PAKISTAN AIRPORTS AUTHORITY
JINNAH INTERNATIONAL AIRPORT
(HVAC SECTION)

TECHNICAL PROPOSAL

IMPROVEMENT/REHABILITATION OF HVAC INFRASTRUCTURE AT JIAP - KARACHI

UPGRADATION OF LOW VOLTAGE MOTOR CONTROL CENTERS FOR CHILLER PLANT INSTALLED AT UTILITY BUILDING JIAP - KARACHI

CONTRACT DOCUMENT

PAKISTAN AIRPORTS AUTHORITY

NAME OF SCHEME: **IMPROVEMENT/ REHABILITATION OF HVAC INFRASTRUCTURE AT JIAP**

SUB HEAD: **UPGRADATION OF LOW VOLTAGE MOTOR CONTROL CENTERS FOR CHILLER PLANT INSTALLED AT UTILITY BUILDING JIAP - KARACHI**

A. MEMORANDUM OF RUNNING BILLS

S.No.	Amount	Dated Initials of Account Personnel

B. MEMORANDUM OF EXTENSION OF TIME

S.No.	From	To	Dated Initials of Personnel

1.	Date and time of Receipt of Bid(s)	As per provision of EPADS
2.	Date and time of opening of Bid(s)	As per provision of EPADS
3.	Submission of Bids	Online through EPADS & Office of Sr. Joint Director (HVAC), Room # 3076, Level-III, East Side, JIAP Karachi

Sr. Joint Director (HVAC)]
JIAP – Karachi

GENERAL INSTRUCTIONS

1) Bids shall be submitted electronically on PPRA EPADS portal.

2) Bidders are advised in their own interest to review the contents of Bidding Documents thoroughly and perform due diligence at their own cost prior to participating in the bidding process.

3) The Bid Security shall be in the form as prescribed in the Invitation to Bids.

4) Original instrument of Bid Security must be submitted at the time of Bid Opening in sealed envelope well before the closing date and time mentioned in Invitation to Bids and its scanned copy must be attached with the electronic bid to be submitted online on EPADS.

5) Should a Bidder fail to submit original instrument of Bid Security in sealed envelope before the closing date and time of Bid Opening or does not attach its scanned copy with the electronic bid, their bid shall be rejected outrightly.

6) All Bidders are requested to submit the bidding documents, without making any changes to the original text, complete with drawings, specifications etc. containing the signatures of the Bidder's representative on each and every page of the documents.

7) The Bidders are advised to submit physical (hard form) bid in original on the date and time mentioned in the invitation to bids to assist in evaluation, however that is not mandatory. In case of any discrepancies between the bid submitted physically and on EPADS, the latter shall prevail.

DECLARATION

It is hereby solemnly affirmed and declared that I / we are not serving employees of any Government organization including PAA, and that it is further assured that if I / we had been previously engaged with PAA as an employee, then that service or employment had ceased to be in effect two years prior to the date of advertisement for this Work.

It is hereby further solemnly affirmed and declared that no serving or retired employee who has not completed two years after retirement from PAA is employed at our Contracting business.

It is hereby further undertaken and guaranteed that no serving or retired employee who has not completed two years after retirement from PAA shall be permitted to have any financial interest in the said Contracting business during the currency of this Contract with PAA.

It is clearly understood and agreed that in the event of a breach of the above undertaking during the currency of this Contract, the said Contract shall be liable to immediate cancellation in which case the security deposits and all other monies due or which may become due to PAA shall stand forfeited and be absolutely at the disposal of the PAA.

[Contractor's Signatures with Seal]

INVITATION TO BIDS

Date: _____

1. Pakistan Airports Authority invites bids from eligible Constructors licensed by the Pakistan Engineering Council in the appropriate category for the Works named on the cover page.

2. The bidding process shall be conducted in line with the single stage two envelopes procedure prescribed under Public Procurement Rules 2004, e-Pak Procurement Regulations, 2023 and any Regulations, Regulatory Guides, Procurement Guidelines or Instructions issued by the PPRA (from time to time), and is open to all potential eligible bidders registered in the EPADS.

3. All bids must be accompanied by Bid Security (amounting to PKR 1,000,000/-) in an acceptable form.

4. The electronic bids prepared in accordance with the instructions prescribed in the electronic bidding documents must be submitted through EPADS on or before the bid closing date and time. Electronic bids will be opened by using EPADS on the same day 30 minutes after bid closing time.

5. The bidders are required to attach and submit following documents electronically.
   a) Scanned copy of CNIC, and attested copy to be submitted physically.
   b) Scanned original valid PEC License, and attested copy to be submitted physically (financial category C-5 (or above) and specialization code is EE-04.
   c) Attested copy of valid NTN Certificate
   d) Affidavit for no blacklisting and litigation.

[Sr. Joint Director (HVAC)]
JIAP – Karachi

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INSTRUCTIONS TO BIDDERS

1. The invitation to bids shall contain the name of work to be carried out as well as the date for submitting and opening the bids and the time allowed for carrying out the work; also the amount of *bid security* to be deposited with the bid. Copies of the specifications, designs and drawings and any other documents required in connection with the work signed for the purpose of identification by Pakistan Airports Authority (PAA) shall also be open for inspection by the Contractor at the office of the Additional Director / Project Manager / Divisional Engineer during office hours.

2. Where a bid is being submitted by a firm, it must be signed separately by each partner thereof, or in the event of the absence of any Partner, it must be signed on his behalf by a person holding a power of attorney authorizing him to do so, such power-of-attorney to be produced with the bid and a Photostat of the Partnership Deed should accompany the bid.

3. Where a firm of Contractors is an incorporated company registered under the Companies Act, the Contractors shall furnish the following documents:

a) Memorandum and Articles of Association together with a copy of certificate of incorporation.

b) In case the Contract is to be signed by one of the Directors of the Contractor's Company, a certified copy of the resolution of the Board of Directors or a Photocopy of the General Power of Attorney executed by the Company authorizing such Directors to enter into and sign the Contract with PAA.

4. The memorandum of work and the schedule of materials to be supplied by the PAA and their issue rates, shall be filled, and completed in the office of Divisional Engineer before the bidding document is uploaded on EPADS.

5. The bidder shall also produce a certificate of registration with the Income Tax Authority, and proof of being Active Taxpayer and attach it with the bid.

6. Bidders may request clarification of the Bidding Documents by sending a written query to the PAA through EPADS. The PAA may, if deemed appropriate, respond to the request at least two days before the bid submission deadline.

7. PAA may, at its discretion convene a pre-bid meeting to provide clarifications on the Bidding Documents. If held, the date, time, and venue of the meeting shall be specified on the EPADS. Bidders are encouraged to submit any queries in writing no later than seven (7) days prior to the scheduled meeting. The minutes of the meeting, including all questions raised and responses provided, shall be promptly circulated to all recipients of the Bidding Documents.

8. Bidders are advised to visit and inspect the Site and its surroundings at their own risk and cost, and to conduct all necessary due diligence to obtain sufficient information for the preparation of their bids and execution of the Contract. PAA shall permit such visits, subject to prior coordination; however, bidders and their representatives shall enter the site entirely at their own risk and shall indemnify and hold harmless the PAA, its personnel, and agents from any liability, loss, damage, injury, or expense arising from or related to such visits.

9. PAA may amend the Bidding Documents at any time before the bid submission deadline, either on their own or in response to a bidder's request for clarification, by issuing a written addendum. Each addendum will become part of the Bidding Documents and will be shared with all purchasers, who must acknowledge receipt in writing. If needed, PAA may extend the bid submission deadline to allow bidders sufficient time to consider the changes.

10. Bidders who propose any alteration in the work specified in the said form of an invitation to bid, or in the time allowed for carrying out the work, or which contain any other condition of any sort,

will be liable to rejection. No single bid shall include more than one work, but Contractors who wish to bid for two or more works shall submit a separate bid for each work.

11. No alterations or additions shall be made by the Contractor in the schedule of quantities and rates must be filled in ink (blue or black) or typed out both in figures and words clearly and legibly in the columns provided in the schedule of Quantities. All corrections must be signed by the Contractors.

12. Bidders shall not be reimbursed any cost of any kind whatsoever incurred by them in connection with preparation and submission of their Bids.

13. Arithmetical errors in the bid will be rectified on the following basis:

a) If there is a discrepancy between the amounts in figures and in words, the amount in words will govern; and if there is a discrepancy between the unit rate and the line item total resulting from multiplying the unit rate by the quantity, the unit rate as quoted will govern, unless in the opinion of the PAA there is an obviously gross misplacement of the decimal point in the unit rate, in which case the line item total as quoted will govern and the unit rate will be corrected.

b) If the bidder quotes different rates for the same items across sub-heads, or attaches page(s) containing items with varying rates for the same item(s), the lowest unit rate will be considered for evaluation.

c) If the bidder does not accept the corrected / evaluated amount of bid, their bid will be rejected, and bid security shall be forfeited.

14. Bids shall be accompanied by a Call Deposit Receipt, Pay Order, or a Banker's Cheque of the amount given in the Memorandum as Bid Security. The Bid Security shall be returned to the un-successful bidders, after the work has been awarded.

15. The quoted bid rates or amounts shall be inclusive of all taxes (but excluding provincial sales tax on services), duties, and cess, etc as applicable fourteen (14) days prior to the date of bid opening, and no claim on this account shall be entertained by PAA.

16. The completed Bid form shall be submitted in accordance with the instructions prescribed by PPRA for submitting electronic bids through EPADS on or before the closing date and time. Electronic bids will be opened by using EPADS on the same day 30 minutes after bid closing time.

17. Original bid submitted electronically shall also be submitted physically along with *Bid Security* in a Sealed Envelope and addressed and delivered in person or sent by Registered post / courier so that it reaches well in time before the opening date, as notified by the PAA. The sealed envelope shall have the name of work, as mentioned in invitation to bids, written on top of it. In case of any discrepancies between the bid submitted physically and on EPADS, the latter shall prevail. The instrument of Earnest Bid Security shall compulsorily be submitted in physical form on the opening date and time, whereas submission of the bid physically is recommended but not mandatory.

18. When a bid is accepted, a receipt for the *bid security* forwarded therewith shall thereupon be given to the Contractor. In the event of a bid being rejected the *bid security* forwarded with such unaccepted bid shall thereupon be returned to the Contractor.

19. The receipt given by an accountant or clerk for any money paid by the Contractor will not be considered as an acknowledgement of payment to the PAA and the Contractor shall be responsible for seeing that he procures a receipt signed by the Divisional Engineer or his authorized officer.

20. Bids will be opened and read in public on the date and time for the opening. Bids whose bid security is received after the time set for receipt shall be rejected. Bidders who submit their bid security, but their bids are not uploaded on EPADS or fail to show on EPADS will be considered and held as non-participants.

21. Additional Director / Project Manager / Divisional Engineer or his duly authorized representative shall open bids in the presence of intending Contractor who may be present at the time and will enter the amounts of all the bids in a Comparative Statement in a suitable form.

22. PAA reserves the rights to postpone the date or time of submission and opening of Bids. Should the date of opening the Bids be postponed, PAA shall give notice of such postponement.

23. The bid shall remain valid for a period of One Hundred & Twenty (120) days from the date of bid opening. In exceptional cases, before this period expires, PAA may request an extension—no longer than the original validity period. Bidders may refuse to extend the bid validity without losing their Bid Security. Those who agree must extend the Bid Security accordingly but cannot change their bids.

24. PAA is not bound to award the Contract to the lowest or to any Bidder and reserves the right to reject any or all Bids and to waive any formalities in the Bids received such as deviations in the use and presentation of the specified Bidding Documents and forms, if it appears to be in the interest of the PAA.

25. Bid shall be accepted by the competent officer of PAA. The acceptance of the Bid shall bind the Bidder to execute the Contract Agreement within the specified period failing which the Bidder shall forfeit his Bid Security not as penalty, but as liquidated damages.

26. For works costing more than Rs. 10 Million, the Contractor shall furnish to the PAA within fourteen (14) days after receipt of Letter of Acceptance, a Performance Security in the form of an irrevocable Bank Guarantee from the Banks approved by PAA (as per the list provided in Appendix-E to Bidding Documents) for an amount equaling to five percent (5%) of the total amount of bid at the time of signing the agreement. The irrevocable Performance Security shall have validity till thirty (30) days after the date of final completion of works. The bond for Performance Security shall be executed on non-judicial stamp paper of appropriate value.

27. For works costing more than Rs. 65 Million, the Contractor may be given a Mobilization Advance of up to 10% of the bid cost by PAA on production of an irrevocable bank guarantee of an equivalent amount from Banks approved by PAA (as per the list provided in Appendix-E to Bidding Documents). The same will be recovered at the rate of 10% of gross amount of the running bills of the Contractors.

28. Prior to engaging in the bidding process, the bidders should at their own cost, read and acquaint themselves with the PAA's procedure for blacklisting of contractors and suppliers available on PAA website: (*https://paawebadmin.paa.gov.pk/media/fdpcknji/caao-003-escw.pdf*)

Attachment:

(i) Technical Specifications (Annexure-A)
(ii) Technical Drawings (Annexure-B)
(iii) Technical Evaluation Criteria (Annexure-C)
(iv) HSE Manual for Contractor, Suppliers & Concessionaries (Annexure-D)

MEMORANDUM

a)	**Name of Work**	**UPGRADATION OF LOW VOLTAGE MOTOR CONTROL CENTERS FOR CHILLER PLANT INSTALLED AT UTILITY BUILDING JIAP - KARACHI**
b)	**General Description of Works**	
c)	**Bid shall be enclosed with (Bid Security)**	Call Deposit Receipt, Pay Order, or a Banker's Cheque from a scheduled Bank in Pakistan, of an amount mentioned in the invitation to bids.
d)	**Security Deposit (including Bid Security)**	Five per cent (5%) of the Contract Price.
e)	**Deduction of Income Tax**	As per Income Tax Ordinance 2001 amended from time to time.
f)	**Time allowed for the work**	**180 Days** (from the date of written order to commence)
g)	**Bill of Quantities**	As per attached schedule.

LETTER OF OFFER FOR EXECUTION OF WORKS

I / We hereby submit our offer (bid) for the execution of the work specified in the above written memorandum within the time specified in each memorandum at the rates specified therein, and in accordance with the specifications, designs, drawings and instructions and with such materials as are provided for by and in all other respects in accordance with such conditions so far as applicable.

2. I / We understand that all the Schedules and Annexes attached hereto form part of this Bid.

4. I / We agree to abide by this bid for the period of one-hundred twenty (120) days from the date fixed for receiving the same and it shall remain binding upon us and may be accepted at any time before the expiration of that period.

3. Should this bid be accepted, I / We hereby agree to abide by and fulfil all the terms and provisions of the said conditions of contract annexed hereto so far as applicable or on default thereof to forfeit and pay to the Pakistan Airports Authority (PAA) the sum of money mentioned in the said conditions.

5. Unless and until a formal Agreement is prepared and executed, this bid, together with your written acceptance thereof, shall constitute a binding contract between us.

6. I / We undertake, if our bid is accepted, to execute the Performance Security referred to in Conditions of Contract for the due performance of the Contract.

7. I / We understand that you are not bound to accept the lowest evaluated or any bid you may receive.

8. I / We do hereby declare that the Bid is made without any collusion, comparison of figures or arrangement with any other person or persons submitted a bid for the Works.

9. As security for due performance of the undertakings and obligations of this Bid, we submit herewith a *Bid Security* in the amount of _____ drawn in your favour or made payable to you and valid for a period of twenty-eight (28) days beyond the period of validity of bid.

Dated the _____ day of _____ 20_____

Witness **[Signature of Contractor]**

Address

The above bid is hereby accepted by me on behalf of PAA.

Dated the _____ day of _____ 20_____

[Signature of Officer by whom accepted]

(On appropriate valued non-judicial stamp papers)

FORM OF AGREEMENT

THIS CONTRACT AGREEMENT (hereinafter called the "Agreement") made on the _____ day of _____ 20_____ between **PAKISTAN AIRPORTS AUTHORITY,** established under the Pakistan Airports Authority Act, 2023, having its Head Office at Terminal-I, JIAP, Karachi, through its duly authorized officer (hereinafter called the "PAA") of the one part;

AND

M/s._____ registered with Pakistan Engineering Council as a licensed Constructor / Operator, having its office at _____ "through its duly authorized person namely _____ (designation) (hereinafter called the "Contractor") (which term shall include its successors-in-interest, authorized representatives and executors) of the other part.

WHEREAS the PAA is desirous that certain Works, *viz*

_____

should be executed by the Contractor and has accepted a Bid by the Contractor for the execution and completion of such Works and the remedying of any defects therein.

NOW this Agreement witnesseth as follows:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the General Conditions of Contract hereinafter referred to.

2. The following documents after incorporating addenda, if any, shall be deemed to form and be read and construed as part of this Agreement, viz:

(a) The Letter of Acceptance;
(b) The completed Letter of Offer for Execution of Works;
(c) The General Conditions of Contract;
(d) The Special Conditions of Contract (if attached).
(e) The Bill of Quantities;
(f) The Specifications; and
(g) The Drawings

3. In consideration of the payments to be made by the PAA to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the PAA to execute and complete the Works and remedy defects therein in conformity and in all respects within the provisions of the Contract.

4. The PAA hereby covenants to pay the Contractor, in consideration of the execution and completion of the Works as per provisions of the Contract, the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

IN WITNESS WHEREOF the parties hereto have caused this Contract Agreement to be executed on the day**,** month, and year first before written in accordance with their respective laws.

_____ _____

(For and on behalf of Contractor) (For and on behalf of PAA)
CNIC No. _____

Signed, Sealed and Delivered in the presence of:

Witness (1): Witness (2):

_____ _____

(Name, CNIC No. and Address) (Name, CNIC No. and Address)

TECHNICAL BID

IMPROVEMENT/ REHABILITATION OF HVAC INFRASTRUCTURE AT JIAP

UPGRADATION OF LOW VOLTAGE MOTOR CONTROL CENTERS FOR CHILLER PLANT INSTALLED AT UTILITY BUILDING JIAP - KARACHI

BILL OF QUANTITY / SCHEDULE OF PRICE

S. No.	Description	Unit	Qty	Rate Per Unit		Amount (PKR)
				In Figures	In words	
01	Careful dismantling of existing MCC enclosure section and DCP panel by isolating its individual feeders, remove plug-in units, control wirings circuit breaker and contactors, dis-connect incoming and outgoing cables after that remove enclosure by lifting equipment and transport to designated area as per standard practice and instruction of incharge complete in all respect.	P/Job	01	Quoted	Quoted	Quoted
02	Provisioning of Enclosure or starter panel H1900xW3500xD700 mm min. IP-56 or NEMA 4X with 2mm galvanized sheet & powder coated paint (RAL-1015) or approved panel, separate hot air exhaust chamber with ducting inside the panel and bus bars (3x400V+N Icc=30KA) and control wiring, tagging, as built drawing, as standard practice, meeting minimum required technical specifications/ capacities given in attached as-built drawing and instruction of incharge. Provisioning of control and monitoring devices in panel such as Thermostat 01 no. Heater for panel 05 nos. Exhaust Fan 6" 05 nos. Filter for exhaust fan 6" 10 nos. Earth leakage relay Z-CT 257Amps 06 Nos. Electrical wire 185mm 4-core 08 meter Electrical wire 50mm 4-core 08 meter Electrical wire 96mm 4-core 04 meter Electrical wire 6mm 4-core 04 meter Electrical wire 4mm 4-core 10 meter Cable joint 185mm 04 nos. Cable joint 50mm 04 nos. Cable joint 96mm 02 nos. Cable joint 6mm 02 nos. Cable joint 4mm 03 nos. Cable Tie Pack Lugs 185mm 4-core 20 nos. Lugs 50mm 4-core 20 nos. Lugs 96mm 4-core 10 nos. Lugs 6mm 4-core 12 nos. Lugs 4mm 4-core 20 nos. Heat sleeve lot including tagging.	P/Job	02	Quoted	Quoted	Quoted

S. No.	Description	Unit	Qty	Rate Per Unit		Amount (PKR)
				In Figures	In words	
03	Installation and SITE services with testing and commissioning of complete system as per standard practice complete in all respect as per instruction of Engineer In charge					
3.1	Provisioning of MCC Main incoming enclosure with following components and specs Digital ACBTP 1250A Qty-01 no. setting 500-1250A,690/1000VA,min 50°C Draw-out type Current transformer 1200/5A qty-03 no Energy analyzer Qty-01 no Indication lights LED 220v(RYB) Qty-03 nos. Current transformer 1200/5A Qty 03 nos. MCB SP 2/6A 6KA Qty.03 nos. adjustable All devices are make by ABB, Schneider, ETON, or equivalent. Installed as per standard practice complete in all respect as per instruction of incharge.	P/Job	02	Quoted	Quoted	Quoted
3.2	Provisioning of 108 KW 400 Amps 50KA soft starter for condenser water pumps. Soft starter with following specs. MCCBTP 400A 50KA with auxiliary contacts NO and NC Qty-02 nos. Soft Starter for 108KW Qty-02 nos. Man/Auto Switch 20A Qty-02 nos. Relay Round 8 pin 10A Qty-04 nos. Base for relay Qty 04-nos. Magnetic Contactor 18A, 24V Qty 02 nos. push button ON and OFF Qty 04 nos. Indication light LED 220V(R.Y.G) Qty 06 nos. MCB SP 2/6A 6KA Qty 02 nos. All devices are make by ABB, Schneider, ETON, or equivalent. installed as per standard practice complete in all respect as per instruction of Incharge	P/Job	02	Quoted	Quoted	Quoted
3.3	Provisioning of soft starter for primary chilled water pumps 46 KW. MCCB TP 200A 36KA with Auxiliary contacts NO and NC Qty 01 no. Soft starter for 46 KW Qty 02 nos. Main-off-Auto switch 20A Qty 02 nos. relay round 8 Pin 10A Qty 04 nos. Base for 8 pin relay Qty 04 nos. Magnetic contactor 18A, 24V Qty 02 nos. push button ON and OFF Qty 04 nos. Indication light LED 220V(R.Y.G) Qty 06 nos. MCB SP 2/6A 6KA Qty 02 nos. All devices are make by ABB, Schneider, ETON, or equivalent. installed as per standard practice complete in all respect, as per instruction of Incharge	P/Job	02	Quoted	Quoted	Quoted

S. No.	Description	Unit	Qty	Rate Per Unit		Amount (PKR)
				In Figures	In words	
3.4	Provisioning of VFD for cooling tower fans 70/19 KW. MCCB TP 150A 36KA with Auxiliary contacts NO and NC Qty 02 nos. VFD Qty 02 nos. Main-off-Auto switch 20A Qty 02 nos. relay round 8 Pin 10A Qty 04 nos. Base for 8 pin relay Qty 04 nos. Magnetic contactor 18A, 24V Qty 02 nos. push button ON and OFF Qty 04 nos. Indication light LED 220V(R.Y.G) Qty 06 nos. MCB SP 2/6A 6KA Qty 02 nos. All devices are make by ABB, Schneider, ETON, or equivalent. installed as per standard practice complete in all respect as per instruction of Incharge	P/Job	02	Quoted	Quoted	Quoted
3.5	Provisioning of chiller auxiliary 8.5 KW starter MCCB TP 30A 30KA with Auxiliary contacts NO and NC Qty 02 nos. Main-off-Auto switch 20A Qty 02 nos. relay round 8 Pin 10A Qty 04 nos. Base for 8 pin relay Qty 04 nos. Magnetic contactor 18A, 24V Qty 02 nos. Indication light LED 220V(R.Y.G) Qty 06 nos. MCB SP 2/6A 6KA Qty 02 nos. All devices are make by ABB, Schneider, ETON, or equivalent. installed as per standard practice, complete in all respect as per instruction of Incharge	P/Job	02	Quoted	Quoted	Quoted
3.6	Provisioning of AHU Motor auxiliary 7.5KW starter MCB TP 32A 10KA with Auxiliary contacts NO and NC Qty 01 no. Magnetic Contactor 18A 2NC & 2NO Qty 01 no. EOCR 0 TO 60A Qty 01 no. relay round 8 Pin 10A Qty 02 nos. Base for 8 pin relay Qty 02 nos. Magnetic contactor 18A, 24V Qty 01 no. Indication light LED 220V(R.Y.G) Qty 03 nos. MCB SP 2/6A 6KA Qty 01 no. Push button ON and OFF Qty 02 nos. All devices are make by ABB, Schneider, ETON, or equivalent. installed as per standard practice, complete in all respect as per instruction of Incharge	P/Job	01	Quoted	Quoted	Quoted
3.7	Provisioning of chilled makeup water pump Motor 4 KW starter MCB TP 16A 10KA with Auxiliary contacts NO and NC Qty 01 no. Magnetic Contactor 12A 2NC & 2NO Qty 01 no. EOCR 0 To 60A Qty 01 no. relay round 8 Pin 10A Qty 02 nos. Base for 8 pin relay Qty 02 nos.	P/Job	01	Quoted	Quoted	Quoted

S. No.	Description	Unit	Qty	Rate Per Unit		Amount (PKR)
				In Figures	In words	
	Indication light LED 220V(R.Y.G) Qty 03 nos. MCB SP 2/6A 6KA Qty 01 no. Push Button ON and OFF Qty 02 nos. All devices are make by ABB, Schneider, ETON, or equivalent. installed as per standard practice complete in all respect as per instruction of Incharge					
3.8	Provisioning of secondary chilled water pump Motor 0.76 KW starter MCB TP 16A 10KA with Auxiliary contacts NO and NC Qty 01 no. Magnetic Contactor 12A 2NC & 2NO Qty 01 no. EOCR 0 To 60A Qty 01 no. relay round 8 Pin 10A Qty 02 nos. Base for 8 pin relay Qty 02 nos. Indication light LED 220V(R.Y.G) Qty 03 nos. MCB SP 2/6A 6KA Qty 01 no. Push Button ON and OFF Qty 02 nos. All devices are make by ABB, Schneider, ETON, or equivalent. installed as per standard practice complete in all respect as per instruction of Incharge	P/Job	01	Quoted	Quoted	Quoted
					Total Amount PKR	**XXXXXXXX**

Total Amount in words :xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx.

Sr. Joint Director (HVAC) – JIAP
ES (E&M) JIAP – Karachi

Annexure – A

TECHNICAL SPECIFICATION:

Soft Starter
3 Phase Induction Motor
Control & Protection

LOW VOLTAGE

CONTENTS

Contents

Introduction

1.1 Scope

This document contains minimum requirements for the selection and supply of soft starters for the control and protection of 3 phase induction motors installed at Utility Building JIAP Karachi.

1.2 Guide

.Motor-Pump set details:

Pump Designation	**CWP - 01 - 04**	Location	indoor
RPM	1500	Existing Motor Power	108 kW
Service	Cooling Tower (open cycle) water	Volts-Phase-Hz	400-3Ø-50
Type	Centrifugal, end suction	Flow Rate (m^3/Hr)	950
Head (meter)	25	Motor Insulation Class	F
Existing Starter Type	Star-Delta	Ambient Temperature	45 deg C

Pump Designation	**CHP - 01 - 04**	Location	indoor
RPM	1500	Existing Motor Power	46 kW
Service	Chilled Water	Volts-Phase-Hz	400-3Ø-50
Type	Centrifugal, end suction	Flow Rate (m^3/Hr)	615
Head (meter)	16.3	Motor Insulation Class	F
Existing Starter Type	Star-Delta	Ambient Temperature	45 deg C

Pump Designation	**Pump 4.1 & 4.2**	Location	indoor
RPM	1500	Existing Motor Power	0.75 kW
Service	Chilled Water	Volts-Phase-Hz	400-3Ø-50
Type	Centrifugal, end suction	Flow Rate (m^3/Hr)	11
Head (meter)	12	Insulation Class	F
Starter Type	Star	Ambient Temperature	45 deg C

The solid state reduced voltage starter shall control 3-phase induction motors at 400 nominal mains voltage, **50 Hz** and shall be rated to suit the FLC Amperage of motor and pumping application characteristics. Where possible motor and load curves will be provided and the supplier will use this data to justify selection. The starter shall provide soft starting and soft stopping of the motor as required.

SOFT STARTER SPECIFICATIONS

2.1 Supplier Qualifications

The soft starter shall have been manufactured by a single vendor.

The manufacturer shall be certified under ISO9000.

The manufacturer shall have produced solid state reduced voltage starters for a minimum of 20 years.

The manufacturer shall have authorized service facilities able to provide 24 hour support within **Karachi, Pakistan.**

2.2 Environmental Specifications

The soft starter shall be suitable for storage at temperatures from -2 ºC to +60 ºC.

The soft starter shall be suitable for use at temperatures from -2 ºC to 42 ºC without derating, and up to 60 ºC with derating.

The soft starter shall be suitable for operation at altitudes up to 100 m above sea level without derating.

The soft starter shall be suitable for use in environments with relative humidity between 5% and 95% (non-condensing).

The soft starter shall use printed circuit boards conformally coated with silicone or similar approved compound.

2.3 Physical Specifications

The soft starter enclosure shall have IP20 degree of protection, with covers for power terminals.

The soft starter control terminals shall be removable plug type for ease of field wiring.

The soft starter should be capable of being mounted without any additional clearances at the side of the product or cabinet.

All accessory options such as network communication cards shall be hot-swappable and able to be easily fitted in the field.

All accessory options such as network communication cards shall not increase the overall physical dimensions of the soft starter.

2.4 General Electrical Specifications

The soft starter shall be a three-phase controlling type using reverse parallel SCR pairs in each phase of the power section. The SCRs shall have a minimum PIV rating of 1600 V.

The soft starter shall include at least two current transformers for deriving motor current to ensure accurate motor protection.

The nominal ratings information shall be shown on the nameplate label of the soft starter and shall be shown either in the AC53a or AC53b format.

The soft starter shall be correctly selected for the application and rated for a minimum of 5 starts per hour. The soft starter supplier shall provide written confirmation of the soft starter ratings in AC53a or AC53b format.

The soft starter shall be suitable for controlling motors on a wide range of 380 VAC to 450/50Hz VAC Mains network voltages..
The soft starter shall have suitable control power supply input.

2.5 Safety

The control input signals shall be current limited, 24 VDC (supplied by the soft starter internal power supply)

The soft starter shall provide means to safely test its correct installation:

- The soft starter shall provide a means to test the installation using a low power (kW) motor.
- The soft starter shall provide a means to test operation of all control circuitry and protection mechanisms, without connection to mains voltage. Functions to be tested include, at minimum:
- motor starting
- motor stopping

2.6 User Interface

The soft starter shall be supplied as standard with a built-in graphical user interface specifically designed for operation in conjunction with the soft starter.

The soft starter shall have the option to add a remote graphical user interface. The remote user interface must have a minimum environmental rating of IP65 when panel mounted and must be capable of being mounted flush on the panel door.

The onboard and optional remote display shall display all information in the English language.

The built-in and remote user interface shall comprise as minimum:

- Suitable sized & easily readable, backlit LCD screen for information feedback in English language and have the ability to display data captured by the soft starter in a graphical format.
- status LEDs indicating
- motor state
- starter control state
- trip status
- local pushbuttons to control:
- menu access
- parameter configuration

The remote user interface shall include the additional functions as minimum:

- local pushbuttons to control:
- motor start
- motor stop
- starter reset
- menu access
- parameter configuration
- parallel operation with built-in user interface
- hot-pluggable operation

The user interface shall provide a means for the operator to quickly access and configure parameters.

The user interface shall display the serial number and software version(s) used within the soft starter.

The user interface shall provide the operator with access to a short list of critical parameters for common applications, including:

- pump (centrifugal or submersible)
- fan (damped or undamped)

The soft starter shall permit the operator through the means of standard USB memory stick to:

- save the current configuration to an external file
- reload a previously saved configuration or default set from an external file
- save log contents and diagnostic data to an external file for further analysis
- update firmware
- add additional languages (maximum 11)

The soft starter shall support remote management via a control network with a choice of either:

- Modbus RTU
- Modbus TCP
- Ethernet/IP
- BACnet

The control network settings shall be configurable via the soft starter user interface.

The soft starter shall provide an on-board real-time clock. Failure of the real-time clock shall not prevent operation of the starter.

2.7 Operating Configurations

The soft starter shall provide the following starting methods:

- Current ramp starting
- Constant current starting
- Adaptive Acceleration Control – to allow the selection of acceleration profiles according to application type and able to self-tune to the motor characteristics.

The soft starter shall provide the following stopping methods

- Timed Voltage Ramp (TVR) soft stop
- Adaptive Acceleration Control – to allow the selection of deceleration profiles according to the application type and able to self tune to motor characteristics.
- DC braking function. The method of DC braking shall ensure the DC pulses are evenly distributed across all three phases of the power circuit. Methods using only two phase DC braking or that require an external DC braking contactor are not acceptable.
- Soft Brake function. Utilizing built-in changeover relay to control forward run and braking contactors with the ability to automatically stop when

motor speed approaches zero through interfacing with the zero speed sensor directly with the soft starter.

The soft starter shall provide a kickstart option for starting the motor. The kickstart option will allow a maximum current level and time to be set, uncontrolled voltage boost methods are not acceptable.
The soft starter shall include a slow speed or jog function that is able to operate both in forward and reverse direction.

The soft starter shall provide a calendar function means of automatically starting and stopping the motor at predetermined days of the week and time of day.

The soft starter shall include shorted SCR functionality, enabling the soft starter to re-start and control the motor even if the soft starter is damaged on one phase (shorted SCR).

The soft starter shall provide an emergency run feature to allow the soft starter to override any warning or trip conditions thus allowing the motor to run as long as possible in emergency situations.

The soft starter shall provide a programmable pump clean control cycle to assist with the removal of debris from pump impellor blades.

The soft starter shall provide the control logic to enable the direction of the motor (forward or reverse) to be selected as part of each start cycle.

2.8 Motor and System Protection Features

The soft starter shall provide the following protections as standard:

- Motor electronic thermal model
- Excess start time
- Motor overtemperature
- Motor thermistor circuit
- Current imbalance
- Frequency out of range
- Phase sequence
- Undercurrent
- Overcurrent
- Undervoltage
- Overvoltage
- Underpower
- Overpower
- Power loss
- Input A trip
- Input B trip
- Starter communications
- Network communications
- Bypass contactor failure (where internal bypass is used)
- L1, L2, L3 phase loss
- L1, L2, L3 shorted SCR
- Motor connection
- Heatsink overtemperature
- Battery / clock failure
- Remote Keypad Fault
- Current when stopped detection

The soft starter's sensitivity to protection situations shall be programmable.

The soft starter's response to a protection activation shall be selectable.

The soft starter's possible responses to a protection activation shall include, at minimum:

- Trip: cease operation immediately and disable the motor
- Shunt Trip + Trip: Activate the shunt trip relay and perform a Trip operation
- Soft trip: cease operation with controlled stop if possible and disable the motor
- Warning and log: notify the condition to the operator and continue operating • Log: write the event to memory without tripping

The soft starters fault diagnostics shall be displayed in clear language on the LCD display. The exclusive use of fault codes is not acceptable.

2.9 Programmable Outputs

The soft starter shall provide one dedicated output relay (for main contactor or shunt trip relay control) and two programmable output relays with user-selectable functionality, enabling indication of, at minimum:

- Ready (Soft starter is in ready state)
- Run (Start starter is in run state, motor is running at full speed)
- Warning
- Trip*
- Trip* + Shunt Relay Trip
- Trip Fail Safe
- Low current warning
- High current warning
- Motor temperature state
- Soft Brake Relay

* Trip states to include at least the following: Motor overload, Current imbalance, Undercurrent, Instantaneous overcurrent, Mains frequency, Programable Input A trip, Programmable Input B trip, Heatsink over-temperature, Phase loss, Motor thermistor

The soft starter shall provide programmable on and off delay times for each of the two programmable relay outputs.

The soft starter shall provide a programmable analog output (selectable as either 0-20mA or 4-20mA) with the following selectable functionality:

- Current
- Motor temperature
- Motor power factor (pf)
- Motor power (kW)
- Heatsink temperature

2.10 Programmable Control Inputs

The soft starter shall provide at least two programmable inputs with the following functionality:

- Motor parameter set selection

- Auxiliary trip (configurable for either N/O or N/C). The input name shall be customizable by the user.
- Jog Forward
- Jog Reverse
- Zero Speed Sensor
- Emergency Mode
- Motor Reverse Direct
- Pump Clean
- Command Override (Network, Digital Inputs, Keypad)

The soft starter shall provide for programmable trip delays for each auxiliary input and allow for assignable text to be displayed on the LCD display following an auxiliary trip.

The settings for each programmable input shall be fully independent of the other.

2.11 Metering and Performance Monitoring

The soft starter shall include comprehensive metering and monitoring functions.

The soft starter shall provide real-time feedback of operating conditions, including:

- starter status
- average current
- L1 current
- L2 current
- L3 current
- mains frequency
- motor voltage (Average rms across all three phases)
- motor voltage (phase voltages A-B, B-C, C-A)
- motor power factor
- motor temperature (as a % of total thermal capacity)
- analog output value
- heatsink temperature
- bypass model
- SCR temperature
- rating capacity
- number of starts
- hours run
- current graph
- last start information including starting current and start duration

The soft starter's user interface shall be able to be programmed to display four operating conditions simultaneously on one viewing screen.

The soft starter shall provide feedback of historical operating information, including:

- lifetime hours run
- lifetime start count
- lifetime thermal resets
- resettable hours run
- resettable start count
- resettable thermal resets

The user interface shall allow the user to select which parameters to display on the LCD.

The soft starter shall record full details of its state at the time of every protection activation. The recorded details shall include, at minimum:

- time & date stamp
- protection type
- motor operating status
- mains frequency
- line current
- last start time (if successful)
- motor thermistor
- ambient temperature
- heatsink temperature
- motor thermal model
- SCR temperature
- Bypass model
- Rating capacity

The soft starter shall record all changes to its configuration for storage in an event log.

The soft starter's event log shall store no fewer than 384 events.

All software related to operation and maintenance of soft starter and application license shall be provided for life-time duration to PAA as project package without any additional cost.

Support and Services

3.1 Commissioning

The soft starter supplier shall undertake for complete commissioning the soft starter.

The soft starter supplier shall provide suitably qualified staff to ensure successful commissioning.

3.2 Documentation

The soft starter shall be provided with complete with:

- User manual/s and Service manual comprising of Operation, Maintenance, Fault Diagnostic and trouble shooting.
- Schematic/ Wiring Diagrams
- Parts List
- Recommended list of spare parts
- 2D & 3D CAD drawings

3.3 Training

The soft starter supplier shall be capable of providing a complete training schedule with the soft starter.

The soft starter supplier shall undertake to deliver the complete training programme to the customer.

The training programme shall be delivered at the customer's premises or at the supplier's premises, as required by the customer.

The training programme shall deliver to the customer the skills to:

- appropriately programme the soft starter to meet customer requirements
- safely commission the soft starter
- safely operate the soft starter
- identify and rectify operating problems caused by incorrect programming • identify and diagnose operating problems caused by faulty soft starter

3.4 Warranty and Repair

The supplier shall guarantee the soft starter against faults of materials or manufacture workmanship for a period of not less than 24 months.

The supplier shall guarantee to provide servicing support for the soft starter for a period of not less than 5 years from time of last manufacture.

3.5 Standards and Approvals

The soft starter must, as a minimum comply with and be certified to:

UL /cUL	UL508
CE	IEC60947-4-2

LOW VOLTAGE VARIABLE FREQUENCY DRIVE SPECIFICATION

Abstract

- This specification defines the requirements for Low Voltage Variable Frequency Drives for the operation of Low Voltage motors.

Three Part Spec
Part 1 General
Part 2 Product
Part 3 Execution

VARIABLE FREQUENCY DRIVES

PART 1 GENERAL

1.01 SCOPE

A. This specification describes the electrical, environmental and agency requirements for three-phase, Variable Frequency Drives (VFD) as specified herein and as shown on the contract existing as-built drawings.

1.02 RELATED SECTIONS

1.03 REFERENCES

A. The variable frequency drives and all components shall be designed, manufactured and tested in accordance with the latest applicable standards.

1. NFPA 70 – National Electric Code (NEC) or equivalent IEC,IEEE OR JIS
2. UL 50 – UL Standard for Safety for Enclosures for Electrical Equipment or equivalent IEC,IEEE OR JIS
3. UL 61800-5-1 – UL Standard for Safety, Variable Speed Drive Systems or equivalent IEC,IEEE OR JIS
4. UL 61800-3 - EMC immunity requirements or equivalent IEC,IEEE OR JIS
5. UL 508A – UL Standard for Safety for Industrial Control Panels or equivalent IEC,IEEE OR JIS
6. UL 508C – UL Power Conversion Equipment or equivalent IEC,IEEE OR JIS
7. NEMA 250 – Enclosures for Electrical Equipment (1000 Volts Maximum) or equivalent IEC,IEEE OR JIS
8. NEMA – Application Guide For AC Variable Speed Drive Systems or equivalent IEC,IEEE OR JIS
9. NEMA ICS 7.1 – Safety Standards for Construction and Guide for Selection, Installation and Operation of Variable Speed Drive Systems or equivalent IEC,IEEE OR JIS
10. VFD's shall be UL / cUL listed. or equivalent IEC,IEEE OR JIS
11. VFD's shall carry the CE mark. or equivalent IEC,IEEE OR JIS
12. IEEE-519-2014 – Harmonic Control in Electrical Systems or equivalent IEC,IEEE OR JIS

B. In case of conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.

1.04 SUBMITTALS - FOR REVIEW/APPROVAL

A. The following information shall be submitted to the Engineer.

1. Dimensioned outline drawing
2. Schematic diagram
3. Power and control connection diagram(s)

B. Submit one (1) .pdf copy of the above information

1.05 SUBMITTALS - FOR INFORMATION

A. The following information shall be submitted to the Engineer:

1. Descriptive bulletins
2. Product Instruction manual
3. Spare Parts List

4. Harmonic Analysis (if applicable to IEEE-519 systems)

1.06 SUBMITTALS - FOR CLOSEOUT

A. The following information shall be submitted for record purposes prior to final payment.

1. Final as-built drawings and information for items listed section in 1.04 and 1.05.

1.07 QUALIFICATIONS

A. For the equipment specified herein, the manufacturer shall be ISO 9001 certified.

B. The supplier of this equipment shall have produced similar electrical equipment for a minimum period of ten (10) years. When requested by the PAA, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement. C. Variable Frequency Drives shall be proven industrial Series for function and quality.

D. The VFD's shall have a minimum design life of 10 years with standard OEM recommended maintenance.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Equipment shall be handled and stored in accordance with manufacturer's instructions. One (1) copy of these instructions shall be included with the equipment at time of shipment.

1.09 INSTRUCTION MANUALS

A. One (1) copy of the equipment instruction manual shall be provided with each item.

B. Instruction manuals shall include the following information:

1. Installation Guidelines
2. LCD Operation (Viewing, Programming and Fault monitoring)
3. Parameter settings and descriptions
4. Trouble shooting
5. Maintenance
6. Equipment Ratings (Technical Specifications)

PART 2 PRODUCTS

2.01 Naming specific venders does not imply acceptance of their standard products nor relieve them from meeting these specifications in their entirety.

VARIABLE FREQUENCY DRIVES (VFD)

1. The VFD shall be rated for 400VAC,50Hz VAC source voltage. The VFD shall provide microprocessor based control for three-phase induction motors. The controller's full load output current rating shall meet or exceed NEC Table 430-150 and be based on an ambient temperature of 40° C (Normal Duty) or 50° C (Heavy Duty).
2. The VFD shall be of the Pulse Width Modulated (PWM) design converting the utility input voltage and frequency to a variable voltage and frequency output via a two-step operation. Suitable for driving the cooling tower motor.
3. The VFD shall have an adjustable switching frequency.
4. The VFD shall have efficiency at full load and speed $\geq$ 95%.
5. The VFD shall maintain the line side displacement power factor at no less than 0.96, regardless of speed and load.
6. The VFD shall have a one (1) minute overload current rating of 150% for heavy duty drives. The drives shall have a minimum six (6) second overload current rating of 140%.
7. The VFD shall be capable of operating any NEMA design squirrel cage induction motor, regardless of manufacturer, with a horsepower and current rating within the capacity of the VFD.
8. The VFD shall have an integral EMI/RFI filter as standard.
9. Insensitive to input line rotation.
10. The VFD's shall have the listed environmental "degree of protection" ratings.
11. All printed circuit board used shall be conform ally coated with silicon or similar apparatus compound to cater high moisture costal climate.

B. Standard operating conditions shall be:

1. Incoming Power: Three-phase, [380 – 450] Vac (-15% to +10%) and 50 Hz (+/-5 Hz) power to a fixed potential DC bus level.
2. Frequency accuracy - +/-1% of maximum output frequency.
3. Ambient Temperature (Normal Duty): (- 2°C~42°C). A 2.5% / °C current derating required up to (50°C) max.
4. Humidity: 0 to 95% (non-condensing and non-corrosive).
5. Altitude: (100 meters) above sea level.
6. Storage Temperature: (-2°C - 65°C).

C. HMI (LCD Display/Keypad)

1. Frequently accessed VFD programmable parameters shall be accessible from an LCD Display/Keypad located on the front of the VFD. The LCD shall have a 3-line alphanumeric programmable display with status indicators. Keypads must use plain English words for parameters, status, and diagnostic messages. Keypads that are difficult to read or understand are not acceptable, The LCD shall have a contrast adjustment and be easily visible in normal ambient light.

2. The keypad shall include a HAND and AUTO pushbutton selection. Both start/stop source and speed reference shall be independently programmable for Keypad, Remote I/O, or Field Bus.
3. The keypad shall have Read, Write and Save capability.
4. The keypad shall have password protection.
5. Upon initial power up of the VFD, the keypad shall display a Quick Start guide that will sequence the minimum necessary parameter adjustments for general start up.
6. The operator interface shall consist of an LCD display/keypad located on the front of the VFD. Features shall include:

a. Pushbuttons for selection, display, and modification of the VFD characteristics as follows:

1) Scroll left, Scroll right, Scroll up/increase, Scroll down/decrease
2) Mode Button
3) Program/Enter
4) Escape
5) Reset
6) Hand / Local Start
7) Stop / Off
8) Auto / Remote Start
9) Multi-function Button (programmable function)

b. The keypad LCD shall display data in easily readable style & have a backlit alphanumeric LCD display.

c. The operator shall be able to scroll through the keypad menu to choose between the following screens: 1) Monitor Mode

2) Parameter Mode
3) Trip (Fault) Mode
4) Configure Mode
5) User/Macro Mode

D. Control Functions

a. The following functions, at a minimum, are to be available:

1) Control Method - V/Hz. Control, Sensor-less Vector Control, Slip Compensation
2) V/Hz. Pattern – Linear, Squared, User Defined
3) Torque Boost
4) Start/Stop command from keypad, remote or communications port
5) Speed reference from keypad, remote or communications port
6) Jog and Jog/Start
7) Fire Mode start and run

8) Motor direction selection
9) Minimum and Maximum speed limits
10) Acceleration and deceleration times
11) Critical (skip) frequency avoidance
12) Current limit
13) Multiple attempt reset and restart function
14) Multiple-step speed inputs
15) Catch a spinning motor (Flying start)
16) DC brake current magnitude and time
17) PID process controller
18) KEB (Kinetic Energy Buffering) Load inertia dependent ride-through during utility loss.

2. The VFD shall have the following interfaces:

a. Inputs – A minimum of seven (7) programmable digital inputs, two (2) analog inputs (one 4-20mA, one 0-10VDC) and serial communications interface shall be provided with the following available as a minimum:
1. Remote Hand/Auto
2. Remote Start/Stop
3. Remote Forward/Reverse
4. Remote preset speeds
5. Remote external trip
6. Remote fault reset
7. Emergency Stop – Quick Stop
8. Drive Enable/Disable
9. Process control speed reference interface, 4-20mA DC
10. Potentiometer with 0-10VDC speed reference interface
11. RS-485 (Modbus-RTU)/ BACnet interface terminals

E. Outputs – A minimum of five (5) discrete programmable relay outputs, one (1) programmable open collector output, and two (2) programmable analog outputs shall be provided, with the following available at minimum.
1. Programmable relay outputs and open collector output selectable with the following available at minimum:
a. Fault
b. Run
c. Stop
d. Ready
e. Jogging
f. At speed
g. In Hand, In Auto
h. Over-temperature

2. Programmable analog output signals selectable with the following available at minimum:

a. Motor current
b. Output frequency
c. Motor voltage
d. DC Bus voltage
e. Target frequency
f. Output power
g. PID reference and feedback

3. Monitoring and Displays
   a. The VFD display shall be an LCD type capable of displaying easily readable text and the following status indicators:
      1) Stop
      2) Forward
      3) Reverse
      4) Warning/Alarm
      5) Fault
      6) Input/Output (I/O) terminal status
      7) Hand (LED)
      8) Auto (LED)
      9) Fault/Reset (LED)
4. The VFD keypad shall be capable of displaying the following monitoring functions at a minimum:
   a. Output frequency
   b. Frequency reference
   c. Motor speed
   d. Motor current
   e. Motor power
   f. Motor voltage
   g. DC-bus voltage
   h. VFD internal temperature
   i. Voltage level of analog input
   j. Current level of analog input
   k. Digital inputs status
   l. Digital (relay) outputs status
5. Protective Functions
   a. The VFD shall include the following protective features at minimum:
      1) Motor Overload

2) Over-current
3) Over-voltage
4) Under-voltage
5) Input/Output phase loss
6) Over-temperature
7) Motor stalled
8) Motor over-temperature (PTC Input req'd)
9) Motor under-load
10) Inverter Fault
11) Loss of Signal

b. The VFD shall provide ground fault protection. VFD's with no ground fault protection during running are not acceptable.

F. Communications

1. The VFD shall include as standard communications protocols.
   a. Modbus-RTU
   b. N2 Metasys
   c. BACnet
2. The VFD shall have optional communications capabilities (option card)
   a. Ethernet IP / Modbus TCP
   b. Lonworks
3. Diagnostic Features
   a. Fault History
      1) Record and log faults
      2) Indicate the most recent first, and store the last ten (10) faults

G. PC Interface

1. Programming and trouble-shooting functions shall be available by using a personal computer's USB port and Windows™ based software. The software shall permit control and monitoring via the USB port. The manufacturer shall supply a diskette (or link to download) the required software. An easily understood instruction manual and software help screens shall also be provided. The computer software shall be used for modifying the drive setup and reviewing diagnostic and trend information. Provide one copy of the advanced programming software. Life –time software updates licenses shall be provided as project package to PAA without any additional cost.

H. Enclosed VFD – Packaged drive

1. Enclosure - The VFD shall be monitored in the main enclosure/panel. The VFD shall have complete front accessibility with easily removable assemblies.
   a. Thermal magnetic breaker or HMCP to provide a disconnect means. The operating handle shall protrude through the door. The disconnect shall not be mounted on the door. The handle position shall indicate ON, OFF, and TRIPPED condition. The handle shall have provisions for padlocking in the OFF position with at least three (3) padlocks. Interlocks shall prevent unauthorized opening or closing of the VFD door with the disconnect handle

in the ON position. Door handle interlock can be defeated by qualified maintenance personnel.

b. AC input line current limiting fuses shall provide a means of disconnecting the VFD from the line under fault conditions.

c. Three contactor bypass shall include a VFD input isolation contactor, bypass contactor and a VFD output contactor that is electrically and mechanically interlocked with the bypass contactor. The bypass control circuit shall include control logic, VFD-Off Bypass switch, bypass status light and motor overload relay.

d. Laminated plastic or steel nameplate engraved with user's identifying name or number.

e. Suitable control power to allow VFD to interface with control relays (dry contacts).

I. Spare Parts

1. The Main PC Boards shall be supplied as spares, one for each different VFD supplied above 50 HP. These include one each of the following.

a. LCD (display/keypad)

b. Input (Filter) PCB

c. Control PCB

d. I/O CPU PCB

e. I/O TB PCB

f. Fan SMPS

J. Service and Support

1. The VFD manufacturer shall maintain, as part of a national network, engineering service facilities and authorized workshop in Karachi, to provide start-up service, emergency service calls, repair work, service contracts, maintenance and training of customer personnel.

PART 3 EXECUTION

3.01 EXAMINATION

3.02 FACTORY TESTING by OEM

A. Factory acceptance test (FAT) or factory test in short shall follow the drive manufacturer's standard test procedures unless otherwise specified.

B. The factory test shall take place at the same facility where the drive is being manufactured.

C. The factory test shall help ensure proper operation of the drive including but not limited to electrical circuitry, mechanical assembly, software, control and monitoring.

D. The factory test shall, at minimum, include following:

1. Visual inspection / check to verify physical dimensions and degree of protection for enclosures, mechanical assembly of components, hardware torquing marks and marking of cables, wires and terminals

2. Point-to-point electrical resistance (ohm) check or voltage check (using a digital voltmeter) to verify all the electrical connections

3. Verification of programming (factory settings) of parameters. The following standard factory tests shall be performed on the equipment provided under this section.
4. Verification of proper operation of all fans.
5. Functional tests to verify proper functionality of the drive

E. When specified, the testing shall include an optional loaded run that operates the drive on a dynamometer.

F. The test results shall be submitted to the customer as part of O&M manuals.

G. The manufacturer shall provide one (1) copy of the factory test report.

3.03 INSTALLATION

A. The OEM authorized representative under the technical direction of the manufacturer shall perform installation.

3.04 FIELD QUALITY CONTROL

A. Provide the services of a qualified manufacturer's employed Field Service Engineer for installation and start-up of the equipment specified under this section. Field Service personnel shall be factory trained with periodic updates and have experience with the same model of VFD on the job site. Sales representatives will not be acceptable to perform this work. The manufacturer's service representative shall provide technical direction and assistance to the Contractor in general assembly of the equipment, installation as specified in manufacturer's installation instructions, wiring, application dependent adjustments, and verification of proper VFD operation.

B. The OEM representative shall perform the following minimum work.

1. Inspection and final adjustments.
2. Operational and functional checks of the VFD.
3. The contractor shall certify that he has read the drive manufacturer's installation instructions and has installed the VFD in accordance with those instructions.

C. The Contractor shall provide one (1) copy of the manufacturer's field start-up report before final payment is made.

3.05 WARRANTY

A. Warranty to commence 24 months from the date of take-over by PAA Warranty Service to include all parts labor and time on-site.

3.06 FIELD TESTING

A. Field testing (519 VFD's) 1. The contractor shall perform harmonic measurements at the point where the utility feeds multiple customers (PCC) to verify compliance with IEEE519-2014. A report of the voltage THD and current TDD shall be sent to the PAA. The contractor shall provide labor, material, and protection as needed to access the test points. The readings shall be taken with all drives and all other loads at full load, or as close as field conditions allow.
2. Optionally harmonics can be measured at the input to the enclosed VFD to show that the addition of this drive does not significantly increase harmonic distortion.

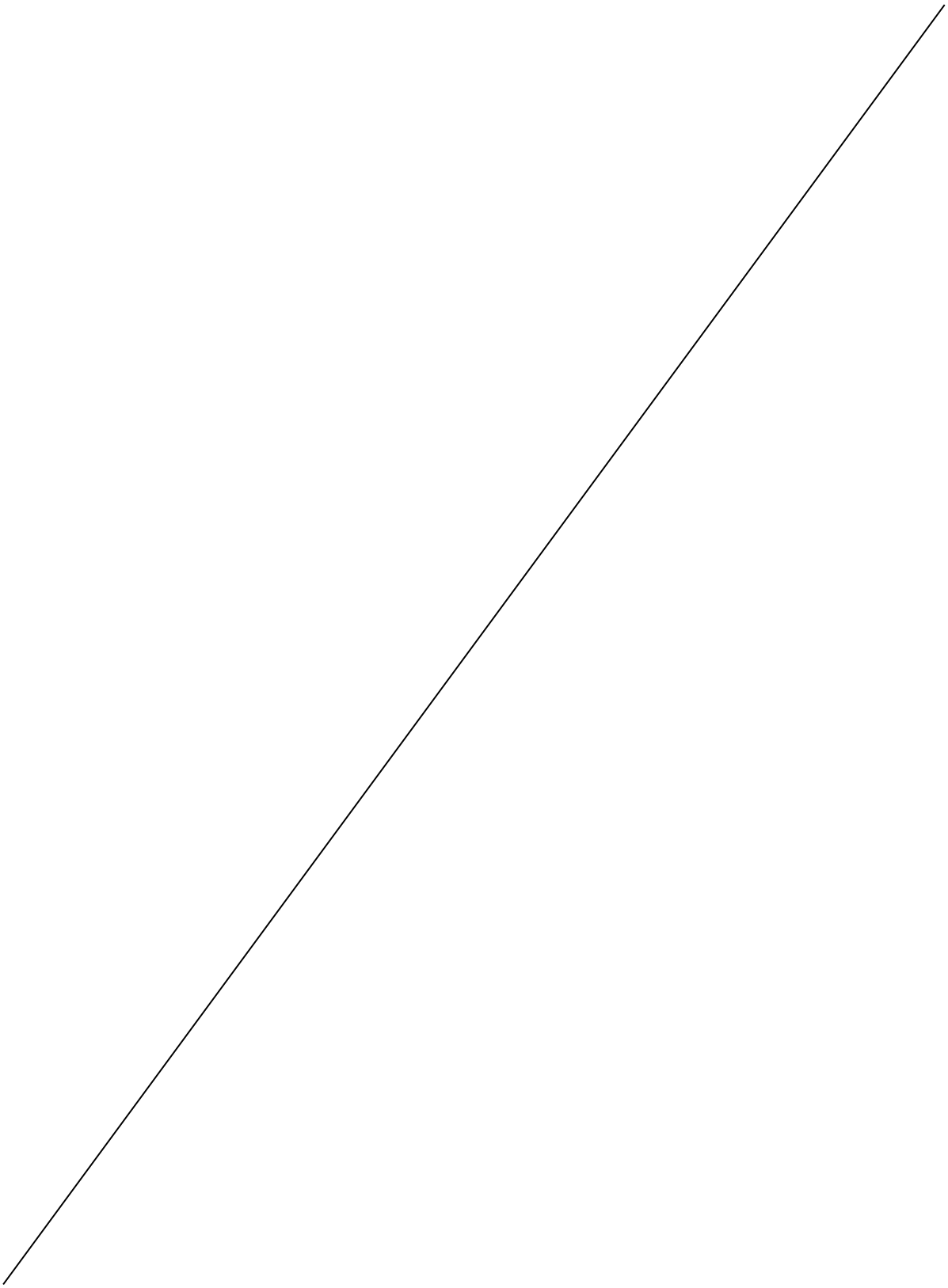
3.07 TRAINING

A. The Contractor shall provide a training session for up to 10 owner's representatives for 05 normal workdays at a job site location determined by the owner. Training and instruction time shall be in addition to that required for start-up service.

B. The manufacturer's qualified representative shall conduct the training.

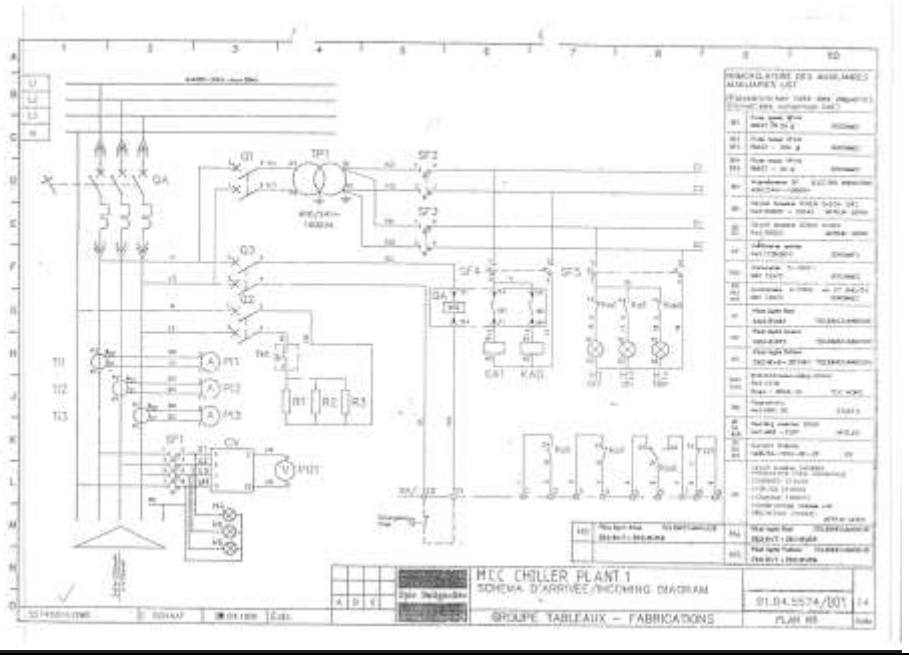
C. The training program shall consist of the following:

1. Instructions on the proper operation of the equipment.
2. Instructions on the proper maintenance of the equipment.
3. Fault diagnostic and trouble shooting.



Annexure – B

TECHNICAL DRAWINGS



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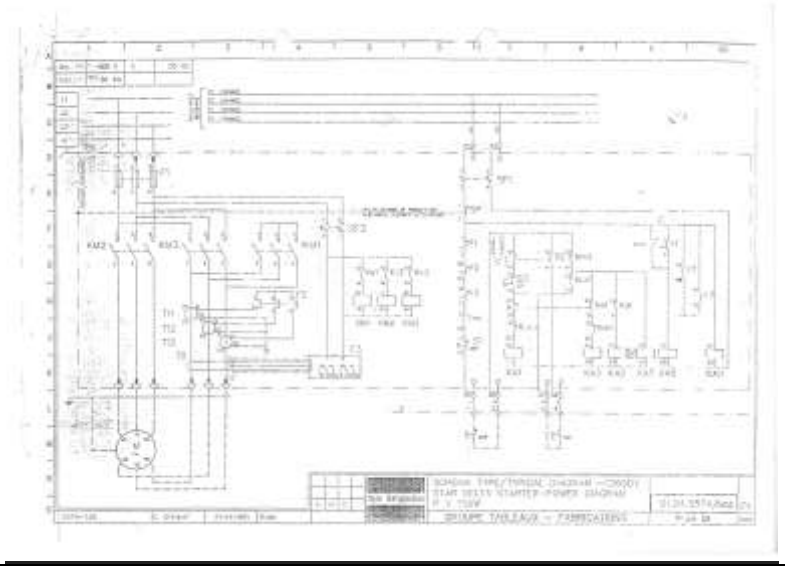

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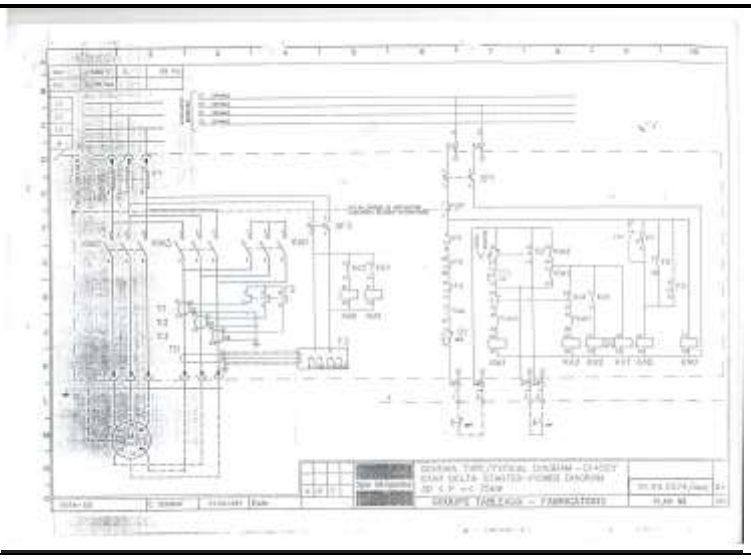

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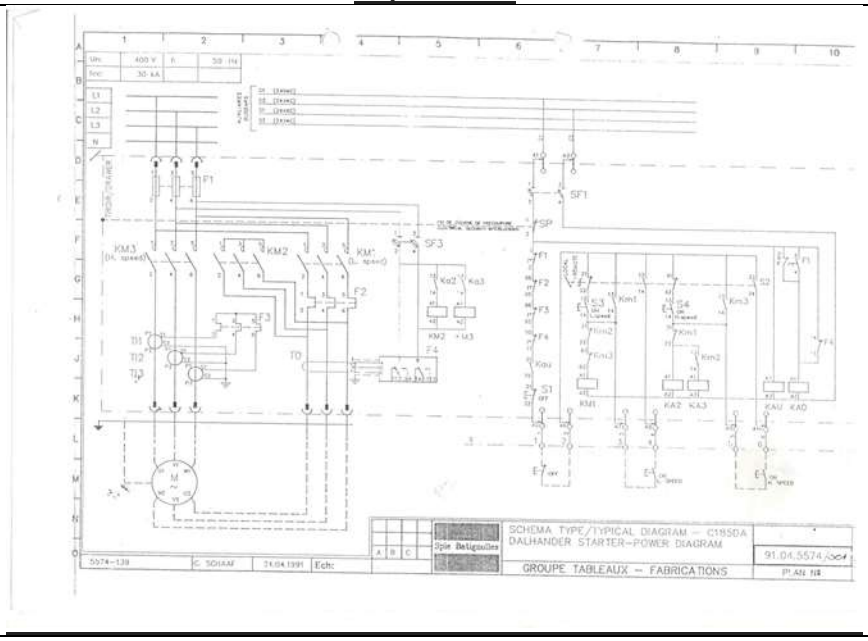
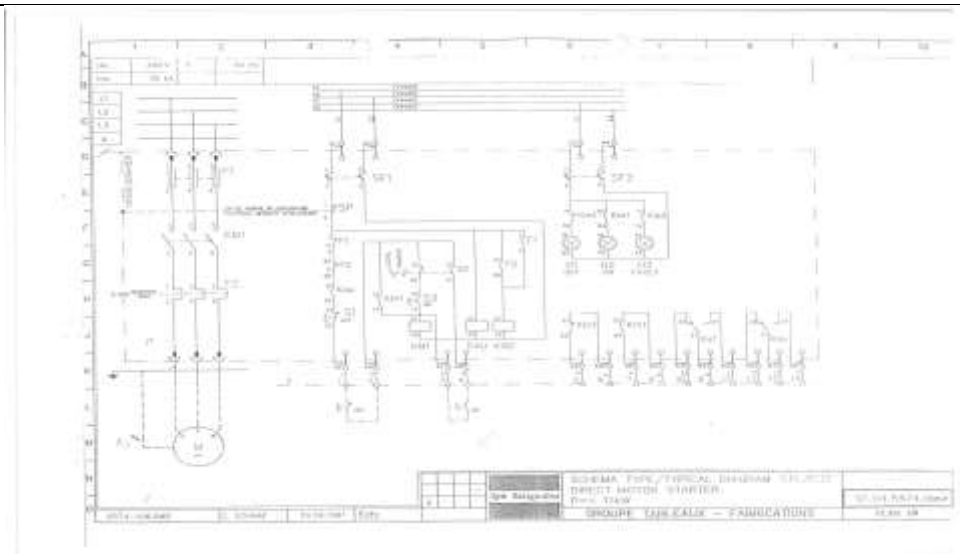


75 KW CTF item-3.4



Item- 3.5-3.6-3.7-3.8

Annexure – C

Technical Evaluation Criteria

Sr.	Documentary Evidences	Provided = YES Not Provided = NO Not Applicable = N/A
a)	Original Bid Security furnished in accordance with Clause : 3 of Invitation to Bids (Refer page – iv). General Instructions to bidder. Note: The physical financial instrument shall reach the office of Sr. Joint Director (HVAC) in envelope before opening of bids.	
b)	Certificate of incorporation / Memorandum & Article of Association or Partnership Deed / Sole Proprietorship etc. *Note: Dully attested (by notary public/ oath commissioner)*	
c)	Joint Venture Agreement (if applicable). In case of foreign firm/company, Joint Venture with Pakistani firm and registration with SECP.	
d)	Affidavit on non-judicial stamp paper valuing PKR : 500/- to the effect that the firm has not been blacklisted by any Government, Semi Government and Autonomous Body. Clause : 5(d) of Invitation to Bids (Refer page – iv). *Note: Dully attested (by notary public/ oath commissioner)*	
e)	Active Taxpayer Status (ATL)/NTN/GST and Professional Tax Certificate. 5(c) of Invitation to Bids (Refer page – iv). *Note: Valid documents and dully attested (by notary public/ oath commissioner)*	
f)	Valid Certification/ License by the Pakistan Engineering Council (PEC) i.e. C-5 (or above) and relevant Specialization Codes i.e. EE-04. *Note: Dully attested (by notary public/ oath commissioner)*	
g)	Power of Attorney in accordance with instructions to bidder (if applicable) on non-judicial stamp paper valuing PKR : 500/-	
h)	Bidding Documents with each page to be signed and stamped by Authorized Representative of the Bidder, as detailed below: a) Instructions to Bidders (IB) b) Contract Documents c) Memorandum for Running Bills & Extension of Time (Page-i) d) General Instructions for Bidders (Page-ii) e) Declaration (Page-iii) to be sign & stamps f) Invitation of Bids (Page-iv) g) Instructions to Bidders (Page-vi to viii) h) Memorandum (Page-ix) i) Letter of offer for execution of Works (Page-x) to be fill details, including email address, sign & stamp (j) Form of Agreement (Page-xi) (k) Bill of Quantities & As-built existing Drawings MCC 1 & 2 (l) Technical Specifications for soft starter VFDs. (m) General Conditions of Contract (Page 01 to 17) (n) Special Conditions of Contract (Page 18 to 22) (o) Annexures and Appendix	
i)	**Technical Submittal as per following:** ▪ The bidders are required to provide relevant technical data i.e. brochure or Product Data Sheets with technical bids in shape of compliance matrix against applicable BOQ items or attached existing as-built drawings give technical specifications for soft starters VFDs. Bidder are also required to submit the Required Supporting Documents as per Technical Evaluation Criteria..	

IMPORTANT NOTE

I. The bidders who respond “Yes” in all of the above requirement and provide documentary evidences in support of their “Yes” shall be technically evaluated. The technical evaluation/marking shall be carried out according to the technical evaluation criteria. Any “No” to above checklist or non-submission of supporting documents or furnishing forged documents or concealment of facts or submission of false information may lead to disqualification of such bidder.

II. The technical proposal shall be examined for compliance with Technical Specifications. The Bidders are required to provide relevant technical data i. e. brochure, catalogue or Product Data Sheet with Technical bids in shape of compliance matrix against Technical Specifications.

III. Client may, at its discretion, waive any minor non-conformity or any minor irregularity in bid. This shall be binding on all competitors and client reserve the right for such waivers.

IV. Client may at its absolute discretion, exclude or reject any bid that in the reasonable opinion of client contains any false or misleading claims or statements. Client has no liability to any person for excluding or rejecting any such bid.

V. All bids fulfilling requirements mentioned above shall be considered as technically responsive.

GENERAL CONDITIONS OF CONTRACT

1 Definitions

In the Contract (as hereinafter defined) the following words and expressions shall have the meanings assigned to them except where the context otherwise requires:

1.1 **"PAA"** means Pakistan Airports Authority and includes its duly authorized agents, successors and assigns.

1.2 **"Competent authority"** means an officer of PAA under whose competence the acceptance of bid lies.

1.3 **"Contractor"** means the person or persons, firm or Company whose Bid (as hereinafter defined) has been accepted by PAA and includes the Contractor's personal representatives, successors and permitted assigns, but does not include any sub-contractor.

1.4 **"Divisional Engineer"** means an Engineer duly authorized by the PAA for execution of work.

1.5 **"Representative of Divisional Engineer"** means any duly authorized officer or officers appointed by the PAA to perform the duties set forth.

1.6 The expression **"Works"** means all the works specified or set forth and required in and by the said specifications, drawings and schedule hereto or to be hereafter specified or required in such explanatory instructions and drawings and also in such additional Instructions and drawings as such from time to time, during the progress of the work hereby contracted for, be supplied by PAA.

1.7 **"Contract"** means the Conditions of Contract specifications, Drawings, priced schedule of Quantities, Bid and the Contract Agreement.

1.8 **"Contract Price"** means the amount / sum stated in the letter of Acceptance, subject to such additions thereto or deductions there from as may be made under the provisions hereinafter contained.

1.9 **"Construction Plant"** means all appliances, equipment or things of whatsoever nature required in or about the execution, completion or maintenance of the Works or Temporary works.

1.10 **"Temporary Works"** means all temporary works of every kind required in or about the execution completion or maintenance of the work.

1.11 **"Drawings"** means the drawings referred to in the Specifications and any modifications of such drawings approved in writing by the PAA and such other drawings as may from time to time be furnished or approved in writing by the Divisional Engineer.

1.12 **"Site"** means the lands and other places on, under, in, through which the works are to be executed or carried out and any other lands or places provided by the PAA for purposes of the Contract.

1.13 **"Approved"** means approved in writing including subsequent written confirmation of previous verbal approval and "Approval" means approved in writing including as aforesaid.

1.14 **"Bid"** means a tender, bid, or proposed remuneration, price, or cost submitted by a natural person, firm, corporation, or other legal entity in response to an invitation to bid, expressing the intent to undertake a specifically defined scope of works in conformity with the prescribed specifications, designs, drawings, instructions, and materials as stipulated under the Contract, and in compliance with all other applicable terms and conditions, including any and all annexures, schedules, or supplementary documents attached to or referenced in the offer.

2 Extent of Contract The Contract comprises the construction, completion and maintenance of the Works and except in so far as the Contract otherwise provides, the provision of all labour, materials, construction plant, temporary works and everything whether of temporary or permanent nature required in and for such construction, completion and maintenance so far as the necessity for providing the same as specified in or reasonably to be inferred from the Contract.

3 Documents Mutually Explanatory The several documents forming the Contract are to be taken as mutually explanatory of one another and in case of ambiguities or discrepancies, the same shall be explained by the Divisional Engineer whose explanation in this respect shall be final.

4 Sufficiency of Bid The Contractor shall be deemed to have satisfied himself before bidding as to the correctness, completeness and sufficiency of his Bid for the works and of the rates and prices stated in the priced schedule of Quantities which rates and prices shall except in so far as otherwise provided in the Contract cover all his obligations under the Contract and all matters and things necessary for the proper completion and maintenance of the Works.

5 Inspection of Site The Contractor shall inspect and examine the Site and its surroundings and shall satisfy himself before submitting the bid, as to the nature of ground and sub soil, the form and nature of the Site, the quantities and nature of the work and materials necessary for the completion of the works and the means of access of the Site, the accommodation he may require and in general shall himself obtain all necessary information as to risk, contingencies and other circumstances which may influence or affect his Bid.

6 Possession of Site The Divisional Engineer, with the written order to commence the works will give to the Contractor possession of the Site as may be required to enable the Contractor to commence and proceed with the construction of the works in accordance with the program referred to in clause 10 hereof and otherwise in accordance with such reasonable proposals of the Contractor as he shall by notices in writing to the Divisional Engineer make and will from time to time as the works proceed give to the Contractor possession of such further portions of the Site as may be required to enable the Contractor to proceed with the construction of

Works with due diligence in accordance with the said programme or proposals (as the case may be).

7 Drawings Three copies of each of the approved Drawings shall be furnished by PAA to the Contractor free of cost. The Contractor shall provide and make at his own expense any further copies required by him.

8 Drawings to be kept on Site One copy of each of the Drawings furnished to the Contractor as aforesaid shall be kept by the Contractor on the Site and the same shall at all times be available for inspection and use by the Divisional Engineer the representative of the Divisional Engineer.

9 Further Drawing and Instructions The Divisional Engineer shall have full power and authority to supply to the Contractor from time to time during the progress of the works such further Drawings and instructions as shall be necessary for the purpose of the proper and adequate execution and maintenance of the works and the Contractor shall carry out and be bound by the same.

10 Programme to be furnished As soon as practicable after the acceptance of his Bid, the Contractor shall submit to the Divisional Engineer for his approval a programme showing the order of procedure and method in which he proposes to carry out the Work and shall furnish for his information, particulars in writing of the Contractor's arrangements for carrying out of the works and the constructional plant and temporary works which the Contractor intends to supply, use or construct, as the case may be. The submission to and approval by the Divisional Engineer or the Representative of the Divisional Engineer of such programme or the furnishing or such particulars shall not relieve Contractor of any of his duties or responsibilities under the Contract.

11 Commencement The Contractor shall commence the Works on Site after the receipt by him of an order in writing to commence work from the Divisional Engineer and shall proceed for the same with due diligence (time being the essence of the Contract on the part of the Contractor).

12 Contractor's Superintendence The Contractor shall give or provide all necessary superintendence during the execution of the Works and as long thereafter as the Divisional Engineer may consider necessary for the proper fulfilling of the Contractor's obligations under the Contract. The Contractor or his competent, qualified and authorized agent or representative approved by the Divisional Engineer in writing (which approval may at any time be withdrawn) is to be constantly on the Works and shall give his whole time to the superintendence of the same if such approval shall be withdrawn by the Divisional Engineer, the Contractor shall without any delay, after receiving written notice of such withdrawal, remove the Agent from the site and shall not thereafter the employ him again on the Site in any capacity and shall replace him by another agent approved by the Officer, Such authorized agent or representative shall receive, on behalf of the Contractor directions and instructions from the Divisional Engineer or the representative of the Divisional Engineer. The Contractor shall also

employ full time Engineer / Sub-Engineer, duly qualified in Civil / Electrical / Mechanical Engineering and having professional experience of at least three years for the purpose of execution of the proposed works and giving full time engineering / technical superintendence during all phases of execution and for receiving technical directions and instructions from the Divisional Engineer.

13 Contractor's Employees

The Contractor shall provide and employ on the Site in connection with the execution and maintenance of the Works:

13.1 Only such technical personnel as are skilled and experience in their respective fields and such sub-agents, foremen and leading hands as are competent to give proper supervision to the work they are required to supervise.

13.2 Such skilled and semi-skilled and unskilled labour as is necessary for the proper and timely execution and maintenance of the Works.

14 Removal of Contractor's Employees

The Divisional Engineer shall have the power to object in writing to and require the Contractor to remove forthwith from the Work any person employed by the Contractor in or about the execution or maintenance of the works who in the opinion of the Divisional Engineer is misconducting himself or is incompetent or negligent in the proper performance of his duties or whose employment is otherwise considered reasonably by the Divisional Engineer to be undesirable. Any person so removed from the works shall be replaced without delay by a competent substitute approved by the Divisional Engineer. The Contractor shall not demand the reasons from the Divisional Engineer for requiring the removal of any one of his employees.

15 Supply of Plant Materials and Labour

Except where otherwise expressly specified, the Contractor shall at his own expense supply and provide all the Constructional plants, work materials, both for temporary and for permanent works, labour (including the supervision thereof) transport to or from the site and in and about the works and other things of every kind required for the construction, completion and maintenance of the works.

16 Works to be executed in accordance with specifications drawings etc.

The Contractor shall execute the whole and every part of the work in the most substantial and workman-like manner and both as regards materials and otherwise in every respect in strict accordance with the specifications. The Works executed by the Contractor shall also conform exactly, fully and faithfully to the designs, drawings and instructions in writing relating to the work issued by the Divisional Engineer.

17 Action where no specification

In the case of any class of work for which there is no such specifications, such work shall be carried out in accordance with the written instructions, and requirements of the Divisional Engineer.

18 Quality of Material,

All materials and workmanship shall be of the respective kinds described in the Contract and in accordance with the instructions of the Divisional Engineer and shall be subjected from time to time to such tests as the

Workmanship and Tests

Divisional Engineer may direct at the place of manufacture or fabrication on the Site or at all or any of such places. The Contractor shall provide such assistance, instruments, machines, labour and materials as are normally required for examining, measuring and testing any work and the quality, weight or quantity of any materials used and shall supply samples of materials before incorporation in the works for testing as may be selected and required by the Divisional Engineer. All samples shall be supplied by the Contractor at his own cost. The cost of making all tests specified in the Contract shall be borne by the Contractor.

19 Delegation of Power to Divisional Engineer's Representatives.

The Divisional Engineer may from time to time in writing delegate to the representatives of the Divisional Engineer any of the powers and authorities vested in the Divisional Engineer. Any written instruction or approval given by the representative of the Divisional Engineer to the Contractor within the term of such delegation (but not otherwise) shall bind the Contractor and the PAA, as though it has been given by the Divisional Engineer provided as follow:

19.1 Failure of the representative of the Divisional Engineer to disapprove any work or materials shall not prejudice the power of the Divisional Engineer thereafter to disapprove such work or materials and to order the pulling down, removal or breaking up thereof.

19.2 If the Contractor shall be dissatisfied by reason of any decision of the representative of the Divisional Engineer he shall be entitled to refer the matter to the Divisional Engineer who shall thereupon confirm, reverse or vary or modify such decision, and whose decision shall be final.

19.3 The Agreement shall be rescinded by the PAA and the final measurements shall be recorded by the Divisional Engineer or his any authorized representative shall record the final measurement and Contractor will not claim for any item not recorded by the Divisional Engineer or his representative.

20 Access to Site

The Divisional Engineer and any person authorized by him shall at all times have access to the Works and to the Site and to all Workshops and places where work is being done or where materials, manufactured articles or machinery are being obtained for the Works and the Contractor shall afford every assistance in or obtaining the right to such access.

21 Way leave etc.

The Contractor shall bear all expenses and charges for special or temporary way leaves required by him in connection with access to the Site. The Contractor shall also provide with the written approval of Divisional Engineer at his own cost any reasonable additional accommodation at Site required by him for the purposes of the Works.

22 Rate of Progress and permission to work during Night.

The whole of the materials, plant and labour to be provided by the Contractor and the mode, manner and speed of execution and maintenance of the works are to be of a kind and conducted in a manner approved by the Divisional Engineer. Should the rate of progress of the Works or any

part thereof be at any time in the opinion of the Divisional Engineer too slow to ensure the completion, the Divisional Engineer shall so notify the Contractor in writing and the Contractor shall thereupon take such steps as may be necessary and the Divisional Engineer may approve to expedite progress so as to complete the Works by the prescribed time or extended time for completion. If the work is not being carried on by day and by night and the Contractor shall request permission to work by night as well as by day, then, if the Divisional Engineer shall grant such permission, the Contractor shall not be entitled to any additional payments. The contractor shall indemnify the PAA from and against all claims, liabilities, demands, proceedings, costs and expenses whatsoever in regard or in relation to such permission. All work at night shall be carried out without unreasonable noise and disturbance.

23 Time for Completion

Subject to any requirement in the Specification of any portion of the Works before completion of the whole of the works, the whole work shall be completed within the stipulated time.

24 Extension of time for completion

Should the amount of extra or additional work of any kind or other special circumstances of any kind whatsoever (acts of God and events beyond the control of PAA etc.) which may occur be such as fairly to entitle the Contractor to an extension of time for the completion of the work, the Divisional Engineer shall determine and grant such an extension of time. Provided that the Divisional Engineer is not bound to take into account any extra additional work or other special circumstances unless the Contractor has within fourteen (14) days after such work has been commenced or such circumstances have arisen, delivered to the representative of the Divisional Engineer full and detailed particulars of any claim for extension of time to which he may consider himself entitled in order that such claim may be investigated at the time.

25 Termination of Contract for slow progress

If in the opinion of the Divisional Engineer the progress of the Works is slow that it cannot be completed within the prescribed period or within the extended period granted to the Contractor, the Divisional Engineer shall give a notice in writing to the Contractor calling upon him to speed up the work by employing more labour and by increasing the rate of supply of material, equipment and plant to an extent to be mentioned in the notice. In case the Contractor fails to comply with the requirements of the notice within ten days from its issue, the Divisional Engineer shall have the power to have the works completed through any other agency at the risk and cost of the Contractor. In any such event, the work executed by the Contractor shall be measured up and all plant, machinery, equipment and material at Site will be taken over by the Divisional Engineer after preparing and inventory thereof, such stores to be used for the completion of the work will be at the cost of the Contractor. All payments due to the Contractor shall be withheld till the completion of the work and any loss suffered by the PAA or expenditure incurred in getting the works executed, shall be recovered from the Contractor.

26 Action and Compensation payable in case of works below specification

If it shall appear to the Divisional Engineer or his representative, that any work has been executed with unsound, imperfect or unskilled workmanship or with materials of any inferior description or that any materials or articles provided by him for the execution of the work are unsound or of a quality inferior to that contracted for or otherwise not in accordance with the contract, the Contractor shall on demand in writing from the Divisional Engineer specifying the work, materials or articles complained of notwithstanding that the same may have been inadvertently passed, certified and paid for, forth-with rectify, or remove and reconstruct the work so specified and provide other proper and suitable materials or articles at his own cost; and in the event of his failing to do so with in a period to be specified by the Divisional Engineer in his demand aforesaid, then the Contractor shall be liable to pay compensation at the rate of one percent on the total cost of work for every day not exceeding ten days apart from the cost of rectification, while his failure to do so, shall continue and in the case of any such failure the Divisional Engineer may rectify or remove, and re-execute the work which may include additional work necessary to strengthen or set right the unsound work carried out by the Contractor or remove and replace with others, the materials or articles complained of as the case may be at the risk and cost of the Contractor in all respect.

27 Security Deposits

The Contractor shall permit the PAA at the time of making any payment to him for work done under the contract to deduct such sum as will amount to be five per cent (5%) of all money so payable; such deductions to be held by PAA by way of security deposit. The sum five per cent (5%) of the amount of the bills including the earnest money held by the PAA by way of security deposit shall be paid back to the Contractor after the satisfactory expiration of Period of Maintenance as defined in the clause 49 hereof.

28 Forfeiture of Security deposit

28.1 In any case in which under any clause, or clauses of this agreement the Contractor shall have rendered himself liable to pay compensation amounting to the whole of his security deposit (whether paid in one sum or deduction by instalments) the PAA shall have the power in its own discretion to adopt any of the following courses, best suited to the interest of the PAA.

a) To rescind the Contract (of which recession notice in writing by the Divisional Engineer to the Contractor shall be conclusive evidence) and in which case the security deposit of the Contractor as available with the PAA shall stand forfeited and be absolutely at the disposal of PAA.

b) To employ labour paid by PAA and to supply materials to carry out the work or any part of the work debiting the Contractor with the cost of the labour and the price of the materials (of the amount of which cost and price a certificate of the Divisional Engineer shall be final and conclusive against the Contractor) and crediting him with the new value of the work done, in all respect in the same manner and at the same rates as if it had been

carried out by the Contractor under the terms of his Contract, the certificates of the Divisional Engineer as to the value of work done shall be final and conclusive against the Contractor.

c) To measure up the work of the Contractor and to take such part thereof as shall be unexecuted out of his hand, and to give it to another contractor to complete, in which case any expenses which may be incurred in excess of the sum which would have been paid to the original Contractor, if the whole work had been executed by him (of the amount of which exceed, the certificate in writing to the Divisional Engineer shall be final and conclusive) shall be borne and paid by the original Contractor and may be deducted from any money due to him by the PAA under the contract or otherwise or from his security deposit, or the proceeds of sale thereof or a sufficient part thereof.

28.2 In the event of any of the above courses being adopted by the PAA, the Contractor shall have no claim to compensation for any loss sustained by him by reason of his having purchased or procured any materials, or entered into any engagements or made any advance on account of or with a view to the execution of the work or the performance of the Contract. And, in case the Contract is rescinded under the aforesaid provisions, the Contractor shall not be entitled to recover or be paid any sum for any work therefore actually performed under this contract. Unless and until the Divisional Engineer will have certified in writing the performance of such work and the value payable in respect thereof, and he shall only be entitled to be paid the value so certified. Again, the Contractor will not in any manner hinder or prevent the owner or Divisional Engineer or any of the workmen and other employed by him from proceeding to complete the said buildings and works as aforesaid.

29 Liquidated damages for delay

If the Contractor fails to complete the works within the stipulated time for completion prescribed under the Contract, or any extended time allowed for completion in accordance with the Contract, then the Contractor shall pay to the PAA a sum equal to ten (10) per cent or less of the Contract Price as liquidated damages (and not as a penalty) for the delay beyond the time prescribed in the Contract or the extended time for completion, as the case may be. The said sum shall be payable by the sole fact of the delay without the need for any previous notice or any legal proceedings, or proof of damage, which shall in all cases be considered as ascertained. The PAA may, without prejudice to any other method of recovery, deduct the amount of such liquidated damages from any monies in its hands due or which may become due to the Contractor. The payment or deduction of such damages shall not relieve the Contractor from his obligation to complete the Works or from any other of his obligations and liabilities under the Contract.

30 Notice to be given before work is covered up

The Contractor shall give not less than five clear days' notice in writing to the Divisional Engineer or his representative before covering up or otherwise placing beyond the reach of measurement of any work, in order

that the same may be measured, and correct dimensions thereof be taken before the same is so covered up or placed beyond the reach of measurement without the consent in writing of the Divisional Engineer or his representative, and if any work shall be covered up or placed beyond the reach of measurement without such notice have been given or consent obtained the same shall be uncovered at the Contractor's expense, or in default thereof no payment or allowance shall be made for such work on the materials, with which the same was executed.

31 Suspension of work

The Contractor shall on the written order of the Divisional Engineer suspend the progress of the works or any part thereof for such time or times and in such manner as the Divisional Engineer may consider necessary and shall during such suspension properly protect and secure the work so far as is necessary in the opinion of the Divisional Engineer. The extra cost (if any) incurred by the Contractor in giving effect to the Divisional Engineer's instructions under this clause shall be borne by the Contractor, if such suspension is:

a) as per the provision of the contract, or
b) Necessary for the proper execution of the work or by reason of weather conditions affecting the safety or quality or the Works or by some default on the part of the Contractor, or
c) Necessary for the safety of the works or any part thereof.

32 Care of works

From the commencement to the completion of the Works, the Contractor shall take full responsibility for the care thereof and of all temporary works, and in the event that any damage, loss or injury should happen to the Works or to any part thereof or to any temporary works from any cause whatsoever (save and except the "expected risk(s)" as defined in clause 33 hereof), the Contractor shall at his own cost repair and make good the same so that at completion, the works shall be in good order and condition and in conformity in every respect with the requirements of the contract and the Divisional Engineer's instructions. The Contractor shall also be liable for any damage to the Works occasioned by him in the course of any operations carried out by him for the purpose of complying with his obligations under Clause 50 hereof. The Contractor shall be fully responsible for the review of the Engineering design and details of the works and shall inform the PAA of any mistakes or incorrectness in such design and details which would affect the works.

33 Expected Risk

The "Expected Risk" are hostilities (where war be declared or not) invasion, act of foreign enemies, rebellion revolution insurrection or military or usurped power civil war or (otherwise than among the Contractor's own employees) riot, commotion or disorder or use by occupation by the PAA of any portion of the Works in respect of which a certificate of completion has been issued or any such operation of the forces of nature as reasonable foresight and ability on the part of the Contractor could not foresee or reasonably provide against (all of which are herein collectively referred as "the expected risk").

34 Damage to persons and property.

The Contractor shall (except if and so far as the Contract provides otherwise) indemnify and keep indemnified the PAA and its Employees from and against all suits, claims, demands, proceedings, and liability of any nature or kind, including costs and expenses, for injuries or damages to any person or any property whatsoever which may arise out of or in consequence of acts or omissions of the Contractor or its agents, employees, servants or subcontractors in the execution of the Contract.

35 Accident or injury to Workmen

The PAA shall not be liable for or in respect of any damages or compensation payable at law in respect or in consequence of any accident or injury to any workman or other persons in the employment of the Contractor or any sub-contractor. The Contractor shall indemnify and keep indemnified the PAA against all such damages, compensation and against all claims, demands, proceedings, cost charges and expenses whatsoever in respect thereof or in relation thereto.

36 Insurance

The Contractor shall obtain and keep in force policies in respect of Erection All Risks, Contractor's All Risks and Workmen's Compensation act, which shall apply specifically and solely to the Contractor and shall fulfil all Contractor's obligations for Insurance in connection with this Contract from an Insurance Company in Pakistan having at latest AA rating from PACRA / JCR-VIS.

37 Compliance with Statutes, Regulations etc.

The Contractor shall conform in all respects with any such Statutes, Ordinances, Laws, Regulations, Bye-laws or requirements of any such local or other authority / authorities which may be applicable to the Works or to any Temporary Works and shall keep the PAA indemnified against all penalties and liability of every kind for breach of any such Statutes, Ordinances, Laws, Regulations, Bye-laws or requirements.

38 Fossils etc.

All fossils, coins, article of value or antiquity and structures and other remains or things of geological or archaeological interest discovered on the site of the Works shall as between the PAA and the Contractor be deemed to be the absolute property of the PAA and the Contractor shall take reasonable precautions to prevent his workmen or any other persons from removing or damaging any such article or thing and shall immediately upon discovery thereof and before removal acquaint the PAA of such discovery.

39 Variation

The Divisional Engineer may introduce any variations to the form, quality or quantity of the work or any part thereof which he considers necessary and for that purpose or if for any other reasons it shall, in his opinion be desirable, he shall have power to order the Contractor to do and the Contractor shall do any of the following:

a) increase or decrease the quantity of any work included in the Contract;
b) omit any such work;
c) change the character or quality or kind of any such work;

d) change the levels, lines position and dimension of any part of the Works; and

e) execute additional work of any kind necessary for the completion of the works.

and no such variation shall in any way vitiate or invalidate the Contract nor it will entitle the Contractor of any claims for compensation whatsoever, but the value (if any) of all such variations shall be taken into account in ascertaining the amount of the Contract Price.

40 Order for variation to be in writing

No such variation shall be made by the Contractor without an order in writing from the Divisional Engineer. Provided that, subject to the provisions of the Contract, no order in writing shall be required for any increase or decrease in the quantity of any work where such increase or decrease is not the result of an order given under this Clause but is the result of the quantities exceeding or being less than those stated in the Bill of Quantities. If for any reason, Divisional Engineer considers it desirable to give any such order verbally, the Contractor shall comply with such order but shall get it confirmed in writing from the Divisional Engineer within four days of the issue of such verbal order.

41 Valuation of Variation

41.1 The Divisional Engineer shall determine the amount (if any) to be added to or deducted from Contract Price in respect of any variation, addition, or omission made by his order. The valuation of any variation, addition or omission shall be calculated on the basis of the unit prices contained in the Bill of Quantities if in the opinion of the Divisional Engineer the same shall be applicable; if not then on the market rates.

41.2 No deviation from specifications stipulated in the Contract or additional items of work shall be carried out by the Contractor unless the rates of the substituted, extra, altered or additional item have been approved in writing by the competent authority failing which the PAA will not be bound to entertain any claim on this account.

42 Quantities

The quantities set out in the Bill of Quantities are the estimated quantities of the work but they are not to be taken as the actual and correct quantities of the works to be executed by the Contractor in fulfilment of his obligation under the Contract.

43 Work to be Measured

The Divisional Engineer shall except as otherwise stated ascertain and determine by measurement the value of work done in accordance with the Contract. The Divisional Engineer shall, when he requires any part or parts of the Works to be measured, give notice to the Contractor or the Contractor's authorized agent or representative who shall forthwith attend or send a qualified agent to assist the Divisional Engineer or his representative in making such measurement and shall furnish all particulars required by either of them. Should the Contractor not attend or neglect or fail to send such agent, then the measurement made by the Divisional Engineer or approved by him shall be taken to be the correct

measurement of the work. The purpose of measuring is to ascertain the volume of work executed by the Contractor and therefore determine the amount of the monthly payments.

44 Method of Measurement

The works shall be measured, notwithstanding any general or local custom except where otherwise specifically described or prescribed in the Contract.

45 Clearance of Site on Completion

On the completion of the Works, the Contractor at his own cost shall clear away and remove from the Site all Constructional plant, surplus materials, rubbish and Temporary Works of every kind and leave the whole of the Site and works clean and in a workman-like condition to the satisfaction of the Divisional Engineer, rubbish should be disposed of in the manner as directed by the Divisional Engineer or his representative.

46 Certificates for Completion of Works

46.1 When the whole of the Works have been substantially completed and have satisfactorily passed any test on completion as prescribed by the Contract, the Contractor may give a notice to that effect to the Divisional Engineer accompanied by an undertaking to finish any outstanding work during the Period of Maintenance. Such notice and undertaking shall be in writing and shall be deemed to be a request by the Contractor, for the Divisional Engineer to issue a Certificate of Substantial Completion in respect of the Works. The Divisional Engineer shall, within twenty-one (21) days of the date of delivery of such notice either issue to the Contractor a Certificate of Substantial Completion stating the date on which, in his opinion, the Works were substantially completed in accordance with the Contract or give instructions in writing to the Contractor specifying all the work which, in his opinion, are required to be done by the Contractor before the issuance of such Certificate. The Divisional Engineer shall also notify the Contractor of any defects in the Works affecting substantial completion that may appear after such instructions and before completion of the work specified therein. The Contractor shall be entitled to receive such Certificate of Substantial Completion within twenty-one (21) days of completion, to the satisfaction of the Divisional Engineer, of the work so specified and making good any defect so notified. Upon issuance of the Certificate of Substantial Completion of the Works, the Contractor shall be deemed to have undertaken to complete with due expedition any outstanding work during the Period of Maintenance.

46.2 Upon satisfactory completion of the work outstanding on the Works, the Divisional Engineer shall within twenty-eight (28) days of the expiration of the Period of Maintenance issue a Certificate of Final Completion to the Contractor. The Contract shall be deemed to be completed upon issuance of such Certificate, provided that the provisions of the Contract which remain unperformed shall remain in force for as long as is necessary to dispose of any outstanding matters or issues between the Parties.

47 Period of Maintenance

The "Period of Maintenance" shall be of 24 Months duration unless otherwise specified in the Special Conditions of the Contract, calculated from the date of completion of the Works stated in the Certificate of Substantial Completion issued by the Divisional Engineer in accordance with the Clause 46 hereof or, in respect of any Section or part of the Works for which a separate Certificate of Substantial Completion has been issued, from the date of completion of that Section or part as stated in the relevant Certificate. The expression "the Works" shall, in respect of the "Period of Maintenance", be construed accordingly.

48 Completion of Outstanding Works and Remedying Defects etc.

During the Period of Maintenance, the Contractor shall finish the work, if any, outstanding at the date of the Certificate of Substantial Completion, and shall execute all such work of repair, amendment, reconstruction, rectification and making good defects, imperfections, shrinkages or other faults as may be required of the Contractor in writing by the Divisional Engineer during the Period of Maintenance and within fourteen (14) days after its expiration, as a result of an inspection made by or on behalf of the Divisional Engineer prior to expiration of the Period of Maintenance. To the intent that the works shall as soon as practicable after the expiry of the Period of Maintenance be delivered to the PAA in as good and perfect condition (fair wear and accepted tear) to the satisfaction of the Divisional Engineer as that in which they were at the commencement of the Period of Maintenance. All such outstanding work shall be carried out by the Contractor at his own expense if the necessity thereof shall, in the opinion of the Divisional Engineer, be due to the use of material or workmanship not in accordance with the Contract, or to neglect or failure on the part of the Contractor to comply with any obligation expressed or implied, on the Contractor's part under the Contract. In case the Contractor fails to comply with the requirements of the notice within ten days from its issue, the Divisional Engineer shall have the power to have the works completed through any other agency at the risk and cost of the Contractor.

49 Refund of Security Deposits

The Security Deposit shall not be refunded prior to 24 Months after the completion of the whole work, unless and until a certificate is issued by the Divisional Engineer for successful and satisfactory passing of the Period of Maintenance with no other liability on the Contractor.

50 Contractor's Liability for Damage done

If the Contractor or his workmen or servants shall break, deface, injure or destroy any part of a building, in which they may be working or any building, road, road kerbs, runway, taxiway, apron, culverts, ducts, fence enclosure, water pipes, cables, drains, electric or telephone or wire poles, trees, grass or grassland or cultivated ground contiguous to the premises on which the work or any part of it is being executed, or if any damage shall happen to the work, while in progress from any cause whatsoever, or any imperfections become apparent in it within three (03) months after a certificate, final or otherwise of its completion shall have been given by the Divisional Engineer as aforesaid, the Contractor shall make the same good at his own expense, or in default, the Divisional Engineer may cause the same to be made good by other workmen, and deduct the expense (of

which the certificate of the Divisional Engineer shall be final) from any sums that may then, or at any time thereafter may become, due to the Contractor, or from his security deposit or the proceeds of the sale thereof, or a sufficient portion thereof.

51 Assignment & Sub-Letting

The Contractor shall not assign or sublet the Contract or any part thereof or any benefit or interest thereon or there under without the prior written consent of PAA. In case of failure, the Divisional Engineer shall by giving Notice in writing rescind the Contract and have the Works executed at the risk and cost of the Contractor.

52 Stores to be supplied by PAA

If the specification or estimate of the work provides for the use of any special description of materials to be supplied by PAA or if it is required that the Contractor shall use certain stores to be provided by the PAA (such materials and stores, and the prices to be charged therefore as hereinafter mentioned being so far as practicable for the convenience of the Contractor, but not so as in any way to control the meaning or effect of this Contract, specified in the schedule of memorandum hereto annexed). The Contractor shall be supplied with such materials and stores as required from time to time to be used by him for the purpose of the Contract only, and the value of the full quantity of materials and stores so supplied at the rates specified in the said schedule or memorandum may be set off or deducted from any sums then due, or thereafter to become due to the Contractor under the contract or otherwise or against or from the security deposit, or the proceeds of sale thereof. All materials supplied to the Contractor shall remain the absolute property of PAA and shall not on any account be removed from the Site of the work and shall at all times be open to inspection by Divisional Engineer. Any such material unused and in perfectly good condition at the time of the completion or termination of the Contract shall be returned to PAA; but the contractor shall not be entitled to return any such materials unless with such consent, and shall have no claim for compensation on account of any such materials so supplied to him, as aforesaid being unused by him, or for any wastage in or damage to any such materials.

53 Bills to be submitted monthly

A bill shall be submitted by the Contractor each month on or before the date fixed by the Divisional Engineer for all works executed in the previous month and the Divisional Engineer shall take or cause to be taken the requisite measurement for purposes of having the same verified, and the claim, as far as admissible, adjusted, if possible, before the expiry of ten days from the presentation of the bill. If the Contractor does not submit the bill within the time fixed as aforesaid, the Divisional Engineer may prepare a bill which shall be binding on the Contractor in all respects.

54 Completion drawings

The completion report of the work along with drawings on prescribed proforma shall be submitted by the Contractor in five copies along with the final bill. In case of failure to submit the completion report and completion drawings by the Contractor on the basis of which the work has been finally completed, the final bill shall be withheld till their submission. The completion report and drawings should be complete in all respects.

Works relating to maintenance do not come under the preview of this clause.

55 Final Bills

The final bill shall be submitted by the Contractor within one month from the date of completion of the Works otherwise the Divisional Engineer's certificate of the measurement and of the total amount payable for the work accordingly shall be final and binding on all parties, and will not be called in to question by anyone.

56 Urgent repair

If by reason of any accident or failure or other event occurring to or in connection with the Works or any part thereof during the execution of the Works or during the Period of Maintenance any remedial or other work on repair shall in the opinion of the Divisional Engineer or his representative be urgently necessary and the Contractor is unable or unwilling at once to do such work or repair, the Divisional Engineer may by his own or other workmen do such work or repair as the Divisional Engineer or his representative may consider necessary. If the work or repair so done by the Divisional Engineer is work which in the opinion of PAA the Contractor was liable to do at its own expense, under the Contract, then all costs and charges properly incurred by the PAA, in so doing shall on demand be paid by the Contractor to the PAA or may be deducted by PAA from any monies due or which may become due to the Contractor. Provided always that the Divisional Engineer shall as soon as after the occurrence of any such emergency as may be reasonably practicable notify the Contractor thereof in writing.

57 Bribes, Commission etc.

Any bribe, commission gift or advantage given promised or offered by or on behalf of the Contractor or his partner, agent, or servant in relation to obtaining or to the execution of this or any other Contract with PAA, or given, promised, or offered by, or on behalf of, the Contractor, or his partner, agent, or servant, to any officer or person in the service or employment of PAA, who shall be in any way connected with the obtaining or the execution of this or any other Contract, shall in addition to any criminal liability, which he may incur subjects the Contractor to cancellation of this Contract, and also to payment of any loss resulting from any such cancellation. Any question or dispute to the commission of any offence under this Clause shall be settled by the PAA, in such manner as it deems fit and sufficient and its decision shall be final and conclusive.

58 Law governing the contract

This Contract shall be governed by and construed in accordance with the laws of the Islamic Republic of Pakistan, and the obligations, rights and remedies of the parties hereunder shall be determined in accordance with such laws. Resort to litigation by either of the parties in respect of any disputes should be had only before a court of appropriate and competent jurisdiction.

59 Increase or Decrease of Cost.

59.1 The Contractor is deemed to have quoted rates given in the Contract (Bill of Quantities) based on the prices of certain specified materials

prevalent in the month during which the last day of the submission of Bid fell.

59.2 No price adjustment shall be allowed under this clause except in respect of the materials specified in Appendix-A to Bidding Document which have actually been incorporated in the Permanent Works during the corresponding period of increase or decrease.

59.3 Adjustment shall be allowed for the specified materials according to the method prescribed in the Appendix-A to Bidding Document.

59.4 All claims for additional payments under this Clause shall be lodged by the Contractor with the Divisional Engineer within such reasonable time from the date of occurrence of the event which, according to the Contractor, entitles him to such additional payments by PAA, but in no case after the expiry of twenty-eight (28) days thereof, such claims shall invariably be supported with all relevant necessary details and particulars required for proper verification thereof and the Divisional Engineer shall be entitled to require the Contractor to provide such further details / information as may be required for due and effective verification of such claims.

59.5 The Divisional Engineer shall verify and certify for payment, if any, claims lodged by the Contractor under this Clause within a period not exceeding twenty-eight (28) days from the date on which the same are submitted by the Contractor as aforesaid.

59.6 In case the PAA is entitled to recover from the Contractor any sum or sums under this Clause arising from any decrease in the said prices for materials, the provisions of this Clause shall apply mutatis mutandis to such recoveries by the PAA.

59.7 If the Contractor fails to complete the works within the time for completion, adjustment of prices therefore until the date of completion of the works shall be made using either the indices or prices, whichever are more favourable to the PAA, provided that if extension of time is granted the above provision shall apply only to adjustments made up to the expiry of such extension of time.

59.8 No escalation shall be allowed to the Contractor in respect of the period extended for the completion of the work due to his own fault.

60 Water Supply/ Power Supply etc.

The Contractor should make his own arrangement for water and power supply required for execution of work and nothing will be paid for the same, by the PAA. Provided that in case water supply is allowed by the PAA to the Contractor from water mains passing through areas where the work is required to be carried out, the Contractor shall pay the cost of water to the department at one-half (1/2) per cent of the total cost of work for drinking purpose and one (01) per cent of the total cost of the items of work involving use of water (that is for constructional purposes). The Contractor shall bear full charges for laying its water lines of all length and size / dimensions from the mains to the site of his underground tanks as he may require and construct for storage purposes at its own cost.

61 Abandonment of work by PAA. PAA shall have the power to abandon any work whether in progress or otherwise and in such an event, the Contractor shall have no claim for any compensation of any kind whatsoever from PAA except the actual cost of the work executed at the Site under the Contract for which the contract requires payment to be made.

62 Materials obtained from excavation & dismantling. All materials (e.g. stone and other materials) obtained in the work of dismantling, excavation etc., will be considered PAA property and may be issued to Contractor (if they require the same for their own use) at rates approved by the Divisional Engineer. If these materials are not required by them, they will be disposed of as found fit by the PAA.

63 Danger Signs to be provided by Contractor Lights for illumination, danger signs for warning, and information / cautionary signs in approved colours and sizes shall be provided by the Contractor wherever required at his own cost on the barriers as directed by the Divisional Engineer.

SPECIAL CONDITIONS OF CONTRACT

6 Possession of Site

(Substitute the clause 6 with following text)

6.1 The Divisional Engineer shall, together with the written order to commence the Works, grant the Contractor possession of such portions of the Site as are necessary to enable the Contractor to commence and carry out the Works in accordance with the programme referred to in Clause 10, subject to any sequencing or phasing requirements prescribed in the Contract.

6.2 Thereafter, and from time to time as the Works progress, the Divisional Engineer shall grant possession of further portions of the Site, as required for execution of the Works with due dispatch, provided such possession aligns with the Contractor's reasonable proposals as approved by the Divisional Engineer.

6.3 The Contractor shall submit any such proposals for staging of site possession in writing to the Divisional Engineer for review and approval, and no right to possession shall arise unless and until expressly granted by the Divisional Engineer.

6.4 PAA shall not be liable for any delay or claim arising from staged or partial possession of the Site, provided such staging is consistent with the Contract or approved programme.

10 Programme to be furnished

(For works with a contract price exceeding the financial limit prescribed for PEC Constructor Registration Category C-3, as revised from time to time, Clause 10 shall be substituted with the following text)

10.1 The Contractor shall, within fifteen (15) days of receiving the Letter of Acceptance, submit a detailed Programme of Works to the Divisional Engineer for approval. The Programme shall include all activities, including mobilization, and clearly identify critical path items using a computerized Critical Path Method (CPM) format. The Programme shall be updated monthly, incorporating a chart of forecasted principal activities, an updated cash flow schedule for payments, and any revisions necessary to reflect actual progress. It shall serve as the baseline for assessing progress and determining Liquidated Damages under Clause 29. Monthly progress reports shall include an up-to-date analysis of actual versus planned progress, identification of current or emerging critical items, and the Contractor's proposed measures for mitigation.

18 Quality of Material, Workmanship and Tests

18.1 Expenditure on account of laboratory testing to ascertain suitability of materials and all other required tests etc. shall be borne by the Contractor.

24 Extension of time for completion

(For works with a contract price exceeding the financial limit prescribed for PEC Constructor Registration Category C-3, as revised from time to time, Clause 24 shall be substituted with the following text)

24.1 In the event of:

(a) the amount or nature of extra or additional work,

(b) exceptionally adverse climatic conditions,

(c) any delay, impediment or prevention by the PAA, or

(d) other special circumstances which may occur, other than through a default of or breach of contract by the Contractor for which he is responsible, being such as fairly to entitle

the Contractor to an extension of the Time for Completion of the Works, or any Section or part thereof,

the Divisional Engineer shall, after due consultation with the Contractor, determine the amount of such extension and shall notify the Contractor accordingly. Provided that the Divisional Engineer is not bound to take into account any extra additional work or other special circumstances unless the Contractor has within fourteen (14) days after such work has been commenced or such circumstances have arisen, delivered to the representative of the Divisional Engineer full and detailed particulars of any claim for extension of time to which he may consider himself entitled in order that such claim may be investigated at the time.

25 Termination of Contract for slow progress

25.1 In the event of termination by the Divisional Engineer, the Contractor shall have the right to file an appeal before the Director General PAA, within seven (07) days from the receipt of such termination notice. The decision of the Director General PAA shall be final and binding.

29 Liquidated damages for delay

29.1 The amount of Liquidated Damages for each day of delay in completion of the whole of the Works, or if applicable for any Section thereof, shall be imposed at the rate of 0.05% of Contract Price as stated in Letter of Acceptance for each day of delay in completion of the Works. Provided that the amount of Liquidated Damages for delay shall not exceed ten (10) per cent of the Contract Price as stated in Letter of Acceptance in all cases.

29.2 In cases where liquidated damages have been imposed or have been proposed to be imposed, the amount to be retained in lieu of Security Deposit during the Maintenance Period shall be based on the cost of works executed, and not the reduced amount to be paid to the Contractor after imposition of liquidated damages.

29.3 Where a work has been delayed beyond the stipulated date of completion, the Contractor shall be required to extend the securities and insurances as per the revised dates at his own cost.

31 Suspension of Works

31.1 Partial / complete suspension in work is likely to take place during emergency operations and VIP movements etc. labour, equipment, and material, etc. shall be removed from the site of work during such suspension periods to a distance for essential security requirements. No compensation whatsoever on this account shall be claimed by the Contractor for those losses likely to occur. All such unforeseen disruptions during working hours may result in idleness of manpower and equipment and waste of material, etc. for which no compensation shall be paid to the Contractor.

31.2 No compensation is payable for interruption in the work due to any reason beyond the control of PAA.

32 Care of Works

32.1 The Construction materials should be stacked at a suitable place as per the direction of the Divisional Engineer or his representative.

32.2 The work shall be so arranged as not to cause any disturbance to the passengers / functionaries and other agencies working at the airport.

41 Valuation of Works

41.1 For works items described in the priced bill of quantities (BoQ), the valuation of works shall be made as per the evaluated rates provided in the corrected priced BoQ, and

41.2 For work items not described in the priced bill of quantities (BoQ) but available in the Pak PWD Schedule of Rates (SoR), the valuation of works shall be made on pro rata basis, and

41.3 For work items neither described in the priced bill of quantities (BoQ) nor available in the Pak PWD Schedule of Rates (SoR), the valuation of works shall be made on the basis of actual cost (market rates) plus a lumpsum of twenty-five per cent (25%) as overheads and profit.

47 Period of Maintenance

47.1 Period of Maintenance or Defects Liability Period shall be of 24 Months duration.

59 Increase or Decrease of Cost

59.1 The Price Adjustment shall be applicable only for the Contracts having stipulated completion period greater than eighteen months and contract price exceeding financial limit of PEC Constructor's Registration Category C-3 as amended from time to time. Contracts having stipulated completion period less than or equal to eighteen months and value equal to or less than the abovesaid limit will be considered as fixed price contracts.

64 Payments to Contractor

64.1 PAA shall release payment to the Contractor within fifty-six (56) calendar days from the date of certification of the Contractor's bill by the Divisional Engineer. Should payment be delayed beyond this period, a simple interest at the rate of zero-point zero five percent (0.05%) per annum shall accrue on the unpaid amount, calculated from the day immediately following the due date until the date of actual payment.

65 Settlement of Disputes

65.1 Any difference or dispute arising between the PAA and the Contractor regarding the interpretation, execution, or performance of any provision of this Contract shall be referred exclusively to the Director General PAA, whose decision shall be final, conclusive, and binding on both parties. The Contractor shall not initiate or pursue any legal proceedings or remedies in relation to such matters. This shall be without prejudice to the rights of the parties under the applicable laws.

66 Authenticity of Financial Instruments

66.1 Any financial instrument, submitted by the Contractor as Bid Security, and Performance Guarantee, if found fake or dishonoured by the issuing bank / financial institution at any pre- / post-contractual stage shall, in addition to any criminal liability, call for blacklisting of the Contractor.

67 Obligations of the Contractor

67.1 The Contractor, during the execution of works, shall be responsible for following the instructions and directions of the Divisional Engineer or his representative only.

67.2 The Contractor shall be responsible to provide and use quality construction material as per the specifications, and to the satisfaction of the Divisional Engineer.

67.3 The Contractor shall strictly adhere to all design requirements and technical specifications established by the Design Engineer and approved by PAA. The charges of which shall be borne by the Contractor, but the additional quantity of any materials used in executing the Works shall be paid as per Contractor's quoted rate.

67.4 The Contractor shall clean the existing rusty steel by approved means at his own cost and no compensation whatsoever shall be given to the Contractor.

67.5 The Contractor will be fully responsible to arrange security clearance of his workmen employed on the job in accordance with the rules requirements enforced at the time of

execution and shall not be entitled for any compensation whatsoever on account of wastage of time and labour due to any reason.

67.6 The Contractor shall enclose the work / site area as per direction of the Divisional Engineer or his representative at his own cost. He will also ensure safety of workers as well as passenger(s) and airport staff during and after the work hours.

67.7 The Contractor shall submit a list of fittings, fixtures, equipment etc.to be dismantled as approved by Engineer In charge accordingly.

67.8 Generally, the works will be carried in accordance with Electrical Act 1910 read with Electricity Rules 1937 and any amendments thereto, Pak PWD Specifications for Electrical Works & latest editions of I.E.E rules of Building Equipment.

67.9 All wires & Cables to be used for executions of work will be copper conductors.

67.10 Damages done by the contractor during execution of work will be made good by the Contractor as per Engineering specifications and to the complete satisfaction of the Divisional Engineer.

67.11 The contractor will perform all types of tests as directed by E&M Engineer In charge after / before executions of his work & will submit test reports in this regard if required.

67.12 Cost of samples of materials will not be claimed & test charges for all required tests as instructed by the E&M Engineer from Govt. or other authorities will be borne by the contractor without any extra claim of this effect.

67.13 The Contractor will submit warranty / guarantees & literature of the Air-Conditioning equipment, Electrical equipment or Mechanical equipment etc as desired by Engineer In charge.

67.14 The approved makes of materials, accessories & equipment are provided in Appendix-F. works shall be executed subject to approval of samples from Engineer In charge.

67.15 Any equipment / items during execution / testing / commissioning & during maintenance period if burnt out / malfunctioning or broken will be replaced by the contractor without any extra cost.

67.16 **STARTUP,TESTING AND COMMISSIONING**

A) The PAA will observe startup and contractor testing of installed equipment. The contractor shall submit the criteria for SITE Acceptance Test (SAT) to PAA for approval. The contractor shall carry out the Tests on Completion in accordance with OEMs' documentation and Site condition, after approval of SAT criteria and providing the documents in accordance with documents mention in the Technical Specification.

B) The contractor shall give to the PAA not less than 02 days notice of the date after which the contractor will be ready to carry out each of the Test on Completion. The Tests on completion shall be carried out in the following sequence.

a. Pre-commissioning tests, which shall include appropriate inspection and ("dry or cold") functional test to demonstrate that each item of Plant can safely undertake the next stage.

b. Commissioning test, which shall include the specific operational test to demonstrate that the Works or Section can be operated safely and as specified, under all available operating condition.

c. Trail operation which shall be demonstrate that the Works or Section perform reliably and in accordance with contract.

67.17 During the warranty period the contractor shall fully support the PAA operational team for smooth operation and gaining full knowledge and command on the equipment operation and maintenance.

67.18 Supplier/Contractor must provide all the relevant detail of Control System (Hardware and Software) used for the operations and control of the soft starter, VFDs and allied installations. All information. All information related to equipment vendor must be provided to PAA.

67.19 The operation and maintenance level password of equipment shall be provided to PAA (if applicable) After completion of warranty period, all level password and configuration software including setup parameters complete in all respect should be handed over to PAA.

67.20 The contractor may maximize the installation efficiency to curtail chiller plant shutdown time by pre-assembling/fabricating and installing the panel on plug and play theme without compromising the project specification.

67.21 The contractor shall supply the following equipment for use at ES Directorate, HQPAA office, to support the requisite project activities. The supplied equipment shall become the property of the Client upon completion of the Defect Liability Period (DLP) and no claim whatsoever in this regard shall be entered by the contractor.

(I) 02 Nos. New Laptops – HP Spectre 14-EU0097NR Intel Core Ultra 7 155H 16GB 1TB 14.3”k OLEDx360 Touch Backlit KB FPR Win 11 Black

(II) 01 No. Laser printer Brother HL-L5200DW Black/White Laser Printer or equivalent.

(III) 01 No. Canon Scanner 6130010 (made in Japan) or equivalent.

67.22 These above mentioned Specifications / Terms shall have to be read in conjunction with the General Conditions of the Contract and BOQ. The provision given hereunder shall take precedence, and decision of accepting officer shall be final in case of variation or any doubt in interpretation. The method of construction and workmanship where not specifically stated will be in accordance with best engineering practices and principles.

67.23 The plant and equipment provided by the Contractor under the Contract shall be a model in current production and shall be of quality workmanship and material. The equipment offered under the specification shall be new (used, demonstrator, prototype, refurbished or discontinued models are not acceptable)

67.24 Contractor shall return / deposit all the dismantled / unserviceable material to HVAC section and submit the receipt of dismantled material deposited with the Final Bill.

67.25 Contractor shall not execute any work (particularly any hot works) prior to information / approval of concerned PAA Engineer In-charge or his representative, Irrespective of working hours, during maintenance period.

67.26 The Contractor shall indemnify PAA against all third-party claims, including claims of infringement of intellectual property rights patent, trademark, industrial design arising from use of the goods or any part thereof.

67.27 Work to be executed during planned shutdowns or low-demand periods. Work on each MCC panel must be completed within a specified timeframe.

67.28 Contractor shall supply and install approved electrical insulating mats in front of all electrical panels, MCCs and distribution boards.

67.29 Commissioning and site acceptance will be under taken at Utility Building JIAP Karachi.

67.30 The Contractor will re-check all parameters and set-points required to validate the performance specification.

67.31 A hand held potable tester shall be provided to check and diagnose faults for R&M of the soft starter & VFD.

Appendix - A

SCHEDULE OF BASIC PRICES OF SPECIFIED MATERIALS

A) Basic Price Materials (To be filled by the Bidder)

We confirm herewith that the following prices were prevalent in the month during which the last day of the submission of bidder fell and have been taken as a basis for quoting the prices given in our Bidder.

Adjustment of increase / decrease in price shall only be admissible for the materials listed herein under:

S.No.	Materials	Unit	Basic Price Ex-Factory/Works	Remarks
1	2	3	4	5
1.	Cement	Bag (50 Kg)		The basis of the rate is the Monthly Statistical Bulletin issued by the Pakistan Bureau of Statistics.
	i) Ordinary Portland Cement			-- do --
	ii) Sulphate Resisting Cement			-- do --
2.	Steel	Kg		
	i) Reinforcement Bars			-- do --
	ii) M.S. Sections			-- do --
3.	Bitumen	Tonne (1000 Kg)		The basis of the rate is the Monthly Statistical Bulletin issued by the Pakistan Bureau of Statistics. If not available then basis would be National Refinery, Attock Refinery or from an approved equivalent source.
	i) Grade 60/70			-- do --
	ii) Grade 80/100			-- do --
	iii) Cutback Bitumen			
	a) Medium Curing			-- do --
	b) Rapid Curing			-- do --

Note:

(1) If the price paid by the Contractor for any of the Specified Materials shall differ from the basic thereof and shall cause an increase or decrease of cost to the extent of five (5) per cent or more to the Contractor in carrying out the Contract, the increase or decrease of such cost shall be adjusted in the Contract Price accordingly. The actual payments shall be made on the basis of quantities actually measured and certified for payment. Any fluctuation in the prices of materials other than the Specified Materials shall not be subject to adjustment of the Contract Price.

(2) The Bidders shall submit satisfactory documentary evidence in support of the rates and prices filled up in this Appendix.

We agree that price variation in the above listed basic prices during the currency of the Contract will be adjusted only to the extent as stipulated under the Conditions of Contract.

Authorized Signatures _____

Name _____

Seal _____

Date _____

Appendix - B

MATERIALS TO BE PROVIDED BY PAA

Schedule showing (approximately) materials to be supplied by the PAA under Clause 52 of the General Conditions of the Contract or for work contracted to be executed and the rates at which they are to be charged for

Particulars	Rate at which the material shall be charged to the Contractor		Place of Delivery
	Unit	Rs.	

Note: The person or firm submitting the Bid should see that the rates in the above schedule are filled up by the Divisional Engineer on the issue of the form prior to the submission of the Bid.

Appendix - C

PERFORMANCE BOND GUARANTEE

Guarantee No:
Date of Issue:
Amount of Guarantee:
Date of expiry:

By this Bond We ..... (hereinafter called "THE SURETY"), (1) do hereby bind ourselves and our successors and assign jointly and severally by these presents to pay to the PAKISTAN AIRPORTS AUTHORITY, KARACHI (hereinafter referred to as the PAA which term shall include his successors in office and assigns) unconditionally on demand and without further question, the sum of Rs…… (Rupees.....), sealed with our respective seal and dated this …….

WHEREAS, M/s. ..... (hereinafter referred to as "THE CONTRACTOR") by an agreement made between the PAA of the one part and the Contractor of the part have entered into a Contract hereinafter called "Said Contract" for the Construction, completion and maintenance of ……." as therein mentioned in conformity with the provisions of the said contract and the sum mentioned in the above written Bond represent the amount of Performance Bond to be furnished by the Contractor for due fulfilment of obligations under the said Contract.

NOW THE CONDITION OF the above written Bond is such that if the Contractor shall duly perform & observe all the terms, provisions, conditions & stipulations of the said contract on the Contractor's part to be performed & observed according to the true purpose, intent & meaning hereof as determined by the PAA who shall be the sole judge in the matter, or if on default by the Contractor for which the PAA shall be sole judge the Sureties/Surety shall pay the amount of this Bond to PAA without reference to the Contract, then this obligation shall be null and void but otherwise shall be and remain in full force and effect but no alteration in terms of the said Contract made by agreement, between the PAA and the Contractor or in the text or nature of the works to be constructed, completed and maintained thereunder and no allowance of time by PAA under the said Contract nor any forbearance or forgiveness in or in respect of any matter or thing concerning the said Contract on the part of the PAA shall in any way release the Sureties/Surety form any liability under the above written Bond.

AND WE agree that this Bond shall be irrevocable and the Guarantee hereby given shall be valid up to … .....and that a Certificate signed by the Director Engineering Services / Additional Director, stating that the Bond has become due will be sufficient proof of its forfeiture and we shall pay the amount so demanded without, any further proof of any kind and that the payment shall be made by us forthwith on the receipt of the Certificate of the Director Engineering Services / Additional Director as aforesaid.

Notwithstanding anything contained hereinabove, the Bank's liability under this Guarantee shall in no event exceed the sum of Rs …….. (Rupees.....), and this guarantee shall remain valid up to ……. where after the Bank shall be completely discharged and released from all its liabilities hereunder unless a claim is received before the aforesaid expiry date.

Signed, sealed and delivered by the said in the presences of:

For and on behalf of
M/s

CONTRACTOR

For and on behalf of

SURETY

WITNESSES:

1. Signature.
   Name.
   CNIC:
   Address.

2. Signature.
   Name.
   CNIC:
   Address.

Appendix - D

MOBILIZATION ADVANCE GUARANTEE

(Bank Guarantee)

Guarantee No. _____ Date _____

WHEREAS the Pakistan Airports Authority (hereinafter called PAA) has entered into a Contract for _____ (Particulars of Contract), with Constructor "M/s _____" (hereinafter called the "Contractor").

AND WHEREAS, PAA has agreed to advance to the Contractor, at the Contractor's request an amount of Rupees _____ (Rs._____), which amount shall be advanced to the Contractor as per provisions of this Contract.

AND WHEREAS, PAA has asked the Contractor to furnish Guarantee to secure the advance payment for the performance of his obligations under the said Contract.

AND WHEREAS, _____ (Scheduled Bank) (hereinafter called the "Guarantor") at the request of the Contractor and in consideration of the PAA agreeing to make the above advance to the Contractor, has agreed to furnish the said Guarantee.

NOW, THEREFORE, the Guarantor hereby guarantees that the Contractor shall use the advance for the purpose of above-mentioned Contract and if he fails and commits default in fulfilment of any of his obligations for which the advance payment is made, the Guarantor shall be liable to PAA for payment not exceeding the aforementioned amount.

Notice in writing of any default, of which the PAA shall be the sole and final judge, on the part of the Contractor, shall be given by the PAA to the Guarantor, and on such first written demand, payment shall be made by the Guarantor forthwith of all sums then due under this Guarantee as determined by the PAA without any reference to the Contractor and without any objection.

This Guarantee shall remain in force until the advance is fully adjusted against payments from the interim Payment Bills of the Contractor or until (Date) _____ whichever is earlier.

The Guarantor's liability under, this Guarantee shall not in any case exceed the sum of Rupees _____ (Rs._____).

This Guarantee which is unconditional and irrevocable, shall remain valid up to the aforesaid date and shall be null and void after the aforesaid date or earlier if the advance made to the Contractor is fully adjusted against payments from interim Payment Bills of the Contractor provided that the Guarantor agrees that the aforesaid period of validity shall be deemed to be extended if on the above mentioned date the advance payment is not fully adjusted as payments from interim Payment Bills of the Contractor.

GUARANTOR

For _____

(Bank Limited)

1. Signature _____
2. Name _____
3. Title _____

Appendix - E

LIST OF BANKS

Following is the list of approved schedule banks (financial institutions) acceptable to PAA for obtaining Bank Guarantee(s):

Public Sector

1) National Bank of Pakistan
2) Sindh Bank Limited
3) The Bank of Punjab

Private Sector

4) Allied Bank Limited
5) Askari Bank Limited
6) Bank Al Habib Ltd.
7) Faysal Bank Ltd.
8) Habib Bank Ltd.
9) Habib Metropolitan Bank Ltd.
10) JS Bank Ltd.
11) MCB Bank Ltd
12) Samba Bank Ltd.
13) Soneri Bank Ltd.
14) Standard Chartered Bank Ltd.
15) United Bank Ltd.
16) Industrial and Commercial Bank of China Ltd.

Islamic Banks

17) Al Baraka Bank (Pakistan) Limited
18) BankIslami Pakistan Limited
19) Dubai Islamic Bank (Pakistan) Limited
20) Meezan Bank Limited

Appendix - F

LIST OF APPROVED MANUFACTURERS / SOURCES

This list of recommended manufactures / suppliers of different materials / equipment with brand names have been provided in order to establish a standard level of performance. The Contractor is supposed to provide and fix the materials / equipment of acceptable quality from the list or equivalent as approved by the Engineer. Whereas the preference of brand and model will be decided by the Engineer. Material from approved list shall stand rejected, if it fails in any of the specified tests or quality standards.

Sr. No.	Description	Manufacturer/Supplier/Source
	Civil Works	
1	Cement (OPC, SR)	Lucky, Pioneer, Maple Leaf, Fauji, Askari, Power, Cherat, DG Khan, Dewan
2	Cement (White)	Kohat, Maple Leaf, Zealpak
3	Construction Chemicals & Sealants	Sika, Fosroc, BASF, Ultra, Fastchem, Vertex, MAPEI, KALON, Mitchell
4	Anchoring / Fixing Systems	Strong hold, Strong force, Hilti, Fischer
5	Sand	Bholari, Lawrencepur or from any other approved source as per Mix Design.
7	Aggregate	From approved source.
8	Steel Reinforcement	Amreli, FF Steel, AFCO, Ittehad, Ittefaq, Fazal, PECO, Razzaque, Metropolitan, Mughal, Pak Steel, Model Steel, Nizami Brothers, Moiz Steel, Poineer, Tayyaba Steel or approved equivalent.
9	Bitumen (Cold)	National Refinery, Attock Petroleum, PARCO
10	Bricks/Blocks	Local (Brand / source to be approved by the Engineer)
11	Ceramic / Porcelain Tiles	Shabbir, Master, Time Ceramic, National, or equivalent imported
12	Vinyl Tiles	Decora, Marflex, A.T.S. Synthetic
13	Wooden Flooring	Sarina, Firstfloor or equivalent
14	Textured Decorative Wall Coating	Rockwall, Wall Tec, Rock Shield, Sand Tec, Graffito, Jotun
15	Aluminum Doors / Windows	ALCOP, Pakistan Cables, Chawla, Prime, Ittehad Aluminum, Thermec, Eng: Co, Alhali Aluminum Co (Pvt) Ltd, Krudson, Lucky or equivalent
16	Aluminum Composite Panel	ALCOP, Chawla, Pakistan Safety Glass (Alucobond), AKB (EuroBond – Exterior. & DuBond – Interior)
17	Paint	ICI (Dulux, Paintex), Berger Robbialac, Brighto, Master, Kansai (Japan), Nippon, Jotun, Diamond, Buxly, Pakistan Phthalates Limited (Kalon Chemicals Company) or equivalent.
18	Powder Coating	Jotun or approved equivalent
19	Concrete Pavers	Tuff Tiles, Izhar, Envicrete, National Pavers, Banu Mukhtar, Magnacrete or equivalent
20	Insulation	Diamond (Jumbolon), Pakistan Insulations, Safe line, Insugreen

Sr. No.	Description	Manufacturer/Supplier/Source
21	Membranes for Roof and Basement walls	Polytec (Henkel Polybit), Hygrip, Roof Grip, A.T.S. Synthetic, Petro Seal, Bitumat (Saudi Arabia), Pakistan Phthalates Limited (Kalon Chemicals Company), Sika Raingard
22	uPVC Doors / Windows	Framez, Uniwin, Nasar Steel, U-Tech, Green Door, V-Make, Chawla
23	Steel Doors and windows	SECCO or any other approved equivalent
24	Termite Proofing	Agenda (Termidor), Biflex, Fiprokil, Mirage, Termicure, Ability
25	Terrazzo Tiles	As approved by Engineer
27	Pre-Engineered Steel Buildings	Zamil, Mammut, Mabani, Kirby, Banu Mukhtar, Izhar, SACHAL
28	Gypsum False Ceiling	Elephant, Lodhia (Arish), DFB, United
29	Glass	Pakistan Safety Glass, Ghani, Al-Fattah, Khawaja, Nowshera Prince or equivalent.
30	Door hardware	Kolf, Sitara Hardware, Jb.Saeed, IM Hardware (Yale), Alpha, Khas, Babar, or approved equivalent.
32	SS Railing	Dah Shi (Taiwan), IIL, or equivalent
33	Medium Density Fibreboard	Al-Noor, ZRK, Nuboard or equivalent.
34	High Density Fibreboard	Patex, Sonitex or equivalent
35	Plywood	Patex, Marineplex or equivalent.
PUBLIC HEALTH WORKS		
1	Sanitary Ware (WC Indian, WC European, Basin / Vanity, Urinal, Flushing Cistern)	Porta, Marachi, Master, ICL, Finecera, Karam, Cera and 3 Star or equivalent.
2	Bottle trap	Porta, Master, Faisal, Sonex, Asia and Super Asia or equivalent.
3	Bath / Kit. Fittings	Porta, Master, Faisal, Sonex or equivalent.
4	PPR-C Pipes & Fitting	Dadex, Beta, Master, Plasco, Turk Plast, Popular Pipe, Accufit, Minhas, Dura Built, IIL, Builtec, Euro Gulf, YAH Plastic Industry, Pelikan Pipe Industry (Civic)
5	uPVC Pipes & Fittings	Dadex, Shavyl, Galco, Beta, Turk Plast, Jamal, Fast Flow, Plasco, Popular Pipe, Master, Accufit, Dura Built, Builtec, Euro Gulf, YAH Plastic Industry, Newtech, Pelikan Pipe Industry (Civic), Prime Star Industries or approved equivalent.
6	RCC Pipe	Shalimar, Pakistan Pipes, National Pipe Industry
7	G.I. Pipes	International Industries Ltd. (IIL), Master Pipe, Jamal, Victory, Steelex or equivalent
8	C.I. Pipes	C.I. Engineering / Corp: Teepu, Alpine, NPC and CME or equivalent.
9	Gate / Sluice Valves	KITZ (Star Corporation), Teepu, Anwer, Asia, Rehman Group, Sirajia Trading co.

Sr. No.	Description	Manufacturer/Supplier/Source
10	G.I. Fittings	KITZ (Star Corporation), Health Engineering (HE)
11	C.I. Fittings & Valves	Teepu, Alpine, Sirajia Trading co.
12	C.I. Manhole Cover	CME, Teepu, Alpine, Turk Plast
17	MS Seamless Pipe	Huffaz Industries, Jamal, KITZ, Sirajia Trading co., Master Pipes, Victory
18	PVC Water Stop	Fosroc, Sika, Decora, Marflex
19	HDPE pipe and Fittings	Dadex, Jamal, Plasco, Turk Plast, Beta, Popular Pipe, Accufit, IIL, DURA BUILT, Builtec, Fast Flow, YAH Plastic Industry, Newtech, Pelikan Pipe Industry (Pelikan), Prime Star Industries
21	Water Tank	Master, Super Tuff, Dura, Accufit, Prime Master
22	Kitchen Sink	Porta, Atlas, Asia or approved equivalent
ELECTRICAL & MECHANICAL WORKS		
1	Wires and Cables	Pakistan Cables, Fast, AGE, Newage, GM
2	Air Switch Breaker, Load brake switches, MCCB and MCB etc.	Terasaki Japan, Siemens, ABB, MG, Hager, Schneider Electric
3	Switches and Sockets	Schneider, Philips
4	Down Light/ Batten Lights	Sunlight, Pierlite, Future Technology, Orient
5	Flood Lights	Philips/ Signify, Osram, GE, Thorn
6	Fans Ceiling/Exhaust/Bracket	Pak, Royal, SK, Super Asia,
7	UPS	Huawei, Homage, Inverex, Goodwee, Crown, Fronius, APC
8	Tubular batteries	AGS, Phoenix, Osaka, Exide, Volta
9	AC Units	Gree, Haier, Orient, Green Air, Dawlance, PEL, Kenwood
10	Air Curtains	Gree, Haier, Orient, Green Air, Dawlance, PEL, Kenwood or Equivalent
11	PVC Conduits and Pipes	Polupar, Galco, Sheval, Adamjee, GM, Dadex
12	PVC Cable Trunk	Adamjee, Jeddah or equivalent
13	Termination Kit / Straight Jointing Kit	Raychem (Germany), 3M (USA), Elastimod (Egypt)
14	LV main distribution panel	Siemens, PEL, FICO, Schneider Electric, ABB, Sunbeams, Engineers & Engineering, Libra, Hussein & Co., BLS. As per technical specification & BOQ/schedule of Rates.

Annexure - D

Note: Wherever the word Civil Aviation Authority (CAA) is mentioned in this section of the document, it shall be read, interpreted, treated and dealt as Pakistan Airports Authority (PAA).

HSE MANUAL FOR CAA CONTRACTORS, SUPPLIERS & CONCESSIONAIRES

MANUAL

VERSION : 2.0
DATE OF IMPLEMENTATION : 15-03-2017
OFFICE OF PRIME INTEREST : Directorate of Safety & Quality Management System (SQMS)

	NAME	DESIGNATION	SIGNATURE
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TYPE OF DOCUMENT	MANUAL (MNL).		
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MASTER COPY

HISTORY

As day to day activities have become highly sophisticated, so has our understanding of how to create a safe, healthful work environment. In the past "Accident Prevention" for organizations simply meant freedom from serious injuries to Employees and property loss. Today, however, "Loss Control" being a part of HSE covers not only injury but occupational diseases and environmental concerns along with fire and property damage control. This new understanding of HSE is not only reflected at all levels of management but also in contractors, suppliers & concessionaires activities.

These days most of the Organizations show their concerns with regard to the welfare of their employees but some-how leave aside the part suppliers, contractors and concessionaires play during routine operations, which at times harm the organizations and employees as well. It is the need of the time that suppliers', contractors' and concessionaires' level of understanding about HSE issues be made at par with that of an organization they are working for.

The present CAA Management has made a concentric and serious effort of establishing International HSE Standards by initiating the process of Integrated Management System (IMS) implementation, in which contrary to the past, role of CAA suppliers, contractors and concessionaires is addressed, so as to keep their activities on harmonious track with CAA operations and to ensure fulfillment of CAA HSE requirements. The publication of this HSE manual is part of the same campaign and commitment made by CAA's top management.

The Directorate of Safety & Quality Management System has been established with its field offices at various airports / locations to provide onsite support and guidance on the issues pertaining to the Health, Safety, Environmental Protection, Energy Conservation, Customer Satisfaction, Aviation Security and Information Security Management System. The requirement detailed in this Manual are derived based upon international standards and industry best practices. The CAA reserves the right to change / amend the requirement stated in this document with the change in requirement of international standard or to suit CAA's requirement.

RECORDS OF AMENDMENTS AND CORRIGENDA

AMENDMENTS			
No.	Date Applicable	Date Entered	Entered by

CORRIGENDA			
No.	Date of Issue	Date Entered	Entered by

TABLE OF CONTENTS

FOREWORD

Pakistan Civil Aviation Authority is focused on improving the Health, Safety and Environment related aspects which would enable to control occupational hazards & safety risks essentially required to implement Environmental Management System. The development and implementation of an Integrated Management System is already in process through which CAA has already acquired ISO 9001:2008 (Quality management System) and is now steadily moving forward to acquire ISO 14001:2004 (Environmental Management System), OHSAS 18001:2006 (Occupational Health and Safety Management System), CS ISO 10001:2007 (Customer Satisfaction), ISMS ISO 27001:2005 (Information Security Management System), EnMS 50001:2011 (Energy Management System) and ICAO SeMS (Security Management System) duly integrated with ICAO's Aviation Safety Management System.

I would like to highlight the pivotal role of contractors, suppliers, and concessionaires in different activities being carried out at our premises to conform to the acceptable safety standards in order to control adverse environmental impacts and safety hazards / risks. We shall constantly need the support of contractors, suppliers, and concessionaires to assist in inculcating a safe and environment friendly culture at our premises.

This Manual contains guidelines to be followed by the contractors, suppliers, and concessionaires in compliance with all the standards and regulation of safety, environment, occupational health and quality based on continual improvement concept while performing work / activity within the areas of responsibility at Pakistan Civil Aviation Authority premises. The relevant CAA officials will extend maximum possible assistance wherever clarifications are required regarding interpretation of this manual.

I would also like to acknowledge the contributions made by the contractors, suppliers and concessionaires in developing and maintaining the infrastructure at the Pakistan Civil Aviation Authority airports and other locations. At the same time, I urge them to actively participate in our efforts to create positive improvements by strengthening the institution through adoption of best quality, health, safety, and environmental practices enabling Pakistan Civil Aviation Authority to become a leading aviation organization.

(ASIM SULEIMAN)
Air Marshal
(Retd.)Director
General
Pakistan Civil Aviation Authority

Dated: - **11 March 2017**

ACRONYMS

ATS	AIR TRAFFIC SERVICE(S)
CAA	CIVIL AVIATION AUTHORITY
CARs	CIVIL AVIATION RULES
CAAF	CIVIL AVIATION AUTHORITY FORM
CAAO	CIVIL AVIATION AUTHORITY ORDER
DMR	DEPUTY MANAGEMENT REPRESENTATIVE
HQCAA	HEADQUARTER CIVIL AVIATION AUTHORITY
HSE	HEALTH SAFETY ENVIRONMENT
IAR	IMPROVEMENT ACTION REPORT
IMS	INTEGRATED MANAGEMENT SYSTEM
MR	MANAGEMENT REPRESENTATIVE
PPE	PERSONAL PROTECTIVE EQUIPMENT
PTW	PERMIT TO WORK
EMS	ENVIRONMENTAL MANAGEMENT SYSTEM
ISO	INTERNATIONAL ORGANIZATION FOR STANDARDIZATION
LOTO	LOCK-OUT TAG-OUT
LPG	LIQUID PETROLEUM GAS
MNL	MANUAL
MSDS	MATERIAL SAFETY DATA SHEET
NEQS	NATIONAL ENVIRONMENTAL QUALITY STANDARDS
OH&SMS	OCCUPATIONAL HEALTH & SAFETY MANAGEMENT SYSTEM
OPI	OFFICE OF PRIME INTEREST
QMS	QUALITY MANAGEMENT SYSTEM
SMS	SAFETY MANAGEMENT SYSTEM
TQM	TOTAL QUALITY MANAGEMENT

Chapter 1
INTRODUCTION

1.1 INTRODUCTION

Integrated Management System comprising International Management System standards ISO 9001: 2008 (Quality Management System), ISO 14001: 2004 (Environmental Management System), OHSAS 18001: 2007 (Occupational Health and Safety Management System), and ICAO's SMS (Safety Management System) has been implemented in Pakistan CAA. These standards require adherence from all the stakeholders to fulfill their respective obligations towards vital aspects of Safety, Quality, Occupational Health and Environment. This HSE Manual outlines the responsibilities of contractors, suppliers and concessionaires working for CAA or on the areas under CAA's jurisdiction

1.2 CAA IMS POLICY

Top Management commitment is demonstrated in IMS Policy, attached as **Appendix-A** (English version) and **Appendix-B** (Urdu version).

1.3 RESPONSIBILITY & AUTHORITY

1.3.1 RESPONSIBILITY FOR HSE COMPLIANCE:

1.3.1.1 CAA shall require Contractors and/or Sub-contractors / Suppliers / Concessionaires to affirm that all supervisors are responsible for ensuring that the works / activities are performed in accordance with all applicable health, safety and environmental rules, regulations and good working practices with equal diligence being paid to the fulfillment of the contractual technical specifications. CAA will require Contractors and Sub-contractors to advise such personnel of their safety responsibilities. Contractors / Suppliers / Concessionaires shall also provide CAA with their organizational setup for a particular contract / subcontract / renewal / bid invitation document, where applicable, specifying the areas of safety responsibilities of their supervisors.

1.3.1.2 **All DDGs** shall ensure imparting necessary directions and establish requisite monitoring & evaluation mechanism in their respective area of responsibilities to fulfill the vision and the objectives contained in this manual.

1.3.1.3 **The concerned Directors / Additional Directors / Airport Managers/Chief Operations Officers / Location Heads / Sectional Heads**, involved / engaged in the purchase of materials, services and contracts (including sub-contracts, if any), shall ensure effective implementation of this manual. They shall also be responsible to designate **Contract Coordinators** where applicable especially on large scale projects.

1.3.1.4 **Contract Coordinator** (a designated CAA Employee) shall be responsible for the on-site implementation of HSE requirements by the contractors and their officials / workers. He shall also be responsible to record on-site management activities and meetings specific to the HSE issues.

1.3.1.5 **Deputy Management Representatives (DMRs)** shall be responsible to oversee the implementation and effectiveness of this manual at their respective Airports / ATS Units / Locations.

1.3.1.6 The concerned **Directors / Additional Directors / Airport Managers / Chief Operations Officers / Location Heads / Sectional Heads**, involved / engaged in the purchase of materials, services and contracts (including sub-contracts, if any), shall ensure incorporation of specific clause(s) on Safety, Health & Environment in the contract agreements or their renewals / bid invitation documents indicating the need for compliance with the detailed guidelines as outlined in this manual.

1.3.1.7 All Safety, Health and Environment requirements contained in this manual shall also be made part of the bid invitation documents / contracts.

1.3.1.8 Any specific requirements not covered in this manual and in the existing HSE clause of the contract / lease agreement may be specified in the contract / lease documents by the respective CAA functions, in consultation with Additional Director SQMS (REG/CF), Additional Director SQMS (ANS/APS) at HQCAA and concerned DMRs at Airports / ATS Units / Locations. These may include but not limited to:

a. Working procedures
b. Risk / impact assessment of the job
c. Requirements of transporting carrier, machinery / equipment and tools
d. Handling / packaging identification requirements
e. Information about the product composition
f. Compliance to the related Safety, Health & Environment procedures for performing the activity
g. Usage of Personal Protective Equipment (PPE)
h. Competence / training requirements of workers
i. Handling and disposal of waste, etc
j. The need to obtain Permit To Work (PTW), where required
k. Emergency procedures
l. Accident / incident reporting
m. Legal requirements

1.3.1.9 The **concerned Directors / Additional Directors / Airport Managers / Chief Operations Officers / Location Heads / Sectional Heads** may ask the supplier / contractor / concessionaire to carry out a **risk assessment** before awarding a contract for high-risk tasks, where applicable.

1.3.2 ONSITE MANAGEMENT OF CONTRACTORS FOR MEGA / MAJORPROJECTS:

1.3.2.1 The **concerned DDGs / Directors / Additional Directors / Airport Managers / Chief Operations Officers / Location Heads / Sectional Heads** shall ask the contractor / supplier / concessionaire to designate a **Safety Officer** wherever applicable, depending upon the quantum of contract, who shall be the focal person and responsible for on-site implementation of HSE requirements on part of contractors / suppliers / concessionaires. For Contracts / Agreements of smaller quantum, the contractor / supplier / concessionaire shall be directly responsible in this regard without having the need to designate such representatives.

1.3.2.2 The **concerned Directors / Additional Directors / Airport Managers / Chief Operations Officers / Location Heads / Sectional Heads** shall be responsible to nominate a representative **(Contract Coordinator)** for on-site management of contractors for mega / major projects. The contract coordinator / representative shall monitor the HSE compliance by the contractor / supplier. This includes monitoring of:

a. Controls to prevent HSE risks
b. Contractor equipment for appropriateness
c. Compliance of work procedures
d. Waste Disposal & Record keeping

e. Compliance of regulatory requirements, to this HSE Manual or their own HSE Manual(s) if exceeding the requirement stipulated by the CAA and PTW by contractors / suppliers / concessionaires

1.3.2.3 **Regular on-site meetings with the contractor** must be convened / held to discuss the HSE compliance and related aspects of the job. Records of such meetings and on-site management activities must be maintained by the Contract Coordinator.

1.3.2.4 **HSE audit or on-site inspections** shall be carried out randomly by the authorized Inspectors of SQMS Directorate in coordination with the concerned Directorate / Branch at HQCAA and concerned Section at airports / locations for checking HSE compliance. IAR (Improvement Action Report) on **CAAF-002-MSXX** shall be raised / generated in case any non-conformity is observed or if any corrective or preventive action is required. All proceedings of the audit or on-site inspections shall be documented by the respective inspectors.

1.3.2.5 All the works, purchase / supplies and services being carried out / rendered by Contractors / Suppliers / Concessionaires shall be liable to monitoring and supervision by CAA's authorized / designated official(s) to ensure their HSE- worthiness. Surprise inspection may be carried out at any time by SQMS Officials.

1.3.2.6 The monitoring / supervision so required shall be made under the relevant clause(s) of the contract. The performance monitoring data of contractors with regard to compliance to HSE manual and CAAO will be collected / maintained and documented on periodical basis by the respective DDGs as well as by SQMS Directorate / SQMS teams at locations, to develop necessary corrective / preventive actions accordingly. This significant data of a particular contractor / supplier / concessionaire, will be critically observed and be given due consideration at the time of awarding / continuation / renewals etc of any contract.

1.3.2.7 All potential Contractors, Suppliers and Concessionaires shall be informed about the availability of HSE manual which would require compliance from them. The latest version of this Manual shall be posted on the CAA's Official Website **www.caapakistan.com.pk.**

1.3.2.8 The concerned Directorate / Branch / Airport / Location shall provide the hard copy of the latest version of HSE Manual to the Contractors / Suppliers / Concessionaires at the time of signing of the Contract Agreements / License Agreements / Lease Deeds / Purchase Orders / Supply Orders, etc.

a. No work be executed without supervision of concerned representation of OPI Section / Branch, especially at aerodrome.

b. The representation of OPI section / function shall ·ensure implementation of preventive control measures during execution of work and corrective measures in case of any abnormal / emergency situation.

c. All food concessionaires shall preferably be certified in Food Safety Management System ISO 22000: 2017.

1.3.2.9 In case of existence of any Contractor's, Supplier's and Concessionaire's HSE Manual having provisions more stringent to this HSE manual, those shall be applicable as far as the currency of that particular contract is concerned.

1.3.2.10 All the Contractors, Suppliers and Concessionaires shall be responsible to provide and update bare minimum training / awareness on HSE to their employees and subsequent implementation. Any breach / violation thereof by any of such employee(s) shall be construed upon to be on behalf of that very Contractor, Supplier and Concessionaire. Records pertaining to HSE related training / awareness shall be maintained and provided to concerned CAA official(s) designated by the OPI and/or Representative(s) of CAA's SQMS team.

1.3.2.11 The training / awareness described above shall include but not limited to the following: -

a. Site acquaintance (i.e. Aerodrome / Building layout, Building Evacuation Procedure, etc).

b. General aerodrome layout & hazards and handling of standardequipment.

c. HSE related operational hazards / environmental aspects and risks / environmental impacts associated and related control measures with the particular contract / agreement.

d. Basic First Aid and other corrective measures.

e. Application of Permit to Work / Lock Out and Tag Out.

f. Special MSDS, classification / composition of hazardous material for handling of hazardous material.

g. Incident(s) / accident(s) including environmental incidents (spills, etc) reporting.

h. Waste management.

i. Basic Fire Fighting.

j. Safe driving.

k. Response in emergency.

l. Personal Protective Equipment (PPE).

Chapter 2

GENERAL INFORMATION

2.1 BASIC SAFETY & SECURITY RESTRAINTS

2.1.1 The following are some basic safety & security restraints. In case of violation of any of these, Contractors / Suppliers / Concessionaire shall be dealt with in accordance with **Rule 91 (Section 10) of CARs 94**:

2.1.1.1 Possession or use of alcoholic beverages or illegal drugs.

2.1.1.2 Possession of un-authorized explosives, firearms, ammunition, and otherweapons.

2.1.1.3 Violation of any safety or security rules or requirements as laid down in **Part VIII, Section 10 of CARs, 94 (Rule 92-110).**

2.1.1.4 Illegal dumping, handling, or disposal of hazardous materials.

2.1.1.5 Demolition or removal, without written permission, of any property belonging toCAA.

2.1.1.6 Intimidating, threatening, harassing, impeding or interfering with CAA employee(s) or designated representative(s).

2.1.1.7 Misuse of fire prevention and protection equipment.

2.1.1.8 Unauthorized removal or destruction of a safety barricade, handrail, guardrail, warning sign, fall protection, or other warning devices intended to protect employees or property.

2.2 SAFETY PERMITS

2.2.1 All CAA contractors, suppliers or concessionaires shall obtain prior approval for PTW from CAA's authorized / designated official(s) and follow all the safety requirements, precautions, controls of PPEs classified as PTW related tasks as any of the operations mentioned below may present a hazard to people, property and environment.

2.2.1.1 Performing burning, welding, cutting, soldering, or other hot work.

2.2.1.2 Working on fire protection / detection systems.

2.2.1.3 Working on electrical, steam, chilled water systems or other energized systems.

2.2.1.4 Installing a temporary electrical service

2.2.1.5 Working with hazardous chemicals (including solvents and paints).

2.2.1.6 Handling, transporting or generating hazardous wastes (including hospital biological waste, waste oil, chemicals, condensate, etc).

2.2.1.7 Using a gas, diesel, or LPG (such as Propane) powered engines.

2.2.1.8 Working on gas pipe lines or associated equipment.

2.2.1.9 Operating a power vehicle or self-propelled work platform.

2.2.1.10 Excavation / trenching.

2.2.1.11 Using radioactive sources or conducting field radiography (x -ray).

2.2.1.12 Working with asbestos & asbestos – containing materials.

2.2.1.13 Working on security systems.

2.2.1.14 Working with compressed air / gases.

2.2.1.15 Working on heating, ventilation, or air conditioning equipment.

2.2.1.16 Working with chemicals, polishing or grinding.

2.2.1.17 Working at heights of more than 06 feet or on roofs.

2.2.1.18 Entering or working in confined spaces like fuel tanks, trenches, service shafts, sewer system, etc.

2.2.1.19 Lifting or hoisting with cranes or hoists.

2.2.1.20 Blasting operations, etc.

2.3 PERFORMANCE MONITORING

2.3.1 The Contractors / Suppliers / Concessionaires shall monitor HSE performance of their employees and activities.

2.3.2 They shall in addition monitor all those performance monitoring actions agreed between CAA and the Contractors / Suppliers / Concessionaires.

2.4 HOUSE KEEPING

2.4.1 All Contractors / Suppliers / Concessionaires shall maintain good housekeeping by keeping work areas neat, clean, orderly, free of excess trash, debris and shall block walkways, stairs, exits, or create a tripping hazard. Poor housekeeping at a job site may lead to an increased potential for safety hazards and an increased frequency of accidents, falls, cuts, spills, leaks, fires or electrocution.

2.4.2 Tools, wires, materials shall not be left or haphazardly spread out at the work place.

2.4.3 Open holes, trenches, or excavations into which people may fall shall be identified, covered or provided with guardrails.

2.4.4 In order to protect the employees and environment, safety blinding shall be provided at all works execution sites, where necessary.

2.5 REPORT OF ACCIDENT, INCIDENT, INJURY OR ILLNESS

2.5.1 The area representatives of contractor shall inform fire, electrical, civil inquiries officials each day before start of work.

2.5.2 All work related accidents, incidents, fatalities, injuries, and illnesses must immediately be reported to the CAA authorized / designated officials.

2.5.3 Every incident / accident happened during execution of contractors work shall properly be analyzed as per **CAA0-015-MSXX** and if fall in Major / Catastrophic categories be published / mentioned in IOU report by the OPI Section / Branch.

Chapter 3

HAZARDOUS WASTE

3.1 HAZARDOUS WASTE MANAGEMENT

3.1.1 Hazardous waste generated by a Contractor / Supplier / Concessionaire as part of its work must be properly identified, stored and disposed in accordance with applicable laws / rules / regulations. The Contractor / Supplier / Concessionaire must coordinate with CAA representative(s) of relevant sections to provide a list of hazardous waste(s) which is / are likely to be generated during the project / activity, and to determine the location(s)for hazardous waste storage.

3.1.2 The Contractor / Supplier / Concessionaire must also ensure, at a minimum:

3.1.2.1 Proper labeling in terms of MSDS.

3.1.2.2 Adequate secondary containment.

3.1.2.3 Segregation of incompatible materials.

3.1.2.4 Routine inspection of storage areas.

3.1.3 In addition, all hazardous waste containers shall be constructed of a material compatible with the waste, in sound condition, and kept securely closed to avoid spill or leakage.

3.2 WASTE DISPOSAL DOCUMENTS

The Contractors / Suppliers / Concessionaires shall be responsible for completing all waste disposal documents as per statutory / regulatory requirements, where applicable and as required by CAA. This may relate to CAA's own waste that is periodically removed for further disposal purposes, or waste created by Contractor / Supplier / Concessionaire while performing a task at CAA premises / areas under CAA's jurisdiction. OPI shall also ensure all normal wastes are also removed by the contracts.

3.3 TRAINING

Contractor / Supplier / Concessionaire must ensure that their employees are appropriately trained in hazardous waste management procedures. In the event a Contractor / Supplier Concessionaire encounters unidentified material that is reasonably believed to be hazardous (radioactive, volatile, corrosive, flammable, explosive, magnetic, infectious, toxic), the Contractor / Supplier / Concessionaire shall immediately stop work in the affected area and report the condition to the CAA's authorized / designated official(s). At no time shall such material be disposed in chutes, drains, pipes or in any other unauthorized manner.

3.4 TRANSPORTATION AND DISPOSAL OF HAZARDOUS MATERIALS

3.4.1 Transportation of hazardous materials on CAA property shall be conducted in accordance with CAA specified instructions. It shall not be disposed to burn or be used in a manner that is harmful to people or environment. While transporting hazardous materials, Contractor / Supplier / Concessionaire shall ensure that no harm is done to people or environment because of poor containers, packing, covering, lashing, fixing, loading, stacking or improper vehicle or mode of transport.

3.4.2 All transportation of dangerous / hazardous goods and materials by air shall be conducted strictly in accordance with provisions of Part XVI, Sections 1-3 and 5-6 of the Civil Aviation Rules, 1994.

3.5 SPILL PREVENTION AND CONTROL

3.5.1 Based on the inventory of oil and hazardous chemicals that will be brought on-site, the Contractor / Supplier / Concessionaire shall have available equipment (e.g., secondary containment pallets, absorbent pads, absorbent booms, speed-dry etc.) that is suitable and sufficient to control a potential spill / release.

3.5.2 The Contractor / Supplier / Concessionaire is responsible for identifying outlets to the environment (e.g., sumps, sewers, storm / floor drains, etc.) and adequately minimizing spill potential to these areas.

3.5.3 The Contractor / Supplier / Concessionaire is responsible for the proper storage of all flammable and combustible chemicals that are brought and/or stored on site to complete the work. Such storage may require the use of safety containers, safety cabinets, and/or secondary containment.

3.5.4 The Contractor / Supplier / Concessionaire shall also ensure that any incompatible chemicals are safely segregated. The Contractor / Supplier / Concessionaire is Responsible for maintaining and securing all chemical containers and all chemical storage-areas. This requires selecting locations and methods to minimize exposure to rainfall, surface water, and the ground surface or subsurface.

3.5.5 The Contractors / Suppliers / Concessionaires must ensure that their employees are adequately trained in spill control procedures and are aware of the use of spill controlkits.

3.5.6 In the event of a release or spill, the Contractor / Supplier / Concessionaire must immediately inform CAA's authorized / designated official(s).

3.6 AIR EMISSIONS

3.6.1 Any conditions discovered which could result in an increase in air pollutant emissions must immediately be reported to the CAA's authorized / designated official(s).

3.6.2 Contractors / Suppliers / Concessionaires activities should not cause unacceptable level of emissions (emissions not meeting NEQS – National Environmental Quality Standards).

3.6.3 Contractors / Suppliers / Concessionaires shall immediately notify the CAA's authorized / designated official(s) whenever they become aware of any unintentional or intentional release of CFCs (Chloro-Fluoro Carbons), Halons etc.

3.7 WASTE WATER DISCHARGES

3.7.1 Waste water must NOT include any corrosive, flammable, or toxic substances / hazardous liquid, etc.

3.7.2 Contractor / Supplier / Concessionaire must ensure no waste water is discharged that violates NEQS.

3.8 BIOLOGICAL / CHEMICAL / RADIOACTIVE HAZARDS

3.8.1 Some CAA operations may involve the use of biological, chemical, or radioactive material that can be hazardous to persons or property, if not handled or disposed safely. Contractors / Suppliers / Concessionaire will mark the areas where work with biological, chemical, or radioactive materials is being performed with proper signs.

3.8.2 The Contractor / Supplier / Concessionaire shall not disturb damage or otherwise handle any suspected asbestos containing material.

3.8.3 The Contractor / Supplier / Concessionaire shall not sweep, dust, vacuum or mop dust / debris which are the product of a suspected asbestos containing material. The Contractor / Supplier / Concessionaire shall also not pick up or throw away any suspected asbestos-containing waste or trash.

3.8.4 Sand blasting, grinding, drilling, brazing, scraping, polishing of floors and other dust emitting surfaces will be done by persons wearing appropriate PPEs.

3.9 HAZARDOUS MATERIALS AND HAZARD COMMUNICATION

3.9.1 Hazardous materials shall not be handled or used by the Contractor / Supplier / Concessionaire without providing training to the concerned employees.

3.9.2 No solvents, paints, or similar flammable, toxic, or irritating materials shall be used in CAA premises / areas under the jurisdiction of CAA unless specifically authorized by CAA.

3.9.3 Adequate ventilation shall be maintained when paints or solvents are used.

3.9.4 Flammable solvents and materials shall be used with extreme caution.

3.9.5 It shall be ensured that flammable paints and solvents are isolated and stored in approved locations, if inside the building.

3.9.6 The Contractor / Supplier / Concessionaire shall submit an inventory of all hazardous chemicals / liquids / materials that are brought on-site or sold to CAA. These should be accompanied by MSDS.

3.9.7 The Contractor /Supplier / Concessionaire shall also ensure that all containers that are brought on site for the storage of hazardous chemicals (e.g., gas, paint, etc.) are labeled and inspected for correctness.

3.9.8 The Contractor / Supplier / Concessionaire shall remove at earliest all hazardous chemicals that it brings on-site when work involving a specific hazardous chemical has been completed.

Chapter 4
SPECIFIC SAFETY REQUIREMENTS

4.1 CONFINED SPACE ENTRY

4.1.1 Contractor / Supplier / Concessionaire will obtain Confined Space Entry Certificate before entering / working in confined spaces. If during the course of work, the Contractor / Supplier / Concessionaire encounters a confined space that has not been previously identified by the CAA, it must immediately bring the space to the attention of the CAA's authorized / designated official(s), and delays entry until the space is examined by the CAA's authorized / designated official

4.1.2 When CAA and Contractor / Supplier / Concessionaire personnel are working in or near confined spaces, the Contractor / Supplier / Concessionaire shall coordinate all operations, with likely-to-be-affected CAA personnel before entry.

4.1.3 Prior coordination shall also be required on entering a confined space with or without a CAA employee

4.2 LOCK-OUT / TAG-OUT (WHERE APPLICABLE)

4.2.1 As part of CAA's Electrical Isolation / De-Isolation permit requirement, standard locks and tags are used to control the start-up of equipment that is being serviced or maintained by its employees. At no time shall the Contractor / Supplier / Concessionaire or its employees override any locks or tags that they encounter during the performanceof their work.

4.2.2 The Contractors / Suppliers / Concessionaires are responsible for developing, implementing and maintaining their own Lock-out / Tag-out Program.

4.2.3 The Contractor / Supplier / Concessionaire shall submit a copy of its Lock-out / Tag-out Program to the CAA's authorized / designated official(s) before the start of any work.

4.3 GENERAL ELECTRICAL SAFETY

4.3.1 Temporary electrical connection(s), where required, shall be obtained from CAA as per the prescribed procedure only.

4.3.2 Only qualified electricians are permitted to work on electrical systems and equipment that use or control electrical / power.

4.3.3 Electrical tools or equipment shall not be operated in wet areas or areas where potentially flammable dusts, vapors, gases, or liquids are present, unless specifically approved.

4.3.4 Should a circuit breaker or other protective device "trip," it is to be ensured that a qualified electrician checks the circuit and equipment and corrects problem before resetting the breaker. Moreover, there should always be a provision for safety isolation ofthe circuit where needed

4.3.5 Barriers and post warning signs shall be erected to ensure that the non-authorized personnel stay clear of the work area.

4.3.6 Hazards (lack of protective guards or covers, damaged equipment, etc.) shall be reported to the CAA's authorized / designated official(s) immediately.

4.3.7 Electrical boxes, switch gear, cabinets, or electrical rooms shall not be left open when not directly attended.

4.3.8 It shall be ensured to insulate energized parts when have been removed or doors are closed. Use of cardboard, plywood or other flammable to cover energized circuits is prohibited.

4.3.9 Proper grounding / earthling and arc quenching, where required, shall be ensured.

4.3.10 The size of the cable / conductor should match with the actual on-site requirement.

4.4 COMPRESSED GAS CYLINDERS

The following measures must be taken for the protection of persons and property:

4.4.1 All the cylinders brought in by the Contractors / Suppliers / Concessionaires shall have valid test certificates performed by a certified testing agency.

4.4.2 Pressure and leak testing shall invariably be carried out and documented in all jobs associated with compressed gas or liquid handling.

4.4.3 Valve protection caps must be in place when compressed gas cylinders are transported, moved, or stored.

4.4.4 Cylinder valves must be closed and valve covers must be replaced when work is complete and when cylinders are empty or moved.

4.4.5 Compressed gas cylinders must be secured in an upright position in a welding cart or to a solid object (using chains, straps, or a rigid retaining bar).

4.4.6 Compressed gas cylinders must be secured on an approved carrier while beingtransported.

4.4.7 Cylinders shall be kept at a safe distance or shielded from welding or cutting operations. Cylinders shall not be placed where they can contact an electrical circuit.

4.4.8 It shall be ensured to keep oxygen and flammable gas regulators in proper working order and a wrench in position on the acetylene valve when in use.

4.4.9 If a leak develops in a cylinder and it cannot be immediately corrected, the cylinder shall be moved to a safe location outside the building / away f ram the location of work.

4.4.10 Cylinders must not be taken into or stored in confined spaces.

4.4.11 Empty & filled cylinders must be kept separately.

4.4.12 Hoses and regulators must not be stored in unventilated or closed containers or areas.

4.5 WELDING, CUTTING AND BRAZING

The Contractors / Suppliers / Concessionaires shall ensure the following:

4.5.1 Obtain PTW.

4.5.2 Inform CAA's authorized / designated official(s) prior to the start of any welding / cutting / brazing work.

4.5.3 Remove combustible materials from the area before beginning work.

4.5.4 Install anti flashback (safety / check) valves in both the oxygen / acetylene hoses at theregulator.

4.5.5 Shield adjacent areas with welding partitions.

4.5.6 Persons involved are adequately trained in using portable fire extinguishers.

4.5.7 Have a second person trained in basic firefighting as standby with an approved fire extinguisher for welding and cutting operations.

4.6 CRANES AND RIGGING

4.6.1 Each crane or hoist brought onto CAA property must have a valid inspection testing performed by a certified testing agency.

4.6.2 The operator is responsible for the proper placement of the crane in relationship to the load to be handled and the landing area so as to obtain the best rated lift capacity, and the installation and maintenance of crane swing radius protection.

4.6.3 All operators must possess a valid crane / hoist operating / driving license as applicable.

4.7 FITNESS

4.7.1 Suppliers / Contractors / Concessionaires shall ensure that all their personnel working in CAA premises are medically fit to perform their assigned tasks.

4.7.2 If requested by CAA, Contractors / Suppliers / Concessionaires shall provide the fitness / health certificates of their employees.

4.8 DRIVING

4.8.1 All Contractors' / Suppliers' / Concessionaires' vehicles while in CAA premises or performing CAA duties shall adhere to speed limits (applicable in that particular zone), and also comply with all other traffic and road safety regulations of CAA.

4.8.2 The drivers should be in possession of valid driving license.

4.8.3 All Contractor / Supplier / Concessionaire vehicles should have:

4.8.3.1 Standard seat belts. The seat belts should be neat and clean and in proper working condition.

4.8.3.2 Standard fire extinguisher.

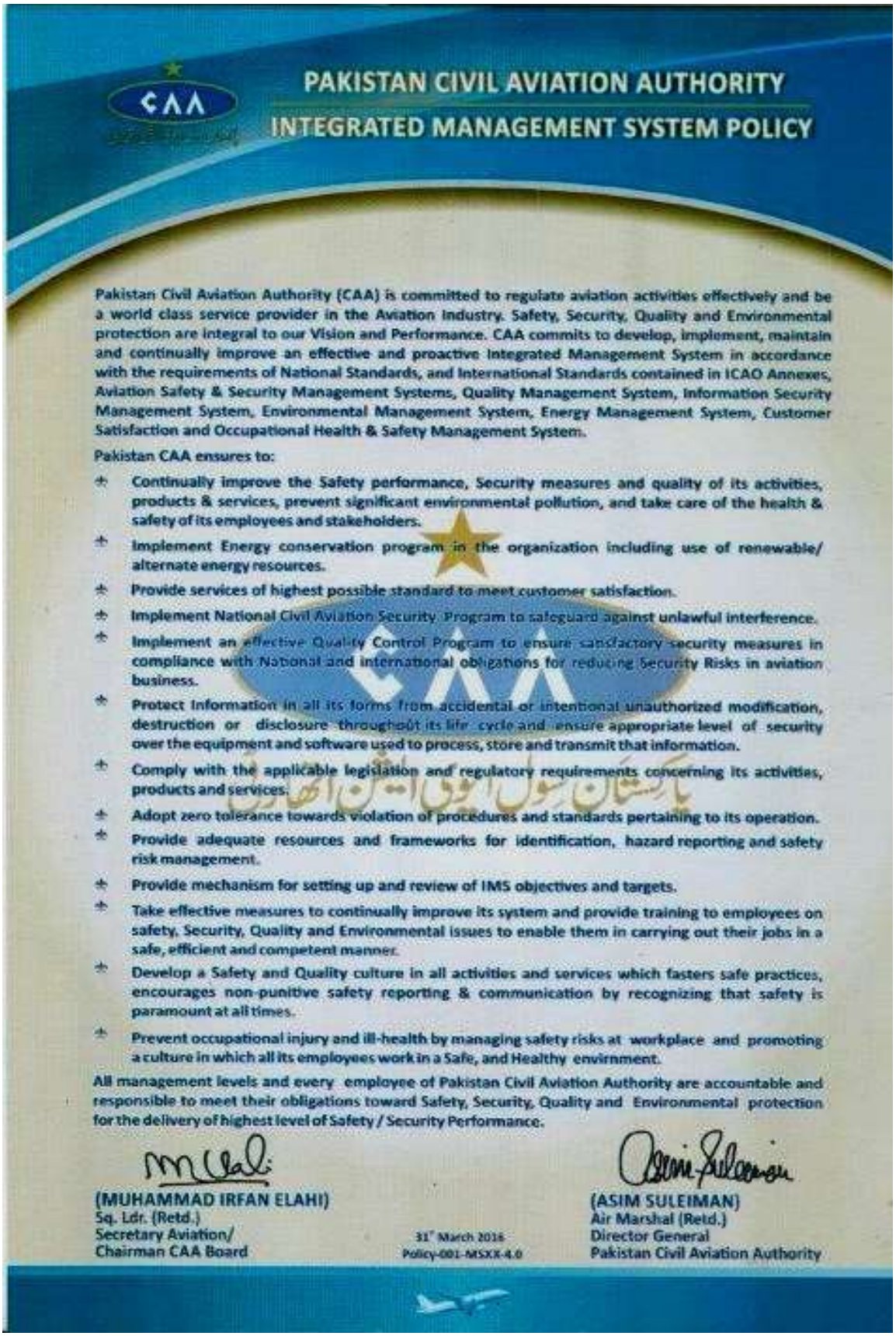
4.8.3.3 Standard first aid box.

4.9 INDEMNITY

Suppliers / Contractors / Concessionaires shall keep harmless and indemnify Pakistan CAA against all losses, damages, injuries, death of any person, claims, actions, third party action arising out of acts and omissions by their employees/ personnel or non-compliance with the terms arid conditions as stated herein and/or any applicable laws and regulation. Contractor shall take clearance with concerned offices before handing / taking over the area to be restored on thesame condition(s) as was/were before start of work (as per contract agreement).

APPENDICES

APPENDIX-A



PAKISTAN CIVIL AVIATION AUTHORITY
INTEGRATED MANAGEMENT SYSTEM POLICY

Pakistan Civil Aviation Authority (CAA) is committed to regulate aviation activities effectively and be a world class service provider in the Aviation Industry. Safety, Security, Quality and Environmental protection are integral to our Vision and Performance. CAA commits to develop, implement, maintain and continually improve an effective and proactive Integrated Management System in accordance with the requirements of National Standards, and International Standards contained in ICAO Annexes, Aviation Safety & Security Management Systems, Quality Management System, Information Security Management System, Environmental Management System, Energy Management System, Customer Satisfaction and Occupational Health & Safety Management System.

Pakistan CAA ensures to:

- Continually improve the Safety performance, Security measures and quality of its activities, products & services, prevent significant environmental pollution, and take care of the health & safety of its employees and stakeholders.
- Implement Energy conservation program in the organization including use of renewable/ alternate energy resources.
- Provide services of highest possible standard to meet customer satisfaction.
- Implement National Civil Aviation Security Program to safeguard against unlawful interference.
- Implement an effective Quality Control Program to ensure satisfactory security measures in compliance with National and international obligations for reducing Security Risks in aviation business.
- Protect Information in all its forms from accidental or intentional unauthorized modification, destruction or disclosure throughout its life cycle and ensure appropriate level of security over the equipment and software used to process, store and transmit that information.
- Comply with the applicable legislation and regulatory requirements concerning its activities, products and services.
- Adopt zero tolerance towards violation of procedures and standards pertaining to its operation.
- Provide adequate resources and frameworks for identification, hazard reporting and safety risk management.
- Provide mechanism for setting up and review of IMS objectives and targets.
- Take effective measures to continually improve its system and provide training to employees on safety, Security, Quality and Environmental issues to enable them in carrying out their jobs in a safe, efficient and competent manner.
- Develop a Safety and Quality culture in all activities and services which fosters safe practices, encourages non-punitive safety reporting & communication by recognizing that safety is paramount at all times.
- Prevent occupational injury and ill-health by managing safety risks at workplace and promoting a culture in which all its employees work in a Safe, and Healthy environment.

All management levels and every employee of Pakistan Civil Aviation Authority are accountable and responsible to meet their obligations toward Safety, Security, Quality and Environmental protection for the delivery of highest level of Safety / Security Performance.

(MUHAMMAD IRFAN ELAHI)
Sq. Ldr. (Retd.)
Secretary Aviation/
Chairman CAA Board

31st March 2016
Policy-001-MSXX-4.0

(ASIM SULEIMAN)
Air Marshal (Retd.)
Director General
Pakistan Civil Aviation Authority

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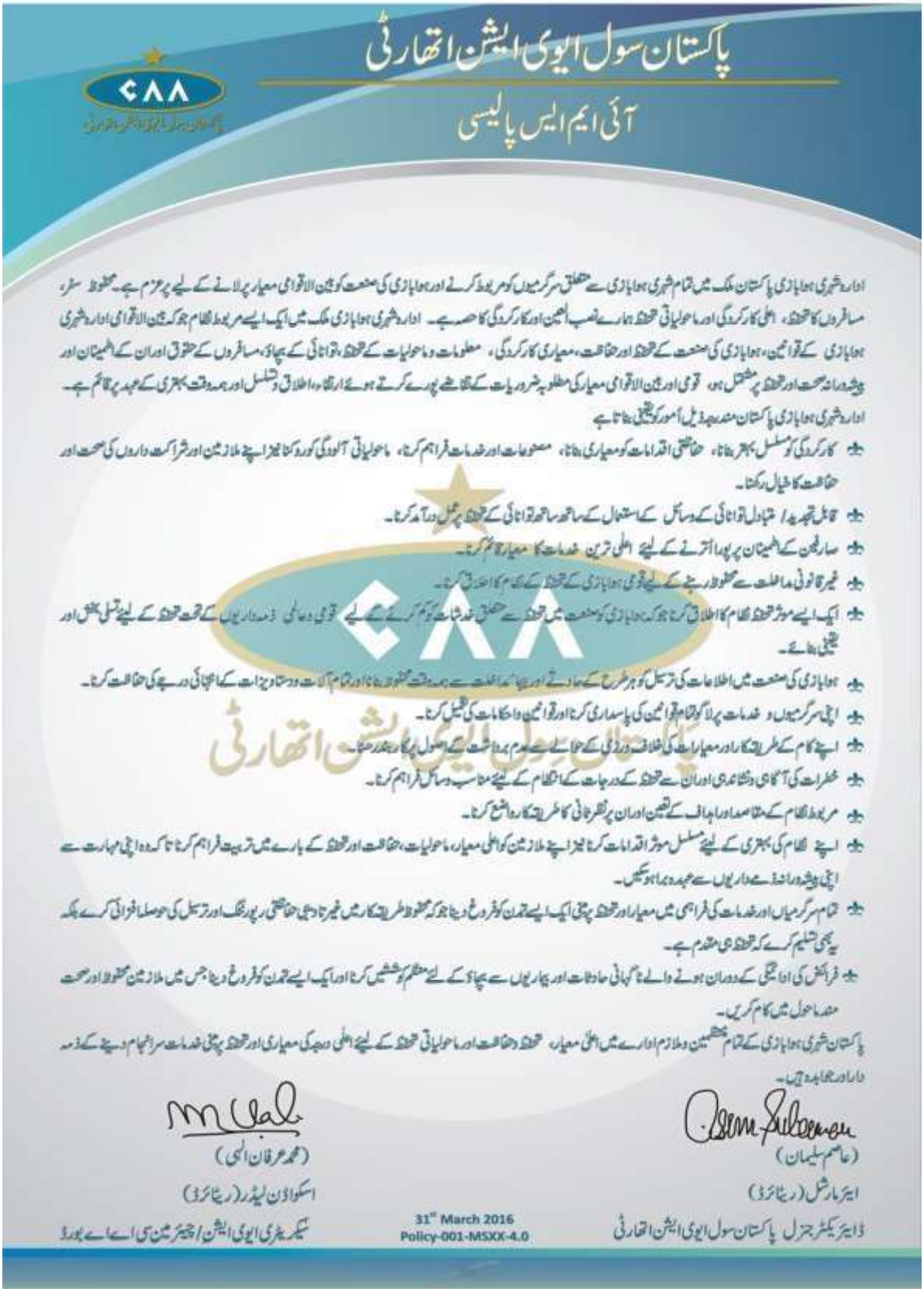
APPENDIX-B



پاکستان سول ایوی ایشن اتھارٹی

آئی ایم ایس پالیسی

ادارہ شہری ہوابازی پاکستان ملک میں تمام شہری ہوابازی سے متعلق سرگرمیوں کو مربوط کرنے اور ہوابازی کی صنعت کو بین الاقوامی معیار پر لانے کے لیے پرعزم ہے۔ محفوظ سفر، مسافروں کا تحفظ، اعلیٰ کارکردگی اور ماحولیاتی تحفظ ہمارے نصب العین اور کارکردگی کا حصہ ہے۔ ادارہ شہری ہوابازی ملک میں ایک ایسے مربوط نظام جو کہ بین الاقوامی ادارہ شہری ہوابازی کے قوانین، ہوابازی کی صنعت کے تحفظ اور حفاظت، معیاری کارکردگی، معلومات و ماحولیات کے تحفظ، توانائی کے بچاؤ، مسافروں کے حقوق اور ان کے اطمینان اور پیشہ ورانہ صحت اور تحفظ پر مشتمل ہو، قومی اور بین الاقوامی معیار کی مطلوبہ ضروریات کے تقاضے پورے کرتے ہوئے ارتقاء، اطلاق و تسلسل اور ہمہ وقت بہتری کے عہد پر قائم ہے۔

ادارہ شہری ہوابازی پاکستان مندرجہ ذیل اُمور کو یقینی بناتا ہے

- کارکردگی کو مسلسل بہتر بنانا، حفاظتی اقدامات کو معیاری بنانا، معلومات اور خدمات فراہم کرنا، ماحولیاتی آلودگی کو روکنا نیز اپنے ملازمین اور شراکت داروں کی صحت اور حفاظت کا خیال رکھنا۔
- قابل تجدید/ متبادل توانائی کے وسائل کے استعمال کے ساتھ ساتھ توانائی کے تحفظ پر عمل درآمد کرنا۔
- صارفین کے اطمینان پر پورا اترنے کے لیے اعلیٰ ترین خدمات کا معیار قائم کرنا۔
- غیر قانونی مداخلت سے محفوظ رہنے کے لیے قومی ہوابازی کے تحفظ کے نظام کا اطلاق کرنا۔
- ایک ایسے موثر تحفظ نظام کا اطلاق کرنا جو کہ ہوابازی کو صنعت میں تحفظ سے متعلق خدشات کو کم کرنے کے لیے قومی داخلی ذمہ داریوں کے تحت تحفظ کے لیے تسلی بخش اور یقینی بنائے۔
- ہوابازی کی صنعت میں اطلاعات کی ترسیل کو ہر طرح کے حادثے اور بیجا مداخلت سے ہمہ وقت محفوظ بنانا اور تمام آلات و دستاویزات کے اعلیٰ درجے کی حفاظت کرنا۔
- اپنی سرگرمیوں و خدمات پر لاگو تمام قوانین کی پاسداری کرنا اور قوانین و احکامات کی تعمیل کرنا۔
- اپنے کام کے طریقہ کار اور معیارات کی خلاف ورزی کے حوالے سے عدم برداشت کے اصول پر کاربند رہنا۔
- خطرات کی آگاہی و نشاندہی اور ان سے تحفظ کے درجات کے انتظام کے لیے مناسب وسائل فراہم کرنا۔
- مربوط نظام کے مقاصد اور اہداف کے تعین اور ان پر نظرثانی کا طریقہ کار وضع کرنا۔
- اپنے نظام کی بہتری کے لیے مسلسل موثر اقدامات کرنا نیز اپنے ملازمین کو اعلیٰ معیار، ماحولیات، حفاظت اور تحفظ کے بارے میں تربیت فراہم کرنا تاکہ وہ اپنی مہارت سے اپنی پیشہ ورانہ ذمے داریوں سے عہدہ برا ہو سکیں۔
- تمام سرگرمیاں اور خدمات کی فراہمی میں معیار اور تحفظ پر مبنی ایک ایسے تمدن کو فروغ دینا جو کہ محفوظ طریقہ کار میں غیر تادیبی حفاظتی رپورٹنگ اور ترسیل کی حوصلہ افزائی کرے بلکہ یہ بھی تسلیم کرے کہ تحفظ ہی مقدم ہے۔
- فرائض کی ادائیگی کے دوران ہونے والے ناگہانی حادثات اور بیماریوں سے بچاؤ کے لیے منظم کوششیں کرنا اور ایک ایسے تمدن کو فروغ دینا جس میں ملازمین محفوظ اور صحت مند ماحول میں کام کریں۔

پاکستان شہری ہوابازی کے تمام مختص ملازم ادارے میں اعلیٰ معیار، تحفظ و حفاظت اور ماحولیاتی تحفظ کے لیے اعلیٰ درجہ کی معیاری اور تحفظ پر مبنی خدمات سرانجام دینے کے ذمہ دار اور عہد بند ہیں۔

(عاصم سلیمان)
ایئر مارشل (ریٹائرڈ)
ڈائریکٹر جنرل پاکستان سول ایوی ایشن اتھارٹی

(محمد عرفان الٰہی)
اسکواڈن لیڈر (ریٹائرڈ)
سیکریٹری ایوی ایشن / چیئرمین سی اے اے بورڈ

31st March 2016
Policy-001-MSXX-4.0

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PAKISTAN AIRPORTS AUTHORITY
JINNAH INTERNATIONAL AIRPORT
(HVAC SECTION)

FINANCIAL PROPOSAL

IMPROVEMENT/REHABILITATION OF HVAC INFRASTRUCTURE AT JIAP - KARACHI

UPGRADATION OF LOW VOLTAGE MOTOR CONTROL CENTERS FOR CHILLER PLANT INSTALLED AT UTILITY BUILDING JIAP - KARACHI

FINANCIAL BID

IMPROVEMENT/REHABILITATION OF HVAC INFRASTRUCTURE AT JIAP - KARACHI

UPGRADATION OF LOW VOLTAGE MOTOR CONTROL CENTERS FOR CHILLER PLANT INSTALLED AT UTILITY BUILDING JIAP - KARACHI

BILL OF QUANTITY / SCHEDULE OF PRICE

S. No.	Description	Unit	Qty	Rate Per Unit		Amount (PKR)
				In Figures	In words	
01	Careful dismantling of existing MCC enclosure section and DCP panel by isolating its individual feeders, remove plug-in units, control wirings circuit breaker and contactors, dis-connect incoming and outgoing cables after that remove enclosure by lifting equipment and transport to designated area as per standard practice and instruction of incharge complete in all respect.	P/Job	01			
02	Provisioning of Enclosure or starter panel H1900xW3500xD700 mm min. IP-56 or NEMA 4X with 2mm galvanized sheet & powder coated paint (RAL-1015) or approved, panel, separate hot air exhaust chamber with ducting inside the panel and bus bars (3x400V+N Icc=30KA) and control wiring, tagging, as built drawing, as standard practice, meeting minimum required technical specifications/ capacities given in attached as-built drawing and instruction of incharge. Provisioning of control and monitoring devices in panel such as Thermostat 01 no. Heater for panel 05 nos. Exhaust Fan 6" 05 nos. Filter for exhaust fan 6" 10 nos. Earth leakage relay Z-CT 257Amps 06 Nos. Electrical wire 185mm 4-core 08 meter Electrical wire 50mm 4-core 08 meter Electrical wire 96mm 4-core 04 meter Electrical wire 6mm 4-core 04 meter Electrical wire 4mm 4-core 10 meter Cable joint 185mm 04 nos. Cable joint 50mm 04 nos. Cable joint 96mm 02 nos. Cable joint 6mm 02 nos. Cable joint 4mm 03 nos. Cable Tie Pack Lugs 185mm 4-core 20 nos. Lugs 50mm 4-core 20 nos. Lugs 96mm 4-core 10 nos. Lugs 6mm 4-core 12 nos. Lugs 4mm 4-core 20 nos. Heat sleeve lot including tagging.	P/Job	02			

S. No.	Description	Unit	Qty	Rate Per Unit		Amount (PKR)
				In Figures	In words	
03	Installation and SITE services with testing and commissioning of complete system as per standard practice complete in all respect as per instruction of Engineer In charge					
3.1	Provisioning of MCC Main incoming enclosure with following components and specs Digital ACBTP 1250A Qty-01 no. setting 500-1250A,690/1000VA,min 50°C Draw-out type Current transformer 1200/5A qty-03 no Energy analyzer Qty-01 no Indication lights LED 220v(RYB) Qty-03 nos. Current transformer 1200/5A Qty 03 nos. MCB SP 2/6A 6KA Qty.03 nos. adjustable All devices are make by ABB, Schneider, ETON, or equivalent. Installed as per standard practice complete in all respect as per instruction of incharge.	P/Job	02			
3.2	Provisioning of 108 KW 400 Amps 50KA soft starter for condenser water pumps. Soft starter with following specs. MCCBTP 400A 50KA with auxiliary contacts NO and NC Qty-02 nos. Soft Starter for 108KW Qty-02 nos. Man/Auto Switch 20A Qty-02 nos. Relay Round 8 pin 10A Qty-04 nos. Base for relay Qty 04-nos. Magnetic Contactor 18A, 24V Qty 02 nos. push button ON and OFF Qty 04 nos. Indication light LED 220V(R.Y.G) Qty 06 nos. MCB SP 2/6A 6KA Qty 02 nos. All devices are make by ABB, Schneider, ETON, or equivalent. installed as per standard practice complete in all respect as per instruction of Incharge	P/Job	02			
3.3	Provisioning of soft starter for primary chilled water pumps 46 KW. MCCB TP 200A 36KA with Auxiliary contacts NO and NC Qty 01 no. Soft starter for 46 KW Qty 02 nos. Main-off-Auto switch 20A Qty 02 nos. relay round 8 Pin 10A Qty 04 nos. Base for 8 pin relay Qty 04 nos. Magnetic contactor 18A, 24V Qty 02 nos. push button ON and OFF Qty 04 nos. Indication light LED 220V(R.Y.G) Qty 06 nos. MCB SP 2/6A 6KA Qty 02 nos. All devices are make by ABB, Schneider, ETON, or equivalent. installed as per standard practice complete in all respect, as per instruction of Incharge	P/Job	02			

S. No.	Description	Unit	Qty	Rate Per Unit		Amount (PKR)
				In Figures	In words	
3.4	Provisioning of VFD for cooling tower fans 70/19 KW. MCCB TP 150A 36KA with Auxiliary contacts NO and NC Qty 02 nos. VFD Qty 02 nos. Main-off-Auto switch 20A Qty 02 nos. relay round 8 Pin 10A Qty 04 nos. Base for 8 pin relay Qty 04 nos. Magnetic contactor 18A, 24V Qty 02 nos. push button ON and OFF Qty 04 nos. Indication light LED 220V(R.Y.G) Qty 06 nos. MCB SP 2/6A 6KA Qty 02 nos. All devices are make by ABB, Schneider, ETON, or equivalent. installed as per standard practice complete in all respect as per instruction of Incharge	P/Job	02			
3.5	Provisioning of chiller auxiliary 8.5 KW starter MCCB TP 30A 30KA with Auxiliary contacts NO and NC Qty 02 nos. Main-off-Auto switch 20A Qty 02 nos. relay round 8 Pin 10A Qty 04 nos. Base for 8 pin relay Qty 04 nos. Magnetic contactor 18A, 24V Qty 02 nos. Indication light LED 220V(R.Y.G) Qty 06 nos. MCB SP 2/6A 6KA Qty 02 nos. All devices are make by ABB, Schneider, ETON, or equivalent. installed as per standard practice, complete in all respect as per instruction of Incharge	P/Job	02			
3.6	Provisioning of AHU Motor auxiliary 7.5KW starter MCB TP 32A 10KA with Auxiliary contacts NO and NC Qty 01 no. Magnetic Contactor 18A 2NC & 2NO Qty 01 no. EOCR 0 TO 60A Qty 01 no. relay round 8 Pin 10A Qty 02 nos. Base for 8 pin relay Qty 02 nos. Magnetic contactor 18A, 24V Qty 01 no. Indication light LED 220V(R.Y.G) Qty 03 nos. MCB SP 2/6A 6KA Qty 01 no. Push button ON and OFF Qty 02 nos. All devices are make by ABB, Schneider, ETON, or equivalent. installed as per standard practice, complete in all respect as per instruction of Incharge	P/Job	01			
3.7	Provisioning of chilled makeup water pump Motor 4 KW starter MCB TP 16A 10KA with Auxiliary contacts NO and NC Qty 01 no. Magnetic Contactor 12A 2NC & 2NO Qty 01 no. EOCR 0 To 60A Qty 01 no. relay round 8 Pin 10A Qty 02 nos. Base for 8 pin relay Qty 02 nos. Indication light LED 220V(R.Y.G) Qty 03	P/Job	01			

S. No.	Description	Unit	Qty	Rate Per Unit		Amount (PKR)
				In Figures	In words	
	nos. MCB SP 2/6A 6KA Qty 01 no. Push Button ON and OFF Qty 02 nos. All devices are make by ABB, Schneider, ETON, or equivalent. installed as per standard practice complete in all respect as per instruction of Incharge					
3.8	Provisioning of secondary chilled water pump Motor 0.76 KW starter MCB TP 16A 10KA with Auxiliary contacts NO and NC Qty 01 no. Magnetic Contactor 12A 2NC & 2NO Qty 01 no. EOCR 0 To 60A Qty 01 no. relay round 8 Pin 10A Qty 02 nos. Base for 8 pin relay Qty 02 nos. Indication light LED 220V(R.Y.G) Qty 03 nos. MCB SP 2/6A 6KA Qty 01 no. Push Button ON and OFF Qty 02 nos. All devices are make by ABB, Schneider, ETON, or equivalent. installed as per standard practice complete in all respect as per instruction of Incharge	P/Job	01			
					Total Amount PKR	

Total Amount in words :._____

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Sr. Joint Director (HVAC) – JIAP
ES (E&M) JIAP – Karachi