

COCHIN INTERNATIONAL AIRPORT LIMITED

**SITC OF 350TR VFD-DRIVEN CHILLER AND 350 TR COOLING
TOWERS FOR TERMINAL 1 CIAL**
(TENDER DOCUMENT)

**COCHIN INTERNATIONAL AIRPORT LTD
KOCHI AIRPORT PO
COCHIN- 683 111**

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SECTION I

1. NOTICE INVITING TENDER

COCHIN INTERNATIONAL AIRPORT LIMITED**Kochi Airport P.O****Phone: 0484-2610115****Website: www.cial.aero**

Date: 04/03/2026

e-Government Procurement (e-GP) E-TENDER NOTICE

For and on behalf of the Managing Director, Cochin International Airport Ltd, invites e-Tenders for the following work from eligible reputed contractors/ firms possessing the necessary experience to execute this work.

TENDER NO: CIAL/ELE/424/ET 18

1.	Name of Work	SITC of 350 TR VFD-Driven Chiller and 350 TR Cooling Towers for Terminal 1 CIAL
2.	Estimate Amount	Rs. 1.93 Crores + GST
3.	Earnest Money Deposit (EMD)	Rs. 3,86,000/-
4.	Tender Submission Fee	Nil
5.	Period of completion	08 months
6.	Tender documents	It can be downloaded from the website www.etenders.kerala.gov.in
7.	Period of download of the tender document	04/03/2026 at 10:00 to 06/04/2026 at 15:30
8.	Date of Bid Submission	17/03/2026 at 10:00 to 06/04/2026 at 15:30
9.	Date of opening of technical bid	07/04/2026 at 15:30
10.	Date of opening of financial bid	It will be notified after the technical bid opening process.
11.	Form of contract	Item rate

GENERAL TERMS AND CONDITIONS OF E-PROCUREMENT

This tender is an e-Tender and is being published online for the above work. This tender is invited in a 2-cover system from the registered and eligible firms through the e-procurement portal of the Government of Kerala (<https://www.etenders.kerala.gov.in>). Prospective bidders willing to participate in this tender shall necessarily register themselves with the above-mentioned e-procurement portal.

The tender timeline is available in the critical date section of this tender, published on www.etenders.kerala.gov.in

A. Online Bidder registration process:

Bidders should have a Class III Digital Signature Certificate (DSC) to be procured from any Registration Authority (RA) under the Certifying Agency of India. Details of RAs will be available on www.cca.gov.in. Once the DSC is obtained, bidders must register on the www.etenders.kerala.gov.in website to participate in this tender. Website registration is a one-time process without any registration fees. However, bidders must procure DSC at their own cost.

Bidders may contact the e-Procurement support desk of Kerala State IT Mission over the telephone at 0471-2577088, 2577188, 2577388 or 0484-2336006, 233226

Email: etendershelp@kerala.gov.in for assistance in this regard.

Critical Date & Time of this Tender

SL.NO	EVENT	DATE & TIME
1	Document download	04/03/2026 at 10:00 to 06/04/2026 at 15:30
2	Bid Submission	17/03/2026 at 10:00 to 06/04/2026 at 15:30
3	Technical bid opening	07/04/2026 at 15:30
4	Financial bid	It will be notified after the technical bid opening process.

B. Online Tender Process:

The tender process shall consist of the following stages:

- i. Downloading of tender document: The tender document will be available for free download on www.etenders.kerala.gov.in. However, tender document fees shall be payable at the time of bid submission as stipulated in this tender document.
- ii. Pre-bid meeting: Nil.
- iii. Publishing of Corrigendum: All corrigenda shall be published on www.etenders.kerala.gov.in and shall not be available elsewhere.
- iv. Bid submission: Bidders have to submit their bids along with supporting documents to support their eligibility, as required in this tender document, on www.etenders.kerala.gov.in. No manual submission of bids is allowed, and manual bids shall not be accepted under any circumstances.
- v. Opening of Technical Bid and Bidder short-listing: The technical bids will be opened, evaluated and shortlisted as per eligibility and technical qualifications. All documents in support of technical qualifications shall be submitted (online). Failure to submit the

documents online will attract disqualification. Bids shortlisted by this process will be taken up for opening the financial bid.

- vi. Opening of Financial Bids: Financial bids from qualified bidders shall only be considered for opening and evaluation on the date and time mentioned in the critical section.

C. DOCUMENTS COMPRISING BID:

Cover 1- Prequalification cum Technical Bid Document

Pre-Qualification cum Technical bid proposal shall contain the scanned copies of the following documents, which every bidder must upload:

1. Document proof of the Eligibility Criteria mentioned **in clause 4** of Notice Inviting Tender.
2. Technical Bid (Tender document sealed and signed)
3. Unconditional ACCEPTANCE LETTER (as per the specimen shown in the tender document, Page No.18)

The department does not take any responsibility for any technical snag or failure that has taken place during document upload.

Cover 2- Financial Bid

The Bidder shall complete the Price bid as per the format given for download along with this tender.

Note: The blank price bid should be downloaded and saved on the bidder's computer **without changing the filename**; otherwise, price bid will not get uploaded. The bidder should fill in the details in the same file and upload the same back to the website.

Fixed price: Prices quoted by the Bidder shall be fixed during the bidder's performance of the contract and not subject to variation on any account. A bid submitted with an adjustable/variable price quotation will be treated as non-responsive and rejected.

D. Tender Document Fees and Earnest Money Deposit (EMD)

The Bidder shall pay an Earnest Money Deposit or Bid Security of **Rs. 3,86,000/-**. The Bid security is required to protect the purchaser against the risk of conduct that would warrant the forfeiture of security.

Online Payment modes: The EMD can be paid in the following manner through an e-payment facility provided by the e-procurement system.

State Bank of India Multi-Option Payment System (SBI MOPS Gateway): Bidders are required to avail of Internet Banking Facility in any of the following banks for making tender remittances in the e-Procurement System.

A) Internet Banking Options (Retail)			
1	Allahabad Bank	25	Indian Bank
2	Axis Bank	26	Indian Overseas Bank
3	Andhra Bank	27	IndusInd Bank
4	Bandhan Bank	28	Jammu & Kashmir Bank
5	Bank of Bahrain and Kuwait	29	Janata Sahakari Bank
6	Bank of Baroda	30	Karnataka Bank
7	Bank of India	31	Karur Vysya Bank
8	Bank of Maharashtra	32	Kotak Mahindra Bank
9	Bassein Catholic Co-operative Bank	33	Lakshmi Vilas Bank

10	BNP Paribas	34	Mehsana Urban Co-op Bank
11	Canara Bank	35	NKGSB Co-operative Bank
12	Catholic Syrian Bank	36	Oriental Bank of Commerce
13	Central Bank of India	37	Punjab and Maharashtra Cooperative Bank
14	City Union Bank	38	Punjab National Bank
15	Corporation Bank	39	Punjab and Sind Bank
16	Cosmos Bank	40	RBL Bank
17	DCB Bank	41	Saraswat Cooperative Bank
18	Dena Bank	42	ShamraoVithal Cooperative Bank
19	Deutsche Bank	43	South Indian Bank
20	Dhanalaxmi Bank	44	Standard Chartered Bank
21	Federal Bank	45	State Bank of India
22	HDFC Bank	46	Syndicate Bank
23	ICICI Bank	47	Tamilnadu Mercantile Bank
24	IDBI Bank	48	Tamilnadu Cooperative Bank

During the online bid submission process, the bidder shall select the SBI MOPS option and submit the page to view the Terms and Conditions page. On further submitting the same, the e-Procurement system will redirect the bidder to MOPS Gateway, where two options, namely SBI and Other Banks*, will be shown.

Any transaction charges levied while using any of the above modes of online payment must be borne by the bidder. The supplier/contractor's bid will be evaluated only if the payment status against the bidder is shown during the bid opening.

E. SUBMISSION PROCESS:

For submission of bids, all interested bidders must register online as explained above in this document. After registration, bidders shall submit their technical bid and financial bid online on www.etenders.kerala.gov.in along with online payment of EMD.

For page-by-page instructions on the bid submission process, please visit www.etenders.kerala.gov.in and the Manual link on the home page.

It is necessary to click the Freeze bid link/icon to complete all processes of bid submission. Otherwise, the bid will not get submitted online, and the same shall not be available for viewing/ opening during the bid opening process.

Further details can be had from the Notice Inviting Tender (NIT) or the Office of the CIAL during working hours.

Sd/-

Managing Director

NOTICE INVITING TENDERS

1. Tenders are invited on behalf of Cochin International Airport Ltd. (CIAL) for the **SITC of 350 TR VFD-Driven Chiller and 350 TR Cooling Towers for Terminal 1 CIAL**. The estimated cost of the work is **Rs. 1.93 Crores + GST** (approximately).
2. The tender shall be on the prescribed Form.
3. The whole work is to be completed **within 08 months**. This period shall be reckoned from the fifteenth day after the date on which the Engineer-in-Charge issues written orders to commence the work or from the date of handing over of the site, whichever is later, in accordance with the phasing, if any, mentioned in the Special Conditions of Contract.
4. Bidders having experience of similar work as mentioned below, and minimum financial and technical capabilities as specified below, will be eligible to bid for the work. The applicant may be an individual, proprietorship firm, partnership firm, company or corporation that meets the requisite eligibility criteria prescribed as under. Joint venture companies and consortiums are not permitted to bid.

Bidders should have:

- i. Valid PF & ESI registration certificate
 - ii. Similar Work Experience
 - A. The bidder should have commenced and completed at least one similar work in a single contract or as a part of a composite contract valuing more than Rs. 1.54 crores during the last 07 years (17.02.2019 - 17.02.2026)
 - or
 - B. The bidder should have commenced and completed at least two similar works in a single contract or as a part of a composite contract valuing more than Rs. 1.16 Crores each during the last 07 years (17.02.2019 - 17.02.2026).
- (Similar work means supply, installation, testing and commissioning of water-cooled chillers of capacity 350TR or above as a single contract or as a part of the composite contract. An attested copy of the principal client certificate for satisfactory completion of the work should be submitted. The certificate shall clearly indicate the components of the project, the date of starting work, the completion date of the work, the work order value (Breakup needed in case of composite contract), work executed value. The work should be 100% completed during the mentioned period of the project.)

- iii. Should have an annual turnover of value not less than Rs. 05 Crores during any one of the last five financial years ending 31st March 2025(CA Audited financial statement with UDIN for the previous 05 years 2020-2021, 2021-2022,2022-2023, 2023-2024, 2024-25 should be submitted).

Not more than one tender shall be submitted by a contractor or by a firm of contractors. No two or more concerns in which an individual is interested, as proprietor and/or partner, shall tender for the execution of the same works. If they do so, all such tenders shall be liable to be rejected.

5. The Accepting Authority, as mentioned in clause 3(b) of the General Conditions of the contract, shall be the Accepting Officer hereinafter referred to as such for this contract.
6. NIL
7. NIL
8. Tender documents consisting of technical specifications, Bill of Quantities of various classes of works to be done, the conditions of the contract and other necessary documents will be open for inspection and sold on payment of Rs. Nil by online payment from **04/03/2026 at 10:00 to 06/04/2026 at 15:30** as mentioned in the detailed tender notice.
9. Copies of other drawings and documents of the works signed for identification by the Accepting Officer, or his accredited representative, will be open for inspection by tenderers at the office of CIAL during working hours between **04/03/2026 at 10:00 to 06/04/2026 at 15:30. Interested firms must visit the site during the above-said dates** before submission of bids.
10. Submission of a tender by a tenderer implies that he has read this notice and all other contract documents and has made himself aware of the scope and specifications of the work to be done and of conditions and rates at which stores, tools and plant, etc. will be issued to him by CIAL and local conditions and other factors bearing on the execution of the works.
11. NIL
12. NIL
13. In the case of item rate tenders, only rates quoted shall be considered.
14. The tender for the Works shall not be witnessed by a Contractors/Contractor who himself/themselves have/has tendered or who may have/has tendered for the same works.

Failure to observe this condition shall render the tender of the Contractor tendering as well as of those witnessing the tender liable to rejection.

15. Tenders shall be received online by the Accepting Authority from **17/03/2026 at 10:00 to 06/04/2026 at 15:30**, and the technical bid shall be opened on **07/04/2026 at 15:30**.
16. The tender shall be accompanied by an Earnest Money Deposit of **Rs. 3,86,000/-** (Rupees Three Lakhs Eighty-Six Thousand Six Rupees only) (should be submitted as online payment).
- 17.1 Tender shall be submitted in two covers (**Cover-1 and Cover-2**).

PREPARATION OF BIDS:

The bid prepared by the bidder shall be in two parts as given below:

The tender shall be submitted in two separate sealed covers (marked Cover-1, Cover-2)

COVER-1.

The following documents shall be included in Cover 1:

1. Document proof of the Eligibility Criteria mentioned **in clause 4** of Notice Inviting Tender.
2. Technical Bid (Tender document sealed and signed)
3. Unconditional ACCEPTANCE LETTER (as per the specimen shown in the tender document, Page No. 18)

COVER-2.

The following documents shall be included in Cover 2:

The Bidder shall complete the Price bid as per the format given for download along with this tender.

Note: The blank price bid should be downloaded and saved on the bidder's computer **without changing the filename**; otherwise, price bid will not get uploaded. The bidder should fill in the details in the same file and upload the same back to the website.

Fixed price: Prices quoted by the Bidder shall be fixed during the bidder's performance of the contract and not subject to variation on any account. A bid submitted with an adjustable/variable price quotation will be treated as non-responsive and rejected.

Cover-2 of those tenderers who provide the EMD and Acceptance letter of the CIAL tender conditions in Cover-1 only will be opened. Any false claim will lead to the rejection of the tender and forfeiture of EMD at any phase of evaluation. Originals of all the submitted documents asked for in this tender should be produced before CIAL as and when required. CIAL has the right to place an order with any firm it deems fit. **It is not binding on CIAL to place an order on the lowest quotation.**

17.2 Notification of the Award of the contract will be made in writing to the successful Bidder by the Accepting Authority. The contract will normally be awarded to the qualified and responsive Bidder offering the lowest evaluated bid in conformity with the requirements of the specifications and contract documents, and the Accepting Authority shall be the sole judge in this regard. **The Accepting Authority does not bind himself to accept the lowest or any tender or to give any reason for his decision.**

18. A responsive bidder is one who submits a priced tender and accepts all terms and conditions of the specifications and contract documents without any modifications.

18.1 A modification is one that affects in any way the quality, quantity and period of completion of the work or which limits in any way the responsibilities or liabilities of the Bidder or any right of CIAL as required in the specifications and contract documents. Any modification in the terms and conditions of the tender that is not acceptable to CIAL shall also be treated as a major modification.

18.2 A tenderer shall submit a responsive bid, failing which his tender will be liable to be rejected.

18.3 The Accepting Authority does not bind himself to accept the lowest or any tender and reserves to himself the right to accept the whole or any part of the tender, and the tenderer shall be bound to perform the same at his quoted rate.

19. On acceptance of tender, **Earnest Money will be treated as part of the Security Deposit (Earnest Money Deposit of the successful tenderer will be treated as initial SD and shall be released after the completion of work).**

20. The successful tenderer, hereafter referred to as Contractor, shall deposit an amount equal to **5% of the accepted value of work (without limit) as Performance Guarantee (Performance Security) in one of the following forms.**

- Cash/DD (if the guarantee is less than Rs.10,000/-).
- An irrevocable BG bond of any scheduled bank or any nationalized bank in the prescribed form (if the guarantee is equal to or more than Rs.10,000/-).

The time limit allowed for submission of the performance guarantee by the contractor shall be **15 days** from the letter of acceptance. **The work order shall be issued to the contractor only after submission of the performance guarantee in an acceptable form.** Performance security shall be released after satisfactory completion of work without any interest. If the contractor fails to carry out the work to the satisfaction of CIAL, performance security will be forfeited.

Upon acceptance of the tender, the successful tenderer shall within 15 days of receipt of intimation of acceptance of the tender, deposit with the CIAL an initial security deposit of 2.5% of the contract sum minus EMD in the form of cash or bank guarantee from nationalised bank/scheduled bank and shall permit CIAL at the time of making any payment to him for work done under the contract to deduct additional Security Deposit such sum as will along with the amount of initial security deposit already deposited amount to 10% of the gross amount of the bill.

If the successful bidder fails within the time limit to furnish the required performance guarantee (Performance Security), CIAL be at liberty to cancel the Letter of Intent and forfeit the full said earnest money.

21. Cochin International Airport Ltd. will return the earnest money without any interest to the unsuccessful tenderers.
22. Canvassing in connection with tenders is strictly prohibited, and the tenders submitted by the tenderer who resorts to canvassing will be liable to rejection.
23. The tenderer shall not be permitted to work in CIAL where his near relative is working in any capacity. He shall also intimate the names of people who are working with him in any capacity or are subsequently employed by him and who are near relatives to any staff in the CIAL. Any breach of this condition by the contractor would render him liable to be

removed from the approved list of contractors of this company and from further tendering in this company.

24. The contractor shall give a list of CIAL and Kochi International Airport Society employees (KIAS) employees related to him.
25. The tender for works shall remain open for acceptance for a period of **ninety days** from the date of opening of tenders. If any tenderer withdraws his tender before the said period or makes any modifications in the terms and conditions of the tender which are not acceptable to the company, then CIAL shall, without prejudice to any other right or remedy, be at liberty to **forfeit the full said earnest money**.
26. On acceptance of the tender, the name of the **accredited representative(s)** of the contractor who would be responsible for taking instructions from the Engineer-in-Charge shall be communicated to the Engineer-in-Charge.
27. A tenderer shall submit the tender that satisfies every condition laid down in this notice, failing which, the tender will be liable to be rejected.
28. The final quoted price should include all the applicable **taxes, loading, unloading charges**, whatsoever applicable charges in India or the statutory levies applicable to this contract. The Amount to be quoted in the BOQ is **exclusive of GST. GST will be paid extra**. GST will be paid to the contractor against the submission of a proper GST invoice to CIAL at the appropriate time. CIAL will not entertain any claim whatsoever beyond the final quoted price, other than GST, which is payable extra to the contractor.

Under the GST Law, the contractor should also comply with the filing of all the returns to the GST network/ government departments within the stipulated time every month or such other period as required by the Government. If the contractor does not comply with any of the GST laws and procedures and if CIAL incurs any liability on this account or does not get the input credit from the comply with the procedures of filing/ uploading of data/ submissions of documents, etc. in time then all such liability including **the input credit of the GST lost by CIAL and the penalties and interest incurred by CIAL would be the liability of the contractor to be recovered from the running account bills or security deposits** or any other amount payable by CIAL to the contractor.

Further, the contractor is to provide **all GST registration-related data/ information to CIAL at the time of tender submission** for updating the CIAL application software.

29. This notice of tender shall form part of the contract document.

30. All the tenderers must indicate the capacity and authority of the individual signing the tender
31. In case any incorrect information is submitted by the tenderer against this tender, the offer shall be summarily rejected. EMD shall be forfeited under this condition.
32. After technical evaluation, CIAL reserves the right to reject any bid.

For and on behalf of

Cochin International Airport Ltd.

Signature:

Designation:

Date

ACCEPTANCE LETTER

(TO BE SUBMITTED IN COVER NO. 1)

(Refer to Condition 17.1 of Notice Inviting Tender)

The Managing Director,
Cochin International Airport Ltd.,
Kochi Airport P.O.- 683 111.

Sir,

ACCEPTANCE OF CIAL'S TENDER CONDITIONS

1. The Tender Document for the work of “the **SITC of 350 TR VFD-Driven Chiller and 350 TR Cooling Towers for Terminal 1 CIAL**” has been sold to me/us by CIAL, and I/We hereby unconditionally accept the tender condition of CIAL’s tender documents in its entirety for the above work.
2. The contents of clauses 17.1, 18.1, 18.2 and 18.3 of Notice Inviting Tender of the Tender Documents have been noted, wherein it is clarified that the unconditional acceptance of the tender conditions in its entirety is a precondition for acceptance of the tender. It is further noted that it is not permissible to put any remarks/conditions (except unconditional rebate on quoted rates, if any) in the tender enclosed in “Cover No.2”. I/We agree that the tender shall be rejected and CIAL shall, without prejudice to any other right or remedy, be at liberty to forfeit the earnest money deposit.
3. We hereby undertake the responsibility of the SITC of 350 TR VFD-Driven Chiller and 350 TR Cooling Towers for Terminal 1 CIAL, Nedumbassery, as per CIAL tender conditions and site conditions.
4. The required earnest money for this work is enclosed herewith.

Yours faithfully,

(Signature of the tenderer)

Date: _____.

with a rubber stamp

COCHIN INTERNATIONAL AIRPORT LTD
TENDER FORM

Item rate tender for “the **SITC of 350 TR VFD-Driven Chiller and 350 TR Cooling Towers for Terminal 1 CIAL**”

1. To be submitted online by 15.30 hours on **06/04/2026** to The Managing Director, Cochin International Airport Ltd., Kochi Airport P.O. – 683 111.
2. Tenders shall be opened in the presence of tenderers who may be present, at 15.30 hours on **07/04/2026** in the office of Cochin International Airport Ltd.,

Issued to _____ (Contractor)

Issued by

Managing Director,
Cochin International Airport Ltd.,
Kochi Airport P.O. – 683 111.

TENDER

To

Cochin International Airport Ltd.

I/We have read and examined the following documents relating to the work titled “the **SITC of 350 TR VFD-Driven Chiller and 350 TR Cooling Towers for Terminal 1 CIAL**”

- a) Notice inviting tender
- b) Schedules A, B, C, D
- c) General Conditions of Contract including Contractor’s Labour Regulations, Model Rules for Labour Welfare and Safety Code and forms of different deeds appended to these conditions.
- d) Special Conditions of Contract
- e) Particular specifications/Technical Specifications
- f) BOQ

I/We hereby tender for the execution of the works referred to in the aforesaid documents upon the terms & Conditions contained or referred to therein and in accordance with all respects with the specifications, designs, drawings and other relevant details at the rates contained in Schedule A and within the period (s) of completion.

I/We agree to keep the tender open for acceptance for **ninety (90)** days from the due date of submission thereof and not to make any modifications to its terms and conditions which are not acceptable to CIAL.

A sum of **Rs. 3,86,000/-** is hereby forwarded in the form of a Demand Draft in favour of CIAL as earnest money. If I/We fail to keep the tender open as aforesaid or make any modifications in the terms and conditions of the tender, which are not acceptable to CIAL, I/We agree that CIAL shall, without prejudice to any other right or remedy, be at liberty to forfeit the said earnest money absolutely and I/We shall not be considered as unsuccessful tenderer for return of earnest money as provided in the Notice Inviting Tender. Should this tender be accepted, I/We hereby agree to abide by and fulfil all the terms, conditions, and provisions of the aforesaid documents.

If, after the tender is accepted, I/We fail to commence the execution of the Works as provided in the Conditions, I/We agree that CIAL shall without prejudice to any other right or remedy, be at liberty to forfeit the said earnest money absolutely and take suitable actions against me/us as deemed fit under the terms and conditions of the contract.

I/We agree that should CIAL decide to forfeit earnest money as aforesaid unless a sum equal to the earnest money mentioned above is paid by me/us forthwith, CIAL may at its option recover it out of the deposit and in the event of deficiency, out of any other moneys due to me/us or otherwise.

(Signature and Seal of Bidder)

If the tender is accepted, I/We agree that the earnest money deposited at the time of tender shall be treated as part of the security deposit and the balance security deposit shall be paid by me/us or CIAL shall collect the same by deductions from my/our running bill as per condition of contract.

Signature in the Capacity of _____

Duly authorized to sign the tender on behalf of the (in-block capitals) _____

Date _____

Witness _____

Postal address _____

Date _____

Address _____

Telegraphic address _____

Telephone No. _____

Fax No. _____

Email address _____

SCHEDULE 'A'

SCHEDULE OF QUANTITIES

Sl. No.	Description	Units	Quantity	Rate		Total
				In fig.	In words	
1	2	3	4	5		6
<p>Schedule of Quantities attached</p>						
(Signature of Issuing Officer)			(Signature of Contractor)			
Date:			Date:			

SCHEDULE 'B'**MATERIALS FOR ISSUE TO THE CONTRACTOR**

(See General Condition 15)

Sr. No.	Particulars	Rate at which material will be issued		Quantity	Place of issue
		Units	Rs.		
1	2	3	4	5	6
Nil					
(Signature of Issuing Officer)			(Signature of Contractor)		
Date:			Date:		

SCHEDULE 'C'**TOOLS AND PLANTS TO BE HIRED TO THE CONTRACTOR**

(See General Conditions 14)

Sr. No.	Particulars	Number available	Hire charges per unit per Working Day	Frequency of maintenance	Value per unit	Place of Issue
1	2	3	4	5	6	7
Nil						
(Signature of Issuing Officer)			(Signature of Contractor)			
Date:			Date:			

SCHEDULE 'D'**SCHEDULE OF FAIR WAGES**

Sr. No.	Category of labour	Wages per day	Remarks
1	2	3	4
<p>Fair wages as fixed by the Central or State Government, whichever are higher shall be applicable.</p>			
(Signature of Issuing Officer)		(Signature of Contractor)	
Date:		Date:	

SECTION -II

2. GENERAL CONDITIONS OF CONTRACT

COCHIN INTERNATIONAL AIRPORT LIMITED

GENERAL CONDITIONS OF CONTRACT

INTERPRETATION AND DEFINITIONS

Singular & Plural:

1. Where the context so requires, words importing the singular only also include the plural and vice versa.

Headings and Marginal Notes to Conditions:

2. Headings and marginal notes to these General Conditions shall not be deemed to form part thereof or be taken into consideration in the interpretation or construction thereof or of the contract.

3. Definitions:

- a. Authority “CIAL” shall mean Cochin International Airport Ltd. having its headquarters at Cochin and includes a duly authorized representative of CIAL or any other person empowered in this behalf by CIAL to discharge all or any of its functions.
- b. The “Accepting Authority” shall mean Managing Director, Cochin International Airport Ltd.**
- c. The “Contract” shall mean the notice inviting the tender, the tender and acceptance thereof and the formal agreement, executed between CIAL and the Contractor together with the documents referred to therein including these Conditions with appendices and any special Conditions, the specifications, designs, drawings, schedule of quantities with rates and amounts and schedule of rates. All these documents taken together shall be deemed to form one Contract and shall be complementary to one another.
- d. The “Contractor” shall mean the individual or firm or company undertaking the works and shall include legal representative of such individual or persons composing such firm or

incorporated company, or successors of such firm or company as the case may be and permitted assigns of such individual or firm or company.

- e. The Contract Sum shall mean:
- i. In the case of Lump Sum Contracts, the sum for which the tender is accepted.
 - ii. In the case of percentage Rate Contracts, the estimated value of the Works as mentioned in the schedule of quantities is adjusted by the Contractor's percentage.
 - iii. In the case of Item Rate Contracts, the cost of the Works is arrived at after extension of the quantities shown in the Schedule of Quantities by the item rates quoted by the tenderer for the various items.
- f. A "Day" shall mean a day of 24 hours from midnight, irrespective of the number of hours worked in that day.
- g. "**Engineer-in-charge**" shall mean the Engineering Officer appointed by the Accepting Authority or his duly authorized representative who shall direct, supervise and be in charge of the works for purposes of this contract.
- h. "Excepted Risks" are risk due to riots (otherwise than among Contractor's employees) and civil commotion (so far as both these are uninsurable), war (whether declared or not), invasion, act of foreign enemies, hostilities, civil war, rebellion, revolution, insurrection, military or usurped power, any acts of Government, damage from aircraft, acts of God, such as earth-quake, lightning and un-precedented flood and other causes over which the Contractor has no control and accepted as such by the Accepting Authority.
- i. "**Market Rate**" shall be the rate as decided by the Engineer-in-charge based on the cost of materials and labour at the Site where the work is to be executed, **plus 15 (fifteen) percent** to cover all overheads and profit.
- j. Schedule(s) referred to in these conditions shall mean **DSR 2018 without Cost Index and Market Rate.**
- k. The "Site" shall mean the lands and/or other places on, under, in or through which the work is to be executed under the Contract, including any other lands or places which may be allotted by CIAL or used for the purposes of the Contract.

- l. “Temporary Works” shall mean all temporary works of every kind required in or about the execution, completion or maintenance of the Works.
- m. “Urgent Works” shall mean any urgent measures which, in the opinion of the Engineer-in-Charge, become necessary during the progress of the work to obviate any risk of accident or failure or which become necessary for security.
- n. A “Week” shall mean seven days without regard to the number of hours worked in any day in that week.
- o. The “Works” shall mean the works to be executed in accordance with the Contract or part(s) thereof, as the case may be and shall include all extra or additional, altered or substituted works or temporary and urgent works as required for performance of the Contract.
- p. Sub-Contractor

The term “Sub-Contractor used herein refers to a party or parties having a direct contract with the Contractor to whom any part of the contract has been sublet by the Contractor with the consent in writing of the Engineer-in-Charge.

- q. Drawings

“Drawings” means the Drawings referred to in the contract and any modification of such drawings approved in writing by the Engineer-in-Charge and such other drawings as may from time to time be furnished or approved in writing by the Engineer-in-Charge, as well as shop drawings which may have to be prepared by the Contractor and are approved by the Engineer-in-Charge.

- r. Contract Price/Amount

“Contract Price/Amount” means the sum mentioned in the Tender, subject to such additions thereto or deductions therefrom as may be under the provisions hereinafter contained.

- s. Month

“Month” shall mean the English Calendar month.

t. Terms of Approval, Judgment or Direction

When the words “Approved”, “Subject to approval”, “satisfactory”, “equal to” “determined by”, “accepted”, “permitted”, etc. are used, the approval, judgement, direction, etc. implied is understood to be a function of the Engineer-in-Charge and/or Consultant and shall have the same effect as if performed by the CIAL.

SCOPE AND PERFORMANCE

4. Contract Documents:

4.1 The Contractor shall be furnished, free of charge, **two certified true copies of the Tender Documents**, except standard specifications and the schedule or rates. All further drawings that may be issued during the progress of the work shall also be provided free of cost. He shall keep one copy of the documents on the Site in good order, and the same shall at all reasonable times be available for inspection and use by the Engineer-in-Charge, his representatives or by other inspecting Officers.

4.2 None of these Documents shall be used by the Contractor for any purpose other than that of this Contract.

4.3 The contractor shall take necessary steps to ensure that all persons employed on any work in connection with this contract have been notified that **the Indian Official Secrets Act 1923 (XIX of 1923)** applies to them and shall continue to apply even after the execution of such works under the Contract.

Works to be carried out:

5. The work to be carried out under the Contract shall, except as otherwise provided in these conditions, **include all labour, materials, tools, plant, equipment and transport which may be required** in preparation of and for and in the full and entire execution and completion of the Works. The descriptions given in the Schedule of Quantities shall, unless otherwise stated, be held to include waste on materials, carriage and cartage, carrying in return for empties, hoisting, setting, fitting and fixing in position, and all other labours necessary in and for the full and entire execution and completion as aforesaid in accordance with good practice and recognized principles.

6. Inspection of Site:

The Contractor shall inspect and examine the site and its surrounding and shall satisfy himself before submitting his tender as to the nature of the ground and subsoil (as far as is practicable) the form and nature of the Site, the quantities and nature of work and materials necessary for the completion of the Works and the means of access to the Site, the accommodation he may require and in general shall himself obtain all necessary information as to risks, contingencies and other circumstances which may influence or affect his tender. **No extra charges consequent on any misunderstanding or otherwise shall be allowed.**

7. Sufficiency of Tender:

The Contractor shall be deemed to have satisfied himself before tendering as to the correctness and sufficiency of his tender for the Works and of the rates and prices quoted in the Schedule of Quantities, which rates and prices shall, except as otherwise provided, cover all his obligations under the Contract and all matters and things necessary for the proper completion and maintenance of the Works.

8. Discrepancies and Adjustment of Errors:

The several documents forming the Contract are to be taken as mutually explanatory of one another, detailed drawing being followed in preference to small-scale drawing and figured dimensions in preference to scale and **Special Conditions in preference to General Conditions.**

8.1 In the case of discrepancy between the Schedule of Quantities, the Specifications and/or the Drawings, the following order of preference shall be observed.

- a) Description of Schedule of Quantities.
- b) Technical/Particular Specification and Special Conditions, if any.
- c) Drawings.
- d) General Specifications.

8.2 If there are varying or conflicting provisions made in any one document forming part of the Contract, **the Accepting Authority shall be the deciding authority** regarding the intention of the document.

8.3 Any error in description, quantity or rate in the Schedule of Quantities or any omission therefrom shall not vitiate the Contract or release the Contractor from the execution of the

whole or any part of the Works comprised therein according to drawings and specifications or from any of his obligations under the contract.

8.4 If on check there are found to be differences between the rates given by the contractor in words and figures or in the amount worked out by him in the schedule of quantities and general summary, the same shall be adjusted in accordance with the following rules:

- a) In the event of a discrepancy between the description in words and figures quoted by a tenderer, **the description in words shall prevail.**
- b) In the event of an error occurring in the amount column of the Schedule of Quantities because of the wrong extension of the unit rate and quantity, the **unit rate shall be regarded as firm**, and the extension shall be amended based on the rate.
- c) All errors in totalling in the amount column and in carrying forward totals shall be corrected.
- d) The total of various sections of the Schedule of Quantities amended shall be carried over to the General Summary and the tendered sum amended accordingly. The tendered sum so altered shall, for the purpose of the tenderer, be substituted for the sum originally tendered and considered for acceptance instead of the original sum quoted by the tenderer. Any rounding off Quantities or in sections of the Schedule of Quantities or in the General Summary, by the tenderer, shall be ignored.
- e) In case of **lumpsum contracts** based on Bills of Quantities (quantities not shown as provisional), should any error in quantities or any omission or items be discovered, the cumulative effect of which varies the Contract sum by more than 5% or Rs.20,000/- whichever is less, then the errors shall be rectified and the rectification dealt with as for deviations/variations under conditions 10 & 11 hereof, and the value thereof shall be added or deducted from the Contract Sum, as the case may be provided that there shall be no rectification of any errors, omissions, or wrong estimates in the prices inserted by the Contractor in the Bills of Quantities.

9. Security Deposits:

- a. The successful tenderer shall within 15 days of receipt of intimation of acceptance of the tender, deposit with the CIAL **an initial security deposit of 2.5%** of the contract sum minus EMD in the form of cash or bank guarantee in the form acceptable to CIAL and shall permit CIAL at the time of making any payment to him for work done under the contract to deduct additional Security Deposit such sums as will along with the

amount of initial security deposit amount to 10% of the gross amount of bill unless he has already deposited the amount of the security as Cash or Bank Guarantees furnished by any of the Nationalized/ Scheduled Banks in India. A Security Deposit of 10 percent will be deducted from every running account bill processed, and the total amount thus deducted will be 10 percent of the work executed value and will only be released after the DLP period.

- i. Provided that the security deposit reaches a limit of Rs.10 (ten) lakhs, the contractor, if he so desires, may convert the amount into one of the Government securities or Bank guarantees from any of the Nationalised/ Scheduled Banks in India. (If the total security deposit reaches a limit of Rs.10 (ten) lakhs, the contractor, if he so desires, may convert the amount into one of the Government securities or Bank guarantees from any of the Nationalised/ Scheduled Banks in India.)
 - ii. Provided that, if at the time of payment of the final bill, the deductions so made together with the earnest money already deposited, fall short of the security deposit above, the recovery of the balance amount of the security deposit shall be deemed to have been waived.
- b. All compensation or other sums of money payable by the Contractor under the terms of this Contract or any other Contract or any other account whatsoever may be deducted from his security deposit or from the interest arising therefrom or from any sums which may be due or may become due to the Contractor by CIAL on any account whatsoever and in the event of his security deposit being reduced because of such deduction as aforesaid, the **Contractor shall within fourteen days of receipt of notice of demand from the Engineer-in-Charge, make good the deficit.**
- c. Refund of Security Deposit: One-half of the security deposit, refundable to the Contractor, worked out based on the value of work completed, shall be refunded to the Contractor on the Engineer-in-Charge certifying in writing that the work has been completed as per condition 31.1 thereof of etc. On expiry of the Defects Liability Period (referred to in Condition 33 hereof) or on payment of the amount of the Final Bill payable by Condition 52.0 hereof, whichever is later, the Engineer-in-Charge shall on demand from the Contractor, refund to him the remaining portion of the security deposit, provided the Engineer-in-Charge is satisfied that there is no demand outstanding against the Contractor. Security Deposit shall be refunded after the DLP period

Deviations/Variations Extent & Pricing:

10.0 The Engineer-in-Charge shall have power

- i. **to make alterations** in omissions from, additions to, or substitutions for the original specifications, drawings, designs and instructions that may appear to him to be necessary or advisable during the progress of the work, and
- ii. **to omit a part of the Works in case of non-availability of a portion of the Site or for any other reasons**, and the Contractor shall be bound to carry out the Works following any instructions given to him in writing signed by the Engineer-in-Charge and such alterations, omissions, additions or substitution shall form part of the Contract as if originally provided therein and any altered, additional or substituted work which the Contractor may be directed to do in the manner above specified as part of the Works, shall be carried out by the Contractor on the same conditions in all respects including price on which he agreed to do the main work.

10.1 The time for completion of the Work shall, in the event of any deviations resulting in additional cost over the Contract Sum being ordered, be extended as follows if requested by the Contractor.

- a. In the proportion that the additional cost of the altered, additional or substituted work bears to the original Contract sum plus.
- b. Any further additional time may be considered reasonable by the Engineer-in-charge. (Subject to a maximum of 25% of the time calculated as above).

10.2 Rates for such additional, altered or substituted work shall be determined by the Engineer-in-Charge as follows:

- i. If the rate for the additional, altered or substituted item of work is specified in the Schedule of Quantities, the Contractor shall carry out the additional, altered or substituted item at the **same rate**. In the case of composite tenders where two or more schedules of quantities may form part of the contract, the applicable rate shall be taken from the schedule of quantities of that part in which the deviation is involved, failing that, at the **lowest applicable rate** for the same item of work in the other Schedule of Quantities.

- ii. If the rate for any altered, additional or substituted item of work is not specified in the Schedule of Quantities, the rate for that item shall be derived from the rate for the nearest similar item specified therein. In the case of composite tenders where two or more schedules of quantities form part of the contract, the rate shall be derived from the nearest similar item in the Bills of Quantities of the part of works in which the deviation is involved, failing that, from the lowest of the nearest similar items in the other schedule of quantities.
- iii. If the rate for any additional, altered or substituted item of Work cannot be determined in the manner specified in sub-paras (I) and (ii) above, then such item of work shall arrive **from DSR 2016** prevailing at the time of tendering plus/minus the percentage by which the tendered amount of the works actually awarded is higher or lower than the estimated amount of the works actually Awarded. **The cost index will not be applied to DSR 2016** for this purpose.
 - a. (Applicable to Measurement Contracts based on item rates or lump sum Contracts based on Bills of Quantities or Percentage Rate Contracts).
- iv. If the rate for any altered, additional or substituted item of Work cannot be determined in the manner specified in sub-para (i) to (iii) above, then the rate for such item of work shall be derived from the Schedule of Rates specified in sub-para (iii) above plus/minus the percentage mentioned in that sub-para. Provided always that if rate(s) for part(s) of an item(s) is/are not specified in the Schedule of Rates, the rate(s) for such part(s) shall be determined by the Engineer-in-Charge based on the purchase price as supported by the vouchers unless the Engineer-in-Charge finds the purchase price unreasonable. In the latter event, the price shall be determined based on market rate(s) prevailing during the fortnight following the date of the order.
- v. If the rate for any altered, additional or substituted item of Work cannot be determined in the manner specified in sub-paras (i) to (iv) above, the Contractor shall, within 14 days of the date of receipt of the order to carry out the said work, inform the Engineer-in-Charge of the rate which he proposes to claim for such item of work supported by analysis of the rate claimed and the Engineer-in-Charge shall within three months thereafter, after giving due consideration to the rate claimed by the Contractor, determine the rate based on market rate (s). In the event of the Contractor failing to inform the Engineer-in-Charge within the stipulated period of the rate which he

proposes to claim, the rate for such item shall be determined by the Engineer-in-Charge based on market rate(s).

- vi. Except in case of items of work below ground surface as it exists at the time of commencement of work (See (B) below), quantities of which may change due to site conditions, provisions contained in sub-conditions (i) to (v) above shall not apply to:
 - a. that the value of any contract item, substituted item or contract-cum-substituted item is more than the original value of the item by 25%.
(Applicable to lump-sum Contracts, Measurement contracts based on item rates and percentage Rate Contracts).
 - b. that the value of deviations ordered on any individual trade item included in the contract is more than 25 per cent. (Applicable to Lump-Sum Contracts only.)
 - c. the value of all items not already included in the Contract is more than 25 per cent.

In case of items of Work below ground surface as it exists at the time of commencement of work, quantities of which may change due to site conditions, provisions contained in sub-conditions (i) to (v) above shall not apply to:

- a. items of any individual trade which exceed by more than 50% of the value of that trade included in the Contract as a whole unless the Contractor and the Engineer-in-Charge agree to a higher percentage for any item.
- b. the value of any item not included in the Contract more than 5% of the contract sum.

NOTE: Individual trade means the sub-heads into which the Schedule of quantities as provided in the Contract has been divided and in the absence of any such provision in the Contract, the sub-heads as given in the Schedule of Rates.

For the operation of clause 10 (vi) B, the following works shall be treated as works below the ground surface.

- a. For buildings, compound walls, plinth level or 1.2 meters (4 ft) above ground level whichever is lower, excluding items above flooring and D.P.C. but including base concrete below the floors.
- b. For abutments, piers, retaining walls of culverts and bridges, walls of water reservoirs the bed of floor level.
- c. For retaining walls where floor level is not determined 1.2 meters above the average ground level or bed level.

- d. For roads and airports all items of excavation and filling including treatment of subbase and lower subbase works.
- e. For water supply lines, sewer lines, underground storm water drains and similar work. All items of work below ground level except items of pipe work and proper masonry work.
- f. For open storm water drains, all items of work except lining of drains.

11. In the case of contract items, substituted items, contract-cum-substituted items or additional items which exceed the limits laid down in sub-para (vi) of Condition 10 above, the Contractor may, within fourteen days of receipt of order or occurrence of the excess, claim revision of the rates, supported by proper analysis, for the work in excess of the above-mentioned limits, provided that if the rates so claimed are in excess of the rates specified in the Schedule of quantities or of those derived in accordance with the provisions of sub-para (i) to (iv) of Condition 10 by more than five percent, the Engineer-in-Charge shall, within three months of receipt of the claim supported by analysis, after giving consideration to the analysis of the rates submitted by the Contractor determine the rates on the basis of market rates and if the rates so determined exceed the rates specified in the Schedule of Quantities or those derived in accordance with the provisions of sub-para (i) to (iv) of Condition 10 by more than five per cent, the Contractor shall be paid in accordance with the rates so determined. In the event of the Contractor failing to claim revision of rates within the stipulated period, if the rates determined by the Engineer-in-Charge within a period of three months of receipt of the claim supported by analysis are within five per cent of the rates specified in the Schedule of Quantities or of those determined under the provisions of sub-paras (i) to (iv) of Condition 10, the Engineer-in-Charge shall make payment at the rates as specified in the Schedule of Quantities or those already determined under sub-paras (i) to (iv) of Condition 10 for the quantities above the limits laid down in sub-para (vi) of Condition 10.

11.1 The provisions of the preceding paragraph shall also apply to the decrease in the rates of items, for the above the limits laid down in sub-para (vi) of Condition 10 provided that such decrease is more than five per cent of rates specified in the Schedule of Quantities or of those derived under the provisions of sub-paras (i) to (iv) of Condition 10, and the Engineer-in-Charge may after giving notice to the Contractor within two months of receipt of order by the Contractor or occurrence of the excess and after taking into consideration

any reply received from within fourteen days of receipt of the notice revise the rates for the work in question within two months of expiry of said period of 14 days having regard to the market rates.

12. Suspension of Work:

a. The Contractor shall, on receipt of the order in writing of the Engineer-in-Charge, suspend the progress of the work or any part thereof for such time and in such manner as the Engineer-in-Charge may consider necessary for any of the following reasons.

- i. on account of any default on the part of the Contractor; or
- ii. for proper execution of the Works or part thereof for reasons other than the default of the Contractor; or
- iii. for the safety of the Works or part thereof.

The Contractor shall, during such suspension, properly protect and secure the Works to the extent necessary and carry out the instructions given on that behalf by the Engineer-in-Charge.

b. If the suspension is ordered for reasons (ii) and (iii) in sub-para (a) above:

The Contractor shall be entitled to an extension of the time equal to the period of every such suspension plus 25%.

c. If the works or part thereof is suspended on the orders of the Engineer-in-Charge for more than three months at a time, except when the suspension is ordered for reason (i) in sub-para (a) above, the Contractor may after receipt of such order serve a written notice on the Engineer-in-Charge requiring permission within fifteen days from receipt by the Engineer-in-Charge of the said notice, to proceed with the Works or part thereof concerning which progress has been suspended and if such permission is not granted within that time, the Contractor, if he intends to treat the suspension, where it affects only a part of the Works as an omission of such part by CIAL under Conditions 10 and 11 or where it affects the whole of the Works, as an abandonment of the Works by CIAL shall within ten days of expiry of such period of 15 days give notice in writing of his intention to the Engineer-in-Charge. In the event of the Contractor treating the suspension as an abandonment of the Contract by CIAL, he shall have no claim to payment of any compensation on account of any profit or advantage which he may have derived from the execution of the work in full but which he could not derive in consequence of the

abandonment. He shall, however, be entitled to compensation, as the Engineer-in-Charge may consider reasonable, in respect of salaries and/or wages paid by him to his employees and labour at Site, remaining idle in consequence and of materials collected which could not be utilized on the Works, adding to the total thereof 10% to cover indirect expenses of the Contractor, provided the Contractor submits his claim supported by the details to the Engineer-in-Charge within 28 days of the expiry of the period of 3 months.

Time and Extension for Delay:

13.0 The time allowed for execution of the Works as specified in the Notice Inviting Tender or the extended time under these Conditions shall be of the essence of the Contract. The execution of the Works shall commence from the **15th day** after the date on which the Engineer-in-Charge issues written orders to commence the work or from the date of handing over of the Site, whichever is later. If the Contractor commits a default in commencing the execution of the work as aforesaid, CIAL shall, without prejudice to any other right or remedy, be at liberty to forfeit the earnest money.

13.1 As soon as possible after the Contract is concluded, the Engineer-in-Charge and the Contractor shall agree upon a Time and Progress Chart. The Chart shall be prepared in direct relation to the time stated in the Contract documents for completion of items of the works. It shall indicate the forecast of the dates of commencement and completion of various trades or sections of the work and may be amended as necessary by agreement between the Engineer-in-Charge and the Contractor within the limitations of time imposed in the Contract documents, and further to ensure good progress during the execution of the work, the contractor shall in all cases in which the time allowed for any work exceeds one month (save for special jobs) complete 1/8th of the whole of the work before 1/4th of the whole time allowed in the contract has elapsed; 3/8th of the work before one half of such time has elapsed and 3/4th before 3/4th of such time has elapsed.

13.2 If the Works be delayed by force majeure or excepted risks, or any other cause which, in the absolute discretion of the Accepting Authority is beyond the Contractor control then upon the happening of any such event causing delay, the Contractor shall immediately give notice thereof in writing to the Engineer-in-Charge but shall nevertheless use constantly his best endeavours to prevent or make good the delay and shall do all that may be reasonably required to the satisfaction of the Engineer-in-Charge to proceed with the Works.

13.3 Request for extension of time to be eligible for consideration shall be made by the Contractor in writing within fourteen days of the occurrence of the event causing delay. The Contractor may also, if practicable, indicate in such a request the period for which extension is desired.

In any such case the Accepting Authority may give a fair and reasonable extension of time for completion of the work. Such extension shall be communicated to the Contractor by the Engineer-in-Charge in writing, within 3 months of the date of receipt of such request by the Engineer-in-Charge.

Tools and Plants:

14.0 The Contractor shall arrange at his own expense all tools, plant and equipment (hereinafter referred to as T&P required for execution of the work, except the items listed in Schedule 'C', which will be given to him on hire by CIAL at rates shown in that Schedule. In case the Contractor does not require some or all items of T & P listed in schedule 'C', he will indicate his requirements at the time of submitting his tender. CIAL T&P hired by the contractor shall be conveyed by him at his expense from the place of issue to the site and back.

14.1 If the Contractor requires any item of T & P on hire from CIAL over and above the requirements indicated by him at the time of submitting his tender, CIAL will, if such item is available, hire it to the Contractor at a rate to be fixed by the Engineer-in-Charge. Any CIAL T&P hired by the contractor shall be used only for the specific work for which it is given to them.

14.2 The period of hire will be reckoned from the commencement of the day of issue up to the end of the day of return (including all recognized holidays), irrespective of the actual hour of issue and return. The Contractor will be exempted from levy of any charges for the number of days he is called upon in writing by the Engineer-in-Charge to suspend execution of the work, provided CIAL's T&P in question has in fact remained idle with the Contractor because of the suspension, provided the Contractor, in case the period of suspension exceeds 11 days, returns CIAL's T&P to the place from where it was issued.

14.3 The hire charges shall be reckoned as under:

- a. the first eight working hours (excluding a break of one hour) 1 working day.

- b. every working hour or part thereof in excess of 8 working hours, at the rate of 1/8 of the hire charges for a working day; provided however if CIAL has paid more than at the rate of 1/8 of the wages of the crew for overtime under the Minimum Wages Act or any other law for the time being in force, the excess over 1/8 of the wages shall also be charged to the Contractor.

14.4 If at any time CIAL's T&P has not been working at all during the day except for a breakdown or has been worked for less than eight hours during a day, the Contractor shall be charged for one working day.

14.5 If any item of CIAL's T&P has stopped working on account of a breakdown before it has worked for four hours in a day, the Contractor will be charged for half a working day. If the item has stopped working after it has worked for more than four hours but less than eight hours, the Contractor will be charged for a full working day.

14.6 The hire charges shown in the Schedule cover charges of crew, stores for maintenance and cleaning purposes and fuel needed to start a machine at the time of issue. All other charges, such as cost of fuel for running a machine, engine oil, kerosene oil, etc., for working CIAL's T&P and all unskilled labour and Water required for servicing/wash out, shall be borne by the Contractor. The Contractor shall permit the Engineer-in-Charge to carry out periodical maintenance of CIAL's T&P in accordance with the provision therefore in the aforesaid Schedule, and there will be no deduction in hire charges for the period spent on such maintenance. However, the contractor shall be allowed to return the tools and plants issued by CIAL for the purposes of repairs, and for the duration of such repairs, no hire charges shall be levied.

14.7 The Contractor shall be responsible for care and custody of CIAL's T&P (including employment of chowkidar) during the period CIAL's T&P remain with him and any damage (fair wear and tear excepted) to any of the equipment (except for Excepted Risks provided always the Contractor has taken precautions necessary to protect it from such risks) shall be made good at the Contractor's expense to the satisfaction of the Engineer-in-Charge unless such damage is caused because of negligence of crew provided by CIAL.

14.8 CIAL give no guarantee in respect of the output of its T&P hired to the Contractor, and no reduction in rates or any compensation shall be allowed on the ground that output or performance of CIAL's T&P was not to the Contractor's expectations.

14.9 CIAL's T&P hired to the Contractor shall be returned at the place of issue (unless otherwise directed) by the Contractor to the Engineer-in-Charge on completion of the work or section of the work or earlier on termination of the hire by CIAL as hereinafter provided on a written notice by the Engineer-in-Charge. CIAL shall be entitled to terminate the hire on two days' notice without assigning any reason whatsoever and the Contractor shall have no claim to any payment of compensation or otherwise whatsoever on account of termination of hire of CIAL's T&P by CIAL. In such an event however, a reasonable extension of time shall be given by the Engineer-in-Charge.

14.10 **A logbook for recording hours during which every item of CIAL's T & P issued** to the Contractor has worked each day shall be maintained by the member of the crew in charge thereof or any representative of the Engineer-in-Charge appointed in that behalf and shall be daily attested by the Contractor or his authorized agent. In case the Contractor contests correctness of any entry and/or fails to sign the Logbook the decision of the Engineer-in-Charge shall be final and binding on him. Hire charges shall be calculated in accordance with the entries in the Logbook.

Materials:

15 a.1 The contractor shall, at his own expense, provide all materials required for the works other than those which are to be supplied by CIAL. The contractor shall deposit royalty and obtain the necessary permit for the collection of stone, sand, red bajri, Kankar, etc. from the local Authority.

15.a.1 All materials to be provided by the Contractor shall be in conformity with the specifications laid down in the contract, and the Contractor shall if requested by the Engineer-in-Charge, furnish proof to the satisfaction of the Engineer-in-Charge that the materials so comply.

15.a.2 The Contractor shall, at his own expense and without delay, supply the Engineer-in-Charge with **samples of materials** proposed to be used in the Works. The Engineer-in-Charge shall, within seven days of supply of samples or within such further period as he may require, intimate to the Contractor in writing, or inform the Contractor whether samples are approved by him or not. If samples are not approved, the Contractor shall forthwith arrange to supply to the Engineer-in-Charge for his approval fresh samples complying with the specifications laid down in the Contract.

15.a.3 The Engineer-in-Charge shall have full powers to require removal of any or all the materials brought to Site by the Contractor which are not in accordance with the Contract specifications or do not conform in character or quality to samples approved by him. In case of default on the part of the Contractor in removing rejected materials, the Engineer-in-Charge shall be at liberty to have them removed by other means. The Engineer-in-Charge shall have full powers to procure other proper materials to be substituted for rejected materials and in the event of the Contractor refusing to comply, he may cause the same to be supplied by other means. All costs which may entail such removal and/or substitution shall be borne by the Contractor.

15.a.4 The Contractor shall indemnify CIAL employee against any action, claim or proceedings relating to infringement or use of any patent or design or any alleged patent or design right and shall pay any royalties or other charges which may be payable in respect of any article or material, or part thereof included in the Contract. In the event of any claim being made or action being brought against CIAL or any agent, servant or employee of CIAL in respect of any such matters as aforesaid, the Contractor shall immediately be notified thereof. Provided that such indemnity shall not apply when such infringement has taken place in complying with the specific directions issued by CIAL, but the Contractor shall pay any royalties or other charges payable in respect of any such use, the amount so paid being reimbursed to the Contractor only if the use was the result of any drawings and/or specifications issued after submission of the tender.

15.a.5 Subject as hereinafter provided in Condition 53/53.1, all charges on account of octroi, terminal or sales tax and other duties on materials obtained for the Works from any source (excluding materials supplied by CIAL) shall be borne by the Contractor.

15.a.6 **The Engineer-in-Charge shall be entitled to have tests carried out as specified in the Contract** for any materials supplied by the Contractor other than those for which, as stated above, satisfactory proof has already been furnished, **at the cost of the Contractor, and the Contractor shall provide at his expense all facilities which the Engineer-in-Charge may require for the purpose.** If no tests are specified in the Contract, and such tests are required by the Engineer-in-Charge, the Contractor shall provide all facilities required for the purpose, and the charges for these tests shall be borne by the Contractor only if the tests disclose that the said materials are not in accordance with the provisions of the Contract. The cost of

materials consumed in tests shall be borne by the Contractor in all cases except when otherwise provided.

15.b Material to be supplied by CIAL: Materials to be supplied by CIAL are shown in Schedule B, which also stipulates quantum, place of issue and rate(s) to be charged in respect thereof.

15.b.1 If, after acceptance of the tender, the Contractor desires CIAL to supply any other materials, such materials may be supplied by CIAL, if available, at rates to be fixed by the Engineer-in-Charge.

15.b.2 For the materials listed in Schedule B, which CIAL has agreed to supply the contractor, he shall give reasonable notice in writing of his requirements to the Engineer-in-Charge in accordance with the agreed phased program. Such materials shall be supplied for the purpose of the Contract only and the value of the materials so supplied at the rate specified in the aforesaid schedule shall be set off or deducted, as and when materials are consumed in items of work for which payment is being made to the Contractor, from any sums then due or which may thereafter become due to the Contractor, under the Contract. At the time of submission of bills, the Contractor shall properly account for the materials issued to him to the satisfaction of the Engineer-in-Charge and certify that the balance of materials supplied is available at the site.

15.b.3 The Contractor shall bear the cost of loading, transporting to Site, unloading, storing under cover as required, assembling and joining the several parts together as necessary and incorporating or fixing materials in the Works, including all preparatory work of whatever description as may be required.

15.b.4 All materials issued to the Contractor by CIAL for incorporation or fixing in the Works (including preparatory work) shall, on completion or on foreclosure of the Works, be returned by the Contractor at his expense, at the place of issue, after making due allowance for actual consumption, reasonable wear and tear and/or waste. If the Contractor is required to deliver such materials at a place other than the place of issue, he shall do so, and the transportation charges from the sites to such place, less the transportation charges which would have been incurred by the Contractor had such materials been delivered at the place of issue, shall be borne by CIAL.

15.b.5 Surplus materials returned by the Contractor shall be credited to him by the Engineer-in-charge at rates not exceeding those at which these were originally issued to him after taking into consideration any deterioration or damage which may have been caused to the said materials whilst in the custody of the Contractor.

15.b.6 If on completion of Works the Contractor fails to return surplus materials out of those supplied by CIAL, then in addition to any other liability which the Contractor would incur, the Engineer-in-Charge may, by a written notice to the Contractor, require him to pay within a fortnight of receipt of the notice, for such unreturned surplus materials at double the issue rates.

15.b.7 If cement is to be supplied by CIAL, every cement godown shall be provided with two locks on each door. The key of one lock at each door shall remain with the Engineer-in-Charge or his representative, and that of the other lock with the Contractor's authorized agent at the Site of Works, so that cement is removed from the godown only according to daily requirements with the knowledge of both parties. In the case of cement purchased by the Contractor, the same arrangement will hold good.

General

15.c Materials required for the Works, whether brought by the Contractor or supplied by CIAL, shall be stored by the Contractor only at places approved by the Engineer-in-Charge. Storage and safe custody of materials shall be the responsibility of the Contractor.

15.c.1 CIAL's officials concerned with the Contract shall be entitled at any time **to inspect and examine any materials intended** to be used in or on the Works, either on the Site or at factory or workshop or other place(s) where such materials are assembled/fabricated, manufactured or at any place(s) where these are lying or from which these are being obtained and the contractor shall give such facilities as may be required for such inspection and examination.

15.c.2 **All materials brought to the Site shall become and remain the property of CIAL and shall not be removed from the Site without the prior written approval of the Engineer-in-Charge.** But whenever the Works are finally completed and advance, if any, in respect of any such materials is fully recovered, the Contractor shall at his own expense forthwith remove from the Site all surplus materials originally supplied by him, and upon such removal, the same shall revert in and become the property of the Contractor.

Labor

16.0 The Contractor shall employ labour in sufficient numbers either directly or through subcontractors to maintain the required rate of progress and of quality to ensure workmanship of the degree specified in the Contract and to the satisfaction of the Engineer-in-Charge. The Contractor shall not employ in connection with the Works any person who has not completed their eighteenth year of age.

16.1 The Contractor shall furnish to the Engineer-in-Charge a weekly distribution return of the number and description by trades of the work people employed on the Works. The Contractor shall also submit on the 4th and 19th of every month to the Engineer-in-Charge a true statement showing in respect of the second half of the preceding month and the first half of the current month

- i. the accidents that occurred during the said fortnight, showing the circumstances under which they happened, and the extent of damage and injury caused by them and
- ii. the number of female workers who have been allowed Maternity Benefit as provided in the Maternity Benefit Act, 1961 or Rules made thereunder, and the amount paid to them.

16.2 The Contractor shall pay to labour employed by him either directly or through subcontractors' wages not less than fair wages as defined in the **Contractor's Labour Regulations**.

16.3 The Contractor shall, in respect of labour employed by him either directly or through subcontractors, comply with or cause to be complied with the Contractor's Labour Regulations regarding all matters provided therein.

16.4 The Contractor shall comply with the provisions of the Payment of Wages Act, 1936, Minimum Wages Act, 1948, Employer's Liability Act, 1938, **Workmen's Compensation Act, 1923**, Industrial Disputes Act, 1947, Employees Provident Fund and Miscellaneous Provisions Act 1952, Maternity Benefit Act 1961, and Mines Act, 1952 or any modifications thereof or any other law relating thereto and rules made thereunder from time to time.

- a. The Contractor shall be liable to pay his contribution and the employees' contribution to the State Insurance Scheme in respect of all labour employed by him

for the execution of the contract, in accordance with the provision of 'The Employees' State Insurance Act, 1948" as amended from time to time. In case the contractor fails to submit full details of his account of labour employed and the contribution payable, the Engineer-in-Charge shall recover from the running bills of contractor an amount of contribution as assessed by him. The amount so recovered shall be adjusted against the actual contribution payable for Employees State Insurance.

16.5 The Engineer-in-Charge shall on a report having been made by an Inspecting Officer as defined in the Contractor's Labor Regulations have the power to deduct from the moneys due to the Contractor any sum required or estimated to be required for making good the loss suffered by a worker or workers by reason of non-fulfilment of the Conditions of the Contract for the benefit of workers; non-payment of wages or of deductions made from his or their wages which are not justified by the terms of the Contract or non-observance of the said Contractor's Labor Regulations.

16.6 The Contractor shall indemnify CIAL against any payments to be made under and for non-observance of the Regulations aforesaid without prejudice to his right to claim indemnity from his subcontractors.

16.7 In the event of the Contractor committing a default or breach of any of the provisions of the aforesaid Contractor's Labor Regulations, as amended from time to time or furnishing any information or submitting or filing any Form/Register/Slip under the provisions of those Regulations which is materially incorrect then on the report of the Inspecting Officers as defined in the Contractor's Labor Regulation, **the Contractor shall without prejudice to any other liability pay to CIAL Rs.250/-** as liquidated damages for every default, breach or furnishing, making, submitting, filing materially incorrect statement as may be fixed by the Engineer-in-Charge and in the event of the Contractor's default continuing in this respect, the liquidated damages may be enhanced to Rs.250\/- per day for each day of default subject to a maximum of 5% of the estimated cost of the Works put to tender. The Engineer-in-Charge shall deduct such amount from the bills or security deposit of the Contractor and credit the same to the Welfare Fund constituted under Regulations. The decision of the Engineer-in-Charge in this respect shall be final and binding.

16.8 Model Rules for Labour Welfare: **The Contractor shall, at his own expense,** comply with or cause to be complied with Model Rules for Labour Welfare as appended to these Conditions or rules framed by the Government from time to time for the protection of health and for making **sanitary arrangements for workers employed directly or indirectly on the works.** In case the Contractor fails to plan as aforesaid, the “Engineer-in-Charge shall be entitled to do so and recover the cost thereof from the Contractor.

16.9 Safety Code: The Contractor shall, at his own expense, arrange for the safety provisions as appended to these conditions or as required by the Engineer-in-Charge, in respect of all labour directly or indirectly employed for performance of the Works and shall provide all facilities in connection therewith. In case the Contractor fails to plan and provide necessary facilities as aforesaid, the Engineer-in-Charge shall be entitled to do so and recover the cost thereof from the Contractor.

- i. Failure to comply with Model Rules for Labour Welfare, Safety Code or the provisions relating to report on accidents and to grant of maternity benefits to female workers shall make the Contractor liable to pay to CIAL as liquidated damages an amount not exceeding **Rs.250/- for each default or materially incorrect statement.** The decision of the Engineer-in-Charge in such matters based on reports from the Inspecting Officers as defined in the Contractor’s Labour Regulation, as appended to these conditions, shall be final and binding, and deductions for recovery of such liquidated damages may be made from any amount payable to the Contractor.

17.0 The Contractor shall not be permitted to enter (other than for inspection purposes) or take possession of the site until instructed to do so by the Engineer-in-Charge in writing. The portion of the site to be occupied by the contractor shall be defined and/or marked on the site plan, failing which these shall be indicated by the Engineer-in-Charge at the site, and the contractor shall on no account be allowed to extend his operations beyond these areas. In respect of any land allotted to the contractor for purposes of or in connection with the contract, the contractor shall be a licensee subject to the following and such other terms and conditions as may be imposed by the licensor: -

- i. that he shall pay a nominal license fee of Rs.1 per year or part of a year for use and occupation, in respect of each separate area or land allotted to him.

- ii. that such use or occupation shall not confer any right of tenancy of the land to the contractor.
- iii. that the contractor shall be liable to vacate the land on demand from the Engineer-in-Charge.
- iv. that the contractor shall have no right to any construction on this land without the written permission of the Engineer-in-Charge. In case he is allowed to construct any structure, he shall have to demolish and clear the same before handing over the completed work unless agreed to the contrary.

17.1 The contractor shall provide, if necessary or if required on the Site, all temporary access thereto and shall alter, adapt and maintain the same as required from time to time and shall take up and clear them away as and when no longer required and as and when ordered by the Engineer-in-Charge and make good all damage done to the Site.

17.2 Land for Labour Camps: No labour camps will be permitted within the Airport Limits, and the Contractor shall make the necessary arrangements, at his own cost, with prior approval of the Engineer-in-Charge in setting the camps.

Setting out the Works:

18.0 The Engineer in Charge shall supply information necessary to enable the Contractor to set out the Works and be responsible for the accuracy of the same. He shall amend at his own cost and to the satisfaction of the Engineer-in-Charge any error found at any stage which may arise through inaccurate settings out, unless such error is based on incorrect data furnished in writing by the Engineer-in-Charge, in which case the cost of rectification shall be borne by CIAL. The Contractor shall protect and preserve all benchmarks used in setting out the Works till the end of the Defects liability Period unless the Engineer-in-Charge directs their earlier removal.

Site Drainage:

19.0 All water which may accumulate on the Site during the progress of the Works, or in trenches and excavations, from other than the Excepted Risks shall be removed from the Site to the satisfaction of the Engineer-in-Charge and at the contractor's expense.

Nuisance:

20.0 The Contractor shall not at any time do, cause or permit any nuisance on the Site or do anything which shall cause unnecessary disturbance or inconvenience to owners, tenants or occupiers of other properties near the Site and to the public generally.

Materials obtained from Excavation:

21.0 The contractor shall treat all materials obtained during dismantling of a structure, excavation of the site for work, etc., as property of CIAL, and such materials shall be disposed of to the best advantage of CIAL according to the instructions issued by the Engineer-in-Charge.

Treasure Trove, Fossils, etc.

22.0 All fossils, coins, articles of value or antiquity and structures and other remains or things of geological or archaeological interest discovered on the Site shall be the absolute property of CIAL, and the Contractor shall take reasonable precautions to prevent his workmen or any other person from removing or damaging any such article or thing. The Contractor shall immediately, upon discovery thereof and before removal, acquaint the Engineer-in-Charge with such discovery and carry out the Engineer-in-Charge's directions as to the disposal of the same at the expense of CIAL.

Protection of Trees:

23.0 Trees designated by the Engineer-in-Charge shall be protected from damage during the course of the Works, and earth level within 1 meter of each such tree shall not be charged. Where necessary, such trees shall be protected by providing temporary fencing.

Watching and Lighting:

24.0 **The Contractor shall provide and maintain at his own expense all lights, guards, facing and watching** when and where necessary or required by the Engineer-in-Charge for the protection of the Works or for the safety and convenience of those employed on the Works or the public.

Contractor's Supervision:

25.0 The Contractor shall either supervise the execution of the Works **or shall appoint a competent agent approved by the Engineer-in-Charge**. If the Contractor does not have sufficient knowledge and experience to be capable of receiving instructions or cannot give his full attention to the Works, the Contractor shall, at his own expense, employ as his accredited agent an **engineer approved by the Engineer-in-Charge**. Orders given to the Contractor's agent shall be considered to have the same force if they had been given to the Contractor himself. **If the Contractor fails to appoint a suitable agent as directed by the Engineer-in-Charge, the Engineer-in-Charge shall have full powers to suspend the execution of the Works until such date as a suitable agent is appointed, and the Contractor shall be held responsible for the delay so caused to the works.**

Inspection and Approval:

26.0 All works embracing more than one process shall be subject to examination and approval at each Stage thereof, and the Contractor shall give due notice to the Engineer-in-Charge or his authorized representative when each stage is ready. In default of such notice, the Engineer-in-Charge shall be entitled to appraise the quality and extent thereof.

26.1 **No work shall be covered up or put out of view without the approval of the Engineer-in-Charge or his authorized representative, and the contractor shall afford full opportunity for examination and measurement of any work which is about to be covered up or put out of view and for examination of foundations before permanent work is placed thereon.** The Contractor shall give due notice to the Engineer-in-Charge or his authorized representative whenever any such work or foundation is **ready for examination**, and the Engineer-in-Charge or his representative shall, without unreasonable delay, unless he considers it unnecessary and advises the Contractor, accordingly, attend for the purpose of examining and measuring such work or of examining such foundations. In the event of the failure of the contractor to give such notice, he shall, if required by the Engineer-in-Charge, uncover such work at the Contractor's expense.

26.2 Company officers concerned with the Contract shall have powers at any time to inspect and examine any part of the Works, and the Contractor shall give such facilities as may be required for such inspection and examination.

Duties and Powers of the Engineer-in-Charge's Representative:

27.0 The duties of the representative of the Engineer-in-Charge are to watch and supervise the Works and **to test and examine any materials** to be used for workmanship employed in connection with the Works. He shall have no authority to order any work involving any extra payment by CIAL, nor to make any variation in the Works.

27.1 The Engineer-in-Charge may, from time to time, in writing, delegate to his Representative any of the powers and authorities vested in the Engineer-in-Charge and shall furnish to the Contractor a copy of all such written delegation of powers and authorities. Any written instruction or written approval given by the Representative of the Engineer-in-Charge to the Contractor within the terms of such delegation shall bind the Contractor and CIAL as though it had been given by the Engineer-in-Charge.

27.2 Failure of the Representative of the Engineer-in-Charge to disapprove any work or materials shall not prejudice the power of the Engineer-in-Charge thereafter to disapprove such work or materials and to order the pulling down, removal or breaking up thereof.

27.3 If the Contractor shall be dissatisfied with any decision of the Representative of the Engineer-in-Charge, he shall be entitled to refer the matter to the Engineer-in-Charge, who shall thereupon confirm, reverse or vary such decision.

Removal of Workmen:

28.0 The Contractor shall employ in and about the execution of the Works only such persons **as are skilled and experienced in their several trades** and the Engineer-in-Charge shall be at liberty to object to and require the Contractor to remove from the Works any person employed by the Contractor in or about the execution of the Works who in the opinion of the Engineer-in-Charge misconducts himself or is incompetent or negligent in the proper performance of his duties and such person shall not be again employed upon the Works without permission of the Engineer-in-Charge.

Uncovering and Making Good:

29.0 The Contractor shall uncover any part of the Works and/or make openings in or through the same as the Engineer-in-Charge may from time to time direct for his verification and shall reinstate and make good such part to the satisfaction of the Engineer-in-Charge. If any such part has been covered up or put out of view after being approved by the Engineer-in-Charge and is subsequently found on uncovering to be executed in accordance with the Contract, the expenses of discovering and/or making openings in or through, reinstating and making good the same shall be borne by CIAL in any other case all such expenses shall be borne by the Contractor.

Work during the Night or on Sundays and Holidays:

30.0 Subject to any provisions to the contrary contained in the Contract, none of the permanent works shall be carried out during night or on Sundays or on authorized holidays **without the permission in writing of the Engineer-in-Charge**, except when the work is unavoidable or absolutely necessary for the safety of life, property and Works in which case the Contractor shall immediately advise the Engineer-in-Charge accordingly. Contractors, if need be, work in shifts with prior written permission from the Engineer-in-Charge.

Completion Certificate:

31.1 As soon as the work is completed, the contractor shall give notice of such completion to the Engineer-in-Charge, and **within thirty days of receipt of such notice**, the Engineer-in-Charge shall inspect the work and shall furnish the Contractor with a certificate of completion indicating

- (a) the date of completion,
- (b) defects to be rectified by the Contractor and/or
- (c) Items for which payment shall be made at reduced rates.

When separate periods of completion have been specified for items or groups of items, the Engineer-in-Charge shall issue separate completion certificates for such items or groups of items. No certificate of completion shall be issued, nor shall the work be considered complete till the contractor has removed from the premises on which the work has been executed. **All scaffolding, sheds and surplus materials, except such as are required for rectification of Defects, rubbish and all huts and sanitary arrangements required for his workmen on the**

Site in connection with the execution of the work as shall have been erected by the Contractor or the workmen and cleaned all dirt from the parts of building(s) in upon or about which the work has been executed or of which he may have had possession for the purpose of the execution thereof and cleaned floors, gutters and drains, eased doors and sashes, oiled locks and fastenings labelled keys clearly and handed them over to the Engineer-in-Charge or his Representative and made the whole premises fit for immediate occupation or use to the satisfaction of the Engineer-in-Charge. If the Contractor shall fail to comply with any of the requirements of this Conditions as aforesaid, on or before the date of completion of the Works, the Engineer-in-Charge may at the expense of the contractor fulfil such requirements and dispose of the scaffoldings, surplus materials and rubbish, etc. as he thinks fit and the Contractor shall have no claim in respect of any such scaffolding of surplus materials except for any sum actually realized by the sale thereof less the cost of fulfilling the requirements and any other amount that may be due from the contractor. If the Expense of fulfilling such requirements is more than the amount realized on such disposal as aforesaid, the Contractor shall forthwith, on demand, pay such excess.

~~31.2 If at any time before completion of the entire work, items or groups of items for which separate periods of completion have been specified, have been completed, the Engineer in Charge with the consent of the Contractor take possession of any part or parts of the same (any such part(s) being hereinafter in this Condition referred to as “the relevant part”) then notwithstanding anything expressed or implied elsewhere in this Contract:-~~

~~a) Within thirty days of the date of completion of such items or groups of items or of possession of the relevant part, the Engineer in Charge shall issue a completion certificate for the relevant part as in Condition 31(1) above, provided the Contractor fulfils his obligations under that Condition for the relevant part.~~

~~b) The Defects Liability period in respect of such items and the relevant part shall be deemed to have commenced from the certified date of completion of such items or the relevant part as the case may be.~~

~~e) — The Contractor may reduce the value insured under Condition 34 by the full value of the complete items or relevant part as estimated by the Engineer in Charge for this purpose. This estimate shall be applicable for this purpose only and for no other.~~

~~d) — For the purposes of ascertaining compensation for delay under Condition 32 in respect of any period during which the Works are not complete the relevant part will be deemed to form a separate item or group, with date of completion as given in the Contract or as extended under Condition 13 and actual date of completion as certified by the Engineer in Charge under this condition.~~

Compensation for delay:

32.0 If the Contractor fails to maintain the required progress in terms of condition 13 or to complete the work and clear the site on or before the contract or extended date-period of completion, he shall, without prejudice to any other right or remedy of CIAL on account of such breach, pay as agreed compensation amount calculated as stipulated below or such smaller amount as be fixed by the Accepting Authority on the contract value of the work for every week that the progress remains below that specified in condition 13 or that the work remains incomplete.

This will also apply to items or groups of items for which a separate period of completion has been specified.

For this purpose, the term 'Contract Value' shall be the value at contract rates of the work as ordered.

- a. Completion period (as originally stipulated) not exceeding 6 months. @ 1 percent per week.
- b. Completion period (as originally stipulated) exceeding 6 months and not exceeding 2 years @ 1/2 percent per week.
- c. Completion period (as originally stipulated) exceeding 2 years @ 1/4 percent per week.

32.1 Provided always that the total amount of compensation for delay to be paid under this Condition shall **not exceed the** under-noted percentage of the Contract value or of the Contract value of the item or group of items of work for which a separate period of completion is given:

- a. Completion period (as originally stipulated) not exceeding 6 months. 10 percent.
- b. Completion period (as originally stipulated) exceeding 6 months and not exceeding 2 years, 7.5 percent.
- c. Completion period (as originally stipulated) exceeding 2 years. 5 percent.

32.2 The amount of compensation may be adjusted or set off against any sum payable to the contractor under this or any other contract with CIAL.

Defects Liability Period:

33.0 The defects liability period shall be **24 months** which shall be reckoned from the certified date of completion of the entire project under the contract and the Contractor shall be responsible to make good and remedy at his own expense within such period any defect which may develop or may be noticed before the expiry of the period and intimation of which has been sent to the Contractor within seven days of the expiry of the said period by a letter sent by hand delivery or by registered post.

Contractor's Liability and Insurance:

34.0 From commencement to completion of the Works, the Contractor shall take full responsibility for the case thereof and for taking precautions to prevent loss or damage and to minimize loss or damage to the greatest extent possible and shall be liable for any damage or loss that may happen to the Works or any part thereof and all CIAL's T&P from any cause whatsoever (save and except the Excepted Risks) and shall at his own cost repair and make good the same so that at completion, the Works and CIAL's T & P shall be in good order and condition and in conformity in every respect with the requirements of the Contract and instructions of the Engineer-in-Charge.

34.1 In the event of any loss or damage to the Works or any part thereof or to any T & P or to any material or articles at the Site from any of the Excepted Risks, the following provisions shall have effect:

- a. The Contractor shall, as may be directed in writing by the Engineer-in-Charge, remove from the Site any debris and so much of the works as shall have been damaged, taking to CIAL's T & P store, such CIAL's T & P articles and/or materials may be directed.
- b. the contractor shall, as may be directed in writing by the Engineer-in-Charge, proceed with the erection and completion of the Works under and in accordance with the provisions and Conditions of the Contract; and
- c. there will be added to the Contract Sum, the net amount due, ascertained in the same manner as for deviations, or as prescribed for payment, in respect of the re-execution of the Works lost or damaged, the replacement of any T & P and any materials and articles lost or damaged but not incorporated in the Works on the day when the loss or damage accrued and the removal by the contractor as provided above of CIAL's T & P articles and/or materials to the CIAL's store and of debris and damaged Works referred to therein and the compensation paid by him, under any law for the time being in force, to any workman employed by him for any injury caused to him, or to the workman's legal successors for loss of the workman's life.

34.2 PROVIDED always that the Contractor shall not be entitled to payment under the above provisions in respect of so much loss or damage as has been occasioned by any failure on his part to perform his obligations under the Contract or not taking precautions to prevent loss or damage or minimize the amount of such loss or damage.

34.3 When CIAL's building for a part thereof is rented by the Contractor, he shall insure the entire building if the building or any part thereof is used by him for the purpose of storing or using materials of a combustible nature, as to which the decision of the Engineer-in-Charge shall be final and binding.

34.4 The contractor shall take out the **Contractor's all-risk (CAR) insurance policy jointly in the name of CIAL and the contractor, and the original policy shall be deposited with CIAL.**

34.5 The Contractor shall indemnify and keep indemnified CIAL against all losses and claims for injuries or damage to any persons or any property whatsoever which may arise out of or in consequence of the construction and maintenance of Works and against all claims, demands, proceedings, damages, costs, charges and expenses whatsoever in respect of or in relation thereto. PROVIDED always that nothing herein contained shall be deemed to render the

Contractor liable for or in respect of or to indemnify CIAL against any compensation or damage caused by the Excepted Risks.

34.6 Before commencing execution of the work, the Contractor shall, without in any way limiting his obligations and responsibilities under this condition, insure against any damage, loss or injury which may occur to any property, (excluding that of CIAL but including CIAL building rented by the Contractor wholly or in part and any part of which is used by him for storing combustible materials), or to any person (including any employee of CIAL) by or arising out of carrying out of the Contract.

34.7 The Contractor shall at all times indemnify CIAL against all claims, damages or compensation under the provisions of Payment of Wages Act, 1936, Minimum Wages Act, 1948 Employer's Liability Act, 1938, the Workmen's Compensation Act, 1923, Industrial Disputes Act, 1947 and the Maternity Benefit Act, 1961, Employees Provident Fund and Miscellaneous Provisions Act 1952 or any modifications thereof or any other law relating thereto and rules made thereunder from time to time or as a consequence of any accident or injury to any workman or other persons in or about the Works, whether in the employment of the Contractor or not, save and except where such accident or injury has resulted from any act of CIAL, his agents or servants, and also against all costs, charges and expenses of any suit, action or proceedings arising out of such accident or injury and against all sum or sums which may with the consent of the Contractor be paid to compromise or compound any claim. Without limiting his obligations and liabilities as above provided, the Contractor shall insure against all claims, damages or compensation payable under the **Workmen's Compensation Act, 1923** or any modification thereof or any other law relating thereto.

34.8 The aforesaid insurance policy/policies shall provide that they shall not be cancelled till the Engineer-in-Charge has agreed to their cancellation.

34.9 The Contractor shall prove to the Engineer-in-Charge from time to time that he has taken out all the insurance policies referred to above and has paid the necessary premiums for keeping the policies alive till expiry of the Defects Liability Period.

34.10 The Contractor shall ensure that similar insurance policies are taken out by his sub-contractors (if any) and shall be responsible for any claims or losses to CIAL resulting from their failure to obtain adequate insurance protection in connection thereof. The contractor shall

produce or cause to be produced by his subcontractors (if any) as the case may be, the relevant policy or policies and premiums receipts as and when required by the Engineer-in-Charge.

34.11 If the Contractor and/or his sub-contractors (if any) shall fail to effect and keep in force the insurance referred to above or any other insurance which he/they may be required to effect under the terms of the Contract then and in any such case CIAL may, without being bound to, effect and keep in force any such insurance and pay such premium or premiums as may be necessary for that purpose and from time to time deduct the amount so paid by CIAL from any moneys due or which may become due to the Contractor or recover the same as a debt due from the Contractor.

Facilities to other Contractors:

35.0 The Contractor shall, in accordance with the requirements of the Engineer-in-Charge, afford all reasonable facilities to other contractors engaged contemporaneously on separate contractors in connection with the Works and for departmental labour and labour of any other properly authorized authority or statutory body which may be employed at the Site on execution of any work not included in the Contract or of any contract which CIAL may enter into in connection with or ancillary to the Works.

Notices to Local Bodies:

36.0 The Contractor shall comply with and give all notices required under any Governmental authority, instrument, rule or order made under any Act of Parliament, State laws or any regulation or byelaws of any local authority relating to the Works. He shall, before making any variation from the contract drawings necessitated by such compliance, give to the Engineer-in-Charge a written notice giving reasons for the proposed variation and obtain the Engineer-in-Charge's instructions thereon.

36.1 The Contractor shall pay and indemnify CIAL against any liability in respect of any fees or charges payable under any Act of Parliament, State laws or any Government instrument, rule, or order and any regulations or byelaws of any local authority in respect of the Works.

Subcontracts:

37.0 The Contractor shall not sublet any portion of the contract without the prior written approval of the Accepting Authority.

Instructions and Notices:

38.0 Subject as otherwise provided in this Contract, all notices to be given on behalf of CIAL and all other actions to be taken on its behalf may be given or taken by the Engineer-in-Charge or any officer for the time being entrusted with the functions, duties and powers of the Engineer-in-Charge.

38.1 All instructions, notices and communications, etc. under the Contract shall be given in writing and if sent by registered post to the last known place of abode or business of the Contractor shall be deemed to have been served on the date when in the ordinary course of post these would have been delivered to him.

38.2 The Contractor or his Agent shall be in attendance at the Site(s) during all working hours and shall superintend the execution of the Works with such additional assistance in each trade as the Engineer-in-Charge may consider necessary. Orders given to the Contractor's Agent shall be considered to have the same force as if they had been given to the Contractor himself.

38.3 The Engineer-in-Charge shall communicate or confirm his instructions to the Contractor in respect of the execution of work in a "Works Site Order Book" maintained in the office of the Engineer-in-Charge, and the Contractor or his authorized representative shall confirm receipt of such instructions by signing the relevant entries in this book. If required by the contractor, he shall be furnished a certified true copy of such instruction(s).

Foreclosure of Contract in Full or in Part due to Abandonment or Reduction in Scope of Work:

39.0 If at any time after acceptance of the tender CIAL shall decide to abandon or reduce the scope of the Works for any reason whatsoever and hence not require the whole or any part of the Works to be carried out, the Engineer-in-Charge shall give notice in writing to that effect to the Contractor and the Contractor shall have no claim to any payment of compensation otherwise whatsoever, on account of any profit or advantage which he might have derived from the execution of the Works in full but which he did not derive in consequence of the foreclosure of the whole or part of the Works.

39.1 The Contractor shall be paid at Contract rates the full amount for works executed at the Site and, in addition, a reasonable amount as certified by the Engineer-in-Charge for the items

hereunder mentioned which could not be utilized on the work to the full extent because of the foreclosure:

- a. Any expenditure incurred on preliminary site work, e.g. temporary access roads, temporary labour huts, staff quarters and site office, storage accommodation and water storage tanks.
- b.
- i. CIAL shall have the opinion to take over Contractor's materials or any part thereof either brought to Site or of which the Contractor is legally bound to accept delivery from suppliers (for incorporation in or incidental to the work), provided, however, CIAL shall be bound to take over the materials or such portions thereof as the contractor does not desire to retain. For materials taken over or to be taken over by CIAL, the cost of such materials shall, however, consider the purchasing price, cost of transportation and deterioration or damage which may have been caused to materials while in the custody of the Contractor.
- ii. For Contractor's materials not retained by CIAL reasonable cost of transporting such materials from Site to Contractor's permanent stores or to his other Works, whichever is less. If materials are not transported to either of the said places, no cost of transportation shall be payable.
- c. If any materials supplied by CIAL are rendered surplus, the same, except normal wastage, shall be returned by the Contractor to CIAL at rates not exceeding those at which these were originally issued, less allowance for any deterioration or damage which may have been caused whilst the materials were in the custody of the Contractor. In addition, the cost of transporting such materials from the Site to CIAL stores, if so, required by CIAL.
- d. Reasonable compensation for transfer of T&P from Site to Contractor's permanent stores or to his other Works, whichever is less. If T & P are not transported to either of the said places, no cost of transportation shall be payable.

39.2 The Contractor shall, if required by the Engineer-in-Charge, furnish to him books of account, wage books, time sheets and other relevant documents as may be necessary to enable him to certify the reasonable amount payable under this Condition.

Termination of Contract for Death:

40.0 If the Contractor is an individual or a proprietary concern and the individual or the proprietor dies and if the Contractor is a partnership concern and one of the partners dies then unless the Accepting Authority is satisfied that the legal representatives of the individual Contractor or of the proprietor of the proprietary concern and in the case of partnership, the surviving partners, are capable of carrying and completing the Contract, the Accepting Authority shall be entitled to cancel the contract as to its in completed part without CIAL being in any way liable to payment of any compensation to the estate of the deceased Contractor and/or to the surviving partners of the Contractor's firm on account of the cancellation of the Contract. The decision of the Accepting Authority that the legal representatives of the deceased Contractor or the surviving partners of the Contractor's firm cannot carry out and complete the Contract shall be final and binding on the parties. In the event of such cancellation, CIAL shall not hold the estate of the deceased Contractor and/or the surviving partners of the Contractor's firm liable in damages for not completing the Contract.

Cancellation of Contract in Full or in Part:

41.0 If the Contractor

- a. at any time makes default in proceeding with the Works with due diligence and continues to do so after a notice in writing of 7 days from the Engineer-in-Charge: or
- b. Commits default in complying with any of the terms and conditions of the Contract and does not remedy it or take effective steps to remedy it within 7 days after a notice in writing is given to him in that behalf by the Engineer-in-Charge: or
- c. fails to complete the Works or items of work with individual dates of completion, on or before the date(s) of completion and does not complete them within the period specified in a notice given in writing on that behalf by the Engineer-in-Charge; or.
- d. shall offer or give or agree to give to any person in CIAL's service or to any other person on his behalf any gift or consideration of any kind as an inducement or reward for doing or forbearing to do or for having done or forborne to do any act in relation to the obtaining or execution of this or any other Contract for CIAL; or
- e. shall enter a Contract with CIAL in connection with which commission has been paid or agreed to be paid by him or to his knowledge, unless the particulars of any such commission

and the terms of payment thereof have previously been disclosed in writing to the Accepting Authority/Engineer-in-Charge; or

- f. Shall offer or give to any person in CIAL service or to any other person on his behalf any gift or consideration of any kind as an inducement or reward for doing or forbearing to do or for having done or forborne to do any act in relation to the obtaining or execution of this or any other Contract for CIAL; or
- g. Shall enter a Contract with CIAL in connection with which commission has been paid or agreed to be paid by him or to his knowledge, unless the particulars of any such commission and the terms of payment thereof have previously been disclosed in writing to the Accepting Authority/Engineer-in-Charge; or
- h. Shall obtain a Contract with CIAL because of ring tendering or other non-Bona fide methods of competitive tendering; or
- i. being an individual, or if a firm, any partner thereof, shall at any time be adjudged insolvent or have a receiving order or order for administration of his estate made against him or shall take any proceedings for liquidation or composition (other than a voluntary liquidation for the purpose of amalgamation or reconstruction) under any Insolvency Act for the time being in force or make any conveyance or assignment of his effective or composition or arrangement for the benefit of his creditors or purport so to do, or if any application be made under any insolvency Act for the time being in force for the sequestration of his estate or if a trust deed be executed by him for benefit of his creditors; or
- j. being a company, shall pass a resolution or the Court shall make an order for the liquidation of its affairs, or a receiver or manager on behalf of the debenture holders shall be appointed, or circumstances shall arise which entitle the Court or debenture holders to appoint a receiver or manager.
- k. Shall suffer an execution being levied on his goods and allow it to be continued for a period of 21 days: or
- l. assigns, transfers, sublets (engagement of labour on a piece-work basis or of labour with materials not to be incorporated in the work, shall not be deemed to be subletting) or attempts to assign, transfer or sublet the entire Works or any portion thereof without the prior written approval of the Accepting Authority; the Accepting Authority may, without prejudice to any other right which shall have accrued or shall accrue thereafter to CIAL by written notice cancel the contract as a whole or only such items of work in default from the Contract.

41.1 The Accepting Authority shall, on such cancellation, have powers to:

- a. take possession of the Site and materials, constructional plant implements, stores, etc., thereon; and/or
- b. carry out the incomplete work by any means at the risk and cost of the Contractor.

41.2 On cancellation of the Contract in full or in part, the Engineer-in-Charge shall determine what amount, if any, is recoverable from the Contractor for completion of the Works or part of the Works or in case the Works or part of the Works is not to be completed, the loss or damage suffered by CIAL. In determining the amount, credit shall be given to the Contractor for the value of the work executed by him up to the time of cancellation, the value of Contractor's materials taken over and incorporated in the Work, and the use of tackle and machinery belonging to the Contractor.

41.3 Any excess expenditure incurred or to be incurred by CIAL in completing the Works or part of the Works or the excess loss or damages suffered or may be suffered by CIAL as aforesaid after allowing such credit shall be recovered from any money due to the Contractor on any account, and if such moneys are not sufficient the Contractor shall be called upon in writing to pay the same within 30 days.

41.4 If the Contractor shall fail to pay the required sum within the aforesaid period of 30 days, the Engineer-in-Charge shall have the right to sell any or all of the Contractor's unused materials, constructional plant, implements, temporary building, etc. and apply the proceeds of sale thereof towards the satisfaction of any sums due from the Contractor under the Contract and if thereafter there be any balance outstanding from the Contractor, it shall be recovered in accordance with the provisions of the contract.

41.5 Any sums in excess of the amounts due to CIAL and unsold materials, constructional plant, etc. shall be returned to the Contractor, provided always that if cost or anticipated cost of completion by CIAL the Works or part of the Works is less than the amount which the contractor would have been paid had he completed the Works or part of the Works, such benefit shall not accrue to the Contractor.

Liability for Damage, defects or Imperfections and rectification thereof:

42.0 If the Contractor or his workman or employees shall injure or destroy any part of the building in which they may be working or any building road, fence, etc. 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 the Contractor shall upon receipt of a notice in writing shall make the same good at his own expense. If it shall appear to the Engineer-in-Charge or his Representative at any time during construction or re-construction or prior to the expiration of the Defects Liability Period, that any work has been executed with unsound, imperfect or unskilled workmanship or that any materials or articles provided by the Contractor for execution of the work are unsound or of a quality inferior to that contract for, or otherwise not in accordance with the Contract, or workmanship, the contractor shall, upon receipt of a notice in writing in that behalf from the Engineer-in-Charge, forthwith rectify or remove and reconstruct the work so specified in whole or in part, as the case may require or as the case may be and/or remove the materials or articles so specified and provide other proper and suitable materials or articles at his own expense, notwithstanding that the same may have been inadvertently passed, certified and paid for and in the event of his failing to do so within the period to be specified by the Engineer-in-Charge in his notice aforesaid, the Engineer-in-Charge may rectify or remove and re-execute the work and/or remove and replace with others the materials or articles complained of, as the case may be or by other means at the risk and expense of the contractor.

42.1 In case of repairs and maintenance works, splashes and droppings from white-washing, painting, etc. shall be removed and surfaces cleaned simultaneously with completion of these items of work in individual rooms, quarters or premises, etc., where the work is done, without waiting for completion of all other items of work in the Contract. In case the Contractor fails to comply with the requirements of this condition, the Engineer-in-Charge shall have the right to get the work done by other means at the cost of the Contractor. Before taking such action, however, the Engineer-in-Charge shall give three days' notice in writing to the Contractor.

Urgent Works:

43.0 If any Urgent Work (in respect whereof the decision of the Engineer-in-Charge shall be final and binding) becomes necessary and the Contractor is unable or unwilling at once to carry it out, the Engineer-in-Charge may, by his own or other work people, carry it out as he may consider necessary. If the Urgent Work shall be such as the Contractor is liable under the

Contract to carry out at his expense, all expenses incurred on it by CIAL shall be recoverable from the Contractor and be adjusted or set off against any sum payable to him.

Changes in the Constitution:

44.0 Where the Contractor is a partnership firm, prior approval in writing of the Accepting Authority shall be obtained before any change is made in the constitution of the firm. Where Contractor is an individual or a Hindu Undivided Family business concern, such approval as aforesaid shall likewise be obtained before the Contractor enters into any partnership agreement under which the partnership firm would have the right to carry out the work hereby undertaken by the Contractor. If prior approval as aforesaid is not obtained, the Contract shall be deemed to have been assigned in contravention of Condition 41 (j) hereof, and the same action may be taken, and the same consequence shall ensue as provided for in the said Condition 41.

Training of Apprentices:

45.0 The contractor shall comply with the provisions of the Apprentice Act 1961 and the Rules and orders issued thereunder from time to time. The contractor shall be liable for any pecuniary liability arising on account of any violation by him of the provisions of this Act.

Contractors, Representatives, Agents and Workmen:

46.0 The Contractor shall employ only Indian Nationals and verify their antecedents and loyalty before employing them on the work. He shall ensure that no person of doubtful antecedents and nationality is in any way associated with the Works.

47.0 Blank

48.0 Blank

VALUATION AND PAYMENT

Records and measurement

49.0 The Engineer-in-Charge shall, except as otherwise stated, ascertain and determine by measurement the value in accordance with the Contract of work done in accordance therewith.

49.1 All items having a financial value shall be entered in computerized bill format, level book, etc., prescribed by CIAL so that a complete record is obtained of all work performed under the Contract. Measurements shall be recorded and entered in an MS Excel worksheet of computerized format by the contractor and shall be submitted to CIAL in both soft and hard copies, along with the site measurement book

49.2 Measurements shall be taken jointly by the Engineer-in-Charge or his authorized representative and by the Contractor or his authorized representative.

49.3 Before taking measurements of any work, the Engineer-in-Charge or the person deputed by him for the purpose shall give a reasonable notice to the contractor. If the Contractor fails to attend or send an authorized representative for measurement after such a notice or fails to countersign or to record the objection within a week from the date of measurements, then in any such event, measurement taken by the Engineer-in-Charge or by the person deputed by him shall be taken to be correct measurements of the work.

49.4 The Contractor shall, without extra charge, aid with every appliance, labour and other things necessary for measurement.

49.5 Measurements shall be signed and dated by both parties each day on the Site on completion of measurement. If the Contractor objects to any of the measurements recorded on behalf of CIAL, a note to that effect shall be made in the **Measurement Book** against the item objected to and such note shall be signed and dated by both parties engaged in taking the measurement.

Methods of Measurement:

50.0 Except where any general or detailed description of the work in Quantities expressly shows to the contrary, the Schedule of quantities shall be deemed to have been prepared and measurements shall be taken in accordance with the procedure set forth in the Schedule of Rates/Specification, notwithstanding any provision in the relevant Standard Method of Measurement or any general or local custom. In the case of items which are not covered by the Schedule of Rates/Specification, measurements shall be taken in accordance with the relevant Standard Method of Measurement issued by the Bureau of Indian Standards (latest)

Payment on Account:

51.0 Interim bills shall be submitted by the Contractor, monthly, such that the gross value of interim bills worked out as given below is not less than Rs 25 lakhs. The Engineer-in-Charge shall then arrange to have the bill verified by taking or causing to be taken, where necessary, the requisite measurements of the work.

51.1 Payment on account of the amount admissible shall be made on the Engineer-in-Charge certifying the sum to which the Contractor is considered entitled by way of interim payment for the following.

- a. All work executed, after deducting therefrom the amounts already paid, the security deposit, statutory deductions and such other amounts as may be deductible or recoverable in terms of the Contract:
- b. 75 per cent of the cost (as assessed by the Engineer-in-Charge) of any materials which are in the opinion of the Engineer-in-Charge reasonable required in accordance with the Contract and have been brought to Site for incorporation in the Works and are safeguarded against loss due to any cause whatsoever to the satisfaction of the Engineer-in-Charge, but have not been so incorporated provided the contractor provides an insurance cover for the full cost of perishable materials.

51.2 The advance payments under (b) above shall be adjusted as and when materials are utilized in the Works.

51.3 The amount admissible for interim bills shall be normally paid within a month of the date of receipt of the bill by the Engineer-in-Charge, and the payment will be made after such verification as is considered necessary.

51.4 Any interim certificate given relating to work done or materials delivered may be modified or corrected by any subsequent interim certificate or by the final certificate. No certificate of the Engineer-in-Charge supporting an interim payment shall of itself be conclusive evidence that any work or materials to which it relates is/are in accordance with the contract.

51.5 Pending consideration of extension of date of completion, interim payments shall continue to be made as herein provided.

Time Limit for Payment of Final Bill:

52.0 The final bill shall be submitted by the Contractor within three months of physical completion of the Works. No further claims shall be made by the Contractor after submission of the final bill, and these shall be deemed to have been waived and extinguished. The Payment shall be made within the period specified hereunder, the period being reckoned from the date of receipt of the bill by the Engineer-in-Charge.

- a. Contract amount not exceeding Rs.5 lakhs: Four months
- b. Contract amount exceeding Rs.5 lakhs: Six months

Reimbursement / Refund on Variation in Price:

53.1 All statutory payments applicable as per the governing laws of the Central and State Governments on the last date of submission of the tender shall be included in the quoted rate. In the event of there being any increase with respect to these statutory payments due to any change in the existing laws or due to imposition of any new laws by the Central and/or State Governments and thereby the Contractor incurs any new liability after the last date for submission of tender, the additional expenditure so incurred by the Contractor on this behalf shall be paid to the Contractor by CIAL. The Contractor shall, within 30 days of becoming aware of any alteration in the laws/levies as provided above, give notice thereof in writing to CIAL together with all information and documentary evidence of the levy and demand of the appropriate authorities and payment of the same by the Contractor. However, should the contractor desire or is required by CIAL to counter the correctness of such demand, the

contractor will initiate appropriate proceedings under the relevant acts and rules framed thereunder for relief against such levy/demand. The contractor will, however, be responsible for refunding the whole or any part of the money paid or reimbursed by CIAL should the contractor succeed in obtaining relief.

If the price of materials, wages of labour and POL required for the execution of the work increase, the Contractor shall be compensated for such increase as per provisions detailed below and the amount of the Contract shall accordingly be varied, subject to the condition that such compensation for escalation in prices shall be available for the work done during the stipulated period of contract including such period for which the contract validity extended under the provisions of clause 13 of the contract and also subject to the condition that no such compensation shall be payable for a work for which the stipulated period of completion is 06 months or less and the awarded value of work is Rs 100 lakhs or less.

53.2 Such compensation for escalation in the prices of materials, labour and POL when due shall be worked out based on the following provisions: -

53.2.1 The contractor shall prepare the statements of escalation or de-escalation at the end of every 3 months and submit them to the Engineer-in-charge. The first statement of escalation shall be prepared at the end of 3 months, excluding the month in which the work was awarded.

The work done from the date of start to the end of this period shall be taken into account. For subsequent statements, the cost of work done during every quarter shall be taken into account. At the completion of work, the work done during the last quarter or fraction thereof shall be taken into account.

For the purpose of reckoning the work done during any period, the bills prepared during the period shall be considered. The dates of preparation of bills as entered in the Measurement Book by the Engineer shall be the guiding factor to decide the bills relevant to any period. The date of completion as finally recorded by the competent authority in the Measurement Book shall be the criterion. The Competent Authority will sanction the compensation for escalation or deduction on account of de-escalation, and the amount thus sanctioned will be included in the next running account bill or final bill, as the case may be.

The base date for working out such an escalation shall be the last date on which tenders were stipulated to be received.

53.2.2 The cost of work on which escalation will be payable shall be reckoned as 85% of the cost of the work as per bills, minus the cost of cement, steel and bitumen organized by the contractor and used on works worked out at the rates mentioned in the Special conditions of contract. Further, the cost of the work shall not include any work for which payment is made under Clauses in GCC, at prevailing market rates.

Calculation of the Cost of Work Done

The cost of work for which escalation/de-escalation is applicable/deductible shall be worked out as below:

- (a) Gross value of work done up to this quarter
.... (A)
- (b) Gross value of work done up to the last quarter..... (B)
- (c) Gross value of work done since previous quarter: (A – B)
..... (C)
- (d) Full assessed value of secured advance (fresh paid in this quarter(D)
- (e) Full assessed value of secured advance (recovered in this quarter)(E)
- (f) Full assessed value of secured advance for which escalation is payable in this quarter:(D– E)(F)
- (g) Advance payment made during the quarter (G)
- (h) Advance payment recovered during the quarter(H)
- (i) Advance payment for which escalation is payable in this quarter:(G – H)
.....(I)
- (j) Extra items/deviated quantities of agreement items paid as per relevant clauses based on prevailing market rate during this quarter (J)

$$M = C + F + I - J$$

$$N = 0.85 M$$

(k) Cost of cement, steel and bitumen arranged by the contractor and used on works worked out at the rates mentioned in special conditions during the quarter..... P

(l) Cost of work for which escalation/de-escalation is applicable(W) = N-P

53.2.3 Components of materials, labour and POL shall be predetermined for every work and incorporated in the conditions of contract attached to the tender papers and the decision of the Engineer-in-Charge in working out such percentage shall be binding on the contractor. The components of materials, labour and POL have been predetermined as given below.

- a. Material + POL - 75%
- b. Labour - 25%

53.2.4 The compensation for escalation for materials, labour and P O L shall be worked out as per the following provisions.

Compensation for the increase in the cost of cement, steel and bitumen.

The tender is based on the Ex-factory price of cement/steel/bitumen shown under special conditions of contract. Any increase or decrease up to 5% from this Ex-factory price shall not attract any reimbursement/refund. If the increase in Ex factory price is more than 5 % of the base Ex factory price mentioned in the tender, the increase above the 5% limit only will be reimbursed to the contractor subject to the production of necessary vouchers and also a certification to the effect that the quantity thus procured at a price higher than mentioned above has actually been brought to the site and actually used on work. However, CIAL has the right to collect the Ex-Factory price of approved brands from approved manufacturers, and the escalation shall be worked out based on Ex-Factory prices collected as above or from the vouchers submitted by the contractor, as decided by CIAL. And if there is a downward price revision, the contractor must reimburse the decrease below 5 % limit only to CIAL, following the submission of necessary vouchers and certification as mentioned in the upward revision. (e.g. If the Ex-factory price shown in the special condition of contract is Rs. 100/-, there will

not be any reimbursement/ refund for actual price variation between Rs. 95 to 105/-. If the actual price becomes Rs. 107/-, then the contractor will be reimbursed with Rs. 2/- (i.e. Rs. 107-105). Similarly, if the actual price becomes Rs. 93/-, then CIAL will recover Rs. 2/- (i.e. Rs. 95-93) from the contractor.)

1. Compensation for escalation for materials (other than cement, steel and bitumen), labour and P O L shall be worked out as per the following formula.

$$a. V_m = W \times (X/100) \times (M1 - M10) / M10$$

$$b. V_l = W \times (Y/100) \times (L1 - L10) / L10$$

$$c. V_f = W \times (Z /100) \times (F1 - F10) / F10$$

Whereas:

V_m = Variation in material cost, i.e. Increase or decrease in the amount in rupees to be paid or recovered.

V_l = Variation in labour cost, i.e. Increase or decrease in the amount to be paid or recovered.

V_f = Variation in cost of fuel, oil and lubricant, i.e. increase or decrease in the amount in rupees to be paid or recovered.

W = $(85/100) \times$ (Cost of work done as per bills) – cost of cement, steel and bitumen arranged by the contractor and used on works worked out at the rates mentioned in special conditions. Cost of work shall not include any work for which payment is made under clauses in GCC, at prevailing market rates.

X, Y, Z = Components of materials, Labour and POL, respectively, expressed as a percentage of the total value of work as predetermined.

$M1 \& M10$ = All India wholesale Index for all commodities for the period under consideration as published by the Economic Advisor to the Government of India, Ministry of Industry & Commerce, for the period under consideration and that is valid at the time of receipt of tenders, respectively.

L1 & L10 = Consumer Price Index for Industrial Labour (All India) declared by Labour Bureau, Govt. of India as applicable for the previous period of the period under consideration and that valid at the time of receipt of tenders respectively.

F1 & F10 = Average Index number of wholesale price for group (fuel, power, light and lubricants) as published weekly by the Economic Advisor to Govt. of India, Ministry of Industry for the period under reckoning and that valid at the time of receipt of tenders respectively.

Escalation will be calculated separately for each subhead, based on the values of X, Y, Z given for each subhead.

53.2.5 The following principles shall be followed while working out the indices mentioned in sub-para 53.2.4 above.

- a. The base index will be the one relating to the month in which the tender was stipulated to be received.
- b. The compensation for escalation shall be worked out at quarterly intervals and shall be with respect to the cost of work done as per bills paid during the three calendar months of the said quarter. The first such payment shall be made at the end of three months after the month (excluding) in which the tender was accepted, and thereafter at a three-month interval. At the time of completion of the work, the last period for payment might be less than 3 months, depending on the actual date of completion.
- c. The index (M1/F1 etc, material & PoL) relevant to any quarter or period for which such compensation shall be the arithmetical average of the indices relevant to the three calendar months. If the period up to date of completion after the quarter covered by the last such instalments of payment is less than three months, the index MI and FI shall be the average of the indices for the months falling within that period.
- d. The escalation for labour (L1) also shall be paid at the same quarterly intervals when escalation due to an increase in the cost of materials and /or P.O.L. is paid under this clause. If such a revision of minimum wages takes place during any such quarterly intervals, the escalation compensation shall be payable at the revised rate only for work done in subsequent quarters.

- e. All India Wholesale Price Index for civil component/electrical component of construction material as worked out on the basis of 'All India Wholesale Price Index for Individual Commodities/Group Items', and All India Wholesale Price Index for 'Fuel, Oil and Lubricant', both published by the Economic Adviser to the Government of India, Ministry of Industry and Commerce, and applying weightages to the Individual Commodities/Group Items, and the higher of the 'Minimum wage of unskilled male mazdoor' notified by the Ministry of Labour and that notified by the Local Administration.

53.2.6 In the event the price of materials, wages of labour and POL required for execution of the work decreases there shall be a downward adjustment of the cost of work so that such price of material, wages of labour and POL shall be deductible from the cost of work under this contract and in this regard the formulae herein before stated under clause 53.2.4 shall apply.

54.0 Advances, subject to the availability of funds, will be given as under within six weeks of submission of application by the Contractor and subject to other conditions being fulfilled and the Engineer-in-Charge certifying the sum to which the Contractor is entitled by way of advance.

In the case of contracts valued at over Rs.50 lakhs, a lumpsum advance not exceeding 5% of the Contract Sum against a bank guarantee from a Nationalized Bank acceptable to CIAL. The lump sum advance so paid will carry interest @ 12% per annum. The advance shall be utilized for the purposes of this contract only and for no other purpose.

54.1 Recovery of the sums advanced above and interest thereon shall be made by deduction from the on account payments referred to in Condition 51 in suitable percentages in relation to the progress, as fixed by the Engineer-in-Charge, so that all the sums advanced with interest thereon shall be fully recovered by the time work amounting to nearly 80% of the Contract Sum is completed. If the amount payable under any interim bill is not sufficient to cover all deductions to be made for sums advanced and other sums deductible therefrom, the balance outstanding shall be deducted from subsequent interim bill/bills, as may be necessary, failing that, as otherwise provided for in the Contract.

Income Tax Recovery:

55.0 Before releasing payment to the contractor, income tax recovery shall be made from the Contractor's bill at the rate as applicable during that time. For payment towards advances under condition 54, no income tax recovery shall be made, and advances shall be recovered as per the terms and conditions provided in condition 54.

Overpayments and Underpayments:

56.0 Wherever any claim for the payment of a sum of money to CIAL arises out of or under this contract against the Contractor the same may be deducted by CIAL from any sum then due or which at any time thereafter may become due to the Contractor under this contract and failing that under any other contract with CIAL or from any other sum due to the contractor from CIAL which may be available with CIAL or from his security deposit; or he shall pay the claim on demand.

56.1 CIAL reserve the right to carry out post-payment audit and technical examination of the final bill including all supporting vouchers, abstracts, etc., CIAL further reserve the right to enforce recovery of any over-payment when detected notwithstanding the fact that the amount of the final bill may be included by one of the parties as an item of dispute before an arbitrator appointed under condition 57 of this Contract and notwithstanding the fact that the amount of the final bill figures in the arbitration award.

56.2 If as a result of such audit and technical examination of any overpayment is discovered in respect of any work done by the Contractor or alleged to have been done by him under the contract, it shall be recovered by CIAL from the Contractor by any or all of the methods prescribed above or if any underpayment is discovered the amount shall be duly paid to the Contractor by CIAL.

56.3 Provided that the aforesaid right of CIAL to adjust overpayments against amount due to the Contractor under any other Contract with CIAL shall not extend beyond the period of two years from the date of payment of the final bill or in case the final bill is a MINUS bill, from the date the amount payable by the Contractor under the MINUS final bill is communicated to the Contractor.

56.4 Any amount due to the Contractor under this Contract for underpayment may be adjusted against any amount then due to which may at any time thereafter become due before payment is made to the Contractor, from him to CIAL on any other Contract or account whatsoever.

ARBITRATION AND LAWS

Arbitration

57.0 Except where otherwise provided for in the contract all questions and disputes relating to the meaning of the specifications, designs, drawings and instructions herein before mentioned and as to the quality of workmanship or materials used on the work or as to any other question, claim right, matter or thing whatsoever in any way arising out of or relating or the contract, designs, drawings, specifications, estimates, instructions, orders or these conditions to otherwise concerning the works, or the execution or failure to execute the same whether arising during the progress of the work or after the completion or abandonment thereof shall be referred to the sole arbitrator as may be appointed by the Accepting Authority. The arbitrator to whom the matter is originally referred is transferred or vacating his office or being unable to act for any reason, the appointing authority for the arbitrator as aforesaid at the time of such transfer, vacation of office or inability to act, shall appoint another person to act as arbitrator in accordance with the terms of the contract. Such a person shall be entitled to proceed with the reference from the stage at which it was left by his predecessor. It is also a term of this contract that no person other than a person appointed by the Accepting Authority should act as arbitrator, and if, for any reason, that is not possible, the matter is not to be referred to arbitration at all.

Case where the amount of the claim in dispute is Rs.50,000/- (Rupees fifty thousand) and above, the arbitrator shall give reasons for the award.

Subject as aforesaid, the provision of the Arbitration Act, 1996, or any statutory modification or re-enactment thereof and the rules made thereunder and for the time being in force shall apply to the arbitration proceeding under this clause.

It is a term of the contract that the party invoking arbitration shall specify the dispute or disputes to be referred to arbitration under this clause, together with the amount or amounts claimed in respect of each such dispute.

- i. The arbitrator(s) may, from time to time, with the consent of the parties, enlarge the time for making and publishing the award.
- ii. The work under the Contract shall continue during the arbitration proceedings, and no payment due or payable under the Contract shall be withheld on account of such proceedings.
- iii. The Arbitrator shall be deemed to have entered on the reference on the date he issues notice to both parties fixing the date of the first hearing.
- iv. The Arbitrator shall give a separate award in respect of each dispute or difference referred to him.
- v. The venue of arbitration shall be such place as may be fixed by the Arbitrator in his sole discretion.
- vi. The award of the arbitrator shall be final, conclusive and binding to all parties to this contract.
- vii. All further disputes which may arise under this contract will have to be filed before the principal sub court, Ernakulam, where the headquarters of the CIAL is located.

Laws governing the Contract

58.0 This contract shall be governed by the Indian Law for the time being in force.

CONTRACTORS' LABOUR REGULATIONS

(see condition 16)

1. Definition: In the regulations, unless otherwise expressed or indicated, the following words and expressions shall have the meaning hereby assigned to them:
 - a. " Labour" means workers employed by a contractor directly, or indirectly through a sub-contractor, or by an agent on his behalf, on a payment not exceeding Rs.500/- per month.
 - b. " Fair Wage" means wages, which shall include wages for a weekly day of rest and other allowances, whether for time or piece work, taking into consideration prevailing

market rates for similar employment in the neighbourhood, but shall not be less than the minimum rates of wages fixed under the Minimum Wages Act.

- c. " Contractor" for the purpose of these Regulations shall include an agent or sub-contractor employing labour on the work taken on contract.
- d. "Inspecting Officer", means any Labour Enforcement Officer, or Assistant Labour Commissioner of the Chief Labour Commissioner's Organization.
- e. " Form" means a form appended to these regulations.

2. Notice of Commencement: The Contractor shall, within SEVEN days of commencement of the work, furnish in writing to the Inspecting Officer of the area concerned the following information:

- a. Name and situation of the work
- b. Contractors' name and address
- c. Particulars of the Department for which the work is undertaken.
- d. Name and address of subcontractors as and when they are appointed.
- e. Commencement and probable duration of the work
- f. Number of workers employed and likely to be employed.
- g. 'Fair wages' for different categories or workers.

3.

- i. Number of hours of work which shall constitute a normal working day: The number of hours which shall constitute a normal working day for an adult shall be NINE hours. The working day for an adult shall be NINE hours. The working day of an adult worker shall be so arranged that inclusive of intervals, if any, for rest it shall not spread over more than twelve hours on any day. When an adult worker is made to work for more than NINE hours on any day or for more than FORTY-EIGHT hours in any week, he shall in respect of overtime work, he paid wages at double the ordinary rate of wages.
- ii. Weekly day of rest: Every worker shall be given a weekly day of rest which shall be fixed and notified at least TEN days in advance. A worker shall not be required or allowed to work on the weekly rest day unless he has or will have a substituted rest day, on one of the five days immediately before or after the rest day. Provided that no substitution shall be

made which will result in the worker working for more than ten days consecutively without a rest day for the whole day. Where in accordance with the foregoing provisions, a worker works on the rest day and has been given a substituted rest day, he shall be paid wages for the work done on the weekly rest day at the overtime rate of wages.

NOTE: The expression 'ordinary rate of wages' means the fair wage the worker is entitled to.

4. Display of notice regarding Wages, Weekly Day of Rest, etc.: The Contractor shall before he commences his work on contract, display and correctly maintain and continue to display and correctly maintain in clean and legible condition in conspicuous places on the works, notice in English and in the local Indian language, spoken by the majority of workers giving the rate of fair wages, the hours of work for which such wages are payable, the weekly rest days workers are entitled to and name and address of the Inspecting Officer. The Contractor shall send a copy of each of such notices to the Inspecting Officers.
5. Fixation of Wage Periods: The Contractor shall fix the wage period in respect of which wages shall be payable. No wage period shall normally exceed one week.
6. Payment of Wages:
 - i. Wages due to every worker shall be paid to him directly. All wages shall be paid in current coins or currency or in both.
 - ii. Wages of every worker employed on the contract shall be paid where the wage period is one week, within THREE days from the end of the wage period; and in any other case, before the expiry of the 7th day or 10th day from the end of the wage period, according as the number of workers does not exceed 1,000 or exceeds 1,000.
 - iii. When employment of any worker is terminated by or on behalf of the contractor, the wages earned by him shall be paid before expiry of the day succeeding the one on which his employment is terminated.
 - iv. Payment of wages shall be made at the work site on a working day except when the work is completed before expiry of the wage period, in which case final payment shall be made at the work site within 48 hours of the last working day and during normal working time.

NOTE: The term 'working day' means a day on which the work on which labour is employed is in progress.

7. Register of Workmen: A register of workmen shall be maintained in the form appended to these regulations and kept at the work site or as near to it as possible, and the relevant particulars of every workman shall be entered there in within THREE days of his employment.
8. Employment Card: The Contractor shall issue an employment card in the Form appended to these regulations to each worker on the day of work or entry into his employment. If a worker already has any such card with him issued by the previous employer, the contractor shall merely endorse that Employment Card with relevant entries. On termination of Employment, the Employment Card shall again be endorsed by the contractor and returned to the worker.
9. Register of Wages, etc.:
 - i. A Register of Wages-cum-Muster Roll in the Form appended to these regulations shall be maintained and kept at the work site or as near to it as possible.
 - ii. A wage slip in the Form appended to these regulations shall be issued to every worker employed by the contractor at least a day prior to the disbursement of wages.
10. Fines and Deductions which may be made from Wages:
 - i. Wages of a worker shall be paid to him without any deductions of any kind **except** the following:
 - a. fines.
 - b. deductions for absence from duty, i.e. from the place or the places where the terms of his employment, he is required to work. The amount of the deduction shall be in proportion to the period for which he was absent.
 - c. deduction for damage to or loss of goods expressly entrusted to the employed person for custody, or for loss of money which he is required to account for, where such damage or loss is directly attributable to his neglect or default.
 - d. deductions for recovery of advances or for adjustment of overpayment of wages. Advance granted shall be entered in a register; and
 - e. any other deduction which CIAL may from time to time allow.
 - ii. No fine shall be imposed on any worker save in respect of such acts and omissions on his part as have been approved by the Chief Labour Commissioner.

- iii. No fine shall be imposed on a worker and no deductions for damage or loss shall be made from his wages until the worker has been given an opportunity of showing cause against such fines or deductions.
- iv. The total amount of fines which may be imposed in any one wage period on a worker shall not exceed an amount equal to three paise in a rupee of the wages payable to him in respect of that wage period.
- v. No fine imposed on a worker shall be recovered from him in instalments, or after expiry of sixty days from the date on which it was imposed. Every fine shall be deemed to have been imposed on the day of the act or omission in respect of which it was imposed.
- vi. The contractor shall maintain both in English and the local Indian language a list, approved by the Chief Labour Commissioner, clearly stating the acts and omissions for which penalty or fine may be imposed on a workman and display it in good condition in a conspicuous place on the work site.
- vii. The Contractor shall maintain a register of fines and the register of deductions for damage or loss in the Forms appended to these regulations which should be kept at the place of work.

11. Register of Accidents: The Contractor shall maintain a register of accidents in such form as may be convenient at the workplace, but the same shall include the following particulars: -

- a. Full particulars of the labourers who met with an accident.
- b. Rate of Wages
- c. Sex
- d. Age
- e. Nature of accident and cause of accident
- f. Time and date of accident
- g. Date and time when admitted to hospital
- h. Date of discharge from the hospital
- i. Period of treatment and result of treatment
- j. Percentage of loss of earning capacity and disability as assessed by the Medical Officer.
- k. Claim required to be paid under the Workmen's Compensation Act.
- l. Date of payment of compensation
- m. Amount paid with details of the person to whom the same was paid.
- n. Authority by whom the compensation was assessed.
- o. Remarks

12. Preservation of Registers: The Register of workmen and the Register of Wages-cum-Muster roll required to be maintained under these Regulations shall be preserved for 3 years after the date on which the last entry is made therein.
13. Enforcement: The Inspecting Officer shall either on his own motion or on a complaint received by him carry out investigations, and send a report to the Engineer-in-Charge specifying the amounts representing workers' dues and amount of penalty to be imposed on the contractor for breach of these Regulations, that have to be recovered from the contractor, indicating full details of the recoveries proposed and the reasons therefore. It shall be obligatory on the part of the Engineer-in-Charge on receipt of such a report to deduct such amounts from payments due to the contractor.
14. Disposal of amounts recovered from the contractor: The Engineer-in-Charge shall arrange payment to workers concerned within FORTY-FIVE days from receipt of a report from the Inspecting Officer, except in cases where the contractor had made an appeal under Regulation 16 of these Regulations. In cases where there is an appeal, payment of workers' dues would be arranged by the Engineer-in-Charge, wherever such payment arises, within THIRTY days from the date of receipt of the decision of the Regional Labour Commissioner (R.L.C.)
15. Welfare Fund: All moneys that are recovered by the Engineer-in-Charge by way of workers' dues which could not be disbursed to workers within the time limit prescribed above, due to reasons such as where about of workers not being known, death of a worker, etc. and also amount recovered as penalty, shall be credited to a fund to be kept under the custody of CIAL for such benefit and welfare of workmen employed by contractors.
16. Appeal against decision of Inspecting Officer: Any person aggrieved by a decision of the Inspecting Officer may appeal against such decision to the Regional Labour Commissioner concerned within THIRTY days from the date of the decision, forwarding simultaneously a copy of his appeal to the Engineer-in-Charge. The decision of the Regional Labour Commissioner shall be final and binding upon the contractor and the workmen.
17. Representation of parties:
 - i. A workman shall be entitled to be represented in any investigation or enquiry under these Regulations by an officer of a registered trade union of which he is a member or by an officer of a Federation of trade unions to which the said trade union is affiliated or where the workman is not a member of any registered trade union, by an officer of a

registered trade union, connected with, or by any other workman employed in the industry in which the worker is employed.

- ii. A Contractor shall be entitled to be represented in any investigation or enquiry under these Regulations by an officer of an association of contractors of which he is a member or by an officer of Federation of associations of contractors to which the said association is affiliated or where the contractor is not a member of any association of contractors, by an officer of association of employers, connected with, or by any other employer engaged in the industry in which the contractor is engaged.
- iii. No party shall be entitled to be represented by a legal practitioner in any investigation or enquiry under these Regulations.

18. Inspection of Books and other Documents:

The Contractor shall allow inspection of the Registers and other documents prescribed under these Regulations by Inspecting Officer and the Engineer-in-Charge or his authorized representative at any time and by the worker or his agent on receipt of due notice at a convenient time.

19. Interpretation, etc, on any question as to the application, interpretation or effect of these Regulations, the decision of the Chief Labour Commissioner, Government of Kerala, shall be final and binding.

20. Amendments: Central Government may, from time to time, add to or amend these Regulations and issue such directions as it may consider necessary for the proper implementation of these Regulations or for the purpose of removing any difficulty which may arise in the administration thereof.

REGISTER OF WORKMAN

(Regulation 7)

- I. **Name and address of Contractor** :
- II. **Number and date of Contract** :.....
- III. **Name and address of department awarding the Contract:**.....
- IV. **Name of contract and location of the work** :.....
- V. **Duration of Contract** :.....

Sl No.	Name and Surname of the workers	Age & Sex	Father's/Husband's Name	Nature of Employment & Designation	Permanent/Home Address of Employee (Village, Dist. Tanna)	Postal Address	Date of Commencement of employment	Date of termination or leaving of employment	Signature or thumb impression of the employee	Remarks
1	2	3	4	5	6	7	8	9	10	11

(Signature and Seal of Bidder)

**EMPLOYMENT CARD
(Regulation 8)**

I. Name and Sex of the worker :

II. Father's/Husband's Name :

III. Address :

IV. Age or Date of Birth :

V. Identification marks :

Particulars of next of kin (wife/husband and children, if any, or of dependent next of kin in case the worker has no wife/husband or child):-

Name :

Full Address of Dependants :

Sl No	Name and address of the employer (Specify whether a contractor or sub-contractor)	Particulars of Location of work site and description of work done	Total period for which the worker is employed (from...to..)	Actual Number of days worked	Leave taken (No. of days should be specified)	Nature of work done by the worker	Wage period	Wage rate with particulars of unit in case of piece work	Total wage earned by the worker during the period shown under col.5	Remarks	Signature of the employer
1	2	3	4	5	6	7	8	9	10	11	12

N.B. For a worker employed at one time on piece work basis and at another on daily wages, prevent entries in respect of cash type of employment should be made separately.

(Signature and Seal of Bidder)

REGISTER OF WAGES-CUM-MUSTER ROLL

(Regulation 9)

- I. **Name and address of Contractor** :.....
- II. **Number and date of Contract** :.....
- III. **Name and address of department awarding the Contract:**
- IV. **Name of the contract and location of the work** :.....
- V. **Duration of the Contract** :.....
- VI. **Wage period** :.....

Sl No.	Name & Surname of the worker	Father's / Husband's Name	Designation	Nature of work	Daily attendance (No. of units worked 1,2,3,4,5, 6,7)	Total attendance units	Fair wages payable		Wages paid		Overtime worked			Total wages paid	Deductions form wages					Net wages payable	Date of payment	S/d or thumb impression of worker	Remarks
							Basic	D.A & other allowance	Basic	D.A & other allowance	Date	No. of hours	Overtime wages earned		Fine	Deduction for damage or loss	House rent	Recovery of advances	Other deductions				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24

* **Reasons to be recorded in column 24.**

(Signature and Seal of Bidder)

REGISTER OF FINES

(Regulation 10(vii))

Sl No.	Name	Father's/ Husband's name	Sex	Department	Nature and date of the offence for which fine imposed	Whether workman showed cause against fine or not if so, enter date	Rate of wages	Date and amount of fine imposed	Date on which fine realised	Remarks
1	2	3	4	5	6	7	8	9	10	11

(Signature and Seal of Bidder)

REGISTER OF DEDUCTIONS FOR DAMAGES OF LOSS CAUSED TO CIAL BY THE NEGLIGENCE OR DEFAULT OF THE EMPLOYED PERSONS

(Regulation 10 (vii))

Sl No.	Name	Father's/Husband's name	Sex	Department	Damage or loss caused with date	Whether workman showed cause against deduction, if so, enter date	Date and amount of deduction imposed	Number of instalments, if any	Date on which total amount realized	Remarks
1	2	3	4	5	6	7	8	9	10	11

(Signature and Seal of Bidder)

SECTION -III

3. FORMS FOR DIFFERENT DEEDS

WAGES SLIP
(Regulation 9)

- (i) Name of the Contractor
- (ii) Place
- 1. Name of workers with
Father's / Husband's name
- 2. Nature of employment
- 3. Wage period
- 4. Rate of Wages payable
- 5. Total attendance/Unit
of work done
- 6. Date on which overtime worked
- 7. Overtime charges
- 8. Gross wages payable
- 9. Total deductions
(including nature of deductions)
- 10. Net wages payable

Contractor's Signature/
Thump Impression

Employees' Signature/
Thump Impression

MODEL RULES FOR LABOUR WELFARE

(See condition 16)

1. Definitions:
 - a) 'Workplace' means a place at which on an average, twenty or more workers are employed.
 - b) 'Large Workplace' means a place at which, on an average, 500 or more workers are employed.

2. First Aid: At every workplace, there shall be maintained in a readily accessible place first-aid appliances including an adequate supply of sterilized dressings and sterilized cotton wool as prescribed in the Factory Rules of the State in which the work is carried on. The appliances shall be kept in good order, and, in large workplaces, they shall be placed under the charge of a responsible person who shall be readily available during working hours.

At large workplaces, where hospital facilities are not available within easy distance of the Works, First Aid posts shall be established and be run by a trained compounder.

Where large workplaces are remotely situated and far away from regular hospitals, an indoor ward shall be provided with one bed for every 250 employees.

Where large workplaces are situated in cities, towns or in their suburbs and no beds are considered necessary owing to proximity of city or town hospitals, suitable transport shall be provided to facilitate removal of urgent cases to these hospitals. At other workplaces, some conveyance facilities shall be kept readily available to take injured person or persons suddenly taken seriously ill, to the nearest hospital.

At large workplaces there shall be provided and maintained an ambulance room of the prescribed sizes, containing the prescribed equipment and in the charge of such medical and nursing staff as may be prescribed. For this purpose, the relevant provisions of the Factory Rules of the State Government of the area where the work is carried on may be taken as the prescribed standard.

3. Accommodation for Labour: The Contractor shall during the progress of the Works provide, erect and maintain necessary temporary living accommodation and ancillary facilities for labour at his own expense and to standards and scales as approved by the Engineer-in-Charge.

4. Drinking Water: In every workplace, there shall be provided and maintained at suitable places, easily accessible to labour, a sufficient supply of cold water fit for drinking.

Where drinking water is obtained from an intermittent public water supply each workplace shall be provided with storage where drinking water shall be stored.

Every water supply storage shall be at not less than 15 meters from any latrine drain or other source of pollution. Where water must be drawn from an existing well, which is within such proximity of latrine drain or any other source of pollution, the well shall be properly chlorinated before water is drawn from it for drinking. All such wells shall be entirely closed in and be provided with a trap door which shall be dust and waterproof.

A reliable pump shall be fitted to each covered well, the trap door shall be kept locked and opened only for cleaning or inspection, which shall be done at least once a month.

5. Washing and bathing Place: Adequate washing and bathing places shall be provided separately for men and women. Such places shall be kept in clean and drained condition.
6. Scale of Accommodation in Latrines and Urinals: There shall be provided within the precincts of every workplace latrine and urinal in an accessible place, and the accommodation, separately for each of these, shall not be less than at the following scales: -

	No. of seats
a) Where number of persons does not exceed 50	2
b) Where number of persons exceeds 50 but does not exceed 100	3
c) For additional persons	3 per 100 or part thereof

In particular cases, the Engineer-in-Charge shall have the power to vary the scale, where necessary.

7. Latrines and Urinals: Except in workplaces provided with water flushed latrines connected with a water-borne sewage system, all latrines shall be provided with receptacles on dry-earth system which shall be cleaned at least four times daily and at least twice during working hours and kept in a strictly sanitary condition. Receptacles shall be tarred inside and outside at least once a year.

If women are employed, separate latrine and urinals screened from those for men and marked in the vernacular in conspicuous letters "For women only" shall be provided on the scale laid down in rule 6. those for men shall be similarly marked "For Men Only". A poster showing the figure of a man and of a woman shall also be exhibited at the entrance to latrines for each sex. There shall be an adequate supply of water close to latrines and urinals.

8. Construction of Latrines: Inside wells shall be constructed of masonry or other non-absorbent materials and shall be cement-washed inside and outside at least once a year.

The dates of cement washing shall be noted in a register maintained for the purpose and kept available for inspection. Latrines shall have at least a thatched roof.

9. Disposal of Excreta: Unless otherwise arranged for by the local sanitary authority, arrangement for proper disposal of excreta by incineration at the workplace, shall be made by means of a suitable incinerator approved by the local medical, health and Municipal or cantonment authorities. Alternatively, excreta may be disposed off by putting a layer of night soil at the Bottom of pucca tank prepared for the purpose and covering it with a 15 cm layer of waste or refuse and then covering it with a layer of earth for a fortnight (when it will turn into manure).

The Contractor shall, at his own expense, carry out all instructions issued to him by the engineer-in-Charge to effect proper disposal of soil and other conservancy work in respect of Contractor's work people or employees on the Site. The Contractor shall be responsible for payment of any charges which may be levied by the municipal or cantonment authority for execution of such work on his behalf.

10. Provision of shelters during rest: At every workplace there shall be provided, free of cost, four suitable sheds, two for meals and two others for rest, separately for use of men and women Labour. The height of each shelter shall not be less than 3 meters from floor-level to lowest part of roof. Sheds shall be kept clean, and the space provided shall be on the basis of at least 0.5 sq.m. per head.
11. Creches: At a place at which 20 or more women workers are ordinarily employed, there shall be provided at least one hut for use of children under the age of 6 years, of such women. Huts shall not be constructed to a standard lower than that of thatched roof, mud floor and walls with wooden planks spread over mud floor and covered with matting.

Huts shall be provided with suitable and sufficient openings, for light and ventilation. There shall be adequate provision of sweepers to keep the places clean. There shall be two 'dials' in attendance. Sanitary utensils shall be provided to the satisfaction of local medical, health and municipal or cantonment authorities. The use of huts shall be restricted to children, their attendants and mothers of children.

Where the number of women is more than 25 but less than 50, the Contractor shall provide at least one hut and one Dai to look after children of women workers.

Size of creche(s) shall vary according to the number of women workers employed.

Creche(s) shall be properly maintained and necessary equipment like toys, etc. provided.

12. Canteen: A cooked food canteen on a moderate scale shall be provided for the benefit of workers wherever it is considered necessary.
13. Planning, sitting and erection of the above-mentioned structure shall be approved by the Engineer-in-Charge, and the whole of such temporary accommodation shall at all times during the progress of the Works be kept tidy and in a clean and sanitary condition to the satisfaction of the Engineer-in-Charge and at the Contractor's expense. The

Contractor shall conform generally to sanitary requirements of local medical, health and municipal or cantonment authorities and at all times adopt such precautions as may be necessary to prevent soil pollution of the Site.

On Completion of the Works the whole of such temporary structures shall be cleared away, all rubbish burnt, excreta or other disposal pits or trenches filled in and effectively sealed off and the whole of Site left clean and tidy to the entire satisfaction of the Engineer-in-Charge and at the Contractor's expense.

14. Anti-malarial precautions: The contractor shall, at his own expense, conform to all anti-material instructions given to him by the Engineer-in-charge, including filling up of any borrow pits which may have been dug by him.
15. Enforcement: The Inspecting Officer mentioned in the Contractor's Labour Regulation, or any other officer nominated in this behalf by the Engineer-in-charge shall report to the Engineer-in-Charge all cases of failure to comply with the provisions of these Rules either wholly or in part and the Engineer-in-Charge shall impose such fines and other penalties as are prescribed in the conditions.
16. Interpretations, etc: On any question as to the application, interpretation or effect of these Rules the decision of the Chief Labour Commissioner or Deputy Chief Labour Commissioner (Central) shall be final and binding.
17. Amendments: Government may, from time to time add to or amend these Rules and issue such directions as it may consider necessary for the proper implementation of these Rules or for the purpose of removing any difficulty which may administration thereof.

SAFETY CODE

(See condition 16)

1. Suitable scaffolds shall be provided for workmen for all work that cannot safely be done from the ground, or solid construction except such short period work as can be done safely from ladders. When a ladder is used an extra mazdoor shall be engaged for holding the ladder and if the ladder is used for carrying materials as well, suitable footholds and handholds shall be provided on the ladder, and the ladder shall be given an inclination not steeper than 1/4 to 1 (1/4 horizontal and 1 vertical).
2. Scaffolding or staging more than 3.25 meters above the ground or floor, swing or suspended from an overhead support or created with stationary support, shall have a guard rail properly attached, bolted, braced and otherwise secured at least 1 meter high above the floor or platform of such scaffolding or staging and extending along the entire length of the outside and ends thereof with only such openings as may be necessary for the delivery of materials. Such scaffolding or staging shall be so fastened as to prevent it from swaying from the building or structure.
3. Working platforms, gangways, and stairways shall be so constructed that they do not sag unduly or unequally and if the height of a platform or gangway or stairway is more than 3.25 meters above ground level or floor level, it shall be closely boarded, have adequate width and be suitably fenced, as described in 2 above.
4. Every opening in the floor of a building or a working platform shall be provided with suitable means to prevent falls of persons or materials by providing suitable fencing or railing with a minimum height of 1 meter.
5. Safe means of access shall be provided to all working platforms and other working places. Every ladder shall be securely fixed. No portable single ladder shall be over 0 meters in length, width between side rails in a rung ladder shall not be less than 30 cm for ladders up to and including 3 meters in length. For longer ladders this width shall be increased at least 6 mm for each additional 30 cm. Uniform step spacing shall not exceed 30 cm. Adequate precautions shall be taken to prevent danger from electrical equipment. No materials on any of the Sites shall be so stacked or placed as to cause danger or inconvenience to any person or the public. The Contractor shall provide all necessary fencing and lights to protect the public from accidents and shall be bound to bear expenses of defence of every suit action or other proceedings at law that may be brought by any person for injury sustained owing to neglect of the above precautions and to pay any damages and costs which may be awarded in any such suit, action or proceedings to any such person or which may with the consent of the Contractor be paid to compromise any claim by any such person.
6. Excavation and Trenching: All trenches, 1.5 meters or more in-depth, shall at all times be supplied with at least one ladder for every 20 meters in length or fraction thereof. The ladder shall be extended from the bottom of the trench to at least 1 meter above the surface of the ground. The sides of a trench which is 1.5 meters or more in depth shall be stepped back to give a suitable slope, or securely held by timber bracing, to avoid the danger of sides collapsing. Excavated material shall not be placed within 1.5 meters of the edge of

the trench or half of the depth of the trench whichever is more. Cutting shall be done from top to bottom. Under no circumstances shall undermining or undercutting be done.

7. Demolition: Before any demolition work is commenced and also during the process of the work: -
 - a) All roads and open areas adjacent to the work site shall either be closed or suitably protected.
 - b) No electric cable or apparatus which is liable to be a source of danger over a cable or apparatus used by the operator shall remain electrically charged.
 - c) All practical steps shall be taken to prevent danger to persons employed, from risk of fire or explosion, or flooding. No floor, roof, or other part of a building shall be so overloaded with debris or materials, as to render it unsafe.

8. All necessary personal safety equipment as considered adequate by the Engineer-in-Charge shall be available for use of persons employed on the Site and maintained in a condition suitable for immediate use and the Constructor shall take adequate steps to ensure the proper use of equipment by those concerned.
 - a) Workers employed in mixing asphaltic materials cement and lime mortars/concrete shall be provided with protective footwear and protective goggles.
 - b) Those engaged in handling any materials which are injurious to the eyes shall be provided with protective goggles.
 - c) Those engaged in welding works shall be provided with welder's protective eye shields.
 - d) Stone breakers shall be provided with protective goggles and protective clothing and seated at sufficiently safe intervals.
 - e) When workers are employed in sewers and manholes, which are in use, Contractor shall ensure that manhole covers are paned and manholes and ventilated at least for an hour before workers are allowed to get into them. Manholes so opened shall be cordoned off with suitable railing and provided with warning signals or boards to prevent accidents to the public.
 - f) The Contractor shall not employ men below the age of 18 and women on the work of painting with products containing lead in any form. Whenever men above the age of 18 are employed on the work of lead paint, the following precautions shall be taken.
 - i. No paint containing lead or lead products shall be used except in the form of paste or ready-made paint.
 - ii. Suitable face masks shall be supplied for use by workers when the paint is applied in the form of a spray or a surface having lead paint dry rubbed and scraped.
 - iii. Overalls shall be supplied by the Contractor to workmen and adequate facilities shall be provided to enable working painters to wash during and on cessation of work.

9. When work is done near any place where there is a risk of drowning, all necessary equipment shall be provided and kept ready for use and all necessary steps taken for prompt

rescue of any person in danger and adequate provision made for prompt first aid treatment of all injuries likely to be sustained during the course of the work.

10. Use of hoisting machines and tackle including their attachments, anchorage and supports shall conform to the following: -
 - (a)
 - i. These shall be of good mechanical construction, sound material and adequate strength and free from patent defects and shall be kept in good repair and good working order.
 - ii. Every rope used in hoisting or lowering materials or as a means of suspension shall be of durable quality and adequate strength, and free from patent defects.
 - (b) Every crane driver or hoisting appliance operator shall be properly qualified and no person under the age of 21 years shall be in charge of any hoisting machine including any scaffolding any winch or give signals to the operator.
 - (c) In the case of every hoisting machine and of every chain ring hook, shackle swivel and pulley block used in hoisting or lowering or as means of suspension safe working load shall be ascertained by adequate means. Every hoisting machine and all gear referred to above shall be marked with a safe working load. In the case of a hoisting machine having a variable safe working load, each safe working load and the conditions under which it is applicable shall be indicated. No part of any machine or any gear referred to in this paragraph shall be loaded beyond a safe working load except for testing.
 - (d) In the case of a departmental machine, the safe working load shall be notified by the Engineer-in-Charge. As regards the Contractor's machines the Contractor shall notify the safe working load of each machine to the Engineer-in-Charge whenever he brings it to the Site of work and get it verified by the Engineer-in-Charge.
11. Motor gearing, transmission, electric wiring and other dangerous parts of hoisting appliances shall be provided with efficient safeguards; hoisting appliances shall be provided with such means as will reduce the minimum risk of any part of a suspended load becoming accidentally displaced. When workers are employed on electrical installations which are already energized, insulating mats, and working apparel such as gloves, sleeves and boots, as may be necessary, shall be provided. Workers shall not wear any rings, or watches and carry keys or other materials which are good conductors of electricity.
12. All scaffolds, ladders and other safety devices mentioned or described herein shall be maintained in a safe condition and no scaffold, ladder or equipment shall be altered or removed while it is in use. Adequate washing facilities shall be provided at or near places of work.
13. These safety provisions shall be brought to the notice of all concerned by display on a noticeboard at a prominent place at the work spot. The people responsible for ensuring compliance with the Safety Code shall be named therein by the Contractor.

14. To ensure effective enforcement of the rules and regulations relating to safety precautions, arrangements made by the contractor shall be open to inspection by the Engineer-in-Charge or his representative and the Inspecting Officers as defined in the Contractor's Labour Regulations.
15. Notwithstanding the above conditions 1 to 14 the contractor is not exempted from the operation of any other Act or Rule in force.

**FORM OF BANK GUARANTEE IN LIEU OF SECURITY
DEPOSIT IN INDIVIDUAL CONTRACT**

(On Non-Judicial Stamp Paper)
{General Condition No.9}

To

The Cochin International Airport Ltd.

In consideration of the Cochin International Airport Ltd. having its head office at Cochin (which expression shall unless repugnant to the subject or context includes its administrators, successors and assignees) having agreed under the terms and conditions of Contract Agreement No. _____ dated _____ made between _____ and CIAL connection with the work of _____ (hereinafter called the said contract), to accept a Deed of Guarantee as herein provided for Rs. _____ (Rupees _____ only) from a Nationalized Bank in lieu of the security deposit to be made by the contractor or in lieu of the deduction to be made from the contractor's bills, for the due fulfillment by the said Contractor of the term and conditions contained in the said Contract, We the _____ Bank (hereinafter referred to as "the said Bank" and having our registered office at _____ do hereby undertake and agree to indemnify and keep indemnified CIAL from time to time to the extent of Rs. _____ (Rupees _____ only) against any loss or damage, cost, charges and expenses caused to or suffered by or that may be caused to or suffered by CIAL by reason of any breach or breaches by the said Contractor of any of the terms and conditions contained in the said contract and to unconditionally pay the amount claimed by CIAL on demand and without demur to the extent aforesaid.

2. We, the _____ Bank, further agree that CIAL shall be the sole judge of and as to whether the said contractor has committed any breach or breaches of any of the terms and conditions of the said contract and the extent of loss, damage, costs, charges and expenses caused to or suffered by or that may be caused to or suffered by CIAL on account thereof and the decision of CIAL that the said Contractor has committed such breach or breaches and as to the amount or amounts of loss, damage, costs, charges and expenses caused to or suffered to or suffered by or that may be caused to or suffered by CIAL from time to time shall be final and binding on us.

3. We, the said Bank, further agree that the Guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said Contract and till at the dues of CIAL under, the said Contract or under any of the terms and conditions governing the said Contract have been fully paid and its claimed satisfied or discharge and till the Accepting Authority of the contract certifies that the terms and conditions of the said Contract have been fully and properly carried out by the said Contractor and accordingly discharges this Guaranty subject, however, that CIAL shall have no claim under this Guarantee after 90 (Ninety) days from the date of expiry of the defects Liability period as provided in the said Contract. i.e., _____ (date) or from the date of cancellation of the said Contract, as the case may be unless a notice of the claim under this Guaranty has been served on the Bank before the expiry of the said period in which case the same shall be enforceable against the Bank notwithstanding the fact, that the same is enforced after the expiry of the said period.

(Signature and Seal of Bidder)

4. CIAL shall have the fullest liberty without affecting in any way the liability of the Bank under this Guaranty or Indemnity from time to time to vary any of the terms and conditions of the said contract or to extended time of performance by the said Contractor or to postpone for any time and from time to time any of the powers exercisable by it against the said Contractor and either to enforcing or forbear from enforcing any of terms and conditions governing the said Contract or securities available to CIAL and the said Bank shall not be released from its liability under these presents by any exercise by CIAL if any liberty with reference to the matters aforesaid or by reason of time being given to the said Contractor or any other forbearance, act or omission on the part of CIAL or any indulgence by CIAL to the said Contractor or any other CIAL matter or thing whatsoever which under the law relating so sureties would but for this provision have the effect of so releasing the Bank from its such liability.

5. It shall not be necessary for CIAL to proceed against the Contractor before proceeding against the Bank and the Guarantee herein contained shall be enforceable against the Bank, notwithstanding any security which CIAL may have obtained or obtain from the Contractor at the time when proceedings are taken against the Bank hereunder be outstanding or unrealized.

6. We, the said bank, lastly undertake not to revoke this Guarantee during its currency except with the previous consent of CIAL in writing and agree that any change in the Constitution of the said Contractor or the said Bank shall not discharge our liability hereunder.

In presence of:

Dated this _____ Day of _____

WITNESS

For and on behalf of (The Bank)

1.

Signature _____

Name & Designation _____

2.

Authorization No. _____

Name & Place _____

Bank's seal _____

The above Guarantee is accepted by Cochin International Airport Ltd.

For and on behalf of Cochin International Airport Ltd.

Signature _____

Name _____

Designation _____

Dated _____

Note:

*** For Proprietary Concerns**

Shri _____ son of _____ resident of _____ carrying on business under the name and style of _____ at _____ (hereinafter called "the said Contractor" which expression shall unless the context requires otherwise include his heirs, executors, administrators and legal representatives).

*** For Partnership Concerns**

1. Shri _____ son of _____ resident of _____.

2. Shri _____ son of _____ resident of _____ carrying on business in co-partnership under the name and style of _____ at _____ (hereinafter collectively called "the said Contractor" which expression shall unless the context requires otherwise include each of them and their respective heirs, executors, administrators and legal representatives).

*** For Companies**

M/s. _____ a company registered under the Companies Act, 1956 and having its registered office in the State of _____ (Hereinafter called "the said Contractor" which expression shall unless the context requires otherwise include its administrators, successors and assignees).

FORM OF BANK GUARANTEE TO SECURE A LUMP-SUM ADVANCE

(On Non-Judicial Stamp Paper)

{General Condition No.54}

To

The Cochin International Airport Ltd.

In consideration of the Cochin International Airport Ltd. having its head office at Cochin (hereinafter called CIAL which expression shall unless repugnant to the subject or context include its administrators, successors and assignees) having agreed under the terms and conditions of Contract Agreement No. _____ dated _____ made between _____ and CIAL connection with the work of _____ (hereinafter called the said contract), to make at the request of the Contractor a lump-sum advance of Rs. _____ (Rupees _____ only) for utilizing it for the purpose of the Contract on his furnishing a guarantee acceptable for CIAL we, the _____ Bank (hereinafter referred to as "the said Bank") and having our registered office at _____ do hereby guarantee the due recovery by CIAL of the said advance with interest thereon as provided according to the terms and conditions of the Contract. If the said Contractor fails to utilize the said advance for the purpose of the Contract and/or the said advance together with interest thereon as aforesaid is not fully recovered by CIAL we, the _____ Bank hereby unconditionally and irrevocably undertake to pay to CIAL on demand and without demur to the extent of the said sum of Rs. _____ (Rupees _____ only) any claim made by on us for the loss or damage caused to or suffered by CIAL by reason of not being able to recover in full the said sum of Rs. _____ (Rupees _____ only) with interest, as aforesaid.

2. We, the _____ Bank, further agree that CIAL shall be the sole judge of and as to whether the said contract has not utilized the said advance or any part thereof for the purpose of the Contract and the extent of loss or damage caused to or suffered by CIAL on account of the said advance together with interest not being recovered in full and the decision of CIAL that the said Contractor has not utilized the said advance or any part thereof for the purpose of the Contract and as to the amount or amounts loss or damage caused to or suffered by CIAL shall be final and binding on us.

3. We, the said Bank, further agree that the Guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said Contract or by virtue of any of the terms and conditions governing the said Contract have been fully paid and its claims satisfied or discharge and till the Accepting Authority of the contract certifies that the terms and conditions of the said Contract have been fully and properly carried out by the said Contractor and accordingly discharges this Guaranty subject, however, that CIAL shall have no claim under the Guarantee after 90 (Ninety) days from the date of expiry

of the defects Liability period as provided in the said Contract. ie. _____ (date) or from the date of cancellation of the said Contract, as the case may be unless a notice of the claim under this Guaranty has been served on the Bank before the expiry of the said period in which case the same shall be enforceable against the Bank now withstanding the fact, that the same is enforced after the expiry of the said period.

4. CIAL shall have the fullest liberty without affecting in any way the liability of the Bank under this Guaranty or Indemnity from time to time to vary any of the terms and conditions of the said contract or to extended time of performance by the said Contractor or to postpone for any time and from time to time any of the powers exercisable by it against the said Contractor and either to enforcing or forbear from enforcing any of terms and conditions governing the said Contract or securities available to CIAL and the said Bank shall not be released from its liability under these presents by any exercise by CIAL if any liberty with reference to the matters aforesaid or by reason of time being given to the said Contractor or any other forbearance, act or omission on the part of CIAL or any indulgence by CIAL to the said Contractor or any other CIAL matter or thing whatsoever which under the law relating to sureties would but for this provision have the effect of so releasing the Bank from its such liability.

5. It shall not be necessary for CIAL to proceed against the Contractor before proceeding against the Bank and the Guarantee herein contained shall be enforceable against the Bank, not withstanding any security which CIAL may have obtained or obtain from the Contractor at the time when proceedings are taken against the Bank hereunder be outstanding or unrealised.

6. We, the said bank, lastly undertake not to revoke this Guarantee during its currency except with the previous consent of CIAL in writing and agree that any change in the Constitution of the said Contractor or the said Bank shall not discharge our liability hereunder.

In presence of:

Date this _____ Day of _____

WITNESS

For and on behalf of (The Bank)

1.

Signature _____

Name & Designation _____

2.

Authorisation No. _____

Name & Place _____

Bank's seal _____

The above Guarantee is accepted by Cochin International Airport Ltd.

For and on behalf of Cochin International Airport Ltd.

Signature _____

Name _____

Designation _____

Dated _____

Note:

*** For Proprietary Concerns**

Shri _____ son of _____ resident of _____ carrying on business under the name and style of _____ at _____ (hereinafter called “the said Contractor” which expression shall unless the context requires otherwise include his heirs, executors, administrators and legal representatives).

*** For Partnership Concerns**

1. Shri _____ son of _____ resident of _____.

2. Shri _____ son of _____ resident of _____ carrying on business in co-partnership under the name and style of _____ at _____ (hereinafter collectively called “the said Contractor” which expression shall unless the context requires otherwise include each of them and their respective heirs, executors, administrators and legal representatives).

*** For Companies**

M/s. _____ a company registered under the Companies Act, 1956 and having its registered office in the State of _____ (Hereinafter called “the said Contractor” which expression shall unless the context requires otherwise include its administrators, successors and assignees).

**FORM OF BANK GUARANTEE FOR
REMOVAL OF PLANT AND EQUIPMENT FROM THE SITE**

(On Non-Judicial Stamp Paper)

To

The Cochin International Airport Ltd.

In consideration of the Cochin International Airport Ltd. having its head office at Cochin (hereinafter called CIAL which expression shall unless repugnant to the subject or context, include its administrators, successors and assignees) having agreed under the terms and conditions of Contract Agreement No. _____ dated _____ made between _____ and CIAL in connection with the work of _____ (hereinafter called the said contract), to permit the Contractor remove the plant and equipment mentioned in the schedule hereto hypothecated to CIAL as security against an advance of Rs. _____ (Rupees _____ only) with interest as provided in the contract granted to the Contractor by CIAL from the site to any other works of the Contractor on his furnishing an acceptable Bank guarantee, we the _____ Bank (hereinafter referred to as "the said Bank") and having our registered office at _____ do hereby undertake and guarantee to indemnify and keep indemnified CIAL from time to time to the extent of Rs. _____ (Rupees _____ only) against any loss or damage, costs, charges and expenses caused to or suffered by or that may be caused to or suffered by CIAL reason of the Contractor failing to bring back to the site the said plant and equipment or any part thereof and to unconditionally pay the amount claimed by CIAL on demand and without demur to the extent aforesaid.

SCHEDULE ABOVE REFERRED TO

Serial No.	Particulars of Plant and Equipment	Nos	Purchase price/Price considered reasonable by Engineer-in-charge	Total Price	Advance (75% of Col.5)

2. We, the _____ Bank, further agree that CIAL shall be the sole judge of and as to whether the said contractor has failed to bring the said plant and equipment or any part thereof back to the site and the extent of loss, damage, costs, charges and expenses caused to or suffered by or that may be caused to or suffered by CIAL on account thereof and the decision

(Signature and Seal of Bidder)

of CIAL that the said Contractor has so failed and as to the amount or amounts of loss, damages, costs, charges and expenses caused to or suffered by or that may be caused to or suffered by CIAL from time to time shall be final and binding on us.

3. We, the said Bank, further agree that the Guarantee herein contained shall remain in full force and effect till the said plant and equipment have been brought back to the Site or till the said advance of Rs. _____ (Rupees _____ only) with interest is fully repayable to CIAL whichever is earlier and till the Accepting Authority of the contract certifies that the said plant and equipment have been brought back to the site or the said advance of Rs. _____ (Rupees _____ only) with interest has been repaid in full, and accordingly discharges this Guarantee subject, however, the CIAL shall have no claim under this Guarantee after 90 (ninety) days from date of expiry of the contract i.e. _____ (date) or from the date of cancellation of the said contract, as the case may be unless a notice of the claim under this Guaranty has been served on the Bank before the expiry of the said period in which case the same shall be enforceable against the Bank notwithstanding the fact, that the same is enforced after the expiry of the said period.

4. CIAL shall have the fullest liberty without affecting in any way the liability of the Bank under this Guaranty or Indemnity from time to time to vary any of the terms and conditions of the said contract or the advance or to extend time of performance by the said Contractor or to postpone for any time and from time to time any of the powers exercisable by it against the said Contractor and either to enforce or forbear from enforcing any of terms and conditions governing the said Contract or securities available to CIAL and the said Bank shall not be released from its liability under these presents by any exercise by CIAL if any liberty with reference to the matters aforesaid or by reason of time being given to the said Contractor or any other forbearance, act or omission on the part of CIAL or any indulgence by CIAL to the said Contractor or any other CIAL matter or thing whatsoever which under the law relating to sureties would but for this provision have the effect of so releasing the Bank from its such liability.

5. It shall not be necessary for CIAL to proceed against the Contractor before proceeding against the Bank and the Guarantee herein contained shall be enforceable against the Bank, notwithstanding any security which CIAL may have obtained from the Contractor shall at the time when proceedings are taken against the Bank hereunder be outstanding or unrealised.

6. We, the said bank, lastly undertake not to revoke this Guarantee during its currency except with the previous consent of CIAL in writing and agree that any change in the Constitution of the said Contractor or the said Bank shall not discharge our liability hereunder.

In presence of:

Dated this _____ Day of _____

WITNESS

For and on behalf of(The Bank)

1.

Signature_____

Name & Designation_____

2.

Authorisation No._____

Name & Place_____

Banks seal_____

The above Guarantee is accepted by Cochin International Airport Ltd.

For and on behalf of Cochin International Airport Ltd.

Signature_____

Name_____

Designation_____

Dated_____

Note:

*** For Proprietary Concerns**

Shri _____ son of _____ resident of _____ carrying on business under the name and style of _____ at _____ (hereinafter called “the said Contractor” which expression shall unless the context requires otherwise include his heirs, executors, administrators and legal representatives).

*** For Partnership Concerns**

1. Shri _____ son of _____ resident of _____.
2. Shri _____ son of _____ resident of _____ carrying on business in co-partnership under the name and style of _____ at _____ (hereinafter collectively called “the said Contractor” which expression shall unless the context requires otherwise include each of them and their respective heirs, executors, administrators and legal representatives).

*** For Companies**

M/s. _____ a company registered under the Companies Act, 1956 and having its registered office in the State of _____ (Hereinafter called “the said Contractor” which expression shall unless the context requires otherwise include its administrators, successors and assignees).

FORM OF HYPOTHECATION DEED

(On Non-Judicial Stamp Paper)

THIS INDENTURE made this _____ day of _____ 20__ between _____ of the one part and Cochin International Airport Ltd., hereinafter called CIAL which expression shall unless the context requires otherwise include its administrators, successors and assigns of the other part.

WHEREAS under General Conditions of Contract relating to the Contract Agreement No. _____ dated _____ entered into between CIAL and the Contractor, the Contractor has applied to CIAL for an advance of Rs. _____ (Rupees _____ only) for plant and equipment described in the Schedule hereto specifically acquired by the Contractor for the works and brought to site.

AND WHEREAS one of the conditions on which the said advance of Rs. _____ (Rupees _____ only) is to be granted by CIAL to the Contractor is that the Contractor shall hypothecate the plant and equipment described in the Schedule hereto in favour of CIAL as security for the due repayment of the said advance.

AND WHEREAS the Contractor has represented that he is the owner of the plant and equipment described in the Schedule hereto.

NOW THIS INDENTURE WITNESSETH THAT in pursuance of the said agreement and in consideration of the premises the Contractor doth hereby hypothecate, assign and transfer to CIAL the plant and equipment described in the Schedule hereto to the intent that the same shall remain and form security for repayment to CIAL of the said advance of Rs. _____ (Rupees _____ only) together with the interest thereon at _____ % per annum.

1. The Contractor hereby agrees, declares and covenants with CIAL as follows:
 - a) The Contractor shall repay to CIAL by the Contractor in respect of the said advance of Rs. _____ (Rupees _____ only) together with interest thereon as aforesaid by _____ (date) and agrees that the said advance be recovered by CIAL by making deductions in the manner provided in General Conditions of Contract and other conditions of the contract from the claims made by the Contractor against CIAL for on account payment.
 - b) The Contractor has paid in full the purchase price of the plant and equipment described in the Schedule hereto and each and every one of them and that the same are the absolute property of the Contractor and that the same have not been sold, pledged, mortgaged or transferred or in any way dealt with by the Contractor.
 - c) So long as any amount remains payable to CIAL by the Contractor in respect of the said advance of Rs. _____ (Rupees _____ only) the Contractor shall not sell, pledge, hypothecate, transfer, part with or in any way deal with the plant and equipment described in the Schedule hereto.

- d) If the said advance of Rs. _____ (Rupees _____ only) shall not be repaid by the Contractor or recovered in the manner described above by the said _____ day of _____ due to any reason whatsoever or the said Contract has been determined earlier or cancelled or if the Contractor shall sell, pledge, mortgage, transfer, part with or in any way deal with the said plant and equipment or any part thereof or the Contractor or any of the partners is adjudged insolvent or the contract is to be wound up or makes any composition or arrangement with its creditors of the Contractor shall commit breach of any of the terms and conditions or covenants as herein contained or if any of the said plant and equipment or if any other property whatsoever belonging to the Contractor has been sold or attached for a period of not less than 21 days in execution of the decree of any court for payment of money, the whole of the said advance of Rs. _____ (Rupees _____ only) or such part thereof as may have remained unpaid or unrecovered together with interest thereon shall forthwith become due and payable.
- e) CIAL may on the happening of any of the events mentioned in the preceding clause (d) or in the event of the said advance or any part thereof becoming due and payable and has not been paid or recovered or cannot be recovered as provided in the said conditions, seize and take possession of the said plant and equipment (and either remain in possession thereof without removing the same or else may remove the same) and sell the said plant and equipment or any of them either by public auction or private contract and may out of the sale proceeds retain the balance of the said advance and interest them remaining unpaid and unrecovered and all costs, charges and expenses and payments incurred or made in maintaining, defending or protecting the rights of CIAL hereunder and shall pay over the surplus, if any, to the Contractor.
- f) The Contractor shall at all times during the continuance of the security and at the expense of the Contractor insure and keep insured the plant and equipment described in the Schedule hereto for the full value thereof in the joint names of the Contractor and CIAL with an insurance company to be approved by the Engineer-in-Charge against the risk of loss or damage from whatever cause arising other than the Excepted Risks. During the continuance of the security the Contractor shall pay all premia and sums of money necessary for keeping such insurance on foot and the insurance policy and receipts in original for premia paid shall be deposited with the Engineer-in-Charge. The Contractor shall assign all his right, title and interest in the policy to CIAL.
- g) The Contractor shall not permit or suffer the said plant and equipment or any part thereof to be destroyed or damaged or used or to be used or to deteriorate in a greater degree than it would deteriorate by reasonable wear and tear thereof in the performance of the Contract.
- h) In the event of any damage or loss happening to the said plant and equipment or any part thereof from whatever cause other than the Excepted Risks the Contractor shall forthwith have the same repaired or replaced as the case may be or arrange for payment of the entire amount recovered or to be recovered from the insurance company to CIAL towards the payment of the said advance of Rs. _____ (Rupees _____ only).

2. Upon repayment or recovery in full of the amount secured on the account of this hypothecation deed the said plant and equipment secured hereunder shall stand released from hypothecation but this is without prejudice to the right of CIAL under any other Conditions of the Contract.

SCHEDULE ABOVE REFERRED TO

Serial No.	Particulars of Plant and Equipment	Nos.	Purchase price/Price considered reasonable by Engineer-in-charge	Total Price	Advance (75% of Col.5)
1	2	3	4	5	6

IN WITNESS WHERE OF the parties hereto have executed these present on the day and year first above written.

Signed and delivered by the within named _____
(Contractor) in the presence of

WITNESS

1.

2.

Signed by Shri _____
(Name and Designation)

For and on behalf of Cochin International Airport Ltd.

WITNESS

1.

2.

Note:

*** For Proprietary Concerns**

Shri _____ son of _____ resident of _____ carrying on business under the name and style of _____ at _____ (hereinafter called "the said Contractor" which expression shall unless the context requires otherwise include his heirs, executors, administrators and legal representatives).

*** For Partnership Concerns**

1. Shri _____ son of _____ resident of _____.

2. Shri _____ son of _____ resident of _____ carrying on business in co-partnership under the name and style of _____ at _____ (hereinafter collectively called "the said Contractor" which expression shall unless the context requires otherwise include each of them and their respective heirs, executors, administrators and legal representatives).

*** For Companies**

M/s. _____ a company registered under the Companies Act, 1956 and having its registered office in the State of _____ (Hereinafter called "the said Contractor" which expression shall unless the context requires otherwise include its administrators, successors and assignees).

FORM OF PERFORMANCE GUARANTEE/ BANK GUARANTEE BOND

(Notice Inviting Tender Clause 20)

In consideration of Cochin International Airport, Nedumbassery having offered to accept the terms and conditions of the proposed agreement between CIAL and hereinafter called “the said contractor (s)” for the work (hereinafter called “the said agreement”) having agreed to production of an irrevocable Bank Guarantee for Rs..... (Rupees only) as a security / guarantee from the contractor(s) for compliance of his obligations in accordance with the terms and conditions in the said agreement.

1. We (hereinafter referred to as the “Bank”) hereby undertake to (indicate the name of the Bank) pay to CIAL an amount not exceeding Rs..... (Rupees only) on demand by CIAL.
2. Wedo hereby undertake to pay the amounts due and payable (indicate the name of the Bank) under this guarantee without any demur, merely on a demand from CIAL stating that the amount claimed is required to meet the recoveries due to or likely to be due from the said contractors (s). Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this Guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs..... (Rupees only)
3. We, the said Bank, further undertake to pay to CIAL any money so demanded notwithstanding any dispute or disputes raised by the contractor(s) in any suit or proceeding pending before any court or Tribunal relating thereto our liability under this present being absolute and unequivocal.

The payment so made by us under this bond shall be a valid discharge of our liability for payment thereunder, and the contractor(s) shall have no claim against us for making such payment.

4. We further agree that the Guarantee herein contained shall (indicate the name of the Bank) remain in full force and effect during the period that would be taken for the performance of the said agreement, and it shall continue to be enforceable till all the dues of CIAL under or by virtue of the said agreement have been fully paid, and its claims satisfied or discharged, or till the Engineer – in – charge, on behalf of CIAL, certifies that the terms and conditions of the said agreement have been fully and properly carried out by the said contractor(s), and accordingly discharge this guarantee.
5. We further agree with CIAL that CIAL (indicate the name of the Bank) shall have the fullest liberty without our consent, and without effecting in any manner our obligations hereunder, to vary any of the terms and conditions of the said agreement or to extend time of performance by the said contractor(s) from time to time or to postpone for any time or from time to time any of the powers exercisable by CIAL against the said contractor(s), and to forbear or enforce any of the terms and conditions relating to the said agreement, and we shall not be relieved from our liability by reason of any such variation or extension being granted to the said contractor (s) or for any forbearance, act of omission on the part of CIAL or any indulgence by CIAL to the said contractor(s) or by any such matter or thing whatsoever which under the law relating to sureties would, but for this provision, have effect of so relieving us.

6. This Guarantee will not be discharged due to the change in the constitution of the Bank or the contractor(s).
7. We lastly undertake not to revoke this Guarantee except with (indicate the name of the Bank) the previous consent of CIAL in writing.
8. This Guarantee shall be valid upto Unless extended on demand by CIAL. Notwithstanding anything mentioned above, our liability against this Guarantee is restricted to Rs. (Rupees Only), and unless a claim in writing is lodged with us within three months of the date of expiry or extended date of expiry of this Guarantee all our liabilities under this Guarantee shall stand discharged.

Dated theday ofFor.....

(Indicate the name of the Bank)

COCHIN INTERNATIONAL AIRPORT LIMITED

RELEASE CERTIFICATE

Contract Agreement No.:

Project: **SITC of 350 TR VFD-Driven Chiller and 350 TR Cooling Towers for Terminal 1 CIAL**

Sub-head:

Location: Cochin International Airport, Nedumbassery

Client: Cochin International Airport Limited

KNOW ALL MEN BY THESE PRESENTS, THAT
(hereinafter referred to as Contractor), for and in consideration of the receipt of the sum of Rs..... (in words)
by contractor from Cochin International Airport Limited, Kochi Airport P.O – 683 111 (hereinafter called CIAL representing the final payment under Contract Agreement No..... dated the Day of20.....between contractor & CIAL hereby releases and forever discharges CIAL and its respective successors and assigns and the property of either of them from all claims and demands whatsoever in any manner arising out of, or related to said contractor, labour performed or materials and equipment furnished by the contractor in connection with, or incidental to the SITC of 350 TR VFD-Driven Chiller and 350 TR Cooling Towers for Terminal 1 CIAL. In consideration of, and to include CIAL to make the aforesaid final payment, the contractor hereby represents, warrants and agrees that

All sums due or to become due, all debts, accounts, damages, obligations, claims and demands of every nature and kind whatsoever in any manner arising out of or related to labour performed or materials and equipment furnished in connection with, or incidental to, the said construction have been paid and satisfied,

There are no unsettled claims for injuries to or death of any person or damage to, or destruction of, property in any manner arising out of, or related to, the aforesaid construction and

it shall indemnify and hold harmless CIAL and its respective successors and assigns from and against any claims, demands, liens, claims, of liens, judgement, attachments and costs related hereto in any manner, arising out of or related to the aforesaid construction.

The contractor acknowledges, for guaranteed purposes, that the date of acceptance of the work performed under Contract Agreement No..... is hereby established as day of 20....

IN WITNESS WHEREOF, the contractor has caused this instrument to be executed by its duly authorized officers thisday of 20....

(Corporate Seal)

Witness: _____
Name of Contractor

Name:

Signature: Signature of Contractor

Title:

Place: Designation

Date:

SECTION IV

4. SPECIAL CONDITIONS OF CONTRACT

**SPECIAL CONDITIONS OF CONTRACT FOR SITC OF 350TR VFD-
DRIVEN CHILLER AND 350 TR COOLING TOWERS FOR
TERMINAL 1 CIAL**

1. SCOPE OF WORK

- SITC of one **350 TR chiller** and one **350 TR cooling tower** at the Central Block AC Plant CIAL, including electrical cables, control wiring, starter panel/its refurbishment, etc., complete as required.
- SITC of pumps at the Central Block AC Plant comprising: 1 No. **Primary Pump**, 1 No. **Secondary Pump**, 1 No. **Condenser Pump**, including electrical cables, control wiring, starter panel/its refurbishment, etc., complete as required.
- SITC of one 350 TR **cooling tower** and one **condenser pump** at the West Block AC Plant CIAL, including electrical cables, control wiring, starter panel/its refurbishment, etc., complete as required.
- Dismantling and Buyback of **existing chilled water pipes, condenser pipes** and SITC of **new Chilled water piping and condenser piping with associated valve package**.
- Dismantling and Buyback of **Pedestals** of chillers (2nos), pumps (12nos), cooling towers (6nos)
- Dismantling and Buyback of existing equipment, as detailed below:
 - Central Block AC Plant: 2 Nos. 200 TR **chillers**, 2 Nos. 200 TR **coolingtowers**, 1 No. **secondary pump**, 2 Nos. **primary pumps**, 2 Nos. **condenser pumps**
 - West Block AC Plant: 2 Nos. 100 TR **chillers**, 4 Nos. **cooling towers**, 3Nos. **condenser pumps**, 1 Nos. **secondary pumps**, 3 Nos. **primary pumps**
- All **associated civil works** like construction of pedestals, making good all openings, chases, cut-outs and damages, etc., required for the equipment executed under this contract.
- All **associated electrical works**, including the SITC of all electrical cables starting from the nearest panel, VFD/Starters, cable trays and sundry items required for the work, are under the scope of the contractor.

(Note: The contractor shall visit the site and assess the actual cable routing and required lengths before quoting. No separate measurement or payment shall be made for cables; the

quoted price shall be deemed to include all required cable lengths and associated accessories for complete installation.)

- CAMC for the chiller and cooling towers for a period of 5 years, commencing after completion of 2 years Defect Liability Period (DLP).

The following Special Conditions shall be read in conjunction with the General Conditions of Contract and amendments/ corrections thereto. If there are any provisions in these Special Conditions which are at variance with the provisions in the above-mentioned documents, the Provisions in these Special Conditions shall take precedence.

The work in general shall be carried out as per the nomenclature of the individual items and in the technical specifications. For items of work not covered above, the same shall be carried out as per CPWD specification and standards, amended up to date with all correction slips or as directed by the Engineer-in-Charge.

For any other item of work not covered in the above para, the same shall be done as per the latest relevant BIS codes of Practice/National Building Code in that order.

For any items of work not covered in the above paragraphs, the same shall be done as per sound engineering practice as directed/approved by the Engineer-in-Charge.

2. EXECUTION OF WORKS

All Correspondence in connection with this project execution must be addressed to CIAL.

The name(s) of the Engineer-in-Charge(s) shall be intimated to the contractor immediately after the award of the contract.

3. DETAILS OF TENDER

The tender document consists of the following, as shown below: -

- Notice inviting tender
- Instruction to bidders
- General conditions of contract
- Special conditions of contract
- Technical specification

- BOQ

If there are variances between conditions / Clauses in different sections of the tender document, then the following precedence shall be noted. The tender conditions shall be read in the following order of precedence.

- 1) Schedule of quantity
- 2) Technical specification
- 3) Special conditions of contract
- 4) General conditions of contract

If there is a variation between the General Conditions of contract and the special conditions of contract, then the special conditions of contract shall have precedence. If there is a variation between the special conditions of the contract and technical specifications, then technical specifications shall have precedence. If technical specifications and drawings are at variance, then drawings shall have precedence. If the drawing and schedule of quantity are at variance, then the schedule of quantity shall have precedence.

4. SHOP DRAWINGS

On award of work, the contractor **shall prepare and furnish the following shop drawings for approval by the Engineer-in-charge before execution.** Such shop drawings shall be based on conceptual drawings as per the specifications mentioned in the tender book. All local laws and regulations shall be followed.

5. MATERIAL APPROVAL

All MATERIAL APPROVAL REQUESTS should have the following dividers.

- a. Covering Page
- b. Table of Contents
- c. Company profile
- d. Material Description (and System description if applicable)
- e. List of Materials (with quantity)
- f. Design/calculation details, if any
- g. Compliance Statement

- h. Technical Catalogue (The original and copies should be highlighted properly for the items proposed or selected)
- i. Drawings, wiring diagrams and single line diagrams (if applicable)
- j. Test reports & Reports of the product.
- k. Installation Method statement, if applicable, as proposed by the manufacturer.
- l. Manufacturer and supplier contact details with the contact person's phone number and email address.

6. COMPLETENESS OF TENDER

All sundry fittings, assemblies, accessories, hardware items, foundation bolts, termination lugs for electrical connections as required, and all other sundry items which are useful and necessary for proper assembly and efficient working of the various components of the work shall be deemed to have been included in the tender, whether such items are specifically mentioned in the tender documents or not.

7. TIME OF COMPLETION

The entire work is scheduled to be completed within **08 calendar months** from the date of issue of the purchase order. The contractor shall execute the contract as per the phased execution schedule approved by the Engineer in charge.

- a. Contractor to submit Programme

After the acceptance of his Tender, the Contractor shall, within fifteen days, submit to the Engineer-in-Charge for his approval, a detailed program considering the total time period stipulated in the contract showing the order, the procedure and the method in which he proposes to carry out the works.

He shall furnish the particulars in writing of his arrangements of manpower, plant and machinery and all other resources owned and dedicated to this work. Cash flow during the execution of the project for the procurement of materials and for carrying out of the works, including temporary works which the Contractor intends to construct, shall also be furnished.

In support of this programme, the Contractor shall submit a work schedule in the form of a CPM/PERT Chart. The Engineer-in-Charge shall, if necessary, modify the program submitted by the Contractor, and approval shall be given by the Engineer-in-Charge, indicating the major

milestones. The programme approved by the Engineer-in-Charge shall be final and binding on the Contractor. The approval by the Engineer-in-Charge of such a program or furnishing of such particulars shall not relieve the Contractor of any of his duties or responsibilities under the contract.

During the progress of work, the Contractor shall be required to furnish the resource mobilization plan as required by the Engineer-in-Charge to keep up with the target date of completion.

This CPM/PERT programme will be required to be updated every month or more frequently as directed by the Engineer-in-Charge, based on the actual progress, resource mobilization and other field conditions prevailing.

b. Progress reports and schedules

The Contractor shall submit to the Engineer-in-Charge by the **third day of every week** three (3) copies of a report in a duly approved format showing the progress made in the construction of the works, mobilization of resources, etc., during the previous week.

- c. **An order book** for each package shall be maintained, and the Contractor shall acknowledge the orders given by the Engineer-in-charge and shall carry them out accordingly.
- d. The Contractor shall particularly note that the tender rates of the various items shall be inclusive of all incidental charges, such as bailing, shoring, bunding, barricading and lighting, etc., if found necessary during execution, and no extra shall be due therefore on any account to the Contractor.
- e. The Contractor should see that the labour and staff employed by him behave appropriately and should dispense with the services of such person or persons from the site as directed by the Engineer-in-charge.

8. TAXES & DUTIES

Royalty charges & taxes, if any, on account of the supply of materials for all works shall be paid by the Contractor at his own cost. No extra claim in this regard shall be admissible.

9. TURNOVER TAXES/WORKS CONTRACT TAXES, GST:

Deductions will be made from the bills towards WCT as per the KVAT Act (if applicable), TDS as per Income Tax and other Indian Taxes, if any and as per the existing Government provisions.

- a. Cess for the construction of works under the Building and Other Construction Workers Welfare Cess Act-1996. The Contractor shall remit the building and other Construction Workers Welfare Cess at 1% on the total cost of construction, including the cost of materials and shall produce the certificate of remittance of Cess to CIAL. In case the Contractor fails to remit the Cess, the applicable Cess will be recovered from the final bill of the Contractor.
- b. Since GST is implemented in India, it is important that the tenderer/contractor, as the Goods and/or Service provider to CIAL, is complying with all the GST laws as applicable. The contractor should also comply with the filing of all the returns to the GST Network/government departments within the stipulated time every month or such other period as required by the Government. If the contractor does not comply with any of the GST laws and procedures and if CIAL incurs any liability on this account or does not get the input credit from the GST Network/Government as goods and/or service receiver due to the contractor's failure to comply with the procedures of filing/uploading of data/submission of documents etc. in time, then all such liability including the input credit of the GST lost by CIAL and the penalties and interest incurred by CIAL would be the liability of the contractor to be recovered from the Running account bills or security deposits or any other amount payable by CIAL to the contractor.
- c. Further, the contractor should provide all GST registration-related data to CIAL as per CIAL's requirement for updating the CIAL application software.”

10. LOI & PERFORMANCE BANK GUARANTEE

The successful bidder, hereafter referred to as the Contractor, shall be issued a **Letter of Intent (LOI) for the work.**

The Contractor shall deposit an amount equal to **5% of the accepted value of the work** as a Performance Guarantee (Performance Security) in the following form.

An irrevocable BG of any scheduled bank or any nationalized bank in the prescribed form.

The time limit allowed for submission of the performance guarantee by the Contractor shall be **15 days from the Letter of Intent**. The purchase order shall be issued to the Contractor only after he submits the performance guarantee in an acceptable form. Performance security shall be released after satisfactory completion of work without any interest.

If the contractor fails to furnish the required performance guarantee (Performance Security) within the time limit, **CIAL will be at liberty to cancel the Letter of Intent and forfeit the full said earnest money absolutely.**

11. COMPLETENESS OF TENDER

All sundry fittings, assemblies, accessories, hardware items, foundation bolts, termination lugs for electrical connections as required, and **all other sundry items which are useful and necessary for proper assembly and efficient working of the various components of the work shall be deemed to have been included in the tender**, whether such items are specifically mentioned in the tender documents or not.

12. PHASING OF WORKS

The work must be carried out in phases as approved by CIAL from time to time, so that the total project work can progress smoothly along with the works of other Contractors/ agencies. The contractor shall plan the work as per the phasing decided by the CIAL, and no claim will be entertained for not handing over the entire area in one stretch. In case there are small patches that could not be handed over due to legal and technical reasons, this will not be considered as obstructions, and no claim will be entertained for delays for such reasons.

The Contractor shall adjust his labour, staff, plant, machinery, etc., according to the requirements of work from time to time regarding approved phases of work, and no claim shall be entertained on account of idle labour, plant, machinery, night works, etc., due to any reason whatsoever.

13. STRUCTURAL ALTERATIONS TO BUILDINGS

5.1 No structural member in the building shall be damaged/altered without prior approval from CIAL.

5.2 Structural provisions like openings and pipes, if any, provided by CIAL for the work, shall be used. Where these require modifications, such contingent works shall be carried out by the contractor, at his cost, after the prior approval of CIAL.

5.3 All cutout openings in floors provided by CIAL shall be closed after installing the cables/pipes/ducts, following the item in the schedule of work.

5.4 All cuttings made by the contractor in connection with the works shall be filled by him at his cost to the original finish. Cutting off all openings/holes chases in walls or slabs for service crossings, including sealing, framework, fireproofing, providing sleeves, cover plates, and making good structure and finishes to an approved/NBC standard. No additional payment shall be made by Owners on this account.

14. PAYMENT TERMS

1. The payment for all the packages will be released in the following manner.
 - 75% of the rate of items, on pro-rata, would be released after the satisfactory supply of materials at the site, as assessed by the Engineer-in-Charge, which are required per the contract and are safeguarded against loss due to any cause whatsoever covered by insurance to the satisfaction of the Engineer-in-Charge.
 - 90% of the rate of items, including supply and installation, on a pro-rata basis, less the payment already released against (a) above, will be made against the completion of installation at the site.
 - 100% of the rate of items less the amount already paid against items (a) & (b) above will be made on testing, commissioning and handing over of the system.
 - **The security deposit of 10% deducted from the bills shall be released only after the successful completion of the DLP period**

All the payments are made after deducting therefrom the amounts already paid, the security deposit (10%), income tax and other amounts as may be deductible or recoverable in terms of the contract. The amount admissible for interim bills shall normally be paid **within a month of the date of submission of the bill.**

2. Pending consideration of the extension of the date of completion, interim payments shall continue to be made as herein provided.
3. Any interim certificate given relating to work done or materials delivered may be modified or corrected by any subsequent interim certificate or by the final certificate.
4. No certificate of the Engineer-in-Charge supporting an interim payment shall be conclusive evidence that any work or material to which it relates is/are in accordance with the contract.
5. **For MSME vendors, payment will be made within 45 days from the date of satisfactory acceptance of goods and services.**

15. SAP PROCEDURES

CIAL has implemented the SAP system. The contractor shall make suitable procedures for measurement and billing. No extra claim in this regard shall be entertained.

16. SAMPLES

The Contractor shall be required to provide the CIAL with **samples of all the materials** sufficiently in advance, free of cost, to obtain approval from CIAL. Approved samples shall be retained by CIAL until the completion of the work, and all materials and workmanship incorporated in the work are to conform to the approved samples in all respects. Rejected materials shall be removed from the site immediately under the supervision of CIAL.

17. SCHEDULE OF QUANTITIES (SOQ)

The **quantities given in the tender SOQ are tentative** and shall vary as per the site/ CIAL requirements. Only required items & quantities are to be supplied/ installed. **The contractor shall take detailed site measurements for all the items, like Supply of piping, insulation, ducting, etc., before placing a purchase order / initiating procurement action.**

For all items in the scheduled of quantity, the permissible deviation limit is plus (+) **25%**. The contractor must carry out the supply/installation of the deviated quantity also **at the same rate** of SOQ. For quantities executed **above 125% of the quantity in SOQ, the rate will be arrived as detailed in the general conditions of contract.**

The contractor shall monitor the requirements of various items and shall report to the Engineer-in-charge regarding deviations in the existing items and the requirements of additional/extra items, if any, for taking necessary action.

18. INSPECTION AND PERFORMANCE TESTING

All materials and equipment supplied by the contractor shall be new. They shall be of such design, size and material as to satisfactorily function under the rated conditions of operation and to withstand the environmental conditions at the site.

Materials to be used in the work shall be inspected by CIAL. Materials shall be offered for inspection as categorised **in the list of approved makes (Category) detailed under “Technical Specifications”, and details of such inspection are furnished below:**

a. Factory Inspection

The categorisation of inspection of various items to be used for this project is shown under “CATEGORY FOR INSPECTION AND TESTING” Special Conditions of Contract.

For Category-1 inspection (Factory Inspection), the contractor must give an inspection call for each item well in advance. No item/equipment in Category-1 should be supplied without factory inspection. The inspection call should include

- (i) Name of the item
- (ii) Reference number of the schedule of quantity
- (iii) Details of approval of specification/drawings, etc
- (iv) Address of the suppliers/sub-suppliers and
- (v) Tentative date of inspection.

*Note: Before the commencement of any Factory Acceptance Test (FAT), the Contractor/Vendor shall submit a **comprehensive Quality Assurance Plan (QAP)** and FAT Protocol to the Engineer-in-Charge of Cochin International Airport Limited (CIAL). **No FAT shall be conducted until the QAP has been formally reviewed and approved in writing by the Engineer-in-Charge.** The Contractor shall ensure that the approved QAP is strictly adhered to during the testing process.*

*All measurement and testing instrumentation used during the Factory Acceptance Test (FAT) must have valid calibration certificates traceable to the **National Institute of Standards and Technology (NIST)**. At the factory, before starting testing, the Contractor shall provide a complete list of all measurement devices and their corresponding calibration certificates to*

the CIAL Engineer-in-Charge. Any device found without a valid, traceable certificate shall be rejected for use in the FAT.

After the receipt of the inspection call for an item, CIAL will depute inspectors to the supplier's works. The inspectors will witness all the Factory Acceptance Tests as per standards and or those specified in the Technical Specifications of the Tender documents. **All arrangements for conducting the inspection and testing at the factory shall be the responsibility of the contractor.** For all Category-1 inspections, **the travelling and boarding expenses of inspectors of CIAL/Consultants shall be borne by the Contractor.** For inspection outside India, the contractor shall make all necessary arrangements, **including a visa (and visa-related expenses such as a visa interview) for three inspectors of CIAL.** For domestic inspections, all the expenses of **two inspectors** must be borne by the contractor. Such expenses shall be deemed to be included in the rates, which shall be **flight charges (to and fro) and boarding & lodging. No additional payment, in this account, will be made to the contractor.** However, **daily DA for CIAL/Consultant inspectors is excluded** from the scope of the contract.

For the items manufactured at one factory, it is desirable to offer all the items for factory inspection in a single stretch. In this case, if a part of the items is offered for factory inspection, the inspectors will conduct the inspection for the offered items. For the balance items, CIAL/consultant reserves the right to either inspect the same (for which the contractor must bear all the expenses) or waive the inspection.

In case the offered item is not ready for inspection, or the inspection could not be carried out due to lack of facilities for testing, etc., at the manufacturer's works, the inspectors will return, and the item must be re-offered for inspection as per its readiness. In this case also, all the expenses of the inspectors, as detailed above, must be borne by the contractor.

However, the inspection conducted, and testing witnessed by the inspectors will not in any case absolve the contractor of his responsibility for the continued performance of the system/components after erection & commissioning at the designated site and during the period of defects liability.

b. Site inspection

All the equipment shall be supplied at the site along with **test certificates.**

The following documents shall be submitted to the Engineer-in-Charge at the time of delivery of each item.

- i. The Supplier's invoice showing **purchase order no., Goods' description, quantity, unit.**
- ii. **Copy of supplier's invoice, delivery note/packing list/lorry receipt.**
- iii. Supplier's/**Manufacturer's guarantee certificate.**
- iv. **Inspection certificate** issued by the Consultants/inspection Agency where factory inspection has been carried out.
- v. All the applicable **test certificates (Routine/Type)** are to be submitted.
- vi. **Excise gate** pass/octroi receipts, wherever applicable, duly sealed, indicating payments made.
- vii. Any other document proving **payment of statutory levies.**

Note: **The nomenclature used for the item description in the invoice/s, packing list/s, delivery note/s, etc., should be identical.** The dispatch particulars, including the name of the transporter, LR no. and date, should also be mentioned in the invoice/s.

c. Testing at Site

- i. On-site testing, as detailed in the technical specifications, shall be conducted to ensure that the machine performance continues to be within the contracted performance parameters, for which the contractor shall make necessary provisions during installation, which will enable testing of the machines.
- ii. All the required equipment and measuring instruments for carrying out the testing must be arranged by the contractor. The instruments used shall be calibrated to test, and the **valid certificate of calibration** should be submitted to the CIAL's Engineer-in-Charge.

19. TESTING AND MEASURING EQUIPMENT

Equipment for measurement of work and testing the installation shall be procured by the Contractor for their use at their own cost. **The same shall also be made available to the Engineer-in-charge without any charges to CIAL.** Measurement equipment shall be made available at the site for the use of the Engineer-in-Charge and **shall be periodically calibrated.**

20. RESTRICTIONS IN WORKING HOURS

Passes must be obtained in advance for the workers. The number of hours working in the area

might be restricted due to operational reasons, and the contractor will not have any claim for extra payment on this account.

The contractor's staff working in the operational area will obey the instructions of the authorities for clearing the site. Also, prior permission must be obtained before stacking materials on the premises.

Work must be carried out in coordination with the HVAC operation team for Terminal 1 CIAL. No extra amount will be paid on account of the site being made available in phases/parts.

21. SITE MAINTENANCE DURING CONSTRUCTION

The Contractors shall time to time, **clear and remove all rubbish and obstructions from the site daily, and the work area shall always be kept clear and unobstructed.** Nothing extra shall be paid on this account.

22. OTHER WORKS

Unless otherwise specified under the technical specification, the construction of **equipment foundations is included under the scope of the contract. Positioning of foundation bolts, grouting, etc., shall also be under the scope of the contract.** The contractor should furnish detailed specifications of foundations and drawings, and the same must be approved before proceeding with foundation erection work. **The foundation shall be of M25 grade.**

All exposed metal work furnished under these specifications, except as otherwise specified, shall be **painted after installation.** Painting shall be with **2 or more coats of Synthetic enamel of approved brand over two coats of zinc chromate yellow primer.**

All sharp points shall be adequately safeguarded. All rotating parts shall be provided with guards for safety.

Openings of walls, slabs, trenches, etc. and making them good thereof to the original finish. Providing all consumables and hardware, such as welding electrodes, sealing compounds, bolts, nuts, washers, gasket material, cement, bricks, graded stone, paints, labour, masonry, etc., are by default under the scope of the contractor.

Supply of skilled and unskilled manpower, experienced supervisory and technical staff and competent management for execution.

The contractor shall be responsible for any damage resulting from his negligence to existing facilities /installations and will restore, replace or repair any such damages at his cost to the complete satisfaction of CIAL.

23. COMPLETION DRAWINGS

On completion of works, the contractor shall submit four sets of "**As-Built**" drawings, along with one set reproducible and one set in CAD version to CIAL **before the submission of the final bill**. The broad list of the 'As-Built' drawings/documents to be submitted but not limited to are as given below, failing which recovery shall be made for each system of the following works executed subject to a maximum of Rs. 15 lakhs. Any other drawings as required by the Engineer-in-Charge shall also be furnished.

24. PRICES

The rate quoted for all items (Imported and Indigenous) shall be in Indian Rupees only. **The price shall be exclusive of GST and Inclusive of all other taxes & duties, applicable customs duty whatsoever, octroi if any, work contract tax, labour, tools & plants, packing, freight/ transportation & insurance up to the site, loading, unloading, fee (s) for testing, inspection, documents, etc.**

CIAL does not give any concessional forms/ certificates/ permits towards any taxes, duties & other levies like sales tax, road taxes/ permits, etc.

The contractor must deliver all items at the site immediately after confirmation from the Engineer-in-Charge, failing which any increase in amount due to a change in price index / foreign exchange rate shall be on account of the contractor and the same shall be borne by the contractor. Any increase in value due to a delay in the supply of equipment/materials shall be to the account of the contractor, and no extra payment whatsoever will be made by CIAL.

Before despatch from the factory, all items shall be **fully insured** by the contractor. The cost of Insurance, freight & handling charges shall be paid by the contractor. The documents in support of the insurance policy shall be submitted to CIAL before shipment.

The contractor shall be solely responsible for ensuring the following:

- i. Sound packing of equipment/components.

- ii. Shipment of the items by the due date as per the schedule.
- iii. Forwarding and transshipment of equipment/components up to the destination.
- iv. Insurance of Inland transshipment.
- v. **Receipt of equipment at the site and safe custody till they are installed, tested and commissioned & taken over by CIAL.**
- vi. Execution, installation, testing and commissioning of the installation as specified in the tender document.
- vii. Handing over of the installation to the authorized representative of CIAL.

25. GUARANTEE / WARRANTY

Unless otherwise specified, all the items/ equipment supplied and installed against this contract shall be **guaranteed for a period of 24 months** from the date of handing over. During this defects liability period (DLP), the Contractor, at his own cost, shall rectify or replace all the defects which may occur in the materials supplied/ installed by him.

The Contractor shall guarantee that all materials, machinery and components supplied, fabricated, designed and installed by him shall be free from defects due to faulty material and/or workmanship and that the system shall perform satisfactorily and efficiency of the system and all the components shall not be less than the values laid down in the specifications of tender documents and the capacities shall not be less than those specified. **During the guarantee period, any or all components found to be defective shall be replaced or repaired free of charge and shortcomings found in the system as specified shall be removed at no extra cost.** The Contractor shall provide the necessary personnel and tools for fulfilling the guarantee. If the defects are not remedied within a reasonable time, CIAL may proceed to get the defects remedied at the Contractor's risk & expense. The Contractor shall, without any cost to CIAL, carry out during the guarantee period all routine and special maintenance of the system and attend to any defects that may arise in the operation of the system.

During the Defects Liability Period, it is the responsibility of the contractor to carry out all the routine and preventive maintenance of all the systems under this Contract.

26. CONSUMABLES

During the Defects Liability Period, the contractor must supply all the spares and consumables required for the maintenance of the installation executed under this contract.

27. MAKES

Wherever make has not been indicated in the approved make list, such items shall be **of ISI-marked//UL listed FM approved certified**. The contractor, if he feels so, may indicate his preferred make of such an item while submitting his offer. However, all such items should have the **approval of the Engineer-In-Charge and his decision in this regard will be final**.

Wherever “**equivalent**” is mentioned against makes, **suitable evidence shall be produced** and shall obtain prior approval of such makes from the Engineer-In-Charge.

28. HANDING OVER / CERTIFIED DATE OF COMPLETION

After installation and commissioning of the entire system, the same shall be **observed for design performance for a period of at least one month**. After this satisfactory trial period and after obtaining statutory approval for energisation from KSEI, the work shall be handed over officially, and the completion date shall be recorded by the Engineer-in-charge with all the prescribed formalities for handing over. This date shall be reckoned as the certified date of completion. **The defects liability period (DLP) shall commence from this date only.**

Unless the installation is handed over completely and is taken over by CIAL, it is the responsibility of the contractor to safeguard and upkeep all materials supplied, and equipment installed under this contract in good working condition.

29. CONFORMITY TO RULES AND REGULATIONS

1. The work shall be carried out in the best workmanlike manner in conformity with this specification, the relevant specification/codes of practice of the Bureau of Indian Standards or IEC recommendations (Except where specified otherwise) and other relevant Indian/International standards with latest amendments, approved drawings and the instructions issued by the Engineer-in-charge or his authorised representative, from time to time. Equipment meeting any other authoritative standard, which ensures an equal or better quality than the above standards, will also be acceptable.

2. In addition to the standards, all works shall also conform to the requirements of the following:
- a) All Electrical works shall be carried out in accordance with the provisions of the Central Electricity Authority (Measures relating to Safety and Electricity Supply) Regulations, 2010, Indian Electricity Act- 2003, amended up to date (Date of call of tender unless specified otherwise)
 - b) The works shall also conform to the relevant Bureau of Indian Standards' Codes of Practice (COP) for the type of work involved.
 - c) Materials to be used in work shall be ISI-marked/UL listed FM approved certified wherever applicable.
 - d) In all electrical installation works, relevant Safety codes of practice shall be followed.
 - e) Fire Insurance Regulations.
 - f) Regulations laid down by the Chief Electrical Inspector of the State Electrical Inspectorate/State Electricity Board/ Central Electrical Authority or any other agencies concerned.
 - g) Regulations laid down by the Fire & Rescue department, NBC, KMBR, KMPR.
 - h) Any other regulations laid down by the local authorities.
 - i) Installation & operating manuals of the original manufacturers of equipment.

30. PROCUREMENT OF MATERIALS

The contractor shall make his arrangements for the timely procurement of all materials required for the work. The status of procurement of every item required for the project is to be submitted every week. In case materials are not supplied in time, the Engineer in charge will arrange for procurement directly from the supplier, and the expenses incurred will be deducted from the contractor's bill. Immediately on the award of the contract, the contractor has to submit the list of makes of items, which he is planning to procure for the project, and approval has to be obtained from the engineer in charge. **After the make approval, detailed specifications/drawings/ test reports, etc, of every item must be submitted.**

31. COMPENSATION FOR DELAY

If the contractor fails to complete the work and clear the site on or before the stipulated completion time or extended period of completion as decided by the Engineer in charge from time to time, he shall, without prejudice to any other right or remedy of CIAL on account of

such breach, pay as agreed a **compensation of the amount calculated based on General Conditions of Contract.**

The Contractor shall maintain in perfect condition all works executed till the completion of the entire works allotted to him.

32. PARTIAL TAKING OVER

CIAL may take over a portion of the work that is completed in all respects before the handing over of the entire work if the remaining portion of the work is delayed. However, the operation of such completed works taken over by CIAL, during the defect liability period, shall be under the scope of the contractor.

33. WORKSITE SAFETY REQUIREMENTS

The Contractor shall be solely responsible for the safety of all workers at the site. All personnel shall mandatorily wear safety shoes and required PPE at all times; workers engaged in height-related works, including scaffolding, shall use full body safety harnesses; and workers involved in welding, cutting, and similar activities shall wear protective gloves and safety goggles. The Contractor's supervisor shall maintain a Daily Safety Audit Form at the site. If the CIAL Engineer-in-Charge observes any unsafe practice, **a penalty of Rs.500 per incident** shall be levied, and the concerned worker(s) shall be immediately removed from the site

34. FINAL DOCUMENTATION:

- Comprehensive operation and maintenance manual.
- Test certificates, consolidated control diagram and technical literature on all controls.
- Equipment warranties from manufacturers.
- Commissioning and testing reports.
- Rating charts for all equipment.
- Logbooks as per the equipment manufacturer's standard format.
- List of recommended spares and consumables.
- Any special tools required for the operation or the maintenance of the plant shall be supplied free with the plant.

At the close of the work and before the issue of the final certificate of completion by the Engineer-in-charge, the contractor shall furnish a written guarantee indemnifying the

department against defective materials and workmanship for the Defects liability period. The contractor shall hold himself fully responsible for reinstallation or replacement free of cost to the department.

35. CATEGORY FOR INSPECTION AND TESTING

All the items under the contract shall be offered for inspection and testing. The broad classification and requirements of the category shall be as follows:

CATEGORY -1:

- a) Acceptance test to be conducted as per standards or as recommended by the manufacturer in the presence of a CIAL representative at the manufacturer's work **(FAT)**.
- b) **Type test certificate** for similar item done; if not, one of the items offered will be type tested.
- c) **Factory Acceptance test reports** witnessed by CIAL representative.

CATEGORY-2:

- a) **Type test certificate** for similar item done; if not, one of the items offered will be type tested.
- b) **OEM** routine test certificate.
- c) **Visual and functional check** by the Engineer-in-Charge at the site.

CATEGORY -3:

- a) **OEM routine test certificate.**
- b) **Visual and functional check** by the CIAL Engineer-in-Charge at the site.

CATEGORY -4:

- a) **Visual and functional check** by the Engineer-in-Charge at the site.

36. IMPORTANT POINTS

- 33.1 The contract agreement shall be executed **on non-judicial stamp paper of value not less than Rs.200/-, and the cost of the stamp paper shall be borne by the contractor.**
- 33.2 The tender shall be valid for 90 days from the date of opening of the price bid.
- 33.3 All materials, tools and tackle, equipment, labour, skilled and semi-skilled, including their **housing, sanitation, procurement of foodstuff, medical aid, etc.**, are to be arranged by the contractor. The cost of Transportation of labour and materials shall be borne by the contractor.
- 33.4 The contractor **shall stock the material** at the site of work strictly as per the instructions of the Engineer-in-charge, **keeping in mind the operational requirements of CIAL.**
- 33.5 In the event of any dispute of any kind related to the work, the decisions of the Engineer-in-charge shall be final and binding.
- 33.6 The contractor shall be responsible for any damage resulting from his negligence to existing facilities/installations and will restore, replace or repair any such damage at his cost to the complete satisfaction of the Engineer-in-charge.
- 33.7 The tenderer must select the equipment meeting the general/technical specifications mentioned in the tender.
- 33.8 The tenderer must return the original tender document duly signed and stamped on all pages.
- 33.9 Tenders with incomplete/ambiguous details are liable to be rejected without seeking any further clarification.
- 33.10 Any variation in terms and conditions from general/special conditions for payment, security deposit, etc., is not acceptable to CIAL.
- 33.11 The tender document shall be submitted duly as mentioned in clause 17.1 of NIT.
- 33.12 The tenderer's printed terms and conditions shall not be considered for evaluation. Hence, no such documents need to be attached.
- 33.13 All the test/calibration certificates shall be submitted to the Engineer-in-charge before handing over the system.
- 33.14 CIAL reserves the right to delete any portion of the schedule from the scope of supply of the contractor and supply the same directly. The contractor shall carry out the installation, testing and commissioning of the item as per the rates available in the BOQ.
- 33.15 **Necessary coordination with the civil contractor and other agencies/ contractors working at the site shall be the responsibility of the contractor.**

33.16 CIAL will not be responsible for the supply of water and Electric power to the contractor. The contractor shall make his arrangements for construction power if required and make necessary payments to the departments concerned.

33.17 All Technical data sheets under Technical Specifications shall be filled in completely and submitted along with the Tender.

33.18 The Contractor shall ensure the correct selection of the approved make meeting the specifications and application duties. Before placing the order for procurement, the sample of the approved make shall be verified for its suitability to the specification and the application duty.

33.19 CAR policy: - Contractor shall submit the CAR (Contractors All Risk) policy before the execution of the work.

33.20 Measurement: Measurement will be made only for the actual quantity installed at the site. No wastage will be considered for that.

33.21 Contractor shall take Workmen's Compensation Insurance from IRDAI-approved insurers for all the employees working at the site for the complete work period.

33.22 Please note that after 5 years of All-Inclusive comprehensive Maintenance (AICMC)/Service Contract, the contractor/OEM can claim only **a maximum of 10% of escalation** from the existing rates for the renewal of the AICMC/Service contract.

37. CLEARING THE SITE

The Contractor shall provide manpower & machinery for cleaning and clearing the debris from all levels and disposing of, **daily**, completely as directed by the Engineer in Charge at his own cost. **Individual items will be treated as complete & measurements will be taken only after complete removal of rubbish/refusal related to that item** up to the satisfaction of the Engineer-in-charge.

The contractor shall also be responsible for removing all stickers, protective covers and wrapping materials after installation and shall keep the site free of any debris.

The contractor shall get approval from the concerned department/authority before removing or dismantling any MEP items.

38. CAMC

The scope of this contract also includes an All-Inclusive Comprehensive Annual Maintenance contract (AICMC) for five years after the DLP period of two years, AICMC for the chillers, cooling towers and pumps executed under this contract. Before the expiry of the Defects Liability Period, the contractor shall ensure that the necessary arrangements for such contracts are made, and the required manpower is arranged.

Chiller-Maintenance: Chiller shall be maintained **exclusively through the Original Equipment Manufacturer (OEM).**

SCOPE OF WORK FOR ALL-INCLUSIVE COMPREHENSIVE MAINTENANCE (AICMC)

1. SCOPE

All-inclusive comprehensive Maintenance & Operation and Maintenance Contract **of the 350 TR chillers, 2 Cooling Towers and all pumps** executed under this contract after handing over of the project, including maintenance for 2 years (DLP) and 5 years after the DLP period.

During this period, all the maintenance, including preventive maintenance, breakdown maintenance, arrangement of spare parts, and other required coordination for the smooth functioning of the items executed in this contract, shall be done by the contractor free of cost.

The contractor has to quote for a five-year Comprehensive Maintenance Contract, which would take place after the DLP period. Hence, 2 years (DLP) +5 years AICMC.

A separate supplementary agreement shall be entered into for the same with CIAL, other than the main agreement.

Chiller-Maintenance: All chillers shall be maintained exclusively through the Original Equipment Manufacturer (OEM) only.

2. PERIOD OF CONTRACT

All-Inclusive Comprehensive Maintenance Contract of the entire system covered under this contract for a **period of Five (5) years** after the Defects Liability Period of **2 years**.

3. PERFORMANCE GUARANTEE

Performance Guarantee 5% of the quoted value by the contractor for the Comprehensive Maintenance Contract will be withheld from the agency while **releasing the Security Deposit** and Performance Guarantee of the main contract after DLP towards Performance Guarantee for the **All-Inclusive Comprehensive Maintenance contract (AICMC) period**.

50% of the Performance Guarantee can be submitted in the form of a Bank Guarantee. The Performance Guarantee towards AICMC will be released on successful completion of AICMC.

4. AGREEMENT

Immediately after the award of the contract for the main works, the contractor shall, in addition to **the main agreement for the work**, enter into a **supplementary agreement with CIAL for the purpose of an All-Inclusive Comprehensive Annual Maintenance Contract** for which

a separate rate is quoted by the contractor along with this tender, and **a separate PO for the same will be issued.**

In case the contractor intends to entrust **third-party agencies** for AICMC, after the defect liability period, such agencies should be OEMs or their authorized agents having sufficient experience. In this case, **the supplementary agreement should be a tripartite agreement.**

In the case of a subcontracting agency agreed by CIAL, **the PO for work can be issued directly to the third-party agency**, and payment for contract execution shall be done directly if the terms and conditions of CIAL are acceptable to the subcontractor, including the terms of minimum wages, ESI & PF registration requirements and compliance. All the conditions mentioned in the Special Conditions of Contract for each work shall be applicable to the subcontractor, along with the successful bidder.

5. SITE

During this maintenance period, Entry into the project area will be restricted. Passes and permits will have to be obtained from the Client for entry of all persons and vehicles into the area as per the rules and regulations.

6. INSPECTION AT SITE

The information given is only indicative. The bidder shall familiarise themselves with the site conditions, the nature of the equipment used, etc. The specific requirements and conditions, specifications of the listed equipment, duties and obligations of the Contractor, General Conditions of Contract, terms of payment, drawings, etc. The maintenance procedure has to be well studied by referring Tender document and the manufacturer's recommendation for each piece of equipment/system.

No claims whatsoever will be entertained by CIAL as extra compensation over and above the quoted rates on any grounds, such as that the bidders have misjudged site conditions, / Subcontractor has undercoated the work, the nature of equipment used, etc. or any other reasons whatsoever, for any item/s in the tender.

7. ALL-INCLUSIVE RATES

The Contractor's rate must be firm and include **the cost of transportation of material to the site, all taxes applicable** as per the latest amendments, including Kerala Value Added Tax Act, new law on Taxation of Service and the fixing or placing in position for which the item of work is intended to be operated. The rate of operation and AICMC shall also include

consumables, spares for repair, wages and other allowances to the operating staff, cost towards contribution to Workers Welfare Fund, additional wages to be paid for workers, uniforms and personal protective equipment for staff and workers and the overheads and profit of the contractor, etc., for the entire contract period. The rates quoted by the Contractor shall be firm throughout the Contract period or till subsequent AICMC is settled, and there shall be no upward revision of the rates quoted by the Contractor for any reason whatsoever. It should be clearly understood that any claim for extra or an increase in minimum wages shall not be entertained in any case whatsoever once the bids are opened.

No alterations shall be made by the bidder in any part of this document, and if any alterations are made or any additional conditions are attached, such tender is liable to be rejected.

8. OPERATIONAL AREA & ENTRY PASSES

The work has to be carried out within the restricted area, and the contractor should arrange for entry passes for his staff. The contractor should apply before the commencement of work for the entry permits for his workmen from the concerned authority. The contractor shall collect the passes with due acknowledgement from the issuing authority and return the same to the issuing authority on expiry/cancellation of the contract or whenever the worker is replaced. The contractor's staff working in the area will obey the instructions of CIAL officials.

A major part of the work lies in the RESTRICTED AREA. The contractor shall ensure that his personnel shall work in areas/zones allotted to them. The contractor and his workmen shall strictly follow all the rules and regulations promulgated by CIAL from time to time. The quoted rates are deemed to be inclusive of all such factors and contingencies.

The work shall be carried out concerning the convenience of the occupants, if any, and the arrangement and program of the work must be adjusted accordingly, for which no extra claims/charge shall be entertained.

9. PAYMENT

The Contractor/Agency shall submit the bills as per the terms agreed in the executed agreement, and payment will be made within 15 days of receipt of the bill and upon submission of the documentary evidence **for Preventive, Predictive and Periodical maintenance and remittance of PF/ESI/Workmen Compensation and other statutory payments. All the applicable taxes, duties and penalties, if any, will be deducted from the bills.**

10. POWER OF ATTORNEY

The contractor shall provide the name of the representative who should have proper power of attorney to conduct various transactions on behalf of the contractor.

11. QUALITY OF SERVICE

The service provided by each person engaged by the Contractor/Agency shall be satisfactory to the CIAL Operator.

12. INSURANCE

The Contractor shall take necessary insurance policies as per statutory guidelines.

13. INDUSTRIAL DISPUTE

It is laid down that in case any industrial dispute has arisen or is apprehended between the Contractor and the employees/workmen, the Contractor is liable to settle the dispute or to submit himself to legal proceedings arising out of such industrial disputes, and CIAL shall not be liable or responsible, in any manner, whatsoever, in this regard.

14. PRESERVATION OF PEACE

The Contractor shall take requisite precautions to prevent any riotous or unlawful behaviour by or amongst his workmen and or others employed on the works by him, for the preservation of peace and protection of the inhabitants and security of property in the neighborhood of the works.

15. AGE LIMIT OF LABOUR

The age limit for employment of labour shall be in strict accordance with the existing labour legislation.

16. MATERIALS, SPARES AND TOOLS

All the necessary **tools, special tools, spares and testing equipment for AICMC** shall be provided by the Contractor. All sundry materials such as **cleaning agents, cotton waste, oil, grease, etc. are also covered under this contract.**

All other materials, spares, and consumables are included in the scope of the contract.

17. ESSENTIAL SERVICES

The job entrusted under this contract is an essential service coming under the preview of the Maintenance of Essential Services Act. The contractor has to ensure that the services are not disrupted either due to abstention or due to a wilful act of labour.

CIAL reserves the right to immediately step in and carry out a part or whole of the work entrusted under this contract, in case of any default or unsatisfactory performance by the contractor, without resorting to the formalities of issuing notices, etc., for rescinding the contract, and the contractor would have no claim for compensation in such a case.

18. ATTENDING COMPLAINTS

CIAL shall reserve the right to fix responsibility for omissions & commissions and to impose levies and for such deficiencies in services after serving notice and giving fair opportunity to the contractor in respect of the following

- Poor workmanship & damage to installations of CIAL.
- Negligent response for attending to any complaints
- Not complying with instructions given to the supervisor

An amount of **Rs.500/-** shall be levied for each lapse/incident of deficiency in service as mentioned above, in addition to the cost of repair/replacement of equipment which has become faulty due to unsound workmanship.

If any urgent work under the scope of the contract (in respect where the decision of the engineer in charge shall be final and binding) becomes necessary and the contractor is unable or unwilling to carry it out, then the engineer in charge may depute his own or other people to carry it out as he may consider necessary. If the **urgent work** is carried out at the expense of the contractor, all expenses incurred on it by CIAL shall be recoverable from the contractor and be adjusted or set off against any sum payable to him.

19. BREAKDOWNS

The contractor shall attend to breakdown repairs, and if any additional manpower is required for speedy rectification, he shall mobilize the same without any additional payment.

Breakdown of services shall be attended to and restored immediately without loss of any time on top priority.

One or more registers in the standard format shall be maintained for recording the breakdowns/faults.

20. ELECTRICAL INSTALLATIONS

All electrical work shall be carried out as per the IE Acts, Instructions and requirements of statutory authorities, i.e., **Electrical Inspector and Kerala State Electricity Board**. While working on electrical repairs and maintenance work in a particular place/zone, the contractor shall make all arrangements not to disturb the power supply feeding power to communication equipment located in that place/zone. In case of emergency/ essentiality, the contractor shall apply to the Engineer-in-Charge before commencement of work

21. FORCE MAJEURE

If performance by either party of its duties and obligation under this agreement is prevented or delayed by circumstances of **force majeure** including, but not limited to fire, flood, earthquakes, strike, war, riots, insurrection, any action undertaken or restriction imposed by authority of any Government agency of court, shortage of equipment or raw materials or any other act beyond its reasonable control, the time within which the affected party must perform shall be delayed for a period under such circumstances to a maximum of 120 days during which the parties shall use alternate methods, but after which period either party shall have the right to terminate the agreement. Determination of this agreement shall not relieve either party from the payment of the sum or performance of other duties and obligations, which may be owing to the other, as a result of the operation of this agreement prior to such termination.

22. TERMINATION

Notwithstanding anything contained herein, in this agreement, the CIAL Operator shall have the right to terminate this contract or part thereof by giving 30 days' notice in writing to the Agency. But if such termination is not agreeable to both or is found to violate the terms of the agreement, such termination shall be invalid, and subsequent action shall be taken as per the provisions of the main contract.

23. JURISDICTION

Any dispute connected with this contract shall fall within the jurisdiction of the Courts at Ernakulam.

24. COMPLETION OF TENURE

On completion of the tenure of the agreement, if not renewed, the Contractor shall hand over all the materials and belongings to the CIAL representative, and the Contractor shall remove

all materials belonging to the contractor including the workforce, without any delay. However, the Contractor shall continue to discharge their responsibilities till the next Contractor takes over the duty, and the Contractor shall train the staff of the new Contractor.

25. DEFECTS LIABILITY PERIOD

The Contractor shall receive calls for any and all problems experienced in the operation of the system under this contract, attend to these within 24 hours of receiving the complaints and shall take steps to immediately correct any deficiencies that may exist.

All equipment that requires repair shall be immediately serviced and repaired. Since the period of Mechanical Maintenance runs concurrently with the defects liability period, all replacement parts and labour shall be supplied promptly free-of-charge to the Owner.

Along with on-call breakdown maintenance, the contractor needs to execute the preventive maintenance of all equipment executed under this contract

The defects liability period shall be as mentioned in the tender document, during which period any or all components found to be defective shall be replaced or repaired free of charge, and any shortcomings found in the system functioning as specified shall be rectified at no extra cost to CIAL.

26. IMPORTANT POINTS

In case the AICMC rate quoted in the original tender is found to be **exorbitantly underquoted** / unrealistic, as compared to the estimated cost for the same, **CIAL reserve the right to demand a Bank Guarantee for the total AICMC contract value.** In this case, the Bank Guarantee should be submitted before the expiry of the defect's liability period of the original contract (which is 24 months from the date of handing over of the entire installation) and before the commencement of the AICMC period. **The BG is to be renewed every year after deducting the contract amount of the preceding year.**

27. SCOPE OF COMPREHENSIVE MAINTENANCE CONTRACT

Notwithstanding the list of maintenance listed below, the Contractor shall submit to the Engineer-in-charge CIAL within one week of the date of handover the details of the proposed **PREVENTIVE, PERIODICAL and PREDICTIVE maintenance schedule.** Though the list

is exhaustive, it cannot be taken to be all-inclusive. Hence, any other services that will normally form part of maintenance requirements as per International Best Practice shall be deemed to be included in the scope of work for the maintenance contract. The maintenance intervals of the filter directly depend on the air cleanliness of each locality. A dirty filter alters the pressure balance in the machine and thus performance. It is strongly recommended that the Contractor set up a programme which ensures that filters are replaced or cleaned before getting clogged “enough” to become a system problem.

**SUPPLEMENTARY AGREEMENT FOR AICMC WORKS
(TO BE EXECUTED ON A NON-JUDICIAL STAMP PAPER)**

The agreement made this -----day of ----- -
20.....between -----
--of -----[hereinafter called the CONTRACTOR of the one part] and the
Managing Director, Cochin International Airport Ltd [hereinafter called CIAL] of other parts.

WHEREAS THIS agreement is supplementary to a contract [hereinafter called the Contract] dated ----- and made between the CONTRACTOR OF THE ONE PART and the Managing Director, CIAL, ON THE OTHER PART, whereby the Contractor, inter-alia undertook to render the AICMC works.

NOW THE AGREEMENT WITNESSETH AS UNDER

This agreement is made thisday of By and between on the first part and CIAL represented by its Managing Director, for the time being, which expression shall include his successors, assignees, etc.

The contractor agrees and abides to do and execute all such acts necessary for the work of “Comprehensive Maintenance Contract for 5 years at CIAL, Nedumbassery”, more fully described in the tender specifications and instructions given from time to time in consideration of the said work agree to pay to the Contractor the cost of such work at such accepted rates as incorporated in the annexed schedule of work for various items and specifications and in such accepted manner as specified in the annexed tender conditions.

1. This contract is governed by the conditions enumerated in the tender document and Letter of Award of Work, which shall form part of this agreement and both the Contractor and CIAL hereby agree to abide by these terms and conditions.
2. The Contractor shall complete the work in all respects in accordance with the instructions and specifications given by CIAL or its authorized representatives.
3. The Contractor hereby agrees to abide by the Special Conditions of Contract for comprehensive maintenance works.
4. The Contractor further agrees and hereby confirms that all other conditions enumerated in the tender documents form part of the agreement, and a duly authenticated copy of the same is attached herewith. It is also understood that the scope appended to the above-mentioned

documents are only indicative and the work will be carried out in accordance to the instructions issued by CIAL from time to time.

5. This agreement is an integral part of the main contract agreement. Any breach or violation of the clauses/non-performance by the contractor will be subjected to penalty or necessary works shall be carried out by CIAL and the excess amount shall be levied from the amount due to the Contractor for AICMC works.

In witness whereof, parties to this agreement, viz for and on behalf of:

CONTRACTOR,

Managing Director, CIAL

the presence of: In the presence of:

1. Witness:

2. Witness:

(In case of tripartite agreement for subcontracting the AICMC work, a separate agreement needs to be executed between the contractor and the subcontracting agency, and this will be suitably made part of this agreement between CIAL and the contractor)

SECTION- V

**5. TECHNICAL SPECIFICATIONS AND APPROVED
MAKE**

TECHNICAL SPECIFICATIONS

SITC OF 350TR VFD-DRIVEN CHILLER AND 350 TR COOLING TOWERS FOR TERMINAL 1 CIAL

1. SCOPE OF WORK

- SITC of one **350 TR chiller** and one **350 TR cooling tower** at the Central Block AC Plant CIAL, including electrical cables, control wiring, starter panel/its refurbishment, etc., complete as required.
- SITC of pumps at the Central Block AC Plant comprising: 1 No. **Primary Pump**, 1 No. **Secondary Pump**, 1 No. **Condenser Pump**, including electrical cables, control wiring, starter panel/its refurbishment, etc., complete as required.
- SITC of one 350 TR **cooling tower** and one **condenser pump** at the West Block AC Plant CIAL, including electrical cables, control wiring, starter panel/its refurbishment, etc., complete as required.
- Dismantling and Buyback of **existing chilled water pipes, condenser pipes** and SITC of **new Chilled water piping and condenser piping with associated valve package**.
- Dismantling and Buyback of **Pedestals** of chillers (2nos), pumps (12nos), cooling towers (6nos)
- Dismantling and Buyback of existing equipment, as detailed below:
 - Central Block AC Plant: 2 Nos. 200 TR **chillers**, 2 Nos. 200 TR **coolingtowers**, 1 No. **secondary pump**, 2 Nos. **primary pumps**, 2 Nos. **condenser pumps**
 - West Block AC Plant: 2 Nos. 100 TR **chillers**, 4 Nos. **cooling towers**, 3Nos. **condenser pumps**, 1 Nos. **secondary pumps**, 3 Nos. **primary pumps**
- All **associated civil works** like construction of pedestals, making good all openings, chases, cut-outs and damages, etc., required for the equipment executed under this contract.
- All **associated electrical works**, including the SITC of all electrical cables starting from the nearest panel, VFD/Starters, cable trays and sundry items required for the work, are under the scope of the contractor.

(Note: The contractor shall visit the site and assess the actual cable routing and required lengths before quoting. No separate measurement or payment shall be made for cables; the quoted price shall be deemed to include all required cable lengths and associated accessories for complete installation.)

- CAMC for the chiller and cooling towers for a period of 5 years, commencing after completion of 2 years Defect Liability Period (DLP).

2. DESIGN CRITERIA

BASIS OF DESIGN

Basis of Ambient Design Condition: ISHRAE HVAC Data Book/IMD Data Book

Ambient Design Condition CIAL, KOCHI

- Latitude -11.2° N
- Longitude -76.280 E
- Summer: DB 95°F/WB 82°F/ RH 58%
- Monsoon: DB 85°F/WB 82°F/RH 88%
- Winter: DB 75°F / WB 65°F / RH 69%

3. CHILLER

AHRI certified factory assembled & tested chiller units with a COP greater than as mentioned in **ECSBC -2024** and **using a zero ODP and low GWP refrigerant like R-513A/R-134a**. The chiller shall comply with IS 16590. The chilling machine shall be of approved make, consisting of the following:

- Horizontal Twin Screw Compressor with a pair of Helical Rotors
- **VFD-driven Compressor Electric Motor with Active Harmonic Filter**
- Shell & Tube type Water Cooled Condenser
- Shell & Tube type water chiller
- M.S. foot mounting, plate with cushy foot mounting
- First charge of refrigerant and oil
- Refrigerant piping & controls
- Microprocessor motor control with multiple displays.
- Water flow switch

3.1 GENERAL:

Each unit will be completely **factory-assembled**, including evaporator, condenser, sub-cooler, oil separator, compressor(s), motor, lubrication system, micro-computer control centre, and all interconnecting unit piping, wiring and accessories.

Performance shall be certified in accordance with the latest edition of **AHRI Standard 550/590**. The chiller shall be **BEE 4-Star rated (latest) or above (ISEER 7.9 or above)** in accordance with the **Gazette of India Notification No. 5770, S.O. 5968(E) & S.O. 5969(E) [E-Gazette ID: CG-DL-E-31122025-268959], Ministry of Power, Dated December 23, 2025**, and shall comply with **IS 16590**. The equipment shall be duly registered with BEE and carry a valid star label, meeting the requirements of **ECSBC 2024** for high-efficiency HVAC systems.

Chillers shall meet the minimum efficiency requirements under **ANSI/AHRI 550/590 standard rating conditions**, which are as follows:

- The Coefficient of Performance (**COP**) shall be greater than or equal to **6.2**.
- The Integrated Part Load Value (**IPLV**) shall be greater than or equal to **8.1**.

The unit shall have all components mounted on a sturdy **powder-coated MS framework** fabricated out of sturdy channels and angles. The compressors and the unit as a whole shall be provided with suitable **anti-vibration mounts**. The vibration of the chilling machine shall not exceed a peak-to-peak displacement of **100 microns** measured anywhere on the machine. The noise level of the machine shall not exceed **85 dB at 1m from the machine**.

3.2 Chiller Design Conditions

5.1 Chiller Capacity - 350 TR

5.2 Chilled Water Leaving Temperature – 45 °F

5.3 Chilled Water Return Temperature – 55 °F

5.4 Chilled Water Flow - 840 GPM

5.5 Evaporator Fouling Factor - 0.0005 ft² °F hr / Btu

5.6 Condenser Water Entering Temperature – 90 °F

5.7 Condenser Water Leaving Temperature – 100 °F

5.8 Condenser Water Flow - 1050 GPM

5.9 Condenser Fouling Factor - 0.001 ft² °F hr / Btu

5.10 Maximum Pressure drop across the condenser and Cooler - 30 ft of wg

Manufacturers should submit the following computer selection sheet for the chiller from their latest version of chiller selection software

- a. Performance sheet with 100%, 75%, 50% and 25% loads **at design conditions at constant condenser water entry temperature** as well as at **AHRI relief temperatures**.
- b. Performance sheet with **100% to 25% unloading at constant condenser water entry temperatures under design conditions**.

3.3 COMPRESSOR:

The compressor will be a semi-hermetic, horizontal **rotary twin screw type**. The compressor housing will be of cast iron, precision-machined to provide minimal clearance for the rotors. The compressor will incorporate a complete anti-friction bearing design to reduce power and increase reliability; four separate cylindrical roller bearings to handle radial loads; and two 4-point angular contact ball bearings to handle axial loads. The compressor will have an internal oil reservoir to assure a constant supply of oil to the bearings at all times. A spring-actuated positive seating check valve will be incorporated in the compressor housing to prevent rotor backspin during shutdown. The shaft seal will be a spring-loaded, carbon ring type with precision lapped collar cooled by low-pressure oil.

Capacity control will be achieved by the **Stepless modulation between 10% to 100% using a combination of Variable Frequency Drive (VFD) and slide valve (if required) for maximum efficiency**. The slide valve will be actuated by oil pressure, controlled by external solenoid valves through the micro-computer control centre. The unit will be capable of operating with lower temperature cooling tower water during part-load operation in accordance with **AHRI Standard 550/590**, latest edition.

3.4 MOTOR DRIVELINE:

The compressor motor shall be a high-efficiency, semi-hermetic, **suction-gas cooled squirrel-cage induction or permanent magnet synchronous motor**, specifically designed and rated for Variable Frequency Drive (VFD) inverter duty. The motor shall meet or exceed the **IEC 60034-30-1 Efficiency Class IE4 or above**, optimized performance at both full and part-load conditions. To maximize the motor's operational lifespan, it must be equipped with **Class F insulation** or higher, specifically treated to withstand the high-voltage spikes (dV/dt) and electrical stresses associated with high-frequency PWM-type VFD operation. The motor shall be thermally protected by multiple internal sensors (thermistors or RTDs) embedded directly into the windings, providing real-time temperature monitoring and **automated safety shutdown through the chiller's microprocessor controller**. Furthermore, the motor and drive combination must be engineered to provide a **True/Total power factor of 0.95 or higher** across the entire operating range, ensuring high electrical efficiency and reducing the reactive power demand on the facility's electrical infrastructure.

3.5 VARIABLE FREQUENCY DRIVE FOR CHILLER MOTOR

The Variable Frequency Drive (VFD) shall be a high-performance, **pulse-width modulated (PWM) type utilizing Insulated Gate Bipolar Transistor (IGBT)** technology, specifically engineered to manage the high-torque starting and operational requirements of a screw compressor. The drive shall be **air-cooled/refrigerant-cooled/liquid-cooled**. Comprehensive protection features must be natively integrated, **including phase loss, ground fault, over-voltage, and motor thermal monitoring, with all operational data, energy consumption metrics, and diagnostics accessible via native BACnet MS/TP or Modbus TCP/IP protocols** for seamless Building Management System (BMS) integration. VFD shall be **factory-fitted and fully integrated** with the **chiller microprocessor**.

3.6 ACTIVE HARMONIC FILTER

The chiller shall be supplied with **either a unit-mounted or free-standing** Active Harmonic Filter (AHF) that ensures full compliance with **IEEE-519 standards**. The harmonic mitigation system must be engineered to maintain the THDv and TDD at **less than 5%** across the entire operating range from minimum load to 100% load. Furthermore, the electrical architecture and motor starters must be designed to support the simultaneous starting of all compressors within

the chiller. The VFD shall serve as the primary starter to ensure that the inrush current does not exceed the rated full-load amperage.

Unit Mounted AHF

The AHF shall be unit-mounted and factory-integrated with the chiller electrical system. It shall be fully interfaced with the chiller microprocessor, such that harmonic performance is monitored and controlled as an integral part of chiller operation.

The chiller package, inclusive of its harmonic mitigation system, shall ensure the following, measured at the chiller incoming power terminals:

- Voltage Total Harmonic Distortion (THD_v): ≤ 5%
- Current Total Demand Distortion (TDD): ≤ 5%
- Overall power factor: ≥ 0.95

The chiller onboard display shall provide real-time indication of:

- Voltage THD
- Current TDD
- Power factor

along with system status and alarms, if any.

Externally Mounted AHF

An externally mounted Active Harmonic Filter shall be acceptable only if:

It is supplied as part of the chiller. It achieves full compliance with **all the above parameters at the chiller terminals** and at all load conditions. It is provided with a dedicated **local display indicating THD_v, TDD, power factor, and operating status.**

Compliance shall be demonstrated **during factory testing and commissioning or at the site**, and non-compliance at any operating load shall be considered unacceptable.

The AHF shall be factory-integrated **or professionally integrated on-site by the Chiller OEM's authorised representative.**

In instances where the Active Harmonic Filter (AHF) is sourced separately from the Chiller unit (e.g., local procurement of AHF for an imported chiller), the Chiller Manufacturer shall maintain **Single Point Responsibility** for the entire system's performance. The following conditions must be met:

- a) **Single Point Warranty:** The chiller OEM must provide a unified warranty covering both the Chiller VFD and the AHF. Any electrical failure or resonance issue caused by the interaction of these two components shall be the sole liability of the OEM and the bidder/contractor.
- b) **Mandatory Integrated Testing:** If the AHF is not factory-fitted at the Chiller's country of origin, the contractor shall conduct a Full-Load Integrated Site Performance Test. Compliance with IEEE-519 (THDv and TDD < 5%) must be demonstrated at the Chiller's main incoming terminals across all operating loads (25%, 50%, 75%, and 100%).
- c) **Compatibility Certification:** Before procurement, the bidder shall submit a '**Technical Compatibility Certificate**' signed by both the Chiller OEM and the AHF manufacturer, confirming that the VFD-AHF combination is designed to work together without causing harmonic resonance or VFD component stress.

3.7 LUBRICATION SYSTEM:

An adequate supply of oil will be available to the compressor at all times. During startup and shutdown, this will be achieved by oil reservoirs in the compressor or by prelube oil pump operation. During operation, oil will be delivered by a positive system pressure differential or full-time operation of an oil pump.

An immersion oil heater will be provided (temperature-actuated) to effectively remove refrigerant from the oil. An external, replaceable-cartridge, oil filter will be provided, along with manual isolation stop valves for ease of servicing. An oil ejector will be provided to automatically remove oil which may have migrated to the evaporator and return it to the compressor. The oil separator will be of a horizontal design with no moving parts and will provide effective oil separation before the refrigerant enters the heat exchangers. The oil separator will be designed, tested, and stamped in accordance with the ASME Boiler and Pressure Vessel Code, Section VIII - Division 1A refrigerant-cooled oil cooler will be provided to allow operation of the chiller over the full range of operating conditions.

3.8 EVAPORATOR:

The evaporator will be of the shell-and-tube, DX/flooded type/falling film type, designed for 150 psig working pressure on the refrigerant side, and will be tested at 450 psig. Shell will be fabricated from rolled **carbon steel plate** with fusion-welded seams; have carbon steel tube sheets, drilled and reamed to accommodate the tubes; and intermediate tube supports spaced no more than 1200 mm apart. The refrigerant side will be designed in accordance with the ASME Boiler and Pressure Vessel Code, Section VIII - Division 1. Tubes shall be high-efficiency, internally and externally enhanced type having plain copper bands at all intermediate tube supports to provide maximum tube wall thickness at the support area. Each tube will be roller expanded into the tube sheets, providing a leak-proof seal, and will be individually replaceable. Water velocity through the tubes will not exceed 6 FPS. Liquid level sight glasses will be located on the side of the shell to aid in determining the proper refrigerant charge. The evaporator will have a refrigerant relief device to meet the requirements of the ASHRAE 15 Safety Code for Mechanical Refrigeration, including an anti-freeze thermostat & cooling thermostat.

Evaporator tubes shall be made of **copper**.

Water boxes will be removable to permit tube cleaning and replacement. Stub-out water connections having mild steel flanges will be provided. Vent and drain connections with plugs will be provided on each water box/pipe. Chiller outlet pipe shall be provided with bellow type water flow switch to prevent compressor startup till full water flow is established

The evaporator shall be insulated with min **38 mm thick Nitrile Rubber to avoid condensation**. Insulation has to be factory-installed. Site insulation work is not accepted.

3.9 WATER COOLED CONDENSER:

The condenser will be of the shell-and-tube type, designed for **150 psig working pressure on the refrigerant side, and will be tested at 450 psig**. Shell will be fabricated from rolled **carbon steel plate** with fusion-welded seams, have carbon steel tube sheets, drilled and reamed to accommodate the tubes, and intermediate tube supports spaced no more than 1200 mm apart. **A refrigerant sub-cooler** will be provided for improved cycle efficiency. The refrigerant side will be designed, in accordance with the **ASME Boiler and Pressure Vessel Code**, Section VIII – Division 1. Tubes shall be high-efficiency, internally and externally enhanced type

having plain copper bands at all intermediate tube supports to provide maximum tube wall thickness at the support area. Each tube will be roller expanded into the tube sheets, providing a leak-proof seal and be individually replaceable. Water velocity through the tubes will not exceed **6 FPS**. The condenser will have refrigerant relief devices to meet the requirements of the ASHRAE 15 Safety Code for Mechanical Refrigeration. The condenser tube shall be made of **copper**.

Water boxes will be removable to permit tube cleaning and replacement. Stub-out water connections having mild steel flanges will be provided. Vent and drain connections with plugs will be provided on each water box. Separate service valves shall be provided for the circulation of acid for the de-scaling process.

Condenser outlet pipe shall be provided with **bellow type water flow switch to prevent compressor start-up until full water flow is established**.

The **shell shall have a large storage area to serve as a receiver / Reservoir**.

The condenser shall be provided with an easily accessible purge connection and a water drain.

Hydrostatic tests shall be carried out at the manufacturer's works before the dispatch of the chiller, and the manufacturer's **test certificate shall clearly indicate the test pressures, Pressure drop at full rated flow, condenser capacity at rated flow and delta T** at clean conditions.

3.10 REFRIGERANT SYSTEM:

Refrigerant flow to the evaporator will be metered by a **single/multiple fixed orifice/ Electronic Expansion valve with no moving parts**. The condenser shell will be capable of **storing the entire system refrigerant charge during servicing**. Isolation from the rest of the system will be achieved by manually **operated isolation valves located at the inlet and outlet of the condenser**. Additional valves, if required, shall be provided to facilitate the removal of refrigerant charge from the system.

REFRIGERANT PIPING

Design Aspects of Refrigerant Plumbing

i) Refrigerant piping shall be designed and installed to:

- Ensure circulation of adequate refrigerant at all loads.
- Ensure **oil returns to the compressor positively** and continuously.
- Keep pressure losses within limits, especially in suction lines.
- Prevent oil/liquid refrigerant from entering the compressor when the compressor is working, as well as when it has stopped.
- Prevent trapping of oil in the evaporator or suction lines, which may return to the compressor in the form of a slug.

ii) Liquid Lines:

- Liquid lines shall be designed to ensure **that flashing of liquid refrigerant does not occur** by minimizing the pressure drop suitably, by avoiding long vertical risers, and by providing appropriate subcooling.
- Each independent refrigerant circuit shall be equipped with a high-capacity filter-drier. The dryer shall be of **the 'Replaceable Core' (shell) type**. The drier assembly must be installed in a **three-valve bypass manifold** (Inlet, Outlet, and Bypass valves) to allow for filter replacement without refrigerant recovery or system shutdown. A moisture-indicating **sight glass with a protected colour-coded scale/ Liquid Line Level sensors** shall be installed immediately downstream of the filter-drier to monitor both refrigerant charge levels and desiccant saturation.

iii) Suction Lines:

- Oil shall be entrained and carried by the suction gas under all conditions of load likely to be encountered in normal operation.
- Piping shall be designed for a suitable velocity of refrigerant (similar to hot gas line) to ensure that oil will not separate from the gas and drain to the compressor in slugs.
- The refrigeration system shall be equipped with controls **for pump down system** so that the **evaporator and suction line are emptied before the compressor shuts off**, thus **preventing liquid refrigerant and oil from entering the compressor when restarted**.
- Refrigerant lines shall be sized to limit pressure drop between evaporator and condensing unit to less **than 0.1 kg. per sq. cm. (3 psi)**.

iv) Isolating valve shall be provided to enable isolation of each compressor in case of multiple compressor units (as built-in valves), strainer, drier and any other components as may be required for proper operation and maintenance. **Isolation valves shall be provided as standard for storing the refrigerant in the condenser during the servicing of the compressor.**

Thermostatic Electronic Expansion valve /float valve shall be provided in the refrigerant circuit of the DX system/ flooded system as per the manufacturer's design.

Material

i) Fittings like bends, tees, sockets, etc. shall be of **wrought copper or forged brass** and shall be suitable for the duty involved. Flare-type compression fittings of forged brass shall be allowed up to 15 mm piping size.

ii) All Refrigerant piping shall be of copper only. **All liquid lines and instrument lines shall be of copper only.**

iii) Valves shall be of the packed, back-seating type, and these shall be of forged or cast brass construction.

3.11 Graphic Control Centre

General: The chiller shall be controlled by a stand-alone microprocessor-based control centre. The chiller control panel shall provide control of chiller operation and monitoring of chiller **sensors, actuators, relays and switches.**

Control panel: The control panel shall include a **min 10 in. diagonal colour liquid crystal display (LCD) surrounded by “soft “keys which are redefined based on the screen displayed at that time.** This shall be mounted in the middle of a keypad interface and installed in a locked enclosure. The screen shall detail all operations and parameters, using a **graphical representation of the chiller and its major components.** Panel verbiage shall be available in other languages as an option, with English always available. Data shall be displayed in either English or Metric units. **Smart Freeze Point Protection** shall run the chiller at 36.00°F, leaving chilled water temperature, and not have nuisance trips on low water temperature. The sophisticated program and sensor shall monitor the chiller water temperature to prevent freeze-up. The panel shall display countdown timer messages, so the operator knows when functions

are starting and stopping. **Every programmable point shall have a pop-up screen with the allowable ranges, so that the chiller cannot be programmed to operate outside of its design limits.**

The chiller control panel shall also provide:

1. System operating information, including:

- return and leaving chilled water temperature
- return and leaving condenser water temperature
- evaporator and condenser saturation temperature
- differential oil pressure
- percent motor current
- evaporator and condenser saturation temperature
- compressor discharge temperature
- oil reservoir temperature
- compressor thrust bearing positioning and oil temperature
- operating hours
- number of compressors starts

2. Digital programming of set points through the universal keypad, including:

- leaving chilled water temperature
- percent current limit
- pull-down demand limiting
- six-week schedule for starting and stopping the chiller, pumps and tower
- remote reset temperature range

Status messages indicating:

- system ready to start
- system running
- system safety shutdown-manual restart
- system cycling shutdown-auto restart
- start inhibit

4. The text displayed within the system status and system details field shall be displayed as a colour-coded message to indicate severity: **red for safety faults, orange for cycling faults, yellow for warnings, and green for normal messages.**

5. Safety shutdowns are enunciated through the display and the status bar, and consist of system status, system details, day, time, cause of shutdown, and type of restart required. **Safety shutdowns with a fixed speed drive shall include:**

- evaporator – low pressure
- evaporator – transducer or leaving liquid probe
- evaporator – transducer or temperature sensor
- condenser – high-pressure contacts open
- condenser – high pressure
- condenser – pressure transducer out of range
- auxiliary safety – contacts closed
- discharge – high temperature
- discharge – low temperature
- oil – high temperature
- oil – low differential pressure
- oil – high differential pressure
- oil – sump pressure transducer out of range
- oil – differential pressure calibration
- oil – variable speed pump – pressure set point not achieved
- control panel – power failure
- motor or starter – current imbalance
- thrust bearing – proximity probe clearance
- thrust bearing - proximity probe out – of – range
- thrust bearing – high oil temperature
- thrust bearing – oil temperature sensor
- watchdog – software reboot

6. Cycling shutdowns are enunciated through the display and the status bar, and consist of system status, system details, day, time, cause of shutdown, and type of start required. Cycling shutdowns with a fixed speed drive shall include:

- multiunit cycling – contacts open
- system cycling - contacts open
- oil - low temperature differential
- oil – low temperature
- control panel - power failure
- leaving chilled liquid - low temperature
- leaving chilled liquid - flow switch open
- motor controller – contacts open
- motor controller – loss of current
- power fault
- control panel - schedule
- starter – low supply line voltage
- starter – low supply line voltage
- proximity probe – low supply voltage
- oil - variable speed pump - drive contacts open

7. **Security access** to prevent unauthorized change of set points, to allow local or remote control of the chiller, and to allow manual operation of the pre-rotation vanes and oil pump. Access shall be through ID and password recognition, which is defined by three different levels of user competence: view, operator, and service.

8. **Trending data with the ability to customize points from once every second to once every hour.** The panel shall trend up to 6 different parameters from a list of over 140, without the need for an external monitoring system.

9. The operating program is stored in **non-volatile memory (EPROM) to eliminate reprogramming the chiller due to AC power failure or battery discharge.** Programmed set points shall be retained in **lithium battery-backed RTC memory for a minimum of 11 years with power removed from the system.**

10. A fused connection through a transformer in the compressor motor starter to provide individual over-current protected power for all controls.

11. A numbered terminal strip for all required field interlock wiring.

12. An RS-232 port to output all system operating data, shutdown/cycling message, and a record of the last 10 cycling or safety shutdowns to a field-supplied printer. Data logs to a printer at a set programmable interval. This data can be preprogrammed to print from 1 minute to 1 day.

13. The capability to interface with a building automation system to provide:

- remote chiller start and stop
- remote leaving chiller liquid temperature adjust
- remote current limit set point adjusts
- remote ready to start contacts
- safety shutdown contacts
- cycling shutdown contacts
- run contacts

3.12 CONTROLS FOR CHILLER SYSTEMS:

This Section covers the requirements of equipment safety controls, refrigerant flow controls, system controls, and variable speed drive (VFD) for chilling units. All the controls shall be microprocessor-based.

EQUIPMENT SAFETY CONTROLS

Compressor:

The compressor shall be provided with the following safety controls: -

- **High discharge pressure (HP) safety (cut out) to stop the compressor automatically,** in case discharge pressure exceeds a pre-set safe value. This safety shall operate when discharge head pressure exceeds the set point. Only manual resetting shall be provided for this safety.
- **Low suction pressure (LP) safety (cut out) to stop the compressor automatically,** in case suction pressure falls below a pre-set safe value. This safety shall operate when the suction pressure falls below the set point. Automatic resetting shall be provided for this safety, with adjustable cut-in and cut-out pressures. This safety shall be used for pumping down the system and shutting off the refrigeration system.

- **Oil pressure (OP) safety (cut-outs) to stop the compressor, in case lubricating pressure falls below the safe set value.** A time delay mechanism shall also be provided, to permit running of the compressor up to a max period of 90 seconds, with the oil
- **Pressure differential** below the set value and allow it to continue normal operation if the pressure differential builds up to the set value within that time or otherwise shut down the compressor. Only manual resetting shall be provided for this system.
- **High bearing oil temperature** cut-out for centrifugal compressors. This shall be provided with a manual reset only.
- **High lubrication oil temperature cut-out** for centrifugal compressors. This shall be provided with manual resetting only.
- **Time delay mechanism on the starting gear** to limit short cycling regardless of the malfunctioning of controls.
- All trip indications shall be provided with an audiovisual indication. The reset shall be manual.
- Safeties mentioned above shall operate when the respective controlled variable crosses the set point to trip the compressor.
- Audiovisual alarm shall also be provided to indicate such operations.

CONDENSER

The safety control for the condenser shall comprise a **safety pressure relief valve** on the shell. This shall operate to relieve the pressure at the set point without prior leakage for small condensers; a fusible plug shall be provided to melt at a predetermined temperature.

CHILLER

An anti-freeze shall be provided with a water chiller, set at a few degrees above the freezing point. This shall operate when the temperature of water in the chiller falls below the set point to trip the compressor motor. The reset provided for this safety shall be manual.

Flooded type chiller, if provided, in addition, shall be provided with a safety pressure relief valve.

REFRIGERANT PLANT

In addition to the safety controls as above for an individual component of the refrigeration plant, the following safety controls shall also be provided for the plant.

- **Over current cut off for** Compressor motor.
- **Condenser water flow switch.**
- **Chilled water flow switch**

The above controls, on operation, shall trip the compressor motor, and these shall be provided with a manual reset arrangement.

The compressor motor shall also be interlocked electrically with,

- **Condenser water pump** in case of water-cooled condenser.
- **Chilled water pumps.**
- **Antifreeze** in case of chillers

Indicating lamps shall also be provided on the control panel to indicate the operation of the **safeties and interlocks.**

REFRIGERANT FLOW CONTROL

A refrigerant plant shall be provided with controls necessary for starting, stopping and modulating the flow of refrigerant in the plant so as to satisfy the load requirements. These comprise solenoid valve, thermostatic expansion valve, float valve, compressor capacity controls, etc. and other special controls if specified in the particular work.

FLOAT VALVE

A float valve shall be provided in the refrigerant plant with flooded type chiller for maintaining the liquid level in the chiller under all conditions of load at a rate commensurate with the rate of vaporisation. This can be provided either on low pressure side or the high-pressure side. When provided as low side float valve, this can be located as a part of the chiller or accumulator.

COMPRESSOR CAPACITY CONTROL.

The compressor shall be equipped for modulating the capacity from 100% up to the 20% for **stable operation without surging**. The pre-rotation vanes located at the impeller inlet for controlling the capacity shall be aerofoil-shaped and shall be made as per the manufacturer's standards. The vane position shall be controlled through a hydraulic/ linkage system. The position of the **vane shall be controlled through a microprocessor-based controller with its sensing elements in the outgoing chilled water lines**. The automatic damper will enable maintenance of the specified chilled water temperature within $\pm 0.11^{\circ}\text{C}$.

3.13 VERIFICATION OF CAPACITY AND EFFICIENCY

A. Unit manufacturer shall provide a **witnessed FOUR-point performance test as per the latest version of AHRI-550/590**-latest editions test procedures, with the exception of AHRI tolerance on capacity.

Chiller performance test shall be witnessed by CIAL/Consultant representative at the factory. Contractor to include in his price for all expenses, including travel, food and accommodation, etc., related to the visit.

Factory performance test for the chiller with the proposed refrigerant at 25%, 50%, 75% and 100% load at **design conditions** and **at constant condenser entry temperature with AHRI tolerance in a manufacturer's test facility**. Furnish a certified test report to confirm performance as specified.

The Manufacturer should submit **AHRI-certified performance sheets** at the above-mentioned load conditions for the **tender design conditions**, along with the bid, and testing should be conducted based on the **proposed design conditions** mentioned in the tender.

B. Include an **AHRI-approved selection method in proposals for chiller performance for acceptable refrigerant**. Verification of date and version of computer program selection or catalogue is available through the Vice President, Engineering, AHRI (703) 524-8800 / Equivalent Standards.

C. Run the performance test with clean tubes in accordance with AHRI 550/590, latest edition, to include the following:

- Make a **downward temperature adjustment** per Section A7.3 to the design, **leaving evaporator** water temperature to adjust from the "design fouling" to the "clean tube" condition.
- Make an **upward temperature adjustment** per Section A7.3 to the **design entering condenser water temperature** to adjust from the "design fouling" to the "clean tube" condition.
- Conduct the performance test with clean tubes and with temperature adjustments in (1) and (2) above without exception. Have the manufacturer clean tubes, if necessary, prior to test to obtain a test fouling factor of 0.0000 -hour square feet F/BTU.

4. Provide factory test instrumentation per AHRI Standard **550/590 or 551/591 standards in concurrence with IS 16590 standards**, and **calibration of all instrumentation traceable to the National Institute of Standards and Technology (formerly NBS)**.

If the equipment fails to perform within allowable tolerances, the manufacturer will be allowed to make necessary revisions to their equipment and retest as required. The manufacturer shall pay all expenses resulting from retesting. If these revisions do not achieve the submitted performance, Clients reserves the right to reject the equipment

D) The Owner or his representative shall be notified **14 days in advance** to witness the factory performance test.

E) Submit a certified test report of all data to the CIAL before completion of the project. **Provide the factory-certified test report signed by an officer of the manufacturer's company**. Preprinted certification will not be acceptable; certification shall be original.

3.14 SOUND

A. Sound Data:

1. The screw chiller Sound Pressure Level (SPL), in decibels (dB), with a reference pressure of **20 micro-Pascal**, shall not exceed the values listed below. All ratings shall be in accordance with **AHRI Standard 575-87**, "Method of Measuring Machinery Sound within Equipment Rooms."

2. AHRI-certified sound rating document shall be submitted for the selected chiller at design condition at full load (100%).

3. No reduction of entering condenser water or raising of leaving chilled water temperatures will be allowed in the SPLs. Making such a temperature adjustment does not represent the loudest operating condition the chiller will experience while on the job and could mask sound problems that would otherwise occur. A minimum of 75 per cent of the sound data points along the length of the machine shall be taken and established as the minimum percentage of total possible points used to determine sound levels.

3.15 WARRANTY

Provide a **5-year warranty for parts**, labour and refrigeration from the date of issuance of the occupancy permit. Warranty to coincide with the manufacturer's parts warranty. Warranty shall be **5 years after the Defect Liability Period of 2 Years**, and Warranty shall be for all parts, labour and refrigeration.

3.16 INSTALLATION

The complete chilling unit shall be installed over an **RCC foundation and shall be adequately isolated against the transmission of vibrations to the building structure**. Necessary foundation bolts, nuts, levelling screws, etc., wherever required for mounting the unit, shall be provided by the contractor.

4. MOTORS

MAKE OF MOTORS

The make of motors shall be as specified in the List of Approved Makes.

- The motor shall be of the following design and should run at all loads without any appreciable noise or hum.
- Totally enclosed fan-cooled/refrigerant-cooled Sq. Cage. (**TEFC**)
- Screen protected drip proof wound Sq. Cage motor. (if specified anywhere in the BOQ)
- Enclosure and type of motor shall depend upon duty and usage unless otherwise specified.
- The winding of motors shall be **class 'F' insulation** and suitable for local conditions. The insulation of motors shall conform to IS: 325/1978.

- All motors shall comply with **IS: 325, IEC-34.1 or BS – 2313, IEC-72.1 for foot-mounted motors.**
- **All motors installed under this contract** for pumps, cooling tower fans, etc., **shall indicate the motor class min IE3 efficiency in conformity with IS 12615 (latest version).**
- The rating of the motor shall be as indicated in the **Schedule of Equipment & Bill of Quantities.** The motors shall be selected on the basis of ambient temperatures and allowable maximum temperature rise.
- Motors above 1HP shall be three-phase unless otherwise specified.
- All motors shall be rated for continuous duty as per IS: 325. Motor shall be suitable for operation on 415 volts \pm 10% volts, 50 \pm 5% Hz AC supply (or 230 \pm 10% volts, 50 \pm 5% Hz for single-phase AC supply).
- Motors shall be provided with a cable box to receive Aluminium conductors, PVC-insulated, PVC sheathed and armoured cables.
- All motors shall be provided with a combination of 'Ball and Roller Bearing'. Suitable grease nipples for regreasing the bearing shall be provided.
- Motors above 0.25 HP shall be provided with overload protection. Motors above 100 HP shall be provided with thermal protection and a thermistor detector in the starter winding.

5. HYDRAULIC PUMPS

Scope:

This specification covers the design, materials of construction, features, performance and testing of the long-coupled end-suction pumps. The pump shall be suitable for the purpose they are intended.

Codes and Standards:

The design, material, construction, manufacture, inspection, testing and performance of end suction pumps shall comply with all currently applicable statutes, regulations and safety codes in the locality where the Equipment will be installed. The Equipment supplied complies with the latest applicable Indian, American or equivalent Standards. Other National Standards are acceptable if they are established to be equal to or superior to the listed standards.

General:

The pumps shall be flexible coupled with a spacer, single-stage, centrifugal, foot-mounted volute-type **radial split casing**, end suction with back-pull out design. Hence, the rotating unit can be removed and serviced without disconnecting the suction, discharge piping and electrical motor. The pump, electric motor, base frame, coupling and coupling guard shall be factory assembled at the pump manufacturer's facility. Installation instructions shall be included with the pump at the time of shipment. The pump manufacturer shall have complete unit responsibility.

Features of Construction:

Pump Casing: Pump casing shall be of robust construction with integrally-cast pedestal support feet in order to transmit pipe load to the base and foundation. Liquid passages in the casing shall have a smooth finish to ensure high Efficiency. **Pump casing shall be capable of withstanding 1.5 times the design pressure.** Pump casing shall be EN-GJL-250 Grey Cast Iron according to BS EN 1561: 1997 and capable of withstanding the maximum pressure developed by the pump. Flange dimensions are in accordance with EN 1092-2/ equivalent ANSI standard. Pump casing shall be fitted with a bronze wear ring. Pump casing shall have tapped and plugged holes for priming and draining.

Impeller:

The impeller shall be **lead-free cast bronze** enclosed type with a smooth surface finish for minimum frictional loss. This ensures high Efficiency. The impeller shall be keyed to the shaft and secured by the impeller lock nut. All impellers **are dynamically balanced to ISO 1940-1: Grade G6.3.** The thrust balancing can be of balancing holes or back vanes. The direction of rotation of the **impeller is clockwise when viewed from the motor.**

Shaft:

Shaft shall be martensitic **stainless steel** according to AISI 420, ground and polished to final dimensions and be adequately sized to withstand all stresses, hydraulic loads, vibrations and torques coming in during operation. The shaft shall be designed in such a way that the first critical speed will be at least 25% away from the maximum rotating speed. Shaft runout shall be limited at the seal face and at the impeller to 0.05 mm. The shaft shall be provided with a mechanical seal as a default fitment to provide the leak free operation.

Wear Rings:

A renewable type of **bronze wearing ring** shall be provided in the pump casing to maintain close running clearance and to minimize leakage and recirculation losses.

Mechanical Seals:

The liquid cavity shall be sealed off at the pump shaft by an internally **flushed mechanical seal with a carbon seal seat and a silicon carbide seal ring, suitable for continuous operation at 284 °F (140° C). The mechanical shaft seal has dimensions according to EN 12756.**

Bearings:

Antifriction ball bearings shall be of standard type and shall meet **minimum L-10 rating life** up to 50000 hrs. These shall be factory-filled lubrication. Bearing of the pump shall be effectively sealed to prevent loss of lubricant or entry of dust or water.

Coupling:

Pumps shall be provided with a flexible type, centre drop-out (Spacer) design coupler, capable of absorbing torsional vibration, which shall be employed between the pump and motor. The coupling guard shall be bolted to the base plate and shall be furnished for all coupled pumps, and it shall be rigid and free of vibration.

Motors:

Motor shall be a **horizontal, foot-mounted, totally enclosed fan-cooled, standard squirrel cage induction motor with main dimensions according to IEC standards.** Electrical tolerances are to IEC 60034. Motor shall be an energy-efficient type. Motor shall be to with **IP 55 enclosure. The class of insulation shall be F with temperature rise limited to Class** Motor shall be suitable for operation on a **415 V ($\pm 10\%$ variation), 50Hz $\pm 5\%$, 3phase, or 240V-1phase AC supply.**

The base plate shall be of fabricated steel and securely welded cross members. The grouting area shall be fully open. The combined pump and motor base plate shall be sufficiently

stiff as to limit the susceptibility to vibration. The base plate should be provided with lifting lugs.

Name plates: Each pump shall be provided with a name plate indicating the following details:

1. Pump type designation
2. Pump Model
3. Rated flow
4. Rated head
5. Pressure rating/max temperature
6. Rated speed

Working pressure: Maximum allowable working pressure (MAWP) for all the pressure-containing parts shall in no case be less than the maximum discharge pressure produced by the pump at shut off (including tolerances), at the max suction pressure, for the maximum impeller diameter and the maximum continuous speed.

Note: MAWP **shall not be less than 10 kg/cm² for pumps with DN150 flanges & 16 kg/cm² for pumps with DN32 to DN250 flanges.** Pump shall be rated for a minimum of **10bar working pressure.**

Vibration: The pump(s) vibration limits shall conform to Hydraulic Institute ANSI/HI 1.1-1.5-1994; section 1.4.6.1.1 or ISO 10816 for recommended acceptable unfiltered field vibration limits (as measured per HI 1.4.6.5.2) for pumps with rolling contact bearings

Sound Level: Sound pressure level of the pump driver shall be max **82 dB(A)* measured at 1m distance from the pump for the duty points.**

(* Note: Based on the motor kW and speed according to ISO 3743)

Painting: The equipment shall be thoroughly cleaned and greased. **All rust; sharp edges and scales shall be removed.** All external and exposed cast iron parts of pumps have an epoxy-based coating made in a cathodic electro-deposition (CED) process, which is a high-quality dip-painting process, and which would prevent rusting and corrosion. The coupling and shaft shall not be painted.

PUMP & MOTOR SELECTION:

The pump(s) selected shall conform to EN 733 standards for Preferred Operating Region (POR) unless otherwise approved by the engineer. The pumps shall be factory-manufactured, assembled, and hydrostatically tested as per Hydraulic Institute standards in an ISO 9001 approved facility. **The motor should be of a variable frequency drive. Motor should be selected as a non-overloading type.**

Note: The motor nameplate rating for pumps under parallel operation shall not be less than the max BKW indicated on the pump data sheet (the power at the END of the curve for the rated impeller) or shall have the specified margin as per this clause, whichever is greater. The pump motors shall also be suitable for Start-up under open discharge valve conditions.

Inspection & Testing of Various Items:

Before effecting delivery of the equipment, the following inspections and tests as per relevant IS standards shall be carried out.

For Pumps:

1. Hydrostatic Testing
2. Performance Test (Single point / Duty point)
3. Dynamic balancing for the pump impeller.

6. COOLING TOWERS

5.1SCOPE:

The scope of this section comprises the supply, erection, testing and commissioning of cooling towers **with pedestals** in accordance with the requirements of drawings and the schedule of quantities.

5.2Design Criteria

- Difference between Condenser water entry and exit temperature through cooling tower: **10 deg F**
- Wet bulb temperature- **83 deg F** (28.3 °C)
- Water Flow rate-**1050 USGPM**

- Fan efficiency: **less than or equal to 0.35kW/ltr-sec** (ECSBC 2024 requirement, at 37.8°C entering water 32.2°C leaving temperature and 28.3°C WB outdoor temperature)
- **Approach less than 5 °F (2.8 °C)** (ECSBC 2024 requirement)

5.3TYPE:

Cooling tower shall be open circuit, **Single Cell type, Induced draft crossflow/counterflow type** in accordance with requirement of the tender drawings and of the bill of quantities.

Cooling towers shall meet the following.

- Cooling Tower shall be CTI STD-201 certified for thermal performance and shall carry the relevant certification label.
- Sound performance shall be in accordance with **CTI ATC-128**. The manufacturer shall provide a certified sound report. Sound levels must not exceed **68 dBA** at a distance of **10 meters** from the air inlet louvres.
- Heat rejection Performance shall be in accordance with **ASHRAE 90.1, latest** edition.
- The cooling tower structure, including the basin, casing, and mechanical supports, shall be designed to withstand seismic forces in accordance with **IS 1893 (Part 4): 2015** (Criteria for Earthquake Resistant Design of Structures - Industrial Structures). The design shall specifically account for **Seismic Zone III** (Kochi).
- Due to the coastal location in Kochi, the tower and its anchorage must be designed as per **IS 875 Part 3** to resist monsoon gusts and cyclonic conditions.
- The manufacturer shall provide detailed RCC pedestal requirements and anchor bolt specifications (in **SS316**) to ensure the tower is securely fastened to the building structure.

5.4GI / FRP INDUCED DRAFT COOLINGTOWERS:

The towers shall be with Single cells based on the capacity. Tower shall be vertical, induced draft, Cross flow / Counter flow type, construction in rectangular shape, square or bottle shape, complete with fan, motor, surface and spray sections, **Aluminium/HDGS ladder**. One isolating switch of appropriate **rating conforming to IP56 shall be provided near the cooling tower for maintenance purposes.**

5.5CAPACITY:

The cooling tower capacities shall be as per the Drawings, Technical data sheet and Schedule of Quantities.

5.6 SIDE CASING:

The casing shall be made of **Pultruded FRP construction** with a minimum thickness of **3mm**. The resin shall be **UV-stabilized, fire-retardant polyester**. The exterior shall have a finished surface for weather resistance, and the interior shall be a smooth moulded surface for minimum air resistance. The casing must withstand a wind pressure of 1.44 kPa and fan-induced vibrations.

Access & Algae Control: The area between the casing and the water basin shall be fitted with **removable, PVC/FRP air inlet louvers**. These louvers must serve a dual purpose:

1. Provide easy access for basin cleaning.
2. **Block 100% of direct sunlight** from reaching the basin to prevent algae growth.

5.7 Access door

For **Crossflow cooling towers**, a walk-in type **FRP access door** of minimum size 600 mm (W) × 1200 mm (H) shall be provided on the end-wall or side casing to allow full technician entry into the plenum for inspection of the cold water basin, underside of hot water basins, fan assembly, and drift eliminators from the dry side. The door shall be fully air- and water-tight with replaceable EPDM/Neoprene gaskets, and the door shall open outwards to ensure a 100% airtight seal under negative pressure. The door shall be fully air- and water-tight with replaceable EPDM/Neoprene gaskets. All door hardware—including hinges, heavy-duty "dual-latch" handles, and mounting fasteners—shall be made of **Stainless-Steel Grade 316 (SS316)**.

For **Counterflow cooling towers**, a smaller inspection-type **FRP access door** of minimum size 600 mm × 600 mm shall be located in the plenum between the drift eliminators and fan deck to allow inspection and removal of spray nozzles and drift eliminators. The door shall incorporate a quick-release SS316 latching system and maintain complete airtight sealing to prevent efficiency loss. All door hardware—including hinges, heavy-duty "dual-latch" handles, and mounting fasteners—shall be made of **Stainless-Steel Grade 316 (SS316)**.

5.8 Structural Frame:

The tower supporting structure shall be made of **Pultruded FRP shapes, meeting CTI STD-137**, or the tower supporting structure shall be made out of **hot-dipped galvanised steel G235 frame of suitable thickness meeting the above requirements of CTI**. The galvanising process shall be carried out in accordance with **ISO 1461:2022**, with a minimum average thickness of **85 microns**.

Fasteners: All bolts, nuts, washers, and casing anchors shall be **Stainless Steel grade SS316**. **Galvanized fasteners for casing assembly are not acceptable**

5.9 COLD WATER BASIN:

The cold-water basin shall be of Pultruded FRP construction (matching the casing) and shall be UV-stabilized. The basin floor shall be sloped (minimum 2%) toward the sump/drain to prevent stagnant water and facilitate cleaning.

The basin shall have a minimum depth of 300mm and be sized to hold the total shut-down volume of the system without overflowing. Cooling tower superstructure shall be supported on the Cooling Tower Basin. Each individual basin shall be provided with an individual outlet. Each outlet shall be equipped with a **removable Anti-Vortexing Plate** and a dual-stage **Stainless Steel SS316 strainer** (perforated type) to protect the pumps. Basin fittings shall include the following:

- a) Bottom outlet/ Suction tank with Anti-Vortexing plate and a dual-stage **Stainless Steel SS316 strainer**.
- b) Drain connection located at the bottom of the suction tank.
- c) Built-in bleed off attached to the inlet header, and it shall be connected to the overflow pipe.
- d) Automatic makeup water valve SS316 valve body with a Stainless-Steel float. (Min 3kg/cm² pressure rating).
- e) **Quick-fill connection** with an independent SS316 stop valve.

Elevation: To ensure Net Positive Suction Head (NPSH) and ease of maintenance, the basin floor shall be supported on a structural frame **no less than 150 cm above the finished floor level**. All supporting hardware in contact with the basin shall be **SS316**.

5.10 DISTRIBUTION SYSTEM:

For counterflow, Hot water distribution shall be by a **sprinkler system** consisting of pipes screwed into a **rotating head** and mounted on top of the vertical **pipe installed centrally** in the tower.

For crossflow, hot water shall be discharged onto a hot water basin & allowed to flow down on the PVC fill through distributors, 360-degree large orifice non-clog nozzles, by gravity. The depth of the hot water basin shall be adequate to avoid water overflow.

5.11 FILLING:

Fill media shall be manufactured from rigid, virgin Polyvinyl Chloride (PVC) sheets. The PVC shall be **fully compounded with antimicrobial additives** during extrusion to inhibit the growth of algae, fungi, and *Legionella* bacteria (verified by **ASTM G21** testing). The material shall meet **CTI STD-136** standards for thermoplastic properties, ensuring high resistance to rot, chemical degradation, and UV exposure

The fill shall be thermo-vacuum formed into a **High-Efficiency Cross-Flute or Offset-Fluted with an orifice size between 19mm and 30mm**. This geometry must promote a high-degree of turbulence and water-rotation to maximize the air-water contact time.

For Crossflow towers, fill sheets shall be **suspended from structural SS316 supports** to allow the fill to hang freely, preventing 'sagging' and allowing bottom-access for basin cleaning. For Counterflow towers, fill sheets shall be **Solvent Welded into dedicated blocks** for structural stability. Blocks must be sized for easy removal by a single technician through the access door for periodic high-pressure cleaning.

The fill material shall be self-extinguishing and meet **ASTM E84 (Current Version)** with a Flame Spread Index (FSI) of **25 or less (Class A)**. Furthermore, the material shall meet the flammability requirements of **CTI STD-136**.

5.12 DRIFT ELIMINATOR

To reduce carry-over losses through entrainment of moisture drops in the air stream, a **UPVC drift eliminator shall be installed to limit drift losses to less than 0.005% of the total water**

circulated. The bidder must provide a **CTI ATC-140 test certificate** to verify that the drift rate does not exceed the specified limit under peak design air velocities.

5.13 MECHANICAL EQUIPMENT'S:

The tower shall be provided with a low-speed fan driven thru Multi grooved V belt/Direct / Gear reducer to achieve the specified **sound noise level**. The fan shall be of the propeller type, pultruded **FRP, low-weight rotor fitted with a minimum of three aerofoil blades**. The fan hub shall be constructed of cast aluminium or epoxy-coated HDG steel, secured with **SS316 hardware** (bolts, nuts, washers, and screws). The entire assembly must be **statically and dynamically balanced at the factory to ISO 1940 Grade G6.3** standards. The fan discharge shall be protected by a heavy-gauge, SS316 or HDGS fan guard to prevent debris ingress and ensure operator safety & shall be easily accessible for inspection and maintenance.

The fan motor shall be of min **Efficiency IE3**, 3-phase, 415V \pm 10%, 50Hz, TEFC (Totally Enclosed Fan Cooled), IP66 rated, class F insulation induction motor. The motor must be fully compatible with **Variable Frequency Drives (VFD)** for precise speed control and energy optimisation.

Fan efficiency shall be **less than or equal to 0.35kW/ltr-sec**.

The mechanical equipment assembly shall be supported by a single-piece, heavy-duty welded steel torque tube or frame, **Hot-Dip Galvanized to a minimum of 85 microns**. For safety and maintenance, an **HDGS/ Aluminium service ladder with a non-slip safety cage** shall be provided, meeting OSHA and Indian Standards.

The mechanical assembly (motor, drive, and fan) shall be designed and balanced such that operational vibration levels do not exceed **Zone B (Acceptable)** as defined in **CTI STD-163 (Latest Edition)**

5.14 PAINTING:

The exterior steel surfaces of all towers shall be given two coats of paint of approved finish. If these shop coats become marred during shipment or erection, the affected areas shall be cleaned off with mineral spirits, wire-brushed and spot primed, then coated with enamel paints of matching shades.

5.15 NOISE LEVELS:

The noise level from the cooling tower shall be less than **68 dB(A) at a 10-meter distance** from the air inlet side of the cooling tower.

5.16 PERFORMANCE SUBMITTALS

1. Manufacturer shall submit a certificate from **CTI validating all relevant specifications mentioned in the technical specifications.**
2. In addition, the manufacturer shall also provide a certificate that the cooling tower, accessories and components withstand the seismic force as per the IS 1893 (Part 4): 2015 (Criteria for Earthquake Resistant Design of Structures - Industrial Structures). The design shall specifically account for Seismic Zone III (Kochi).
3. Sound level report along with sound curves and characteristics of sound attenuators, if required to meet the noise criteria.
4. The manufacturer shall submit a complete performance rating and power consumption at varying loads & varying outdoor wet bulb temperatures. The same shall be verified at the time of testing and commissioning of the installation. Reports shall be software generated, excel reports are not acceptable.

5.17 TESTING AT SITE

Capacity of the cooling tower shall be computed from the measurements of the water flow, incoming/outgoing water temperatures and ambient air wet bulb temperature using accurately calibrated mercury –in-glass/digital thermometers. Computed ratings shall conform to the specified capacities and quoted ratings. **Power consumption for cooling towers shall be computed from measurements of incoming voltage and input current. A certificate in this regard, duly certified by CTI, shall be provided.**

7. PIPING, VALVES & ACCESSORIES:

SCOPE:

The scope of this section comprises the supply and laying of pipes, pipe fittings and valves, testing and balancing of all water and refrigerant piping required for the complete installation. All pipes, inclusive of fittings and valves, shall follow the applicable Indian Standards. All pipes, valves, and fittings shall have a **minimum PN16 rating.**

MATERIAL

CHILLED AND CONDENSER WATER PIPING

All chilled water and condenser water pipes and fittings shall be of **MS class 'C' (heavy class)**, conforming to BIS 1239 for pipe size up to 150 mm dia shall be of MS tube and for pipe size **200mm dia and above shall be as per BIS 3589**, having a minimum **6mm thickness**. All jointing in the pipe system shall generally be by **welding**, unless mentioned otherwise, or directed at the site. All welding shall be done by qualified welders and shall strictly conform to the Indian Standards code of procedure for manual **metallic welding of Mild steel as per BIS 823**. Condenser & Chilled water line must have a quick filling connection arrangement at the plant room, 40mm size with a full-way valve & a drain line too of the same size.

All pipes and their steel supports shall be thoroughly cleaned and **given one primary coat of red oxide paint before being installed**. All chilled water piping will rest on pipe supports with a **rubber insert seated on MS angles/channel approved by the consultant/client and securely fastened with a U strap**. All welded piping shall be subjected to approval at the site.

Fittings used on welded piping shall be of the weldable type. The ends of pipe lengths to be welded shall be cut square by saw or cutter, and the edges levelled to form a **'V' groove before welding**. Under no circumstances shall the edges be formed by gas cutting. The welded joint shall be painted externally with a coat of **red-oxide primer**.

Tee-off connections shall be through equal or reduced tees. Drilling and tapping of the walls of the main pipe shall not be resorted to and will not be allowed.

For circumferential joints between pipe lengths/pieces 200 mm dia and larger, welding rings shall be provided.

Flanges shall be of slip-on raised face type. **The supply of flanges shall also include the supply of bolts and nuts, and suitable asbestos/fibre rubber insertion gaskets (minimum 3mm thick)**.

FITTINGS

All fittings shall be of **MS class 'C' (Heavy class)**. Butt weld fittings shall conform to **BS 4504 PN 16 and Flanges to BS 10 Table E** unless otherwise indicated in the specifications. Screwed

fittings shall be malleable iron banded, black heart type to BS 143 with BS 21 taper internal and external pipe threads. Joints shall be made with jointing compound and the best quality hemp.

All bends shall be ready-made of heavy-duty, wrought steel of appropriate class.

PRE-INSULATED PIPES AND FITTINGS

General

Pre-insulated pipe shall be provided complete with factory-made bends and tees as required. The pipes shall be installed in complete accordance with the manufacturer's recommendations.

The pre-insulated pipes shall consist of a High-Density Polyethylene (HDPE) internal carrier pipe insulated with rigid polyurethane foam and protected externally by an impact-resistant outer pipe of **high-density polyethylene**. During manufacture, the carrier pipe, the polyurethane foam, and the outer casing shall be securely bonded together. The insulation and outer cover shall have sufficient compressive and shear strength to resist any long-term underground loadings.

INSULATION

The service pipe insulation shall be polyurethane foam with **36 kg/cu m minimum density, 90% minimum closed cell content, minimum compressive strength of 40 psi** and thermal conductivity of **0.14 Btu-in/hr/ft²/°F**. The insulation shall fill the annular space between the service pipe and jacket and shall be bonded to both the service pipe & jacket. The insulation thickness shall be a minimum of **50mm**.

8. Manual Balancing Valves/Double Regulating Valves

The valves shall be in cast-iron flanged-end construction.

Y-pattern, **Manual Double Regulating**, Variable orifice type conforming to BS5152. Body, bonnet in **Cast Iron [GG 25] with SS Stem. Disc 65mm to 200mm SG Iron with EPDM coated, 250 & 300 SS with EPDM ring, Hand Wheel shall be Ductile Iron** having a Vernier scale for accurate setting and enables the disc to be locked in the set position. End connections to be flanged to BS4504 PN16.

The valve shall incorporate a **double regulating mechanism with a memory stop or built-in locking device**, allowing the valve to be used both for isolation and for balancing purposes. The valve shall be designed and tested in accordance with **BS 7350 for double regulating globe valves and flow measurement devices**.

Each valve shall be supplied with **two built-in pressure test cocks (binder points)** to enable differential pressure measurement during commissioning. These test cocks shall be designed with **insulation extensions**, allowing them to protrude through the pipe insulation (typically 50 mm or as specified in the project). After installation, the valve body shall be **insulated at the site using the same insulation material and thickness as the chilled water piping system** to maintain thermal efficiency and prevent condensation.

The valve shall have a **minimum pressure rating of PN 16**, with a working pressure of **16 kg/cm²** and a test pressure of **24 kg/cm²**. The valve shall be suitable for an operating temperature range of **-10°C to +110°C**, ensuring reliable performance under typical HVAC chilled water and condenser water system conditions.

- Pressure/ temperature rating: 16 bar for -10 to 120°C
- Hydro Static Pressure: Body: 24 bar Seat: 17.6 Bar

9. Butterfly Valves

It should be checked that the same is as per makes specified in the contract.

All butterfly valves shall be designed, manufactured, and tested strictly in accordance with IS 13095:2020 – Butterfly Valves for General Purposes. Compliance with this standard is mandatory as per the “Butterfly Valves (Quality Control) Order, 2020” issued by the Ministry of Commerce and Industry (Notification S.O. 1920(E) dated 17th June 2020). Each valve supplied shall bear the Standard Mark (ISI Mark) cast or embossed on the valve body as evidence of conformity to the applicable Indian Standard. Any valve supplied without the physical ISI mark and a valid BIS License (CM/L Number) corresponding to the product and size range shall be rejected during inspection.

The valve body shall be manufactured from Iron conforming to IS 210 Grade FG 260. The valve disc shall preferably be made from Bronze/Stainless Steel ASTM A351 Grade CF8 (SS304) or CF8M (SS316).

The valve seat or liner shall be manufactured from EPDM (Ethylene Propylene Diene Monomer) rubber. The seat shall be of the renewable or integrally moulded type and shall be suitable for water temperatures ranging from 4°C to 50°C, which corresponds to the typical HVAC operating range. The valve stem or shaft shall be made from Stainless Steel AISI 410 or AISI 304/316 and shall incorporate a blow-out proof design, either as a one-piece or two-piece configuration, to ensure safe operation under pressure conditions. Bearings or bushings shall be manufactured from PTFE or bronze to minimise friction and enable smooth, low-torque operation of the valve.

The valves shall be available in **wafer type** for standard pipeline installation between flanges. **Lug-type valves** shall be provided wherever dead-end service or equipment isolation is required, such as at pumps or chillers, allowing downstream piping to be removed without depressurizing the system. The valves shall be designed for a minimum pressure rating of **PN 16**.

10. Check Valves

The valve shall be a **Dual Plate, Wafer-type, Spring-loaded, Non-Slam Check Valve** suitable for use in Chilled Water and Condenser Water systems. The required sizes shall be DN 200 (8") and DN 250 (10") as specified in the bill of quantities. The valve shall be designed for a minimum pressure rating of **PN 16** or higher, depending on the system design pressure.

The valves shall be strictly designed as per **API 594** and tested as per **API 598** for Dual Plate Check Valves.

The valve body shall be manufactured from **Cast Iron** conforming to IS 210 Grade FG 260. The valve plates (discs) shall be made of **Bronze/Gun metal** to prevent corrosion and scale formation. The stop pin and hinge pin shall be manufactured from **Stainless Steel** AISI 410 or AISI 304. The springs shall be made of **Stainless Steel** AISI 316 or Inconel and shall be designed for high-cycle fatigue resistance to ensure that the plates close immediately before flow reversal occurs. The valve seat shall be resilient **EPDM**, either moulded or bonded to the body, to ensure bubble-tight shut-off and zero leakage performance. Bearings used within the valve assembly shall be PTFE or Stainless Steel 316.

11. Strainers

Strainer – 65mm to 300mm

Y Type Strainers, Body and cover to be of Cast Iron [GG 25] with Stainless steel screens of 1.5mm perforations. End connections to be flanged to BS4504 PN16. Drilling on the bolted cover, with a drain plug connection, Internal and external epoxy coating required to 100 microns.

- Pressure/Temperature rating: 16 bar
- Hydro Static Pressure: Body: 24 bar

12. Flexible Bellows

Rubber Bellow – 65mm to 600mm

Bellows to be of EPDM Rubber.

- Pressure/Temperature rating: 16 bar at 40°C.
- Hydro Static Pressure: Body: 24 bar

13. Thermometers / Temperature Gauges

The thermometer shall be a Glass Stem-type V shape with **Aluminium casing, gold coloured** anodised, with clear figures by means of black marking; scale range in °C.

Brass insert shall be ½” BSPP male threaded ends, removable from casing.

Glass Insert shall be a capillary tube of prismatic solid glass with clear **black scale marking**, blue spirit/Mercury filling on a white background, flexible mounted glass tube with rubber rings.

Scale range: **0 to 120°C**

14. Pressure Gauges

Bourdon tube type with a **SS304 casing** glycerine filled of 100mm in diameter. **SS316** bourdon tube with **brass bottom** connections of G ½” BSPP male threads, operating temperature of -20 to 60°C with 1% accuracy.

Pressure gauges **to be fitted with gauge cocks and siphons** for easy reading directly on installations.

Scale range: 0 to 10 bar

15. Other items

Gauge Cock – 15mm

Brass gauge cocks shall be with quarter-turn levers. Gauge Cocks to threaded **connections to BS EN ISO 228-1 (British Standard Pipe Parallel BSPP)**

Pressure Rating: **25 Bar**

Siphon – 15mm

Siphons to be of the **U-type made of SS316**. Siphons shall be of threaded **connections to BS EN ISO 228-1 (British Standard Pipe Parallel BSPP)**

Pressure Rating: **25 Bar**

Drain cocks – 15mm

Drain cocks to be of **forged brass** (nickel plated) construction, ball type with hose union, cap and chain arrangement, NBR O Ring, PTFE seat, **Aluminium Lever** operated with threaded end connections to **BS EN ISO 228-1 (British Standard Pipe Parallel BSPP)**.

Pressure Rating: 25 Bar

Automatic Air Vents – 15 to 25mm

Body and cover shall be of **Brass**, and the float shall be of Polypropylene material. Float and lever in anti-corrosion resin, Gasket shall be EPDM and an Integral Brass check valve, end connections to be threaded to **BS EN ISO 228-1 (British Standard Pipe Parallel BSPP)**.

Pressure Rating: 12 Bar

16.Flanges – 50mm - 600mm

Flanges shall be made of Carbon steel material, raised face, serrated finish to BS4504 PN16 as per DIN 2543 standard, Slip On type.

Pressure Rating: 16 Bar

Flanges may be tack-welded into position, but all final welding shall be done with joints dismantled. 3mm thick gaskets shall be used with all flanged joints; the gaskets shall be fibre-reinforced rubber as approved by the Engineer-in-charge. Flanges shall be used as follows: Counter flanges for equipment having flanged connections. Flanged pairs shall be used on all such equipment, which may require to be isolated or removed for service (E.G. pumps, Refrigeration machines, air handling units, etc.) All threaded valves shall be provided with nipples and flanged pairs on both sides to permit flange connections, for removal of valves from main lines for repair/replacement.

*Note: All BSPP (G-thread) connections for pressure gauges, siphons, and service cocks shall be made water-tight using **soft copper washers or bonded seals (Dowty seals)** to allow for proper orientation of the instrument face."*

17.PIPING INSTALLATIONS

Piping shall be properly supported on, or suspended from, stands, clamps, and hangers as specified and as required. The contractor shall adequately design all the brackets, saddles, anchors, clamps and hangers, and be responsible for their structural sufficiency.

Pipe supports shall be of steel, adjustable for height and **primer coated with rust preventive paint and finish coated black. Where pipe and clamps are of dissimilar materials, a gasket shall be provided.** The spacing of pipe supports shall not exceed the following:

<u>Pipe Size</u>	<u>Rod Diameter (mm)</u>	<u>Base Support</u>
Upto 65mm	10	40 x 40 x 6 thk. Angle
75 to 125mm	10	50 x 50 x 6 thk. Angle
150 mm to 200 mm	15	ISMC 75
250 mm	20	ISMC 100 *
300 mm	22	ISMC 150 *
350, 400 mm	25	ISMC 150 *
450, 500 mm	32	ISMC 150 *
600 mm	32	ISMC 200 *

* Floor mounted support shall be preferred.

<u>Pipe Size</u>	<u>Spacing between supports</u>
Upto 12mm	1.5 meter
15 to 25mm	2.0 meter
30 to 150mm	2.0 meter
Over 150mm	2.5 meter

TESTING & BALANCING

All piping shall be tested to a **hydrostatic test pressure of at least two and a half times the maximum operating pressure**, but not less than **10 Kg per sq.cm**. Gauge for a period of not less than 24 hours. All leaks and defects in joints revealed during the testing shall be rectified to the satisfaction of the Consultant/Client. Piping repaired subsequent to the above pressure shall be retested in the same summer. Piping may be tested in sections, and such sections shall be securely capped

The contractor shall provide all materials, tools, equipment, instruments, services and labour required to perform the test and to remove water resulting from cleaning and after testing.

After completion of the installation, all water systems shall be adjusted and balanced to deliver the water quantities as specified, quoted or as directed, to individual air handling units and fan coil units, and cooling coil.

All supporting arrangements, including necessary suspenders, brackets, rods, bolts and nuts, etc., and all civil work related thereto - including drilling of holes for fixing grip bolts and any

chipping and finishing, shall be included within the scope of the work of the tenderer and shall be carried out by the successful air conditioning contractor.

All supports in the plant rooms, near cooling towers, etc., shall be given two coats of black paint.

Pipe sleeves 50 mm (2 ins.) larger in diameter shall be provided wherever pipes pass through walls or structures, and the annular space shall be filled with felt and finished with retaining rings to isolate any vibrations from being transmitted to walls/structures.

Drains shall be provided at all low points in the piping system and shall be of the following sizes:

Main.-mm	Drain - mm
Upto 300	25
Over 300	50

Suitable vibration elimination fittings shall be provided at the inlet and outlet of pumps, chillers and condensers.

Install manual air vents at high points in piping, at heat-transfer coils, and elsewhere as required for system air venting.

18.INSULATION

All valves, fittings, flanges, pumps, strainers, etc. in the chilled water line shall be insulated in the same manner as described above for chilled water pipes with uniformly cut pieces

from slabs of resin-bonded fibreglass wool, duly aluminium-clad. Care should be taken to ensure that no damage is caused to the insulation when valves or strainers are operated.

PUMP INSULATION

Chilled water pump shall be insulated to the same thickness as the pipe to which they are connected, and application shall be the same as above. Care shall be taken to apply insulation in a manner so as to allow the dismantling of pumps without damaging the insulation.

SHELL INSULATION

The chiller shells shall be factory insulated in accordance with the manufacturer's standards.

MEASUREMENT OF INSULATION

Unless otherwise specified measurement for duct and pipe insulation for the project shall be based on centre line measurements described herewith:

Insulation of Chilled Water / Drain Water.

- Insulation of pipes shall be measured in terms of linear length of pipe for each size.
- For insulation of bends, elbows, tees etc. it shall be measured along with the centre line of insulation and shall be measured in metres.
- Insulation of valves shall be separately accounted as per bill of quantities.

19.PRE DELIVERY INSPECTION AND TESTING

This shall be carried out at the manufacturer's works for the items mentioned as Category 1 in the list of approved makes.

INITIAL INSPECTION AT MANUFACTURER'S WORKS:

Chiller

Salient features like type of chiller, **number and inside diameter of tubes (from which gauge of tubes can be verified), material of tubes, type, material and the number of fins, wherever applicable, diameter and length of chiller and provision of fittings,** should be verified against requirements specified in the contract during stage inspection. Tube thickness shall be checked. **Both Condenser and Evaporator shall be ASME certified and U stamped and shall be verified during FAT.**

Factory performance test for the chiller with the proposed refrigerant at 25%, 50%, 75% and 100% load at **design conditions and at constant condenser entry temperature with AHRI tolerance in a manufacturer's test facility.** Furnish a certified test report to confirm performance as specified.

Compressor salient features, such as model, capacity control, type of lubrication, etc., shall be verified against the requirements visually without opening the compressors. Manufacturer's internal type test certificates shall be scrutinised to check compliance with the requirements as specified in the contract.

Compressor OEM document/ test certificate showing the following tests shall be submitted during FAT:

- **Pneumatic test pressure test at 21 kgf/sq.cm for casing of the compressor.**
- **Vacuum test for the compressor for 0.5mm Hg.**

CHILLER PERFORMANCE

The chillers offered shall be energy efficient. To evaluate the performance of chillers offered, the tenderer should provide the IPLV/NPLV value in the Technical Data Sheet in the tender.

The Manufacturer should **submit AHRI-certified performance sheets at 25%,50%, 75% and 100% load conditions for the tender design conditions specified**, along with the bid, and testing should be conducted for the chillers with the proposed refrigerant based on the same. **The NPLV value shall be verified during the performance test at manufactures factory on an AHRI-certified test bed.** The method for calculating the NPLV value is given in the coming paragraphs.

Determination of **Part-Load Performance for Water-Chilling Packages covered by AHRI 550/590 standard (latest edition), the IPLV / NPLV shall be calculated as follows:**

- a. Determine the part-load energy efficiency at 100%, 75%, 50%, and 25% load points at the conditions specified in AHRI 550/590 Standard (latest edition). (Table for calculating the part load conditions given below)
- b. Use the following equation to calculate the IPLV / NPLV for units rated with kW/TR:

$$\text{IPLV} = \frac{1}{\frac{0.01}{A} + \frac{0.42}{B} + \frac{0.45}{C} + \frac{0.12}{D}}$$

20. INITIAL INSPECTION AT SITE

Pumps

Salient features such as model and make shall be checked as per contract requirements. The **manufacturer's test certificates with Sr. No., head, and discharge will be furnished and verified against contract requirements.**

Cooling tower

Salient features such as **make, model, dimensions, materials used, constructional details, number and size of nozzles, headers, size of tank, etc.** should be verified against the requirements. Inspection of the **cooling tower in knocked down condition** would be carried out at the site.

The manufacturer's test certificate **certifying the capacity of the cooling tower (in tons of refrigeration (TR) for the specified flow) and the static balancing of the fan should be furnished.**

Switch Gear, Control Gear, and Measuring Instruments

These should be of a specified make. Electric motors should be of specified make, manufacturer's test certificate for the electric motor shall be furnished.

21. Pipes

It should be checked that the same is as per makes specified in the contract.

Dimensions, including weight and tensile strength, shall be checked form Govt or Govt. approved independent list laboratory, for which randomly selected samples from each lot of supply will be taken. The cost of such testing will be borne by the contractor.

22. Insulation and acoustic lining

Physical verification for thickness and make should be made as per the contract before the application of insulation. The manufacturer's test certificate for density should be furnished.

Note: The accuracy of testing instruments shall be as mentioned in the final inspection procedure.

23. FINAL INSPECTION:

After completion of the entire installation as per specification in all respects, the contractor shall demonstrate trouble-free running equipment and installation for a period of a minimum of **120 hours of running**. After the trial run, the AC contractor shall offer the plant for the seasonal test as mentioned in the **Final Performance and Capacity Test**. The test result, as per CPWD General Specifications for HVAC works 2004, Appendix G, shall be furnished. The equipment capacity computations shall be carried out as per CPWD General Specifications for HVAC works 2004, para-B, under notes of Appendix G. The input KW of the unit / TR at full load shall also be checked against contract requirements. Pressure drops across the chiller and condenser at specified flow rates shall be checked against the contract requirements. All instruments for testing shall be provided by the AC contractor. Water flow meter: Water flow shall be measured using the water flow meter.

System shall be balanced within the following tolerances.

Water flow rates

- Chilled Water: 2% of flow
- Condenser Water: 5% of flow

24.ELECTRICAL INSTALLATION

STANDARD SPECIFICATION OF MOTOR CONTROL CENTRE (MV PANEL), POWER & CONTROL CABLING

All Electrical Installations shall comply with the technical specifications mentioned in the respective **Technical Specifications - Electrical**.

STANDARD SPECIFICATION ON ELECTRICAL MOTORS AND STARTERS

This section deals with the supply, installation, testing and commissioning of all types of motors used for pumps, air-handlers, compressors, cooling towers, etc. The motor installation, wiring & its control shall be carried out in accordance with the specifications as detailed below. All motors shall be of a minimum efficiency level **IE3** unless otherwise mentioned.

25.EQUIPMENT GUARDS AND RAILS

Provide readily removable guards or railings for belt drives and rotating machinery. Guards shall consist of heavy angle iron frames, hinged and latched, with heavy galvanized iron crimped mesh wire securely fastened to frames.

26.PAINTING

Painting requirements of this section shall confirm to the relevant standards. Provide surface preparation, priming, and final coat application in strict accordance with the manufacturer's recommendations. Provide field painting of all piping, hangers, supports, equipment platforms, railings, and miscellaneous metals located outdoors (including galvanized jacketed piping, insulated ductwork, and insulated piping). **Provide painting of all exposed mechanical items.**

27.Welding of Pipes

The welding procedure shall only be carried out by fully trained and experienced welders and shall conform to IS-823. PURCHASER reserves the right to set the correct welding procedure if not satisfied. The welding electrode shall be of reputed make and shall have a suitable coating complying with relevant Indian Standards.

All welding electrodes used for the work shall strictly conform to **IS 814:2004 – Covered Electrodes for Manual Metal Arc Welding of Carbon and Carbon Manganese Steel**. Compliance with this Indian Standard is mandatory to ensure proper weld quality, mechanical strength, and compatibility with carbon steel piping and structural materials used in HVAC installations.

As per the **Ministry of Commerce and Industry notification (S.O. 3153(E) dated 14th July 2023)**, all welding electrodes supplied for use in projects must bear the **ISI Standard Mark** on the electrode packaging. The ISI marking confirms that the electrodes are manufactured under a valid **BIS license** and meet the prescribed quality and safety standards.

This requirement became **mandatory with effect from 16 January 2024**, and only **ISI-marked welding electrodes** are permitted for use in projects. Any electrode packets supplied without the **ISI mark and valid BIS certification** shall be considered **non-compliant and shall be rejected at the site during inspection**.

All piping shall be tested by filling water, removing air locks, foreign materials, etc. and applying pressure **at 1.5 times the maximum working pressure** (but not less than 10 kg/sq.cm.) and seeing that the pressure drop is within 0.5 Kg per Sq. cm over a period of **24 hours**. The testing shall be carried out in sections by blocking both ends or closing the valves provided. After completion of the installation and connecting to the mains of the pumping system, the installation shall once again be tested and rectify breakage if any breakage or replace the defective material replaced, free of cost. All leaks and defects in joints revealed during the testing shall be rectified to the satisfaction of the Engineer-in-Charge. Piping repaired after the above pressure test shall be retested in the same manner. The system may be tested in sections, and such sections shall be securely capped. Pressure gauges may be capped off during pressure testing of the installation.

28.DISMANTLING ACTIVITY

The following operation procedure shall be followed for dismantling:

- Dismantling of equipment from its existing location
- Leading and buying back as identified/confirmed by the Engineer in charge.
- Proper cordoning/ barricading shall be done to ensure the safety of public/other building services while dismantling is in progress.

Dismantling activities shall be done in such a manner **that it doesn't affect the existing or adjacent structure/equipment located near the item**. Any damage occurred while dismantling activity shall be made good at the risk and cost of the contractor. No extra payment would be made regarding the same.

Contractor to ensure a site visit to assess the dismantling items before sharing their offer

29.IDENTIFICATION OF SERVICES

SCOPE

The scope of this section comprises the identification of services for each piece of equipment.

VALVE LABELS AND CHARTS

All valves shall be identified with 2mm **UV-stabilised** acrylic laminate tags (indoor) or SS316 tags (outdoor) featuring white engraved lettering on a black background, indicating the service name and a reference number matching the "as-built" drawings. Tags must be permanently secured to the valve neck using SS316 stainless steel ball chains. Additionally, a wall-mounted valve chart—consisting of a **colour-coded** schematic and a comprehensive schedule detailing valve size, service, and normal operating position—shall be displayed in each plant room, protected by an **aluminium** frame with anti-glare safety glass.

IDENTIFICATION OF SERVICES.

Pipe work shall be legibly marked with black or white letters to indicate the type of service and the direction of flow, identified as follows: -

- Chilled Water: CHW
- Condenser Water: CONDW
- Pipe shall have the letters F and R added to indicate flow and return, respectively, as well as directional arrows.

30. GENERAL

Mechanical services shall generally be designed and installed with provisions to contain noise and the transmission of vibration, generated by moving plant and equipment at source, as illustrated on the tender drawings and plant and equipment schedules, to achieve the acceptable noise rating specified for occupied areas.

In addition to the provisions specified in the Specification, particular attention must be given to the following details at the time of ordering plant and equipment and their installation: -

- a) All moving plant, machinery and apparatus shall be **statically and dynamically balanced** at manufacturers works and certificates issued.
- b) The isolation of moving plant, machinery and apparatus, including lines, equipment, **from the building structure.**
- c) Where ductwork and pipe work services pass through walls, floors and ceilings, or where supported shall be surrounded with a **resilient acoustic absorbing material** to prevent contact with the structure and minimise the outbreak of noise from plant rooms.
- d) The reduction of noise breakout from plant rooms and the selection of externally mounted equipment and plant to meet the ambient noise level requirements of the Specifications.
- e) Electrical conduits and connections to all moving plant and equipment shall be carried out in **flexible conduit** and cables to prevent the transmission of vibration to the structure and nullify the provisions of anti-vibration mountings.
- f) All resilient **acoustic absorbing materials shall be non-flammable, vermin and rot-proof and shall not tend to break up or compress sufficiently** to transmit vibration or noise from the equipment to the structure.

31.ANTI-VIBRATION MOUNTINGS.

All items of rotating and reciprocating plant and equipment shall be isolated from the structure by the use of anti-vibration materials, mountings or spring-loaded supports fixed to either **concrete bases, inertia blocks or support steels** as indicated.

Centrifugal pumps shall be mounted on **inertia bases consisting of reinforced concrete sub-base, anti-vibration mountings and concrete-filled steel upper plinth**. The Contractor shall be responsible for issuing the steel upper plinth and mountings to the Contractor for building-in.

Pipe work connections to circulating pumps, chillers, cooler coils and other equipment shall be made with **flexible connections as per Specifications**.

The construction of the anti-vibration mountings shall generally comply with the following: -

Enclosed Spring Mounting (Caged or Restrained Springs)

Each mounting shall consist of cast or fabricated telescopic top and bottom housing enclosing one or more helical steel springs as the principal isolation elements and shall incorporate a built-in levelling device.

The springs shall have an outside diameter of not less than 75% of the operating height and be selected to have at least 50% overload capacity before becoming coil bound. The bottom plate of each mounting shall have bonded to it a neoprene pad designed to attenuate any high-frequency energy transmitted by the springs.

Mountings incorporating snubbers or restraining devices shall be designed so that the snubbing, damping, or restraining mechanism is capable of being adjusted to have no significant effect during the normal running of the isolated machine.

A restrained isolator shall be provided on chillers, subject to approval by the manufacturers.

OPEN SPRING MOUNTINGS.

Each mounting shall consist of one or more helical steel springs as the principal isolation elements and shall incorporate a built-in levelling device. The spring shall be fixed or otherwise securely located to cast or fabricated top and bottom plates and shall have an outside diameter

of not less than 75% of the operating height and shall be selected to have at least 50% overload capacity before becoming coil bound. The bottom plate shall have bonded to it a neoprene pad designed to attenuate any high-frequency energy transmitted by the springs.

NEOPRENE-IN-SHEAR MOUNTINGS.

Each mounting shall consist of a steel top plate and base plate completely embedded in oil-resistant neoprene. Each mounting shall be capable of being fitted with a levelling device, and bolt holes in the base plate and tapped holes in the top plate so that they may be bolted to the floor and equipment where required.

INERTIA BASES FOR PUMPS.

The inertia base shall be an all-welded mild steel channel frame, the minimum depth of which shall be 1/12 of the longest span between isolator but not less than 150 mm, filled with concrete, the density of which shall be 2300 kg/m³. The inertia base shall be sufficiently large to provide support for all parts of the equipment, including any component that overhangs the equipment base, such as suction and discharge elbows on centrifugal pumps. The frame shall include pre-located equipment anchor bolts fixed into position and housed in a steel sleeve, allowing minor bolt location adjustment. Isolator support brackets shall be welded into the corners of the base and suitably reinforced for the load of the equipment and base.

Additional reinforcing roads shall be provided at 200 mm centres to ensure the concrete and frame are adequately stiffened against distortion.

DENSITY OF VIBRATION ISOLATORS

Density Designation	Density (kg/m ³)	Loading (kg/m ²)
Light	3.0-4.5	250- 2500
Medium	5.5-6.0	2500 - 20000
Heavy	7.0-7.5	15000-30000

FLEXIBLE CONNECTIONS

Flexible connections shall be provided on all rotating plant and equipment isolated from the structure and anti-vibration materials or mountings. Pipe work crossing building movement or construction joints shall be installed with flexible connections.

Flexible connections shall be fitted **to all pump suction and discharge connections, chillers and other vibrating equipment and where anti-vibration mounts and inertia bases are fitted.** Flexible connections shall be fitted to all cooler coil chilled water pipe work connections. Flexible connections shall allow freedom of movement of the plant in all plans. Making flanges to pipe work flexible connections shall be of the smooth-faced weld-nick type.

Rubber Bellows shall be fitted as close to the source of vibration as practicable. The pipe at the other end of the bellows shall be a fixed point. Rubber bellows shall be a single convolution of multiply reinforced **EPDM rubber with wire reinforced cuffs.** Flanges shall be able to swivel and be removable. The date of manufacture shall be moulded on the bellows.

Flexible connections with screwed connections shall be reinforced EPDM rubber hoses and shall have at least one full union to avoid torturing on installation. **Flexible pipe connections on chilled water systems shall be suitable for a working pressure of 10 bar and a test pressure of 17 bar.**

32. TECHNICAL DATA TO BE FURNISHED WITH TENDER:

CHILLERS:

1 CHILLERS

1. Model
2. Manufacturing Place
3. Nominal Capacity (TR)
4. Overall Dimensions (L × W × H)
5. Operating Weight (Kg)
6. AHRI Certification (Yes/No, with certificate copy)
7. Minimum Clearance Required All Around
8. Type of Foundation Required
9. Noise Level at 1 m Distance from Machine (dB(A))

1.1 COMPRESSOR

1. Type of Compressor
2. Model
3. Manufacturer
4. Overall Dimensions
5. Weight
6. Refrigerant
7. Number of Compressors per Chiller
8. Operating Speed (RPM)
9. Type of Drive
10. Operating Suction / Discharge Temperature
11. Capacity in TR at Operating Conditions
12. Range of Capacity Control (%)
13. Power Consumption at Part Loads (kW):
 - a. 100% Load
 - b. 75% Load
 - c. 50% Load
 - d. 25% Load

14. Type of Bearings
15. Type of Motor
16. Motor Manufacturer
17. Motor Rating (kW)
18. Motor RPM
19. Method of Starting Offered
20. Starting Current (Amps)
21. Class of Insulation
22. Class of Protection (IP Rating)
23. Range of Operating Voltage & Frequency

1.2 WATER COOLED CONDENSER

1. Manufacturer of Condenser
2. Shell Diameter
3. Shell Length
4. Number of Circuits
5. Entering Water Temperature (°C)
6. Leaving Water Temperature (°C)
7. Water Flow Rate (LPM)
8. Total Water Side Heat Transfer Area (Sq.m)
9. Total Refrigerant Side Heat Transfer Area (Sq.m)
10. Material of Tubes
11. Tube Diameter (mm)
12. Tube Thickness (mm)
13. Material of Baffles
14. Test Pressure (kg/cm² or bar)
15. Degree of Subcooling (°C)
16. Pressure Loss Across Condenser (m of wg)

1.3 CHILLER (EVAPORATOR)

1. Type of Chiller – Flooded/Falling Film
2. Material of Shell
3. Shell Diameter

4. Shell Thickness
5. Shell Length
6. Total Length
7. Material of Tubes
8. Nature of Tube Surface (Plain / Enhanced)
9. Number of Tubes
10. Tube Thickness
11. Tube Length
12. Water Side Heat Transfer Area (Sq.m)
13. Refrigerant Side Heat Transfer Area (Sq.m)
14. Entering Water Temperature (°C)
15. Leaving Water Temperature (°C)
16. Water Flow Rate (LPM)
17. Pressure Drop (kPa / m of wg)
18. Number of Circuits
19. Type of Expansion Device

1.4 GUARANTEED POWER CONSUMPTION FIGURES FOR THE CHILLER

1. Power Consumption for Compressor (kW)
2. Total Power Consumption of Chiller Package (kW)
3. Power Factor
4. TDD
5. THDv

2 CONDENSER WATER PUMPS

1. Make
2. Model
3. Type
4. Water Flow – LPM
5. Head – m
6. Operating Speed (RPM)
7. Material of Impeller
8. BKW (Brake kW)

9. Efficiency (Performance curves to be enclosed)
10. Type of Motor
11. Motor Rating (kW)
12. Type of Starter

3 CHILLED WATER PUMPS – PRIMARY

1. Make
2. Model
3. Type
4. Water Flow – LPM
5. Head – m
6. Operating Speed (RPM)
7. Material of Impeller
8. BKW (Brake kW)
9. Efficiency (Performance curves to be enclosed)
10. Type of Motor
11. Motor Rating (kW)
12. Type of Starter

4 CHILLED WATER PUMPS – SECONDARY

1. Make
2. Model
3. Type
4. Water Flow – LPM
5. Head – m
6. Operating Speed (RPM)
7. Material of Impeller
8. BKW (Brake kW)
9. Efficiency (Performance curves to be enclosed)
10. Type of Motor
11. Motor Rating (kW)
12. Type of Starter

5 COOLING TOWER

1. Manufacturer
2. Model Offered
3. Type of Tower (Crossflow / Counterflow)
4. Material of Tower Side Casing
5. Materials of Cold Basin and Hot Basin
6. Material of Structural Frame
7. Height of Cold Basin from Floor
8. Material of Fill
9. Material of Support for Fills
10. Material of Rotor
11. Rotor Speed (RPM)
12. Material of Nozzles
13. Make of Motor
14. Motor Rating (kW)
15. Make of Fan
16. Fan Speed (RPM)
17. Type of Drive for Fan (Direct / Belt / Gearbox)
18. Flow Rate Through Tower (m³/hr)
19. Design Wet Bulb Temperature (°C)
20. Delta T (°C)
21. Approach Value (°C)
22. Drift Loss as % of Flow
23. Guaranteed Maximum Total Loss (Not to Exceed Value)
24. Efficiency of Cooling Tower as kW/L/s
25. Materials for Hardware used
26. Counterflow/Crossflow
27. Material for Strainers used
28. Size of Access Door
29. CTI certified

6 PIPES & VALVES

1. Make of Pipes

2. Make of Butterfly Valves
3. Make of Check Valves
4. Make of Two-Way / Three-Way Valves
5. Make of Y-Strainers
6. Make of Thermometers
7. Make of Pressure Gauges

33.LIST OF APPROVED MAKES

Sr. No	Item	Approved Makes	Category
1	Chiller	Carrier/York/Trane /climaveneta/Dunham-Bush	1
2	Cooling Tower	Marley/Evapco/Baltimore Aircoil Company/Advance	1
3	Secondary Pumps	Xylem- Bell & Gossett/Grundfos/Armstrong	2
4	Condenser pumps	Xylem- Bell &Gossett/Grundfos/Armstrong	2
5	Primary Pump	Xylem- Bell &Gossett/Grundfos/Armstrong	2
6	Motors	Siemens/ABB/GEC	2
7	MS Pipes	Jindal- Hissar /TATA	2
8	Pre-Insulated Chilled Water Pipes	Seven Star/Perma pipe/Zeco	2
9	Balancing Valve	Advance/Econosto/Sant/Flowcon/T&A	3
10	Check Valve	Advance/Econosto /Audco / T&A/Zoloto	3
11	Y-Strainer	Econosto/Advance/Sant/Oventrop/T&A/VTM	3
12	Flexible Pipe Connections	Resistoflex /Econosto/Cori /Easyflex	3
13	Pressure Gauge	H. Guru/Feibig/Econosto/Japsin	3
14	Thermometer	H. Guru/Emerald/Econosto/ Feibig/Japsin	3
16	Vibration Isolator	Kinetics/Resistoflex/Dunlop/Mason	3
17	Butterfly Valves	Advance / Audco / Zoloto/T&A	3
18	VFD Drive	Danfoss/Yaskawa/Siemens	3
19	Anchor Fastener	Fischer/Hilti	4
20	Paint	Asian/ICI/Nerolac/Berger	4
21	PVC Conduit	ISI marked	4
22	Welding Electrodes	Advani /Esab/Superon	4

34.CATEGORY REQUIREMENT OF TEST CERTIFICATE / INSPECTION

CATEGORY -1:

- d) Acceptance test to be conducted as per standards or as recommended by the manufacturer in the presence of a CIAL representative at the manufacturer's work (**FAT**).
- e) **Type test certificate** for similar item done; if not, one of the items offered will be type tested.
- f) **Factory Acceptance test reports** witnessed by CIAL representative.

CATEGORY-2:

- d) **Type test certificate** for similar item done; if not, one of the items offered will be type tested.
- e) **OEM** routine test certificate.
- f) **Visual and functional check** by the Engineer-in-Charge at the site.

CATEGORY -3:

- c) OEM routine **test certificate**.
- d) **Visual and functional check** by the CIAL Engineer-in-Charge at the site.

CATEGORY -4:

- b) **Visual and functional check** by the Engineer-in-Charge at the site.