long radius of pre-formed bends.

Refrigerant piping shall be copper tubing (Nitrogenized ACR Grade), type L for Single Split DX Type Air Conditioning System, bright annealed, dehydrated and sealed. Soft tempered tubing shall be used where bending is required and where flare joints are used. Hard drawn tubing shall be used where no bending is required and silver-brazed joints are used, and for all tubing larger than 19 mm (3/4 inch.) as per approval of the Engineer. Copper tube joint shall be brazed, except joints on lines 19 mm (3/4 inch.) or smaller which may be flared (single Split DX Type Air Conditioning Units). Fittings for flare joints shall be standard SF' forged brass flare-type with short shank flare units. Fittings for brazed joints shall be wrought copper or forged brass seat fittings. Cast seat type fittings will not be allowed for brazed joints.

Certification shall be provided that samples representing each lot have been tested and inspected as directed in ASTM B280 and all requirements have been met. A report of test results shall also be furnished. Product Inspection, quality assurance, Product Identification, Product Packaging and package making shall be as per ASTM B280.

2.4 Condensate Drain Piping

All condensate drain piping including fittings shall be of u-PVC ASTM D-1785, DIN 8077-8078, DIN 16962, AWWA C901, AWWA C906, and other applicable codes and standards as stated in ASHRAE and approved by the engineer.

3.0 **INSULATION**

3.1 General

The Contractor shall provide insulation for the services and equipment specified hereafter or elsewhere in these specification. Insulation shall be as per the following Insulation Schedule.

Insulation material shall be non combustible and shall be complete with vapour barrier, protection covering and jacketing (where specified), adhesives, insulation tape, duct sealer and/or sealing tape, fastening material.

3.1.2 Insulation Schedule (Table 1-1)

Service	Thickness in (mm)	Insulation Type	Vapor Barrier	Protection
<u>Refrigerant Piping for Single Split Type AC Unit</u>				
i) Indoor	1/2in (13mm) min.	Elastomeric extruded Nitrile Rubber tubing (Class 0 type) to fit standard diameters of copper tubing	-	Insulation taping and hard refrigerant piping provided within removable heavy gauge G.I solid bottom piping / cable tray.
ii) Outdoor (Exposed on Roof and in Shafts)	1/2in (13mm) min.	Elastomeric extruded Nitrile Rubber tubing (Class 0 type) to fit standard diameters of drain piping with UV protective covering	-	Insulation taping and hard refrigerant piping provided within removable heavy gauge G.I perforated bottom with solid cover piping / cable tray.
<u>Condensate Drain Piping</u>				
iii) Indoor	1/2in (13mm) min.	Elastomeric extruded Nitrile Rubber tubing (Class 0 type) to fit standard diameters of copper tubing	-	Insulation taping
iv) Outdoor	1/2in (13mm) min.	Elastomeric extruded Nitrile Rubber tubing (Class 0 type) to fit standard diameters of drain piping with UV protective covering	-	Insulation taping.

3.1.3 Insulation Protection

a. Insulation Tape

Insulation tape for joints shall be of aluminum foil type 50 mm (2 inch) wide, of make ABRO, USA or approved equal.

*** End of Section 8965 ***