ADDENDUM / CORRIGENDUM NO. 01

(May 05, 2023)

Renovation of Exim Bank of Pakistan Office at 5th Floor, Bahria Complex-1, M.T Khan Road, Karachi

The bidders shall take into consideration in the preparation of their bids, the following amendments/additions in the Bidding and Contract documents issued to them for subject work.

1. Please find hereunder our response on each query;

Sr.	Query	EXIM Response
1	It is requested if that the performance guarantee in the form of bank guarantee shall be changed to insurance guarantee.	Only Bank Guarantee is acceptable.
2	Project time shall be extended to 4 months instead of 3 months as there will be work stoppage due to Eid holidays	Bidder's request is not acceptable. Completion time is 03 months. The Bidder has to prepare its schedule and resources accordingly.
3	Kindly reduce the minimum IPC value from 30% of Bid value to 15% of bid value as this will enable the contractors to submit 5 to 6 IPCs enabling better cash flows to run the project. Kindly consider submittal approval & order placement in work done in this case as well	Minimum IPC value for the month is 30%. The Contractor, however, may submit 02 IPCs during the month. But the total should not be less than 30%.
4	Similarly referring to clause 60.11 sub-clause B, the clause state that the recovery of mobilization advance shall be recovered into equal instalments from first two IPCs. Kindly revise this recovery to four instalments excluding the first IPC.	Bidder's request is not acceptable. Mobilization Advance shall be recovered as per the Clause 60.11 of Conditions of Contract.

5	Further referring to clause 10.2 of PCC 1 the period of validity of performance security is extended till 14 days after the issuance of defect liability certificate this means that the contractors financial instrument in the form of bank grantee shall be bound till 16 months approx. It is requested that the aforementioned financial instrument shall be release upon issuance of TOC as the employer will also have retention money as security till expiration of OLP.	Bidder's request is not acceptable Validity of Performance Guarantee shall be according to the Conditions of Contract.
6	Furthermore, the contract requires the contractor to furnish insurance of works and equipment including third party liability and joint names of employer, contractor, and consultant till a period valid till issuance of DLC. In this regard Referring to clause 25.5 PCC 2 kindly allow the contractor to submit insurance from companies other than NICL as well, as this will be less costly enabling the contractor to furnish the better priced bid.	Bidder's request is not acceptable. Third party insurance to be as per the Conditions of Contract.
7	Referring to furniture BOQ it is requested that the procurement agency/consultant shall provide list of approved manufacturer for furniture items along with equivalent model codes so as to enable the contractors to efficiently price equivalent models respectively.	Dimensions Office Karachi. Interwood Global Office world Karachi. Master Offisys
8	Referring to clause 26 of special provision of contract page SP-11 kindly clarify if contractor's labor, technicians and supervision staff are allowed to camp at site. Further referring to clause 40 of SP-17 kindly clarify, if both day work and night work are allowed on site	Day & night work may be carried out except office hours following the security instructions.
9	Kindly allow provision of secure advance in the contract or kindly specify breakup of payment in reference to material delivery at site.	Bidder's request is not acceptable. Secure Advance is not allowed. Only Mobilization Advance is allowed.

10	Can you expand on sales tax inclusion in the bid? What mechanism will be adopted for Sindh sales tax deduction?	The Rate of Sindh Sales Tax on Services is stated in Summary of Bid Price on whole bid price as a line Item and will be deducted in each IPC as per the procedure stated by Sindh Revenue Board.
11	Kindly expand on material delivery area & cargo lift availability for the building.	Vendors may utilize cargo lift @ Rs 2000/- per hour with prior approval.
12	In reference to electrical BOQ serial # 1-1EA Part (a to d) it is requested to provide single line diagrams of these distribution boards.	*The Single Diagram is attached.*
13	In reference to power circuit and data and communication wiring including floor boxes, kindly specify if any conduit lying will be done on the floor. If so there is no floor concrete item present in the BOQ.	The floor boxes and conduits shall be on floor. Include item in flooring.
14	In reference to fire alarm system item #1-BTB kindly specify the extent of integration with building management system, if local FAS system is connected with building management system then only an essernet module is required otherwise if FAS synchronization such as opening of automatic doors via access control system, PAS voiced generated message Etc. Are required then a bacnet module will be used which is very costly.	*The Fire Alarm interface is required with Main Fire Alarm Panels of Building Fire Suppression System and HVAC FCU's BMS. For Access Controller and other provision shall be available in FACP for future up gradation.*
15	In reference to the current unstable socio-political environment in Pakistan, there is a severe financial and economic uncertainty in the market causing massive price shifts. In the regard it is requested the price escalation clause maybe incorporated in the bid.	Bidder's request is not acceptable. The Price Escalation is not allowed. The Bidders are required to prepare its bid keeping in view the current economic and socio political situation of Pakistan.
16	Referring to item 01-10C civil works kindly provide the model number or 3D of pattern tile enabling the contractor to provide an accurate pricing	Consider shabbier tiles premium series or equivalent for pricing.

17	In reference to BOQ items relevant to dry wall partition. Kindly specify if these items include provision of sound insulation using glass wool or thermo pore.	Yes provide glass wool in partitions
18	Referring to item # 1-1TC voice-hybrid PBX kindly confirm if the PBX should have voice recording for 180 days and recording server built-in feature or it should only have provision and compatibility for future addition of these equipment.	*For PABX the voice recording shall be provided as mentioned in BoQ. If Built-in system meeting the BoQ requirements than server is not required, otherwise the server shall be provided.*
19	Referring to item # 1-1TC kindly elaborate the scope of operation maintenance works of PBX system (example: reconfiguration of PBX)	*For PABX One-year standard warranty and maintenance period shall be included in the quoted rates.*
20	Referring to technical specification special provision sub-clause 1.15 regarding fire suppression system the clause states that the contractor shall provide operation maintenance services of fire suppression system for a period of 365 days, and payment of the aforementioned shall be paid under BOQ item firefighting system operation during defect liability period. It is requested that the aforementioned item is missing in the BOQ hence kindly elaborate the scope of operation maintenance of firefighting system and specify if the scope of OLP includes operation maintenance of any other BOQ item.	The updated drawings, specifications and BOQ as per the proposed fire suppression design are enclosed herewith. The location of the unit shall be finalized as per actual conditions at the site in coordination with the project architect. The measurement of refrigerant piping and drain shall be as per the actual installed at the site.
21	Kindly specify the location of installation of AC outdoor units.	The location of the unit shall be finalized as per actual conditions at the site in coordination with the project architect. The measurement of refrigerant piping and drain shall be as per the actual installed at the site.
22	In reference to fire suppression system, Kindly specify if scope detection & suppression should be also cover single or all three zone i.e above false ceiling and below raised flooring as well	No, only room coverage is required for fire suppression as shown in Drawing # 41156/04/TD/J02.
23	Kindly provide list of approved manufacturer for ac-split units.	The list of approved manufacturers including specifications for HVAC Works is attached.

24	Access control system BOQ requires software & report generation. But the same requires desktop as well. Will this BOQ item will only include application software or desktop as well?	*CCTV desktop as proposed in this Tender shall be utilized to install software's for Access Control System.*
25	Avaya maintenance will require PC as well within 2 Lan cards etc. Will the bidder set-up additional PC for maintenance or Exim bank will be providing this PC. Is there any policy forbidding external pc connection? Can CCTV PC be used for the same?	*Every Component require for proper operation of PABX and to fulfill BoQ requirement shall be provided by the Contractor*
26	Given the current scenario of Pakistan there are sever import restriction and importer area facing sever delays as SBP is restricting opening of LCs and port clearance is also an issue hence it is probable that any imported item delivery time might exceed the project limit hence in this case it is requested that the contractor shall not face imposition of LO due the aforementioned scenario	Will be considered the case based on actual facts at that time
27	Referring to item# 1-14TB kindly specify if four different licensed software's are required or one software with integration to all four units will be acceptable.	*BOQ Item No. 1-14TB licensed software required for 4 nos. access controllers. The Unit shall be read 'Job' instead of No. and Qty shall be read '1' instead of '4'.*
28	Kindly specify placement of Gen-set & Gen-set Earthling requirement. Can building earthing be used for Genset & main earthing. Kindly specify mechanism for data centre earthing.	*The DG-set placement and earthing scheme required coordination with the building management, for that matter the contractor shall prepare shop drawings and submit for approval to the NESPAK.*
29	Kindly provide extension of bid submission date.	An extension of 07 days in bid submission is recommended as the time lost in the last week of Ramazn and Eid Holidays.

Sr.	Query	EXIM Response
1.	Bid Submission place in Invitation to bid is NESPAK Karachi office while in BID Data Sheet BDS-5, Sub Clause 19.2	The bid Submission address mentioned in the Invitation for Bid is correct. Kindly submit bids at Employer's Address in Islamabad.

	(Employer address for the purpose of bid submission) the address is mentioned of Client's Islamabad Office, Please clarify.	
2.	Minimum IPC against bid is 30% of bid submitted it is requested to reduce it to 15 %.	Minimum IPC value for the month is 30%. The Contractor, however, may submit 02 IPCs during the month. but the total should not be less than 30%.
3.	Network Switches are of CISCO brand which at present is not available in ex-stock while new delivery timelines are almost 14 months please if it can be changed to Huawei.	Huawei is acceptable.
4.	Furniture items pictures are not cleared please provide picture in colors.	BOQ attached.
5.	No details of planters in drawings are provided.	Refer BOQ item no. 1-16C (A) and drawing No. B009 & B010.
6.	Aluminium strip size in 4" thick MDF Partition is missing please clarify.	Half inch wide (Tee) section.
7.	The subject bid is single stage envelop so technical and financial bid will be submitted together or separately.	The Bid submission is Single Stage One Envelope Procedure. Bidders are requested to read Clause IB19 of instructions to bidders an bidding data.. Bidders are requested to fill in the rates in Volume-I of Bidding Documents. In addition to this, a company profile, establishing Bidder's eligibility in accordance with eligibility Criteria stated in Clause IB3.1 of Bidding Data is required to be submitted.

Sr.	Query	EXIM Response
8.	**SUBMISSION DATE**	The date has been extended.

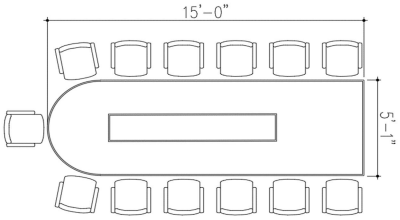
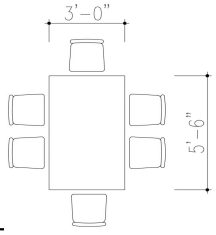
9.	**TENDER FEE:** We have downloaded the documents from EXIM Banks website Do we still need to pay 15,000/- Printing Fee?	No
10.	**SITE VISIT:** May we visit the site tomorrow so we can have a feel of the space and scout ahead to plan?	Vendors may visit the site during office hours at one hour notice.
11.	**ITEM 01-15C:** Please specify the size of Acrylic Logo	2'-6" X 1'-6"
12.	**ITEM 1-1EA**	*The Single Diagram is attached.*
13.	***Item 1-5-EA to 1-9-EA***	*In Wiring Items gang switches and back boxes are not included they are separate items.*
14.	**ITEM 1-19 TB**	Instead of '6"(W)x6"(H)x4"(D) 16 SWG size shall be read "12"(W)x12"(H)x4"(D) 16 SWG.
15.	**Fire Suppression System**: The item states supply of clean agent 35 KG; however, the drawing shows piping system and gas dispersion system. We would like to understand the scope of works. Is it installation of complete system? OR only supply of the clean agent?	Queries has been already responded above.
16.	***Item 1-4EB***	*The list spares is mentioned below;*
17.	**Furniture Executive Room**: Items are 3 only however qty wise 4 items are called may we delete the first line in qty section? PFA Picture from BOQ	Updated BOQ Attached.

1. Following documents shall be part of tender,

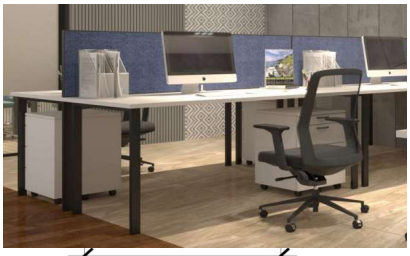
SUPPLY OF FURNITURE FOR
OFFICE OF EXIM BANK AT 5TH FLOOR BAHRIA COMPLEX KARACHI
COST ESTIMATE

Sno.	Item Description	Item Image	Qty	Rate	amount
1	**CEO room**				
	CEO Room Desk - Lincoln Table Desk with Side rack made of particle board/MDF pressed with veneer and genuine leather writing pad on worktop and Side rack, Storage should have fingerprint biometric locks. Size: 2100 x 1050 x 750		1		
	a) Two seater: Made of oak wood frame with imported Latheride upholstery		1		
	b) One seater: Made of oak wood frame with imported Latheride upholstery		1		
	c) Center Table: Made of laminated top with imported pvc edging and MS powder coated base		1		
	d) Office chair: High Back Artificial Leather chair with auto weight sensing mechanism, chair height and locking controls on the arm rests, tilting control system.		1		
	e) Visitor chair: Low Back Executive Chair made of leatherette and fixed arms and base.		2		
	f) Executive Credenza low height, made of laminate pressed on particle board/MDF with shelves and soft closing doors. Size 11'-0" wide		1		
2	**Executive room**				
	Executive Desk with Side rack made of particle board/MDF pressed with veneer worktop. Side rack should include space for CPU and technology box containing 4 UK standard power sockets and concealed cable Size: 1800 x 800 x 750		3		
	d) Office chair: medium Back Artificial Leather chair with chair height and locking controls on the arm rests, tilting control system.		3		
	e) Visitor chair: Low Back Executive Chair made of leatherette and fixed arms and base.		6		

SUPPLY OF FURNITURE FOR
OFFICE OF EXIM BANK AT 5TH FLOOR BAHRIA COMPLEX KARACHI
COST ESTIMATE

Sno.	Item Description	Item Image	Qty	Rate	amount
2	**Conference Room** **a) Table** Laminated Table top with latheride in centre console, wooden frame and base as per design and instruction by Architect. For 13 Persons Size: 15'-0"X5'-2"x2'-6"	 	1		
	b) Chairs: medium Back Mesh chair with chair height and locking controls on the arm rests.		13		
	b) Chairs: low Back Mesh revolving chair with chair height and locking controls with out arms.		12		
3	**Reception Sofas** **a) Two seater:** Made of oak wood frame with imported Latheride upholstery		2		
	c) Center Table: Made of laminated top sides and bottom seamless joints with imported pvc edging.		1		
	Small meeting Room a)Meeting Table: Made of high pressure laminated top with imported pvc edging and MS base Size: 3'-0"X 5'-6"X 2'-6"		1		
	b) Chairs: low Back cushioned revolving chair with chair height and locking controls with out arms.	 	6		

SUPPLY OF FURNITURE FOR
OFFICE OF EXIM BANK AT 5TH FLOOR BAHRIA COMPLEX KARACHI
COST ESTIMATE

Sno.	Item Description	Item Image	Qty	Rate	amount
	workstation a) work station Table: made of high pressure laminated top with imported pvc edging and laminated front and side partitions with fabric upholstery and technology box and MS base.		20		
	b) chairs: medium back chairs with adjustable seat and lumber support, lokcing system. Cushion seat and breathable mesh back		20		
	c) drawers units: made of high pressure laminated top, sides and drawers including locks.		20		
8	**Work station chairs**				
	a) Record room		1		
	b) Server room		1		
	c) Tresury		2		
		Total amount PKR			
		Total amount in words			

EXIM BANK OF PAKISTAN

OFFICE FOR EXIM BANK AT KARACHI

FIREFIGHTING WORKS

1. Special Provisions
2. Technical Provisions
3. Schedule of Prices
4. Appendix-I (list of approved manufacturers)
5. Tender Drawings

MAY 2023

National Engineering Services Pakistan (Pvt) Limited
Architecture & Planning Division Karachi
4th Floor, N.I.C. Building, Abbasi Shaheed Road, Shahrah-e-Faisal, Karachi.
Phone: (0092 21) 9925430-34, Fax: (0092 21) 99225424
Email: apk@nespak.com.pk
http://www.nespak.com.pk

Clearance Code		Doc. No.		Rev. No.	

Supply, Installation, Testing and Commissioning of Fire Suppression System for Exim Bank at Karachi

Table of Contents

SPECIAL PROVISIONS

1 GENERAL

This specification is intended to set out general outline and the minimum requirements and standards of installation for the various units of equipment and works it covers.

This Specification shall be read in conjunction with the Bidding Drawings (as per Schedule of Drawings) and are intended to be mutually explanatory and complementary to one another. All works and specification called for by one, i.e. Specification or Drawings even if not by the other shall be fully executed and complied.

Whenever international standards are specified, the Contractor may use the better local standard subject to Engineer's approval. In the event that different standards are specified, the most applicable standard shall apply.

The contractor shall carry out detailed design and localize to suit approved professional engineer to endorse the design and make submission to Competent Authorities for approval.

All necessary works to comply with requirements of the local Competent Authority are deemed to be included in the tender sum.

The Contractor shall be deemed to have inspected and examined the site and its surroundings and acquainted himself as to the nature of the existing works, buildings and the site, the extent and nature of works and materials or equipment required for the necessary completion of the Contract works, the means of communication and access to the site and in general obtain for himself all Bid. No claim whatsoever made by the Contractor on the grounds of want of knowledge of any of the aforesaid will be entertained.

2 Scope of Works

The works to be performed consists of design, supply, delivery, installation, painting, testing, commissioning, Maintenance and Warranty of the following entire fire protection system and equipment comprising:

a) Clean Agent Fire Extinguishers

3 Statutory Regulations and Bye-Laws

The works and all plants, equipment materials forming part of this contract shall comply in all respect with any relevant Local Statution Regulation, Bye-Laws and other Regulation currently in force.

The contractor shall obtain and complete all notices required by the above Authorities as necessary and shall obtain all consents necessary for the various works to be executed and shall' pay all fees in connections

herewith.

All codes, acts, standards and regulations shall be the latest published edition unless otherwise stated. In addition, current Rules and Requirements of the following bodies as applicable shall be complied with:

a) Installation of stationary pumps for fire protection (NFPA 20)

b) All other Authorities having jurisdiction over the installation of equipment and carrying out this contract works in the locality.

The work shall also be carried out strictly in accordance with the current editions of all applicable British Standards or other National Standard acceptable to the Engineer. All electrical installations and materials supplied shall comply with IEEE and Local Codes and to be approved by the Local Electricity Department or Authority.

Where discrepancy arises, the most stringent Standard shall take precedence on all matters relating to the works.

The Contractor shall bear the cost for all necessary arrangement to obtain approval for fittings, valves expansion joints, equipment and materials from the relevant authority, if required.

4 Permits and Fees

The Contractor shall procure all permits and pay all fees and charges incurred in connection with this Contract.

5 Training Course

The Contractor shall conduct minimum one (01) full complete comprehensive operating and maintenance training program on the operation and maintenance of the systems installed. The training programs shall include but not limited to overall systems, the familiarization of the equipment, trouble-shooting techniques for fault rectification and servicing of the systems/equipment installed. The training shall consist of all notes and materials, etc. including hands-on training as a major portion of the whole training program.

TECHNICAL PROVISIONS

FIRE PROTECTION EQUIPMENT

1.0 SCOPE OF WORK

The work to be done under this section of the Specifications includes furnishing all plant, labor, equipment, appliances and materials and in performing all operations required in connection with the supply, installation, testing & commissioning of black steel pipes and fittings for firefighting system, portable fire extinguishers, fire hose cabinets, as shown on the Drawings, as specified herein and/or as directed by the Engineer.

2.0 PORTABLE FIRE EXTINGUISHERS

2.1 Materials and Equipment

Portable fire extinguishers shall be of European origin or approved equal and shall contain specified quantities and types of extinguishing agents. Extinguishers shall be classified according to type of extinguishing agents and the Class of fire types for which it is intended to be used. The extinguisher container/vessel shall be of anticorrosive material or otherwise lined internally with corrosion-resistant material. The outside surfaces of the container/vessel shall be painted with at least two coats of anti- corrosive paint. The extinguisher container shall be designed as pressure vessel and shall conform all the applicable standards of ASME pressure vessel codes. The container shall be fitted with spring-loaded pressure safety valve. The valve shall be set to blow off at 90% of container test pressure. It shall be fitted with gauge showing empty and full status.

2.2 Codes and Standards

Portable fire extinguishers shall conform to NFPA (National Fire Protection Association) of USA or FOC (Fire Offices Committee) of UK and BS 5423.

2.3 Types of Extinguishers

2.3.1 Automatic Clean Agent Fire Extinguisher (FM-200)

Automatic ceiling mounted clean agent fire extinguishers are self-contained standalone system and flexible to suit prevailing local conditions. FM-200 is a suitable fire-extinguishing agent for total flooding, portable, and local application systems. FM-200 is non-corrosive, electrically nonconductive, free of residue and characterized by low toxicity.

Design concentration shall not be less than 7% and maintained at 21^0C at the time of filling. Temperature rating of 35 kg extinguisher shall be 68^0C.

2.4 Installation

Portable fire extinguishers shall be installed at three feet height above finished floor.

Where only extinguishers are installed they shall be fixed to wall column with painted steel clamps or stored in steel or concrete in extinguisher cabinets as shown on the applicable drawings or as directed by the Engineer. Where clamped to the wall/column the clamp shall be such that extinguisher can be conveniently fixed and removed without loss of time.

Where stored in cabinets, the cabinets shall be of steel or concrete with glazed steel door painted with at least two coats of anti-corrosive signal red enamel paint over a prime coat of red oxide paint. The locking arrangement will be such that the door can be opened from inside by breaking the glass and from outside with key.

2.5 Markings

Portable Fire extinguishers shall be painted with color code according to NFPA Standard specifications. On the body of the extinguishers shall be marked/imprinted the following information.

a) Instructions on how to use the extinguisher
b) Name of the extinguishing agent
c) Weight/volume of the extinguishing agent
d) Gross weight of the extinguisher
e) Filling pressure of the extinguishing agent
f) Classes of fires for which the extinguishing agents may be effectively used
g) Name of the manufacturer and the year of manufacture

3.0 MEASUREMENT AND PAYMENT

Portable Fire Extinguishers

3.1 Measurement

Measurement of acceptably completed works of fire Portable Fire Extinguishers will be made on the basis of actual number provided and installed in position as shown on the drawing or as directed by the Engineer.

3.2 Payment

Payment will be made for acceptable measured quantity of fire extinguishers on the basis of unit rate per number quoted in the Bill of Quantities and shall constitute full compensation for all the works related to the item.

OFFICE FOR EXIM BANK AT KARACHI

SCHEDULE OF PRICES

Fire Supression System

(NON-MRS ITEMS)

Item. Each	DESCRIPTION	UNIT	QTY.	UNIT RATE (Rs.)	TOTAL AMOUNT (Rs.)
1	Supply and installaion of ceiling mounted Automatic Clean agent (HFC 227 ez/FM200) Fire extinguisher with 7% by volume concentration at 21 deg. C i) Agent weight : 35 kgs	Each	1		
			TOTAL (PKR)		

LIST OF APPROVED MANUFACTURERS FOR ITEMS/ MATERIALS/EQUIPMENT OF FIRE FIGHTING WORKS

The Bidder should note that only Equipment/materials from the following approved manufacturers shall be allowed to be used on this Project provided their products meet the specified requirements.

SR. NO.	EQUIPMENT/ MATERIAL	APPROVED MANUFACTURER/ SUPPLIER	COUNTRY (origin, manufacturing, assembly, testing & supply)
1.	Clean Agent Fire Extinguisher	FIKE NAFFCO SFFECO LIFECO OR APPROVED EQUAL	USA/UK/UAE

NOTE 1: ALL EQUIPMENT/MATERIAL MUST BE SUPPLIED FROM AUTHORIZED/SOLE DISTRIBUTORS. MANUFACTURERS AUTHORIZATION CERTIFICATE IN ORIGINAL MUST BE PROVIDED.

NOTE 2: MINIMUM QUALIFICATION CRITERIA REQUIREMENT OF FIREFIGHTING EQUIPMENT MANUFACTURER

For all proposed equipment manufacturer shall meet the minimum following criteria:

- Minimum ten (10) years of international experience for same offered equipment.
- Minimum three (03) years national experience with local authorization representative and after sale service available in Pakistan.
- Compliance with international standards/codes as per Clause S-08 of specifications of firefighting works applicable to relevant equipment.
- High ambient compatibility equipment.
- Most energy efficient equipment/model available in market and offered for the project.
- Testing facilities as per project requirement.
- Verifiable list of minimum five (05) projects in last five (05) years in Pakistan.
- International certificate of performance of proposed equipment/model available as per international standards.

NOTE: ALL EQUIPMENT/MATERIALS OTHER THAN STATED ABOVE SHALL BE SUBJECT TO PRIOR APPROVAL OF THE ENGINEER IN RESPECT OF MAKE & COUNTRY OF ORIGIN.

Initials of Signatory to Bid: _____

LIST OF DRAWINGS

SR. NO.	DRAWING NO.	TITLE
FIREFIGHTING WORKS		
01	41156/04/TD/J01	FIRE FIGHTING - LIST OF DRAWINGS, GENERAL NOTES, ABBREVIATIONS & LEGENDS
02	41156/04/TD/J02	FIRE FIGHTING - LAYOUT PLAN & STANDARD DETAIL

LEGEND AND ABBREVIATIONS

SYMBOL	ABRV.	D E S C R I P T I O N
		POWDER AUTOMATIC FIRE EXTINGUISHER (35 kg)

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETER UNLESS OTHERWISE INDICATED.
2. CONTRACTOR SHALL BE RESPONSIBLE TO PROVIDE PORTABLE FIRE EXTINGUISHERS AS PER NFPA CODE AND SPACE REQUIREMENT.
3. EXTINGUISHERS SHALL BE CLASSIFIED ACCORDING TO TYPE OF EXTINGUISHERS AGENTS AND THE CLASS OF FIRE TYPES FOR WHICH IT IS INTENDED TO BE USED. ALL INSTALLATION SHALL BE AS PER NFPA CODE & TO ALSO COMPLY LOCAL CODES AS APPLICABLE.
4. ARRANGEMENT OF FIRE EXTINGUISHERS SHALL BE REVISED SUBJECT TO SITE CONDITION.

CLIENT

EXIM BANK OF PAKISTAN

CONSULTANT

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD.

ARCHITECTURE & PLANNING DIVISION KARACHI.
4th Floor, N.I.C. Building, Abbasi Shaheed Road, Karachi, Tel: 99225430-34

REV.	DATE	DESCRIPTION	APPROVED
04			
03			
02			
01			

DRAWN	WAQAR KAZMI
SUBMITTED	
RECOMMENDED	
CHD./VER.	
APPROVED	

PROJECT

OFFICE FOR EXIM BANK AT KARACHI

TITLE

LIST OF DRAWINGS, GENERAL NOTES, ABBREVIATIONS & LEGENDS

SCALE: 1/8"=1'-0"

DATE: JANUARY, 2023

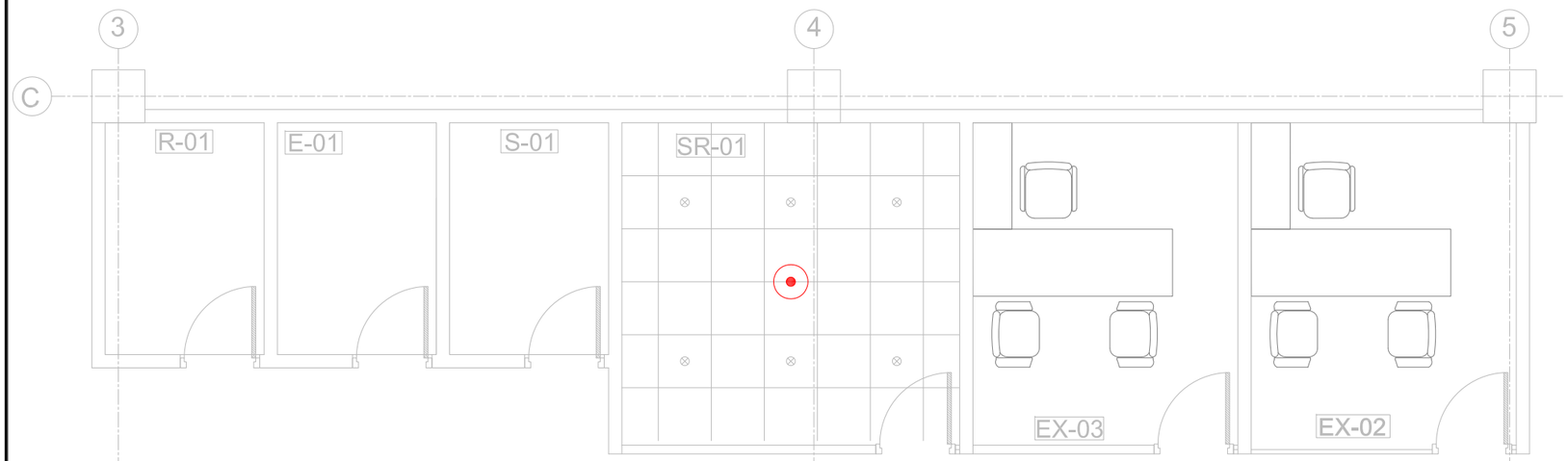
DRAWING No.: **41156/04/TD/ J01**

REV.: 0

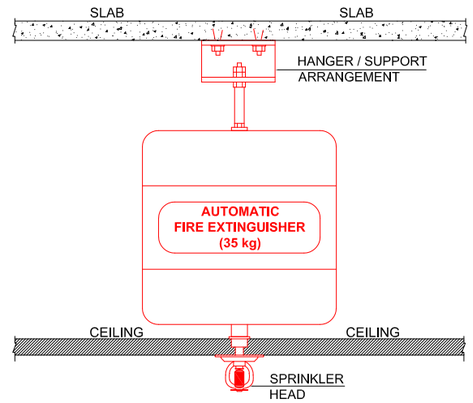
E:\HVAC WORKS\41156 - EXIM BANK OF PAKISTAN (KARACHI)\FF\AUTOMATIC DCP\41156 - J01.DWG

1/8"=1'-0" SHEET SIZE: A2

2/02 **KEY PLAN**
N.T.S



1/02 **LAYOUT PLAN**
1/4"=1'-0"



TYPICAL INSTALLATION DETAIL OF AUTOMATIC FIRE EXTINGUISHER ABOVE CEILING

NOTES

1. ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE INDICATED.
2. FOR LEGEND AND GENERAL NOTES REFER DRAWING NO. 41156/04/TD/J01.

CLIENT
EXIM BANK OF PAKISTAN

CONSULTANT
NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD.
ARCHITECTURE & PLANNING DIVISION KARACHI.
4th Floor, N.I.C. Building, Abbasi Shaheed Road, Karachi, Tel: 99225430-34

REV.	DATE	DESCRIPTION	APPROVED
04			
03			
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DRAWN	WAQAR KAZMI
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APPROVED	

PROJECT
OFFICE FOR EXIM BANK AT KARACHI

TITLE
FIREFIGHTING
LAYOUT PLAN & STANDARD DETAIL

SCALE: 1/8"=1'-0"

DATE: JANUARY, 2023

DRAWING No.: **41156/04/TD/ J02**

REV.: 0

E:\HVAC WORKS\41156 - EXIM BANK OF PAKISTAN (KARACHI)\FF\AUTOMATIC DCP\41156 - J02.DWG
1/8"=1'-0" SHEET SIZE: A2

EXIM BANK OF PAKISTAN

SUPPLY, INSTALLATION, TESTING & COMMISSIONING FOR HEATING, VENTILATION AND AIR CONDITIONING (HVAC) SYSTEM OF EXIM BANK OFFICE AT KARACHI

SPECIFICATIONS

- Specifications
- Annexure A: List of Recommended Manufacturers for Items/Materials/Equipment for HVAC Works
- Schedule of Prices (SOP)
- Drawings

May 2023

National Engineering Services Pakistan (Pvt) Limited
Architecture & Planning Division Karachi
4th Floor, N.I.C. Building, Abbasi Shaheed Road, Shahrah-e-Faisal, Karachi.
Phone: (0092 21) 9925430-34, Fax: (0092 21) 99225424
Email: apk@nespak.com.pk
http://www.nespak.com.pk

HVAC WORKS

SECTION 1 - GENERAL REQUIREMENTS

1-01 GENERAL

The Contractor will design & execute all works related to the HVAC system to ensure functional ease and serviceability. The provision of these works will be made in accordance with International Codes for design and execution. The Contractor will submit technical data sheets and shop drawings to fully elaborate offered equipment.

The work to be done under the section of these Specifications includes furnishing all labor, equipment, appliances, and materials and performing all operations required in connection with the installation of equipment including all accessories, testing, and commissioning.

The scope works include the supply and installation of the items mentioned in the Schedule of Prices and any other for completion of the system.

1-02 MATERIALS

All materials shall be of the highest grade, free from defects and imperfections, of recent manufacture and unused, and of 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.

1-03 SHOP DRAWINGS

The Contractor shall make detailed analysis of the requirements of the works by visiting the site. Based upon such analysis he shall prepare detailed Shop Drawings at his own cost for HVAC System in the scope of this contract and Equipment. The Contractor shall submit 3 copies each of all such Shop Drawings for obtaining approval of the Engineer. After obtaining approval and after having in possession these approved Shop Drawings, the Contractor shall use these Shop Drawings for fabrication, construction and installation.

The work described on any shop drawing submitted shall carefully be checked by the Contractor for all clearances, field conditions, maintenance of architectural conditions and proper coordination with all trades on the job. To this end, the Contractor during the shop drawing stage, shall ensure that he receives drawings of all other trades that might interfere with the proper installation of his work. No payment shall be made for any variations or alterations on site due to lack of knowledge of other trades. Any unresolved conflict between trades shall be referred to the Engineer for decision.

Equipment layout is to be detailed on shop drawings, showing the exact method of installing and clearly illustrating components to be used in making all connections.

The Position of hangers and supports with type and method of installation of each hanger, detailing the type of hanger fixing with a reference number for each type.

All general layout drawings shall be drawn to 1:50 (1':1/4") scale. Details of

hangers, methods of fixing of ducts, detailed cross section of ducts and risers, details of control shall be drawn to 1:10 (1':1") scale.

The Contractor shall prepare Drawings and Schedules showing precise details of holes in concrete, masonry, etc. and necessary sleeves required for passage of ducts and supports etc. Drawings and Schedules, approved by the Engineer must be available before any structural work requiring holes or other modifications, is constructed.

Signed and approved drawings shall not be departed from unless a signed variation order or site instruction is issued in writing by the Engineer. Drawings returned to the Contractor for alteration or amendments are to be resubmitted for approval.

Amended or altered drawings shall show the nature of the amendment or alteration in a revision block on the drawing, together with revision number or letter and the date of the revision.

The Contractor shall be responsible for any discrepancies, errors or omissions in the drawings and other particulars supplied by him whether such drawings and particulars have been approved by the Engineer or not, provided that such discrepancies, errors, or omissions are not due to inaccurate information or particulars furnished in writing to the Contractor by the Engineer.

1-04 AS-BUILT DRAWINGS

The Contractor shall supply to the Engineer a set of "As-Built" drawings showing the Contract works as installed, together with any other information necessary for operation and maintenance. Three copies of each drawing (scale as per shop drawing) and other information shall be supplied, along with a soft copy.

1-05 MANUFACTURER'S DATA

Manufacturer's performance data, certified factory drawings and/or curves of apparatus giving full information as to capacity, performance at different operating and ambient conditions, dimensions, materials, electrical data and all information pertinent to the adequacy of the submitted equipment shall be submitted for approval. One original and 2 copy of catalogues and other information shall be submitted.

Manufacturer's names, sizes, catalogue numbers and/ or samples of all materials shall also be submitted for approval.

Orders for equipment submitted for approval must be accompanied by relevant drawings, curves, technical data, catalogues and samples. Where data, certified drawings or other required information is not available until after orders have been placed, the Engineer shall give provisional approval until all requested drawings and information have been supplied to the Engineer and approved by him. It is the Contractor's responsibility to ensure that all necessary information is supplied to the Engineer in accordance with the progress of works.

Should the Engineer give provisional approval only for an order due to lack of

complete information and should the missing information not eventually meet with the approval, the Engineer shall not be held responsible for any delay incurred. For equipment where information from the manufacturers is likely to be delayed, it is essential that the Contractor places provisionally approved orders at the earliest possible date so as to ensure approval of orders in complete conformity with the progress of the works.

Submittals and shop drawings should, as far as possible, be complementary so that drawings and submittals can be cross-checked.

1-06 SAMPLES

Contractor shall provide at his cost, samples of materials, instruments, gauges and electrical items, for approval by the Engineer before order is placed for the same. Engineer may waive this requirement, if detailed published catalogues submitted by the Contractor provide sufficient information for approval. These samples shall include, but not limited to:

i) G.I. Sheet
ii) Duct and insulation
iii) Insulation adhesive, Duct Sealant and tapes
iv) AI/AO Diffusers, Linear Diffusers and Grills
v) Duct hangers support arrangement.
vi) Paints
vii) Anchor bolts, studs, etc. for hanging arrangements
viii) Any other item required by the Engineer

1-07 WORKMANSHIP

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

1-08 PROTECTION

The Contractor shall keep duct and other openings closed to prevent entry of foreign matter. All fixtures, equipment and apparatus shall be covered and protected against dirt, water, chemical or mechanical damage, before and during the construction period. 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 bearing housings and similar items shall be protected until in service: no rust will be permitted.

1-09 CUTTING, PATCHING AND REPAIRING

Required for proper installation and completion of HVAC works, including masonry work, concrete work, and carpentry work, painting and re-painting shall be performed by skilled persons in respective trades, at expense of the Contractor. Construction shall be cut only after obtaining written permission from the Engineer.

1-10 LINES, LEVELS AND SPACES

The Contractor shall check dimensions at the building site and establish lines and levels for work specified in Specifications. The Contractor shall check

with the work of other trades to ensure proper clearance of ductwork, conduit and other items. Any deviations observed between drawings and actual construction shall be brought into the notice of the Engineer. The erection supervisor shall regularly inspect, during the progress of civil works, the areas allocated for installation of HVAC works, and any conflict observed shall immediately be reported to the Engineer.

1-11 SEALING OF OPENINGS

The contractor shall seal all openings in external walls where HVAC ducts penetrate in an external membrane. The sealing shall be air-tight to prevent penetration of outside air and water into the building. The method and materials for sealing shall be subject to Engineer's approval.

1-12 ACCESS PANELS

The Contractor shall mark locations of, and give sizes of, access panels required in false ceiling and wall paneling for adjustment and maintenance of HVAC equipment, such as Dampers, ceiling-hung equipment, etc. This information shall be provided to the Engineer before the commencement of false ceiling work by the concerned persons.

1-13 SUPPORTS AND CEILING HUNG EQUIPMENT

All ductwork where used shall be mounted on or suspended from supports, all as specified and as required.

Flexible duct connections, as specified elsewhere, shall be fitted wherever ducts cross building expansion joints, at suction and discharge end of each air handling unit wherever ducts are connected to such unit, and/or wherever shown on the drawings.

SECTION 2 – EQUIPMENT, DUCTING AND SHEET METAL WORK

2-01 GENERAL – EQUIPMENT

All equipment shall be of such overall dimensions, operating weights, service area requirements and configuration that it can be located where required without any adverse effect on its performance and clearance requirements. Any change in other trades work, anticipated by offering alternate equipment, shall be estimated by the Contractor and its cost shall be included in the quoted price for HVAC Works.

All equipment supplied under this section shall be brand-new, factory manufactured and complete in all respects. The type, characteristics, capacity ratings of all equipment shall be as Scheduled.

2-01.1 DX - SPLIT AIR-CONDITIONING UNITS

All unit(s) shall be inverter type. Unit(s) shall have split type indoor, remote air cooled condensing unit, factory assembled, tested, single unit connected to outdoor unit as specified and shown. Unit shall include:

i) Air Cooled Condensing Units (CU)

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 the Indoor AC Unit and shall be suitable for operation at 50 ^{o}C ambient temperature conditions.

The unit casing shall be constructed from galvanized sheet steel, zinc phosphate 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. The Condensing unit shall be of same manufacturer as the Indoor AC unit.

Condenser coils shall be made of seamless copper tubes mechanically expanded into aluminum fins.

For Coils used in corrosive environments and handling untreated fresh air the Fins should be Hydrophilic blue fin which can pass 500 hrs Salt spray test.

Condenser fans shall be of direct drive, 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.

Hermetically sealed reciprocating/rotary compressors shall be fitted with internal and external shock absorbers to minimize vibration and noise transmission. The compressor shall be fitted with a discharge line silencer

and charged with the required quantity of oil for adequate lubrication circulated by means of an internal oil pump.

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

The units shall be complete with K-Type refrigerant piping & insulation and all necessary valves and filter drier 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 installed on steel brackets of adequate strength fixed to the walls with expansion bolts or on a concrete foundation on the roof as shown on the drawings.

ii) Indoor Unit (SAC-Units)

The DX-type Indoor units shall be elegant, decorative types, wall mounted ceiling recessed (cassette) mounted, concealed ducted or vertical floor standing type as specified. 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
- DX-type cooling coil
- Supply air fan and motor
- Thermostat microprocessor type with cooling & heating mode
- Automatic air swing mechanism
- Supply air plenum with adjustable grille

The casing shall comprise of galvanized sheet steel, zincphosphated, with a stoved enamel finish or as approved by the engineer and shall include supply and Return air grilles. For cassette type, AC units, the colour of the front grille shall be approved by the Engineer.

Fan shall be statically and dynamically balanced centrifugal type with backwardly 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 voltute 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.

Filters with dust arrestance of 35% as per ASHRAE standards shall be provided. The filter media shall be washable, cleanable, reusable, chemical and moisture resistant, non-perishable, and flame resistant.

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

Fins shall be of continuous aluminium having extended collars for spacing and bonding mechanically to the tube.

Coils shall be air pressure tested to 20.6 bar while immersing the coil in a tank of water after completion.

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 air-cooler shall incorporate a galvanized 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.

Microprocessor based thermostat with integral 3 speed fan selector shall be supplied as part of the unit.

Condensate Drain

All cooling coil condensate drain shall be uPVC class D. The fittings for the cooling coil condensate drain shall be uPVC class D.

2-01.2 ELECTRIC CABLES

All power wiring from the point of supply to each equipment shall be carried out by the HVAC Contractor.

All LT cables shall be copper conductor, PVC insulated for single core and PVC insulated PVC sheathed for multi-core. All cables shall be of specified voltage grade complying with BS 6346 and/or BS 6004. The PVC insulation shall comply with BS 6746. Conductor shall be stranded or solid high conductivity soft annealed copper complying with BS 6360.

All multicore and single core sheathed cables for circuits operating up to 600/1000 volts grade. All single core unsheathed cables shall be of 450/750 volt grade.

All cables shall have phase identification colors on insulation of each core. The colour code for three phase circuits shall be red, yellow and blue for phase conductors and black for neutral conductor. Where insulated earth conductor is installed, it shall have green or green and yellow insulation.

Single-phase circuits shall have red for phase and black for neutral conductor.

While cable selection for the specified project, the power factor is required to be considered as 0.8.

All DC circuits shall have red for positive and black for negative conductor.

2-02 DUCTING

2-02.1 Ducting Material

All duct work shall be of galvanized steel sheet unless otherwise indicated on Drawings. Galvanized steel shall be of lock forming quality (LFQ) and shall have a galvanized coating of 8 oz total for both sides of one square meter of a sheet. The GI sheet shall conform to ASTM A-525 and ASTM-90.

Galvanized steel sheet shall be Cut Lengths coated by the Hot-Dip Method and manufactured per ISO Standard 3575-76 zinc coating designation Z-275.

2-02.2 Structural Steel

Structural Steel shall be M.S. members rolled from Pakistan Steel billets or equivalent conforming to ASTM designation A-36 standard specifications for structural steel.

2-02.3 Canvas Cloth

Canvas Cloth shall have specified weight with flame retardant quality.

2-02.4 Painting

All steel work in connection with supports for ductwork etc. exposed to the elements is to be painted with two coats of an approved rust preventive paint.

All exposed metal surface of hangers, brackets, etc. must be painted with two under-coats and two finishing coats of enamel paint of approved color. G.I. sheet is not to be painted. However, all uninsulated pipe work and valves are to be painted as stated above.

Identification bands shall be painted on uninsulated ducting, or on insulation at frequent intervals. Lettering shall be agreed with the Engineer.

All duct hangers in concealed locations shall be given one coat of black asphalt paint before being concealed.

2-03 DUCT CONSTRUCTION

All sheet metal duct work shall be of a standard construction and erected in a first class workmanlike manner. The duct work shall be constructed as per SMACNA Low Velocity Duct Construction Standards.

Ducts shall be straight and smooth on the side, with joints neatly finished. Where ducts are lined with interior insulation, the dimensions required shall be for the net free area after insulation is applied. Ducts shall be anchored securely to the structure in an approved manner and shall be installed so as

to be completely free from vibration under all conditions of operation.

Sheet metal ducts shall be properly braced and reinforced with steel angles, or other structural members approved by the Engineer unless otherwise required, the internal ends of all slip joints shall be installed in the direction of flow.

Finished work shall show no flaking or peeling within 6 mm (1/4 inch) of a cut edge. The construction and gauge of material, size and spacing of stiffeners for duct work shall be as follows:

Larger Dim. of Duct (mm)	Gauge (US)	Traverse Joint Type/Size (mm)	Interm Bracing, Angle Size (mm)	Max. Spacing between Traverse Joint &/or Interm Reinforcement (m)
Thru 300	26	Drive slip/-	-	-
325 thru 450	24	Drive slip/-	-	
475 thru 750	24	Pocket lock/25	25x25x3	1.5
775 thru 1050	22	Pocket lock/25	25x25x3	1.5
1075 thru 1350	22	Pocket lock/40	40x40x3	1.5
1375 thru 1500	20	Pocket lock/40	40x40x3	1.5
1525 thru 2100	20	Angled reinforced standing seam	40x40x3	0.75
2125 thru 2400	18	Angled reinforced standing seam	40x40x6	0.75
Over 2400	18	Angled reinforced standing seam	40x40x6	0.75

Other types of Traverse joints allowed as per ASHRAE/ SMACNA Standards shall be acceptable, subject to Approval of Engineer, in places where pocket lock is not possible due to tight space.

All angles for bracing shall be painted with one coat of approved rust-inhibitive paint before fixing to duct.

All duct work in the finished areas shall be run parallel to the beams wherever possible. All outlet opening and open ends shall be kept closed with sheet metal caps during construction. Rectangular duct shall be constructed by breaking the corners and grooving the longitudinal seams. Elbows and transformation sections may be formed with Pittsburgh corner seams but complicated fittings shall be constructed with double seams. Angle bracing shall be of steel and shall be carried out on all four sides of the ducts. All bracing is to be in accordance with the current addition of the ASHRAE Hand Book/ SMACNA Standards.

2-04 ELBOWS

Ducts shall be built with curves and bends, where required, to affect an easy

flow of air. Curved elbows shall have a center line radius at least equal to 150% of the width of the duct unless otherwise indicated. All duct curves having an inside radius smaller than the width of the curve shall be equipped with approved single thickness vanes.

Vertical ducts shall have full size bends where horizontal branches are taken off unless otherwise indicated, and/or approved.

Where square elbows are used in changing directions, approved and aerodynamically correct vanes as per latest SMACNA Duct Construction Standards shall be used.

These turning vanes must be free from vibration when the system is in operation.

2-05 HANGERS

Hangers and supports shall be fastened to the structure in a manner approved by the Engineer All fastening shall be such as to ensure permanent stability and to be capable of supporting at least three times the applied load.

Galvanized sheet metal ducts less than 500 mm in width (larger dimension) may be suspended by means of galvanized iron straps extended along the bottom of the duct to form a trapeze, only if hanger length above the duct is not more than 300 mm.

All other ducts shall be suspended by means of iron bars securely fastened to the angle iron bracing or angle iron placed under the duct. Bars shall be fastened to bracing only on un-insulated ducts.

Bars shall be welded to angles at ceiling, attached therein by anchor screws and heavy iron washers. Where horizontal ducting is fixed to walls, columns, supported from floor slabs, etc. angle iron frames are to be fabricated and fitted to support rectangular ductwork and associated equipment.

Vertical ducts are to be supported by steel angles bolted to at least two sides of the duct and on the complete circumference of the ducts where the larger duct dimension is greater than 600 mm (24 inch).

Angle iron extensions shall be either grouted or bolted to the structure.

Hangers spacing and sizes shall be as follows:

Larger Duct Dim. (mm)	Strap Size (mm)	Bar Dia (mm)	Bottom Angle Size (mm)	Maximum Spacing (m)
Thru 300	25 x 22 ga.	10	25x25x3	2.5
325 thru 450	25 x 22 ga.	10	32x32x3	2.5
475 thru 750	25 x 18 ga.	10	40x40x3	2.5

Larger Duct Dim. (mm)	Strap Size (mm)	Bar Dia (mm)	Bottom Angle Size (mm)	Maximum Spacing (m)
775 thru 1050	25 x 18 ga.	10	40x40x3	2.5
1075 thru 1350	25 x 16 ga	10	40x40x3	2
1350 over	25 x 16 ga	12.5	50x50x6	2

Hanger rods shall be cross-braced whenever the length of rod above duct work is more than 1 m (3 feet) to prevent swing of ducts.

All structural steel including hanger rods and angle iron shall be painted with one coat of approved rust- inhibitive paint before installing.

2-06 QUADRANTS FOR VOLUME DAMPERS

All dampers other than dampers behind registers and diffusers shall be fitted with substantial locking quadrants, mounted outside the duct in an accessible position. On insulated ducts the quadrants shall be fastened to bearing plates flush with the outside finish of the insulation.

2-07 DAMPERS

2-07.1 Volume Dampers (V.D)

A substantially constructed manual volume damper of the butterfly or multiple blade type as per latest SMACNA Duct Construction Standards shall be fitted where shown on the Drawings and at all branch entries or exits with main ducts for balancing purposes. Dampers shall have galvanized or painted steel interlocking blades of 200 mm (8") maximum blade width. Blades shall be fabricated from 16 gauge steel with seamed edges and a maximum length of 1.2 m (4 ft.) It should be noted that these dampers, shall be separate and independent from the dampers, hereinafter specified. Volume Dampers are not required where splitters Dampers, as specified hereinafter, are installed.

2-07.2 Splitter Dampers (S.D)

At each point of division in a supply trunk duct where a branch is taken off a trunk duct, an adjustable splitter or deflecting damper, one gauge heavier than the duct with operating rod and locking quadrant as above, shall be installed. These deflecting dampers shall be permanently set and locked in position after completion of the installation and adjustment with fans running.

Operating rods are to be full blade length extending through the duct to externally mounted bearing plates. Construction shall be as per latest SMACNA Duct Construction Standards.

2-07.3 Fire Dampers (F.D)

Fire dampers shall be installed as shown on the drawings. Frame shall be 100 mm x 25 mm x 3 mm (4”x1”x1/8”) galvanized steel channel with 16 gauge

thick blades. Blades shall have an overlap of 25 mm (1”) and shall be fixed on self-lubricating bronze type bearings.

Dampers shall be complete with linkage rod and fusible link rated at 71°C (160 deg. F.) Fusible Link shall be from US/UK. Damper construction shall meet NFPA 90-A requirements, and shall have the “hour” fire-rating not less than the fire rating of the plane where installed. Fire dampers shall be airtight when in a close position.

2-08 FLEXIBLE DUCT CONNECTIONS

Flame proof flexible connections shall be furnished and installed on all suction and discharge connections of fans and air-conditioning units for prevention of transmission of vibration through the ducts to occupied spaces.

Flexible connections also be provided wherever ducts cross building expansion joints.

Flexible connections shall be factory fabricated of imported origin, made from chemically impregnated canvas or other material approved by the Engineer. Connections shall fit closely and are to be secured in an airtight fashion at connections to ductwork, fans and apparatus. The unclamped section of the flexible connection between apparatus and ductwork shall not be less than 6" in length. Flexible connections shall not be painted or insulated. Samples of the material shall be presented to the Engineer for approval before installation.

2-09 ACCESS DOORS AND PANELS

Wherever necessary, suitable access openings, doors and frames to permit inspection, operation and maintenance of all filters, controls, dampers, bearings or other apparatus shall be provided in ducting. Doors shall be of double construction, of not lighter than 20 gauge metal sheet and shall have sponge rubber gaskets around their entire perimeter. On insulated duct work the space between the inner and outer door sheets shall be insulated as specified for the ductwork. All access doors in sheet metal shall have air tight seal, shall be hung on heavy flat hinges and shall be secured in the closed position by means of wing type nuts and screws or coin operated catches.

2-10 SLEEVES

Where ducts pass through walls, partitions, or floors, wooden sleeves shall be provided by the Contractor and these sleeves shall remain in place permanently. Sleeves shall be packed with non-combustible glass- fiber insulation, minimum of 24 kg/m^3 (1.5 lb/ft^3). Density and sealed with sealant.

2-11 TEST WELLS

The Contractor shall provide test wells for measurement of air velocity and static pressure for balancing purpose. These wells made up of a brass nipple with screwed caps are to be fixed into the duct or casing on the downstream sides of branch volume damper in each branch supply duct, and on upstream side of branch volume damper in each branch return. The design of test well shall be subject to Engineer's approval.

SECTION 3 – INSULATION

3-01 GENERAL

3-01.1 The Contractor shall provide insulation for the services and equipment specified hereafter. Insulation shall be as per the following Insulation Schedule.

3-01.2 Insulation material shall be complete with vapor barrier protection covering and jacketing (where specified), adhesives, insulation tape, duct sealer and/or sealing tape, fastening material, and jacketing for outdoor ducting and piping.

3-01.3 Identification bands shall be painted on insulation at frequent intervals. Lettering shall be agreed upon with the Engineer.

3-02 Insulation Schedule

Sr. No.	Services	Thick-ness mm (Inch)	Insulation Type	Vapour Barrier	Protection
a)	Indoor supply/return duct				
i)	Concealed to vision duct passing through conditioned space	1	Glass fiber blanket	Reinforced aluminum foil	8-Oz canvas
b)	Refrigerant Piping				
i)	Indoor	3/4 (min.)	Elastomeric extruded Nitrile Rubber tubing to fit standard dia meters of copper tubing		
ii)	outdoor	1 (min.)	Elastomeric extruded Nitrile Rubber tubing to fit standard dia meters of copper tubing		10 oz (280 gm) canvas with sealing adhesive coat
c)	Cooling coil condensate drain piping	1/2	Nitrile Rubber	Reinforced aluminum foil	--

3-03 INSULATION MATERIALS

3-03.1 Duct Insulation

Insulation material for ducts and sheet metal air plenums shall be flexible glass fiber, 16 kg/m^3 (1.0 lbs/cu.ft) density and maximum conductivity of 0.039 W/m/°C at 24°C (75°F).

3-03.2 Vapour Barrier for Duct Insulation

Vapour barrier when specified shall be factory applied flame retardant reinforced aluminum foil, 0.02 mils thick.

3-03.4 Insulation Protection Material and Accessories

3-03.4.1 Canvas

226 gms per Sq.m (8 Oz per square yard) as specified in Insulation Schedule.

3-03.4.2 Water & Rat Proof Paint

As approved by the Engineer.

3-03.4.3 Banding

13 mm x 0.5 mm (1/2" x 1/48") galvanized steel or aluminum bands.

3-03.4.4 Insulation Tape

Insulation tape for joints shall be of aluminum foil type, 50 mm (2 inch) wide, equivalent to Scotch No.473.

3-03.4.5 Adhesive

Adhesive for thermal insulation shall comply with ASTM Standard C 916-79 or equivalent. Adhesive for acoustic liner shall comply TIMA Standard AHC-101-1975 or equivalent.

3-03.4.6 Duct Sealer

Sealer for duct joints shall be butyl rubber caulking, weather proof and water resistant, conforming to U.S. Federal Specification TT-S-001657 Type 1, as manufactured by Woodmont Products, INC, USA, or approved equal.

3-03.4.7 Duct Sealing Tape

Duct sealing tape shall be 75 mm (3 inch) wide self-adhesive vinyl cloth tape.

3-04 INSULATION APPLICATION

3-04.1 General

All Thermal and acoustic insulating materials shall be installed as specified hereinafter.

Insulation shall be installed in a smooth, clean, workmanlike manner and joints shall be tight and finished smooth.

All surfaces to be insulated shall be dry and free from loose scale, dirt, oil or water when insulation is applied. Insulation shall be applied in such a manner that there will be no air circulation within the insulation or between the insulation and the surface to which it is applied.

Surface imperfections in the insulation such as clipped edges, small joints or cracks and small voids, or holes not over 645 mm^2 (1 sq. inch) shall be filled with like insulating material.

Where a vapour barrier is fixed on site it shall be fixed in such a manner as to obviate the possibility of moisture penetration. It shall be fixed where required by means of an approved type bituminous compound or approved equal for tightness.

Insulation for all services shall only be applied until after testing and approval for tightness obtained from the Engineer, unless otherwise instructed in writing by the Engineer.

Insulation is to be applied where indicated on the drawings or called for in these specifications.

3-04.2 Duct Insulation

Before applying insulation, either sealing tape or duct sealer shall be applied on all corners of traverse joints for air tightness.

The insulation shall be fixed on ducts with a suitable adhesive as specified. Adhesive shall be applied on at least 75% surface area. In addition to the fixing by adhesives, insulation on the underside of ducts exceeding 450 mm (18 inch) width must have mechanical fasteners of an approved pattern to prevent insulation sagging, or alternatively bands as specified above shall be used at intervals not exceeding 1.2 m (4 feet).

All joints on the insulation shall be sealed with 50 mm (2 inch) aluminum foil tape. The tape shall only be fixed to the vapour seal and not to the bare insulation and, therefore, joints in the insulation shall not occur longitudinally at corners of ducts. If it is unavoidable to have joints at longitudinal corners then the insulation must be cut back and the vapour seal folded over the bare edge of the insulation so that the tape adheres only to the vapour seal.

SECTION 4 - AIR INLETS AND OUTLETS

4-01 GENERAL

Before placing orders for these items, the Contractor shall check that all items to be supplied by the manufacturer comply for spread, throw, drop and noise, with capacities and characteristics as indicated on the drawings and schedules. All outlets shall be specifically selected for their particular application and designed for quite operation. All items are to be approved by the Engineer.

All air inlets/outlets shall be of material as indicated on the Drawings and Schedules, and/or as specified.

Color and finish shall be subject to Engineer's approval. Ceiling diffuser face and margin sizes and styles shall be coordinated with false ceiling/boxing type. All devices shall have substantial approved gaskets to completely prevent streaking on walls or ceilings due to leakage.

Where ceiling panels and ceiling diffusers are of different size, ceiling diffuser shall be centered in ceiling panel. Duct routing may slightly be adjusted, if necessary, for this purpose or duct drops for diffuser necks may be offset upto a max. of 30 degrees. or diffuser locations having requirement of greater than 30 degrees offset, flexible round insulated duct connection shall be used.

All wooden frames for wall inlets/outlets (where not mounted directly on the duct) shall be 19 mm (3/4") thick set permanently in the walls. These frames shall be provided by the Contractor. The Contractor shall be responsible for all cuttings of walls, fixing of wooden frames in walls and repair of masonry/plaster required for fixing side-wall inlets/outlets. The Contractor shall furnish wooden frames for wall inlets/outlets to those responsible for civil construction for installation at locations indicated on shop drawings prepared by the Contractor for this purpose.

Ceiling inlets/outlets shall not be supplied on false-ceiling. Cutting of false ceiling (tiles) shall be the responsibility of the HVAC Contractor.

Manufacturer's certified free area for each type and size of grille, register, linear/square diffuser and louver shall also be provided for the purpose of air balancing.

All air inlets/outlets shall be manufactured as per Tuttle & Bailey standards of air inlets/outlets.

4-02 GRILLES

All side wall outlets and inlets shall be of sizes and characteristics as scheduled and shown on the Drawings.

Double deflection type grilles shall have vertical front bars and horizontal back bars.

All supply outlets shall have opposed blade dampers, finished in black paint, fixed to the outlet and shall be operatable with a removable key inserted from

front of the grille.

All return and/or exhaust inlets shall have similar dampers if scheduled.

4-03 CEILING DIFFUSERS

Ceiling diffusers shall be of the sizes and characteristics as scheduled and shown on the Drawings.

Ceiling diffusers shall be furnished with volume dampers as furnished by the diffuser manufacturer, finished in black paint.

Volume control for these diffusers shall be accessible through the diffuser from below the ceiling and shall maintain their setting when adjusted. Each diffuser shall be provided with sponge rubber or felt gasket. Return diffusers shall be similar to supply diffusers unless otherwise indicated. Inner core shall be removable and shall be mounted on outer frame. (Throw pattern for supply diffusers shall be as shown on Drawings by arrows or as shown in schedule).

Ceiling diffusers intended for use with flexible round insulated duct shall have suitable inlet box.

4-04 LINEAR DIFFUSERS

Linear diffusers shall be of characteristics and capacity as scheduled. Sizes and throw patterns shall be as shown on the drawings. Each diffuser shall include externally insulated lined plenum box with duct connection collar of size shown on drawings as “blanked off”, a sheet metal plate shall blank off the diffusers/grilles behind the core. Dampers, pattern controller and plenum box shall not be required with blanked-off diffusers/grilles.

Plenum boxes shall have inlet connection collar spaced as shown on drawings, but not more than 1.2 m (4 ft) c/c.

SECTION 5- INSPECTION TESTING AND COMMISSIONING

5-01 GENERAL

5-01.1 The whole of the works supplied under this Contract shall be subject to inspection and tests by the Employer and/or Engineer should he so require, during manufacturing erection and after completion. The inspection and tests shall include, but not be limited to, the requirements of this Section of the Specifications.

5-01.2 For this purpose the Engineer shall, at all reasonable times, be allowed free and ready access to the Contractor's shop and the shops of his suppliers for the purpose of inspecting the specified equipment components, or any other parts, and obtaining information as to the progress of the work.

5-01.3 Specific tests required by the various items of the materials shall be treated in accordance with the specifications of the corresponding clauses of the Specifications.

5-01.4 The Contractor shall submit to the Engineer, fifteen (15) days prior to the date of commencement of the balancing and performance tests, three (03) copies of the complete test procedure. The procedure, method and points of measurement as well as the method of calculation shall be approved by the Engineer before any test is carried. Three (03) copies of the test results shall be furnished to the Engineer for his approval.

5-01.5 The Contractor shall supply all necessary testing and balancing instruments, which shall include the instruments to carry out any test of any kind on a piece of equipment, apparatus part of system or on a complete system if the Engineer requests such a test for determining specified or guaranteed data, as given in the Specifications or in the Schedule of Equipment. Necessary skilled staff shall be provided by Contractor.

5-01.6 Any damage resulting from the test shall be repaired and/or damaged material replaced with intimation to the Engineer, all to the satisfaction of the Engineer, and at no extra cost to the Employer. Skilled staff shall again be provided by the Contractor.

5-01.7 In the event of any repair or any adjustment having to be made, other than normal running adjustment, the tests shall be void and shall be recommenced after the adjustment or repairs have been completed.

5-01.8 All testing, balancing and final adjustment shall be in accordance with the provision of the applicable ASHRAE Standards, or other approved relevant standards.

5-01.9 The Contractor shall test a piece of equipment, apparatus, parts of system or a complete system in accordance with method and Schedule of Tests provided by the Engineer to determine Specified or Guaranteed data, given in the Specifications, Schedule of Equipment and Contractor's Data Sheets.

5-01.10 The contractor shall be responsible for carrying out tests on the material/equipment/installation furnished by him.

5-02 PRELIMINARY INSPECTION & TESTS

5-02.1 General

All equipment/material shall be inspected and tested to determine the completeness and general conformance to specified requirements, when operated independent of overall HVAC System, for noise, vibration, and electrical data.

5-02.2 Ductwork

Inspection on ductwork shall be carried out by Contractor's supervisor in the presence of Engineer's representative to the satisfaction of the Engineer.

All joints in ducts and at outlets shall be physically inspected for air leakage prior to wrapping of insulation. All dampers shall be tested on site for proper operation prior to installation.

Ducts, plenums and casing shall be inspected and made substantially air tight before covering with insulation or concealing in the masonry. The terms substantially airtight shall be construed to mean that no air leakage will be noticeable through the senses of feeling or hearing.

5-03 BALANCING AND COMMISSIONING

5-03.1 Balancing

All, ductwork air inlet and outlets and air volume control dampers shall be adjusted and balanced to deliver within 10% of the specified quantities indicated on the Drawings. Where the equipment or systems depend upon controls for proper operation, functioning and performance, the Engineer may ask the Contractor that the later shall be operated simultaneously with the equipment or system during tests.

If the air quantities cannot be delivered without exceeding the speed range of the sheaves or the available horsepower, the Engineer shall be notified before proceeding with the balancing of air distribution system.

Any addition/replacements required to meet the specified flow rates shall be the responsibility of the Contractor at his own cost.

The balancing and commissioning work will be done by a specialized firm/approved by the Engineer, having working experience of more than five (05) years along with working experience of at least five (05) projects of similar nature.

5-03.2 Commissioning

Upon completion of whole or part of HVAC System is substantially complete and ready for operation as specified, the Contractor shall carry out Commissioning. Appropriate Seasons are not necessary and the purpose of the commissioning is to start-up the whole or part of HVAC System with manual and/or automatic controls and to put the whole or part of HVAC system in operation to make it ready to provide cooling and/or heating.

SECTION 6 - MEASUREMENTS AND PAYMENTS

6-01 GENERAL

Unless expressly excluded, the cost of all materials, equipment and works required by Specifications, acceptably furnished, installed and tested as Specified, shall be considered to be included in the amounts tendered against the item listed in the Schedule of Prices.

6-02 SOP ITEM NO. 2

6-02.1 Measurement

Measurement will be made of each item and all associated accessories and work acceptably furnished, installed and tested as individual units.

6-02.2 Payment

Payment of these items will be made at the Contract Unit Rates for these items entered in Schedule of Prices.

6-03 SOP ITEM NO. 7 & 8

6-03.1 Measurement

No measurement will be made of the items mentioned above.

6-03.2 Payment

Payment will be made at a Contract Lump sum Price entered for the respective item in Schedule of Prices.

6-04 SOP ITEM NO. 1 (a & b)

6-04.1 Measurement

Measurement will be made for surface area of installed sheet metal ducting and plenums for different gauges. No measurement will be made for wastage, bracing flanges, hangers and supports, fasteners, anchor bolts air-turning vanes, splitter dampers, and duct protection.

6-04.2 Payment

Payment will be made for the number of units measured as provided above at the Contract Unit Rates as entered in SOP.

6-06 SOP ITEM NO. 1 (c)

6-06.1 Measurement

Measurement will be made of the area of sheet metal to which the insulation is applied. No measurement will be made for accessories and adhesive.

6-06.2 Payment

Payment or deduction will be made for the number of units measured as above at the Contract Unit Rates entered in SOP.

6-07 SOP ITEM NO. 5 & 6

6-07.1 Measurement

Measurement will be made of the core area of the respective item acceptably furnished, installed and tested. No measurement will be made of accessories and attachments.

6-07.2 Payment

Payment will be made for the number of units measured as provided above at the Contract Unit Rates as entered in SOP.

6-05 SOP ITEM NO. 3 & 4

6-05.1 Measurement

Measurement will be made of the length of condensate pipe/ refrigerant pipe/ Round duct/ flex. Duct connection route at the center line of duct, fittings and accessories, acceptably furnished, installed and tested. No measurement will be made for fittings, accessories, attachments, hangers, nuts and bolts.

6-05.2 Payment

Payment will be made for the number of units measured as provided above at the Contract Unit Rates as entered in SOP.

OFFICE FOR EXIM BANK AT KARACHI

HVAC WORKS

SCHEDULE OF PRICES

ITEM NO.	DESCRIPTION OR CODE	UNIT	QTY	UNIT RATES IN FIGURES (PKR)	TOTAL AMOUNT (PKR) COL 4 x COL 5
1	2	3	4	5	6
1	**Supply and installation of Sheet Metal Ducting and insulation as per schedule specification & drawings with accessories & fitting complete in all respects.**				
	***G. I.* Sheet Metal Work**				
	a) U.S GAUGE 26	SFT	200		
	b) U.S GAUGE 24	SFT	1,500		
	Insulation				
	c) Indoor Supply Air Duct Concealed to Vision	SFT	1,700		
2	**Supply and installation of Decorative Wall Mounted (Inverter) indoor units, outdoor condensing units and hanging arrangements, including electrical works complete in all respect.**				
i)	SAC-1/ OU-1 (Nominal Capacity = 24,000 BTU/HR) - Decorative Wall Mounted Unit	EACH	2		
3	**Supply and installation of refrigerant pipes, insulation, fittings including all accessories for complete system complete in all respect.(For Split Units)**				
i)	DIA 9.52 mm (3/8")	RFT	100		
ii)	DIA 15.88 mm (5/8")	RFT	100		
4	**Supply and installation of uPVC Drain Pipes, Conduits for Refrigerant Pipes, fittings including all accessories complete in all respect.**				
i)	1 inch	RFT	100		
5	**Supply and installation of Volume Damper (VD) for complete system as per specification/ drawings with accessories & fitting and complete in all respects.**	SFT	25		
6	**Supply and installation of Air devices for complete AC system as per specification & drawing with all accessories & fitting and complete in all respects including GST as approved by consultant and engineer incharge.**				
	a) Code A : Four Way Ceiling Supply Air Diffuser Square / Rectangular Face	SFT	35		
	b) Code B : Four Way Ceiling Return Air Diffuser Square / Rectangular Face	SFT	30		
	c) Code C: 1 inch - 2 Slot Return Air Linear Diffuser	SFT	6		
	d) Code D: Return Air Rectangular Grille Double Deflection Adjustable Bars	SFT	20		
7	**Supply and Installation of Hanger and Supports with all accessories except item # 2 (Complete in all respect).**	LOT	1		
8	**Testing, Commissioning and Air Balancing of the HVAC System**	LOT	1		

TOTAL = Rs

IN WORDS : RUPEES _____

LEGENDS

sft Square Feet

EXIM BANK OFFICE, KARACHI

LIST OF APPROVED MANUFACTURERS FOR ITEMS/MATERIALS/EQUIPMENT FOR HVAC WORKS

The Bidder should note that only Equipment/materials from the following approved manufacturers or approved equivalent shall be allowed to be used on this Project provided their products meet the specified requirements. All equipment shall be supplied from Manufacturer's own Plant/Facility.

S. No.	Equipment/ Material	Recommended Manufacturer/ Supplier or approved Equivalent	Country (origin, manufacturing, assembly, testing & supply)
1	DX-Type Split Air Conditioning Units	TOSHIBA DAIKIN HITACHI SAMSUNG LG GREE MIDEA YORK PEARL MITSUBISH OGENERAL	MALAYSIA/KOREA/CHINA/TURKEY/THAILAND/JAPAN
2	Cooper Pipe	MULLER WEDNESBURY CRANE GOLDEN DRAGON	USA/EUROPE/KOREA/CHINA
3	Duct/pipe insulation, Sound Liner	KIMMCO AFICO IZTOPRAK, IZOCAM, ODE OWENS CORNING, KNAUF, ARMAFLEX, DURKFLEX, AEROFOAM	KUWAIT / SAUDI ARABIA/ TURKEY / EUROPE / USA
4	G.I. Sheets	PAK STEEL MILLS KARACHI. ILL, imported make available locally, approved by Engineer.	PAKISTAN / SOUTH AFRICA/NEW ZEALAND
5	Air Inlets/Outlets	MEHRAN, THERMEC, AIR CONTROL STEELCRAFT, SA INDUSTRIES, AEROTECH,PAK PRIEMER, EAP	PAKISTAN
6	Paint	ICI, MASTER PAINTS, BERGER	PAKISTAN
7	Fasteners, Hanging Rods, Rawal Plugs, Supports etc.	FISHER, HILTI, SPIT, SIKLA MUNGO, NORM, INDEX, INKA, DIAMOND WALRAVEN	AS PER MANUFACTURER'S FACILITY
8	White Glue	FOSTER	USA/EUROPE
9	Duct Sealant	DOW CORNING ZAHBIA	USA/TURKEY

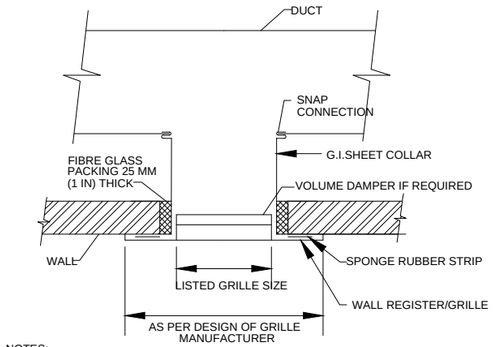
S. No.	Equipment/ Material	Recommended Manufacturer/ Supplier or approved Equivalent	Country (origin, manufacturing, assembly, testing & supply)
10	Low Voltage Panel,SA Electric Concern, Siemens, Elmetec, PEL,	SA ELECTRIC CONCERN, SIEMENS, ELMETEC, PEL, BILAL SWITCHGEAR MESI, CEECO, JEI, ELECTRECH QUALITY SWITCHGEAR, MTECH	PAKISTAN
11	LV and Control Cables and Wires (600/1000V)	PAKISTAN CABLES PIONEER CABLES NEWAGE CABLES FAST CABLES	PAKISTAN
12	PVC Conduit and Accessories	BETA POPULAR GALCO	PAKISTAN
13	Steel Conduit, Cable Trays and Accessories	HILALL INDUSTRIES, IIL, JAMAL, PIONEER, NIB ASHRAF INDUSTRIES	PAKISTAN
14	MCCBs, MCB and Magnetic Contactors	SCHNEIDER, SIEMENS ABB, LEGRAND, TERASAKI PANASONIC GREEN POWER TELEMECANIQUE	FRANCE/GERMANY/ ITALY/JAPAN
15	ACBs, ELCBs	ABB, SIEMENS, SCHNEIDER. TERASAKI, LEGRAND	FRANCE/ITALY/JAPAN
16	Relays and Timers	FINDER INTER	ITALY/TURKEY
17	PFI Relays	NOKIAN ENTES	FINLAND/TURKEY
18	Voltmeters/Ammeters	CIRCULOR REVALCO INTER ENTES	ITALY/TURKEY
19	Current Transformer/ Voltage Transformer	CIRCULOR REVALCO FICO	ITALY/PAKISTAN
20	Selector Switches/ Push Button	LEGRAND KRAUS & NAIMER ABB, BOSCH, CLIPSAL REVALCO	SWEDEN/FRANCE/ ITALY
21	Indication Lamps	LEGRAND BRETER ABB TELEMECANIQUE	FRANCE/ITALY
22	Terminal Blocks	LEGRAND ABB PHOENIX CABOUR	FRANCE/ITALY/JAPAN
23	LV Change over Switch Capacitors	SOCOMEC, ABB, AMBER, NOKIAN, DUCATI	FRANCE/GERMANY/ JAPAN/PAKISTAN
24	Isolators Switches	BRETTER SIEMENS	ITALY GERMANY

LIST OF DRAWINGS

SR. NO.	DRAWING NO.	TITLE
	HEATING, VENTILATION AND AIR CONDITIONING (HVAC) WORKS	
01	41156/04/TD/K01	HVAC - LIST OF DRAWINGS, GENERAL NOTES, ABBREVIATIONS, LEGENDS & STANDARD DETAILS
02	41156/04/TD/K02	HVAC - LAYOUT PLAN

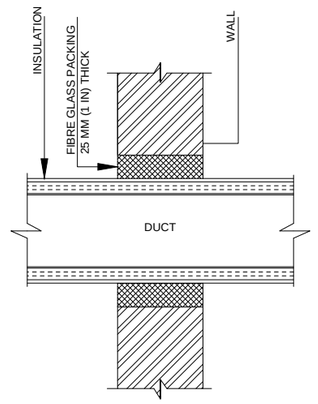
SYMBOL DESCRIPTION

- 14x6 — AIR DUCT FIGURE IS DIMENSION OF SIDE SHOWN
- SUPPLY DIFFUSER 12x12
- RETRUN DIFFUSER 12X12
- SAC - SPLIT AIR CONDITIONER
- CU - CONDENSING UNIT
- VOLUME DAMPER (VD)
- CIRCUIT BREAKER (3 PHASE)
- CIRCUIT BREAKER (1 PHASE)
- BUS BAR
- 12x12 / - (A) — SUPPLY AIR DIFFUSER,12x12 INCH CORE SIZE CODE "A" AS LISTED IN SCHEDULE OF PRICES
- 12x12 / - (B) — RETURN AIR DIFFUSER,12x12 INCH CORE SIZE CODE "B" AS LISTED IN SCHEDULE OF PRICES
- 6x48 (2 Slot x1") / - (C) — 1 INCH - 2 SLOT LINEAR SUPPLY DIFFUSER, 6X48 INCH CODE C AS LISTED IN SCHEDULE OF PRICES.
- 60x36 / - (D) — RETURN AIR GRILLE, 60x36 INCH CORE SIZE CODE "D" AS LISTED IN SCHEDULE OF PRICES

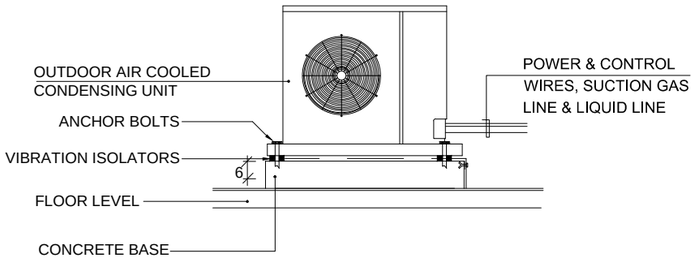


NOTES:
1. REGISTER SHOULD NOT BE SCREWED TO OR SUPPORTED FROM CEILING FRAME OR PANELS.
2. DETAIL SHOWN IS ONLY INDICATIVE, ACTUAL DETAIL TO BE PROVIDED BY CONTRACTOR AFTER COORDINATING WITH FALSE CEILING DETAILS.

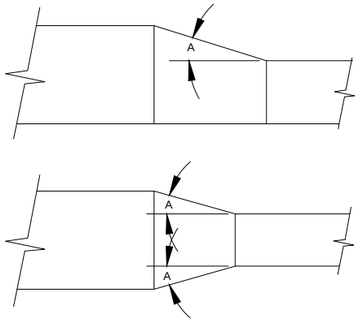
WALL REGISTER/GRILLE INSTALLATION

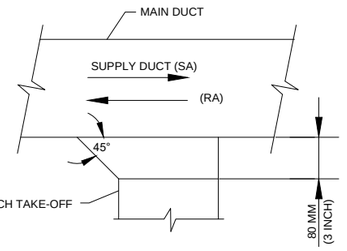


DUCT THROUGH WALL SUPPLY AND RETURN



TYPICAL INSTALLATION METHOD OF CONDENSING / OUTDOOR UNIT

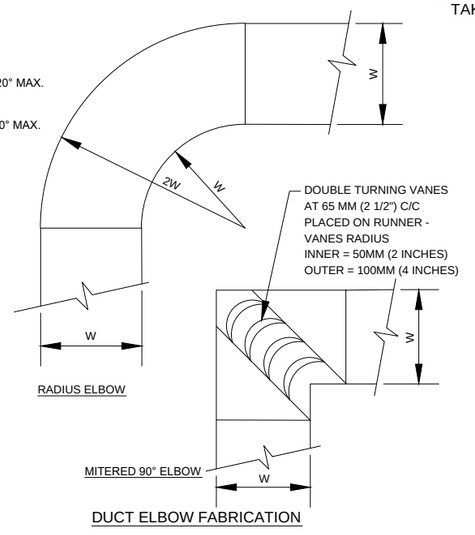




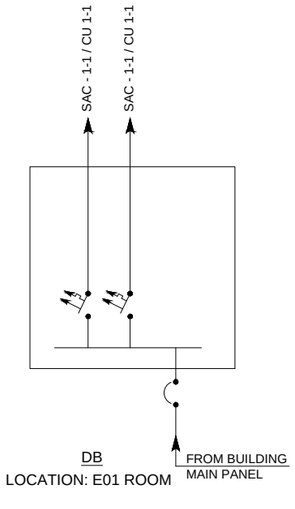
BRANCH DUCT TAKE-OFF

TAPER ANGLE A:
1. FOR ENLARGING AREA = 20° MAX. (RETURN DUCTS)
2. FOR REDUCING AREA = 30° MAX. (SUPPLY DUCTS)

DUCT TRANSITION FABRICATION



DUCT ELBOW FABRICATION



NOTES

1. ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE INDICATED.
2. THESE DRAWINGS ARE ONLY FOR BIDDING PURPOSE. CONTRACTOR WILL PREPARE SHOP DRAWINGS SHOWING THE EXISTING DUCT AND NEW DUCT CONNECTIONS WITH DIFFUSERS AT NEW PROPOSED LOCATIONS AS MARKED ON DRAWINGS. THE SHOP DRAWINGS SHALL BE PREPARED AFTER COORDINATION OF ALL SERVICES AND SUBMIT FOR APPROVAL BEFORE INSTALLATION.
3. THE AIR FLOW AT EACH DIFFUSER SHALL BE BALANCED AS PER ACTUAL AVAILABLE AT SITE DURING TESTING AND COMMISSIONING.
4. READ THIS DRAWING IN CONJUNCTION WITH ALL RELEVANT PROJECT DRAWINGS.
5. FOR ELEVATIONS AND SECTION OF THE BUILDING REFER TO RELEVANT ARCHITECTURE DRAWINGS.
6. AIR INLETS/OUTLETS SHOULD BE INSTALLED AFTER CO-ORDINATION WITH REFLECTED CEILING PLAN AND ELECTRICAL PLAN.
7. DUCTS PASSING THRU BUILDING EXPANSION JOINTS SHALL HAVE FLEXIBLE PIPE CONNECTORS & FLEXIBLE DUCT CONNECTIONS RESPECTIVELY.
8. EXACT ROUTE AND LOCATION OF EACH DUCT SHALL BE DETERMINED IN COORDINATION WITH OTHER SPECIALITIES PRIOR TO INSTALLATION.
9. ACCESS PANEL SHALL BE PROVIDED BY OTHERS IN FALSE CEILING AT ALL DAMPERS LOCATIONS - HVAC CONTRACTOR TO GIVE SIZES LOCATIONS.

CLIENT
EXIM BANK OF PAKISTAN

CONSULTANT
NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD.
ARCHITECTURE & PLANNING DIVISION KARACHI.
4th Floor, N.I.C. Building, Abbasi Shaheed Road, Karachi, Tel: 99225430–34

REV.	DATE	DESCRIPTION	APPROVED
04			
03			
02			
01			

DRAWN: WAQAR KAZMI
SUBMITTED:
RECOMMENDED:
CHD./VER.:
APPROVED:

PROJECT: OFFICE FOR EXIM BANK AT KARACHI

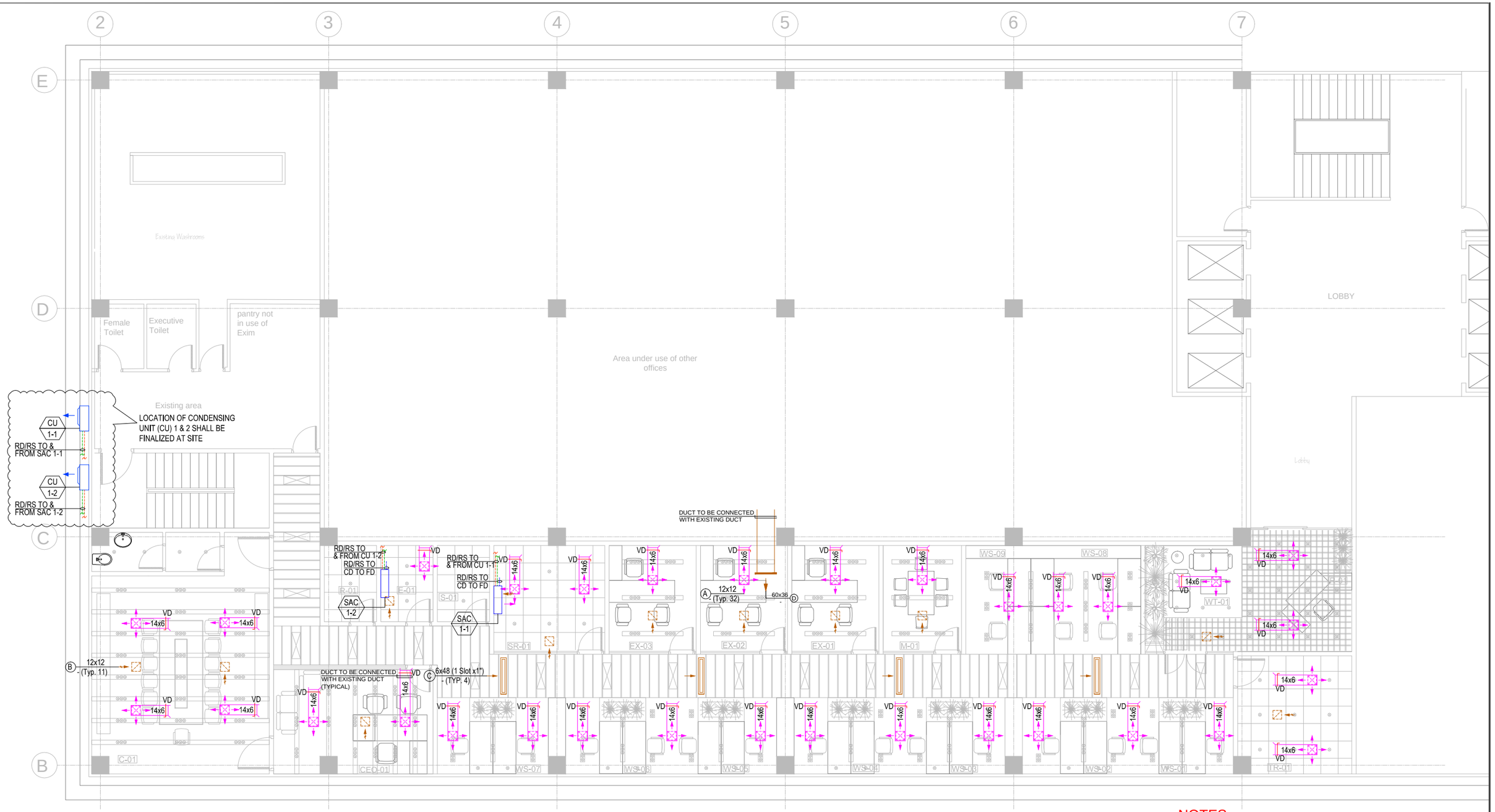
TITLE: HVAC - LIST OF DRAWINGS, GENERAL NOTES, ABBREVIATIONS, LEGENDS & STANDARD DETAILS

SCALE: N.T.S

DATE: FEBRUARY, 2023

DRAWING No.: 41156/04/TD/ K01

REV.: 0



1/02 LAYOUT PLAN

1/8"=1'-0"

NOTES

1. ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE INDICATED.
2. FOR LEGEND AND GENERAL NOTES REFER DRAWING NO. 41156/04/TD/K01
3. THESE DRAWINGS ARE ONLY FOR BIDDING PURPOSE. CONTRACTOR WILL PREPARE SHOP DRAWINGS SHOWING THE EXISTING DUCT AND NEW DUCT CONNECTIONS WITH DIFFUSERS AT NEW PROPOSED LOCATIONS AS MARKED ON DRAWINGS. THE SHOP DRAWINGS SHALL BE PREPARED AFTER COORDINATION OF ALL SERVICES AND SUBMIT FOR APPROVAL BEFORE INSTALLATION.
4. THE AIR FLOW AT EACH DIFFUSER SHALL BE BALANCED AS PER ACTUAL AVAILABLE AT SITE DURING TESTING AND COMMISSIONING.

CLIENT
EXIM BANK OF PAKISTAN

CONSULTANT
NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD.
ARCHITECTURE & PLANNING DIVISION KARACHI.
4th Floor, N.I.C. Building, Abbasi Shaheed Road, Karachi, Tel: 99225430–34

REV.	DATE	DESCRIPTION	APPROVED
04			
03			
02			
01			

DRAWN	WAQAR KAZMI
SUBMITTED	
RECOMMENDED	
CHD./VER.	
APPROVED	

PROJECT
OFFICE FOR EXIM BANK AT KARACHI

TITLE
HVAC WORKS LAYOUT PLAN

SCALE
1/8"=1'–0"

DATE
FEBRUARY, 2023

DRAWING No.
41156/04/TD/ K02

REV.
0