# VOLUME - IA

Technical Conditions of Contract (TCC) for "Pre-Bid Tie up for Erection & Commissioning Sub Contract for Main Plant Package of 2x30MW CGPP"

FOR

HINDALCO INDUSTRIES LIMITED (HIL)

BHARAT HEAVY ELECTRICALS LIMITED

| | | |
|---|---|---|
| Maharatna Company | **Technical Conditions Of Contract (TCC)**<br>**PROJECT ENGINEERING & SYSTEMS DIVISION**<br>**HYDERABAD** | Ref No: HY/PE&SD/SC-PROJECTS/2024-25/TCC/HINDALCO/E&C/01<br>Rev. No. 00 |



**TECHNICAL CONDITIONS OF CONTRACT (TCC)**

**FOR**

# "Pre-Bid Tie up for Erection & Commissioning Sub Contract for Main Plant Package of 2x30MW CGPP"

**FOR**

**HINDALCO INDUSTRIES LIMITED (HIL)**

| **Revisions:** Refer to record of revisions | Prepared By: | Checked By: | Approved By: | Date |
|---|---|---|---|---|
| | | | | 10.11.2024 |
| | | | | |

# Volume IA
# Part I
# Contract Specific Details

## Chapter I- Introduction

### 1.0 Introduction:

1.1 Aditya Alumina refinery complex in Kansariguda, Odisha is set up by HINDALCO Industries Limited (HIL). The project is based on the Kodingamali bauxite deposit in the Rayagada District of Odisha approved by the Government of Odisha. This complex includes an Alumina refinery with a capacity of 0.85 million TPA and requires a cogeneration power plant to meet the steam and power demand.

1.2 BHEL is looking for a competent Erection & Commissioning Sub-Bidder (E&CSC) qualified as per the requirements specified under Chapter No.-VI of this TCC, to assist BHEL by providing Erection & Commissioning Services **for Main Plant Package during Pre-bid stage of the tender and E&C during Post order stage (if BHEL bags the order as LSTK) for 2x30 MW CGPP at Aditya Alumina Complex, Kansariguda Unit owned by HINDALCO Industries Limited (HIL), Kansariguda, District- Rayagada, Odisha (India)**, for which BHEL intends to bid as the EPC Bidder.

1.3 This TCC intends to specify the minimum requirements of the Erection & Commissioning Sub Bidder (E&CSC) to be eligible to associate with BHEL for the subject job both for Pre-Bid and Post-Order (if BHEL gets the order from HINDALCO Industries Limited (HIL) in above referred **Main Plant Package of 2x30MW CGPP** Tender). This document provides details to be input by the bidders for submitting their competitive offer.

## Chapter II- Legend

**2.0 Legend:**

| | |
|---|---|
| HIL | HINDALCO Industries Limited (OWNER) |
| BHEL | Bharat Heavy Electricals Limited (EPC Bidder) |
| PE&SD | Project Engineering & Systems Division, Hyderabad (unit of BHEL) |
| PMC | Project Management Consultant |
| E&CSC | Erection and Commissioning Sub Contractor |
| BQC | Bidder Qualification Criteria |
| WO | Work Order |
| LOI | Letter of Intent |
| LSTK | Lumpsum Turnkey |
| EPC | Engineering, Procurement & Construction |
| BEDP | Basic Engineering & Design Procedure |
| BOP | Balance of Plant |
| BD | Basic Data |
| BE | Basic Engineering |
| DE | Detailed Engineering |
| SUP | Supply |
| ST | Storage |
| ERE | Erection |
| TEST | Testing |
| COM | Commissioning |
| PGT | Performance Guarantee Test |

## Chapter III- Project Information

1. **Introduction:** HINDALCO Industries Limited (HIL), the owner/ customer intends to install a Cogeneration Power Plant (CGPP) of 2x30MW STG with 02 nos of CFB boilers each of capacity of 300 TPH at Aditya Alumina Complex, Odisha. HINDALCO Industries Limited (HIL) has appointed TCE as a Project Management Consultant (PMC) for the project. The work will be on an EPC basis.

**2. Project Details**

| | | | |
|---|---|---|---|
| 1 | Customer | : | HINDALCO Industries Limited (HIL), Rayagada, Odisha |
| 2 | Project Information | : | Main Plant Package of 2x30MW CGPP |
| 3 | Location | : | Kansariguda, Rayagada, Odisha |
| 4 | Address Detail | : | Aditya Alumina Complex, HINDALCO Industries Limited (HIL), Kansariguda, Rayagada District, Odisha, India |
| 5 | Nearest Railway Station | : | Singaramba Railway Station, 0.9 KM |
| 6 | Road Approach | : | SH-44, 6.0 KM (Bhawanipatna -Tikiri), NH-26 (Bargarh-Vazianagaram) |
| 7 | Nearest Air Port | : | Visakhapatnam International Airport, Andhra Pradesh, 152 KM |
| 11 | Ambient Air Temperature (Average) | : | a) Maximum : $46.6^0$ C<br>b) Minimum : $3^0$ C |
| 12 | Average Relative Humidity | : | 99 % |
| 13 | Climatic Condition | : | Hot and Dry Climate |

**Bidder is advised to visit the project site and appraise himself about the local conditions and infrastructure available in the area for fulfilling their commitments under the contract. BHEL will not admit any claims whatsoever on account of Bidder's non-familiarization of local conditions.**

## Chapter IV- Scope of Work of E&CSC

### 4.0 Scope:

**4.1** Scope of the Erection & Commissioning Bidder (E&CSC) is to provide support for the erection and commissioning of all types of equipment and BOP supplies by various BHEL Units and other free issue items by Customer, if any, the activities of Site Enabling/ Establishment, Statutory Approvals, Material Handling and Store/Site Preparation, Site Security, Cranes and handling equipments, Safety, quality Services during Pre-bid stage of the tender and during Post order stage (if BHEL bags the order as EPC) for subject package.

**4.2 E&CSC shall execute and be solely responsible for, broadly, the following activities of the subject tender/ project:**

4.2.1 All the plant & equipment and piping, etc., units/sub-units supplied by the BHEL shall be erected by the Bidder. Testing and commissioning of plant & equipment and piping, etc. individually and in an integrated manner shall be under the scope of the Bidder. The Bidder is responsible for ensuring proper installation and satisfactory performance of the plant & equipment, piping, etc. supplied to them.

4.2.2 Bidder's scope of work shall include unloading and storage, preservation, handling at site complete erection/ installation of mechanical, electrical, instrumentation and other associated works, pre-commissioning, commissioning, handing over and performance guarantee testing.

4.2.3 Technological structure for the plant & equipment shall be erected by the Bidder.

4.2.4 The scope shall also include obtaining all necessary approval / statutory clearances from the concerned authority/agencies including IBR. However, Necessary official fees for the same shall be paid by the Customer for site activities.

4.2.5 All statutory fees shall be paid by the Bidder and the same shall be reimbursed by the BHEL/Customer upon production of documentary evidence by the Bidder.

4.2.6 The Bidder shall include in their scope the requirement of oils, grease, lubricants and consumables for the plant & equipment to be supplied by them. All consumables till commissioning shall be in the scope of the Bidder. A list of initial fills of oils, grease and lubricants shall be submitted by the Bidder. Quantities and specifications of the same shall be furnished by the Bidder after the placement of the work order.

4.2.7 Any work/ equipment and material which may not have been specifically mentioned in this Technical Specification but are required to make the plant complete in every respect under Tender condition and necessary for safe operation and guaranteed performance of the plant shall be deemed to have been covered under the scope of this Technical Specification and shall be provided by the Bidder within the quoted price.

4.2.8 The Bidder shall supply all required manpower, E&C tools and related equipment, all hoisting equipment, all necessary scaffoldings, all necessary transporting equipment, and consumables. Construction and erection materials, petrol, diesel oil, Kerosene, solvents, sealing compound, tapes, brazing and soldering materials, welding and brazing gases, packing sheets/compounds, temporary supports, wooden blocks, spacers, templates, jute and cotton wastes, sand/emery paper etc. as required for the satisfactory completion of work.

4.2.9 Pre-Commissioning & Commissioning shall be single point responsibility of the Bidder, completely covering the activities and services in respect of all the equipment & works specified and covered under the Technical Specification as mentioned in the BHEL TCC Specification and HINDALCO Industries Limited (HIL) customer specification **(BIDDING DOCUMENT NO.: TCE.13833A-ME-6002-6001, REV.-0 October 2024)**.

4.2.10 Any loss of plant and equipment due to imprudence, negligence and/or unsuitable treatment and handling shall be replaced by the Bidder at his own cost.

4.2.11 The Bidder shall satisfy the BHEL/Customer by possessing the necessary technical experience and having at his disposal, suitable facilities and staff to ensure that the contract shall be executed with the best quality material and workmanship within the stipulated time.

4.2.12 During site testing and commissioning, the Bidder shall be required to formulate and operate a safety clearance system. The details of these systems are to be approved by the Customer / Consultant.

4.2.13 Pre-bid support is required for submitting the offer to M/s HINDALCO Industries Limited (HIL) during the Pre-Bid Stage.

4.2.14 Erection & Commissioning with respective detailed BOQ of Civil, Electrical, Mechanical, C&I disciplines at Post Bid.

4.2.15 Preparation of Material Requisitions of all Equipment and Package items as defined in the tender elsewhere.

4.2.16 Technical Support in Technical & Construction Audits.

**4.3 E&CSC shall execute E&C Scope, if BHEL is successful in getting the Order.**

Memorandum of Understanding (MoU) will be signed on non-judicial stamp paper of Rs. 200/- by BHEL with L-1 Bidder after reverse auction and /or price negotiation after submission of Bid Bond for 1% value of the finalized price as per the **attached draft (Annexure-A).** The MoU shall be converted into a contract after BHEL wins the order from M/s HINDALCO Industries Limited (HIL). BHEL will intimate the MoU partner to enter into the contract once the order is received from the customer. The following documents (As per the details mentioned in the draft MoU in (**Annexure-A**) shall form part of the contract:

a. Notice Inviting Tender
b. This Technical Specification (relevant part for Post-Bid order)
c. General Conditions of Contract
d. Special Conditions of Contract
e. Forms & Procedure
f. Price Bid
g. Customer Specification as Annexure-I

**Chapter V- Facilities in the scope of BHEL/Bidder**

| S. No. | Description<br><br>PART I | Scope / to be taken care by | | *Remarks* |
|---|---|---|---|---|
| | | **BHEL** | **Bidder** | |
| **5.1** | **ESTABLISHMENT** | | | |
| **5.1.1** | **FOR CONSTRUCTION PURPOSE**: | | | |
| a | Open space for office (as per availability) | Yes | | Location shall be finalized after joint survey with customer. |
| b | Open space for storage (as per availability) | Yes | | Location shall be finalized after joint survey with customer. |
| c | Construction of bidder's office, canteen and storage building including supply of materials and other services | | Yes | |
| d | Bidder's all office equipment, office / store / canteen consumables | | Yes | |
| e | Canteen facilities for the bidder's staff, supervisors and engineers etc. | | Yes | |
| f | Firefighting equipment like buckets, extinguishers etc. | | Yes | |
| g | Fencing of storage area, office, canteen etc. of the bidder | | Yes | |
| **5.1.2** | **FOR LIVING PURPOSES OF THE BIDDER** | | | |
| a | Open space for labor colony (as per availability) | | Yes | |
| b | Labor Colony with internal roads, sanitation, complying with statutory requirements | | Yes | |
| **5.2.0** | **ELECTRICITY** | | | |

| S. No. | Description<br><br>PART I | Scope / to be taken care by | | *Remarks* |
|---|---|---|---|---|
| | | **BHEL** | **Bidder** | |
| **5.2.1** | Electricity For construction purposes | | Yes | Electricity shall be provided by the Customer at one point on a non-chargeable basis. Further distribution from the Customer feeder point shall be done by Bidder. No separate payment for downstream power distribution shall be made. The bidder shall install a calibrated energy meter at the feeder point for billing purposes (if necessary). |
| 5.2.2 | Electricity for the office, stores, canteen etc. of the bidder | | Yes | |
| **5.2.3** | Electricity for living accommodation of the bidder's staff, engineers, supervisors etc. | | Yes | |
| **5.3.0** | **WATER SUPPLY** | | | |
| **5.3.1** | For construction purposes | | Yes | Construction Water shall be provided by the Customer at one point on a non-chargeable basis. Further distribution shall be done by Bidder.—Further distribution from the Customer supply point shall be done by Bidder. No separate payment for downstream water distribution shall be made**.** |
| **5.3.2** | Water supply for bidder's office, stores, canteen etc. | | Yes | |
| **5.3.3** | Water supply for Living Purpose | | Yes | |
| 5.4.0 | **LIGHTING** | | | |
| a | For construction work (supply of all the necessary materials)<br>1. At office/storage area<br>2. At the preassembly area<br>3. At the construction site /area | | Yes | |

| S. No. | Description<br><br>PART I | Scope / to be taken care by | | *Remarks* |
|---|---|---|---|---|
| | | **BHEL** | **Bidder** | |
| b | For construction work (execution of the lighting work/ arrangements)<br>1. At office/storage area<br>2. At the preassembly area<br>At the construction site /area | | Yes | |
| c | Providing the necessary consumables like bulbs, switches, etc. during the course of project work | | Yes | |
| d | Lighting for the living purposes of the bidder at the colony / quarters | | Yes | |
| **5.5.0** | **COMMUNICATION FACILITIES FOR SITE OPERATIONS OF THE BIDDER** | | | |
| a | Téléphone, fax, internet, intranet, e-mail etc. | | Yes | |
| **5.6.0** | **COMPRESSED AIR wherever required for the work** | | Yes | |
| **a** | Supply of Compressor and all other equipments required for compressor & compressed air system including pipes, valves, storage systems etc | | Yes | |
| **b** | Installation of above system and operation & maintenance of the same | | Yes | |
| **c** | Supply of the all the consumables for the above system during the contract period | | Yes | |
| **5.7.0** | **Demobilization of all the above facilities** | | Yes | |
| **5.8.0** | **TRANSPORTATION** | | | |
| a | For site personnel of the bidder | | Yes | |
| b | For bidder's equipment and consumables (T&P, Consumables etc.) | | Yes | |

| Sl. No | Description<br><br>PART II | Scope / to be taken care by | | *Remarks* |
|---|---|---|---|---|
| | | **BHEL** | **Bidder** | |
| **5.9.0** | **Erection Facilities** | | | |

| Sl. No | Description<br><br>PART II | Scope / to be taken care by | | *Remarks* |
|---|---|---|---|---|
| | | **BHEL** | **Bidder** | |
| **5.9.1** | **Engineering works for construction:** | | | |
| a | Providing the erection drawings for all the works covered under this scope | | Yes | Drawing schedule shall be finalized at the time of kick off meeting |
| b | Drawings for erection methods | | Yes | In consultation with BHEL |
| c | As-built drawings – where ever deviations observed and executed and also based on the decisions taken at site- example – routing of small bore pipes | | Yes | In consultation with BHEL |
| d | Shipping lists etc. for reference and planning the activities | Yes | | |
| e | Preparation of site erection schedules and other input requirements | | Yes | In consultation with BHEL |
| f | Review of performance and revision of site erection schedules in order to achieve the end dates and other commitments | Yes | Yes | In consultation with BHEL |
| g | Weekly erection schedules based on S. No. e. hard copy to Construction manager, by email to HO. | | Yes | In consultation with BHEL |
| h | Daily erection / work plan based on S. No. g. hard copy to Construction manager, by email to HO. | | Yes | In consultation with BHEL |
| i | Periodic visit of senior official of the bidder to site to review the progress so that works are completed as per schedule. It is suggested this review by the senior official of the bidder should be done once in every two Weeks. | | Yes | |
| j | Arranging the materials required for Work | | Yes | |
| k | Coordination for inspection & checking and getting clearance from customer | | Yes | |
| l | Preparation of formats for completion of activities | | Yes | |
| m | Preparation of preassembly bay | | Yes | |
| **5.10** | **Work Permits, gate pass etc. from customer for manpower, machinery and material** | | Yes | |
| 3.11 | Ambulance Services for Bidder's site staff | | Yes | |

**5.9 Open Space:**

i) BHEL shall provide the Bidder through end customer HIL, adequate levelled unhindered and unencumbered land inside the Plant premises for all construction infrastructures, batching plants, maintenance workshop, fabrication yard, bending yard, field offices, temporary structures, storage of construction materials, etc. free of cost.
ii) The construction and subsequent demolition/area clearance of such facility shall be at Bidder 's own cost.
iii) BHEL shall not provide to the Bidder any residential accommodation to any of his staff and the Bidder has to make his own arrangements.
iv) Bidder has to make his arrangements for the labour colony.
v) Location and area requirements for office/storage sheds/fabrication yards shall be discussed and mutually agreed to.

**5.10 Construction Power:** Construction Power shall be provided by the BHEL/HIL (free of cost) within battery limits of each section/unit and at Bidder's construction infrastructure locations, Bidder will tap off from the existing 6.6 kV switchgear system.

5.10.1 Bidder shall have to make their arrangement for feeding to various load centres. This shall include supply, laying and termination of required power and control cables, associated distribution boards, if required, breakers etc. The Bidder shall make its own arrangements to lay and maintain necessary distribution lines and wiring at its own cost.

5.10.2 Provision of distribution of electrical power from the given points to the required places with proper distribution boards, approved cables and cable laying including supply of all materials like cables, switch boards, pipes etc., observing the safety rules laid down by electrical authority of the State/ BHEL / their customer with appropriate statutory requirements shall be the responsibility of the tenderer / Bidder.

5.10.3 The Bidder shall ensure that the electrical equipment employed by the Bidder will be such that the aggregate power factor does not fall below 0.9 at the Customer 's terminal point. Penalty if any levied by customer on this account will be recovered from Bidder's bills.

5.10.4 Bidder has to make their own arrangements for electricity requirement for labour colony at their cost. Any duty, deposit involved in getting the Electricity for Bidders use i.e. Office shed, labour colony etc. shall be borne by the bidder.

5.10.5 BHEL is not responsible for any loss or damage to the Bidder's equipment as a result of variations in voltage / frequency or interruptions in power supply.

5.10.6 The Bidder will employ Electricians having valid Electrical License for carrying out the installations as well as for maintenance.

5.10.7 However, in case the HIL/BHEL is not in a position to provide Construction Power due to Grid failure of State Electricity Board or any other reason whatsoever, Bidder shall make his own arrangement for Construction Power without affecting the work schedule.

5.10.8 No claim whatsoever shall be entertained on account of non-availability of Construction Power from BHEL except that the generation cost including cost of diesel shall be reimbursed to Bidder for construction power generated by him due to non-availability of construction power from Customer.

5.10.9 The Bidder has to arrange and install switchboards with HRC fuses and switches including cable of required length (from Customer supply to Bidder's main board and further distribution Boards) of appropriate size and capacity at his own cost. Power supply shall be made available by Customer only after fulfilling the above requirements.

**5.11 Construction Water:**

Construction Water shall be provided by Customer (free of cost) within battery limits of each section / unit and at Bidder's construction infrastructure locations. Further distribution shall be done by Bidder at his own cost.

The Bidder shall be responsible to store water in sufficient quantities to meet its requirements and ensure that there is no wastage of water. Quantum of supply will depend on availability and no claim for shortfall shall be allowed by BHEL.

However, in case BHEL/ HIL is not able to provide construction water due to any reason whatsoever, Bidder shall be responsible for making all arrangements for Construction water at his cost. Any statutory requirements/ documentation etc. to this effect shall be met by the Bidder.

Non-availability of water due to any reason shall not entitle the Bidder for any claim against BHEL because of cost and time implications.

**5.12 Online Site Construction Management System (SCMS):**

5.12.1 Two Nos of computers and printers (MFP) of latest configuration (preferably i5 processor, 8GB Ram, 1 TB Hard disk, with internet provision on all the computers), along with one data entry operator per computer to be arranged by Bidder for reporting of daily progress, billing, updating details in online SCMS package of BHEL, etc., within the quoted rate.

**5.13 Consumables:** All consumables shall be of approved type. The Bidder shall use the BHEL / Customer approved consumables only.

5.13.1 The Bidder shall provide within finally accepted price / rates, all consumables like welding electrodes (including alloy steel and stainless steel), all gases (inert, welding, and cutting), soldering material, dye penetrants, radiography films. Other erection consumables such as wrap cloth, tapes, jointing compound, grease, lubricants, M-seal, Araldite, petrol, CTC / other cleaning agents, grinding and cutting wheels are to be provided by the Bidder. Steel, H&S, packers, shims, wooden planks, scaffolding and pre-assembly materials, hardware items etc. required for temporary works such as supports, scaffoldings and bed are to be arranged by him. Sealing compounds, gaskets, gland packing, wooden sleepers, for temporary work, required for completion of work except those, which are specifically supplied by BHEL, are also to be arranged by him.

5.13.2 All consumables to be used for the job shall have to be approved by BHEL prior to use.

5.13.3 All the shims, gaskets and packing, which go finally as part of equipment, shall be supplied by BHEL free of cost.

5.13.4 In the event of failure of Bidder to bring necessary and sufficient consumables, BHEL shall arrange for the same at the risk and cost of the Bidder. The entire cost towards this along with standard BHEL overhead shall be deducted from the Bidder's immediate due bills.

**5.14 Gases:**

5.14.1 All the required gases like Oxygen / Acetylene / Argon / Nitrogen required for work shall be supplied by the Bidder at his cost. It shall be the responsibility of the Bidder to plan the activities and store sufficient quantity of these gases. Non-availability of gases shall not be considered as reason for not attaining the required progress.

5.14.2 BHEL reserves the right to reject the use of any gas in case required purity is not maintained.

5.14.3 The Bidder shall submit weekly / fortnightly / monthly statement report regarding consumption of all consumables for cost analysis purposes.

5.14.4 The Bidder shall ensure safekeeping of the inflammable cylinder at a separate place away from normal habit with proper security etc.

**3.15 Electrodes Supply and Storage**

5.15.1 It shall be the responsibility of the Bidder to obtain prior approval of BHEL, before procurement, regarding suppliers, type of electrodes etc. On receipt of the electrodes at site, it shall be subject to inspection and approval by BHEL. The Bidder shall inform BHEL details regarding type of electrodes, batch number and date of expiry etc. Test certificates for electrodes and other consumables should be submitted to BHEL Engineer as per requirement.

5.15.2 Shortage of any of the electrodes or the equivalent suggested by BHEL shall not be quoted as reason for deficiency in progress or for additional rate. Bidder shall submit weekly/ fortnightly/ monthly statement/ report regarding consumption and available stock of all types of electrodes for avoiding stoppage of work on consumable scarcity.

5.15.3 Storage of electrodes shall be done in an air conditioned / controlled humidity room as per requirement, at his own cost by the Bidder.

3.15.4 All low hydrogen electrodes shall be baked / dried in the electrode-drying oven (range 375 deg. C - 425 deg. C) To the temperature and period specified by the BHEL Engineer before they are used in erection work and each welder should be provided with one portable electrode drying oven at the work spot. Electrode drying oven and portable drying ovens shall be provided by Bidder at his cost.

5.15.5 In case of improper arrangement of procurement of above electrodes BHEL reserves the right to procure the same from any source and recover the cost from the Bidder's first subsequent bills at market value plus departmental charges of BHEL communicated from time to time. Postponement of such recovery is not permitted.

5.15.6 BHEL reserves the right to reject the use of any electrodes at any stage, if found defective because of bad quality, improper storage, date of expiry, unapproved type of electrodes etc. It shall be the responsibility of the Bidder to replace at his cost without loss of time.

**5.16 Possession of Generators**

As there are bound to be interruptions in regular power supply, power cut/ load shedding in any construction sites, suitable extension of time, if found necessary only be given and Bidder is not entitled for any compensation. It shall be the responsibility of the tenderer / Bidder to provide, and maintain the complete installation on the load side of the supply with due regard to safety requirements at site. It shall be responsibility of the Bidder to have at least one diesel operated welding generator sets to get urgent and important work to go on without interruptions. The consumables required to operate the generators are to be provided by tenderers. This may also be noted while quoting. No separate payment shall be made for this contingency.

**5.17 Lighting Facility:**

Adequate lighting facilities such as flood lamps, hand lamps and area lighting shall be arranged by the Bidder at the site of construction, pre-assembly yard and Bidder's material storage area etc. at his cost.

**5.18 Bidder's Obligation on Completion**

On completion of work, all the temporary buildings, structures, pipelines, cables etc. shall be dismantled and leveled and debris shall be removed as per instructions of BHEL by the Bidder at his cost. In the event of his failure to do so, the expenditure towards clearance of the same will be recovered from the Bidder. The decision of BHEL Engineer in this regard shall be final.

**5.18 Potable/Drinking Water:** The Bidder shall at his own cost provide supply of drinking water at office, canteen and other accommodation for his staff and workmen including provisions of toilets and other welfare facilities in compliance with the relevant laws. The Bidder shall also provide communication, transport and medical facilities to his staff and workmen. Bidder has to make his own arrangements for his water requirement for his labour colony at his cost.

**5.19 Other Facilities**

i) Adequate water less urinals (male & female both) shall be arranged by the Bidder within quoted rates, at site of construction at different level and different areas of works with proper disposal arrangement.
ii) Bidders have to comply requirements of HSE & Statutory requirement in line with Customer/ BHEL HSE plan.
iii) Bidders have to arrange labour rest sheds, drinking water facility, toilets, canteen facility as per local labour act/BOCW act. Maintaining hygiene and disposal of debris, scraps, canteen items and area cleaning is included in Bidder's scope.
iv) Bidder has to arrange trained scaffolding experts with accreditation from statutory agencies with proper experience and they will issue fitness certificates for safe use. Such kind of qualified scaffolding experts will vary as per job requirement. At the same time, training has to be given by these experts at regular intervals for their own workers for increasing no. of experts.
v) Agencies HSE officers should have sufficient experience as per rule 209 of BOCW act central rule 1998. Agencies HSE officers will be part of BHEL HSE Team and they will be responsible for giving training on HSE issues in addition to normal field works and other normal site requirements.
vi) Preparation of method statement, HIRA, Job Safety analysis, permit to work, Lifting plans, and all supporting documents as required for starting & continuation of work/job is in Bidder's scope.
vii) First aid facilities shall be maintained by Bidder at no. of working places as required as per instruction of BHEL Engineer. The basic medical facility will be maintained by BHEL at site.
viii) Bidder has to arrange land within his quoted rate for making labour colony. Bidder's labour colony has to be maintained with proper hygiene, drinking water, bathroom water, lighting arrangement, sewerage system. These facilities are to be regularly maintained including drains, surrounding, and upkeepment of labour colony. BHEL/Customer & local statutory authorities will visit labour colony from time to time and all healthy conditions are to be maintained by Bidder.
ix) Scaffolding pipes, clamps, safety nets, floor grills for working platforms are to be made of good quality with proper certifications as per IS Codes.

**5.20 Dewatering:** Bidder shall ensure at all times that the work area & approach/ access roads are free from accumulation of water, so that the materials are safe and the erection/ progress schedule are not affected. All equipments/materials required for dewatering such as pumps, pipes and accessories shall be arranged by the Bidder. No separate claim in this regard shall be admitted by BHEL.

**5.21 Site Organization**

i) The Bidder shall provide adequate staffing in the following areas in addition to the staffing requirements of execution as instructed/informed by BHEL:
   a) Overall planning, monitoring & control.
   b) Quality control and quality assurance.
   c) Materials management.
   d) Safety, fire & security.
   e) Industrial relations and fulfilment of labour laws and other statutory obligations.

ii) The Bidder shall maintain a site organization of adequate strength in respect of manpower, construction machinery and other implements at all times for smooth execution of the contract. This organization shall be reinforced from time to time, as required to make up for slippage from the schedule without any commercial implication to BHEL. The site organization shall be headed by a competent Construction Manager having sufficient authority to take decisions at site.

iii) The Bidder should also submit to BHEL for approval a list of construction equipment, erection tools, tackle etc prior to commencement of site activities. These tools & tackles shall not be removed from site without written permission of BHEL.

## 6.0 Bidders (E&CSC) Qualification Criteria:

### 6.1 Technical Criteria

6.1.1 The Bidder (sole or consortium) should have carried out Erection & Commissioning /of the following equipment in a single / separate project during last Twenty (20) years ending last date of the month previous to the one in which NIT is published

**(a)** One (01) no. coal fired Boiler of steam generation capacity not less than 100TPH and
**(b)** One (01) no. Steam Turbine Generator having power generation capacity not less than 20MW.

6.1.2 Bidder in support of the above-mentioned Technical Eligibility criteria, copies of the following documents should be submitted by the Bidder:

(a) Work Order(s)/ any other letter of award of work/ Contract Agreement(s)/ Purchase Order(s)/any other documents in respect of Technical Eligibility Criteria as above.
(b) Commissioning Certificate/ Completion certificate/ Final acceptance certificate/ any other documents indicating completion corresponding to above.

### 6.2 Financial Criteria

6.2.1 The average annual financial Turnover of E&CSC during any of the preceding five financial years i.e., 2023-2024, 2022-2023, 2021-2022, 2020-2021 & 2019-2020 shall be equal to or more than INR **20.0 Crs.**

6.2.2 Net worth of the Bidder based on the latest Audited Accounts as furnished for 'C1' above should be positive.
Net worth = Paid up share capital* + Reserves. (*Share Capital OR Partnership Capital OR Proprietor Capital as the case may be)

6.2.3 Bidder must have earned cash profit in any one of the five Financial Years as applicable in the last five years defined in 'C1 above based on latest Audited Accounts. NET cash profit= (PAT + Non-cash expenditure viz depreciation).

6.2.4 Audited financial statement have to be submitted for all the five years as indicated against clause above. If financial statements are not required to be audited statutorily, then instead of audited financial statements, financial statements are required to be certified by chartered accountant. Published Annual Report available in the public domain shall also be acceptable.

6.2.5 In case audited Financial statements have not been submitted for any of five years as indicated above, then the applicable audited statements submitted by bidders against the requisite five years, will be averaged for five years i.e. total divided by five.

6.3 For evaluation of PQR, in case Bidder alone does not meet the pre-qualifying technical criteria- B above, bidder may utilize the experience of its Parent/ Subsidiary Company along with its own experience, subject to following:

The parent company shall have a controlling stake of ≥50% in the subsidiary company.

i) The Parent Company/ Subsidiary Company of which experience is being utilized for bidding shall submit Security Deposit (SD) equivalent to 1% of the total contract value.

ii) The parent/ subsidiary company and bidder shall provide an undertaking that they are jointly or severally responsible for successful performance of the contract.

6.4 The bidder can be a company under Companies Act, 1956 or Partnership firm or Proprietor firm. Bidder to submit the document for same.

6.5 E&CSC shall not be under not been banned or blacklisted or de-listed or put on Holiday by any Government / Quasi-Government / Public Sector Undertaking / Private Firm / Financial Institutions on due date of submission of bid.

## Chapter VII-Bid-Evaluation Criteria

### 7.0 Bid-Evaluation Criteria:

7.1 The bid evaluation shall be on Lumpsum L1 basis as per the Lumpsum Price in the attached Price Bid Format. Quotations submitted in partial will be summarily rejected. BHEL will not entertain any other expenses/ assumptions written separately elsewhere other than those specified in the price bid format. Price shall be quoted in Indian Rupees.

7.2 Memorandum of Understanding (MoU) will be signed on non-judicial stamp paper of Rs. 200/- by BHEL for Post-bid work with L-1 Bidder after reverse auction and /or price negotiation after submission of Bid Bond for 1% value of the finalized price as per attached draft. The MoU shall be converted into contract after BHEL wins the order from M/s HINDALCO Industries Limited (HIL). BHEL will intimate the MoU partner for entering into the contract once the order is received from the customer.

7.3 E&CSC shall not have any claim whatsoever on the Post-Order component, if BHEL is not successful in winning the Contract.

**Chapter VIII- Terms of Contract**

## 8.0 Terms of Contract:

**8.1** BHEL reserves the right of cancellation of this NIT at its discretion, based on the status of Tender or time available for submitting BHEL's offer to M/s HINDALCO Industries Limited (HIL) or as per business decision.

**8.2** The MoU shall be valid for at least **180 days from the last date of opening of Unpriced Technical and Commercial bid by Customer (M/s HINDALCO Industries Limited (HIL)))** or date of signing of contract agreement post issue of work order in case BHEL gets the order from M/s HINDALCO Industries Limited (HIL), whichever is earlier. Further extension of the validity of MoU shall be on mutual agreement.

**8.3 Completion schedule for Unit-1 & 2 shall be 24 months & 27 months from the date of commencement of work for the respective unit.**

**8.4 Contract Period shall be Twenty Seven Months (27) Months from the date of commencement of work in Unit-1 & Unit-2, whichever is later . Date of commencement shall be a mutually agreed date between BHEL & E&CSC after issue of work order for the separately for ech of Unit-1 & Unit-2 . However for determining the completion period of the contract the later of the commencement date in unit 1 and 2 shall be reckoned.**

**8.5** E&CSC shall not sublet the work without prior written permission of BHEL.

**8.6** The bid price shall be all-inclusive and shall cover all services necessary for the successful completion of the project. Any services, if specifically, not included in the specification but found necessary for the safe and satisfactory functioning of the units shall be erected and commissioned by the Bidder at no extra cost to BHEL.

**8.7** Bidder shall take all necessary measures to protect the work and workmen against accident and occupational diseases. Bidder shall observe and comply with all Governmental safety regulations as well as BHEL/Customer's and accepted industry safety practices as required for this work

**8.8** If any contradiction arises between the BHEL TCC Specification and the HINDALCO Industries Limited (HIL) Customer specification (Bidding Document No.: **TCE.13833A-ME-6002-6001**, Rev.0 October 2024), the **Customer Specification shall supersede** the BHEL TCC Specification.

## Chapter IX- Guarantees and Penalties

### 9.0 Guarantees and Penalties:

9.1 Since speedy completion of project is essential for a tight project schedule, it shall be responsibility of E&CSC to ensure timely delivery of all milestones.

9.2 E&CSC shall familiarize fully with the standard/ procedures/ practice of BHEL/Customer, to avoid any dispute at later date and after order placement.

9.3 BHEL shall not pay any amount, other than the fee specifically agreed, towards any cost incurred by E&CSC by way of salaries to their employees (income and taxes), insurance of any nature, benefits/ bonus to the employees, etc. BHEL's liability is limited to the amount contracted for the services to be rendered under the scope of work defined.

9.4 E&CSC shall bear all expenses/ fee penalties in case of suits, court proceedings, damage claims etc., due to any reason whatsoever.

9.5 E&CSC shall ensure that it possesses the latest revisions of various national and international standards, codes of practices, statutory & environmental regulations etc. as applicable, for execution of the work. BHEL shall not provide any such documents to E&CSC. Engineers of E&CSC assigned for this project shall have familiarity on relevant documents as mentioned above for their use and applications.

9.6 E&CSC shall maintain at their own cost the personal accidents policy, life insurance and / or any such insurance required in respect of their personnel deputed to outstation visits for the given contract.

9.7 E&CSC shall keep all information/data/drawings etc. related to the E&C work as confidential information and shall not divulge or use the information indirectly or directly in any way detrimental to the interest of BHEL. All drawings, documents, manuals, including all originals prepared or obtained during the work shall remain the property of BHEL and shall be handed over to BHEL on demand.

9.8 All T&Ps for E&C work are to be deployed by the Bidder as and when required as per instruction of BHEL/Customer/PMC. If works is delayed due to non-availability of above T&Ps, BHEL reserves the right to deploy the same and recover the charges thereof from the contractor as per prevailing market rate/hiring rate/BHEL internal hiring rates + Applicable overhead rates.

## Chapter X- Statutory Regulation

**10.0** BUILDING & OTHER CONSTRUCTION WORKERS (REGULATION OF EMPLOYMENT AND CONDITIONS OF SERVICE) ACT, 1996 (BOCW Act) AND RULES OF 1998 READ WITH BUILDING & OTHER CONSTRUCTION WORKERS CESS Act, 1996 & CESS RULES, 1998 and

INTER-STATE MIGRANT WORKMEN ACT, 1979 (IN CASE BIDDER ENGAGE MANPOWER FROM OTHER STATE)

In case any portion of work involves execution through building or construction workers and/or inter-state migrant workers, then compliance to the above titled Acts as applicable shall be ensured by the Bidder and Bidder shall obtain license and deposit the cess under the Act. In the circumstances, it may be ensured as under: -

It shall be the sole responsibility of the Bidder in the capacity of employer to forthwith (within a period of 15 days from the award of work) apply for a license to the Competent Authority under the BOCW Act and/or ISMW Act as applicable and obtain proper certificate thereof by specifying the scope of its work. It shall also be responsibility of the Bidder to furnish a copy of such certificate of license / permission to BHEL within a period of one month from the date of award of contract.

It shall be the sole responsibility of the Bidder as employer to ensure compliance of all the statutory obligations under these acts and rules including that of payment / deposit of cess as per the applicability under above referred Acts within a period of one month from the receipt of payment.

It shall be the responsibility of the sub-Bidder to furnish the receipts / challans towards deposit of the cess together with the number, name and other details of beneficiaries (building/Inter-state Migrant workmen) engaged by the sub-Bidder during the preceding month.

It shall be the absolute responsibility of the sub-Bidder to make payment of all statutory payments & compensations to its workers including that is provided under the Workmen's Compensation Act, 1923.

## Chapter XI- Field Quality Control Plan

Work shall be executed as per approved field quality control plan (FQCP). Indicative quality control plan of HINDALCO Industries Limited (HIL) is attached **Annexure-I**. Bidder shall prepare, submit the field quality control plan in line with HINDALCO Industries Limited (HIL) QCP.

Submitted FQCP shall be reviewed and approved by BHEL/HIL/ TCE.

## Chapter XII- List of Documents

**Work shall be performed as per below listed documents, customer/ BHEL specifications,:**

| Sl No | Description | Reference | Remarks |
|---|---|---|---|
| **1** | Technical Specification of HINDALCO Industries Limited (HIL) | Annexure-I | |
| **2** | Draft MOU | Annexure-A | |
| **3** | | | |

## Chapter XIII- Price Bid Format

**Price Schedule**

| ITEM NO. | DESCRIPTION | UOM | TOTAL PRICE(Rs) |
|---|---|---|---|
| **1.0** | Complete Erection and commissioning of the Plant "Main Plant Package of 2x30MW CGPP" as per the TCC/Technical/Tender specification. | Lumpsum | |
| | **TOTAL** | | |

**NOTES: -**

1. E&CSC to quote strictly as per BHEL's NIT requirements.
2. E&CSC to note that this is a LUMP SUM Turn-Key Order. Any additional claim after placement of order will not be entertained under any circumstances.
3. E&CSC to quote the base rates only. Goods and Services Tax shall be indicated separately for the Erection & Commissioning Portion.
4. E&CSC shall also submit unpriced copy of the Price-Bid Format with "Quoted" against each line item of the format along with the technical offer.
5. E&CSC to quote strictly in the price bid format with line wise itemized price
6. Payment of GST will be made as per GCC & SCC document.
7. A detailed Billing Break up (BBU) shall be prepared by the bidder after award of the work and shall be approved by BHEL. The same approved BBU shall be used for item wise payment to the bidder for monthly RA Bill payments
8. All the requirements stipulated in the Tender Specification, Replies to Pre bid queries, subsequent amendments, Clarifications etc issued by M/s BHEL/ TCE (from date of issue of Tender to date of Handing over of the Plant) shall be met by E&CSC. However, Tender Specification, amendments, Clarifications etc issued by M/s TCE/BHEL, Three(3) days prior to bid submission date shall be considered for Bid evaluation.
9. In the event of price reduction during negotiation by BHEL with end Customer, corresponding reduction will be passed on to the successful E&CSC.

Signature of Erection & Commissioning Sub-Bidder (E&CSC)

Authorized representative .....

Date.....

# VOLUME -IB

## PART—II

## Technical Specification

# A. STEAM TURBINES - 2 nos. (each of 30 MW)

***Erection Weight per Steam Turbine as below:***

**Note: For 2 Turbines, Erection Agency should consider 2 times of below erections weights**

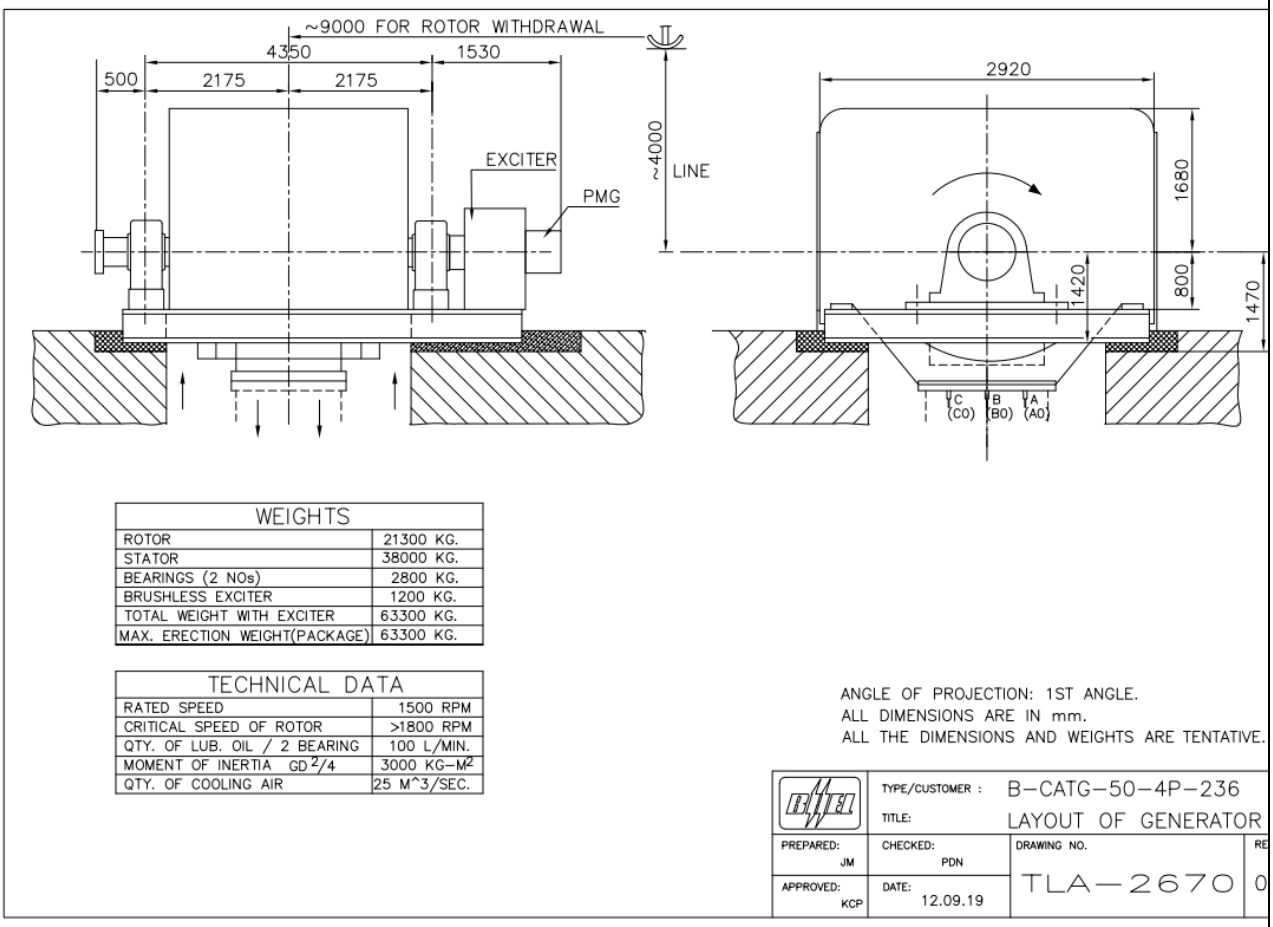
| Erection Weights are as follows | | **Wts / Qty** | |
|---|---|---|---|
| a) Total Turbine Assembly | : | 50,000 | kgs |
| b) Gear Box | : | 13,000 | kgs |
| c) Oil Tank (MOT, OHOT) | | 10,000 | kgs |
| d) Lube Oil System (2 No. MOP, EOP, JOP, OIL CENTRIFUGE, LUBE OIL FILTER ETC.) | : | 12,000 | kgs |
| e) GOVERNING CONSOLE | | 1,200 | kgs |
| f) LUBE OIL PIPING | | 10,000 | kgs |
| g) INTEGRAL PIPING & VALVES | | 10,000 | Kgs |
| h) Local Instrumentation | : | 5,000 | Kgs |

# B. GENERATORS - 2 nos (each of 30 MW)

***Erection Weight per Generator as below:***

**Note: For 2 Generators, Erection Agency should consider 2 times of below erections weights**

| S.NO. | ITEM | WIDTH MM. | DEPTH MM | HEIGHT MM | WEIGH KG |
|---|---|---|---|---|---|
| A. | GENERATOR | | | | |
| 1. | AS PER LAYOUT DRG. NO. TLA-2670-Rev02 | | | | |
| B | BRUSHLESS EXCITATION SYSTEM | | | | |
| 1. | BRUSHLESS EXCITER | AS | PER | LAYOUT | DRG. |
| 2. | PILOT EXCITER | AS | PER | LAYOUT | DRG. |
| | | | | | |
| C | CONTROL,METERING,RELAY, PROTECTION & SYNCHRONISING PANELS | | | | |
| 1. | CONTROL PANEL | 2000 | 1000 | 2300 | 1000 |
| 2. | RELAY AND PROTECTION PANEL | 2000 | 1000 | 2300 | 1200 |
| D | GENERATOR AUXILIARY CUBICLE(GAC) | | | | |
| 1. | GAC | 6000 | 3000 | 4000 | 8500 |




| WEIGHTS | |
|---|---|
| ROTOR | 21300 KG. |
| STATOR | 38000 KG. |
| BEARINGS (2 NOs) | 2800 KG. |
| BRUSHLESS EXCITER | 1200 KG. |
| TOTAL WEIGHT WITH EXCITER | 63300 KG. |
| MAX. ERECTION WEIGHT(PACKAGE) | 63300 KG. |

| TECHNICAL DATA | |
|---|---|
| RATED SPEED | 1500 RPM |
| CRITICAL SPEED OF ROTOR | >1800 RPM |
| QTY. OF LUB. OIL / 2 BEARING | 100 L/MIN. |
| MOMENT OF INERTIA $GD^2/4$ | 3000 KG-$M^2$ |
| QTY. OF COOLING AIR | 25 M^3/SEC. |

ANGLE OF PROJECTION: 1ST ANGLE.
ALL DIMENSIONS ARE IN mm.
ALL THE DIMENSIONS AND WEIGHTS ARE TENTATIVE.

| | | | |
|---|---|---|---|
| BHEL | TYPE/CUSTOMER : B-CATG-50-4P-236 | | |
| | TITLE: LAYOUT OF GENERATOR | | |
| PREPARED: JM | CHECKED: PDN | DRAWING NO. TLA-2670 | RE 0 |
| APPROVED: KCP | DATE: 12.09.19 | | |

# C. Heat Exchangers

***Erection Weight for HE is per STG as below:***

**Note: For 2 STGs, Erection Agency should consider 2 times of below erections weights**

| Sl.No | Equipment | Overall Dimensions (in mm) | Quantity | Dry Weight (in kgs) |
|---|---|---|---|---|
| *1.* | ***Surface Condenser*** | | | (Wt / no.) |
| a. | Main Assly | L 6500 x W 3700 x H 3800 | 1 no. | 45,000 |
| b. | Hot Well | L 3000 x W 2200 x H 2200 | 1 no. | |
| c. | Dome | L 3000 x W 1000 x H 2500 | 1 no. | |
| *2.* | ***Steam Jet Air ejector*** | | | |
| | Assly | L 6000 x W 2800 x H 3000 | 1 no. | 7,500 |
| *3.* | ***Gland Steam Condenser*** | | | |
| a. | Complete Assly. | L 4000 x W 1300 x H 1200 | 1 no. | 1400 |
| *4.* | ***Spray cum Tray Deaerator*** | | | |
| a. | Heater Assly. | L 5300 x W 2600 x H 2800 | 1 no. | 35000 |
| b. | Storage Tank Assly. | L 12500 x W 4000 x H 4250 | 1 no. | |
| *5.* | ***HP Heater*** | | | |

| | | | | |
|---|---|---|---|---|
| | Complete Assly. | L 2600 x W 1300 x H 1200 | 1 no. | 1400 |
| *6.* | ***HP Flash Tank*** | | | |
| | Complete Assly. | Dia. 1500 x H 2800 | 1 no. | 3000 |
| *7.* | ***ST Oil Cooler*** | | | |
| | Complete Assly. | Dia. 750 x H 4500 | 2 nos. | 5500 |
| *8.* | ***STG Air Cooler*** | | | |
| c. | Per Element | L 3000 x W 670 x H 630 | 6 nos. | 850 |

# D. CFBC BOILERS: 2 nos. (each of 300 TPH)

**BOILER PARAMETERS**

| Description | Unit | BMCR |
|---|---|---|
| **Main steam** | | |
| Steam flow at MSSV | t/h | 300 |
| Steam pressure at MSSV | bar (a) | 70 |
| Steam temperature at MSSV | °C | 490 |
| **Feed water** | | |
| Feed water temperature at eco. Inlet | °C | 190 |
| Reheat steam | | |
| Reheat flow | t/h | NA |
| Pressure at inlet | $kg/cm^2(a)$ | NA |
| Temperature at inlet | °C | NA |
| Pressure at outlet | $kg/cm^2(a)$ | NA |
| Temperature at outlet | °C | NA |
| Peak capacity | t/h | N.A. |

**SALIENT DESIGN FEATURES**

Circulating Fluidized Bed Boiler
Combustor with bottom refractory lining.
Two number cooled cyclones with inside refractory lining
Two number ash rotary drum coolers.
Natural circulation
Superheaters and Economiser
Balanced draft furnace
Two nos Radial PA Fans
Two nos Radial SA Fans
Speed control of PA, SA&ID fans by Inlet damper & VFD
One number APH.
One no. Electrostatic precipitator
Fuel, limestone cum bed material bunkers.
Start-up fuel LDO firing system, Load rise with LDO firing system, with 2 Nos. start-up burners.
Wallseal blowers
SNCR system

***Erection Weight per CFBC Boiler as below:***

**Note: For 2 Boilers, Erection Agency should consider 2 times of below erections weights**

| Product Group No. | Description | Weight |
|---|---|---|
| 04 | BOILER DRUM(S) | 50.0 |
| 05 | WATER WALL HEADERS | 23.0 |
| 06 | WATER WALL PANELS | 365.0 |
| 07 | CIRCULATION SYSTEM COMPONENTS | 184.0 |
| 08 | BUCKSTAYS AND FRAMING | 140.0 |
| 09 | SEAL BOXES | 10.0 |
| 10 | SUPERHEATER HEADERS | 46.0 |
| 11 | SUPERHEATER COILS AND WALLS | 221.0 |
| 12 | SUPERHEATER COMPONENTS | 99.0 |
| 15 | REHEATER HEADERS | 0.0 |
| 16 | REHEATER COILS AND WALLS | 0.0 |
| 17 | REHEATER COMPONENTS | 0.0 |
| 18 | ROOF SKIN CASING | 1.3 |
| 19 | ECONOMISER HEADERS, COILS AND COMPONENTS | 165.0 |
| 21 | SOOT BLOWER AND SOOT BLOWING SYSTEM | 15.0 |
| 24 | BOILER INTEGRAL PIPING & FITTINGS | 40.5 |
| 28 | MANHOLES & FURNACE OPENINGS | 4.0 |
| 30 | FIXING COMPONENTS FOR MAIN BOILER LINING & INSULATION | 21.0 |
| 31 | BOILER SKIN CASING | 2.0 |
| 32 | FIXING COMPONENTS FOR BOILER AUXILIARIES INSULATION | 65.7 |

| Product Group No. | Description | Weight | |
|---|---|---|---|
| 33 | LINING AND INSULATION MATERIALS | 700.0 | |
| 34 | BUNKER COLUMNS | 332.0 | |
| 35 | BOILER SUPPORTING STRUCTURES | 1250.0 | 170 tons ceiling girder, 18 tons metapoly roof sheets |
| 36 | GALLERIES AND STAIRWAYS | 320.0 | 120 tons galvanized grills, 10 ton hand rails, 15 tons stairs Al. sheet 0.71mm thickness |
| 37 | BOILER OUTER CASING | 125.0 | |
| 38 | INTERCONNECTING WALKWAYS | 0.0 | |
| 39 | EXTERNAL STRUCTURES (SUPPORTING STRUCTURES FOR ID SYSTEM) | 70.0 | |
| 42 | OIL & GAS SYSTEM | 19.0 | |
| 44 | BOTTOM ASH HANDLING SYSTEM | 10.0 | |
| 47 | FUEL PIPING | 18.0 | |
| 48 | DUCTS, DAMPERS & EXPANSION JOINTS | 360.0 | |
| 49 | CYCLONES, VORTEX FINDERS | 0.0 | |
| 66 | BUNKERS | 310.0 | |
| 80 | External piping | 10.0 | |
| 81 | Tanks & Vessels | 10.0 | |
| | | | |
| | PP | 1208.5 | |
| | NPP | 1566.0 | |
| | Structure | 2212.0 | |
| | Total | 4986.5 | |

**LIST OF MAJOR EQUIPMENT WATER VOLUMES FOR PR. PARTS/PAINTING AREA**

| Sl. No. | Description | No. off per boiler | Data |
|---|---|---|---|
| 1. | Combustor size | 1 | W12.5x D6.4m x H34m |
| 2. | No. of PA Fans | 2 | |
| | Type/Size | | Radial/NDV 22 |
| | Speed | rpm | 1460 |
| | Motor rating | kW | 725 |
| | Speed control | | VFD and Inlet damper |
| 3. | No. of SA Fans | 2 | |
| | Type/Size | | Radial/NDV 19 |
| | Speed | rpm | 1432 |
| | Motor rating | kW | 375 |
| | Speed control | | VFD and Inlet damper |
| 4. | No. of ID Fans | 2 | |
| | Type/Size | | Radial/NDZV 25 |
| | Speed | rpm | 959 |
| | Motor rating | kW | 850 |
| | Speed control | | VFD and Inlet damper |
| 5. | Wallseal blower | 2 Nos. | 1 W+ 1 S |
| | Type | | Positive displacement |
| | Speed | rpm | 500 |
| | Drive | | Belt driven |
| | Motor rating | kW | 200 |
| | Approximate weight | kg | 4000 |
| 6. | Purge seal blower | 0 Nos. | |
| | Type | | |
| | Speed | rpm | |
| | Drive | | |
| | Motor rating | kW | |
| | Approximate weight | kg | |
| 7. | No. of GR Fans | 0 | |
| | Type/Size | | |
| | Speed | rpm | |
| | Motor rating | kW | |
| | Speed control | | |
| | Approximate weight | kg | |
| 8. | Ash cooler air blower | 0 Nos. | |
| | Type | | |

| | | | |
|---|---|---|---|
| | Speed | rpm | |
| | Drive | | |
| | Motor rating | kW | |
| | Approximate weight | kg | |
| 9. | Airheater | 1 | 300 tons |
| | Type | | Tubular |
| 10. | Electrostatic precipitator | 1 (2 Streams) | 1 X FAA -5 X 45M -2 X 108150 – 2 |
| 11. | Water volume | $m^3$ | |
| | Economiser coils | | 42 |
| | Headers & piping-Economiser | | 1.7 |
| | Superheater coils | | 32.0 |
| | Back Pass Wall | | 6.7 |
| | Headers & piping-Superheater | | 17.3 |
| | Wing wall Evaporators | | 3.2 |
| | Combustor Water Walls incl cyclones | | 33.0 |
| | Headers & piping-Evaporator | | 27.4 |
| | Drum Up to NWL | | 4.9 |
| | Total | | 177 (incl. 5% reserve) |
| 12. | Painting area | $m^2$ | 60,000 |
| 13. | Weight summary | | |
| | Pressure parts (PG Nos. 04, 05, 06, 07, 10, 11, 12, 15, 16, 17, 19, 20, 21, 24) | tons | 1208.5 |
| | Non-pressure parts (PG Nos. 08, 09, 18, 28, 30, 31, 32, 33, 34,35,36, 37,38, 39,40,46, 48, 65, 67 & 99) | tons | 3741.0 |
| | Firing system (PG Nos. 41, 42, 43, 45 & 47) | tons | 37.0 |
| | Others (PG Nos. 80, 81) | tons | 20 |
| | Boiler Valves | tons | 25.0 |
| | Boiler BOI | tons | 270.0 |
| | Boiler C & I | tons | 25.0 |

## DETAILS OF HP ERECTION WELDS FOR HINDALCO RAYAGADA ODISHA 300 tph CFBC Boilers

## (Per Boiler)

**Note: For 2 Boilers, Erection Agency should consider 2 times of below erections weights**

| SL NO | PG NO: | DESCRIPTION | MATERIAL | OD (mm) | T (mm) | NO OF WELDS |
|---|---|---|---|---|---|---|
| 1 | 07 | DOWNCOMERS | SA106 GRC | 368 | 40 | 15 |
| 2 | 06 | COMBUSTOR PANELS | SA106 GRC | 57 | 8 | 1860 |
| 3 | 05 | HEADERS | SA106 GRC | 323.9 | 50 | 16 |
| 4 | 07 | RISERS | SA106 GRC | 159 | 16 | 150 |
| 5 | 12 | PIPE/PIPE BEND + PIPE/PIPE BEND | SA106 Gr.C + SA106 Gr.C | 273 | 25 | 2 |
| 6 | 12 | ELBOW + PIPE BEND | SA234WP22 + SA106GrC | 273 | 25 | 1 |
| 7 | 12 | DRUM STUB + SAT CONN. PIPE | SA106 GRC | 273 | 25 | 8 |
| 8 | 12 | PIPE + PIPE BEND | SA106 GRC | 273 | 25 | 8 |
| 9 | 12 | PIPE BEND + PIPE BEND | SA106 GRC | 273 | 25 | 16 |
| 10 | 11 | CYCLONE INLET DUCT | SA106 GRC | 38.1 | 6 | 300 |
| 11 | 11 | CYCLONE | SA106 GRC | 38.1 | 6 | 960 |
| 12 | 11 | SEAL POT & RETURN LEG | SA106 GRC | 38.1 | 6 | 200 |
| 13 | 11 | SEAL POT O/L to CYCLONE I/L | SA335P12 | 273 | 30 | 4 |
| 14 | 11 | CYCLONE OUTLET DUCT | SA 213 T11 | 38.1 | 6 | 400 |
| 15 | 10 | HANGER INLET HDR | SA106GRC | 273 | 25 | 4 |
| 16 | 10,12 | HANGER INLET HDR.NIPPLE + HANG. TUBE | SA106 GRC + SA213 T22 | 38.1 | 6 | 106 |
| 17 | 12 | HANG. TUBE + ITSH. COIL HANG. TUBE | SA213 T22+ SA213 T22 | 38.1 | 6 | 106 |
| 18 | 12 | ITSH. COIL HANG. TUBE + RH2. COIL HANG. TUBE | SA213 T22 + SA213 T22 | 38.1 | 6 | 106 |
| 19 | 12 | RH2 HANG. TUBE + RH1. COIL HANG. TUBE | SA213 T22 | 38.1 | 6 | 106 |
| 20 | 12 | RH1. COIL HANG. TUBE + HT (LOWER) | SA213 T22 | 38.1 | 6 | 106 |
| 21 | 10 | HT (LOWER) + B.P.LOWER RING HDR | SA213 T22 + SA106GrC | 38.1 | 6 | 106 |
| 22 | 10 | B.P.LOWER RING HDR. ELBOW + HDR. PIPE | SA335P12 | 273 | 36 | 4 |
| 23 | 10 | B.P.GAS INLET HDR. ELBOW + HDR. PIPE | SA335P12 | 273 | 36 | 4 |
| 24 | 10,11 | B.P.LOWER RING HDR. NIPPLE + FRONT PANEL | SA106 Gr.C + SA213 T11 | 38.1 | 6 | 110 |
| 25 | 11 | PANEL + B.P.GAS INLET RING HDR.NIPPLE | SA213 T11 + SA335 P12 | 38.1 | 6 | 110 |
| 26 | 10 | B.P.GAS INLET HDR.NIPPLE + PANEL | SA335 P12 + SA213 T11 | 38.1 | 6 | 110 |
| 27 | 10 | PANEL + B.P.ROOF.OUTLET HDR.NIPPLE | SA213 T11 + SA335 P12 | 38.1 | 6 | 110 |
| 28 | 11 | PANEL + LOOSE TUBE | SA213 T11 + SA213 T11 | 38.1 | 6 | 110 |
| 29 | 10 | LOOSE TUBE + PANEL | SA213 T11 + SA213 T11 | 38.1 | 6 | 110 |
| 30 | 10,11 | B.P.LOWER REAR SIDE RING HDR + PANEL | SA213 T11 + SA213 T11 | 38.1 | 6 | 110 |
| 31 | 11 | PANEL + PANEL | SA213 T11 + SA213 T11 | 38.1 | 6 | 110 |
| 32 | 11 | PANEL + PANEL(ROOF) | SA213 T11 + SA213 T11 | 38.1 | 6 | 110 |
| 33 | 11,10 | BP ROOF PANEL + B.P.ROOF OUTLET HDR | SA213 T11 + SA213 T11 | 38.1 | 6 | 220 |
| 34 | 10,11 | B.P. LOWER LEFT SIDE RING HDR + PANEL | SA210 Gr.A1 + SA213 T11 | 38.1 | 6 | 70 |
| 35 | 11 | PANEL + PANEL | SA213 T11 + SA213 T11 | 38.1 | 6 | 70 |
| 36 | 11,10 | PANEL + B.P. LEFT SIDE WALL OUTLET HDR | SA213 T11 + SA213 T11 | 38.1 | 6 | 70 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 37 | 10,11 | B.P. LOWER RIGHT SIDE RING HDR + PANEL | SA213 T11 + SA213 T11 | 38.1 | 6 | 70 |
| 38 | 11 | PANEL + PANEL | SA213 T11 + SA213 T11 | 38.1 | 6 | 70 |
| 39 | 11,10 | PANEL + B.P RIGHT SIDE WALL OUTLET HDR | SA213 T11 + SA213 T11 | 38.1 | 6 | 70 |
| 40 | 10 | B.P FRONT/REAR WALL OUTLET HDR+ LINK | SA335 P12 + SA335 P12 | 273 | 36 | 2 |
| 41 | 10,12 | B.P SIDE WALL OUTLET HDR EQ.TEE + LINK | SA234WPC + SA335 P12 | 273 | 36 | 2 |
| 42 | 12 | LINK + LINK | SA335 P12 + SA335 P12 | 159 | 16 | 4 |
| 43 | 12,10 | PIPE BEND + ITSH IL HDR | SA335 P12 + SA335P12 | 219 | 28 | 16 |
| 44 | 10,11 | ITSH INLET HDR.NIPPLE + ITSH COIL | SA213T12 +SA335P22 | 44.5 | 6.3 | 212 |
| 45 | 11,10 | ITSH COIL + ITSH OUTLET HDR.NIPPLE | SA213T22 +SA335P22 | 44.5 | 6.3 | 212 |
| 46 | 10 | ISH OUTLET HDR.TEE + PIPE | SA234WP22CL1 + SA335P22 | 406.4 | 70 | 4 |
| 47 | 10 | ELBOW + PIPE/ PIPE BEND | SA234WP12CL1 + SA335P22 | 406.4 | 70 | 2 |
| 48 | 12 | PIPE + DESH-II | SA335P22 | 406.4 | 70 | 1 |
| 49 | 10 | PIPE + FSH INLET HDR.TEE | SA335P22 + SA234WP12CL1 | 406.4 | 70 | 4 |
| 50 | 10,11 | WWSH HEADER + HDR NIPPLE + PANEL | SA213T91 | 38.1 | 6.6 | 400 |
| 51 | 10 | FSH O/L HDR TEE + PIPE | SA335P22 + SA335P22 | 406.4 | 70 | 4 |

| SL NO | PG NO: | DESCRIPTION | MATERIAL | OD (mm) | T (mm) | NO OF WELDS |
|---|---|---|---|---|---|---|
| 52 | 10 | PIPE + PIPE /ELBOW | SA335P22 + SA234WP22 | 406.4 | 70 | 2 |
| 53 | 10 | PIPE BEND + PIPE | SA335P22 | 406.4 | 70 | 1 |
| 54 | 10 | PIPE BEND + HDR TEE | SA335P22 + SA234WPC | 406.4 | 70 | 2 |
| 55 | 10 | PIPE + VALVE | SA335P22 + DA216WCB | 406.4 | 70 | 2 |
| 56 | 10 | PIPE + VALVE | SA335P22 + DA216WCB | 406.4 | 70 | 1 |
| 57 | 17 | RH Inlet Pipe to DESH | SA106 Gr.C | 457.2 | 30 | 1 |
| 58 | 15 | DESH to RH Inlet HDR | SA106 Gr.C | 457.2 | 30 | 2 |
| 59 | 16 | RH INLET HDR.NIPPLE + RH COIL-I | SA213 T11 + SA213 T11 | 44.5 | 4 | 424 |
| 60 | 16 | RH COIL-I + RH COIL-II | SA213 T11 + SA213 T91 | 44.5 | 4 | 424 |
| 61 | 16 | RH COIL-II + RH OUTLET HDR.NIPPLE | SA213T91 | 44.5 | 4 | 424 |
| 62 | 19 | ECO inlet Pipe To HDR | SA106 Gr.C | 273 | 28 | 1 |
| 63 | 19 | ECO. INLET HDR.NIPPLE + ECO COIL-I | SA106 Gr.C + SA201Gr.A1 | 38.1 | 4 | 106 |
| 64 | 19 | ECO COIL-I + ECO COIL-II | SA210 Gr.A1 | 38.1 | 4 | 106 |
| 65 | 19 | ECO COIL-II + ECO COIL-III | SA210 Gr.A1 | 38.1 | 4 | 106 |
| 66 | 19 | ECO COIL-III + ECO. OUTLET HDR.NIPPLE | SA210 Gr.A1 + SA106 Gr.C | 38.1 | 4 | 106 |
| 67 | 19 | ECO OUTLET HDR.EQ.TEE + PIPE BEND | SA234WP22 + SA106Gr.C | 219.1 | 22.23 | 6 |
| 68 | 24 | PIPE + PIPE/ BEND PIPE/ PIPE LOOP/ REDUCER | SA106 Gr.C OR SA234 WPB | 60.3 | 3.91 | 95 |
| 69 | 24 | PIPE + ELL/ VALVE OR TEE/ HRSB INLET THERMOWELL | SA106 Gr.B + SA105 | 60.3 | 3.91 | 40 |
| 70 | 24 | PIPE + VALVE OR TEE | SA106 Gr.B + SA105 | 33.4 | 3.38 | 15 |
| 71 | 24 | PIPE + PIPE OR REDUCER | SA106 Gr.B+ SA106Gr.B OR SA234 WPB | 33.4 | 3.38 | 24 |
| 72 | 24 | PIPE + PIPE/ SP BEND/ PIPE LOOP/ REDUCER | SA335P22 + SA335P22 OR SA234WP22 | 60.3 | 8.74 | 12 |
| 73 | 24 | PIPE + VALVE/TEE | SA335P22 SA182F22 | 60.3 | 8.74 | 21 |
| 74 | 24 | PIPE + VALVE OR TEE | SA106 Gr.B + SA105 | 60.3 | 3.91 | 2 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 75 | 24 | PIPE + PIPE OR REDUCER | SA335P22 + SA335P22 OR SA234WP22 | 60.3 | 8.74 | 19 |
| 76 | 24 | PIPE + VALVE OR TEE | SA106 Gr.B + SA105 | 33.4 | 3.38 | 4 |
| 77 | 24 | PIPE + PIPE OR REDUCER | SA106 Gr.B+ SA106Gr.B OR SA234 WPB | 33.4 | 3.38 | 6 |
| 78 | 24 | REDUCER + PIPE OR COND.LOOP | SA234WPB + SA106GR.B | 21.3 | 2.77 | 1 |
| 79 | 24 | TEE + FLANGE (ie ITEMS 16+17) | SA105 + SA105 | 63.7 | 10 | 5 |
| 80 | 24 | PIPE + VALVE | SA335 P22 + SA182 F22 | 33.4 | 4.55 | 2 |
| 81 | 24 | PIPE + REDUCER | SA335 P22 + SA234WP22 | 33.4 | 4.55 | 1 |
| 82 | 24 | PIPE + CONN. PIECE | SA335 P22 + SA182 F22 CL3 | 60.3 | 8.74 | 682 |
| 83 | 24 | PIPE+VALVE/ BEND/ SOCKET | SA213 TP347H+ SA182 F216 | 14 | 2.9 | 682 |
| 84 | 24 | PIPE + CONNECTOR | SA213 TP347H + SA182 F12 | 14 | 2.9 | 5 |

| SL NO | PG NO: | DESCRIPTION | MATERIAL | OD (mm) | T (mm) | NO OF WELDS |
|---|---|---|---|---|---|---|
| 85 | 24 | PIPE + VALVE | SA106 Gr.B + SA105 | 21.3 | 3.73 | 180 |
| 86 | 24 | PIPE + PIPE/ REDUCER | SA106Gr.B + SA106Gr.B/ SA234WPB | 21.3 | 3.73 | 5 |
| 87 | 24 | PIPE + VALVE | SA335 Gr.P22 + SA182 F22 | 21.3 | 3.73 | 13 |
| 88 | 24 | PIPE + PIPE REDUCER | SA335P22 + SA335P22 OR SA234WP22 | 21.3 | 3.73 | 33 |
| 89 | 24 | PIPE + PIPE BEND/ REDUCER | SA106 Gr.B+ SA106Gr.B OR SA234 WPB | 73 | 7.01 | 100 |
| 90 | 24 | PIPE + PIPE/BEND | SA335 GR.P22 + SA335 GR.P22/SA335 GR.P22 | 33.4 | 6.35 | 13 |
| 91 | 24 | PIPE + PIPE/VALVE | SA106 Gr.B + SA105 | 60.3 | 8.74 | 105 |
| 92 | 24 | PIPE + PIPE/BEND | SA106 Gr.B + SA106 Gr.B/SA106 Gr.B | 60.3 | 8.74 | 18 |
| 93 | 24 | PIPE + PIPE/ VALVE/ BEND | SA335 GR.P22 + SA335 GR.P22/ SA182 F22 | 73 | 9.53 | 20 |
| 94 | 24 | PIPE + VALVE/ STUB/BEND | SA335 GR.P22 + SA182 F22/ SA335 GR.P22 | 108 | 16 | 22 |
| 95 | 24 | PIPE+ VALVE/ TEE | SA106 GR.B+ SA105 /SA105 | 33.4 | 4.55 | 90 |
| 96 | 24 | PIPE+ PIPE/ BEND/ FLAT END COVER | SA106 GR.B+ SA106 GR.B /SA105 | 33.4 | 4.55 | 10 |
| 97 | 24 | PIPE+ VALVE | SA335 GR.P22 + SA182 F22 | 33.4 | 4.55 | 38 |
| 98 | 24 | PIPE+PIPE /BEND | SA335 GR.P22 + SA335 GR.P22 / SA335 GR.P22 | 33.4 | 4.55 | 20 |
| 99 | 24 | PIPE+VALVE | SA335 GR.P22 +SA182 F22 | 33.4 | 6.35 | 90 |
| 100 | 24 | PIPE+PIPE /BEND | SA335 GR.P22 +SA335 GR.P22 / SA335 GR.P22 | 33.4 | 6.35 | 4 |
| 101 | 24 | PIPE + VALVE | SA106 GR.B + SA105 | 48.3 | 7.14 | 8 |
| 102 | 24 | PIPE +PIPE /BEND/ REDUCER | SA106 GR.B + SA106 GR.B /SA234 WPB | 48.3 | 7.14 | 35 |
| 103 | 24 | PIPE+VALVE/TEE | SA106 GR.B +SA105 / SA105 | 60.3 | 5.54 | 76 |
| 104 | 24 | PIPE+ PIPE/ BEND/ FLAT END COVER | SA106 GR.B+ SA106 GR.B /SA105 | 60.3 | 5.54 | 8 |
| 105 | 24 | PIPE+ VALVE | SA106 GR.B + SA105 | 60.3 | 8.74 | 100 |
| 106 | 24 | PIPE+PIPE /BEND | SA106 GR.B+ SA106 GR.B /SA106 GR.B | 60.3 | 8.74 | 8 |
| 107 | 24 | PIPE+ VALVE | SA335 GR.P22 + SA182 F22 | 60.3 | 8.74 | 25 |
| 108 | 24 | PIPE+PIPE /BEND | SA335 GR.P22 +SA335 GR.P22 / SA335 GR.P22 | 60.3 | 8.74 | 5 |
| 109 | 24 | PIPE+ VALVE | SA106 GR.B + SA105 | 73 | 7.01 | 33 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 110 | 24 | PIPE +PIPE /BEND/ REDUCER | SA106 GR.B + SA106 GR.B /SA234 WPB | 73 | 7.01 | 2 |
| 111 | 24 | TUBE + CONN. PIECE | SA213 TP347 H + SA182 F12 | 31.8 | 4 | 2 |
| 112 | 24 | TUBE + CONN. PIECE | SA106 GR.B + SA182 F12 | 33.4 | 4.55 | 42 |
| 113 | 24 | PIPE+ VALVE/ TEE | SA106 GR.B+ SA105 /SA105 | 21.3 | 3.73 | 20 |
| 114 | 24 | PIPE +PIPE /BEND/ REDUCER | SA106 GR.B + SA106 GR.B /SA234 WPB | 21.3 | 3.73 | 40 |

| SL NO | PG NO: | DESCRIPTION | MATERIAL | OD (mm) | T (mm) | NO OF WELDS |
|---|---|---|---|---|---|---|
| 115 | 24 | PIPE+ VALVE | SA106 GR.B + SA105 | 33.4 | 4.55 | 50 |
| 116 | 24 | PIPE +PIPE /BEND/ REDUCER | SA106 GR.B + SA106 GR.B /SA234 WPB | 33.4 | 4.55 | 20 |
| 117 | 24 | PIPE+ VALVE / GAUGE | SA106 GR.B + SA105 | 48.3 | 7.14 | 20 |
| 118 | 24 | PIPE +PIPE /BEND/ REDUCER | SA106 GR.B + SA106 GR.B /SA234 WPB | 48.3 | 7.14 | 23 |
| 119 | 24 | PIPE+ VALVE/ TEE | SA106 GR.B+ SA105 /SA105 | 21.3 | 3.73 | 5 |
| 120 | 24 | PIPE +PIPE / REDUCER | SA106 GR.B + SA106 GR.B /SA182 F12 | 21.3 | 3.73 | 56 |
| 121 | 24 | PIPE+ VALVE/ TEE/ELL | SA106 GR.B+ SA105 /SA105 | 33.4 | 4.55 | 15 |
| 122 | 24 | PIPE +PIPE / REDUCER | SA106 GR.B + SA106 GR.B /SA182 F12 | 33.4 | 4.55 | 41 |
| 123 | 24 | PIPE+ VALVE/ TEE | SA106 GR.B+ SA105 /SA105 | 48.3 | 7.14 | 35 |
| 124 | 24 | PIPE +PIPE / REDUCER | SA106 GR.B + SA106 GR.B /SA182 F12 | 48.3 | 7.14 | 20 |
| 125 | 24 | PIPE +PIPE / REDUCER | SA106 GR.B + SA106 GR.B /SA182 F12 | 73 | 9.53 | 4 |
| 126 | 24 | PIPE+CONN.PIECE/ VALVE | SA335 GR.P22 + SA182 F12/ SA182 F22 | 48.3 | 7.14 | 4 |
| 127 | 24 | PIPE+CONN.PIECE | SA106 GR.B + SA182 F12 | 48.3 | 7.14 | 4 |
| 128 | 24 | PIPE+PIPE | SA335 GR.P22 +SA335 GR.P22 | 48.3 | 7.14 | 23 |
| 129 | 24 | PIPE+ VALVE/ TEE | SA106 GR.B+ SA105 /SA105 | 21.3 | 3.73 | 5 |
| 130 | 24 | PIPE +PIPE / REDUCER | SA106 GR.B + SA106 GR.B /SA182 F12 | 21.3 | 3.73 | 56 |
| 131 | 24 | PIPE+ VALVE/ TEE/ELL | SA106 GR.B+ SA105 /SA105 | 33.4 | 4.55 | 15 |
| 132 | 24 | PIPE +PIPE / REDUCER | SA106 GR.B + SA106 GR.B /SA182 F12 | 33.4 | 4.55 | 43 |
| 133 | 24 | PIPE+ VALVE/ TEE | SA106 GR.B+ SA105 /SA105 | 48.3 | 7.14 | 35 |
| 134 | 24 | PIPE +PIPE /BEND/ REDUCER | SA106 GR.B + SA106 GR.B /SA182 F12 | 48.3 | 7.14 | 15 |
| 135 | 24 | PIPE +PIPE /BEND/ REDUCER | SA106 GR.B + SA106 GR.B /SA182 F12 | 73 | 9.53 | 4 |
| 136 | 24 | PIPE+CONN.PIECE/ VALVE | SA335 GR.P22 + SA182 F12/ SA182 F22 | 48.3 | 5.08 | 4 |
| 137 | 24 | PIPE+CONN.PIECE | SA106 GR.B + SA182 F12 | 48.3 | 7.14 | 4 |
| 138 | 24 | PIPE+PIPE | SA335 GR.P22 +SA335 GR.P22 | 48.3 | 5.08 | 12 |
| 139 | 24 | PIPE+PIPE OR MITRE BEND | SA106 GR.B + SA106 GR.B | 219.1 | 6.35 | 6 |
| 140 | 24 | PIPE+PIPE | SA106 GR.B + SA106 GR.B | 60.3 | 3.91 | 12 |
| 141 | 24 | PIPE+PIPE OR MITRE BEND | SA106 GR.B + SA106 GR.B | 114.3 | 6.02 | 10 |
| 142 | 24 | PIPE+PIPE | SA106 GR.B + SA106 GR.B | 33.4 | 3.38 | 20 |
| 143 | 24 | PIPE+ VALVE OR ELL | SA106 GR.B + SA 105 | 33.4 | 3.38 | 11 |
| 144 | 24 | PIPE+ VALVE OR ELBOW | SA106 GR.B + SA 105 | 60.3 | 3.91 | 11 |

**Note:110 tons of piping & fittings considered additionally per boiler**

# E. Valves

***Erection Weight per BTG (Boiler + Turbine + Generator) as below:***

**Note: For 2 BTGs, Erection Agency should consider 2 times of below erections weights.**

| Description of Items | Quantity | Total Weight in Kgs | Remarks |
|---|---|---|---|
| Valves | 520 nos. | 141,000 Kg | Size of valves varies from 0.25" to 28" |

# F. ESP, APH, FANS

***Erection Weight per CFBC Boiler as below:***

**Note: For 2 Boilers, Erection Agency should consider 2 times of below erections weights**

| Description of Items | Quantity | Total Weight in Kgs/litres | Remarks |
|---|---|---|---|
| Fans | 1 lot | 119,000 Kg | |
| Air Pre Heater (TAPH) | 1 lot | 286,000 Kg | including 79 MT Corten steel tubes |
| ESP | 1 lot | 1710,000 Kg | including 225 MT CE of Corten steel & 1 MT SS lining for hopper |
| First Fill of Lubricants | 18 barrels | 3780 litres | |

# G. HT 6.6 kV Motors

***Erection Weight is for total Project as below:***

| Description of Items | Quantity | Weight in Kgs per Motor | Remarks |
|---|---|---|---|
| ID FAN | 4 nos | 7600 | |
| SA FAN | 4 nos | 3500 | |
| PA FAN | 4 nos | 5800 | |
| BFP | 4 nos | 7800 | |

# H. HT Switchgear

***Erection Weight is for total Project as below***

| SOE Item No. | Qty. of Switch boards | Qty. of Panels in each switch board | Item Details / Name of Switchboard | Package Size | Total Number of Packages | Package Serial Nos. (From... | To) | Width of Switch board (m) | Height of Switch board (m) | Depth of Switch boa |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 28 | Panels– 6.6kV CPP Unit Switchgear-1 | **Double** | 14 | 1 | 14 | 22.960 | 2.800 | 2.927 |
| 2 | 1 | 28 | Panels– 6.6kV CPP Unit Switchgear-2 | **Double** | 14 | 15 | 28 | 22.960 | 2.800 | 2.927 |
| 3 | 1 | 39 | Panels– 6.6kV CPP Staton Switchgear-1 | **Double** | 19 | 29 | 47 | 31.980 | 2.800 | 2.927 |
| 3 | | | | **Single** | 1 | 48 | 48 | 0.820 | 2.800 | 2.927 |
| 4 | 1 | 34 | Panels– 6.6kV CPP Staton Switchgear-2 | **Double** | 17 | 49 | 65 | 28.280 | 2.800 | 2.927 |
| 5 | 1 | 9 | Panels– 6.6kV DG Switchger | **Double** | 4 | 66 | 69 | 7.780 | 2.800 | 2.927 |
| 5 | | | | **Single** | 1 | 70 | 70 | 0.820 | 2.800 | 2.927 |

| PROJECT SUMMARY | |
|---|---|
| **Total SOE Items** | **5** |
| **Total Panels** | **138** |
| **Total No. of Packages (Double Size)** | **68** |
| **Total No. of Packages (Single Size)** | **2** |
| **Grand Total No. of Packages** | **70** |
| **Grand Total Shipping Volume (Cbm)** | **997** |
| **Grand Total Shipping Weight (Metric Tonnes)** | **207** |

| SHIPPING SIZE DETAILS | | | |
|---|---|---|---|
| **Double Size Package** | | **Single Size Package** | |
| **Weight** | **3MT** | **Weight** | **1.5 MT** |
| **Volume** | **14.43** Cbm | **Volume** | **8.03 Cbm** |
| **Width** | **1.85 m** | **Width** | **1.03 m** |
| **Height** | **3.00 m** | **Height** | **3.00 m** |
| **Depth** | **3.20 m / 2.6m** | **Depth** | **2.60 m** |

# I. BUSDUCT

***Erection Weight is for total Project as below***

**Tentative Weight and Dimensional details - Busduct**

| Sl No. | Item | Qty. | UoM | Unit Weight(KG) | Total Weight (KG) | Maximum Dimension of Single BoM (LXBXH) | Nos. of Expected BoMs. For 02 |
|---|---|---|---|---|---|---|---|
| 1 | SPBD:GAC to GT connection | 2 | Set | 10000 | 20000 | 500mmx1500mmx4000mm | 36 Nos. |
| 2 | Current Transformers for SPBD | 2 | Set | 10500 | 21000 | 500mmx500mmx500mm | 60 Nos. |
| 3 | LT BUSUDCT | 12 | Set | 3000 | 36000 | 900mmx500mmx4000mm | 60 Nos. |
| 4 | STEEL STRUCTIRE (MT) | 2 | Set | 36000 | 72000 | 6000mmx150mmx150mm | 50 Nos. |
| 5 | APE | 2 | Set | 10000 | 20000 | 2000mmx2500mmx3000mm | 02 Nos. |
| 6 | SPARES | 1 | Set | 10000 | 10000 | 500mmx500mmx500mm | 35 Nos. |
| 7 | MISC. Items | 1 | Set | 20000 | 20000 | | |
| | | | | | **199000** | | |

# J. Transformers

***Erection Weight is for total Project as below***

| Description of Items | Quantity | Weight in Kgs per Transformer | Remarks |
|---|---|---|---|
| Transformers (6.6 kV/415 V, 95 KVP - 1000 mA) | 24 nos | 2000 | Without oil |

# K. Other Mechanical Items

***Erection Weight is for total Project as below***

| Sl. No. | Equipment /Package Description | Qty | Dimension (each) Lx B x H (M) | Weight/Item (in Tons) | Remarks |
|---|---|---|---|---|---|
| 1. | **Pumps with Motors** | | | | |
| a. | Make-up water Transfer Pump | 2 | 2.5 x 2 x 1.5 | 2.0 | |
| b. | Condensate Extraction Pump | 6 | 0.5 x 0.5 x 4 | 2.5 | |
| c. | Sump Pump | 2 | 0.5 x 0.5 x 4 | 0.5 | |
| d. | BFPs | 3 | 8.5 x 2.5 x 1.5 | 12 | |
| **2.** | **Pre-fabricated Storage Tanks** | | | | |
| a. | Atm. Flash Tank | 2 | 1.5 x 1.5 x 1.5 | 0.8 | |
| b. | Lube oil tanks (22m3) | 2 | 3.4 x 2.5 x 3 | 5 | |
| **3.** | **Dosing Systems** | | | | |
| a. | LP Dosing System (Hydrazine) | 2 | 3 x 2.5 x 4 | 1.5 | - |
| b. | LP Dosing System (Morpholine) | 2 | 5 x 4 x 6 | 3 | - |
| c. | Dosing system coming in AC system | 1 | 1.5 x 1.5 x 1.5 | 1 | - |
| d. | Hydrazine for LP Dosing | **100 liters/ Day (100% Concentrated Hydrazine)** | | | |
| e. | Morpholine for LP Dosing | **600 liters/ Day (5% Concentrated Morpholine)** | | | |
| **4.** | **Dosing Systems** | | | | |
| a. | Plate type heat Exchanger | | | 1 | |
| **5.** | **Control Valves, De-Super Heaters, PRDS stations, Pressure relief Valves etc.** | | | | |
| a. | Control Valves | 30 | | Total Wt : 15 T | |
| b. | De-superheaters | 8 | | 0.2 | |
| c. | PRDS | 6 | | 0.35 | |
| d. | On-Off Ball Valves | 20 | | 0.2 | - |
| e. | Pressure Safety Relief Valves | 10 | | 0.3 | - |
| f. | Thermal Relief Valves | 2 | | 0.2 | - |

| Sl. No. | Equipment /Package Description | Qty | Dimension (each) Lx B x H (M) | Weight/Item (in Tons) | Remarks |
|---|---|---|---|---|---|
| **1.** | **Site Fabricated Storage Tanks** | | | | |
| a. | LDO Storage Tank (25 M3) | 2 | 4.5 Dia. x 5 Ht | 12 (Empty) | |
| b | Condensate Storage Tank (250 M3) | 1 | 7 Dia. x 9 Ht | 20 (Empty) | |

| Sl. No. | Equipment /Package Description | Qty | Dimension (each) Lx B x H (M) | Weight/Item (in Tons) | Remarks |
|---|---|---|---|---|---|
| **1** | **Air Conditioning System (**centralized chilled water system using Vapor absorption chiller) | 1 lot | | 20 | |
| **2** | **Ventilation System** | 1 lot | | 3 | |
| **3.** | **EOT Cranes & Hoist, Elevators** | | | | |
| b. | EOT crane for STG hall (70/10 tons) | 1 | 7.0 x 3.0 x 16.0 | 29.0 | - Rail length 60m |
| | Single Girder under slung EOT Crane (15 Tons) in BFP bay | 1 | 12.0 x 2.0 x 1.0 | 12 | - Rail length 40m<br>- Span 7.0 m |
| | Single Girder under slung EOT Crane (5 Tons) in Chilled water plant | 1 | 12.0 x 1.0 x 1.0 | 5 | - Rail length 20m<br>- Span 10.0 m |
| | Electric wire rope hoist in ESP Control room (3 Tons) | 1 | | 1 | |
| **4.** | **Online Tube Cleaning System (OLTCS)** | | | | |
| a | Ball Recirculation skid - OLTCS | 2 | 3 x 1.5 x 1.5 | 1.5 | |
| b | Ball Separator - OLTCS | 2 | Dia 1.4 x 2 | 2.0 | |
| **5** | **6.6 kV HT DG set of (2 MW capacity each)** | 2 | 7.6x1.42 | 60 | Dry Weight of genset |
| | Silencer | 2 | | 5 | |
| **6** | **Elevator (for Passenger)** | 1 | Capacity 800 kg | 2 | for STG |

| Sl. No. | Equipment /Package Description | Qty | Weight in Tons | Remarks |
|---|---|---|---|---|
| | **Non IBR pipes, fittings, Hangers, Pipe support & Insulation** | | | |
| **1.0** | **Non IBR Pipes & Fittings (CS)** | | 200 | |
| 1.1 | Pipes | | | |
| a) | NB 1000 | 200m | | |
| b) | NB 450 | 135m | | |
| c) | NB 250 | 168m | | |
| d) | NB 200 | 350m | | |
| e) | NB 150 | 390m | | |
| f) | NB 100 | 1366m | | |
| g) | NB 80 & below | 10445m | | |
| **2.0** | **Non IBR Pipes & Fittings (SS)** | | 60 | |

| | | | | | |
|---|---|---|---|---|---|
| **3.0** | **Pipe Hangers and Supports** | | 30 | | |
| **4.0** | **Structural Material Pipe Supports & pipe rack** | | 50 | | |
| **5.0** | **Insulation (**Rockwool Mattress, Aluminium Cladding & Insulation Ancillaries) | | 50 | | |
| **6.0** | **Other Valves- Non Trichy** | | 25 | | |

# L. Other Electrical Items

***Erection Weight is for total Project as below:***

| Sl. No. | Equipment /Package Description | Unit | Qty | Dimension (each) LxBxH (M) | Weight (eac KG |
|---|---|---|---|---|---|
| **1.0** | **LV Oil Filled 6.6/0.415kV, 2.5MVA Distribution transformer** | Nos | **8** | 3.6 x 2.8 x 3.55 | **7000** |
| **2.0** | **415V Emergency DG set** | Nos | **2** | | **4500** |
| **3.0** | **SCADA system** | Set | **1** | | |
| **4.0** | **LT Switchgear Package** | | | | |
| | 415V PMCC | Nos | **7** | 12x1.75x2.5 | 12000 |
| | 415V STGMCC | Nos | **2** | 11.2X1X2.5 | 9000 |
| | 415VBoiler MCC | Nos | 2 | 11.2X1X2.5 | 9000 |
| | 415V ESP PMCC | Nos | 2 | 12x1.75x2.5 | 10000 |
| | 415V Valve DB | Nos | 4 | 10.4x1.25x2.5 | 6000 |
| | 415V Soot Blower MCC | Nos | 2 | 6.4x1.0x2.5 | 5000 |
| | 415V ACDB | Nos | 1 | 2.4x1.0x2.5 | 2000 |
| | 415V ACVent MCC | Nos | 1 | 11.2X1X2.5 | 9000 |
| | 415V LDB | Nos | 2 | 2.4x1.0x2.5 | 2000 |
| | 220V DCDB | Nos | 2 | 2.4x1.0x2.5 | 2000 |
| | | | | | |
| *5.1* | *DC System-1 (For unit1-1 & 2)* | | | | |
| 5.1.1 | 110V Battery Bank (2400 Ah, 55 Cells)<br><br>*1 Set of 2400Ah battery*<br>*(1 Set=2 nos. of 1200Ah battery bank connected in parallel)* | Sets | 2 | 4000x725x1800 for 1 no. of 1200Ah battery | 5200 kg for no. of 1200A battery |
| 5.1.2 | 110V, 650A Battery Charger | Sets | 2 | 4000x1000x2200 | 3050 kg |
| 5.1.3 | Battery Isolation Box (650A) | Nos. | 2 | 700x350x1000 | 95 kg |
| | | | | | |
| **6.0** | **PLANT ILLUMINATION PACKAGE** | | | | |
| 6.1 | Surface mounted LED Bulkhead fixture (10-15W approx) suitable for 240V AC supply | Nos | 60 | NA | 1.5 |
| 6.2 | Recess mounted LED Down light (12W approx) suitable for 110V DC supply | Nos | 60 | NA | 1.5 |
| 6.3 | Surface mounted 10-15W LED Bulkhead fixture suitable for 110V DC supply | Nos | 170 | NA | 1.5 |
| 6.4 | Flame proof DC LED Well Glass fixture (35W approx) suitable for DC Supply | Nos | 8 | NA | 4 |
| 6.5 | Industrial type general purpose LED Batten with 2 nos. (18-22W approx,230V AC) LED tube lamp. | Nos | 800 | NA | 1.5 |
| 6.6 | 600x 600mm Recess mounted decorative LED fixture (33-36WApprox, 230V AC) with high effficiency low glare optics. | Nos | 1150 | NA | 2 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 6.7 | Industrial corrosion resistant type fixture of polycarbonate body with 2 nos. (18-22W approx,230V AC) LED tube lamp. | Nos | 90 | NA | 1.75 | |
| | 6.8 | LED Well Glass fixture (35-50WApprox, 230VAC) | Nos | 3400 | NA | 3.5 | |
| | 6.9 | LED medium bay fixture (80-100WApprox, 230VAC) | Nos | 200 | NA | 4.5 | |
| | 6.10 | LED high bay fixture (150-180WApprox, 230VAC) | Nos | 200 | NA | 5 | |
| | 6.11 | Flame proof LED Well Glass fixture (35-50WApprox, 230VAC) | Nos | 44 | NA | 4 | |
| | 6.12 | LED street lighting fixture (60W approx, 230V AC) | Nos | 180 | NA | 5 | |
| | 6.13 | LED Flood lighting Fixture (90 watt approx) | Nos | 150 | NA | 6 | |
| | 6.14 | Flame proof LED Street lighting fixture (60WApprox, 230VAC) | Nos | 10 | NA | 5 | |
| | 6.15 | LED Flame proof Flood lighting Fixture (180-200 watt approx) | Nos | 10 | NA | 10 | |
| | 6.16 | 11meter Steel tubular pole | Nos | 4 | NA | 180 | |
| | 6.17 | 4.75 meter 50NB GI pole | Nos | 20 | NA | 25 | |
| | 6.18 | 3 meter 50NB GI pole | Nos | 1500 | NA | 12 | |
| | 6.19 | 1200mm long 150 deg bend (50NB) pipe | Nos | 190 | NA | 7.5 | |
| | 6.20 | Saddle with saddle bar | Nos | 66000 | NA | 0.1 | |
| | 6.21 | GI steel Conduit branching JB | Nos | 2600 | NA | 0.3 | |
| | 6.22 | GI Flexible conduit (20 mm dia) | Mtrs | 5000 | NA | 0.15 | |
| | 6.23 | GI Flexible conduit (25mm dia) | Mtrs | 500 | NA | 0.2 | |
| | 6.24 | Gland /Connector for fixing Flexible conduits | Nos | 2800 | NA | 0.02 | |
| | 6.25 | 3000mm long 25mm PVC conduit | Nos | 10400 | NA | 2 | |
| | 6.26 | PVC conduit bend | Nos | 14000 | NA | 0.1 | |
| | 6.27 | PVC conduit coupler | Nos | 14000 | NA | 0.025 | |
| | 6.28 | PVC Conduit branching JB (Deep drawn type for concealed wiring at ceiling) | Nos | 1400 | NA | 0.15 | |
| | 6.29 | PVC Conduit branching JB | Nos | 5000 | NA | 0.15 | |
| | 6.30 | Fan box (deep drawn type for concealed wiring at ceiling) | Nos | 20 | NA | 0.15 | |
| | 6.31 | PVC Ceiling Rose | Nos. | 2400 | NA | 0.2 | |
| | 6.32 | 3000mm long 50NB GI conduit | Nos | 40 | NA | 15 | |
| | 6.33 | 3000mm long 50NB PVC conduit | Nos | 30 | NA<br>NA | 5 | |
| | 6.34 | 3000mm long 20mm GI conduit | Nos | 600 | NA | 1.9 | |
| | 6.35 | Check nuts for 20mm conduit | Nos | 3000 | NA | .01 | |
| | 6.36 | Galvanised steel chain | Mtrs | 16000 | NA | 0.5 | |
| | 6.37 | Spring loaded ball socket suitable for conduit branching round JB | Nos | 1200 | NA | 0.2 | |
| | 6.38 | GI Clamp for LED Batten (For Surface mounting) | Nos | 900 | NA | .3 | |
| | 6.39 | Rubber grommet 25mm | Nos | 200 | NA | .005 | |
| | 6.40 | Rubber grommet 20mm | Nos | 1000 | NA | .005 | |
| | 6.41 | S Hook for Highbay and Medium bay fixture | Nos | 400 | NA | .075 | |
| | 6.42 | S Hook for Recessed mounted fixture | Nos | 5000 | NA | .05 | |
| | 6.43 | Rawl plug 1.5" with screw | Nos | 28000 | NA | .005 | |
| | 6.44 | Galvanised anchoring Fastener 6mm dia x 35mm long (Bolt type) | Nos | 12000 | NA | 0.05 | |
| | 6.45 | Galvanised anchoring Fastener 6mm dia x 35/70mm long (Hook/Half ring type) | Nos | 7000 | NA | 0.05 | |

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|---|---|---|---|---|---|---|---|
| | 6.46 | Galvanised anchoring Fastener 10mm dia x 68mm long (Bolt type) | Nos | 1800 | NA | 0.075 | |
| | 6.47 | Galvanised U type fan bolt (For Fan & High/Midbay Fixture) | Nos | 400 | NA | 0.075 | |
| | 6.48 | Cable clamps suitable for 3Cx2.5sqmm Cu. Armoured Cable | Nos | 100000 | NA | .05 | |
| | 6.49 | Cable clamps suitable for 4Cx25/35sqmm Cu. Armoured Cable | Nos | 15000 | NA | .05 | |
| | 6.50 | 4 way 250x200x120mm rectangular sheet steel weather proof JB (IP55) | Nos | 100 | NA | 2.5 | |
| | 6.51 | 4 way 200x150x100mm rectangular sheet steel weather proof JB (IP55) with 2A MCB | Nos | 2700 | NA | 2 | |
| | 6.52 | Flame proof Cast light alloy JB (250x200x150mm ) | Nos | 8 | NA | 3.5 | |
| | 6.53 | Flame proof Cast light alloy JB (200x150x100mm ) with 2A MCB | Nos | 60 | NA | 3 | |
| | 6.54 | MCB Box with 20A MCB | Nos | 200 | NA | 2.0 | |
| | 6.55 | FLP DC MCB Box with 10A DC MCB | Nos | 4 | NA | 3 | |
| | 6.56 | Switchboard (Flush/Surface mount type) with 2/3nos. 6A Piano type switch | Nos | 200 | NA | 0.5 | |
| | 6.57 | Decorative type 6/16A receptacle with 16A switch ( Flush/Surface mounted, modular type) | Nos | 250 | NA | 0.4 | |
| | 6.58 | Industrial metal clad type 1Ph, 20A Socket with 20A interlocked rotary switch & Plug | Nos | 260 | NA | 1.5 | |
| | 6.59 | Flameproof 1ph, 20A Socket with interlocked rotary switch & Plug | Nos | 6 | NA | 3 | |
| | 6.60 | Industrial metal clad type 3Ph, 63A (5pin) receptacle with interlocked rotary switch & Plug | Nos | 100 | NA | 2.5 | |
| | 6.61 | 24V socket module with 40W GLS/20W LED Hand lamp | Nos | 12 | NA | 3 | |
| | 6.62 | 18 way AC Indoor Lighting Panel | Nos | 4 | 1200x200x900 | 75 | |
| | 6.63 | 12 way AC Indoor Lighting Panel | Nos | 28 | 1000x200x900 | 70 | |
| | 6.64 | 6 way AC Indoor Lighting Panel | Nos | 84 | 800x200x900 | 65 | |
| | 6.65 | 6 way DC indoor Lighting Panel | Nos | 20 | 900x200x900 | 60 | |
| | 6.66 | 18 way AC Outdoor Lighting Panel | Nos | 14 | 1200x200x900 | 80 | |
| | 6.67 | 12 way AC Outdoor Lighting Panel | Nos | 16 | 1000x200x900 | 75 | |
| | 6.68 | 6 way AC Outdoor Lighting Panel | Nos | 28 | 800x200x900 | 70 | |
| | 6.69 | Flame proof 12 way AC Lighting Panel | Nos | 2 | 800x200x800 | 70 | |
| | 6.70 | Flame proof 6 way AC Lighting Panel | Nos | 4 | 600x200x600 | 70 | |
| | 6.71 | 1Cx 1.5 Sqmm Cu. Multi strand PVC Flexible wire (Green) | Mtrs | 60000 | NA | 0.025 | |
| | 6.72 | 1Cx 2.5 Sqmm Cu. Multi strand PVC Flexible wire (Red, Yellow, Blue and black) | Mtrs | 100000 | NA | 0.03 | |
| | 6.78 | 75 kVA Normal Lighting transformers | Nos | 4 | 1400x1100x1400 | 700 | |
| | **7.0** | **HT POWER CABLE** | | | | | |
| | 7.1 | 6.6KV(UE) 3CX185 Al ARM PVC/FRLS CABLE | mtr | 10000 | NA | 5650 | |
| | **8.0** | **HT POWER CABLE TERMINATION KITS** | | | | | |
| | 8.1 | 6.6KV(UE) 3CX185 Terminating Kit | Nos | 90 | NA | NA | |
| | **9.0** | **LT POWER CABLE** | | | | | |
| | 9.1 | 1CX10 CU XLPE UNARM | mtr | 4000 | NA | 170 | |
| | 9.2 | 1CX35 CU XLPE UNARM | mtr | 3000 | NA | 420 | |
| | 9.3 | 1CX120 CU XLPE UNARM | mtr | 3000 | NA | 1250 | |
| | 9.4 | 1CX25 Cu FLEXIBLE UNARM | mtr | 1000 | NA | 325 | |
| | 9.5 | 1CX35 AL XLPE UNARM | mtr | 4200 | NA | 180 | |
| | 9.6 | 1CX630 Al XLPE | mtr | 28500 | NA | 2800 | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 9.7 | 2CX2.5 Cu XLPE | mtr | 120000 | NA | 310 | |
| | 9.8 | 2CX6 Al XLPE | mtr | 10800 | NA | 485 | |
| | 9.9 | 2CX10 Al XLPE | mtr | 4000 | NA | 565 | |
| | 9.10 | 2CX16 Al XLPE | mtr | 10200 | NA | 570 | |
| | 9.11 | 2CX35 Al XLPE | mtr | 1600 | NA | 690 | |
| | 9.12 | 2CX120 Al XLPE | mtr | 6800 | NA | 1500 | |
| | 9.13 | 3CX2.5 Cu XLPE | mtr | 316000 | NA | 460 | |
| | 9.14 | 3CX6 Al XLPE | mtr | 18000 | NA | 580 | |
| | 9.15 | 3CX10 Al XLPE | mtr | 14400 | NA | 680 | |
| | 9.16 | 3CX16 Al XLPE | mtr | 14400 | NA | 530 | |
| | 9.17 | 3CX25 Al XLPE | mtr | 6600 | NA | 770 | |
| | 9.18 | 3CX50 Al XLPE | mtr | 2800 | NA | 1100 | |
| | 9.19 | 3CX150 Al XLPE | mtr | 1000 | NA | 1425 | |
| | 9.20 | 3.5CX35 Al XLPE | mtr | 7200 | NA | 980 | |
| | 9.21 | 3.5CX70 Al XLPE | mtr | 2000 | NA | 1600 | |
| | 9.22 | 3.5CX95 Al XLPE | mtr | 5400 | NA | 1900 | |
| | 9.23 | 3.5CX185 Al XLPE | mtr | 2400 | NA | 3250 | |
| | 9.24 | 3.5CX240 Al XLPE | mtr | 4600 | NA | 4100 | |
| | 9.25 | 4CX2.5 Cu XLPE | mtr | 11600 | NA | 560 | |
| | 9.26 | 4CX4 Cu XLPE | mtr | 2000 | NA | 660 | |
| | 9.27 | 4CX6 Al XLPE | mtr | 9800 | NA | 625 | |
| | 9.28 | 4CX10 Al XLPE | mtr | 5400 | NA | 765 | |
| | 9.29 | 4CX16 Al XLPE | mtr | 26600 | NA | 715 | |
| | 9.30 | 4CX25 Al XLPE | mtr | 22200 | NA | 940 | |
| | 9.31 | 4CX35 Al XLPE | mtr | 7000 | NA | 1050 | |
| | 9.32 | 4CX185 Al XLPE | mtr | 4600 | NA | 3650 | |
| | **10.0** | **CONTROL CABLES** | | | | | |
| | 10.1 | 3Cx1.5 sqmm Cu PVC PVC/FRLS | mtr | 8000 | NA | 400 | |
| | 10.2 | 5Cx1.5 sqmm Cu PVC PVC/FRLS | mtr | 10400 | NA | 500 | |
| | 10.3 | 7Cx1.5 sqmm Cu PVC PVC/FRLS | mtr | 120000 | NA | 565 | |
| | 10.5 | 10Cx1.5 sqmm Cu PVC PVC/FRLS | mtr | 34000 | NA | 750 | |
| | 10.6 | 12Cx1.5 sqmm Cu PVC PVC/FRLS | mtr | 4000 | NA | 650 | |
| | 10.7 | 3Cx2.5 sqmm Cu PVC PVC/FRLS | mtr | 20000 | NA | 475 | |
| | 10.8 | 7Cx2.5 sqmm Cu PVC PVC/FRLS | mtr | 31000 | NA | 700 | |
| | **11.0** | **CABLE GLANDS & Lugs PACKAGE** | lot | 1 | | | |
| | **12.0** | **PRE FABRICATED GI CABLE TRAYS AND ACCESSORIES (GI Cable trays and accessories):** | | | | | |
| | 12.1 | Ladder type cable tray, W=600mm. | Sets | 6000 | 2.5X0.6X0.1 | 45 | |
| | 12.2 | TEEs of 900mm bending radius for ladder type cable tray, W=600mm | Sets | | NA | 45 | |
| | 12.3 | Horizontal Bends of 900mm bending radius for ladder type cable tray, W=600mm | Sets | | NA | 35 | |
| | 12.4 | Vertical UPs of 900mm bending radius for ladder type cable tray, W=600mm | Sets | | NA | 25 | |
| | 12.5 | Vertical downs of 900mm bending radius for ladder type cable tray, W=600mm | Sets | | NA | 25 | |
| | 12.6 | H.CROSS OF900MM(BR)&CP FOR600MM GI CT(L) | Sets | | NA | 25 | |
| | 12.7 | Cover along with accessories for 600mm width ladder type cable | Sets | 400 | 2.5X0.6X0.005 | 30 | |
| | 12.8 | Ladder type cable tray, W=300mm. | Sets | 4000 | 2.5X0.3X0.1 | 40 | |
| | 12.9 | Cover along with accessories for 300mm width ladder type cable | Sets | 200 | 2.5.0X0.3X0.005 | 20 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 12.10 | Horizontal Bends of 600mm bending radius for ladder type cable tray, W=300mm | Sets | | NA | 25 | |
| 12.11 | Vertical UPs of 600mm bending radius for ladder type cable tray, W=300mm | Sets | | NA | 20 | |
| 12.12 | Vertical downs of 600mm bending radius for ladder type cable tray, W=300mm | Sets | | NA | 20 | |
| 12.13 | 600mm (W) Perforated type cable tray. | Sets | 1700 | 2.5X0.6X0.1 | 50 | |
| 12.14 | TEEs of 900mm bending radius for perforated type cable tray, W=600mm | Sets | | NA | 55 | |
| 12.15 | Horizontal Bends of 900mm bending radius for perforated type cable tray, W=600mm | Sets | | NA | 45 | |
| 12.16 | Vertical UPs of 900mm bending radius for perforated type cable tray, W=600mm | Sets | | NA | 45 | |
| 12.17 | Vertical downs of 900mm bending radius for perforated type cable tray, W=600mm | Sets | | NA | 45 | |
| 12.18 | Horizontal Cross of 900mm bending radius for perforated type cable tray, W=600mm | Sets | | NA | 55 | |
| 12.19 | Cover for Perforated type Cable Tray, W=600mm | Sets | 1400 | 2.5X 0.6X0.025 | 40 | |
| 12.20 | 300mm(W) Perforated type cable tray | Sets | 2600 | 2.5X 0.3X0.075 | 30 | |
| 12.21 | Cover for Perforated type Cable Tray, W=300mm | Sets | 900 | 2.5X 0.6X0.025 | 25 | |
| 12.22 | TEEs of 600mm bending radius for perforated type cable tray, W=300mm | Sets | | NA | 35 | |
| 12.23 | Horizontal Bends of 600mm bending radius for perforated type cable tray, W=300mm | Sets | | NA | 30 | |
| 12.24 | Vertical UPs of 600mm bending radius for perforated type cable tray, W=300mm | Sets | | NA | 25 | |
| 12.25 | Vertical downs of 600mm bending radius for perforated type cable tray, W=300mm | Sets | | NA | 25 | |
| 12.26 | 150mm (W) Perforated type cable tray. | Sets | 4000 | 2.5X0.15X0.075 | 20 | |
| 12.27 | 50mm(W) Perforated type cable tray | Sets | 3000 | 2.5X 0.05X0.025 | 20 | |
| 12.28 | Cover for Perforated type Cable Tray, W=150mm | Sets | 3200 | 2.5X 0.15X0.025 | 15 | |
| 12.29 | Cover for Perforated type Cable Tray, W=50mm | Sets | 2200 | 2.5X 0.05X0.015 | 7.5 | |
| | | | | | | |
| **13.0** | **PLANT EARTHING PLANT LIGHTNING PROTECTION MATERIALS** | | | | | |
| 13.1 | 75x10mm GI Strip Below ground | Mtr | 8000 | | 6 KG/Mtr | |
| 13.2 | 75x10mm GI Strip above ground earthing | Mtr | 5500 | | 6 KG/ Mtr | |
| 13.3 | 50 x 6 mm GI Strip | Mtr | 18000 | | 2 .5 KG/Mtr | |
| 13.4 | 35 x 6mm GI Strips | Mtr | 3000 | | 2 KG/ Mtr | |
| 13.5 | 25 x 6 mm GI Strips | Mtr | 9000 | | 1.18 KG/Mtr | |
| 13.6 | 25 x 3mm GI Strips | Mtr | 9000 | | 0.6 KG/ Mtr | |
| 13.7 | 6SQ.MM Stranded G.I wire | Mtr | 90000 | | 1 KG/ Mtr | |
| 13.8 | 16SQ.MM Stranded G.I wire | Mtr | 24000 | | | |
| 13.9 | Copper Pipe Electrodes (3000 mm Length) | Nos | 40 | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 13.1 | 100mm Dia CI Pipe electrode ,4200mm length,13mm thick | Nos | 80 | | | |
| 13.11 | Vertical Air Termination Rod for lightning protection (1400 mm height) | Nos | 40 | | 25 | |
| **14.0** | **MS STRUCTURAL STEEL** | | | | | |
| 14.1 | ISMC 100 Channels | | | | 200000 kG | |
| 14.2 | ISA 65x65x6 mm Runner angles | | | | 52000 kG | |
| 14.3 | ISA 50x50x6 mm Runner angles | | | | 70000 kG | |
| **15.0** | **Conventional fire proof sealing materials** | | | | | |
| 15.1. | Fire Break Coatings for HT/LT Power Cables | Sq.mtr | 1000 | | | |
| 15.2. | Fire proof materials required for sealing of cable entry through conduits/trenches & through panels | Sq.mtr | 1200 | | | |
| **16.0** | **INSULATING MATS** | | | | | |
| 16.1 | Insulating Mats (upto 1.1kV) | No. | 100 | 1MX10M | 15Kg | |
| 16.2 | Insulating mats (above 1.1kV) | No. | 100 | 1MX10M | 15Kg | |

# M. Other C&I Items

***Erection Weight is for total Project as below:***

| S No. | Description | Panel/Equipment | | |
|---|---|---|---|---|
| | | Size/panel (mm) | Unit Weight (Kg) | Qty. |
| 1 | DCS Package | | | |
| 1 (a) | DCS Panels | 800x1000x2100 | 350 | 140 nos |
| 1 (b) | Operator & Engineering work station, LVS | 800x800x1200 | 100 | 15 nos |
| 1 (c) | Printer | 800x800x1200 | 100 | 5 nos |
| 2 | SWAS System | Wet Panel – 2000 x 1000 x 2200 | 1000 | 2 set |
| | | Dry Panel – 1200 x 800 x 2250 | 800 | 2 set |

| S. No. | Item | Weight/Inst (in Kgs) | Qty. (In Nos.) |
|---|---|---|---|
| 1 | PT | 5 | 400 |
| 2 | Wireless PT | 8 | 0 |
| 3 | Remote seal PT | 6 | 36 |
| 4 | DPT | 5 | 275 |
| 5 | Wireless DPT | 8 | 0 |
| 6 | Remote seal DPT ( remote seal for HP side only) | 6 | 20 |
| 7 | Remote seal DPT ( remote seal for HP and LP side) | 7 | 0 |
| 8 | TT | 5 | 442 |
| 9 | Wireless TT | 7 | 0 |
| 10 | LT- Radar (Guided wave) | 35 | 28 |
| 11 | LT- Radar (Non-contact type) | 35 | 0 |
| 12 | Level Transmitter - Ultrasonic Type | 50 | 0 |
| 13 | PS | 2 | 110 |

| | | | |
|---|---|---|---|
| 14 | LS | 2 | 0 |
| 15 | DPS | 2 | 15 |
| 16 | PG (Bourdon Tube) | 2 | 454 |
| 17 | PG (Solid Front) | 2 | 0 |
| 18 | PG (Diaphragm seal) | 2 | 56 |
| 19 | DPG (Bourdon Tube) | 2 | 36 |
| 20 | LG (Reflex Type)- side mounting | 25 | 44 |
| 21 | LG (Float & board) - top mounting | 30 | 0 |
| 22 | TG(Bimetallic) with Thermowell M33*2 | 5 | 0 |
| 23 | TG(Bimetallic) with Thermowell Flanged | 5 | 560 |
| 24 | Thermocouple with Thermowell M33*2 | 5 | 0 |
| 25 | Thermocouple with Thermowell Flanged | 5 | 200 |
| 26 | RTD with Thermowell M33*2 | 5 | 0 |
| 27 | RTD with Thermowell Flanged | 5 | 180 |
| 28 | Thermowell M33*2 | 3 | 0 |
| 29 | Thermowell Flanged | 3 | 30 |
| 30 | Rotameter | 10 | 0 |
| 31 | Junction Box (weather/Ex proof) | 8 | 560 |
| 32 | MCT Block | 100 | 0 |
| 33 | FRP Canopies for JBs | 2 | 560 |
| 34 | FRP Canopies for Transmitters | 2 | 600 |
| 35 | FRP Canopies for Positioners | 2 | 45 |
| 36 | FRP Canopies for Temperature Elements | 2 | 380 |
| 37 | Universal hand-held | 1 | 2 |
| 38 | Multi variable flow transmitter | 10 | 0 |
| 39 (a) | Local Instrument racks with fittings and JB (LIR) | 40 | 0 |
| 39 (b) | Local Instrument Encloser with fittings and JB (LIE) | 50 | 0 |
| 40 | Orifice Plate Assemblies, Annubar,Nozzles | 200 | 48 |
| 41 | Mass Flow Meter/ Vortex/ Venturi/ flow meters | 100 | 2 |
| 42 | Other instruments/ equipments as per final construction documents | -- | As required |
| 43 | Instrumentation items for on skid GTG Package and their other auxiliary packages | -- | NA |
| 44 | On skid instruments for sub packages like | -- | |
| | · Instrument air system | | NA |
| | · Gas booster compressors | | NA |
| | · Gas conditioning system | | NA |
| | · Various storage and drain tanks | | 1 set |
| 45 | Gauge boards on equipment skids & pressure gauge | -- | 1 lot |
| 46 | Vibration Transmitters | 50 | 0 |

| Sl. No. | Description | | Qty. | Unit | Unit weight(Kgs) |
|---|---|---|---|---|---|
| **PIPE AND PIPE FITTINGS** | | | | | |
| 1 | PIPE (SMLS), SA 106 Gr. B | 1/2" SCH 160 | 200 | Meters | 0.8 |
| 2 | PIPE (SMLS), SS 316L | 3/4" SCH 160 | 0 | Meters | 1.2 |
| 3 | PIPE (SMLS), SA 106 Gr. B | 1/2" SCH 80S | 13600 | Meters | 0.8 |
| 4 | PIPE (SMLS), SA 335 Gr. P22 | 3/4" SCH 160 | 1200 | Meters | 1.2 |
| 5 | SWAGE NIPPLE | 3/4" PL x 1/2" PL | 0 | Nos. | 0.4 |
| 6 | REDUCER | 3/4" X1/2"BW | 110 | Nos. | 0.4 |
| 7 | NIPPLE | 1/2" PL x NPT(M) | 2750 | Nos. | 0.2 |
| 8 | NIPPLE | 3/4" PL x NPT(M) | 150 | Nos. | 0.3 |
| 9 | EQUAL TEE | 1/2" SW | 1250 | Nos. | 0.3 |
| 10 | EQUAL TEE | 3/4" SW | 0 | Nos. | 0.45 |
| 11 | COUPLING | 1/2" SW | 1500 | Nos. | 0.2 |
| 12 | GATE VALVE | 1/2" SW | 1700 | Nos. | 0.3 |
| 13 | GATE VALVE | 3/4" SW | 0 | Nos. | 0.45 |
| 14 | Ball VALVE (Quarter turn) | 1/4" NPT(F) | 165 | Nos. | 0.5 |
| 15 | ELBOW | 1/2" SW | 2300 | Nos. | 0.2 |
| 16 | ELBOW | 3/4" SW | 0 | Nos. | 0.3 |
| 17 | CAP | 1/2" NPT(F) | 1400 | Nos. | 0.2 |
| 18 | SYPHON | 1/2" NPT | 32 | Nos. | 0.55 |
| 19 | CONDENSATE POT | Ø1/2" SW | 320 | Nos. | 1.2 |
| 20 | FLANGE | 3/4" WNRF | 4800 | Nos. | 1.5 |
| 21 | STUDS, NUTS & GASKETS | | 2500 | Nos. | 0.3 |
| **TUBE AND TUBE FITTINGS (SS316)** | | | | | |
| 22 | TUBE (SMLS) | 1/2" x 2.1MM THK | 6000 | Meters | 0.3 |
| 23 | TUBE (SMLS) | 8mm OD X 1 mm THK | 2000 | Meters | 0.3 |
| 24 | TUBE UNION | 1/2" | 900 | Meters | 0.3 |
| 25 | TUBE UNION | 8mm OD | 165 | Nos. | 0.2 |
| 26 | UNEQUAL TEE | 1" x 1" x 1/2" SW | 40 | Nos. | 0.3 |
| 27 | FEMALE CONNECTOR | 1/2"NPT(F) x 1/2" OD TUBE | 1000 | Nos. | 0.3 |
| 28 | FEMALE CONNECTOR | 1/4" NPT(F) x 6mm OD TUBE | 165 | Nos. | 0.3 |
| 29 | MALE CONNECTOR | 1/2"NPT(M) x 1/2" OD TUBE | 1000 | Nos. | 0.3 |
| 30 | MALE CONNECTOR | 1/4" NPT(M) x 6mm OD TUBE | 500 | Nos. | 0.3 |

| | | | | | |
|---|---|---|---|---|---|
| 31 | 3 PIECE UNION | 1/2" NPT(M) x 1/2" NPT(F) | 440 | Nos. | 0.3 |
| 32 | REDUCER | 1/2" SW x 1/4" NPT | 160 | Nos. | 0.4 |
| 33 | 2 WAY MANIFOLD | | 1000 | Nos. | 1 |
| 34 | 5 WAY MANIFOLD | | 330 | Nos. | 1 |
| **FASTENING MATERIALS** | | | | | |
| 35 | ANCHOR BOLT | M10 X 160 | 7000 | Nos. | 0.02 |
| 36 | SCRU HEX | M10X50 P8.8 | 2000 | Nos. | 0.02 |
| 37 | NUT HEX P | M10-8 | 2000 | Nos. | 0.01 |
| 38 | WASHER MCD | 10.5-ST | 4500 | Nos. | 0.01 |
| 39 | SHELL TYPE PIPE CLAMP | 1/4" | 660 | Nos. | 0.02 |
| 40 | U-BOLT GALVZD | 1/2" | 8000 | Nos. | 0.02 |

| S. No. | Description | | Qty. | Unit |
|---|---|---|---|---|
| 1 | PIPE | 2" SCH HVY | 4000 | Meters |
| 2 | STR STEEL MS ANGLE | 50x50x6 | 20000 | Kg's |
| 3 | STR STEEL 6 mm PLATE | 250 x 250 x 6 | 10000 | Kg's |
| 4 | ISMC MS CHANNEL | 100 x 50 | 16000 | Kg's |
| 5 | Base Plate | 200x200x6 | 2200 | Kg's |

| S.No. | Item Description | Application | Total Qty. | Unit | Remarks |
|---|---|---|---|---|---|
| 1 | CONDUCTIVITY ANALYSER | Steam & Water circuit | 24 | Nos. | |
| 2 | PH ANALYSER | Steam & Water circuit | 16 | Nos. | |
| 3 | SILICA ANALYSER | Steam & Water circuit | 6 | No. | 3 Channel |
| 4 | DISSOLVED OXYGEN | Steam & Water circuit | 4 | Nos. | |
| 5 | HYDRAZINE ANALYSER | Steam & Water circuit | 0 | No. | |
| 6 | SODIUM ANALYSER | Steam & Water circuit | 8 | Nos. | |
| 7 | PHOSPHATE ANALYSER | Steam & Water circuit | 0 | No. | |
| 8 | CHLORIDE ANALYSER | Steam & Water circuit | 0 | Nos. | |
| 9 | WET Rack with sample handling system | Steam & Water circuit | 2 | No. | |
| 10 | Dry Panel | Steam & Water circuit | 2 | No. | |
| 11 | Secondary Cooler | Steam & Water circuit | 2 | Nos. | |
| 12 | Chiller | Steam & Water circuit | 2 | Nos. | |

| S. No | Description | MU | Qty. | Weight in Kg/Mtr |
|---|---|---|---|---|
| [A] | Signal cable | | | |
| 1 | 1P X 1.5 MM2 IS, I&OS | Meters | 130000 | 0.40 |
| 2 | 2P X 1.5 MM2 IS, I&OS | Meters | 4000 | 0.49 |

| | | | | |
|---|---|---|---|---|
| 4 | 4P X 1.5 MM2 IS, I&OS | Meters | 40000 | 0.6 |
| 5 | 6P X 1.5 MM2 IS, I&OS | Meters | 26000 | 0.9 |
| 6 | 8P X 1.5 MM2 IS, I&OS | Meters | 100000 | 0.98 |
| 7 | 12P X 1.5 MM2 IS, I&OS | Meters | 60000 | 1.5 |
| **[B]** | **Thermocouple Extension cable IS** | | | |
| 1 | 1PX16 AWG, T/C N-IS | Meters | 5000 | 0.45 |
| 2 | 2PX16 AWG, T/C N-IS | Meters | 500 | 0.6 |
| **[C]** | **Traid cable** | | | |
| 1 | 1T X 1.5 MM2 IS | Meters | 6000 | 0.39 |
| 2 | 8T X 1.5 MM2 IS | Meters | 20000 | 1.5 |
| 3 | 12T X 1.5 MM2 IS | Meters | 1000 | 2.25 |
| **[D]** | **FF cable** | | | |
| 22 | Spur Cable (1PX0.82 MM2 TYPE A) | Meters | 25000 | 0.40 |
| 23 | Trunk Cable (4PX1.31MM2 TYPE B) | Meters | 30000 | 0.6 |

| Sl. No. | Description of Equipment | QTY | UOM | No. of Panels/Desk | Dimensions(LxBxH) in mm | Unit Weight (Kgs) | Storage Requirement | Unit Shipping weight (kg) | Heat Loss Per Panel (Watts) |
|---|---|---|---|---|---|---|---|---|---|
| 1.1 | VFDs 375kW, 6.6kV for SA Fan | 4 | | | 6500 W x 1200 D x 2800 H | 3000 | Covered | 3150 | 10500 |
| 1.2 | Breaker Panel (6.6kV) for VFD | 4 | Sets | (I/P, O/P & Bypass breaker) | 600 X 800 X 1600 | 800 | SWGR Non A/C | 840 | |
| 2.1 | VFDs 725kW, 6.6kV for PA fans | 4 | | | 6500 W x 1200 D x 2800 H | 3000 | Covered | 3150 | |
| 2.2 | Breaker Panel (6.6kV) for VFD | 4 | | | 600 X 800 X 1600 | 800 | Covered | 840 | |
| 3.1 | VFDs 850kW, 6.6kV for PA fans | 4 | | | 6500 W x 1200 D x 2800 H | 3000 | Covered | 3150 | 10500 |
| 3.2 | Breaker Panel (6.6kV) for VFD | 4 | Sets | (I/P, O/P & Bypass breaker) | 600 X 800 X 1600 | 800 | SWGR Non A/C | 840 | |
| 4.1 | 240VAC UPS with ACDB,Parallel Redundant Type | 1 | Nos | | 15000 x 2300 x 800 | 9760 | Covered | 10248 | 4320 |
| 4.2 | 5. 2X100% configuration Lead-Acid type with 60 mins back up | | | | 7605 x 586 x 1550 | 11023 | Covered | 11575 | |