vedanta

Vedanta Limited, a subsidiary of Vedanta Resources Plc is one of the world's leading diversified natural resources companies. With business operations in India, South Africa, Australia, Ireland, Namibia, Liberia and Sri Lanka.

Expression of Interest

1. EPC Contract for Alumina Handling System 2. Procurement of Spares and Capex

Last Date of Submission : 15.07.2016

Bharat Aluminium Company Limited (BALCO), a subsidiary of Vedanta Limited and a leading producer of Aluminium in India, invites Expression of Interest from Established, Technically Competent and Financially sound Vendors for developing Alumina Handling System at Balco Korba

1. Brief Description of the Alumina Handling System:

Alumina unloading, storage and conveying system, the system will comprise of alumina wagon unloading station along with storage silo of 16,000MT capacity. The stored alumina will be extracted from the silo and transfer to two fresh existing alumina silo of capacity of 3000 MT through conveyors to the distance of approx.900 m to the pot room.

2. Brief Description of the Procurement of Spares and Capex:

a. Flue Wall Cleaning & Straightening Machine

b. Pot Demolition Machine

c. medium voltage drive 315 KW

Interested and Competent Suppliers can submit their Expression of Interest, giving details of their Organization, Statutory Registration Licenses, 03 years Audited balance sheets, Offices, Major clientele, Performance Certificates and other necessary data, within 07 days of publication of the advertisement by submitting the documents through e-mail/courier to:

balco

BHARAT ALUMINIUM CO. LTD.

(1) EPC Contract for Alumina Handling System:
For any technical query, please contact
Mr. Sheri Verghese (097 5500 0831)
For any commercial query, please contact
Ms. Shweta Rathore (099 8199 4692)
Head Commercial (Projects)
Aluminium Bhawan,
Balco Nagar – 495684, Korba, Chhattisgarh
Email: tender.korba@vedanta.co.in

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BHARAT ALUMINIUM CO. LTD.

(2) Procurement of Spares and Capex
For any query, please contact
Mr. Vinay Agrawal (097 5208 0078)
Head Commercial (Spares)
Aluminium Bhawan,
Balco Nagar – 495684, Korba, Chhattisgarh
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TENDERING SPECIFICATION

for

ALUMINA

STORAGE, TRANSPORTATION & DISTRIBUTION SYSTEM

Contents:

1. Intent of Specification

1.1 General

The proposed Aluminium Complex of Bharat Aluminium Company Limited (BALCO) will be situated at Korba in the state of Chhattisgarh, India. This expansion of Aluminium Smelter will be based on 340 kA prebaked anode technology for production of primary aluminium metal. BALCO has entered into a technology agreement with Guiyang Aluminium Magnesium Design & Research Institute (GAMI), China for aluminium smelter technology.

1.2 Intent of Specification

The intent of specification is to enable Bidder to submit a detailed and comprehensive offer for the equipment/facility/services taking into account all the technological/technical requirements specified in this specification. This specification is to cover design, manufacture, shop testing, painting, supply, transportation to site of all the plant & equipment, erection, testing, commissioning, demonstration of performance tests and final handing over of all plant and equipment with connected accessories.

1.3 Site Information

The site lies at 22°24' N latitude and at 82°44' E longitude. The average elevation of the Plant area is at about 290-300 m above mean sea level. All plant and equipment shall be designed to suit the climatic conditions prevailing in this area. The meteorological data pertaining to KORBA site is furnished below:

- Elevation : 300m
- Extreme maximum ambient temperature : 50°C
- Extreme maximum temperature in potroom : 65°C
- Extreme minimum temperature : 3.6°C
- Average rainfall in the past years : 2633.1 mm
- Average relative humidity in the past years : 64%
- Maximum relative humidity : 99%
- Average atmospheric pressure : 97 kPa
- Earthquake zone : Zone ll
- Wind speed mean : 9.3 kmhp
- Wind speed max : 150 kmph

The Bidder shall take note of the above climatic conditions at project site.

1.4 Power Supply

- **Mai**n Power supply : 415V ±10%, 50Hz ±3%, 3 phase, 4 wire AC with earth neutral
- Fault level : 28.73 MVA at 415 volts
- Short circuit level : 50 kA (r.m.s.) for 1 sec at 415 V bus of MCC/DB
- Voltage for Motors : 415V ±10%, 50Hz ±3%, 3 Phase, 4 wire, AC
- Control voltage : 220 V 1 phase, 50 Hz, AC obtained through suitably rated control transformer
- Lighting : AC 415V/240V ±10%, 50Hz ±3%, 3 phases/ single phase supplied by dedicated lighting transformers
- Indication lamp Voltage : 24VDC generated through 415V/24 V Transformer
- PLC Inputs : 24 VDC, 4-20 mA
- PLC Outputs : 24VDC, 4-20 mA, 0-10 V
- UPS output Voltage : 220 V, AC, single phase

1.5 Construction Power and Water

Supplier shall make their own arrangement for Construction power and water. The purchaser shall make the power available within the 1000m peripheral distance from the work area.

2. Special Instructions to Bidder

2.1 General

2.1.1 Bharat Aluminium Company Limited (hereinafter called "BALCO / PURCHASER") will receive tenders in respect of the work, items and equipment to be furnished and erected as set forth in the accompanying chapters/ documents. All tenders shall be prepared and submitted in accordance with these instructions.

2.1.2 Tenders submitted after the time and date fixed for receipt of tenders as set out in the Invitation to tender are liable to be rejected.

2.1.3 The terms "Scope of Work & Services" referred herein shall cover the entire scope of the proposal, which includes supply, and erection of items, equipment, labour and services including successful completion of Performance Guarantee Tests.

2.1.4 The complete scope envisaged in this Tendering Specification is given at Chapter-04 "Scope of Work & Services". Bidder is requested to indicate positively the division of work under the following heads:

a) to be directly undertaken by the Bidder,
b) envisaged to be undertaken by Bidder's Indian Sub-Bidder with Bidder's unit responsibilities, and
c) to be excluded from Bidder's scope of responsibility.

2.2 Scope of the Proposal

2.2.1 The scope of the proposal shall be on the basis of a single Bidder's responsibility, completely covering all the equipment, materials & services specified in the specification. However, Bidder may offer for one or more items, complete in all respect, wherever applicable, for consideration by Purchaser.

a) Complete system design and layout.
b) Detailed Engineering of Civil, structure, Electrical, P&I and conveying system
c) Complete manufacture including shop testing.
d) Providing engineering drawings, data, operation & maintenance manuals to Purchaser.
e) Packing, forwarding and transportation / shipment from manufacturer's works to the project site.
f) Receipt, storage, preservation and conservation of all equipment and materials at site.
g) Pre-assembly, if any, erection, testing and commissioning of the complete works/ equipment.
h) Bidders shall bring all the material required in Pre-fabricated state, only assembly will be done at site.
i) Reliability tests and performance guarantee tests on completion of commissioning.
j) Statutory approval from Government authorities.
k) Furnishing of spares.
l) Furnishing of 'as-built' drawings.

2.2.2 Tenders not covering complete scope are liable for rejection.

2.2.3 In principle, the party who is responsible for the process technology and, hence, the total system guarantee, shall undertake total responsibility for successful execution of the job/Contract.

2.2.4 In case of a joint tender, the division of work between Foreign Bidder and Indian Bidder shall be indicated, specially indicating the Bidder who will assume complete responsibility.

2.3 Time Schedule

2.3.1 One of the main considerations for award of the Contract shall be demonstrated capability of the Bidder to maintain the time schedule for performing the specified works at all stages of activities. Bidder who have not executed in time similar job in the past may not be considered.

2.4 Language of the Tenders

2.4.1 All information in the tenders shall be in English.

2.5 Information required with the Tender

2.5.1 The Bidder must clearly indicate in the tender, the name of the manufacturer, the type or model of each principal item of equipment proposed to be furnished and erected. The tender should also contain drawings and descriptive materials indicating general dimensions, material from which the parts are manufactured, principles of operation, the extent of pre-assembly involved, major construction equipment proposed to be deployed, method of erection and the proposed erection organizational structure.

2.5.2 The above information shall be provided by the Bidder in the form of separate sheets, drawings, catalogues etc. in all copies of the tender.

2.5.3 Tenders not containing sufficient descriptive material to describe accurately the equipment proposed may be treated as incomplete and hence rejected. The Purchaser will retain such description materials and drawings submitted by the Bidder. Any major departure from these drawings and descriptive materials submitted will not be permitted during the execution of the Contract without specific written permission of the Purchaser.

2.5.4 Standard catalogue pages and other documents of the Bidder may be used in the Tender to provide additional information and data as deemed necessary by the Bidder.

2.6 Understanding and Clarifications on Documents & Specifications

2.6.1 The Bidder is required to carefully examine the tendering specifications and documents and fully inform himself as to the conditions and matters which may in any way affect the works or the cost thereof. If any Bidder finds discrepancies or omissions in the specifications and documents or is in doubt as to the true meaning of any part, he shall at once request in writing for an interpretation/clarification, to the Purchaser, in triplicate. The Purchaser, then will issue interpretations and clarifications as he may think fit in writing. After receipt of such interpretations and clarifications, the Bidder may submit his tender but within the time and date as specified in the 'Invitation to Tender'. All such interpretations and clarifications shall form a part of the specifications and documents and accompany the Bidder's proposal.

2.7 Maintenance Tools & Tackles

2.7.1 The tender shall include all special tools & tackles required for the operation and maintenance of the equipment in each equipment package. The Bidder shall indicate all the above items in the proposal sheets in the form of a schedule giving therein the description and the quantity of each item.

The lump sum price if quoted by the Bidder shall include the price for these tools & tackles.

2.8 Deviation to Tender Document

2.8.1 The Bidders are requested to carefully study all the Contract Documents like Invitation to Tender, Instructions to Bidder, General Terms and Conditions of the Contract and all other documents and they shall prepare a deviation statement, if any, clearly indicating the deviations sought for by the Bidder.

2.8.2 If any deviation not mentioned in the statement but mentioned anywhere else, the tender will not be considered. If such items are not clearly explained in the deviation statement it will mean that the Bidder has agreed to all other terms and conditions mentioned in the above Tender Documents.

2.9 Note

All other requirements have been further elaborated in the "Instructions to Bidder" attached with this tendering specification. Bidder shall carefully go through the requirements as given in the Instruction to Bidder.

3. SPECIAL CONDITIONS OF CONTRACT

3.1 Tendering

3.1.1 The Bidder shall study the General Conditions of Contract and other relevant documents of the Purchaser and the enclosed technical specification and submit his tender furnishing all the relevant technical information, data, drawings etc. as asked for.

3.1.2 The Bidder may suggest modifications/deviations from the Technical specification. However, the reasons for such modifications/deviations shall be clearly spelt out in the offer.

3.1.3 The Bidder shall include the spare parts and specialities required for the operation and maintenance of the plant and equipment for a period of 24 months to be reckoned from the date of taking over of the plant and equipment. The Bidder will be required to replenish at his own expense the stock of spares used, if any, from these, normal

operation, spares for any reason during the performance test and guarantee period. Commissioning spares shall be supplied by the Bidder separately.

3.1.4 The Bidder shall include in their scope the requirement of all resins, lubricants and all other consumables for testing, commissioning & setting to work of plant & equipment and for the operation of the plant during testing & performance guarantee runs.

3.1.5 The Bidder shall also quote separately for the supply of complete set of special tools and tackles required for maintenance and operation. Item wise list and price shall be furnished. Fabrication/manufacturing drawings shall be furnished along with the supplies.

3.1.6 The Bidder shall submit a PERT chart/Time Bar chart indicating the duration and completion schedule of major activities such as submission of civil load data for building and foundation design by the Purchaser, submission of design data and drawings for approval, manufacturing of components/units supply at site etc. without which the tender will not be considered. PERT chart/Time Bar Chart furnished afterwards shall form part of the contract and cannot be altered arbitrarily except Force Major Conditions as may be agreed with the Purchaser.

3.1.7 ***The Bidder shall submit an offer which complies with the Technical specification. However, the Bidder, if desires, can submit, in addition, an alternative offer for a design which may differ from the specification. Such alternative would be given careful consideration provided that adequate supplementary information, drawings and data are submitted to permit a complete evaluation of the offer made.***

3.1.8 The Bidder shall not off-load the contract or part thereof to any Sub-Vender without written permission of the Purchaser. In the event of subletting of any part of the work is permitted by the Purchaser, the fact that such permission has been accorded shall not establish any contractual relationship between approved Sub-Vender from any of his obligations and liabilities under the contract.

3.1.9 All drawings & documents and nameplates on the equipment shall be in English Language and the same shall be incorrigible.

3.1.10 All general structural works is in Bidder's scope.

3.1.11 Any type of fabrication work of all the structures and equipment shall be done outside the BALCO plant premises, no space will be provided for fabrication only for storage.

3.1.12 Any additional equipment/materials which are not specifically mentioned in the specification but are required to make the plant & accessories complete in all respects for smooth operation and guaranteed performance shall also be covered in the tender.

3.1.13 The Bidder shall clearly indicate the name and credentials of his collaborator, if any, and the reference list of similar installation executed by them and/or the Bidder in India as well as abroad during the last five years.

3.1.14 The Bidder shall quote based on the reputed makes of equipment. The makes of bought – out items shall be furnished in the offer.

3.1.15 The Bidder shall furnish the offer in two parts:

I. Price
II. Technical part and commercial part (unpriced)

Also, the Bidder is to note that the purchaser reserves the right to accept the offer in part or in total without assigning any reason there to.

3.1.16 Tender with inadequate documents/data/ drawings/ information/calculations may not be considered. The Bidder shall indicate clearly their reservations, if any, with respect to the stipulations of this Technical specification.

3.1.17 It is suggested that the Bidder shall get himself fully acquainted with the site conditions and the nature of work to be carried out before submitting their quotation. **The bidder shall make site visit for understand technical requirements, collect data, local authority requirements , engagement of labours and statutory compliance.**

3.1.18 The successful Bidder has to work in close cooperation with other agencies/contractors working at the site.

3.2 Standards/Statutory Rules and Regulations

3.2.1 All plant and equipment supplied shall be in conformity with codes and standards as applicable and nationally/internationally acceptable for the type of equipment/system supplied with safety. The different codes to be followed in design & manufacture and a consolidated list of codes and standard to be followed shall be submitted with the offer by the Bidder. Copies of all such codes shall be submitted with the offer as may be different from those mentioned in this specification. All codes and standards used/referred to shall be to their latest edition/version as on the date of the acceptance of the tender. **The same shall be listed out in the bid document with respect to the system considered.**

3.2.2 All equipment as may be necessary shall conform to the provision of statutory and other regulations in force, such as Indian Explosive Act, Indian Factories Act, Indian Petroleum Act and also those of State Government.

3.2.3 All electrical equipment supplied shall comply with the latest revision of Indian Electricity Rules and within the statutory requirement of the Government of India and State Government as regards safety, earthing and other provisions specified therein for installation and operation of electrical equipment.

3.2.4 All facilities envisaged including layout, plant, and equipment shall conform to the provisions of statutory regulations in force. Any subsequent modifications in design/manufacture/Installation to meet the requirement of Statutory Regulations in force shall be carried out without any extra cost to the purchaser. All such approval/clearances shall be obtained by the successful Bidder at their cost within reasonable period keeping the overall time schedule of the project.

3.3 Weights & Prices

a) The Bidder shall furnish weight break-up of indigenous and FOB items separately along with their itemized prices under the heads as given below:

I. Design and Engineering
II. Manufacture, assembly, testing, packing and supply of complete plant and equipment
III. Price shall for supply item in detailed list against each item.
IV. Spares for 2 years normal operation & maintenance
V. Special tools and tackles
VI. Transport
VII. Taxes and levies
VIII. Erection, testing & commissioning of plant & equipment

b) The Purchaser reserves the right to accept or reject the offer in full or part thereof for all or any of the items/sub-items indicated above.

c) The Bidder shall inspect the site and satisfy himself with regard to the nature of work, exact site conditions, etc. before submission of offer. Any claim, what so ever, made for extra payment submitted by Bidder on this account after acceptance of his offer, shall not be considered.

d) While scrutinising the "Techno-Commercial" part of the tender, the Consultant/ Purchaser may require certain clarifications/ confirmations from the Bidders for complete and proper evaluation of the tender. The Bidders shall submit such clarifications/confirmations in a week's time from the date of receipt of such queries.

3.4 Inspection & Testing

3.4.1 The Bidder on being requested shall present sufficient documentary evidence that the materials used in the manufacture of the plant or equipment will meet the specification requirements. With respect to materials used for construction of the plant and equipment such as structural steel, mild steel, cast iron, cast steel etc., the Bidder shall produce requisite test certificates along with specimen and test pieces on which tests were carried out by the manufacturer, at the time of examination. With respect to large castings or forgings the Bidder shall arrange for necessary X-ray and ultrasonic tests to be carried out at his own cost.

3.4.2 The Purchaser or his duly authorized representative shall, have the right to be present at all the tests carried out and arranged by the Bidder. If called for, samples and specimens shall become the purchaser's property. The Bidder shall notify the Purchaser in an appropriate manner as to the progress of the contract work particularly before any assembly in order that the inspections or test can be carried out as may be required to ascertain without prejudice to the Bidder's liability whether the materials and/or services are in conformity with the requirements of the Contract.

3.4.3 The plant and equipment supplied shall be new and best of their kind and of latest technology on the date. All materials and equipment shall comply with the latest Indian Standards, statutory requirements of the concerned State Governments. In absence of relevant Indian Standards/practices, other standards which are internationally accepted, acceptable to the Purchaser, could be followed but the same shall be clearly indicated in the offer. Necessary certificates from the competent authorities, as applicable, shall be furnished for different equipment as supporting documents. Materials for all pressure parts and other important components shall be exhaustively listed in the tender along with chemical composition, physical properties and code reference.

3.5 Custody

3.5.1 ***Where the Bidder is to erect the equipment, the Bidder shall assume custody of all plant, machinery, materials and equipment upon arrival at the plant site, and remain responsible thereafter until the plant is accepted and taken over by the Purchaser.***

4. Scope of Work

The scope of work of this specification shall cover the survey, soil testing, Collection of relevant drawing required at various stages of design, design shall include civil, mechanical structure, electrical, instrumentation and conveying system, manufacture, shop testing, painting, supply transportation to site of all the plant & equipment, unloading, storage, site handling, civil construction, erection, testing, commissioning, demonstration of performance tests and final handing over of all plant and equipment with connected accessories for following areas:

- Unloading system of alumina from the BTAP wagon to 16000 MT silo.
- 16000MT **minimum capacity** silo and associated structures/building.
- 16000MT silo internal alumina transfer system to conveyor.
- 16000MT Silo outlet via conveyor system pipe to fresh alumina silo of FTP-1 and FTP-2.
- Approach, drains and area lighting.
- Integration with the present plant alumina conveying system.
- Monitoring of all parameters at central control room.
- All required safety, fire prevention and environmental requirements as per Vedanta sustainability and British safety standard five.

4.1 This specification shall be read in conjunction with the following:

a) Invitation to tender
b) General conditions of contract

The scope of supply shall include but not necessarily be limited to the following items as detailed out under Chapter 5 of this Technical Specification.

5. Technical Specifications & Requirements

The major raw material for the smelter is alumina, in additions, the bath crust powder and anode baking fume collected by purification system will return to be mixed with the alumina to form the bath mixture.

The technical option for the alumina storage, transportation, and supply and distribution system adopts the combination of Al_2O_3 train tanker pressurizing transportation, Al_2O_3 tanker truck pressurizing transportation, conveying of stored alumina via conveyors to Day silo's (fresh alumina silo).

5.1 Daily Consumption of Alumina

Calculations are made on the basis maximum Hot Metal production capacity of 315,605 tons per annum and 860 tons per day. The consumption of main raw material is as follows:

5.1.1 The normal daily consumption:

- Alumina : 860*2 pot room =***1720 t/d*** *(consumation)*

5.1.2 Quality of Alumina:

- Al_2O_3 : ≥98.5 %
- SiO_2 : ≤0.04%
- Fe_2O_3 : ≤0.04%
- Na_2O : ≤ 0.6%
- Bulk density : 0.95 ~ 1.05 g/cm3
- Repose angle : 30 ~35°

5.2 Process Flow

The alumina conveying system includes the following 3 parts:

- Unloading of alumina to primary storage silo system(depending upon the silo scheme proposed by the bidder),
- Primary storage silo to junction house.
- Junction House to FTP1 and FTP2 fresh alumina silo.

For overall layout of the plant and alumina handling system see the attached Plant Layout drawing.

- *Plant Layout with proposed alumina conveying .dwg*
- *FTP fresh alumina silo 525-001-0010-R02.pdf*

For the process flow of the alumina storage, transportation, supply and distribution system as required by us, see the attached drawings:

- *Alumina silo 16000mt and conveying system. pdf.*

5.2.1 Fresh alumina storage and conveying:

Balco Smelter .325MTA proposed Alumina storage covers a alumina silo with a capacity of 16000t, 26 wagon alumina unloading system with minimum rake turnaround time within the layout location. The system will incorporate equipments to segregate solid contamination found within the alumina, either before the alumina is unloaded into the 16000mt silo or at the outlet of the 16000mt silo(primary silo).

Train tanker unloading station to be designed for minimum rake turnaround time, conveying rate in accordance to the outlet capacity of the BTAP wagon. The unloading system shall be automated system with local control panels, the hooking and unhooking to the wagon flange will be done manually. The wagon unloading area shall be covered with light structure.

The alumina from primary storage silo is to be conveyed via pipe conveyors to fresh alumina silo of FTP1& FTP2. The minimum average conveying rate proposed is 150mtph. The conveyor structures should have access ladders and platforms as per attached safety standards. The system should be isolated from any type of atmospheric contamination and electrical shocks.

5.2.2 Dust collection system& Noise levels:

According to the process flow and equipment arrangement, there are should de-dusting systems to eliminate direct emission of dust into the atmosphere. The collecting hoods are set at the points where process equipments and silos release air with dust, and then it is sent to the bag filter or alumina silo through ducts. The alumina is collected down in bag filters and returned to the process flow or silos, and the cleaned gases are exhausted to atmosphere. The outlet concentration of each dust collection unit is not more than 5mg/Nm^3.

The noise levels of the system should be 50 db, with respect to fans, blowers and compressors if any to be installed at various location of the system. Care to be taken to eliminate such high noise levels with required system arrangements as per industrial practice.

5.2.3 Alumina bulker loading point:

Alumina transported through road via alumina bulkers, a provision to load the same at the 16000mt silo or at primary silo system should be provided along with the required unloading system.

5.2.4 Material lifting equipments:

System should have material handling equipments at location to ease various maintenance and shutdown activity.

5.3 Main Equipment and Technical Parameters in Balco scope

1. **Train tanker:**

- Tank effective volume : 58m^3
- Working pressure : 0.2 and 0.6 Mpa (2types of train tankers)
- Al_2O_3 conveying rate : ~ 50t/h. tank
- Control mode : PLC
- Drawing *: wagon general arrangement.TIF*

2. **Compressed Air:**

- HP air : 6 bar
- LP air : 3 bar

Note: Vendor to study the present scenario of compressed air availability and provide a optimized solution for new installation.

3. **Alumina Bulker:**

- Tank effective volume : 20m^3
- Working pressure : 3bar
- Al_2O_3 conveying rate : ~ 50t/h. tank
- Control mode : PLC
- Drawing: *REV_G.A._OF_ALUMINA_TRANSPORT_TRAILER_06.09.11.pdf*

5.4 Control System

5.4.1 Equipment:

The control system consists main four parts: general control, up level monitoring and control, power distribution and integrated local operation panel. The close co-operation of this four parts realize monitoring and control of the whole system.

General control:

Control of alumina conveying and distribution equipments is realized by PLC. PLC system is composed of two parts: main rack and expansion rack.

The main racks are located in the cabinet respectively. It is installed with CPU, CNB communication module (could communicate with up level computer and expansion rack, analogical input and output module, which collects signals from level switch, pressure transmitter and power distribution unit. It compares the signals with set parameters, analyzes and calculates and then drives solenoid valves and motors.

Expansion racks are located in the cabinet respectively. It communicates with main rack.

Panel view is realized by communication between I/O module and main rack.

5.4.1.2 Up level monitoring:

Display of status of equipment, real time alarm and working time on panel view is realized by communication board and Control Net in up level computer and PLC. It may give report according to alarm information.

5.4.1.3 Power distribution:

It provides power supply loop for motors. It could be local control or interlocked control. Local control is used for maintenance.

5.4.1.4 Integrated local operation platform:

- Control of blowers:
  Integrated local operation platform is set for local manual operation. Open and close of valves and status display could be realized.

- Control of motors:
  Distributed control boxes are set for manual operation and maintenance of motors.

- Panel view display:
  To realize integrated local operation and display working status of various equipment.

5.4.2 Instrument

5.4.2.1 The measurement and control items are as follows:

- Level indication and alarm of silos;

5.4.2.2 Instrument selected

- Non contact radar level transmitter for the continuous level measurement of silo;
- Vibrating level switch for the measurement of silo situation (full or empty);
- Intelligent pressure transmitter for the measurement of compressed air pressure.
- Limit switch for actuating movement
- The unit is equipped with the PLC control system, and all the input/output signals (4~20mA) of PLC are isolated and converted through the isolator.
- All instruments should be provided with installation materials, such as bolts, nuts, gaskets, and flanges etc.

5.4.3 System Control:

There are two working modes: automatic control and manual control. The difference is that operation of equipment is not limited by limit switches in manual mode. One could judge if operation of equipment is to its position from scada.

Note: Emergency stop to be provided at various critical location of equipment installation, but starting can only be done the main control room.

5.4.3.1 Manual control:

- Open or close valves by set switches;
- Start or stop motors by push button;
- Push button of "start" and "stop" on distributed control boxes control motors without going through PLC. Switches are for setting control mode of motors.

5.4.3.2 Automatic control process:

- Materials are conveyed from alumina silo to fresh alumina silo. PLC controls conveyor, fans according to material level and process. Frequency converter is adopted for blowers under enriched alumina silo. Frequency is set through up level computer and/or at control panel of the frequency converter according to process requirement to secure safe conveying of material.

ANNEXURE - 'A'

BATTERY LIMIT

Sl. No.	AREA	*BATTERY LIMIT*
1	**Civil Work**	• *All civil work included in bidder's scope however bidder shall submit the load data's, layout and detail civil drawings as applicable to be submitted to the purchaser for notification.* • *All foundation is in bidder's scope. The design of the foundation and supply of foundation bolts is in bidder's scope.* • *Associated civil and structural buildings in the best ergonomic manner with all the required facility as per requirement of man and machine to be located at this location.* • *Earth removal and area grading under bidder's scope.* • *Soil testing under bidder's scope.* • *Load test of pile under bidder's scope.* • *Silo pile cap, silo base and unloading station platform under bidder's scope.* • *Approach roads and drains to unloading station and conveyor structures, the same shall be connected to the plant main road and drainage system under bidder's scope.* • *Associated buildings required like transformer room, Office and MCC room under bidder's scope.* • *Complete furnishing of these rooms along with AC and LAN connection facility bidder scope.* • *Rain water harvesting system bidder's scope.* • *Sewage system of all the buildings to be provided in bidder's scope.* • *During construction any damage or any damage foreseen due the construction the new system to the existing system will be rectified and strengthened as per relevant IS standards by the bidder.*
2	**Structural Work**	• *Complete structural design, fabrication and erection of silo, conveyor structures under bidder's scope.* • *All steel structures including supporting structures, walkways, staircases are included in bidder's scope.* • *Unloading station shed under bidder's scope.* • *Any modification required within the existing structures, piping same will also be in bidder's scope.*
3	**Compressed Air**	• *Vendor shall study the present compressed air scenario in the plant and the requirement for the new system.* • *Additional compressors if required shall be installed as per*

Sl. No.	AREA	*BATTERY LIMIT*
		the optimised requirement of the new system. • *The compressor shall be installed at the central compressor house.* • *Piping, electrical, safety and instrumentation for the same till the unloading station shall be in bidder's scope.* • *Integration of the new compressors with the existing system.*
4	**Electric Power supply**	• *Supply, installation & commissioning of transformers are in Bidder's scope.* • *Supply, installation and termination of all incomer cables up to mcc are in purchaser's scope.* • *Supply and laying of all power cables (including cable trays) from MCC to various connecting points are in Bidder's scope.* • *Supply of all control and signal cables with cable tray, including the laying of cables and cable tray and pipe are in Bidder's scope.* • *All control & signal cabling from instruments/ limit switches etc to MCC's are in Bidder's scope.* • *Supply shall be provided by Balco till the transformer of bidder.* • ***Lighting of the following areas:*** • *Alumina unloading & transfer system* • *Conveyor system and its approach at ground level* • *Alumina transportation and distribution system are in bidder's scope.* • *Earthing & lightning arrester for each building are in purchaser's scope.* • *Conveyor structural earthing under bidder's scope.* • *Earthing for motors/ panels/ electrical equipments/ junction boxes/ push button switch boxes etc. are in Bidder's scope.* • *Earthing shall be done through GI (Galvanized Iron) strips of suitable size and double earthing should be provided for all those electrical equipments/ accessories mentioned above are in Bidder's scope.* • *Earthing for all equipments/accessories: - Earthing ring shall be formed by inter-connecting all the electrical equipment and this ring shall be connected to the nearest earthing grid of BALCO, for e.g. for alumina transfer system BALCO's earthing grid shall be along the pot-room etc.* • *Complete earthing of the installation is in Bidder's scope including lightening arrestors.* • *The required Government statutory compliance under bidder's scope.* • *Note: Location from where the power will supplied to the new system will be cleared after the site and total tentative max load is given in the bid.*
5	**Alumina Unloading and conveying system.**	• *Supply and installation of Flexible hoses for connection to Alumina rail tanker with matching flanges and QRC (quick*

Sl. No.	AREA	*BATTERY LIMIT*
		relief valve) are in bidder's scope. • *Supply and installation of all subsequent connections, piping, and hoses for transfer of material up to 16000 t capacity silo or primary silo system are in bidder's scope.* • *Supply and installation of Connection flanges at top of storage silos are in bidder's scope.* • *Supply and installation of Air storage tank.* • *Supply and installation of dense phase system including supportive steel structures for unloading alumina from train tanker to silo top inlet flange is in bidder's scope* • *Supply and installation of de -dusting and anti-segregation system system for alumina unloading stations are in bidder's scope .* • *Supply and installation of vibro-feeders and anti-segregation system under bidder's scope.* • *Supply and installation of valves, switches, level and proximity sensors, NRV, flow meter and safety instruments under bidder's scope.* • *Supply and installation of conveyor system along with all required safety system under bidder's scope.*
8	**3000 t capacity Fresh alumina silo's**	• *These silos will be in purchaser's scope including fluidizing bed at the bottom along with 2 nos discharge points & piping up to top of enriched Alumina silos shall be in purchaser's scope.* • *Connecting flanges at conveyor unloading system along with its associated structures, walkway, and platform is in bidder's scope.* • *Connection to the anti-segregation system under bidder's scope, after dismantling the existing system.* • *The present system of air lift loading of fresh alumina silo of 3000 mt capacity will have to re-design to keep the alumina input into the fresh alumina in progress till the new system will not be completely operational in bidder's scope.* • *This system will be in operation to handle bulkers transporting alumina and also act as emergency feeding point in case of shut down and break down of the conveyor system in bidder's scope.* • *Feeding system at the bottom of the 100 mt silo to be installed with vibrating screen at air slide inlet point and the feeding input points on the top the silo shall be relocated the same shall be in the scope of the bidder.*
9	***During Site construction work***	• *Construction power shall be given at 1 point in Alumina unloading area from LT feeder in potline at alumina handling area within 500 m (radius) distance free of charge.* • *Subsequent distribution including necessary clearance for the board from electrical inspector is in bidder's scope.* • *Bidder shall also provide DG sets for power during power outage.*

Sl. No.	AREA	*BATTERY LIMIT*
		• *Bidder shall draw water from a radius of 500 metre for construction.* • *Only space for site office, storage and erection space shall be given.* • *All required safety, government and statutory body clearance shall be taken for work need during construction and initial operational phase.*

Note: *Battery limit first point* - Train wagon outlet flange.
Battery limits final point - Conveyor outlet to anti-segregation system at FTP1 and FTP 2.
All facility b/w these 2 points to complete the system shall be in bidder scope.

ANNEXURE - 'B'

SPARES

Spares Commissioning and 2 year spares:-

Spares shall be divided into commissioning and 2 year spares. The same shall be listed and outline along with bid submission. This shall be clearly bifurcated into insurance and regular spares.

1. Mechanical.
2. Electrical.
3. Instrumentation.
4. Safety.

ANNEXURE - 'C'

PERFORMANCE GURANTEE TEST

1. Warranty

1.1 Bidder warrants that the Contract Equipment supplied will be of latest technology and of the latest design. The equipment, components and materials used will be completely new, of good quality, reliable and adequate to the requirements of production process for long term operation and service life (Service life to be specified along with bid document).

1.2 Bidder warrants that the Technical Documentation supplied be legible, complete, clear and correct, and shall meet the requirements of assembly, installation, commissioning, performance test, operation and maintenance of the Contract Equipment.

1.3 Bidder warrants that Contract Equipment delivered will be as specified in the Contract and free of defects. The warranty period is twelve (12) months starting from the date after commissioning or twenty four (24) months after the date of the last FOB shipment of the equipment, whichever comes first provided all instructions of operation and maintenance given by Bidder are followed.

1.4 System once commissioned shall be operated by M/s Balco for 3 months, if any teething problems are noted the same shall be informed to the Bidder for replacement and rectification. Within 1month from notification, failing which the same shall be executed by M/s Balco at Bidders risk and cost.

2. Performance Figures and Liquidated Damages:

2.1 The performance data warranted by Bidder is listed below. The relevant remedial work and/or liquidated damages will be applicable in case the performance data cannot be achieved within a reasonable period due to reasons attributable to Bidder. However, Bidder has the right to improve or to replace to meet the performance figure within a reasonable period, before payment of liquidated damages. If after trial to improve the performance figure by Bidder, this item still does not comply with the required performance figure, this item may be accepted by Buyer, provided Bidder accepts the liquidated damages as indicated.

2.2 However, the maximum cumulated amount of liquidated damages will, in no circumstance, exceed ten percent (10%) of the FOB value of the Contract Price of the Contract equipment. Liquidated damages shall be the sole and final remedy to the Buyer. After acceptance of liquidated damages by Bidder, the Buyer will sign the Certificate of Acceptance for the Contract Equipment in two (2) originals.

2.3 Pre-condition of warranty is described in table under:

SL. NO.	ITEM	PERFORMANCE	WARRANTED FIGURES	*REMARKS*
1	Capacity of Dense Phase system for charging alumina to the silos	Conveying Capacity: Steps to be followed to take the PG Test of the Hyper Dense Phase system is described in art 3.2 of this annexure.	Assured figures by the bidder	
2	Capacity of conveyor system for charging alumina to the fresh silos	Conveying Capacity: Steps to be followed to take the PG Test of the Hyper Dense Phase system is described in art 3.4 of this annexure.)	Average capacity 150mt/h	
3	Attrition of alumina particle	Two places Alumina sampling will be done— a. Alumina sample from the Train	1%	

SL. NO.	ITEM	PERFORMANCE	WARRANTED FIGURES	*REMARKS*
		b. Tank Wagon & Alumina sample from the conveyor top of fresh alumina silo		
4	Accuracy of level sensor, limit switches and proximity switchs of all the silos		±0.5 %	
5	Noise level of fans/ blower	At a distance of 1 mtr.	Max. 50 dB	
6	Dust emission level		5mg/Nm3	
7	Energy consumption of the system	Kw-Hr	Assured figures by the bidder	
8	Compressed air consumption	Nm3/Hr	Assured figures by the bidder	

If there is any deviation from the PG parameters, then LD will be imposed on the respective subsystem where the deviation has occurred.

3. Test method of Performance Guarantee:

3.1 Conveying capacity:For PG test, alumina quality must meet the requirements specified in technical annexure 1, and it must be dry and clean.

Particular measurement method is as follows: note down the actual weight of alumina in the alumina tanker, connect any one dense phase conveying pipe and air supply pipe to alumina tanker on site, record the start and end time of conveying, divide the actual alumina weight in the tanker by the conveying time duration, the result is just the conveying capacity of one section of pipe. For one same section of pipe, do the same for three times, and take the average value of the three values as the final test value of conveying capacity for a single dense phase pipe. At a time each partition of a single tank wagon Alumina has to be unloaded.

3.2 Conveying capacity of belt conveyor:
Belt conveyor : ~150 t/h
Note: Test plan to be provided by the bidder and mutually agreed by both parties before contract finalization.

3.3 Attrition of alumina:
Note: Test plan to be provided by the bidder and mutually agreed by both parties before contract finalization.

3.4 Compressed air and electrical power consumption:
Note: Test plan to be provided by the bidder and mutually agreed by both parties before contract finalization.

ANNEXURE - 'D'

TIME SCHEDULE

1. Kick of Meeting at Project Site BALCO, Korba:

Within 15 days of Advance Payment or within 30 days of LOI

2. Delivery of Documents:

Sl. No.	Documents	*Delivery Dates*
1	General Arrangement Drawing (Plan & Sections including location of control rooms & blower rooms)	*Within 1 month of LOI*
2	Drawing showing the location of all terminal points / battery limits of various utility services including utility requirements.	*Within 1 month of LOI*
3	A: Instrumentation Control Philosophy along with list of annunciation points B: List of Electrical Equipment indicating Specification & HP Rating	*Within 4month of LOI*
4	P & ID along with Control Philosophy - final	*Within 5month of LOI*
5	a) PLC user's program table and its copy b) copy of PLC programming software	*1 month before Start-up*
6	PLC Users manual & catalogue	*1 month before Start-up*
7	Six hard copies and One soft copy of installation, operation and maintenance manual, spare parts manual, PG parameters and test procedure manual(testing book) which includes Test Certificates of all bought out items a) Provisional b) Final	*a)1 month before Mechanical completion* *b)1 month after Hot Commission*
8	*All the As-built drawings*	*At the time of taking over certificate.*

3. Project Implementation Plan:

a) Site Mobilization : within 1month of kick of meeting
b) Performance Guarantee Test (PG Test): Within 6 months after commissioning of total system.
c) The bidder shall submit a project schedule along with the bids from start to finish of the project, with detail month wise milestone plan.
d) 1 Month after PG final Project report.

ANNEXURE - 'E'

TRAINING

Bidder shall include the training of Purchaser's operating and maintenance personnel in their scope of Work.

The actual training tools shall be developed as part of the detailed engineering and shall be based on information incorporated into the Operation and Maintenance Manuals (O&MM's),as well as other information developed during the engineering phase. The training material shall incorporate, at purchaser's site.

- Flow sheets
- Drawings
- Manuals (O&M's)
- Operational analysis and trouble shooting
- Control system overview and details of the software programs
- Trouble Shooting
- Maintenance

The training will de done as:

- Classroom training of Purchaser's operating personnel
- Classroom training of Purchaser's maintenance personnel for:
  - Mechanical equipment
  - Electrical equipment
  - Instrumentation and control equipment
- Hands on training in the plant before and during the commissioning

The classroom training shall be done in the pre-commissioning phase (pre-operational testing), by Bidder personnel with wide experience from similar projects.

The hands on training will be carried out in the pre-commissioning - commissioning/start-up phase. We plan to involve Purchaser's operating personnel in start-up activities to ensure practical and reliable hands on training.

ANNEXURE - 'F'

PROGRESS REPORT

The Bidder/Contractor will submit the Monthly Progress Report without fail. This report shall give the information on the progress of the following:

a) Engineering
b) Ordering of bought-out items
c) Supply of bought-out items at Site
d) Fabrication job at site and at fabricator's workshop
e) Supply of Fabricated items at site
f) Civil work at site
g) Structural work at site
h) Erection of Equipment

The Progress Report shall be submitted by the Bidder/Contractor by end of every month, without fail. This is essential and running bills will be accepted only after the submission of the Progress Report.

The Progress Report shall be submitted in the Format attached.

The lead partner shall issue the Progress Report of both the lead partner as well as the Indian partner.

BHARAT ALUMINIUM COMPANY LTD

Aluminum Smelter Project

ANNEXURE-1

TECHNICAL DATA SHEET

FOR

ALUMINA STORAGE, TRANSPORTATION AND DISTRIBUTION SYSTEM

Sl. No.	Technical Specifications	BALCO's REQUIREMENT	BIDDER Confirmation / Comments
1.	Scope of work for the Supplier	Design, Engineering, Supply, Erection & Commissioning and Performance Testing of Alumina unloading and transfer system	
		Design, Engineering, Supply, Erection & Commissioning and Performance Testing of Fresh Alumina storage and transfer system	
		Design, engineering, supply ,erection and commissioning and Performance testing of pipe conveyor system from fresh alumina storage near unloading station to the fresh alumina silo in pot line FTP-1 and FTP-2, above 3 system with required electrical, utility, safety and integration of the system with the existing system with required retro-fitting and modification.	
2.	Potline Data		
	a. No. of Potline	1 Nos.	
	b. No. Of Potroom	2 Nos.	
	c. Current Amperage, kA	325 kA	
	d. Total No. of Pots	Total 336 nos	
	e. Length of each potroom	Refer layout drawing layout drawing attached	
	f. Total no of Wagons in one rake	51	
	g. No of wagons to be unloaded per placement	26	
	h. Unloading rate per rake	6 hrs /rake	
	i. Total consummation of alumina per month	53,000 Mt/month	
	J. Total no of rakes to be unloaded in month	21	
	K. Unloading shed	26 no wagon + additional space	
	l. Primary silo capacity	more then 16,000 mt(mini),As required by the designer can also be proposed	
	M.Conveying pneumatic system from wagon to primary silo pressure	2 bar (lp wagon) + 6 bar(hp wagon)	

Sl. No.	Technical Specifications	BALCO's REQUIREMENT	BIDDER Confirmation / Comments
	N. Type of conveying from wagon to silo primary	Dense phase	
	O. Conveying of alumina from primary silo to fresh alumina silo FTP 1 and 2	enclosed pipe conveyor	
	P Transfer rate of conveyor to one ftp silo	150 MT/HR	
3.	**Alumina Quality**		
	a. Al_2O_3	98.5 ~ 98.6 %	
	b. SiO_2	0.02 ~ 0.04 %	
	c. Fe_2O_3	0.03 ~ 0.04 %	
	d. Na_2O	0.5 ~ 0.6 %	
	e. Bulk density	0.95 ~1.05 g/cm^3	
	f. Angle of Repose	35 ~ 37 ^{o}	
	g. Size-→ –325 mesh	10 ~ 12 %	
4.	**Function of Alumina unloading and transfer system**		
	a. Installation of Alumina Unloading system from rail tanker (fluidized bed at bottom) by compressed air at pressure of 2kg/cm2 and 6 kg/cm2. Alumina tanker supply will be owner's scope	Bidder scope	
	b. Transfer of Alumina from rail tanker to Primary storage silo through rubber hosepipe and dense phase conveying system.	Bidder scope	
	c. The vendor shall make all the required study of the present compressed air requirement and shall make arrangement for installation after getting prior approval for the same from M/s	Bidder scope	

Sl. No.	Technical Specifications	BALCO's REQUIREMENT	BIDDER Confirmation / Comments
	BALCO, based on the study done.		
	d. Site survey along with soil testing to be done for design of all the civil systems. The same shall be in bidders scope.	Bidder scope	
5.	**Description of Unloading and transfer system that will be designed, manufactured, built , erected and commissioned w.r.t civil, mechanical, electrical, instrumentation, safety, sustainability and Fire**	Bidder's scope	
	a. Total number unloading station	1 nos.	
	b. Total number of Alumina rail tanker to be unloaded at time	26 nos.	
	c. Total number of Alumina rail tanker shall be unloaded by one dense phase conveying system.	Bidder scope	
	d. Tota number of dense phase conveying line shall be at unloading station.	Bidder scope	
	e. Total number of dense phase conveying line is connected with number of fresh Alumina storage silo • Portability of wagon unloading between different stations. • Safety life line for work men operating on top the wagons. • Concrete floor PQC required of width 2 mtrs adjacent railway tracks, for fixing and maintenance of the wagon along with unloading station • Provision to be made	Bidder scope	

Sl. No.	Technical Specifications	BALCO's REQUIREMENT	BIDDER Confirmation / Comments
	to have first and second level safety protection system.		
	f. Total number of Primary storage and secondary surge silo to be installed and its capacity.	Bidder scope	
	g. The conveying pipe is composed of inner pipe, outer pipe, Flange and adjustable bolt or sign rod. The accessories include sealing gasket and bolt. Along with point for material inspection.	Bidder scope	
	h. Pneumatic test will be carried out with the compressed air of 0.6 Mpa in way of using soapy water to test each joint to prevent air leakage of dense phase conveying pipe.	Bidder scope	
	i. Before assembling of the exterior pipe and inner pipe of dense phase, sandblasting treatment should be done first, then the exterior surface of the outer pipe should be painted with one layer of red lead primer and two layers of white surface coating. As per relevant IS standard if material manufactured in India or DIN if the material manufactured out of India.	Bidder scope	
	j. Part number must be clearly printed on the inlet flange and with obvious marking showing the direction of material flowing.	Bidder scope	
	k. The inner pipe must not have any tilting and bending.	Bidder scope	
	l. The quality requirement of welding seam will be as per grade 3 of structure steel.	Bidder scope	

Sl. No.	Technical Specifications	BALCO's REQUIREMENT	BIDDER Confirmation / Comments
	M.The pipe shall be arranged in ergonomic manner along with required platforms and over head walkways, without any trip and fall hazard, maintenance and operational view point for people operating and maintenance of the system.	Bidder scope	
	n. Working pressure	2 bar to 6 bar conveying air pressure, instrument air of 6 bar	
	o. Alumina flow rate for each conveying pipe.	Bidder scope	
	p. Control mode	PLC	
	q. Effective volume of rail tanker	58 m3 , Drawing attached	
	r. Diameter of 16000MT silo	30m	
	s. Auto/Manual mode for emergency, With HMI and LOCAL SCADA	Bidder scope	
	t. SCADA and PC required along with trends and report generation of daily, shift and monthly loading and unloading assessing the performance.	Bidder scope	
	u. The main control room to separate from the MCC room, fan room to be properly insulated for noise levels, transformer room and office room should have a free view of the entire unloading station.	Bidder scope	
	V.All parameters should be displayed for monitoring at the central control room at central pentagon. • Wagons pressurization is to be controlled via pneumatic valve and Manual cut-off valve • Conveying pressurization also to be controlled via	Bidder scope	

Sl. No.	Technical Specifications	BALCO's REQUIREMENT	BIDDER Confirmation / Comments
	pneumatic valve and Manual cut-off valve • Wagon pressurization air line should have air pressure regulating valve, cut off valves and safety blow valves. • Local control panel required at every 4 stations. • Field instruments should be both analog and digital, having one common display of pressure of individual stations and common headers on site. • Air receivers to have Auto Drain valve, safety valves, pressure gauges and point for hydro testing, approach for walk ways/stairs and platforms for instruments. • Machine guarding of all the equipments installed and Air receiver Tanks installed should be as per Vedanta Standards as per attachment		
9.	**Technical Data Alumina Unloading and transfer system upto Primary storage silo**		
1	*No of material line valve per pipe per station,*	Bidder to submit the type, spec and make	
2	No of Pneumatic line valves per station	Bidder to submit the type, spec and make	
3	No of Pneumatic line auto	Bidder to submit the type, spec	

Sl. No.	Technical Specifications	BALCO's REQUIREMENT	BIDDER Confirmation / Comments
	vavle spec and make	and make	
4.	No of pressure gauges on pneumatic and material line per station	Bidder to submit the type, spec and make	
5.	No of pressure Transmitter on pneumatic line and material line per station	Bidder to submit the type, spec and make	
6	No of pressure gauges on main pneumatic line header per station	Bidder to submit the type, spec and make	
7	No of pressure Transmitter on main pneumatic line header per station	Bidder to submit the type, spec and make	
8	No pressure release valves in one station	Bidder to submit the type, spec and make	
9	No pressure regulating valves in one station	Bidder to submit the type, spec and make	
10	No of Material sampling point on material line per station	Bidder's scope	
11	Designed life of the system dense phase piping and control system	Bidder's scope	
12	Availability of the system of the unloading system.	Bidder's scope	
13	Compressed air consumption of the unloading system and figures guarantied	Bidder's scope	
14	Electrical power consumption of the unloading system and figures guarantied	Bidder's scope	
15	Shed size and type	Bidder's scope	
16	Illumination of the area in the shed and around the unloading system and safety signage.	Bidder's scope	
17	Maintenance Electrical DB for welding and other works	Bidder's scope	
18	Unloading and storage area drain, pathways, approach road, toilets, rest room and office to be considered and detailed in the bid.	Bidder's scope	
19	Total no of manpower required for operating the	Bidder's scope	

Sl. No.	Technical Specifications	BALCO's REQUIREMENT	BIDDER Confirmation / Comments
	system guarantied		
20	Fire Protection system as TAC for the unloading system. Detailed outline to be furnished along with the bid doc.	Bidder's scope	
21	Safety and Sustainability as per Vedanta standard to be adopted for the unloading and storage system, salient features of safety offered by the bidder to detailed in the bid Doc.	Bidder's scope	
22	The required Furniture, A/C and ventilation for the equipments and control room is in bidder's scope.	Bidder's scope	
23	Time taken for installation of the system from civil to mechanical commissioning	Bidder's scope	
24	Time taken for commissioning of the system	Bidder's scope	
25	Salient operational features and parameters can be detailed along with bid doc in report form.	Bidder's scope	
6.	**Description of Primary unloading storage system that will be designed, manufactured, built , erected and commissioned w.r.t civil, mechanical, electrical, instrumentation, safety, sustainability and Fire**	Bidder's scope	
1	Silo capacity (minimum 16,000 mt) and bidders proposal	Bidder's scope	
2	Total no of silo to be installed for the proposed station	Bidder's scope	
3	Physical dimension of the silo(diameter + Height)	Bidder's scope	
4	Construction material -Steel shell or Covered	Bidder's scope	

Sl. No.	Technical Specifications	BALCO's REQUIREMENT	BIDDER Confirmation / Comments
5	Codes and standards used for design and construction of the silo's	Bidder's scope	
6	Silo top anti segregation system spec/ advantage/ attrition rate % confirmed and make	Anti segregation system (parameter < 1% allowed alumina attrition value)	
7	**Operational requirements on top of silo** -Level transmitter chain type, the system should provide the height of filling and also the amount of alumina. -dip points as per EIN requirement for physical verification and the same should have proper covering against external environment. - Safety valves/ Super low pressure valve. - Dust collection system to be installed at bottom of the silo with cut of valves with approach for the same, and discharge should be fed back to the system itself. - Lighting arrestor to be installed to cover the complete Alumina unloading and storage system from the top of the silo by making grids as per IS norms. - Staircase, handrails, barricading, platforms installed should be as per Vedanta Standards as per attachment. The silo top hand rail bottom section to be covered by mesh all around the silo. - Multiple points discharge points at silo bottom.	Bidder's scope	
8	Dust collection points and duct collector installation	Bidder to submit the type, spec and make	

Sl. No.	Technical Specifications	BALCO's REQUIREMENT	BIDDER Confirmation / Comments
	location		
9	Dust collector out let material to be return system and its provisions to detailed	Bidder to submit the type, spec and make	
10	No of material level transmitter or sensors to be installed	Bidder to submit the type, spec and make	
11	No of super low pressure value to installed on to silo pressure balance inside and outside the silo	Bidder to submit the type, spec and make	
12	Silo fluidization system -total no of beds to be installed /spec and make	Bidder to submit the type, spec and make	
13	Silo fluidization system -total no of inverted cones to be installed.	Bidder to submit the type, spec and make	
14	Silo fluidization system - pneumatic piping network pipe size, overall length and system specification.	Bidder's scope, along with type, spec and make	
15	Silo bottom- Total number of silo material outlet points.	Bidder's scope	
16	Silo bottom- Total number of valves on each material outlet points. -Should have 2 valves at bottom discharge	Bidder to submit the type, spec and make	
17	Silo bottom- Material conveying method from the outlet valve till the inlet of belt conveyor	Bidder to submit the type, spec and make	
18	Silo bottom should have provision for bulker loading of capacity 25 mt. • Vibrating screen should be installed before TPS loading point • -No of material loading points into Bulkers • Type of telescopic spout , spec, make and loading rate.	loading time 10 to 15 minutes	

Sl. No.	Technical Specifications	BALCO's REQUIREMENT	BIDDER Confirmation / Comments
	• Type of telescopic spout salient features and dust emission rate. •		
19	Silo bottom discharge to conveyor to have vibrating screen and metal separator	mesh size + 5mm	
20	Silo bottom- no of vibrating screen installed at the bottom of silo	Bidder to submit the type, spec and make	
21	Silo bottom- Dust collection system (independent or combined with silo to dust collection system)	Bidder's scope	
22	Silo bottom- Dust collection system if independent spec and make to be given	Bidder to submit the type, spec and make	
23	Location and no of lifting equipment if any to be specified at the silo bottom extraction system	Bidder to submit the type, spec and make	
24	Shed to be provide to protect the system from natural elements if loading system out side the silo	Bidder's scope	
25	No of Material inlet valve at the inlet of the belt conveyor	Bidder's scope	
26	Dust collection system at the inlet of belt conveyor to be linked to the silo bottom collection pipes	Bidder's scope	
27	Dust collection system at the inlet of belt conveyor to be linked to the silo bottom collection pipes	Bidder's scope	
28	If more then 1 primary storage silo proposed at the unloading station, specify the reason	Bidder's scope	
29	Details of the extra silo holding capcity,codes and standards used for the design and construction of the same	Bidder's scope	

Sl. No.	Technical Specifications	BALCO's REQUIREMENT	BIDDER Confirmation / Comments
30	Conveying of alumina from these installed secondary silo's to main storage silo type and specification	Bidder's scope	
31	Conveying rate and efficiency of the system to specified	Bidder's scope	
33	Conveying system installation by the bidder in other project's or location can be given for the proposed system	Bidder's scope	
34	Control philosophy of the new proposed system within the Electrical and instrumentation and PLC line diagram to be submitted with Bid doc.	Bidder's scope	
35	Discharge rate of the primary storage silo Mt /hr	Bidder's scope	
36	Approach roads, drains, compressed air piping and Fire protection system for storage system to be detailed by providing a layout. • This shall also include space for bulker parking and considering its turning radius.	Bidder's scope	
7.	**Description of Fresh Alumina storage and transfer facility up to 3000 MT fresh alumina daily storage silo of FTP1 and 2, system that will be designed, manufactured, built , erected and commissioned w.r.t civil, mechanical, electrical, instrumentation, safety, sustainability and Fire.**	**Bidder's scope**	
1	The belt conveyor is adopted for alumina conveying from Primary	Bidder has to confirm	

Sl. No.	Technical Specifications	BALCO's REQUIREMENT	BIDDER Confirmation / Comments
	Alumina Storage silo to 3000MT fresh Alumina daily storage silo of FTP 1 and 2		
2	Type of conveyor	pipe conveyor,	
3.	No of Transfer Points connecting to FTP1 and FTP 2 silo	1 transfer point (junction house)	
4	Operational requirements • Should come with all the safety equipments as per BS V • Lifting equipments to be given at all critical points. • Walk ways and Hand rails on both side of conveyor. • Sump pump and lighting equipments to be provided at transfer point at primary silo bottom to belt conveyor if below GL. • The belt to be covered at points were conveyor forming into pipe and pipe unwinding locations • Steel mesh to be provided on hand rail was height conveyor reaches more then 30 mtrs. • Conveyor bottom to be covered with steel plate at road crossing and pot room cross over. • Double earthing with insulation mate to be provided, when the gallery run over the pot room or high tension transmission line.	Bidder's scope	

Sl. No.	Technical Specifications	BALCO's REQUIREMENT	BIDDER Confirmation / Comments
	• Indicator lights at every 100 mtrs of the conveyor, if at road level and over head crossing. • Approach road and connecting drains and lighting to be provided near all approach towers. • Lighting throughout the conveyor with illumination levels as per IS stanadrs.		
5	Capacity of conveyor	Bidder's scope	
6	Dia of the pipe conveyor	Bidder's scope	
7.	Lump size of material conveyed	zero	
8.	Material density	95-1.05 t/m3	
9.	Belt speed	not more then 2.5 mtr per second, if the same is to be higher kindly give reason. VFD in drive system required	
10.	Type of conveyor belt to be used spec and make	steel cord	
	-type of fabric	Bidder's scope	
	-Cover grade		
	-Cover thickness		
	• Face cover		
	• Back cover		
	-No of plies		
	-Factor of safety		
	-Normal working tension		
	-Type of belt joint		
11	Radius of the proposed conveyor stream	Bidder's scope	
12	Slope of the conveyor stream	Bidder's scope	
13	No of junction houses and it height	Bidder's scope	
14	GA drawing with elevation and plan	Bidder's scope	
15	Transition distance for belt to form into pipe	Bidder's scope	
16	The above length to be completely covered, to have no impact by natural	Bidder's scope	

Sl. No.	Technical Specifications	BALCO's REQUIREMENT	BIDDER Confirmation / Comments
	elements.		
17	No of idlers used to form the pipe	Bidder's scope	
18	No of idlers in the front and no of idlers at the back of the idler frame	Bidder's scope	
	-idler width		
	-idler dia		
	-idler shaft dia		
	-Thickness of the idler shell and seat frame		
19	Distance b/w the 2 idler frames	Bidder's scope	
20	Pipe shape on the return lap	Bidder's scope	
21	support structure length and walk way arrangement(max length to be specified).	Bidder's scope	
22	support structure to be provide with railing fixed with mesh and the hand rails to be as per BS –V	Bidder's scope	
23	No of approaches that will be provided to the conveyor support structure from ground level	Bidder's scope	
24	At inclination of more then 12 deg steps to be provided in the walk platform	Bidder's scope	
25	Location of the Drive system (head pulley or tail pulley)	Bidder's scope	
26	Lagging type and thickness depending drive or non drive specify(shore hardness/abrasion/adhesion strength)	Bidder's scope	
27	No of pulleys to be installed in the conveying system	Bidder's scope	
	Drive electrical spec and make(protection class and insulation class) -Motor rating -Motor location in system, (master slave arrangement or single motor driven at head end)	Bidder's scope	
28	Type of coupling, make and	Bidder's scope	

Sl. No.	Technical Specifications	BALCO's REQUIREMENT	BIDDER Confirmation / Comments
	spec		
29	Type of gear box , spec and make	Bidder's scope	
30	Lifting equipment for maintenance location make and spec	Bidder's scope	
31	Head pulley end of the conveyor to be installed with a shed, if required to go below ground to be considered in civil scope	Bidder to submit the type, spec and make	
32	Tail end or the discharge end of the conveyor should also to be covered by a penthouse type structure with complete enclosure	Bidder's scope	
33	Safety equipments, sensors incorporated to this conveyor system to specified along qty and make	Bidder's scope	
34	Cross-over ,over pot room to be insulated electrical insulated and floor to be covered with seal plate and rubber mat	Bidder's scope	
35	Precaution for corrosion of the structure from fumes generated by the pot to be considered and suggestion to specified.	Bidder's scope	
36	Illumination level at the floor of the walk to be specified in lux	Bidder's scope	
37	Emergency exit and stop buttons to be provided at strategic locations -Spacing of exit locations -Spacing of emergency stop -Pull cord -zero speed switch type and mounting location	Bidder's scope	
38	Junction house location and function to be explained	Bidder's scope	
39	Type of chute and gate with skirt arrangement to be installed to feed the	Bidder's scope	

Sl. No.	Technical Specifications	BALCO's REQUIREMENT	BIDDER Confirmation / Comments
	conveyor stream to FTP-1 AND FTP-2 and feeding on top silo to specified (material to be used in each of the item to be specified).		
40	Actuator operated diverter gate spec and make	Bidder's scope	
41	The layout and plan to be sent along with the proposal	Bidder's scope	
42	Total length of the conveyor system	Bidder's scope	
43	Usage of the existing structural foundation available on top of Fresh alumina silo FTP-1,2 • If, no. new proposal to be provided. • if, yes proposal to be provided with drawing in both case • Expansion box top of silo make and spec to handle 30 mt/hr conveying capacity to be dismantled. • The existing alumina feeding system to integrated at 2 points on top of the 3000 mt silo, after dismantling of the expansion box. • Vibro screen at bottom of 100 mt silo to be installed to handle conveying capacity of 30 mt per hr • Integration of dust collection system plan to cater to the need of airlift system.	Bidder's scope	
44	All standards used for design, fabrication and erection to be specified along with bid doc.	Bidder's scope	
45	Designed life of the system	Bidder's scope	

Sl. No.	Technical Specifications	BALCO's REQUIREMENT	BIDDER Confirmation / Comments
	dense phase piping and control system		
46	Availability of the system of the unloading system.	Bidder's scope	
47	Compressed air consumption of the unloading system and figures guarantied	Bidder's scope	
48	Electrical power consumption of the unloading system and figures guarantied	Bidder's scope	
8	Control System		
	Local Control Desk & Panel View		
	Location	Bidder to Specify	
	Operator panel type	PanelView 1250P	
	Qtty	Bidder to specify	
	Function of PanelView		
		1.Display of process flow and monitoring of equipment running status	
		2.Real time display of various measurement parameters	
		3.Alarm and record system for equipment fault and control system fault	
		4.Interlock start/stop function and emergency stop function of single equipment	
		5.Function of setting various adjustment parameters	
		6.Definition of operation rights of different levels	
		7. Along with all the required back up and legal rights to be handed over to the purchaser in English.	
9	PLC		
	(Vendor shall strictly stick to the specifications given here, and shall confirm the same)	a) PLC shall be used for sequencing, PID control, data acquisition and other required process control applications	
	PLC and IO panel Quantity	Bidder to provide control	

Sl. No.	Technical Specifications	BALCO's REQUIREMENT	BIDDER Confirmation / Comments
		architecture and specify	
		b) PLC shall have facility for networking through suitable communication module. The communication protocol shall be ControlNet.	
		c) PLC data bus shall be redundant with required communication processors and network components including repeaters, connectors, end terminators, etc.	
		d) 20% spare I/Os of each type in each card shall be provided as spare for Purchaser's use	
		e) 10 % spare memory shall be provided for Purchaser's use	
		f) 10 % spare space shall be provided in PLC panel racks for Purchaser's use	
		g) Enclosure class of PLC panels shall be IP54 and make of panels shall be RITTAL	
		h) PLC make shall be Rockwell Automation (Control Logix 1756-L6x series)	
		i) All the required software like PLC programming, application, HMI etc. shall be provided with all the necessary licenses and CDs	
		j) Lap top PC for programming of PLC with required software and run time license should be provided	
	PLC Inputs	24VDC , 4-20mA	
	PLC Outputs	24V DC through interposing relays rated for 220V, AC, 6A	
10	HMI PCs - 4 nos	HMI (operator and engineering stations-total 4 numbers) shall consist of industrial grade PC with 21" color TFT monitor and cater to the entire Alumina Handling System. Minimum PC specifications shall be as follows:	
	Vendor shall strictly stick to the specifications given here,	Bidder scope	

Sl. No.	Technical Specifications	BALCO's REQUIREMENT	BIDDER Confirmation / Comments
	and shall confirm the same		
		Intel P4, 2.4A GHz/400, 512 SLC	
		512 MB DDR SDRAM PC266 ECC	
		40 GB HARD DISK	
		Graphics card : Matrix G450 / 32 MB, DVI, DH	
		LAN on board : 10/100 Mbps	
		DVD / CD ROM, CD R/W, 3.5" 1.44 MB disk	
		Keyboard & mouse	
		Minimum Windows XP professional	
		Aux. Voltage 230V, AC	
		Specifications for 21" TFT color monitor shall be as follows:	
		• Max. 1600 x 1200, 85 Hz	
		• 50-cm(21") color TFT monitor; 30 – 121 kHz	
		The operator stations shall be located in the CCR (Potroom Control Room –Vendor shall note the location of Potroom Control Room in the GAMI's Layout) but the PLC & I/O Panels shall be located area wise as per requirement.	
		To integrate to the existing printing arrangement at central control room, 1 dot and colour printer at unloading area control room.	
		All the required graphics of process shall be available on HMI with real time data. HMI shall be used for control, data acquisition, MIS reports including daily production & process reporting , and alarm annunciation and monitoring of process. HMI shall also be suitable for trending and historical data archiving for a minimum period of 6 months. The memory shall be sized accordingly	
		The application software shall be latest version of RSView SE enterprise	

Sl. No.	Technical Specifications	BALCO's REQUIREMENT	BIDDER Confirmation / Comments
		PLC Programming software shall be RSLogix 5000 Professional	
		Redundant data high way shall be provided. PLC and HMI shall communicate through this data high way. All the required hardware & software for above shall be provided	
		All the required software to achieve above functions shall be supplied with proper licenses, CDs etc	

ANNEXURE# 1

GENERAL SPECIFICATION ELECTRICAL

NAME OF PACKAGE: ALUMINA HANDLING SYSTEM.

	GENERAL REQUIREMENT OF ELECTRICAL AND INSTRUMENTATION		
			BIDDER CONFIRMATION
1	**SYSTEM SPECIFICATION**		
	Main Power supply	415v+/-10%,50Hz+/-3%,3 phase, 4 wire AC with earth neutral	
	Fault level	28.73 MVA at 415 volts	
	Short circuit level	50 kA (r.m.s) for 1 sec at 415 V bus of MCC/DB	
	Voltage for Motors	415V+/-10%,50Hz+/-3%,3Phase,4wire,AC	
	Control voltage	220 V 1 phase ,50 Hz ,AC obtained through suitably rated control transformer	
	Lighting	AC 415V/240V ±10%, 50Hz ±3%, 3 phases/ single phase supplied by dedicated lighting transformers	
	Indication lamp Voltage	24VDC generated through 415V/24 V transformer.	
	PLC Inputs	24 VDC, 4-20 Ma	

	PLC Outputs	24VDC,4-20 mA,0-10 V	
	UPS output Voltage	220 V ,AC ,single phase	
2	CONTROL SYSTEM ARCHITECTURE		
2.1	**Level - 0**	**Level 0 will consist of field mounted primary interfaces, measurement, sensing and activation components. Communication to Level 1 will be hardwired digital and analogue signals and low level communication media.**	
		The field instruments will generally perform the following functions. - Interface to field equipment - Interface up to PLC - Measuring - Sensing - Activation - Signalling - Local recording - Analysis	
2.2	Level 1	Level I will comprise a Allen Bradley Contrologix 1756-L6x series PLC. The level 1 equipment will be connected to the level 2 SCADA system via a separate Ethernet communication network.	
		<u>The PLC's and panel view (1500 P) will generally perform the following functions :-</u> -Control functions -Interlocking -Sequencing and timing -Calculations -Alarm logic -Start up sequences -Safety functions -Communication to level 0 and 1 -Diagnostics - Local operator interface to Process	

		The Local control panel shall cover the following important features for operation requirements:- -Display of process flow and monitoring of equipment running status -Real time display of various measurement parameters - Alarm and record system for equipment fault and control system fault - Interlock start/stop function and emergency stop function of single equipment -Function of setting various adjustment parameters - Definition of operation rights of different levels	
		No of local panel views - Bidder to confirm	
2.3	**Hardware and software to be provided for level 1 operation.**	<u>Location:</u> <u>Local control room</u>	
		1 Allen Bradley Contrologix 1756-L6x series Processor complete with power supply and chassis, all digital and analogue modules, thermocouple input module. Ethernet communication for distributed I/O Ethernet Net communication for PLC to PLC communication and Panelview Ethernet communication to the clients SCADA system UPS for PLC	

		1 - Set instrumentation as necessary together with all push buttons and lights for full operation.	
		1 – Set distributed I/O for MCC panel.	
		<u>Location : Local Panel near Equipment or Local control room</u>	
		1 – Set distributed I/O in local panel.	
		1- Panel view 1500P in Local panel	
		Location: Field mounted on equipment	
		1 - Set of Manual Push-button Stations wherever required. 1 – Set of Emergency Stop push buttons wherever required.. 1 - Per motor - Local push button station with ammeter.	
2.4	***LEVEL 2 - HMI SYSTEM AND SOFTWARE***	<u>Programming Software</u>	
		RS Logix 5000 Ver. 13 (PLC Programming software)	
		RS Linx (Communication software)	
		RS View SE enterprise (SCADA)	
		Operating System- Window Xp	
2.5	**HMI**	<u>1 no- operator station + 1No Operator cum engineering station + One programming laptop – Bidder to confirm</u> + 1 No Managers Monitoring Station at Manager's Office	
	a) PC based HMI System to be provided in the control room	**Bidder to confirm**	
	b) HMI system to be used for : - Operator work station - Operator cum	**Bidder to confirm** Bidder to confirm Bidder to confirm	

	engineering station - data logging - MIS reports like production per shift, per day, per month	Bidder to confirm	
	c) PC Specifications	• Intel P4, 2.4A GHz/400, 512 SLC • 2 GB DDR SDRAM PC266 ECC • 320 GB HARD DISK • Graphics Acceleration card: Matrox G450 / 32 MB, DVI, DH • LAN on board: 10/100 Mbps • DVD / CD ROM, CD R/W, 3.5" 1.44 MB disk • Keyboard & mouse • Windows XP professional • Aux. Voltage 220V, AC through UPS system (to be supplied by Bidder) Specifications for 21" color monitor shall be as follows: • Max. 1600 x 1200, 85 Hz • 50-cm(21") color monitor; 30 - 121 kHz,TFT Graphic adaptor for two color monitors shall be provided	
	d) Memory of HMI System	20 % extra.	
	e) UPS	**To be provided for SCADA and PLC**	
		Back up shall be 30 minutes at full load	
		Designed for 130% overloading	
	f) Softwares	**Supplier shall supply all the software to achieve the required functions – with proper licenses.**	
		All the required software to achieve above functions shall be supplied with proper licenses, CDs etc	

	g) Printers	Two numbers printers – 1 no. dot matrix and 1 no. A3 size color Laser jet printer shall be provided hooked up to HMI stations and cater all requirements.	
	h) Additional Minimum features:	All the required graphics of process shall be available on HMI with real time data. HMI shall be used for control, data acquisition, MIS reports, and alarm annunciation and monitoring of process. HMI shall also be suitable for trending and historical data archiving for a minimum period of 6 months. The memory shall be sized accordingly	
		i) Redundant data high way shall be provided. PLC and HMI shall communicate through this data high way. All the required hardware & software for above shall be provided	
2.6	**Programmable Logic Controller**		
a.	**Make: Rockwell Automation only**	**Bidder to confirm**	
b.	Type	**Allen Bradley Contrologix 1756-L6x Series**	
c.	10% spare I/Os of each type in each card shall be provided as spare for Purchaser's use	**Bidder to confirm**	
d.	10 % spare memory shall be provided for Purchaser's use	**Bidder to confirm**	
e.	10 % spare space shall be provided in PLC panel racks for Purchaser's use	**Bidder to confirm**	
f.	PLC shall have facility for networking through suitable	**Bidder to confirm**	

	communication module. The communication protocol shall be universally accepted open protocol like, MOD BUS, IEC etc. All the required hardware & software shall be provided to achieve the above		
g.	Enclosure class of PLC panels shall be IP54 and make of panels shall be RITT AL	**Bidder to confirm**	
h.	All the required software like application, HMI etc. shall be provided with all the necessary licenses and CDs	**Bidder to confirm**	
i.	Lap top PC for programming of PLC with required software and run time license shall be provided	**Bidder to confirm**	
j	PLC shall be used for sequencing, PID control, data acquisition and other required process control applications	Bidder to confirm	
k	PLC shall have hot standby CPU & redundant power supply. The data bus shall also be redundant with required communication processors	Bidder to confirm	
3	**INSTRUMENTS-**		

	GENERAL GUIDELINE AND SPECIFICATION		
a	The instrumentation system and equipment shall preferably be offered from latest state of the art microprocessor based & smart range of commercially available products from global manufacturers.	Bidder to confirm	
b	In case of an item being offered from any global manufacturer, Bidder has to ensure the availability of services & spares in India on short notices	Bidder to confirm	
c	The preferred manufacturers for instruments are **Honeywell / Emerson / Yokogawa in general for all applications, VEGA for level and P+F** for switching applications	Bidder to confirm	
d	The analog signal input & output to / from transmitter / converter shall be considered computer compatible 4-20 mA DC with HART protocol. The digital signal shall be TTL compatible voltage pulse and switching signal shall be considered as potential free contacts from line / field mounted devices.	Bidder to confirm	
e	Level sensors shall be of non contact type /	Bidder to specify	

	laser / radar based		
f	All pressure gauges shall be with bourdon type sensing element. All temperature gauges shall be with bimetal / filled in type sensing system. All pressure signal transmitters shall be microprocessor based & indicating type with HART protocol	Bidder to confirm	
g	RTD / Thermocouple type temperature sensors shall be considered based on the merit of the application.	Bidder to confirm	
h	All control / shut off valves shall be duly sized & provided with electrically operated actuators complete with valve position limit switches & position transmitters	Bidder to confirm	
i	The preferred manufacturers for all instruments are Honeywell / Emerson / Yokogawa in general and VEGA for level applications and P+F for switching applications. Any other make shall necessitate prior approval from Purchaser.	Bidder to confirm	
j	Level Flex Transmitter and Vibrating fork type level switch shall be used for signaling of level of silo situation (full or empty) and material blocking situation**(if any)**	Bidder to confirm	
k	PT 100 type of RTD	Bidder to confirm	

	shall be used with temperature transmitters at Inlet Duct **(if any)**		
l	Isolated analog input signals (4-20 mA DC) shall be used for the PLC system using isolator cards	Bidder to confirm	
m	Analog values emitted by temperature transmitter, differential pressure transmitters or vibration transmitters ….., and signals emitted by position detectors, level detectors, flow detectors…., (high, low, open, close, alarm, fault) are displayed on screen and recorded on operator station desk.	Bidder to confirm	
n	f) Pressure differential transmitters shall be set on the outlet duct of each module to measure gas flow rate**.(if any)**	Bidder to confirm	
o	The outlet of the spray cooling tower shall be set with 2 temperature transmitters, and when the difference between the two temperature values detected by the two transmitters reaches some value, the system shall make the corresponding reaction**.(if any)**		
q	Vibration monitors for exhaust fans and motors shall be provided	Bidder to confirm	

4	**MCC**		
a	Enclosure class shall be IP52	Bidder to confirm	
b	Single front, fully draw out design. CRCA sheet steel of thickness 2 mm & for doors & covers 1.6 mm	Bidder to confirm	
c	Motor feeders shall have Motor protection CB/MCCB, contactor rated for 125% of motor rated current, thermal overload relay and auxiliary contactors as required. Indicating lamps of LED type for status indication. Ammeters for motor rating of 15 k W & above. Minimum rating of contactors shall be 16A. Type II co-ordination shall be ensured. Auxiliary & trip contact shall be provided for MPCB/MCCB	Bidder to confirm	
d	Power supply feeders shall have MCCB of suitable rating with S/c, E/F ,O/C with microprocessor release . Ammeter shall be provided for 100A & above rating. Auxiliary & trip contact shall be provided for MPCB/MCCB	Bidder to confirm	
e.	20 % spare feeders shall be provided	Bidder to confirm	
f.	The incoming feeders shall be 2 nos. with a bus coupler with **4 pole arrangement.** Suitably rated ACBs or MCCBs with u/V, S/c,	Bidder to confirm	

	E/F ,O/C with microprocessor release shall be used for the purpose through castle key interlocking Incoming feeder shall have phase indicating lamps, voltmeter with SS and ammeter with SS. Bus coupler shall have phase indicating lamps & voltmeter with SS		
g.	TPN, Main horizontal & vertical bus bars suitable for S.C. level specified. Material shall be electrolytic grade aluminium	Bidder to confirm	
h.	Copper control bus bars as required	Bidder to confirm	
i.	Earth bus of G.I .with minimum size of 50 x 6 mm	Bidder to confirm	
j.	Power cabling through PVC insulated single core flexible cable of minimum size 2.5 sq. mm. and of stranded copper conductor. Control cabling through PVC insulated single core flexible cable of minimum size 1.5 sq. mm. and of stranded copper conductor	Bidder to confirm	
k.	Design shall conform to relevant IS/IEC standards	Bidder to confirm	
L	**VFD's If any**	Bidder's scope and Bidder to specify the qty	
	The VFD panels shall be located in local control room along with PLC panels, Which shall be air conditioned or in case of non air conditioned	Bidder to confirm	

	room the air conditioning unit with VFD to be provided by supplier.		
	The tentative location and design of local control room to be decided by supplier prior to finalization of order.	Bidder to confirm	
	Preferred make: Rockwell	Bidder to confirm	
	VFD shall have option for hardwired start / stop control through an Local control station and also Control Net Provision for remote start/ stop control and status indication	Bidder to confirm	
5	**CABLES**		
a.	Supply, laying & termination of all power, control and special cables required for PLC shall be included in the scope of work	Bidder to confirm	
b	**11 kV (UE) XLPE Cables- As per IS 7098 part-2** Conductor - Compacted circular, Aluminum conductor- IS 8130/IEC 60228 Conductor screen- Extruded semi conducting compound- Insulation- XLPE Insulation non metallic screen- Extruded semi conducting compound Insulation metallic screen- Copper wire/ copper tape.		

	Fillers- Cores laid up suitably with fillers – Non hygroscopic PVC /Ployproelene fibre Inner sheath /Bedding- PVC ST2 Armour- Galvanized flat steel strip /round wire armor Outer Sheath- FR PVC ST2,		
c	**1.1 kV, XLPE aluminum power cables- As per IS 7098/Part-1 /1988** Power cables shall be 1.1 kV grade, XLPE insulated, PVC type ST2 sheathed and armoured as per IS 7098 part-1 1988. Power cable shall be 4/3.5 core of aluminium conductor with minimum size of 4 sq. mm. PVC taping as insulation is not acceptable The construction shall be as under: Conductor – Aluminium Conductor confirming to IS 8130/1984- solid circular, stranded circular .compacted circular .strandrad shaped as applicable. Insulation - XLPE Inner sheath - PVC ST2 Armour – Galvanized flat strip	Bidder to confirm	

	Outer Sheath - FR PVC ST2		
d.	Copper core Armoured power cable - 1.1KV volatge grade , Insulatin-XLPE, Inner sheath Extruded PVC FR ST2 , Outer sheat FR PVC ST2, Armouring-Galvanised steel, round wire As per IS 7098	Bidder to confirm	
e.	Spare core shall be 10% with minimum of 1 core	Bidder to confirm	
f.	The cables shall conform to IS: 1554, 1988/relevant IEC Standards.	Bidder to confirm	
g	Purchaser shall terminate incoming power at the MCC incomer	Bidder to confirm	
h	All cables from the outgoing of MCC to various consumers shall be included in the Bidder's scope of work	Bidder to confirm	
i	Supply and lying of controlnet or ethrenet cable to be done using GI conduit and with proper separation from main power cables.	Bidder to confirm	
j.	Handshaking signals	All signals required by the system is in the bidder scope	
6	**LV MOTORS**		
a	Ambient Temperature	Ambient Temperature shall be considered as 50 deg. C for all outdoor as well as ventilated indoor installation	
		The electrical equipment shall be designed for an ambient temperature of 50 deg. C. and 100% humidity both not occurring simultaneously for area	

		outside pot-room. Equipment inside pot-rooms shall be designed for 65 deg. C	
b	Constructional Features	• Shall conform to IS:325-1978/relevant IEC • Horizontal foot mounting type with integral feet design • Degree of protection IP- 55 • Lifting arrangement shall be provided	
c	Terminal Box	• Suitable to terminate aluminium armored cables of 3½ cores/ 4 cores. • IP-55 degree of protection • On right hand side when viewed from drive end • Fitted with double compression cable glands. • Shall be rotatable through 360 ^{0} in steps of 90 ^{0}. • Separate earthing stud inside terminal box for termination of fourth core of cable shall be provided.	
d	Cooling	Shall be of TEFC design (IC 0141 as per IS 6362 – 1971/relevant IEC Standards)	
e	Electrical Design	Suitable for DOL starting. • All six terminals to be brought to Terminal Box. • Capable of starting & run up with minimum 85 % rated voltage at its terminals. • Duty class shall meet the requirement of driven equipment. • Starting current shall be as per IS/IEC. • Starting torque not less than 160 % of nominal torque. • Capable of withstanding occasional overloads of 50% for 2 minutes. • Minimum Class `F' insulation with final temperature limited to 120 ^{0}C. • Over speed with stand capacity shall be as per IS/IEC. • Pull out torque shall be as required by driven equipment but not less than 275% of the rated torque. • Number of starts shall be as per IS/IEC	

f	Earthing	Two separate earthing terminals on opposite sides of motor body	
		Electronic earthing (Pit and connection all)to be provided for all control panels as per standard requirement- Bidder to specify and confirm.	
		Dedicated earth pits for the overall system to be constructed by the supplier and the same shall be connected to main earth grid if necessary by the bidder	
		Main earth grid shall be designed and constructed by the purchaser.	
g	Quality of Operation	Vibration limited as per IS 12075 – 1986/relevant IEC Standards Noise level as per IS 12065-1987/relevant IEC Standards.	
h	Tests	As per IS : 325, 1987 Routine tests to be carried out in presence of purchaser Type test certificates to be furnished before inspection All motors shall be provided with LCS with remote /local option from SCADA	
7	**UPS**	• Rating and qty of UPS and their application– Bidder to specify and confirm. • Back up time for UPS shall be 30 minutes. Type of battery shall be Ni-Cd. • Static by pass shall be provided with stabilizer. • Spare capacity of UPS shall be minimum 30 % To be provided for SCADA system, PLC and all critical load if any.	
8	**LIGHTING**		
	Plant lighting in equipment area shall be in supplier scope. The separate power	Bidder to confirm	

	for lighting shall be provided by the purchaser.		
9	**EARTHING SYSTEM**		
a	Dedicated earth pits and earthing grid for the system. The same shall be connected to main grid later on if required	Bidder to confirm	
b	Lightning and aviation system if any required shall be in supplier scope	Bidder to confirm	
10	**ERECTION & INSTALLATION OF ACCESSORIES (STANDARD)**		
a	Before starting the erection the contractor shall undertake thorough inspection of all the new items/units to ensure that no damage has occurred during storage and transportation.	Bidder to confirm	
b	All assemblies and sub-assemblies of the equipment, wherever applicable, shall be dismantled. The bearings gears and other components shall be thoroughly cleaned and lubricated before reassembly	Bidder to confirm	

c	The contractor shall check the new civil foundations, if any, made by the purchaser to ensure conformity with the installation requirements. Minor dressing chipping etc. shall be carried out by the contractor without any extra cost to the purchaser	Bidder to confirm	
d	Proper alignment, leveling and fixing/fastening shall be ensured. Complete erection shall be carried out in accordance with approved drawings and erection manuals of respective sub-suppliers	Bidder to confirm	
e	All tools, tackles, hoists, electrodes, accessories and skilled/unskilled workers for erection and testing shall be arranged by the contractor	Bidder to confirm	
f	The working conditions, practices and all applicable statutory/safety requirements shall be duly taken care of by the contractor. The work shall be carried out in such a way that other agencies working in adjoining areas are not affected.	Bidder to confirm	
g	After erection all temporary structures, storage sheds etc. constructed for execution of the job shall be dismantled	Bidder to confirm	

	and the area shall be left clear from mucks & debris etc		
h	After erection of all plant and equipment, the contractor shall conduct tests on individual equipment to ensure that they conform to specified requirements and applicable codes. Details of tests shall be mutually agreed upon at least two weeks in advance. The purchaser will satisfying himself with respect to the following: i) Equipment as erected conform to the approved drawings and manuals ii) Pressure testing of pipes & valves and running test of blowers, and door drives etc	Bidder to confirm	
i	Supply, fabrication, assembly and erection of all erection / installation accessories & equipment like GI cable trays, MS cable tray supports, painted support structures for equipment, GI pipes, GI earth strips, clamps, nuts, bolts, washers, cable tags, ferrules etc, are included in Bidder's Scope	Bidder to confirm	
j	Kindly confirm that	Bidder to confirm	

	there shall be no fabrication work carried out at site. All the structures, equipment, ducts, staircases etc shall fabricated outside from the site. Therefore no fabrication area shall be allotted to Supplier.		
11	**APPROVED VENDOR LIST- ELECTRICAL**	Refer Annexure.	
13	**CONSTRUCTION POWER AT SITE**	The construction power shall make available at one single location within 500 meter peripheral working area. The cables lying from construction power substation with switches shall be in bidder scope.	
14	**TECHNICAL DOCUMENTATION**		
a	**Along with Bid document**	1. Control system architecture- PLC and SCADA configuration 2. Electrical consumer list 3. Electrical load in KW/KVA approximate 4. PLC /MCC/Local Control desk-Qty and approx size 5. List of makes as per preferred makes 6. List of Deviation – If any 7. Any Additional requirement detail 2 sets of hard copies and in soft copies – 1 sets in CD or by e-mail.	
b	**Within one (1) month of LOI or during the kick off meeting**	1. Electrical consumer list 2. PLC an SCADA configuration- Preliminary	

		3. Electrical load data 4. List of Electrical equipment- Preliminary list . 5. MCC /PLC and Local control desk- Preminary detail 6. Local control room- GA drawing and panel Arrangement. 7. Location of panels at field. 8. P& I - Preliminary 9. Instrument list- preliminary 10. Control Philosophy-Preliminary **Six (6) hard copies & in soft copies i.e. two sets of CD'**	
c	**Within one (1) month of kick-off meeting**	1. Electrical consumer list- Final 2. Electrical load data- Final 3. List of panels- Final 4. MCC ,PLC and local control desk- final 5. Hardware configuration drawings of PLC control system; 6. I/O interfaces drawings of PLC control system; 7. Drawings of PLC electrical control system; 8. Arrangement drawings of the cabinet and instruments, and interconnecting wiring diagram provided by the Seller; **Six (6) hard copies & in soft copies i.e. two sets of CD'**	
d	Within four (4) months of LOI	1. Instruments list and drawings- Final 2. Control Philosophy- Final 3. General PLC block diagram(system configuration) 4. I/O list for PLC 5. PLC control software; 6. Status data sheet and measurement parameters sheet of PLC control system;	

		7. Configuration software and communication software of Panelview operator interface; 8. Communication agreement and technology stipulation between PLC control system and master computer supervision station. 9. Electrical schematics, SLD , interconnection and termination drawing for equipment ,control Desk, PLc etc. 10. Motor list. 11. MCC /PLC general arrangement 12. MCC front panel arrangement. 13. List of power and control cables indicating start and end points, cable numbers,specification,core numbers and the type.	
e	Within eight (8) months of LOI	Program files ● PC/PLC user's program table and its floppy copy ● Floppy copy of PLC programming software Operation manual 1. Installation instruction. 2. Start –up instruction. 3. Operation Guide 4. Maintenance instruction and plan 5. Equipment disassembly 6. Technical descriptions and plan of lubricant 7. Hydraulic Technical description 8. Startup program 9. Operation instruction 10. Brochure of electrical equipment 11. PLC user's manual and catalogue	

GENERAL CONDITIONS OF CONTRACT

FOR

SERVICE CONTRACT

FOR

BALCO SMELTER EXPANSION PROJECT AT

KORBA,CHHATTISGARH

1.2 **Interpretation in this Contract:**

1.2.1 Terms and phrases defined in the Article-1 shall have the same meanings where used in this Contract.

1.2.2 References in the singular shall include references in the plural and vice versa.

1.2.3 References to a particular Article -or sub-Article -shall, except where the context otherwise requires, be a reference to that Article, or sub- Article .

1.2.4 The headings are inserted for convenience and are to be ignored for the purposes of construction.

1.2.5 The words "include" and "including" are to be construed without limitation.

1.2.6 The Schedules to the Contract form part of this Contract and will be of full force and effect as though they were expressly set out in the body of the Contract.

1.2.7 Whenever provision is made for the giving of notice, approval or consent by any Person, unless otherwise specified such notice, approval or consent shall be in writing and the words "notify" and "approve" shall be construed accordingly.

1.2.8 The invalidity or unenforceability of any portion or provision of this Contract shall not affect the validity or enforceability of any other portion or provision. Any invalid or unenforceable portion or provision shall be deemed severed from this Contract. The Parties agree that in such circumstances to interpret and to negotiate an equitable amendment to the provisions of this Contract to give effect to the underlying purposes of this Contract.

1.2.9 The failure of either Party, at any time during the Term hereof, to require performance by the other Party of any provision of the Contract shall in no way affect the full right to require such performance at any time thereafter. The waiver by either Party of a breach of any provision of the Contract does not constitute a waiver of any succeeding breach of the same or any other provision, nor shall it constitute a waiver of the provision itself.

SCOPE OF WORK

2.1 The scope of work to be carried out by the Contractor pursuant to the terms of this Contract includes, but not limited to Unloading, Storage, Fabrication, Erection, Commissioning and successfully demonstrating the Performance Guarantee parameters of XXXXXXXXXX, detailed scope of work is as per the signed Technical Specifications. The detailed scope and specifications shall be as per signed and mutually agreed Technical Specifications for XXXXXXXXXX.

2.1 Receipt, unloading at Site, storage and preservation for all equipment and material required for the Facility as a whole.

2.2 Construction management and administration including supervision and procuring statutory clearances/approvals within the scope of the Contractor as defined here-in-under.

2.3 Erection, testing and commissioning

All erection work including site supervision and inspection, pre-operational checking, starting, calibration, system balancing and all commissioning activity including start up, trial run, Cold Run and activities relating to Performance Guarantee Tests as detailed in Schedule-1 of the Contract. The Contractor shall be responsible for construction of Structural work and all others connected civil construction works as detailed in Technical Specification of this Contract

2.4 Procurement comprehensive insurance policy covering storage and erection risks. said policy shall also cover comprehensive risks during handling, storage, erection and commissioning. Besides, the Contractor shall also take an “Contractors All Risks” (CAR) insurance, Third Party Liability insurance, Personal Accident Insurance in respect of Contractor’s Supervisory Personnel and workmen and such other insurance as required as per statute. The policy shall be 125% of the fully erected value of the Package including value of spares for two years operation

2.5 Field training of operation and maintenance personnel of the Owner.

2.6 Provide all temporary ladders; scaffolding materials; platforms, supports and other necessary facilities required for handling, erection, testing and visual inspection of supplies at the point of installation and shall also provide necessary packing plates, wedges, shims, levelling screws etc. required for erection of equipment and structures

2.7 The scope of work also includes arranging labour of every discipline (skilled / unskilled) as required for the proper and successful execution of work to the satisfaction of the Owner

2.8 Clean the Site / fabrication yard, and provide housekeeping during fabrication and final cleaning at the time of handing over

2.9 Provide All temporary / enabling works such as temporary sheds, access roads, water supply (including drainage and sewage), power supply, offices, stores, yards, utility buildings, labour camps, fencing, etc.

2.10 All erection work including inspection, testing and quality control as per agreed QAP, pre-operational checking, starting, calibration, system balancing, hooking up with existing system, all commissioning activity including trial run (no load / with load)

2.11 Watch and ward to ensure security and safety of material in Contractor's custody

2. Completeness:

Any work which is not specifically mentioned in this Contract but required for the completion of the Facility and/or for safe, trouble free, normal operation, shall be done free of cost to the Owner, unless expressly excluded in this Contract and within the battery limits offered by the contractor and agreed by the owner.

Article-3

CONTRACT PRICE

3.1 In consideration of the Contractor carrying out the Works given in Article-2 and signed Technical Specification, the Owner hereby covenants to pay to the Contractor the Contract Price amounting to **Rs. XXXXXXX/-** (Say Indian Rupees XXXXXXXXXXXXXXOnly) at the time and in the manner prescribed in Article-4 of the Contract subject to such deductions/adjustments as may be allowable in the Contract.

3.2 Basis of Contract Price

3.2.1 Contractor to inform itself Fully

The Contractor shall be deemed to have inspected the Site and its surroundings and to have satisfied itself as to all technical, commercial, social and general condition of and all circumstances affecting the Site and the Works, the form and nature of the Site, the extent

and nature of the work and materials necessary for the carrying out and completion of the Works, the means of communication with and transportation and access to the Site, the accommodation it may require and in general all risks and contingencies influencing or affecting the Works. The Contractor shall not, except as expressly provided in this Contract, be entitled to any extension of the Completion Schedule or to any adjustment of the Contract Price on grounds of misinterpretation or misunderstanding of any such matter.

3.2.2 Above price is inclusive of prices towards following:-

a) Receipt, Unloading, Storage, Handling & Movement of materials / equipment at site.

b) Erection & commissioning

Except as otherwise expressly set forth in this Contract, the above price is all inclusive, firm and final and not liable to any change under any condition whatsoever.

c) The above prices are inclusive of all charges, taxes and duties applicable as per rules whether leviable by Central, State or local authorities both inside or outside India except Service Tax that shall be paid extra at actuals against submission of documentary evidence required for availing CENVAT credit.

3.3 Taxes and Duties

3.3.1 The Contract Price is inclusive of all taxes, duties, imposts, fees and levies in India be it central, provincial or local including works contract tax and excluding Service Tax as may be payable by and/or normally assessed upon the Contractor in respect of the performance or arising out of the performance of all or any of the obligations of the Contractor under this Contract as applicable as on the date of this Contract.

3.3.2 The rates and amount of taxes & duties indicated in the Contract Price are firm during the execution of work. However, statutory changes or imposition, if any, shall be to Owner's account. No other escalation on whatsoever basis shall be entertained.

Statutory variations in taxes/duties or imposition of any new tax in India shall be to OWNER's account.

3.3.3 TDS for Income Tax and Works Contract Tax as applicable shall be deducted from Contractor's bills and relevant certificates shall be furnished to the Contractor so as to enable the Contractor to take necessary tax credits. Such deduction of tax by the Owner

shall have no effect on the Contract Price and Contract Price(as per Article 3 hereof) shall not be liable to increase because of such deductions. No tax will be deducted at source if a tax exemption certificate from the tax authorities is provided by the Contractor to the Owner.

3.3.4 Where any tax is assessed on Owner for non-compliance of tax obligations of the Contractor's for their Scope of Work under this Contract, the Contractor shall allow the Owner to recover such tax amount from the Contractor citing reasons thereof

Article-4

4.1 PAYMENT TERMS

Subject to any deductions / adjustments from the Contract Price as per the Contract, the Contractor shall be entitled to receive the Contract Price, from the Owner, in the following manner:

a) 10% (ten percent) of the Contract Price shall be paid as advance against submission of Advance bank guarantee for equivalent amount along with the submission of Security Bank Guarantee for value equal to 5% of the contract price in Owner's format both valid till commissioning.
b) 70% (eighty percent) of the Contract Price shall be paid against pro-rata completion against monthly running bills, certificated by Owner's Engineer-in-charge.
c) 10% of the Contract Price shall be paid against successful and satisfactory commissioning
d) 10% (ten percent) and demonstration of Performance guarantee certified by Owner's engineer-in-charge at site and also against submission of Performance bank guarantee for value equal to 10% valid till completion of warranty period.

4.2 BANK GUARANTEE :

The Contractor shall procure and deliver to the Owner, Bank Guarantee(s) in such form and amounts as specified hereunder.

a) The Advance Bank Guarantee amounting to 10% of the Contract Price shall be submitted within 15 (fifteen) days from the date of Contract valid till the Commissioning.
b) The Security Bank Guarantee amounting to 5% of the Contract Price shall be submitted within 15 (fifteen) days from the date of Contract valid till commissioning.

c) The Performance Bank Guarantee amounting to 10% of the Contract Price shall be submitted within 15 (fifteen) days of successful completion of all works valid upto warranty period.

d) All the Bank Guarantees furnished by the Contractor shall be unconditional, irrevocable and from a nationalized bank of repute acceptable to the Owner and only in Balco's format.

e) All Bank Guarantees shall have a claim period of 06 (Six) months from the date of expiry and shall be extended at the instance of the Owner, if required.

f) The value of Advance Bank Guarantee shall be reviewed and reduced once in six months corresponding to the adjustments of advance made by the Owner and based on a certificate to be issued by the Owner.

g) The Bank Guarantees shall have the provision of the same currency as the Contract price.

Article-5

EFFECTIVE DATE OF CONTRACT

5.1 Effective Date of the Contract shall be XXXXXXXX. However, Advance payment shall be released within 21 days of submission of correct Bank Guarantee as per Owner' format.

5.2 Commencement

The Contractor shall commence the Works immediately from the Effective Date of the Contract and shall thereafter, subject to the terms of the Contract, proceed with the Works diligently and expeditiously.

Article-6

COMPLETION SCHEDULE

6.1 Time is the essence and most important feature of the Contract. The Contractor undertakes to complete the Facility as per the completion schedule, failing which the Contractor shall be liable to pay Liquidated Damages as per Article 7 of the Contract.

Contractor shall hand over the facilities as per below schedule:

Notwithstanding the date of execution of this Contract, this Contract shall for all purposes and for the performance of obligations ,The Contractor shall have the date effective and enforceable with effect from the date of contract.

The complete scope of work envisaged under this contract should be completed within XXXXXXXXXXXXX months from the effective date of contract

The Contractor agrees that time is the essence of this Contract and undertakes to complete this work within the time schedule as stipulated in this contract.

6.2 The completion period shall be inclusive of all the lead time required for procurement of Contractor's raw materials/items including transportation upto Site, inspection, testing and any other relevant activity required for execution of Work. The time for completion of the Work, including extension of time granted, if any, is the most important feature of the Contract.

6.3 The Contractor shall submit to the Owner a Time v/s Progress Chart for mutual agreement showing the order in which the Contractor proposes to carry out the Work and also indicating the probable dates of commencement and completion of various parts/section of the Work.

6.4 The Contractor shall adhere to the programme in detail. Any modification to this shall be subject to the approval of the Engineer in Charge.

6.5 If at any time, it appears to the EIC that the actual progress of Work does not conform to the mutually agreed programme referred to in clause 6.4, the Contractor shall furnish, a revised programme showing the modifications to the mutually agreed programme as are necessary to ensure the completion of the Work within the time limit for completion referred to in clause 6.1

Note: The detail milestones shall be as per the signed technical documents.

Article-7

LIQUIDATED DAMAGES

LIQUIDATED DAMAGES FOR DELAY IN SUPPLY/COMMISSIONING

7.1 Liquidated Damages due to Delay in Supply/Commissioning

In case of delay in supply/commissioning of Facility for reasons not attributable to BALCO, Contractor shall be liable to pay liquidated damages for the respective system and not by way of penalty, an amount calculated at the rate of 0.5% of the Contract Price of the respective system for each week of delay or part thereof subject to a maximum of 5% of Contract Price.

LIQUIDATED DAMAGES DUE TO NON PERFORMANCE

7.2 In case, the Performance of Facility as a whole is below guaranteed performance parameters as set out in the performance guarantee clause of the technical specifications of the contract, The Contractor shall pay to BALCO, liquidated damages and not way of penalty for each of the short fall of guarantee parameters as mentioned in the Technical Specifications up to a maximum of 10 % of contract price.

7.3 Recovery of Liquidated Damages

The Owner shall have right to recover any such amount, as deductible / recoverable under liquidated damages, from the pending bills of Contractor, if any, and / or from the retention money and / or by encashing any Bank Guarantee.

7.4 The liquidated damages for delay and non-fulfillment of performance guarantees shall be mutually exclusive and shall be levied independently

7.5 Payment or deduction of Liquidated Damages shall in no way relieve the Supplier/ Contractor from completing the works and discharging all its other obligations under this Contract

Article-8

BILLING SCHEDULE

8.1 For facilitating release of payments the Contractor shall prepare and submit detailed Billing Schedule and Despatch Schedule separately for the Plant & Equipment within 45 days of the Effective Date of the Contract for approval by the Owner. The Contractor shall arrange for

supplies of the Plant, Machinery and Equipment in the logical sequence required for erection by the Owner within the overall delivery schedule of the Contract. The Contractor shall promptly give written notice to the Owner of any anticipated delay in maintaining such schedule stating reasons and remedial measures, there for. This shall not however in any way absolve the Contractor from his responsibility of timely delivery of Plant and Equipment as per contractual time schedule.

Article-9

UNLOADING AND STORAGE

9.1 The Contractor shall notify the Owner prior to the delivery of any Plant or other shipments to the Site. The Contractor shall be responsible for the subsequent receipt, unloading, storage and preservation of all Plant and Equipment. The Plant and Equipment and materials shall be issued to the Contractor by the Owner for further handling and erection.

9.2 The CONTRACTOR shall, at his own expense, provide suitable sheds and storage yards, in such places and in such numbers as, are needed, for orderly and proper storage of material, either supplied by the OWNER or as brought by the CONTRACTOR for the WORK, to prevent damage due to rain, wind, direct exposure to sun etc. as also from theft, pilferage etc. He shall obtain prior approval, in writing, from the ENGINEER for erection of such sheds and storage yards before undertaking construction. Storage and safe custody, including protection against theft and pilferage, of all material with the CONTRACTOR, including Free Issue Material, shall be the responsibility of the CONTRACTOR

Article 10

CONTRACTOR'S STAFF

10.1 SITE STAFF AND KEY PERSONNEL

The Contractor shall ensure that there are at all times at the Site sufficient suitably qualified and experienced staff to supervise the carrying out of the Works at the Site, to direct the Owner's operating staff in the start-up, commissioning, testing and operation of each Unit until Taking-Over and thereafter to advise the Owner during the conduct of any further Performance Guarantee Tests and in the operation of the Facility until Final Completion.

In particular, but without limitation, the Contractor shall forthwith upon the date of signing of the Contract appoint suitably qualified and experienced persons acceptable to the Owner, such personnel shall, for so long as they may be engaged in connection with the

Works, give substantially the whole of their time to the superintendence of the Works and shall not be removed from their posts or replaced without the prior written approval of the Owner, which approval shall not be unreasonably withheld or delayed.

10.2 PROJECT DIRECTOR

The person appointed as the Contractor's Project Director for the Works shall have full authority to act on behalf of the Contractor for all purposes in connection with the Contract. The Project Director shall not be engaged in any project other than the Works and shall not be replaced or removed without the prior consent of the Owner, which consent shall not be unreasonably withheld or delayed. The Contractor shall notify the Owner of the Project Director's normal place or places of work.

10.3 CONSTRUCTION MANAGER

The person appointed by the Contractor pursuant to Article 10.1 hereof as the construction manager shall be employed at the Site from the commencement of Works on the Site until Final Completion to supervise all work done on the Site and to receive all instructions related to Site activities given by or on behalf of the Owner. The construction manager so appointed shall be present at the Site throughout normal working hours except when on leave, sick or absent for reasons connected with the proper performance of the Works. Whenever the construction manager is absent from Site the Contractor shall nominate a suitable person to act as his or her deputy. The Contractor shall obtain the Owner's approval of the person appointed as construction manager and shall not replace or remove such person without the prior consent of the Owner, which consent shall not be unreasonably withheld or delayed.

10.4 OBJECTION TO REPRESENTATIVE

The Owner shall be entitled by notice to the Contractor to object to any representative or person employed by the Contractor or any Sub-Contractor in the execution of the Works who shall, in the reasonable opinion of the Owner, misconduct himself or herself or be incompetent or negligent, and the Contractor shall remove such person from the Works and appoint a suitable replacement or ensure that the relevant Sub-Contractor does so.

10.5 OWNER'S APPROVAL OF KEY PERSONNEL

The Contractor shall submit the resumes of the personnel nominated to fill all the key positions, to the Owner for review, comment or rejection of the nominations.

Article 11

CONTRACTOR'S EQUIPMENT

11.1 Loss or Damage to Contractor's Equipment

The Contractor shall be liable for loss of or damage to any of the Contractor's Equipment which may occur and shall insure against such loss.

11.2 Maintenance of Contractor's Equipment

The Contractor shall be responsible for maintaining the Contractor's Equipment on the Site in a safe working condition

11.3 All the tools, tackles, machinery and consumables required for the Work will have to be arranged and deployed by the Contractor whether specifically mentioned in the Contract or otherwise.

11.4 In order to facilitate issue of exit gate passes for material and Equipment to be taken out after completion of Work, the Contractor shall, prior to taking such things inside, submit a list of Equipment and all other material to the Owner that he is taking inside the Owner's premises.

11.5 The Contractor shall submit to the Engineer in Charge(EIC), upon request a statement, showing the Equipment deployed at Site for the purpose of Work, and additional Equipment in the course of shifting or to be shifted or to be required during the ensuing month or months and all such further information/particulars as it may be necessary or required to enable the EIC to satisfy himself that the Contractor has taken necessary measures for the execution of Work in accordance with the Contract.

11.6 After completion of Work or termination of Contract, the Contractor shall promptly dismantle, at his own cost, distribution and other temporary facilities he has erected for execution of Work and shall also remove the same within a reasonable time, but not exceeding one month, fixed by the Engineer. On his failure to do so, the Owner shall be entitled to remove them at the risk and cost of the Contractor.

Article 12

INSURANCE

12.1 Contractor's Insurance Obligations

Without limiting the Contractor's obligations and responsibilities under the Contract, the Contractor shall procure and maintain a comprehensive insurance policy from a reputed insurance company acceptable to the Owner, covering risks of damage and loss of goods up to taking over of the Units. The said policy shall also cover comprehensive risks during unloading, handling, storage, erection and commissioning. Besides, the Contractor shall also take an "Erection All Risks" insurance, Third Party Liability insurance, Personal Accident Insurance in respect of Contractor's supervisory personnel and workmen and such other insurance as required as per statute.

The value of the insurance policy shall be 125% of the full erected value of the Facilities.

The Owner shall be the principal beneficiary of the policy along with the Contractor and shall reserve the exclusive right to assign the policy.

In the event of loss or damage, the Contractor shall be solely responsible to lodge the claims and settle the same. The Contractor shall proceed with repair or replacement of the goods without waiting for settlement of the claim. It is further clarified that no extension of Completion Schedule nor any extra claim shall be admissible on account of insurance.

Article-13

DRAWINGS & DOCUMENTS

13.1 The Supplier/ Contractor shall submit drawings and documents in requisite number of sets as described in the specification, as per the submission Schedule given therein.

13.2 Approval of Supplier/ Contractors' drawings and documents shall not relieve the Supplier/ Contractors of any of its responsibilities under the Contract.

13.3 The Supplier/ Contractor shall depute his engineers for discussions and approval of drawings by Owner/Consultant without any extra costs to the Owner.

Article 14

WARRANTY/GUARANTEE AND DEFECTS

14.1 The Contractor shall also guarantee that his proposed facility is free from all defects, including latent defects.

14.2 Should any defect attributable to above arise within the Warranty period, as indicated below, the bidder shall replace such defective portion or part thereof at no extra cost (considering all cost elements involved) to the Owner . Such repair / replacement shall be carried out with minimum loss of time.

14.3 The Warranty period shall be 12 (twelve) months from the date of successful commissioning. The Warranty period shall exclude any downtime for defects / repairs attributable to Contractor.

14.4 Making Good Defects

The Contractor shall be responsible for promptly making good by replacement at FOR Site, repair and/or modification, as per the instruction of the Owner at its expense any Defect in any part of the Facility which may appear during the Guarantee Period in relation thereto and which arises from any failure to comply with the provisions of Article 14.3 hereof.

14.5 Extension of Guarantee Period

The Guarantee Period for the System or any part thereof shall be extended by a period equal to the period during which the relevant Facility or part cannot be used by reason of any Defect to which Article 14.5 applies. The provisions of this Article 14.5 shall apply to all repairs; replacements or modifications carried out by the Contractor to remedy Defects as if the component replaced, repaired or modified had been taken over on the date they were completed.

14.6 Delay in Remedying Defects

If the Contractor fails to commence and proceed diligently with the remedy of any such defect within 30 (thirty) days of receipt of notification thereof from the Owner, the Owner may proceed to do the work at the Contractor's expense provided that it does so in a reasonable manner in accordance with Good Industry Practice, notifies the Contractor of its intention to do so and permits the Contractor to inspect such repaired or replaced Plant to ensure that quality standards have been maintained. The reasonable cost so incurred by the Owner shall be deducted from the Contract Price or to be paid by the Contractor to the Owner.

14.7 Removal of Defective Supplies

The Contractor may with the consent of the Owner, which consent shall not be unreasonably withheld, remove from the Site at his own cost any part of the Facility which is defective, if the nature of the defect is such that repairs cannot be expeditiously

14.8 Guarantee due to Design Defects

Wherever it is established that a Defect in a component is due to faulty design only, the Contractor shall replace all identical components performing the same function under the same working conditions with new ones based on the correct design, even though, such components may not have given rise to any failure.

14.9 Further Tests

If any replacement, repair or modification is of such a character as may affect the subsequent performance of the Facility or any part thereof in accordance with the Performance Guarantees, the Owner may within 30 (thirty) days after such replacement, repair or modification give to the Contractor notice requiring that such further tests be conducted in respect of the relevant part as may be necessary to demonstrate the adequacy and efficacy of the replacement, repair or modification.

14.10 Operation and Maintenance

The obligations and liabilities of the Contractor under this Article do not extend to any repairs, adjustments, alterations, replacements, or maintenance that may be required as a result of normal wear and tear or as a result of the Owner's failure to operate or maintain the Facility after Taking-Over in accordance with Good Industry Practice consistent with the operating and maintenance manuals supplied by the Contractor.

14.11 **LATENT DEFECTS**

If any Defect of the kind (i) significantly affects the operation or output of the Facility, or (ii) arises as a result of any act or omission on the part of the Contractor which a highly skilled Contractor acting conscientiously would have foreseen or avoided shall appear in any part of the Plant within a period of 5 years after the expiry date of Guarantee Period of such part of the Plant, the same shall be made good by the Contractor by repair or replacement, provided that the Defect was "latent", i.e. could not have been discovered by a reasonable examination prior to the expiry of the Guarantee Period. Such Defects shall not include those defects where (i) at the time of discovery of the defect, the repair or replacement is already contemplated for such parts under the recommendations contained

in the operating and maintenance manuals, or (ii) if and to the extent that such defect has occurred due to the operation of the power plant in a manner other than that advised in the final operation and maintenance manual submitted by the Contractor to the Owner, or (iii) the defect arises from fair wear and tear.

Article 15

ASSIGNMENT AND SUB-CONTRACTING

15.1 Assignment by Contractor

The Contractor shall not without the prior written consent of the Owner assign to any Person any benefit of or obligation under the Contract in whole or in part, except that the Owner hereby consents to assignment of the Contractor's rights to receive any payment due under the Contract.

15.2 Assignment by Owner

The Contractor hereby consents to the creation by the Owner of a security assignment of the Contract in favour of any Financing Entity (or a trustee acting on behalf of one or more Financing Entities) and hereby undertakes to execute upon the request of the Owner such documents as may be reasonably and customarily required to give effect to any such assignment provided that the Contractor's consent, which shall not be unreasonably withheld or delayed, shall be required for the inclusion in such documents of any terms other than a simple confirmation of the consent given above or a simple acknowledgement of a notice of an assignment pursuant to this Article. Any stamp duty and all costs and expenses payable in respect of such documents shall be to the account of the Owner in respect of any such documents required to be signed by the Contractor.

Sub-Contracting

15.3.1 The Contractor shall not sub-contract the whole of the Works to third parties for the performance of the Contract.

15.3.2 The Contractor shall, within 1 (one) month of effective date of the Contract, deliver to the Owner a Major Sub-contractors List for approval. The Contractor shall furnish all particulars of such Sub-Contractors while seeking approval. The Parties may by mutual agreement add to or delete from such list from time to time and approve any successor or replacement of any Person listed on such list or any other vendor, consultant or sub-contractor. For any Sub-Contractor not included in the Major Sub-Contractor List involving

a contract price in excess of Rs.10,000,000 (Say Indian Rupees ten millions only) shall be with the written approval of the Owner (such approval not to be unreasonably withheld), while for those Sub-Contractors involving a contract price less than the value above mentioned, particulars shall be furnished for the Owner's information.

15.3.3 The Contractor shall furnish to the Owner copies of technical ordering specifications and principal commercial terms (un-priced) of the major sub-contracts as the Owner may reasonably request from time to time.

15.3.4 The approval granted by the Owner shall not discharge the Contractor from his contractual obligations.

15.3.5 The Contractor shall be responsible for the acts, defaults and neglects of all Sub-Contractors and all its and their agents, servants or workmen of any of them as fully as if they were the acts, defaults or neglects of the Contractor under the terms of this Contract.

15.3.6 The Contractor shall ensure that all sub-contracts are made in writing.

15.3.7 Each instrument evidencing any sub-contract shall provide that, pursuant to terms in form and substance satisfactory to the Owner, the rights of the Contractor under such sub-contract are assignable to the Owner, its successors and assigns upon the Owner's written request following termination of this Contract.

Article 16

OWNER'S REPRESENTATIVE

16.1 Duties of the Owner's Representative

The Owner's Representative shall carry out such duties in issuing certificates, decisions, instructions and orders as are specified in the Contract to be carried out by the Owner and, except to the extent otherwise stated in the Contract or notified to the Contractor by the Owner from time to time, the Owner's Representative shall have full authority to act on behalf of the Owner for all purposes in connection with the Contract and shall be the Contractor's primary point of contact with the Owner in relation to the execution of the Works.

16.2 Owner's Responsibility

The Owner shall cause the Owner's Representative to perform every act required under the Contract to be performed by the Owner's Representative and any obligation stated under the Contract to be an obligation of the Owner's Representative shall be deemed to be an obligation of the Owner. The Owner shall be responsible for any act, neglect or omission of the Owner's Representative as if it was an act, neglect or omission of the Owner.

16.3 Decisions, Instruction and Orders of the Owner's Representative

The Contractor shall proceed with the Works in accordance with the written decisions, instructions and orders given by the Owner's Representative subject to and in accordance with the Contract, including provisions for Variations as set out in the Contract.

16.4 Owner's Instructions in Writing

No decision, instruction or order given by the Owner's Representative shall be effective until written confirmation thereof has been received by the Contractor. Provided that, in any exigency of work, the Owner's Representative may issue oral instructions with which the Contractor shall immediately comply, the Owner's Representative shall confirm any such oral instruction in writing within 48 (forty-eight) hours of its issuance.

Article-17

LEGAL COMPLIANCE AND STATUTORY REQUIREMENTS

17.1 Compliance with Applicable Law

The Contractor shall in its performance of the Contract and the carrying out of the Works ascertain and comply with the Applicable Laws.

The Contractor shall indemnify the Owner, the Owner's Affiliates and their respective directors, officers, employees and agents against losses, claims and liabilities, including any governmental penalties and sanctions payable to a Competent Authority, together with any legal expenses incurred in connection therewith, to the extent arising out of any failure of the Contractor, any Sub-Contractor or their respective agents or employees to comply in the performance of the Contract.

17.2 Divergences from Statutory Requirements

If the Contractor or the Owner finds any divergence between the Applicable Law and the Performance Guarantees or the Technical Specifications it shall immediately give to the other Party written notice specifying the divergence. The Contractor shall promptly upon

becoming aware of the same, inform the Owner in writing of its proposed amendment for removing the divergence, and with the Owner's consent the Contractor shall complete the Works in accordance with the amendment.

17.3 Contractor to Obtain Clearance

The Contractor shall be responsible to obtain and maintain in effect all Applicable Clearances required in connection with execution of the Works and pay all fees required to be paid to any Competent Authorities.

Contractor should submit a clearance certificate from HR, stating that all statutory charges are paid and all clearance are obtained along with submission of every running bills payment.

Contractor should submit a no-claim certificate along with the submission of each running bills.

17.4 Import and Export Permits

The Owner shall be responsible for obtaining all import permits and other licences required for the importation of any Services or Equipment. The Contractor shall be responsible within the Contract Price for obtaining all import permits and other licences required for the importation of Contractor's Equipment or other goods or materials required for the purposes of the Works.

The Contractor shall be also responsible, within the Contract Price, for obtaining all permits and other licences required for re-exportation of any Equipment, Contractor's Equipment or other goods or materials that the Contractor desires to export, and for the exportation and re-importation of any component or piece of equipment that it must export for repairs or replacement.

However, the Owner shall extend all such cooperation that is reasonably required to facilitate the re-exportation/re-importation under the Applicable Law

Article-18

INTELLECTUAL PROPERTY

18.1 Indemnity Against Infringement

The Contractor shall indemnify the Owner from and against any demands, claims, suits and causes of action and any liability, legal costs, expenses, settlements arising from or incurred

by reason of any infringement or alleged infringement of letters patent, registered design, unregistered design right, copyright, trade mark or trade name by the use or possession of any Plant. The Contractor hereby represents to the Owner that, as of the date of signing of the Contract, the Contractor has received no notification of any rightful patent infringement claim which would prejudice the Owner's right to use or maintain the Plant.

18.2 Conduct of Proceedings

In the event of any claim being made or action brought against the Owner which is covered by the indemnity set out in Article 18.1 hereof, the Owner shall promptly notify the Contractor thereof and the Contractor may at its own expense conduct all negotiations for the settlement of the same, and any litigation that may arise there from. The conduct by the Contractor of such negotiations or litigation shall be conditional upon the Contractor having first given to the Owner such reasonable security as shall from time to time be required by the Owner to cover the amount ascertained or agreed or estimated, as the case may be, of any compensation, damages, expenses and costs for which the Owner may become liable. The Owner shall not, unless and until the Contractor shall have failed to take over the conduct of the negotiations or litigation, agree to any settlement of such negotiations or litigation or make any admission, which might be prejudicial thereto.

18.3 Infringement Preventing Performance

If, in consequence of any infringement of letters patent, registered design, copyright, trademark or trade name, the Contractor is prevented from executing the Works, or the Owner is prevented from using the Facility, the Contractor shall at its own expense:

18.3.1 procure for the Owner the right to continue using the relevant Plant or part; or,

18.3.2 replace the relevant Plant or part with a non-infringing Plant or part; or,

18.3.3 modify the relevant Plant or part so it becomes non-infringing.

Article-19

SECRECY AND CONFIDENTIALITY

Confidential Information

The Owner and the Contractor shall treat the details of the Contract and any information made available in relation thereto as private and confidential and neither of them shall publish or disclose the same or any particulars thereof (save insofar as may be necessary

for the purposes of the Contract), without the previous written consent of the other Party, provided that nothing in this Article shall prevent the publication or disclosure of any information that has come within the public domain otherwise than by breach of this Article.

The Contractor/ Contractor acknowledges that the drawings, specifications, documents, data, manuals, etc. whether as documents or in electronic media (hereinafter referred to as "the Information") furnished by the Owner shall be regarded as the proprietary information of the Owner and the same is of considerable financial value.

The Information furnished by the Owner in this enquiry is for the single and sole use for the execution of this Contract and shall be treated as strictly confidential by the Contractor / Contractor, his employees and agents, and shall always remain the property of the Owner. The Contractor / Contractor undertakes that the Information shall not be used or disclosed to third party(s) by the Contractor / Contractor for any purpose whatsoever other than the execution of this Contract. The Information in original, duplicate, photostat or in any electronic form shall not be retained by the Contractor / Contractor and shall be returned to the Owner immediately on completion/termination of the Contract. In case the bidder not being successful, these documents shall be retuned promptly on demand by the Owner.

Article-20

CONTRACTOR'S GENERAL OBLIGATIONS

20.1 Except as otherwise expressly excluded in this Contract, the Contractor shall, in accordance with the provisions of the Contract which are more particularly described in Article-1 and Schedule-1 hereto carry out such engineering and perform such work and other services as may be required for the execution of the Works.

20.2 Labour Requirements

The Contractor shall prepare and make available to the Owner from time to time details of the numbers and trades of workmen whom the Contractor proposes to employ (whether directly or through Sub-Contractors) on the Site throughout the periods shown in the Project Schedule.

As far as practicable, the Contractor shall give preference in the employment of unskilled labourers at the Site to persons living locally.

20.3 Expediting of Progress

If for any reason which does not entitle the Contractor to an extension to the Completion Schedule, the rate of progress of any Unit or any other part of the Works is at any time in the reasonable opinion of the Owner too slow to ensure that Provisional Completion of any Unit will occur on or before the scheduled Completion Schedule in relation thereto, the Owner may so notify the Contractor in writing. The Contractor shall respond within 10 (ten) working days with its plan (including but not limited to re-planning task sequences, increasing labour or other resources of the Contractor or any Sub-Contractor employed on the Works or the addition of Sub-Contractors) to accelerate the progress of the Works so as to achieve Provisional Completion no later than the scheduled Completion Schedule. The Contractor shall not be entitled to any additional payment for taking such steps.

20.4 Security

Fencing, Guarding, Lighting, etc.

The Contractor shall be responsible for the proper fencing, guarding, lighting and security of all the Works on the Site and for the proper provision of temporary roadways, footways, guards and fences on the Site as far as may be necessary for the Works and so as not to endanger the owners and occupiers of adjacent property, the public and others, all in accordance with Good Industry Practice.

20.5 Clearance of Site

On a continuous basis consistent with Good Industry Practice during the progress of the Works the Contractor shall clear away and remove pursuant to the directions of the Owner from the Site all scrap, debris, other waste materials.

The Contractor shall, leave on the Site for the Owner such temporary works as instructed by the Owner.

The Contractor shall at all times and particularly after completion of the Works, keep the Site and the Facility in a clean, safe and workmanlike condition and shall dispose of all rubbish (other than hazardous materials or other materials which may contaminate

ground-water, for which other arrangements shall be made by the Contractor) in a properly prepared landfill site in accordance with Good Industry Practice.

20.6 Safety

Site Operations and Safety Regulations

The Contractor shall be solely responsible for the adequacy, stability and safety of its operations on the Site. The Contractor shall, prior to the commencement of Works at the Site, prepare and submit to the Owner a comprehensive set of safety regulations in connection with its operations at the Site. The Contractor shall comply with and shall ensure that all of its employees, agents and Sub-Contractors of any tier engaged in work at the Site comply with the provisions of such safety regulations.

20.7 Safety Supervisor

The Contractor shall have on its staff at the Site a person dealing with the safety and protection against accidents of all staff and labour including any other men, servants, agents or any person concerned with any activity of the Owner. This person shall be appropriately qualified for this work and shall have the authority to issue instructions and to take protective measures in connection with the prevention of accidents.

20.8 Health and Safety Records and Reports

The Contractor shall maintain such records and make such reports concerning safety, health and welfare of persons at the Site and damage to property at the Site as the Owner shall from time to time reasonably require consistent with Good Industry Practice. The Contractor shall in any event report to the Owner details of any accident occurring on the Site or, if occurring elsewhere, which causes damage to any Plant intended for incorporation in the Facility, as soon as reasonably practicable after its occurrence.

20.9 Health and Safety Precautions

The Contractor hereby confirms that all design, manufacture, construction and commissioning work undertaken in India complies with all applicable Health and Safety at Work Codes and regulations in force in India from time to time until the date of Final Completion.

20.10 Without prejudice to its general obligation to comply with Applicable Laws concerning health and safety precautions, the Contractor shall at its own cost take all due precautions to ensure the safety of its staff and labour and, in collaboration with and to the requirements of the local health authorities where appropriate, shall ensure that medical staff, first aid equipment and stores, sick bay and suitable ambulance service are available at the Site at all times throughout the period of the Contract and that suitable arrangements are made for the prevention of epidemics and all necessary welfare and hygiene requirements. In the event of the outbreak of any illness of an epidemic nature, the Contractor shall comply with and carry out such regulations, orders and requirements of any Competent Authority for the purpose of dealing with and overcoming the same.

20.11 Labour Welfare

20.11.1Housing for Labour

The Contractor shall provide and maintain such temporary accommodation and amenities as may be reasonably necessary for all its and its Sub-Contractors' staff and labour employed at the Site, including all fencing, water supply (both for drinking and other purposes), electricity supply, sanitation, fire prevention and fire-fighting equipment and other agreed requirements in connection with such accommodation or amenities.

20.11.2 Festivals and Religious Customs

The Contractor shall in all dealings with its and its Sub-Contractors' staff and labour have due regard to all recognised festivals, days of rest and religious or other customs.

20.11.3 Disorderly Conduct

The Contractor shall at all times take all reasonable precautions to prevent any unlawful riotous or disorderly conduct by or amongst its or its Sub-Contractors' staff and labour and for the preservation of peace and protection of persons and property in the neighbourhood of the Site against the same.

20.12 Accidents and Damage

20.12.1 Care of the Facility

The Contractor shall be responsible for the care of each Unit, those parts of the Works relating thereto and all Plant, goods and materials intended for incorporation therein until Taking-Over of such Unit occurs in accordance with this Contract. In the event of

termination of the Contract in accordance with these Conditions, responsibility for the care of such Plant, goods and materials shall pass to the Owner upon the effective date of termination or, if later, upon the date on which such Plant, goods and materials are delivered to the Owner or the Owner otherwise takes possession of them.

20.12.2 For the avoidance of doubt, the Contractor shall be responsible for all Plant, including spare parts, chemicals, lubricants and other consumables, procured from outside India from the point at which the Owner's Contractor ceases to have such responsibility.

20.12.3 Making Good Loss or Damage to the Works

In the event that any Unit, any part of the Works relating thereto or any Plant, goods or materials intended for incorporation therein shall suffer loss or damage whilst the Contractor has responsibility therefore, the same shall be made good by the Contractor at its own expense except to the extent that such loss or damage shall be caused by the Owner's Risks.

20.12.4 In the event that any Unit, any part of the Works relating thereto or any Plant, goods or materials intended for incorporation therein shall suffer loss or damage whilst the Contractor has responsibility for the care thereof as provided in the Contract, which is caused by any of the Owner's Risks the Contractor shall, unless instructed by the Owner to do otherwise, make good the same and the requirement for such making good shall be deemed to have arisen pursuant to an instruction requiring a Variation to which the provisions of this Article hereof shall apply.

For the purposes of this Article, the "**Owner's Risks**" are the risk of loss or damage to the Facility or any part thereof caused by:

any Force Majeure event to the extent the Contractor has complied with the provisions of Force Majeure; and

use of the Works or any part thereof by the Owner; and

the act, neglect or omission or breach of contract or of statutory duty of the Owner, its agents or servants or other Persons for whom the Owner is responsible (but excluding the Owner's or the Operator's operations and maintenance personnel whilst performing duties in accordance with the Contractor's directions).

20.12.5 Injury to Persons and Property other than the Works

Except as otherwise stated in this Article, the Contractor shall be liable for and shall indemnify, protect, defend and hold harmless the Owner, the Owner's Affiliates and their respective directors, officers, employees and agents (the "**Indemnified Party**") from and against any and all demands, claims, suits and causes of action and any and all liability,

costs, expenses, settlements and judgements incurred in connection therewith (including court costs and reasonable attorney's fees incurred by the Owner if and only if the Contractor fails to address such claim by its own attorney having received notice of the claim) in respect of personal injury to or death of third parties and in respect of loss of or damage to any third party property to the extent that the same arises out of or in consequence of any negligent, reckless or tortuous act or omission (including strict or absolute liability) or any breach of statutory duty of the Contractor, any Sub-Contractor or their respective agents or employees in connection with activities under this Contract, except to the extent that such injury, death or damage is caused or contributed to by the Owner when the Owner shall be liable for and shall indemnify the Contractor's Indemnified Party in respect of all matters as aforesaid to such extent.

20.12.6 Accidents or Injury to Workmen

The Contractor shall indemnify, protect, defend and hold harmless the Owner's Indemnified Party from and against any and all demands, claims, suits and causes of action and any and all liability, costs, expenses, settlements and judgements incurred in connection therewith (including court costs and reasonable attorney's fees incurred by the Owner if and only if the Contractor fails to address such claim by its own attorney having received notice of the claim) arising in connection with the death of or injury to any person employed by the Contractor or its Sub-Contractors in connection with the Works except to the extent such death or injury is caused or contributed to by the Owner when the Owner shall be liable for and shall indemnify the Contractor's Indemnified Party in respect of all matters as aforesaid to such extent.

20.13 Claims in Respect of Damage to Persons or Property

In the event of any claim being made against any Person arising out of the matters referred to in respect of which it appears that the Contractor may be liable to indemnify the Owner's Indemnified Party under this Article the Contractor shall be promptly notified thereof and may at its own expense conduct all negotiations for the settlement of the same and any litigation that may arise in relation thereto, subject to compliance with the terms of the claims procedures under any applicable insurance policy. The Owner's Indemnified Party shall not, unless and until the Contractor shall have failed to take over the conduct of the negotiations or litigation, agree to any settlement of such negotiations or litigation or make any admission which might be prejudicial thereto. The Owner's

Indemnified Party shall at the request of the Contractor afford all available assistance for any such purpose and shall be repaid all costs reasonably incurred in so doing.

20.14 Compliance with Labour Laws & Regulations

The Contractor shall ensure compliance with all applicable labour laws, regulations and statutory requirements and shall indemnify Owner against any claims or proceedings against him.

20.15 CONSTRUCTION WATER AND POWER

The Owner shall provide open land for site office, storage yards, fabrication yard and batching plants inside the plant boundary free of cost. The Owner shall also provide construction water and power supply at one point at each area of work including batching plant, site office, workshops, etc. within the plant area, on Chargeable Basis. Further distribution of power from the point of supply shall be arranged by the contractor at his own cost. The contractor, at his cost, will also arrange for suitable meters, fuses, switches, elcbs, etc. Required for safe and secure use of these utilities. The metering shall be done at the source point. Owner shall not provide any land for contractor's labour colony and aggregate crushing plant

20.16 PROJECT SCHEDULING, INFORMATION AND PROGRESS REPORTS

20.16.1 Project Scheduling

The Contractor shall prepare and submit a detailed Project Schedule/PERT for approval of the Owner which will be periodically updated so as to match the Project Schedule. The Contractor shall perform the Works in accordance with the Project Schedule.

20.16.2 Progress Reports

The Contractor shall at monthly intervals prepare formal written and quantitative reports to the Owner on the progress of the Works by reference to the Project Schedule in a format approved by the Owner and in sufficient detail to permit the Owner to assess performance, plan witness dates and evaluate forecasts, including reports on key sub-contracts (as applicable). Within 10 (ten) days of the submission of each such report and at such other times as the Owner may reasonably request, the Contractor and the Owner shall meet to discuss progress. Each monthly progress report shall be submitted no later than the 5th day of the month following that in respect of which it is made, but may report

on actual progress only up to the 25th day of the month and anticipated progress thereafter. Monthly progress reports shall include the following:

a) executive summary;

b) description of the work and services performed during the preceding month;

c) updated Project Schedule showing progress to the end of the month (as percentages complete of the Contractor's activities broken down into significant elements of the Works) and the current schedule of activities and the targets for the next month;

d) updated billing schedule showing the payment become due to the end of the next month;

e) identification of areas with foreseeable problems relating to scope, claims for adjustments to the Contract Price, or changes in the Project Schedule; and

f) such other information and supporting documentation as the Owner may reasonably request;

The Contractor shall submit the progress report every month and in 5 (five) hard copies. The Owner shall have the right to depute his representative at the premises of the Works of the Contractor or any of its Sub-Contractors to ascertain the progress of the Works. The Contractor shall as and when required by the Owner give the Owner access to all scheduling information prepared by the Contractor in respect of the Works and shall permit the Owner's Representative to attend and fully participate in scheduling and progress meetings.

Article-21

REJECTION OF DEFECTIVE PLANT

For the purpose of this Contract, Minimum Acceptance Criteria is defined in Technical Specification hereto.

If the completed plant or any portion thereof before it is finally accepted is found to be defective or fails to fulfil the Minimum Acceptance Criteria, the Owner shall give the Contractor notice setting forth particulars of such defects or failure and the Contractor shall forthwith make the defective plant good, or make it comply with the Acceptance Criteria. Should they fail to do so within a period of time as deemed reasonable by the Owner and stated in the said notice, the Owner at its discretion shall have the right to either (a) accept the Facility subject to reduction in Contract Price as may be mutually agreed between the Parties or, (b) in the event the Parties fail to reach such agreement

under (a) within 30 (thirty) days, Owner shall be entitled to reject and replace at the cost of the Contractors the whole or any portion of the plant as the case may be which is defective or fails to fulfil the Acceptance Criteria of the Contract. However, such rejection/replacement by the Owner shall not absolve the Contractor of any of their responsibilities under this Contract.

In the event of such rejection, the Owner shall be entitled to the use of the plant in a reasonable and proper manner for a time reasonably sufficient to enable him to obtain other replacement plant.

Article-22

DEFECTS BEFORE TAKING-OVER

If, at any time prior to Taking-Over of the relevant Unit, the Owner notifies the Contractor that any work done or materials used by the Contractor or any Sub-Contractor or any Plant supplied in connection with such Unit is or are not in accordance with the Contract, or that such part does not fulfil the requirements of the Contract (all such matters being in this Article hereinafter called "**Defects**") then the Contractor shall, at its own expense, remedy the Defects so specified. If the Contractor fails to do so in respect of any Defect and such failure poses an imminent danger to the health and/or safety of persons engaged in carrying out the Works, the Owner may, take such steps as may in all the circumstances be reasonable to remedy such Defects including appointment of third parties for rectification of such Defects and the Contractor shall pay to the Owner the cost of doing so. It is further clarified that the Owner shall have the right to deduct such sum form any sum due and payable to the Contractor including encashment of any bank guarantee/security.

Article-23

ACCEPTANCE OF THE FACILITY

23.1 **Mechanical Completion**

23.1.1 Mechanical Completion, for the Facility, shall mean the completion of the following activities, in relation to that Facility, to the satisfaction of the Owner:

23.1.2 the connecting / hooking up of such Equipment to other relevant Equipment with welding, wiring, controls and safety systems;

23.1.3 ensuring that such components of Equipment and all related operating systems are individually cleaned, leak checked, lubricated and point-to-point checked to verify that such components of Equipment and related operation systems have been correctly installed so as to respond to simulated test signals / instructions (i.e. loop checks) equivalent to actual signals / instructions received during operation;

23.1.4 ensuring that such Equipment and related operating systems are ready for start-up, initial operation, commissioning, adjustment and testing and may be so operated safely and without damage thereto; and

23.1.5 pre-commissioning activities (Cold Tests) as applicable to each Equipment, system or component such as stroking of control valves, phase rotation of electrical equipment and completion of checks for continuity of other electrical circuits (including loop checks) and the responses of controls and control equipment are completed.

Cold test shall be taken up by the Contractor to prove that the Facility has been erected as per Contract & after erection is fit for commissioning. Details of Cold tests are given in the Technical Specification

23.2 Commissioning and Taking Over

23.2.1 On completion of cold Tests and Once the Facility has successfully passed all pre-commissioning tests / inspections and is capable of safe operation as per the operation manual and Good Industry Practices, the Contractor shall declare that the Facility is ready for start up and Commissioning. The Contractor shall then proceed for Commissioning of the Facility in accordance with the procedure as specified in the Technical Specifications.

23.2.2 The Contractor shall also ensure that he has, in relation to any Facility :

(b) provided to the Owner such preliminary operating and maintenance manuals and drawings, updated P&I drawings, electrical single line drawings and control diagrams and other information as may be specified in the Technical Specifications to be provided prior to Taking Over of that Facility or otherwise as may reasonably be required by the Owner for the safe and reliable operation of the Facility; and

(c) provided to the Owner such certification by the Contractor or other written evidence, as the Owner may reasonably require, that the Contractor has complied with the Applicable Laws relating to the operation of the Facility and has obtained all Applicable Clearances in connection with the construction of the Facility which the Contractor has to comply with or obtain,

23.2.3 On successful Commissioning of the Facility and provided the Contractor has completed all his contractual obligations due till Commissioning, the Owner shall issue Commissioning Certificate.

23.2.4 Upon successful Commissioning of the Facility, all surplus materials and equipment, whether or not required in connection with the performance of the Contractor's obligations, shall be the property of the Owner.

23.2.5 Take over

On successful completion of Commissioning, the System shall be provisionally taken over by the Owner and Take over Certificate will be issued by the Owner.

23.3 **Performance Acceptance Certificate**

Once a Facility is Taken Over by the Owner and has successfully attained stabilized and consistent operations, the Contractor shall, with consent of the Owner, proceed for demonstration of Performance Guarantees by conducting Performance Guarantee Tests in accordance with the procedures as specified in the Technical Specifications. The contractor shall give the Owner at least 30 (thirty) days prior written notice of the date on which the contractor intends to commence the Performance Guarantee Tests.

Subject to the relevant provisions of the Contract, the Contractor shall, as soon as Facility/ Unit has passed all the Performance Guarantee Tests and has completed all other tests required and as stipulated in Annexure 1 hereto, so notify the Owner in writing and if such notice was given properly in accordance with the requirements of the Contract, the Owner shall, within 45 (forty five) days of receipt of such notice, either issue a Performance Acceptance Certificate for that Unit, or

if reasonable cause exists for doing so, notify the contractor that Performance Acceptance has not been achieved, stating the reasons thereof.

23.4 Final Completion

Final completion certificate shall be issued by the Owner after the Contractor has demonstrated successfully Performance Guarantee Tests and fulfilled all his obligations as per the Contract

Article-24

VARIATIONS

24.1 The Owner shall have the right, during the performance of the Contract, to change the scope and/or technical character of the Project and/or of the services stipulated in the Contract. Owner may by a notice in writing to the contractor request for changes in the scope of work. Within 3(three) days of receipt of such notice, the contractor shall inform the owner, in writing of the effect of such change would have on the price, schedule, and other provisions of the contract and within 3 (three) days of receipt of such information, Owner shall advise the contractor in writing of its acceptance or otherwise. On the same being accepted by the owner such changes shall be deemed to form part of this agreement. Contractor should not execute any other work unless mentioned in this contract without any prior written approval from the owner

24.2 If any changes are required for completeness of the work, the Contractor shall not be entitled to extra price or time.

24.3 In the event, the Owner requests a change as per Article 24.1 the Contract price and time shall be adjusted upwards or downwards, as the case may be and as shall be mutually agreed to. The Contractor shall not be entitled to any extension of time unless such changes adversely affect the time schedule.

24.4 The Contractor shall not change any work to be made pursuant to this Contract except as may become necessary to enable him to meet his technical obligations under this Contract, provided however that such changes shall be subject to prior written approval of the Owner.

24.5 If any changes are required for completeness of the works as per Article 24.2, or the Contractor himself changes as per Article 24.4, the Contractor shall not be entitled to extra price or time.

24.6 The Contractor shall proceed with the changes as requested as per Article 24.1 pending adjustment of Contract price and time schedule where so applicable in terms of Article - 24.3.

24.7 In the event that a request for changes by the Owner should affect the guarantees of the plant/process, a readjustment of such guarantees shall be agreed upon jointly, before the Contractor proceeds with the change.

24.8 Changes occasioned due to non-observance by the Contractor of the provisions of this Contract or arising out of detection by the Owner of errors in the documents or in works not in compliance with the design, specifications & drawings or with the best engineering practice, shall neither give rise to price adjustment nor extension of time. The Contractor shall take immediate steps to restore the contractual position

Article-25

CONTRACTOR'S CO-OPERATION WITH FINANCING

The Contractor shall, as and when requested to do so by the Owner at any time after the signing of this Contract, prepare and provide such information in connection with the Contract and/or the Works (including resolutions, certificates, opinions of counsel or other documents related to the Contractor's corporate authorisation to enter into the Contract and to undertake the obligations set forth herein) as may be reasonably required for any potential lender to the Owner under a proposed loan agreement. The Contractor shall cooperate with the Owner in good faith in order to satisfy the requirements of the Owner's financing arrangements, including where appropriate and reasonable the making of amendments to the terms of the Contract as may be required by the Financing Entities and mutually agreed by the Parties.

Article-26

INTERPRETATION OF CONTRACT DOCUMENTS

26.1 Several Conditions, Schedules listed in this contract and forming an integral part of this Contract are to be taken as mutually explanatory to one another.

26.2 There are no understandings or agreements between the Owner and the Contractor which are not fully expressed herein including the Schedules referred to in the Contract. No modifications of this Contract shall be valid unless the same is agreed in writing by the Parties hereto and issued as an amendment to the Contract.

26.3 All the words and expressions used in this Contract shall unless repugnant to the context here the same meaning as are respectively assigned to them in Article 1 of Contract. All headings to the Articles, Conditions, Schedules or to any other part of the Contract are solely for the purpose of giving a concise indication and not a summary of contents thereof and they shall not be deemed to be a part thereof or be used in the interpretation or construction thereof.

26.4 Contract shall include following documents having priority as per the order given below;

i) Contract Agreement,
ii) Technical Specification

Article-27

FORCE MAJEURE

27.1 As used in this Agreement, Force Majeure means any act, event or circumstance, or combination of acts, events or circumstances, which may materially and adversely affect the affected Party's performance of its obligations pursuant to the terms of this Contract, but only if and to the extent that such acts, events or circumstances are not within the affected Party's reasonable control, were not reasonably foreseeable and could not have been prevented or overcome by the affected Party through the exercise of reasonable skill or care. Any act, event, circumstance or combination thereof meeting the description of Force Majeure that has the same effect upon the performance of Major Sub-Contractors which directly, materially and adversely affects the performance by the Owner or

Contractor of its obligations in whole or in part under this Contract shall constitute Force Majeure with respect to the Owner or Contractor respectively.

27.2 The Force Majeure Events shall comprise the acts, events and circumstances, such as (i) act of war, invasion, armed conflict or act of foreign enemy, blockade, embargo, revolution, riot insurrection, civil commotion, act of terrorism or sabotage, in each case occurring inside or directly involving India; (ii) strikes, lockouts or other generalised labour action occurring within India (excluding such events which are site specific and attributable to the Contractor); (iii) Radioactive contamination or ionising radiation or chemical contamination originating from a source in India or resulting from another Force Majeure Event; (iv) flood, cyclone, lightning, earthquake, drought, storm or any other extreme effect of the natural elements; (v) epidemic or plague; (vi) fire or explosion, except as may be attributable to the Contractor; (vii) air crash or shipwreck; (viii) an act of God (ix) issue of notification(s), order(s), direction(s) by the Central or State Government or any authority /department of the Central or State Government or by any Court of Law rendering the execution or continuance of execution of the contract or the obligation(s) of the parties under this contract.

27.3 As time being the most important feature of the Contract if either Party is prevented from the performance of its obligations in whole or in part for reasons of Force Majeure Event, then provided notice of happening of any such eventuality is given by the affected Party to the other Party within 7 (seven) days from the date of occurrence and cessation of the Force Majeure, the period of Force Majeure shall be excluded from the time specified for fulfilment of obligation of the Party prevented by Force Majeure. If the effect of any events specified in Article 27.2 other than Sub-Article 27.2 (ii) lasts for a continuous period of less than 3 (three) days, such events shall not be construed to be Force Majeure Events.

27.4 It is however clarified that in the event of Force Majeure preventing the Contractor from performing its obligations under the Contract, for a continuous period of less than 6 (six) months from the beginning of Force Majeure Event or an aggregate period of not more than 9 (nine) months, the Contractor shall be entitled to extension of time for the period during which such Force Majeure Event had occurred for fulfilment of its obligations under the Contract and the Contractor shall not be entitled to terminate the Contract or abandon the project during such above mentioned period.

27.5 If Force Majeure Event continues beyond the period of 6 (six) months from the beginning of the Force Majeure Event or prevent the Contractor from performing its obligations under the Contract for an aggregate period of more than 9 (nine) months, the Parties shall mutually decide further course of action. If mutual settlement cannot be arrived at within 30 (thirty) days, either Party shall have the right to terminate the Contract. In the event of such termination, the Owner shall be liable to make payment for all Works done by the Contractor till the time such Force Majeure had commenced and the Contractor shall be liable to hand over all works and Supplies completed pursuant to the Contract till the date of termination due to Force Majeure.

27.6 Neither Party can claim any compensation from the other Party on account of Force Majeure Event

27.7 Performance to Continue

Upon the occurrence of any circumstances of Force Majeure the Contractor shall use all reasonable endeavours to continue to perform its obligations under the Contract and to minimise the adverse effects of such circumstances.

Article-28

INSPECTION AND TESTING AT SITE

Opening-Up for Inspection and Testing on Site In circumstances where:

28.1.1 any element of the Works has been found to be defective or otherwise not in accordance with the requirements of the Contract and the Owner has reasonable grounds to suspect that the Works may contain other similar defects or non-compliant elements; or

28.1.2 the Contractor has failed to give the Owner a reasonable opportunity in accordance with the agreed quality plan to inspect any element of the Works before it is covered up,

the Owner shall be entitled to require the Contractor, at the Contractor's cost, to open up for inspection or to arrange for or carry out any tests of any such element of the Works.

28.2 Quality Assurance and Control

The Contractor shall comply and require that its Sub-Contractors comply with the provisions of the Technical Specifications in connection with quality assurance and quality control arrangements in the carrying out of the Works. All records maintained by the Contractor and its Sub-Contractors pursuant to such quality assurance and quality

control obligations shall be made available for inspection by the Owner upon reasonable notice.

28.3 The Contractor shall submit their quality assurance plan, within 30 days of Effective Date Of Contract, clearly stating the stages of inspection and methods of inspection etc. The Contractor shall accord to the inspecting personnel all necessary assistance and shall make available free of charge all necessary instruments and appliances and test beds and tools and other materials necessary for the performance of the inspection (s) so as to enable the inspectors to work properly in accordance with the Contractor's Quality Assurance Plan ("**QAP**"). The above mentioned inspection (s) and testing shall be in accordance with the **QAP** to be approved by the Owner.

28.4 Owner or its duly authorized representative shall have, at all reasonable times, access to the Contractor's facilities within the Owner's premises and shall have the power to examine, inspect and call for tests for material and/or workmanship during the execution of Work. Such tests shall be carried out by the Contractor wholly at his expense. Such inspection and test shall not absolve and relieve the Contractor of its responsibility to carry out and complete the Work in accordance with the Technical Specifications or discharging any of its contractual obligations.

28.5 FOR MATERIAL

28.5.1 The Owner shall have full powers to get the incoming material, being used in Work, tested by an independent agency at his expense in order to crosscheck / revalidate their soundness and adequacy. Such inspection and test shall not absolve and relieve the responsibility of the Contractor to carry out and complete the Work in accordance with the Drawings and Specifications as is provided to the Contractor or discharging any of its contractual obligation

28.5.2 It shall be the responsibility of the Contractor to submit necessary samples and obtain prior approval of the Owner/Owner's representative in respect of all material, fittings, fixtures and any other item as decided by the Owner/Owner's representative. One such approved sample of each shall be kept with the Owner/Owner's representative at SITE for future reference.

28.5.3 The fittings or fixtures shall confirm to Specifications and shall have prior approval of the Owner/Owner's representative.

28.5.4 If the Contractor desires to substitute any material or item, he must secure the approval of the Owner/Owner's representative, in writing, of any such substitution well before making such substitution. Material designated in Specifications, or in the SCHEDULE OF ITEMS, as "equal or other approved" shall be considered as coming under the provision of this Article as substitutions and no such material shall be used until specific approval of the Owner/Owner's representative has been received in writing.

28.5.5 All standard tests, which are performed for quality control, shall be done with proper maintenance of records.

28.5.6 The Specifications prescribe various tests at specified intervals for ascertaining for the quality of the Work done. If the tests prove to be unsatisfactory, the Owner/Owner's representative shall have liberty to order the Contractor to redo the Work done in that period and / or to order such alterations for rectification that may be necessary or both at the cost of the Contractor. The Contractor shall be bound to carry out such orders failing which the rectification / redoing will be done by the Owner/Owner's representative through other agencies and cost recovered from the Contractor. Such rectification/redoing by the Owner/Owner's representative through any other agency and recovery of cost shall be in addition to any other right the Owner may have against the Contractor.

28.6 WORKMANSHIP AND TESTING

28.6.1 The Contractor shall carry out Radiography, Magnetic particle test of weld joints and any other stage wise test & inspection required to be carried out in conformation to the particulars contained in or implied by the Specifications and as referred to in and represented by the Drawings or in such other additional particulars, instruction and documents as may be found requisite to be given during the execution of the Work and to the entire satisfaction of the Owner/Owner's representative.

28.6.2 Owner or its duly authorized representative shall have, at all reasonable times, access to the Contractor's facilities within the Owner's premises and shall have the power to examine, inspect and call for tests for material and / or workmanship during the execution of Work. Such tests shall be carried out by the Contractor wholly at his expense. Such inspection and test shall not absolve and relieve the responsibility of the Contractor to carry out and complete the Work in accordance with the Drawings and Specifications as is provided to the Contractor or discharging any of its contractual obligation.

28.6.3 Work shall be carried out in such a manner so as not to interfere with effects like vibration etc., or retard or disturb the existing structure's foundations, the progress of operation and maintenance of the existing plant or of other works being executed by other agencies.

28.6.4 The Contractor shall be responsible for the true and perfect setting out of the Work and for the correctness of the positions, levels, dimensions and alignment of all parts of the Work. All measurements shall comply with the dimensions noted on the DRAWINGS and / or as directed. If at any time during the progress of Work, any error shall appear or arise in the position, levels, dimensions, or alignments of any part of the Work, the Contractor, on being required to do so by the Owner/Owner's representative, shall rectify, at his own expense, such errors to the satisfaction of the Owner/Owner's representative notwithstanding that he may have been assisted by the Owner/Owner's representative in setting out the same earlier

Article-29

RISK PURCHASE

29.1 In case, the work is not completed within the stipulated schedule, the Owner reserves right to cancel the Contract for the balance work which has not been executed and get the balance work done from any other sources at the risk and cost of the Contractor and recover the cost/ expenditure that would be incurred extra by the Owner from the Contractor.

29.2 In case, the work already executed cannot be put to its intended use in absence of unexecuted work, Owner shall have the liberty to get the entire work done from any other source at the risk & cost of the Contractor. The additional cost incurred in getting the work done from new source, will be recovered from the Contractor..

Article-30

ARBITRATION

30.1 The Parties hereto shall endeavour to settle all disputes and differences relating to and/or arising out of the Contract amicably.

30.2 In the event that the Parties failing to resolve any dispute amicably the same shall be referred to Arbitration in accordance with the Arbitration and Conciliation Act 1996 with all modifications and re-enactments thereto, as is prevalent in India. Each Party shall be entitled to nominate an Arbitrator and the two Arbitrators so nominated shall jointly nominate a third presiding Arbitrator. The Arbitrators shall give a reasoned award. The place of arbitration shall be Korba, India. The language used in arbitral proceedings shall be English.

30.3 This contract shall be construed in accordance with and governed by the laws of India. The parties hereby expressly submit themselves to exclusive jurisdiction of the courts in Korba, India.

30.4 The Parties hereto agree that the Contractor shall be obliged to carry out its obligations under the Contract even in the event a dispute is referred to Arbitration. It is further clarified that the Owner shall be entitled to retain any sum or portion of Contract price which has become due and payable, for any unfinished Works or any subject matter under arbitration.

Article-31

TERMINATION AND SUSPENSION

31.1 TERMINATION DUE TO CONTRACTOR'S DEFAULT

31.1.1 If the Contractor:

a) shall have voluntarily commenced winding-up, bankruptcy, insolvency, reorganization, stay, moratorium or similar debtor-relief proceedings, or shall have become insolvent or

is unable to pay its debts as they become due, or admits in writing its inability to pay its debts or makes an assignment for the benefit of its creditors;

b) has insolvency, receivership, reorganization or bankruptcy proceedings brought against him and the petition commencing such proceedings is not controverted and the proceedings dismissed or effectively stayed within 30 (thirty) days of such commencement;

c) has abandoned the Contract;

d) despite previous warnings in writing from the Owner, has wrongfully refused or has materially failed or neglected at any time to execute the Contract or is failing to proceed with the Contract with due diligence or is neglecting to carry out its other obligations under the Contract in each case so as to affect materially and adversely the execution of the Contract;

e) fails to remove and replace portion of Supplies after receiving, from the Owner, notice to the effect that the said portion of Supplies have been rejected;

f) offers or gives or agrees to give to any person in the Owner's service or to any other person on his behalf, any gift or consideration of any kind as an inducement or reward for doing or for bearing to do so or for having done or forborne to do any act in relation to obtaining or execution of this or any other Contract for the Owner;

g) shall enter into a contract with the Owner's employee in connection with which commission has been paid or agreed to be paid by him or to his knowledge, unless the particulars of any such commission and the terms of payment thereof have previously been disclosed, in writing, to the Owner;

h) has failed to deliver Supplies of any or all of the Units within the Completion Schedule;

then the Owner may, by notice to the Contractor and without prejudice to any other remedy under the Contract, terminate the Contract but without thereby releasing the Contractor from any of his obligations or liabilities which have accrued as at the date of termination of the Contract and without affecting the rights and powers conferred by the Contract on the Owner. Upon such termination the Owner may itself complete the Supplies or may employ any other Contractor to complete the job at the risk and cost of the Contractor.

31.1.2 Opportunity to remedy

The Owner's right to terminate the Contract following the occurrence of the events or circumstances, as described above, shall be subject to the Owner having first given the

Contractor 30 (thirty) days prior notice of its intention to terminate the Contract, during which period the Contractor shall have failed to remedy or to take all reasonable steps to commence the remedy of the default.

31.1.3 Payment After Termination due to Contractor's Default

The Owner shall not be liable to make any further payments to the Contractor until the costs of execution and all other expenses incurred by the Owner in completing the Supplies, and thereby the Facility, have been ascertained (herein called the "Cost of Completion"). If the Cost of Completion when added to the total amounts already paid to the Contractor as at the date of termination exceeds the total amount which would have been payable to the Contractor for the execution of the complete Supplies, the Contractor shall upon demand, pay to the Owner the amount of such excess. Any such excess shall be deemed a debt due by the Contractor to the Owner and shall be recoverable accordingly.

If there is no such excess the Contractor shall be paid the value of the Supplies executed after adjusting the total of all payments received by the Contractor as on the date of termination

31.2 TERMINATION WITHOUT CONTRACTOR'S DEFAULT

The Owner reserves the right to terminate the Contract at any time, without assigning any reason, by giving a notice of 1 (one) month. The Contractor shall stop the performance of the Contract from the date of termination and shall hand over all the drawings, documents and goods manufactured till date, including related rights, sanctions and approvals, to the Owner. The Owner shall pay to the Contractor the cost incurred by the Contractor till the date of termination, duly supported with documents, as compensation after adjusting payments already made till the termination. No consequential damages shall be payable by the Owner to the Contractor in the event of such termination.

31.3 SUSPENSION

30.3.1 The Owner may suspend the work in whole or in part at any time by giving Contractor notice in writing to such effect stating the nature, the date and the anticipated duration of such suspension. On receiving the notice of suspension, the Contractor shall stop all such

work, which the Owner has directed to be suspended with immediate effect. The Contractor shall continue to perform other work in terms of the Contract, which the Owner has not suspended. The Contractor shall resume the suspended work as expeditiously as possible after receipt of such withdrawal of suspension notice. No claim on this regard will be entertained.

31.4 RIGHTS OF THE OWNER AFTER TERMINATION

31.4.1 The Owner shall, on such termination of the Contract, have powers to :

(a) take possession of the Site and any material, Equipment, plant, implements, stores etc. thereon; and / or

(b) carry out the incomplete Work by any means at the risk and cost of the Contractor.

31.4.2 On termination of the Contract, in full or in part, the EIC shall determine what amount, if any, is recoverable from the Contractor for completion of the Work or part of the Work, or in case the Work or part of the Work is not to be completed, the loss or damage suffered by the Owner. In determining the amount, credit shall be given to the Contractor for the value of the Work executed by him up to the time of termination and the value of Contractor's material lying at Site. If the Contractor fails to be present so as to record the measurements in his presence, the recording of measurements as recorded by the ENGINEER shall be binding on the Contractor.

31.4.3 The Owner shall have the right to use Contractor's plant, machinery and material on the balance Work but shall not in any way be responsible for any damage or loss of the same and the Contractor shall not be entitled to any compensation thereof.

31.4.4 Any excess expenditure incurred or to be incurred by the Owner in completing the Work or part of the Work or the loss or damages suffered by the Owner as aforesaid after allowing necessary credits, shall be recovered from any money due to the Contractor on any account and if such money is not sufficient, the Contractor shall be called upon in writing to pay the same within 30 days.

31.4.5 If the Contractor fails to pay the required sum within the aforesaid period of 30 days, the Owner shall have the right to sell any or all of the Contractor's unused material, Equipment, plant, implements, temporary buildings, etc. and apply the proceeds of sale thereof towards the satisfaction of any sum due from the Contractor under the Contract and if thereafter there by any balance still outstanding from the Contractor, the Contractor shall, upon demand, pay the Owner the money due and it shall be deemed a debt due by the Contractor to the Owner and shall be recovered accordingly.

31.4.6 Any sums in excess of the amounts due to the Owner and unsold materials, constructional plant, etc. shall be returned to the Contractor. It is always understood that if the actual cost of completion by the Owner of the balance Work or part of the Work is less than the amount which the Contractor would have become eligible had he completed the Work or part of the Work under the terms of Contract, the Contractor shall not be entitled to claim such benefit to his advantage.

31.4.7 The Owner shall not be liable to make any further payments to the Contractor until the costs of execution and all other expenses incurred by the Owner in completing the Works have been ascertained (herein called the "Cost of Completion"). If the Cost of Completion when added to the total amounts already paid to the Contractor as at the date of termination exceeds the total amount, which would have been payable to the Contractor for the execution of the Works, the Contractor shall upon demand, pay to the Owner the amount of such excess. Any such excess shall be deemed a debt due by the Contractor to the Owner and shall be recoverable accordingly. If there is no such excess the Contractor shall be entitled to be paid the difference (if any) between the value of the Works ascertained and the total of all payments received by the Contractor as on the date of termination.

31.5.0 **URGENT WORKS**

If any urgent work (in respect where of the decision of the EIC shall be final and binding) becomes necessary for safety of the Work or personnel and the Contractor is unable or unwilling to carry it out, the Owner, on due advise from EIC, shall have right to employ departmental labour or other agencies he may consider expedient. All expenses incurred by the Owner shall be recoverable from the Contractor and be adjusted or set off against any sum payable to him.

Article-32

LANGUAGE

All documents, instructions, catalogues, brochures, pamphlets, design data, operation and maintenance manuals, communications shall be in English language.

Article-33

NOTICES

33.1 Notices to Owner

Any contractual notice, report, certificate or other communication to be given to the Owner under the Contract shall be served by sending the same by facsimile transmission (with a confirmation copy by couriers or by hand delivery only in case of major issues relating to the Contract, Viz. Notices of Tests, arbitration, making a claim, termination etc.) to, or by leaving the same at, the respective addresses set out below or such other addresses as may be specified for that purpose in writing to the Contractor.

Owner:

Head -Commercial
Bharat Aluminium Company Limited
Korba Aluminium Project
PO – BALCONAGAR
Korba- 495684, Chhattisgarh, India.

with a copy in all cases to the Owner's Representative:

Head - Projects
Bharat Aluminium Company Limited
Korba Aluminium Project
PO – BALCONAGAR
Korba- 495684, Chhattisgarh, India

32.2 Notices to Contractor

All certificates, notices or decisions, instructions and orders to be given by the Owner's Representative or the Owner under the Contract shall be served by sending the same by

facsimile transmission (with a confirmation copy by couriers or by hand delivery only in case of major issues relating to the Contract, Viz. Notices of Tests, arbitration, making a claim, termination etc.) to, or by leaving the same at, the address set out below or such other address as the Contractor shall nominate in writing for that purpose:

Contractor:

XXXXXX

Tel: +91-xxxxxxxxxxxxxxx,

Email: xxxxxxxxxxxxxxxxxxx.com

with a copy in all cases to the Contractor's Representative:

32.3 Serving of Notices

Any notice sent by facsimile transmission shall be deemed to have been served at the time of receipt, provided that a positive transmission report from the sender's machine will be conclusive evidence of receipt in the absence of evidence to the contrary.

32.4 Other Communications

All other communications pertaining to the Works not referred to in Articles 32.1 and 32.2 shall be made between the Contractor and the Owner's Representative or other representatives nominated by the Contractor or the Owner's Representative from time to time in respect of such categories of communication and subject to such limits of authority as may be agreed as part of the project co-ordination procedures or as may be notified from time to time.

32.5 Project Co-ordination Procedures

The Contractor shall within 60 (sixty) days of date of signature of the Contract submit to the Owner for approval a draft project co-ordination procedures document setting out procedures for communications between the Contractor, the Owner and the Owner's Representative in connection with this Contract, including details relating to correspondence, circulation of notices and documentation, meetings and other interfaces.

The Parties shall comply with the requirements of such project co-ordination procedures once approved by the Owner, and such procedures may be amended from time to time by mutually agreement.

Article-34

MAXIMUM LIABILITY

34.1 The maximum liability of the Principal Contractor in aggregate under this Guarantee shall not exceed 100% (one hundred percent) of the total Contract Price, provided however, such limit shall not apply to Liquidated Damages and liability against indemnity and infringement of intellectual property rights. It is clarified that in the event of any claim for Liquidated Damages and liability against indemnity and infringement of intellectual property rights the same shall be over and above the maximum liability of 100% (one hundred percent) of the Total Contract Price

Article – 35

CONSEQUENTIAL DAMAGE

35.1 Except as expressly provided in the Contract, in no event shall any Party hereto be liable to the other Party, by way of indemnity or by reason of any breach of the Contract or otherwise, for any loss of profit, loss of use, loss of contracts, idle labour or for any indirect, incidental or consequential damage whatsoever that may be suffered by the other Party.

35.2 It is hereby agreed and clarified that this exclusion of liability shall not apply in respect of :

a) statutory penalties and sanctions and legal expenses for which the Owner is indemnified under Article 17 hereof; and

b) the indemnity to Owner against infringement given under Article 18 hereof

Article-36

GOVERNING LAW & JURISDICTION

This Contract shall be construed in accordance with and governed by the laws of India and in the event of any litigation the jurisdiction of this Contract shall be that of the appropriate courts in Korba, Chattisgarh, India

GENERAL CONDITIONS OF CONTRACT

FOR

SUPPLY CONTRACT

FOR

BALCO SMELTER EXPANSION PROJECT AT

KORBA,CHHATTISGARH

1.1 Interpretation in this Contract:

1.1.1 Terms and phrases defined in the Article-1 shall have the same meanings wherever used in this Contract.

1.1.2 **References in the singular shall include references in the plural and vice versa.**

1.1.3 **References to a particular Article, sub-Article -shall, except where the context otherwise requires, be a reference to that Article-, sub-Article**

1.1.4 **The headings are inserted for convenience and are to be ignored for the purposes of construction.**

1.1.5 **The words "include" and "including" are to be construed without limitation.**

1.1.6 **The Annexure to the Contract form part of this Contract and will be of full force and effect as though they were expressly set out in the body of the Contract.**

1.1.7 **Whenever provision is made for the giving of notice, approval or consent by any Person, unless otherwise specified such notice, approval or consent shall be in writing and the words "notify" and "approve" shall be construed accordingly.**

1.1.8 **The invalidity or unenforceability of any portion or provision of this Contract shall not affect the validity or enforceability of any other portion or provision. Any invalid or unenforceable portion or provision shall be deemed severed from this Contract. The Parties agree that in such circumstances to interpret and to negotiate an equitable amendment to the provisions of this Contract to give effect to the underlying purposes of this Contract.**

1.1.9 **The failure of either Party, at any time during the Term hereof, to require performance by the other Party of any provision of the Contract shall in no way affect the full right to require such performance at any time thereafter. The waiver by either Party of a breach of any provision of the Contract does not constitute a waiver of any succeeding breach of the same or any other provision, nor shall it constitute a waiver of the provision itself**

ARTICLE - 2

SCOPE OF WORK

2.2 The scope of work to be carried out by the Supplier pursuant to the terms of this Contract includes, but not limited to design, engineering, manufacture, procurement, inspection, assembly, painting, testing, packing, forwarding, transportation, insurance and delivery of XXXXXXXX on single point responsibility basis with all commissioning spares, 2 years recommended spares as per the agreed list and signed Technical Specification for XXXXXXXX on FOR Site, Korba basis. The detailed scope and specifications shall be as per signed and mutually agreed Technical Specifications for XXXXXXXXXXXXX.

2.3 Completeness:

The Contractor shall ensure that all equipment, fittings, accessories/materials of supplies which may not be specifically mentioned in the specification/drawing/scope of supply/work, but which are usual or necessary for proper commissioning of the equipment, are to be provided by The Contractor without any extra cost to The Owner, unless expressly excluded in this Contract. The Supplier shall be deemed to have carefully examined and to have knowledge of all the documents, drawings and other documents forming part of above subject and references and also have satisfied itself as to the nature and character of the work to be executed. Any information thus has or otherwise obtained from the Owner shall not in any way relieve the Supplier from its responsibility for completion of total Scope of Work or any other work not specifically mentioned in this Contract but necessary for completion of the Facility within the battery limits offered by the Supplier and agreed by the owner.

2.3 Special Tools and Consumables

2.3.1 Commissioning Spares

The Supplier shall supply along with the equipment mentioned in Article 2.1 hereof, adequate commissioning spares (only for replacement of faulty material) as per the Technical Specification. The contract price at Article-3 hereof includes the prices for such commissioning spares.

2.3.2 Spares for two years operation and maintenance

The Supplier shall provide list of spares along with price required for 2-years normal operation and maintenance of the plant as given in the Annexure 4. The Supplier should keep the prices of two years operation and maintenance valid till two years after successful commissioning of the System. The Owner shall be at liberty to place order for additional spares.

2.3.3 Initial fill of Oil, lubricants and consumables

The Supplier shall supply along with the Plant & Equipment the oils and lubricants required for the initial fill including hydraulic fluids, grease, flushing oils etc. well in advance, for commissioning of the Plant & Equipment. The cost of such initial fill of oils including hydraulic oils and other

lubricants is included in the Contract Price. The Supplier shall be responsible for supply of full quantities of such oils and lubricants as may be required for this purpose till completion of commissioning irrespective of the oils & lubricants, quantity etc. mentioned in Technical Specification. These oils & lubricants should be preferably of Indian origin. In the case of imported oil & lubricant, specification for the same shall be furnished by the Supplier for procurement in future.

2.4 PAINTING

The general specification for painting and colour code etc. shall be followed for painting of the equipment, steel structures etc. as given in the Technical Specification

Article-3

CONTRACT PRICE

3.1 In consideration of the Supplier supplying the Plant and Equipment, the Owner hereby covenants to pay to the Supplier the Contract Price amounting to Rs. **XXXXXXXXX**/- (Includes all taxes and duties including CST @2% against 'C' form ,excluding of Excise Duty which shall be paid on submission of necessary Cenvatable Documents) Say Indian Rupees **xxxxxxxxxxxxxx only** at the time and in the manner prescribed in Article-4 of the Contract subject to such deductions/adjustments as may be allowable in the Contract.

3.2 Basis of Contract Price

3.2.1 Supplier to inform itself Fully

The Supplier shall be deemed to have inspected the Site and its surroundings and to have satisfied itself as to all technical, commercial, social and general condition of and all circumstances affecting the Site and the Works, the form and nature of the Site, the extent and nature of the work and materials necessary for the carrying out and completion of the Works, the means of communication with and transportation and access to the Site, the accommodation it may require and in general all risks and contingencies influencing or affecting the Works. The Supplier shall not, except as expressly provided in this Contract, be entitled to any extension of the Completion Schedule or to any adjustment of the Contract Price on grounds of misinterpretation or misunderstanding of any such matter.

3.2.2 Except as otherwise expressly set forth in this Contract, the above prices are all inclusive, firm and final and not liable to any change under any condition whatsoever. The agreed rates are inclusive of all incidental/miscellaneous expenses incurred in order to discharge the contractual obligations.

3.2.3 All taxes and duties on Supplies payable and shall be borne and paid by the Supplier & the Owner shall reimburse the same as indicated in the Article 3.3

3.2.4 Freight & transit insurance for supplies are included in the Contract Price.

3.2.5 The price shall be on the basis of scope of work, specifications and battery limits as defined herein and more particularly described in the technical details as agreed and signed during your visit at BALCO, Korba. The price includes all statutory fees / levies in India as may be required up to commissioning

3.2.6 In case the project is entitled to any Tax benefit / concessions in India, the same shall be passed on to The Owner by The Contractor

3.3 **Taxes & Duties**

3.3.1 Contract Price shall be inclusive of all taxes, duties and levies except Excise Duty, However, Excise duty which shall be reimbursed at actual against submission of CENVATABLE documents. Owner will issue necessary C-forms and Road Permits, wherever required / permitted. Since the excise duty shall be reimbursed on submission of CENVATABLE Excise Invoice by the Supplier, the Supplier shall be responsible for the correctness of the CENVATABLE documents to enable the Owner to avail the CENVAT credit. All other taxes and duties of whatsoever nature shall be to the Supplier's account and the Owner shall not entertain any claim whatsoever in this regard.

Statutory variations in taxes/duties or imposition of any new tax in India shall be to OWNER's account.

Article 4

PAYMENT TERMS

In consideration of the payments to be made by the Owner to the Supplier as provided in the Contract, the Supplier covenants with the Owner to supply the Plant and equipment in conformity in all respects with the provisions of the Contract.
Subject to any deductions from the contract price as per Contract the Supplier shall be entitled to receive the contract price in the following manner:

4.1 Supply of Plant & Equipment & Spares

4.1.1 Payment Terms

Subject to any deductions from the Contract Price as per Contract the Supplier shall be entitled to receive the Contract Price in the following manner:

a) 10% of the Contract Price shall be paid as advance against submission of advance bank guarantee for equivalent amount valid till end of Supply along with submission of security bank guarantee for value equal to 5% of the contract price valid till commissioning.

b) 70% of the Contract Price shall be paid on pro-rata receipt and acceptance of material at site and also against submission and receipt of correct and complete documents within 30 days.

c) 10% of the Contract Price shall be paid against successful and satisfactory Commissioning, certified by the owner's engineer-in-charge at site.

d) 10% of the Contract Price shall be paid against successful, satisfactory commissioning and demonstration of performance guarantee (applicable for transformers) certified by the owner's engineer-in-charge at site and also against submission of Performance Bank Guarantee for value equal to 10% of the contract price valid till the completion of warranty period.

4.1.2 Bank Guarantee :

The Contractor shall procure and deliver to the Owner, Bank Guarantee(s) in such form and amounts as specified hereunder.

h) The Advance Bank Guarantee amounting to 10% of the Contract Price shall be submitted within 15 (fifteen) days from the date of contract valid till the completion of Supply.

i) The Security Bank Guarantee amounting to 5% of the Contract Price shall be submitted within 15 (fifteen) days from the date of Contract valid till commissioning.

j) The Performance Bank Guarantee amounting to 10% of the Contract Price shall be submitted within 15 (fifteen) days of successful completion of all works valid upto warranty period.

k) All the Bank Guarantees furnished by the Supplier shall be unconditional, irrevocable and from a nationalized bank of repute acceptable to the Owner and only in The Owner's format.

l) All Bank Guarantees shall have a claim period of 06 (Six) months from the date of expiry and shall be extended at the instance of the Owner, if required.

m) The value of Advance Bank Guarantee shall be reviewed and reduced once in six months corresponding to the adjustments of advance made by the Owner and based on a certificate to be issued by the Owner.

The Bank Guarantees shall have the provision of the same currency as the Contract price.

Article-5

EFFECTIVE DATE OF CONTRACT

5.1 Effective Date of the Contract shall be the date of Contract. However, Advance payment shall be released within 30 days of submission of correct Bank Guarantee as per Owner' format.

5.2 Commencement

The Supplier shall commence the Works immediately from the Effective Date of Contract and shall thereafter, subject to the terms of the Contract, proceed with the Works diligently and expeditiously.

Article 6

DELIVERY SCHEDULE

Notwithstanding the date of execution of this Contract, this Contract shall for all purposes and for the performance of obligations ,The Contractor shall have the date effective and enforceable with effect from the date of award of this contract

The complete scope of work envisaged under this contract should be completed within XXXXXXXXXXX months from the effective date of contract

The Contractor agrees that time is the essence of this Contract and undertakes to complete this work within the time schedule as stipulated in this contract.

The details of milestone as per Technical Specification.

Article-7

LIQUIDATED DAMAGES

7.1 **Liquidated Damages due to Delay in Completion**

In case of delay in supply/commissioning of equipment for reasons not attributable to THE OWNER, supplier shall be liable to pay liquidated damages for the respective system and not by way of penalty, an amount calculated at the rate of 0.5% of the Contract Price of the respective system for each week of delay or part thereof subject to a maximum of 5% of Contract Price.

7.2 **Liquidated Damages due to Non Performance :-**

7.2.1 In case, the Performance of unit/system as a whole is below guaranteed performance parameters as set out in the performance guarantee clause of the technical specifications of the contract, The Contractor shall pay to the Owner, liquidated damages and not way of penalty for each of the short fall of guarantee parameters up to a maximum of 10 % of contract price.

7.3 The liquidated damages for delay and non-fulfilment of performance guarantees shall be mutually exclusive and shall be levied independently.

Payment or deduction of Liquidated Damages shall in no way relieve the Supplier from completing the Works and discharging all its other obligations under this Contract.

7.4 Recovery of Liquidated Damages

The Owner shall have right to recover any such amount, as deductible / recoverable under liquidated damages, from the pending bills of SUPPLIER, if any, and / or from the retention money and / or by encashing any Bank Guarantee.

Article-8

BILLING CUM DESPATCH SCHEDULE

For facilitating release of payments the Supplier shall prepare and submit detailed Billing Schedule and Despatch Schedule separately for the Plant & Equipment within 45 days of the Effective Date of the Contract for approval by the Owner. Within 3 months from the Effective Date of contract, a detailed shipping schedule shall be submitted, indicating the break-up of the complete Plant into shipment units with approximate weights and dimensions and the respective dates upon which such units will be dispatched from the Supplier's and/or its Sub-Supplier's works. The Supplier shall arrange for supplies of the Plant, Machinery and Equipment in the logical sequence required for erection by the Owner within the overall delivery schedule of the Contract. The Supplier shall promptly give written notice to the Owner of any anticipated delay in maintaining such schedule stating reasons and remedial measures, there for. This shall not however in any way absolve the Supplier from his responsibility of timely delivery of Plant and Equipment as per contractual time schedule.

Article-9

PACKING, MARKING AND DESPATCH

9.1 The general specification of packing and marking in respect of Plant and Equipment shall be as per good Industry Practices.

All Plant and Equipment and materials shall be consigned in favour of

Head – Stores

Bharat Aluminium Company Limited

1200 MW Power Project

Korba, - 495684 Chhattisgarh, India

9.2 The Supplier shall take prior instructions from Owner before making first delivery of the project so as to ensure proper documents are in place. Subsequently, Owner shall issue detailed despatch instructions to the Supplier.

9.3 DESPATCH CLEARANCE

All consignments shall be dispatched only after receipt of "Inspection Certificate" and "Dispatch Clearance" from Purchaser. Any deviation from the above instruction may result in non-acceptance of consignment.

9.4 TRANSIT RESPONSIBILITY

9.4.1 Equipment should be conserved and packed in such a manner so as to protect it from damage, deterioration and pilferage during transportation to site.

9.4.2 The responsibility for safe delivery of complete equipment at site is that of the Supplier/ Contractor.

9.4.3 An open package inspection shall be carried out once the consignment arrives at site. If this inspection were to reveal deficiencies, damage or incorrect or incomplete deliveries, that are responsibility of the Supplier/ Contractor, the Supplier/ Contractor shall eliminate the faults within a time limit set by the Purchaser. All costs whatsoever arising in this connection shall be borne by the Supplier/ Contractor

Article-10

TRANSFER OF TITLE

The title to the Plant and Equipment and goods shall be passed to the Owner when delivered to the Site, provided however, such passing of title of ownership to the Owner shall not in any way absolve, diminish or dilute the responsibilities and obligations of the Supplier as per the Contract.

Article-11

LICENCES / APPROVALS

11.1 License / Approval

The Supplier shall obtain the necessary licenses / approval if any required for their scope of work from the competent authorities and the charges for approval of electrical equipment from any Indian authority shall be reimbursed by THE OWNER to The Contractor only upon submission of original and essential documents, issued by the said authority, as a proof of such approval. Failure to obtain licenses / approval shall not be considered as Force Majeure.

Article-12

INSURANCE

12.1 All the insurances required for the supplies covered under the Contract shall be arranged by the Supplier at his own cost. The Owner shall neither bear any responsibility nor any liability whatsoever on this account.

12.2 The Owner shall be the principal beneficiary of the policy along with the Supplier and shall reserve the exclusive right to assign the policy. The Supplier shall take out insurance policy from one or more reputed Insurance Company.

12.3 The insurance policy to be taken by the Supplier shall cover replacement cost of all supplies with due consideration of escalation, incidental expenses, supervision cost etc.

12.4 All the insurance claims shall be lodged and settled by the Supplier and the missing/damaged items shall be replaced/repaired by the Supplier without any extra cost to the Owner and without affecting the scheduled completion time. The Owner's decision regarding replacement of goods damaged, lost or rendered unusable shall be final.

12.5 The supplier shall also cover insurance for all those items which will be repaired/refurbished at the works of Supplier/sub-Supplier.

12.6 In the event of loss or damage, the Supplier shall be solely responsible to lodge the claims and settle the same. The Supplier shall proceed with repair or replacement of the goods without waiting for settlement of the claim. It is further clarified that no extension of Completion Schedule nor any extra claim shall be admissible on account of insurance.

Article-13

EXTRA ORDINARY TRAFFIC

13.1 **Damage to Highways**

The Supplier shall use all reasonable endeavours to prevent damage to any of the highways or bridges on the routes to the Site by any traffic of the Supplier or its Sub-Suppliers. If and to the extent that any such damage is caused to any highway or bridges by the Supplier or its Sub-Suppliers, the Supplier shall immediately arrange to remedy such damage at its own expense.

13.2 Special Loads

Should the Supplier consider that the moving of one or more loads of Plant or Supplier's Equipment is likely to damage any highway or bridge unless special protection or strengthening is carried out, then the Supplier shall before moving the load submit to the relevant Competent Authority its proposals as to the moving of the load, including details of the weight and other particulars of the load to be moved and its proposal for protecting or strengthening the highway or bridge.

13.3 Extraordinary Traffic Claims

If the Owner shall receive any claim in respect of damage or injury to highways or bridges arising out of the execution of the Works, it shall immediately report the claim to the Supplier. The Supplier shall then negotiate the settlement of and pay all sums due in respect of such claim and shall reimburse to the Owner all costs, charges and expenses reasonably incurred by the Owner in relation thereto.

13.4 Non-interference with Local Traffic

The Supplier shall take all such measures as may be reasonably necessary to ensure that its arrangements and those of its Sub-Suppliers with respect to the transport of goods, material and labour to the Site do not interfere with local traffic in the vicinity of the Site and where such interference is unavoidable shall make such special arrangements and obtain such permissions from the relevant Competent Authorities as may be reasonably required to minimise the effect of such interference.

Article – 14

WARRANTY/GUARANTEE AND DEFECTS

14.1 The supplier shall also guarantee that his proposed facility is free from all defects, including latent or those pertaining to:(a) Design

(b) Engineering

(c) Material

(d) Manufacturing

(e) Workmanship

(f) Shelf life

(g) Protection

(h) Usage

14.2 Should any defect attributable to above arise within the guaranteed period, as indicated below, the bidder shall replace such defective portion or part thereof at no extra cost (considering all cost elements involved) to the Owner . Such repair / replacement shall be carried out with minimum loss of time.

14.3 The guarantee period shall be 12 (twelve) months from the date of successful commissioning. The guarantee period shall exclude any downtime for defects / repairs attributable to supplier.

14.4 Making Good Defects

The Supplier shall be responsible for promptly making good by replacement at FOR Site, repair and/or modification, as per the instruction of the Owner at its expense any Defect in any part of the Facility which may appear during the Guarantee Period in relation thereto and which arises from any failure to comply with the provisions of Article 14.3 hereof.

14.5 Extension of Guarantee Period

The Guarantee Period for the System or any part thereof shall be extended by a period equal to the period during which the relevant Facility or part cannot be used by reason of any Defect to which Article 14.5 applies. The provisions of this Article 14.5 shall apply to all repairs; replacements or modifications carried out by the Supplier to remedy Defects as if the component replaced, repaired or modified had been taken over on the date they were completed.

14.6 Delay in Remedying Defects

If the Supplier fails to commence and proceed diligently with the remedy of any such defect within 30 (thirty) days of receipt of notification thereof from the Owner, the Owner may proceed to do the work at the Supplier's expense provided that it does so in a reasonable manner in accordance with Good Industry Practice, notifies the Supplier of its intention to do so and permits the Supplier to inspect such repaired or replaced Plant to ensure that quality standards have been maintained. The reasonable cost so incurred by the Owner shall be deducted from the Contract Price or to be paid by the Supplier to the Owner.

14.7 Removal of Defective Supplies

The Supplier may with the consent of the Owner, which consent shall not be unreasonably withheld, remove from the Site at his own cost any part of the Facility which is defective, if the nature of the defect is such that repairs cannot be expeditiously carried out on the Site.

14.8 Guarantee due to Design Defects

Wherever it is established that a Defect in a component is due to faulty design only, the Supplier shall replace all identical components performing the same function under the same working

conditions with new ones based on the correct design, even though, such components may not have given rise to any failure.

14.9 Further Tests

If any replacement, repair or modification is of such a character as may affect the subsequent performance of the Facility or any part thereof in accordance with the Performance Guarantees, the Owner may within 30 (thirty) days after such replacement, repair or modification give to the Supplier notice requiring that such further tests be conducted in respect of the relevant part as may be necessary to demonstrate the adequacy and efficacy of the replacement, repair or modification.

14.10 Operation and Maintenance

The obligations and liabilities of the Supplier under this Article do not extend to any repairs, adjustments, alterations, replacements, or maintenance that may be required as a result of normal wear and tear or as a result of the Owner's failure to operate or maintain the Facility after Taking-Over in accordance with Good Industry Practice consistent with the operating and maintenance manuals supplied by the Supplier.

14.11 Latent Defects

If any Defect of the kind (i) significantly affects the operation or output of the Facility, or (ii) arises as a result of any act or omission on the part of the Supplier which a highly skilled Supplier acting conscientiously would have foreseen or avoided shall appear in any part of the facility within a period of 5 years after the expiry date of Guarantee Period of such part of the Plant, the same shall be made good by the Supplier by repair or replacement, provided that the Defect was "latent", i.e. could not have been discovered by a reasonable examination prior to the expiry of the Guarantee Period. Such Defects shall not include those defects where (i) at the time of discovery of the defect, the repair or replacement is already contemplated for such parts under the recommendations contained in the operating and maintenance manuals, or (ii) if and to the extent that such defect has occurred due to the operation of the power plant in a manner other than that advised in the final operation and maintenance manual submitted by the Supplier to the Owner, or (iii) the defect arises from fair wear and tear.

Article-15

ASSIGNMENT AND SUB-CONTRACTING

15.1 **Assignment by Supplier**

The Supplier shall not without the prior written consent of the Owner assign to any Person any benefit of or obligation under the Contract in whole or in part, except that the Owner hereby consents to assignment of the Supplier's rights to receive any monies due under the Contract.

15.2 Assignment by Owner

The Supplier hereby consents to the creation by the Owner of a security assignment of the Contract in favour of any Financing Entity (or a trustee acting on behalf of one or more Financing Entities) and hereby undertakes to execute upon the request of the Owner such documents as may be reasonably and customarily required to give effect to any such assignment provided that the Supplier's consent, which shall not be unreasonably withheld or delayed, shall be required for the inclusion in such documents of any terms other than a simple confirmation of the consent given above or a simple acknowledgement of a notice of an assignment pursuant to this Article. Any stamp duty and all costs and expenses payable in respect of such documents shall be to the account of the Owner in respect of any such documents required to be signed by the Supplier.

15.3 Sub-Contracting

15.3.1 The Supplier shall not sub-contract the whole of the Supplies to third parties for the performance of the Contract.

15.3.2 The Supplier shall, within 1 (one) months of signing of the Contract, deliver to the Owner a Major Sub-Suppliers List for approval. The Supplier shall furnish all particulars of such Sub-Suppliers while seeking approval. The Parties may by mutual agreement add to or delete from such list from time to time and approve any successor or replacement of any Person listed on such list or any other vendor, consultant or sub-Supplier. For any Sub-Supplier not included in the Major Sub-Suppliers List involving a contract price in excess of Rs.10,000,000 (Say Indian Rupees ten million only) shall be with the written approval of the Owner (such approval not to be unreasonably withheld), while for those Sub-Suppliers involving a contract price less than the value above mentioned, particulars shall be furnished for the Owner's information.

15.3.3 The Supplier shall furnish to the Owner copies of technical ordering specifications and principal commercial terms (un-priced) of the major sub-contracts as the Owner may reasonably request from time to time.

15.3.4 The approval granted by the Owner shall not discharge the Supplier from any of his contractual obligations.

15.3.5 The Supplier shall be responsible for the acts, defaults and neglects of all Sub-Suppliers and all its and their agents, servants or workmen of any of them as if they were the acts, defaults or neglects of the Supplier under the terms of this Contract.

15.3.6 The Supplier shall ensure that all sub-contracts are made in writing.

15.3.7 Each instrument evidencing any sub-contract shall provide that, pursuant to terms in form and substance satisfactory to the Owner, the rights of the Supplier under such sub-contract are assignable to the Owner, its successors and assigns upon the Owner's written request following termination of this Contract.

Article-16

OWNER'S REPRESENTATIVE

16.1 **Duties of the Owner's Representative**

The Owner's Representative shall carry out such duties in issuing certificates, decisions, instructions and orders as are specified in the Contract to be carried out by the Supplier and, except to the extent otherwise stated in the Contract or notified to the Supplier by the Owner from time to time, the Owner's Representative shall have full authority to act on behalf of the Owner for all purposes in connection with the Contract and shall be the Supplier's primary point of contact with the Owner in relation to the execution of the Works.

16.2 **Owner's Responsibility**

The Owner shall cause the Owner's Representative to perform every act required under the Contract to be performed by the Owner's Representative and any obligation stated under the Contract to be an obligation of the Owner's Representative shall be deemed to be an obligation of the Owner. The Owner shall be responsible for any act, neglect or omission of the Owner's Representative as if it were an act, neglect or omission of the Owner.

16.3 **Decisions, Instruction and Orders of the Owner's Representative**

The Supplier shall proceed with the Works in accordance with decisions, instructions and orders given by the Owner's Representative subject to and in accordance with the Contract, including provisions for variations as set out in the Contract.

16.4 **Owner's Instructions in Writing**

No decision, instruction or order given by the Owner's Representative shall be effective until written confirmation thereof has been received by the Supplier. Provided that, in any exigency of work, the Owner's Representative may issue oral instructions with which the Supplier shall immediately comply, the Owner's Representative shall confirm any such oral instruction in writing within 48 (forty-eight) hours of its issuance.

Article-17

LEGAL COMPLIANCE & STATUTORY REQUIREMENTS

17.1 **Compliance with Applicable Law**

The Supplier shall in its performance of the Contract and the carrying out of the Works ascertain and comply with the Applicable Laws.

The Supplier shall indemnify the Owner, the Owner's Affiliates and their respective directors, officers, employees and agents against losses, claims and liabilities, including any governmental penalties and sanctions payable to a Competent Authority, together with any legal expenses incurred in connection therewith, to the extent arising out of any failure of the Supplier, any Sub-Supplier or their respective agents or employees to comply in the performance of the Contract.

17.2 **Divergences from Statutory Requirements**

If the Supplier or the Owner finds any divergence between the Applicable Law and the Contract or the Technical Specifications, it shall immediately give to the other Party written notice specifying the divergence. The Supplier shall promptly upon becoming aware of the same, inform the Owner in writing of its proposed amendment for removing the divergence, and with the Owner's consent the Supplier shall entirely at its own cost and expense complete the Works in accordance with the amendment.

17.3 Contractor to Obtain Clearance

The Contractor shall be responsible to obtain and maintain in effect all Applicable Clearances required in connection with execution of the Works and pay all fees required to be paid to any Competent Authorities.

Contractor should submit a clearance certificate from HR, stating that all statutory charges are paid and all clearance are obtained along with submission of every running bills payment.

Contractor should submit a no-claim certificate along with the submission of each running bills.

17.4 Import and Export Permits

The Owner shall be responsible for obtaining all import permits and other licences required for the importation of any Services or Equipment. The Contractor shall be responsible within the Contract Price for obtaining all import permits and other licences required for the importation of Contractor's Equipment or other goods or materials required for the purposes of the Works.

The Contractor shall be also responsible, within the Contract Price, for obtaining all permits and other licences required for re-exportation of any Equipment, Contractor's Equipment or other goods or materials that the Contractor desires to export, and for the exportation and re-importation of any component or piece of equipment that it must export for repairs or replacement

Article-18

INTELLECTUAL PROPERTY

18.1 **Indemnity Against Infringement**

The Supplier shall indemnify the Owner from and against any demands, claims, suits, and causes of action and any liability, legal costs, expenses, settlements arising from or incurred by reason of any infringement or alleged infringement of letters patent, registered design, unregistered design right, copyright, trade mark or trade name by the use or possession of any Plant. The Supplier hereby represents to the Owner that, as of the date of signing of the Contract, the Supplier has received no notification of any rightful patent infringement claim which would prejudice the Owner's right to use or maintain the Plant.

18.2 **Conduct of Proceedings**

In the event of any claim being made or action brought against the Owner which is covered by the indemnity set out as given above, the Owner shall promptly notify the Supplier thereof and the Supplier may at its own expense conduct all negotiations for the settlement of the same, and any litigation that may arise there -from. The conduct by the Supplier of such negotiations or litigation shall be conditional upon the Supplier having first given to the Owner such reasonable security as shall from time to time be required by the Owner to cover the amount ascertained or agreed or estimated, as the case may be, of any compensation, damages, expenses and costs for which the Owner may become liable. The Owner shall not, unless and until the Supplier shall have failed to take over the conduct of the negotiations or litigation, agree to any settlement of such negotiations or litigation or make any admission, which might be prejudicial thereto.

18.3 **Infringement Preventing Performance**

If, in consequence of any infringement of letters patent, registered design, copyright, trade mark or trade name, the Supplier is prevented from executing the Works, or the Owner is prevented from using the Facility, the Supplier shall at its own expense:

18.3.1 **procure for the Owner the right to continue using the relevant Plant or part; or,**

18.3.2 replace the relevant Plant or part with a non-infringing Plant or part; or,

18.3.3 modify the relevant Plant or part so it becomes non-infringing.

Article 19

SECRECY AND CONFIDENTIALITY

19.1 **Confidential Information**

The Owner and the Supplier shall treat the details of the Contract and any information made available in relation thereto as private and confidential and neither of them shall publish or disclose the same or any particulars thereof (save insofar as may be necessary for the purposes of the Contract), without the previous written consent of the other Party, provided that nothing in this Article shall prevent the publication or disclosure of any information that has come within the public domain otherwise than by breach of this Article.

The Supplier/ Contractor acknowledges that the drawings, specifications, documents, data, manuals, etc. whether as documents or in electronic media (hereinafter referred to as "the Information") furnished by the Owner shall be regarded as the proprietary information of the Owner and the same is of considerable financial value.

The Information furnished by the Owner in this enquiry is for the single and sole use for the execution of this Contract and shall be treated as strictly confidential by the Supplier / Contractor, his employees and agents, and shall always remain the property of the Owner. The Supplier / Contractor undertakes that the Information shall not be used or disclosed to third party(s) by the Supplier / Contractor for any purpose whatsoever other than the execution of this Contract. The Information in original, duplicate, photostat or in any electronic form shall not be retained by the Supplier / Contractor and shall be returned to the Owner immediately on completion/termination of the Contract. In case the bidder not being successful, these documents shall be retuned promptly on demand by the Owner.

Article 20

CONTRACTOR'S GENERAL OBLIGATIONS

20.1 DRAWINGS & DOCUMENTS

20.1.1 The Supplier/ Contractor shall submit drawings and documents in requisite number of sets as described in the specification, as per the submission Schedule given therein.

20.1.2 Approval of Supplier/ Contractors' drawings and documents shall not relieve the Supplier/ Contractors of any of its responsibilities under the Contract.

20.1.3 The Supplier/ Contractor shall depute his engineers for discussions and approval of drawings by Purchaser/Consultant without any extra costs to the Purchaser.

20.2 Supplier's Obligations

Except as otherwise expressly enclosed in this Contract, the Supplier shall, in accordance with the provisions of the Contract which are more particularly described in Technical Specification hereto,

furnish and deliver the Plant and equipment and perform all such related work as may be required for the execution of the Works.

Article-21

REJECTION OF DEFECTIVE PLANT

21.1 For the purpose of this Contract, Minimum Acceptance Criteria is defined in Technical Specification (Annexure 2) hereto.

21.2 If the completed plant or any portion thereof before it is finally accepted is found to be defective or fails to fulfil the Minimum Acceptance Criteria, the Owner shall give the Supplier notice setting forth particulars of such defects or failure and the Supplier shall forthwith make the defective plant good, or make it comply with the Acceptance Criteria. Should they fail to do so within a period of time as deemed reasonable by the Owner and stated in the said notice, the Owner at its discretion shall have the right to either (a) accept the Facility subject to reduction in Contract Price as may be mutually agreed between the Parties or, (b) in the event the Parties fail to reach such agreement under (a) within 30 (thirty) days, Owner shall be entitled to reject and replace at the cost of the Suppliers the whole or any portion of the plant as the case may be which is defective or fails to fulfil the Acceptance Criteria of the Contract. However, such rejection/replacement by the Owner shall not absolve the Supplier of any of their responsibilities under this Contract.

21.3 In the event of such rejection, the Owner shall be entitled to the use of the plant in a reasonable and proper manner for a time reasonably sufficient to enable him to obtain other replacement plant.

Article-22

DEFECTS BEFORE TAKING-OVER

22.1 **If, at any time prior to Taking-Over of the System, the Owner notifies the Supplier that any work done or Plant supplied or materials used by the Supplier or any Sub-Supplier is or are not in accordance with the Contract, or that such part does not fulfil the requirements of the Contract (all such matters being in this Article hereinafter called "Defects") then the Supplier shall, at its own expense, remedy the defects so specified. If the Supplier fails to do so in respect of any Defect and such failure poses an imminent danger to the health and/or safety of persons engaged in carrying out the Works, the Owner may take such steps as may in all the circumstances be reasonable to remedy such Defects including appointment of third parties for rectification of such Defects and the Supplier shall pay to the Owner the cost of doing so. It is further clarified that the Owner shall have the right to deduct such**

sum form any sum due and payable to the Supplier including encashment of any bank guarantee/security.

Article 23

PERFORMANCE GUARANTEE AND ACCEPTANCE
ACCEPTANCE OF THE FACILITY

23.2 **Mechanical Completion**

23.1.1 Mechanical Completion, for the Facility, shall mean the completion of the following activities, in relation to that Facility, to the satisfaction of the Owner:

23.1.6 the connecting / hooking up of such Equipment to other relevant Equipment with welding, wiring, controls and safety systems;

23.1.7 ensuring that such components of Equipment and all related operating systems are individually cleaned, leak checked, lubricated and point-to-point checked to verify that such components of Equipment and related operation systems have been correctly installed so as to respond to simulated test signals / instructions (i.e. loop checks) equivalent to actual signals / instructions received during operation;

23.1.8 ensuring that such Equipment and related operating systems are ready for start-up, initial operation, commissioning, adjustment and testing and may be so operated safely and without damage thereto; and

23.1.9 pre-commissioning activities (Cold Tests) as applicable to each Equipment, system or component such as stroking of control valves, phase rotation of electrical equipment and completion of checks for continuity of other electrical circuits (including loop checks) and the responses of controls and control equipment are completed.

Cold test shall be taken up by the Contractor to prove that the Facility has been erected as per Contract & after erection is fit for commissioning. Details of Cold tests are given in the Technical Specification

23.2 Commissioning and Taking Over

23.2.1 On completion of cold Tests and Once the Facility has successfully passed all pre-commissioning tests / inspections and is capable of safe operation as per the operation manual and Good Industry Practices, the Contractor shall declare that the Facility is ready for start up and Commissioning. The Contractor shall then proceed for Commissioning of the Facility in accordance with the procedure as specified in the Technical Specifications.

23.2.3 The Contractor shall also ensure that he has, in relation to any Facility :

(b) provided to the Owner such preliminary operating and maintenance manuals and drawings, updated P&I drawings, electrical single line drawings and control diagrams and other information as may be specified in the Technical Specifications to be provided prior to Taking Over of that Facility or otherwise as may reasonably be required by the Owner for the safe and reliable operation of the Facility; and

(c) provided to the Owner such certification by the Contractor or other written evidence, as the Owner may reasonably require, that the Contractor has complied with the Applicable Laws relating to the operation of the Facility and has obtained all Applicable Clearances in connection with the construction of the Facility which the Contractor has to comply with or obtain,

23.2.3 On successful Commissioning of the Facility and provided the Contractor has completed all his contractual obligations due till Commissioning, the Owner shall issue Commissioning Certificate.

23.2.4 Upon successful Commissioning of the Facility, all surplus materials and equipment, whether or not required in connection with the performance of the Contractor's obligations, shall be the property of the Owner.

23.2.5 Take over

On successful completion of Commissioning, the System shall be provisionally taken over by the Owner and Take over Certificate will be issued by the Owner.

23.3 Performance Acceptance Certificate

Once a Facility is Taken Over by the Owner and has successfully attained stabilized and consistent operations, the Contractor shall, with consent of the Owner, proceed for demonstration of Performance Guarantees by conducting Performance Guarantee Tests in accordance with the procedures as specified in the Technical Specifications. The contractor shall give the Owner at least 30 (thirty) days prior written notice of the date on which the contractor intends to commence the Performance Guarantee Tests.

Subject to the relevant provisions of the Contract, the Contractor shall, as soon as Facility/ Unit has passed all the Performance Guarantee Tests and has completed all other tests required and as stipulated in Annexure 1 hereto, so notify the Owner in writing and if such notice was given properly in accordance with the requirements of the Contract, the Owner shall, within

45 (forty five) days of receipt of such notice, either issue a Performance Acceptance Certificate for that Unit, or

if reasonable cause exists for doing so, notify the contractor that Performance Acceptance has not been achieved, stating the reasons thereof.

23.4 Final Completion

Final completion certificate shall be issued by the Owner after the Contractor has demonstrated successfully Performance Guarantee Tests and fulfilled all his obligations as per the Contract

Article-24

VARIATIONS

24.9 **The Owner shall have the right, during the performance of the Contract, to change the scope and/or technical character of the Project and/or of the services stipulated in the Contract. Owner may by a notice in writing to the contractor request for changes in the scope of work. Within 3(three) days of receipt of such notice, the contractor shall inform the owner, in writing of the effect of such change would have on the price, schedule, and other provisions of the contract and within 3 (three) days of receipt of such information, Owner shall advise the contractor in writing of its acceptance or otherwise. On the same being accepted by the owner such changes shall be deemed to form part of this agreement. Contractor should not execute any other work unless mentioned in this contract without any prior written approval from the owner**

24.10 If any changes are required for completeness of the work, the Contractor shall not be entitled to extra price or time.

24.11 In the event, the Owner requests a change as per Article 24.1 the Contract price and time shall be adjusted upwards or downwards, as the case may be and as shall be mutually agreed to. The Contractor shall not be entitled to any extension of time unless such changes adversely affect the time schedule.

24.12 The Contractor shall not change any work to be made pursuant to this Contract except as may become necessary to enable him to meet his technical obligations under this Contract, provided however that such changes shall be subject to prior written approval of the Owner.

24.13 If any changes are required for completeness of the works as per Article 24.2, or the Contractor himself changes as per Article 24.4, the Contractor shall not be entitled to extra price or time.

24.14 The Contractor shall proceed with the changes as requested as per Article 24.1 pending adjustment of Contract price and time schedule where so applicable in terms of Article -24.3.

24.15 In the event that a request for changes by the Owner should affect the guarantees of the plant/process, a readjustment of such guarantees shall be agreed upon jointly, before the Contractor proceeds with the change.

Changes occasioned due to non-observance by the Contractor of the provisions of this Contract or arising out of detection by the Owner of errors in the documents or in works not in compliance with the design, specifications & drawings or with the best engineering practice, shall neither give rise to price adjustment nor extension of time. The Contractor shall take immediate steps to restore the contractual position

Article-25

SUPPLIER'S CO-OPERATION WITH FINANCING

The Supplier shall, as and when requested to do so by the Owner at any time after the signing of this Contract, prepare and provide such information in connection with the Contract and/or the Works (including resolutions, certificates, opinions of counsel or other documents related to the Supplier's corporate authorisation to enter into the Contract and to undertake the obligations set forth herein) as may be reasonably required for any potential lender to the Owner under a proposed loan agreement. The Supplier shall cooperate with the Owner in good faith in order to satisfy the requirements of the Owner's financing arrangements, including where appropriate and reasonable the making of amendments to the terms of the Contract as may be required by the Financing Entities and mutually agreed by the Parties.

Article-26

INTERPRETATION OF CONTRACT DOCUMENTS

26.1 Annexures of this Contract are forming an integral part of this Contract are to be taken as mutually explanatory to one another.

26.2 There are no understandings or agreements between the Owner and the Supplier which are not fully expressed herein including the Annexures referred to in the Contract. No modifications of this Contract shall be valid unless the same is agreed in writing by the Parties hereto and issued as an amendment to the Contract.

26.3 All the words and expressions used in this Contract shall unless repugnant to the context have the same meaning as are respectively assigned to them in the Contract. All headings to the Articles, Annexure or to any other part of the Contract are solely for the purpose of giving a concise indication and not a summary of contents thereof and they shall not be deemed to be a part thereof or be used in the interpretation or construction thereof.

26.4 Contract shall include following documents having priority as per the order given below;

iii) Contract Agreement,

iv) Technical Specification

Article-27

FORCE MAJEURE

27.1 **As used in this Agreement, Force Majeure means any act, event or circumstance, or combination of acts, events or circumstances, which may materially and adversely affect the affected Party's performance of its obligations pursuant to the terms of this Contract, but only if and to the extent that such acts, events or circumstances are not within the affected Party's reasonable control, were not reasonably foreseeable and could not have been prevented or overcome by the affected Party through the exercise of reasonable skill or care. Any act, event, circumstance or combination thereof meeting the description of Force Majeure that has the same effect upon the performance of Major Sub-Suppliers which directly, materially and adversely affects the performance by the Owner or Supplier of its obligations in whole or in part under this Contract shall constitute Force Majeure with respect to the Owner or Supplier respectively.**

27.2 The Force Majeure Events shall comprise the acts, events and circumstances, such as (i) act of war, invasion, armed conflict or act of foreign enemy, blockade, embargo, revolution, riot insurrection, civil commotion, act of terrorism or sabotage, in each case occurring inside or directly involving India; (ii) strikes, lockouts or other generalised labour action occurring within India (excluding such events which are site specific and attributable to the Supplier); (iii) Radioactive contamination or ionising radiation or chemical contamination originating from a source in India or resulting from another Force Majeure Event; (iv) flood, cyclone, lightning, earthquake, drought, storm or any other extreme effect of the natural elements;

(v) epidemic or plague; (vi) fire or explosion, except as may be attributable to the Supplier; (vii) air crash or shipwreck; (viii) an act of God (ix) issue of notification(s), order(s), direction(s) by the Central or State Government or any authority /department of the Central or State Government or by any Court of Law rendering the execution or continuance of execution of the contract or the obligation(s) of the parties under this contract.

27.3 As time being the most important feature of the Contract if either Party is prevented from the performance of its obligations in whole or in part for reasons of Force Majeure Event, then provided notice of happening of any such eventuality is given by the affected Party to the other Party within 7 (seven) days from the date of occurrence and cessation of the Force Majeure, the period of Force Majeure shall be excluded from the time specified for fulfilment of obligation of the Party prevented by Force Majeure. If the effect of any events specified in Article 27.2 other than Sub-Article 27.2 (ii) lasts for a continuous period of less than 3 (three) days, such events shall not be construed to be Force Majeure Events.

27.4 It is however clarified that in the event of Force Majeure preventing the Supplier from performing its obligations under the Contract, for a continuous period of less than 6 (six) months from the beginning of Force Majeure Event or an aggregate period of not more than 9 (nine) months, the Supplier shall be entitled to extension of time for the period during which such Force Majeure Event had occurred for fulfilment of its obligations under the Contract and the Supplier shall not be entitled to terminate the Contract or abandon the project during such above mentioned period.

27.5 If Force Majeure Event continues beyond the period of 6 (six) months from the beginning of the Force Majeure Event or prevent the Supplier from performing its obligations under the Contract for an aggregate period of more than 9 (nine) months, the Parties shall mutually decide further course of action. If mutual settlement cannot be arrived at within 30 (thirty) days, either Party shall have the right to terminate the Contract. In the event of such termination, the Owner shall be liable to make payment for all Works done by the Supplier till the time such Force Majeure had commenced and the Supplier shall be liable to hand over all works and Supplies completed pursuant to the Contract till the date of termination due to Force Majeure.

27.6 Neither Party can claim any compensation from the other Party on account of Force Majeure Event

27.7 Performance to Continue

Upon the occurrence of any circumstances of Force Majeure the Supplier shall use all reasonable endeavours to continue to perform its obligations under the Contract and to minimise the adverse effects of such circumstances.

Article-28

RISK PURCHASE

28.1 In case, shipment of material is not made within the stipulated schedule, the Buyer reserves right to cancel the Contract for the balance quantity which has not been shipped & purchase balance quantity from any other sources at the risk and cost of the supplier and recover the cost/ expenditure that would be incurred extra by the Buyer from the seller

28.2 In case, the shipped material already supplied cannot be put to its intended use in absence of undelivered material, Buyer shall have the liberty to buy the entire quantity from any other source at the risk & cost of the supplier. The additional cost incurred in purchasing the said material from new source, will be recovered from the supplier besides recovering cost of the material, which has been delivered, by the supplier and the consequential losses incurred by the buyer due to non-supply of the balance quantity in time, will also be recovered. However, such risk-purchase Article shall not apply to any part of extension, which would be granted by the 'Buyer' under Force Majeure conditions.

Article-29

ARBITRATION

29.1 The Parties hereto shall endeavour to settle all disputes and differences relating to and/or arising out of the Contract amicably.

29.2 In the event that the Parties failing to resolve any dispute amicably the same shall be referred to Arbitration in accordance with the Arbitration and Conciliation Act 1996 with all modifications and re-enactments thereto, as is prevalent in India. Each Party shall be entitled to nominate an Arbitrator and the two Arbitrators so nominated shall jointly nominate a third presiding Arbitrator. The Arbitrators shall give a reasoned award. The place of arbitration shall be Korba, India. The language used in arbitral proceedings shall be English.

29.3 This contract shall be construed in accordance with and governed by the laws of India. The parties hereby expressly submit themselves to exclusive jurisdiction of the courts in Korba, India.

29.4 The Parties hereto agree that the Contractor shall be obliged to carry out its obligations under the Contract even in the event a dispute is referred to Arbitration. It is further clarified that the Owner shall be entitled to retain any sum or portion of Contract price which has become due and payable, for any unfinished Works or any subject matter under arbitration.

Article-30

TERMINATION AND SUSPENSION

30.1 TERMINATION DUE TO SUPPLIER'S DEFAULT

30.1.1 If the Supplier:

i) shall have voluntarily commenced winding-up, bankruptcy, insolvency, reorganization, stay, moratorium or similar debtor-relief proceedings, or shall have become insolvent or is unable to pay its debts as they become due, or admits in writing its inability to pay its debts or makes an assignment for the benefit of its creditors;

j) has insolvency, receivership, reorganization or bankruptcy proceedings brought against him and the petition commencing such proceedings is not controverted and the proceedings dismissed or effectively stayed within 30 (thirty) days of such commencement;

k) has abandoned the Contract;

l) despite previous warnings in writing from the Owner, has wrongfully refused or has materially failed or neglected at any time to execute the Contract or is failing to proceed with the Contract with due diligence or is neglecting to carry out its other obligations under the Contract in each case so as to affect materially and adversely the execution of the Contract;

m) fails to remove and replace portion of Supplies after receiving, from the Owner, notice to the effect that the said portion of Supplies have been rejected;

n) offers or gives or agrees to give to any person in the Owner's service or to any other person on his behalf, any gift or consideration of any kind as an inducement or reward for doing or for bearing to do so or for having done or forborne to do any act in relation to obtaining or execution of this or any other Contract for the Owner;

o) shall enter into a contract with the Owner's employee in connection with which commission has been paid or agreed to be paid by him or to his knowledge, unless the particulars of any such commission and the terms of payment thereof have previously been disclosed, in writing, to the Owner;

p) has failed to deliver Supplies of any or all of the Units within the Completion Schedule; then the Owner may, by notice to the Supplier and without prejudice to any other remedy under the Contract, terminate the Contract but without thereby releasing the Supplier from any of his obligations or liabilities which have accrued as at the date of termination of the Contract and without affecting the rights and powers conferred by the Contract on the Owner. Upon such termination the Owner may itself complete the Supplies or may employ any other Supplier to complete the job at the risk and cost of the Supplier.

q) If the supplier abandons this contract or commit any delay beyond 4 weeks for performance of any obligations, the Owner may terminate this contract forthwith and take possession of all Plant and Equipment and the Site

30.1.2 Opportunity to remedy

The Owner's right to terminate the Contract following the occurrence of the events or circumstances, as described above, shall be subject to the Owner having first given the Supplier 30 (thirty) days prior notice of its intention to terminate the Contract, during which period the Supplier shall have failed to remedy or to take all reasonable steps to commence the remedy of the default.

30.1.3 Payment after termination due to Contractor's default

30.1.3.1 The Owner shall not be liable to make any further payments to the Contractor until the costs of execution and all other expenses incurred by the Owner in completing the work, and thereby the Facility, have been ascertained (herein called the "**Cost of Completion**"). If the Cost of Completion when added to the total amounts already paid to the Contractor as at the date of termination exceeds the total amount which would have been payable to the Contractor for the execution of the complete work, the Contractor shall upon demand, pay to the Owner the amount of such excess. Any such excess shall be deemed a debt due by the Contractor to the Owner and shall be recoverable accordingly.

30.1.3.2 If there is no such excess the Contractor shall be paid the value of the work executed after adjusting the total of all payments received by the Contractor as on the date of termination.

30.2 TERMINATION WITHOUT SUPPLIER'S DEFAULT

The Owner reserves the right to terminate the Contract at any time, without assigning any reason, by giving a notice of 1 (one) month. The Supplier shall stop the performance of the Contract from the date of termination and shall hand over all the drawings, documents and goods manufactured till date, including related rights, sanctions and approvals, to the Owner. The Owner shall pay to the Supplier the cost incurred by the Supplier till the date of termination, duly supported with documents, as compensation after adjusting payments already made till the termination. No consequential damages shall be payable by the Owner to the Supplier in the event of such termination.

30.3 SUSPENSION

30.3.1 The Owner may suspend the work in whole or in part at any time by giving Supplier notice in writing to such effect stating the nature, the date and the anticipated duration of such suspension. On receiving the notice of suspension, the Supplier shall stop all such work, which the Owner has directed to be suspended with immediate effect. The Supplier shall continue to perform other work in terms of the Contract, which the Owner has not suspended. The Supplier shall resume the suspended work as expeditiously as possible after receipt of such withdrawal of suspension notice. No extra claim will be entertained on this regard.

30.4 RIGHTS OF THE OWNER AFTER TERMINATION

30.4.1 The Owner shall, on such termination of the Contract, have powers to :

(a) take possession of the Site and any material, Equipment, plant, implements, stores etc. thereon; and / or

(b) carry out the incomplete Work by any means at the risk and cost of the Contractor.

30.4.2 On termination of the Contract, in full or in part, the Engineer in Charge shall determine what amount, if any, is recoverable from the Contractor for completion of the Work or part of the Work, or in case the Work or part of the Work is not to be completed, the loss or damage suffered by the Owner. In determining the amount, credit shall be given to the Contractor for the value of the Work executed by him up to the time of termination and the value of Contractor's material lying at Site. If the Contractor fails to be present so as to record the measurements in his presence, the recording of measurements as recorded by the Engineer in Charge shall be binding on the Contractor.

30.4.3 The Owner shall have the right to use Contractor's plant, machinery and material on the balance Work but shall not in any way be responsible for any damage or loss of the same and the Contractor shall not be entitled to any compensation thereof.

30.4.4 Any excess expenditure incurred or to be incurred by the Owner in completing the Work or part of the Work or the loss or damages suffered by the Owner as aforesaid after allowing necessary credits, shall be recovered from any money due to the Contractor on any account and if such money is not sufficient, the Contractor shall be called upon in writing to pay the same within 30 days.

30.4.5 If the Contractor fails to pay the required sum within the aforesaid period of 30 days, the Owner shall have the right to sell any or all of the Contractor's unused material, Equipment, plant, implements, temporary buildings, etc. and apply the proceeds of sale thereof towards the

satisfaction of any sum due from the Contractor under the Contract and if thereafter there by any balance still outstanding from the Contractor, the Contractor shall, upon demand, pay the Owner the money due and it shall be deemed a debt due by the Contractor to the Owner and shall be recovered accordingly.

30.4.6 Any sums in excess of the amounts due to the Owner and unsold materials, constructional plant, etc. shall be returned to the Contractor. It is always understood that if the actual cost of completion by the Owner of the balance Work or part of the Work is less than the amount which the Contractor would have become eligible had he completed the Work or part of the Work under the terms of Contract, the Contractor shall not be entitled to claim such benefit to his advantage.

30.4.7 The Owner shall not be liable to make any further payments to the Contractor until the costs of execution and all other expenses incurred by the Owner in completing the Works have been ascertained (herein called the "Cost of Completion"). If the Cost of Completion when added to the total amounts already paid to the Contractor as at the date of termination exceeds the total amount, which would have been payable to the Contractor for the execution of the Works, the Contractor shall upon demand, pay to the Owner the amount of such excess. Any such excess shall be deemed a debt due by the Contractor to the Owner and shall be recoverable accordingly. If there is no such excess the Contractor shall be entitled to be paid the difference (if any) between the value of the Works ascertained and the total of all payments received by the Contractor as on the date of termination

Article-31

LANGUAGE

All documents, instructions, catalogues, brochures, pamphlets, design data, operation and maintenance manuals, communications shall be in English language.

Article- 32

NOTICES

32.1 Notices to Owner

Any contractual notice, report, certificate or other communication to be given to the Owner under the Contract shall be served by sending the same by facsimile transmission (with a confirmation copy by couriers or by hand delivery only in case of major issues relating to the Contract, Viz. Notices of Tests, arbitration, making a claim, termination etc.) to, or by leaving the same at, the respective addresses set out below or such other addresses as may be specified for that purpose in writing to the Supplier.

Head -Commercial
Bharat Aluminium Company Limited
Korba Aluminium Project
PO – BALCONAGAR
Korba- 495684, Chhattisgarh, India.

with a copy in all cases to the Owner's Representative:

Head- Projects
Bharat Aluminium Company Limited
Korba Aluminium Project
PO – BALCONAGAR
Korba- 495684, Chhattisgarh, India

32.2 Notices to Supplier

All certificates, notices or decisions, instructions and orders to be given by the Owner's Representative or the Owner under the Contract shall be served by sending the same by facsimile transmission (with a confirmation copy by couriers or by hand delivery only in case of major issues relating to the Contract, Viz. Notice of Tests, arbitration, claims, termination etc.) to, or by leaving the same at, the address set out below or such other address as the Supplier shall nominate in writing for that purpose:

Supplier:

Mr XXXXXXXXXX

T e l : + X X X X X X X X X X X X X X X X X

E m a i l : x x x x x x x x x x @ X X X X X . c o m

32.3 Serving of Notices

Any notice sent by facsimile transmission shall be deemed to have been served at the time of receipt, provided that a positive transmission report from the sender's machine will be conclusive evidence of receipt in the absence of evidence to the contrary.

32.4 Other Communications

All other communications pertaining to the Supplies not referred to in Articles 32.1 and 32.2 shall be made between the Supplier and the Owner's Representative or other representatives nominated by the Supplier or the Owner's Representative from time to time in respect of such

categories of communication and subject to such limits of authority as may be agreed as part of the project co-ordination procedures or as may be notified from time to time.

32.5 Project Co-ordination Procedures

The Supplier shall within 15 (fifteen) days of date of signature of the Contract submit to the Owner for approval a draft project co-ordination procedures document setting out procedures for communications between the Supplier, the Owner and the Owner's Representative in connection with this Contract, including details relating to correspondence, circulation of notices and documentation, meetings and other interfaces.

The Parties shall comply with the requirements of such project co-ordination procedures once approved by the Owner, as such procedures may be amended from time to time by mutual agreement.

ARTICLE 33

INSPECTION AND TESTING

33.1 The Purchaser or Purchaser's Representatives shall at any time have access to the Supplier's/Sub-Supplier's manufacturing premises for the purpose of inspection, reviewing and checking the items under manufacture as per approved Quality Assurance Plan (QAP).

33.2 Should such inspection entail any cost, these shall be borne by the Supplier with the exception of the travel, accommodation and personal costs for the inspectors appointed by the Purchaser or the respective authorised representatives. Should such inspection be repeated due to reasons attributable to the Supplier, then the travel, accommodation and personal costs shall be borne by the Supplier.

33.3 Where special tests in addition to agreed tests are required by the Purchaser, the Supplier shall bear the cost of the only if such special test proves that the equipment is not in accordance with the Technical Specifications. However, if such special tests are necessary based on the result of the agreed test, then cost of all such special tests shall be to the account of the Supplier.

33.4 The Supplier shall render the inspecting personnel all necessary assistance and shall make available free of charge all necessary instruments and appliances and test beds and tools and other materials necessary for the performance of the inspection so as to enable the inspectors to work properly in accordance with the QAP.

33.5 The readiness for carrying out the inspection and testing must be notified to Purchaser in writing 2 (two) weeks before the anticipated date of inspection. Inspection call should contain internal inspection and test reports, if required as per QAP. Should the Purchaser waive the inspection and testing, the Supplier will be notified accordingly and shall execute the inspection and testing by himself deemed as in Purchaser's Representative's presence and the Supplier shall forthwith forward to the Purchaser the inspection and test reports in triplicate.

33.6 The carrying out of the inspection and testing by the Purchaser, or any waiver thereof, shall in no manner relieve the Supplier from discharging any of his contractual obligations.

33.7 The Supplier undertakes that any deficiencies or defects resulting from his fault and discovered during the inspection and testing shall forthwith be remedied/ repaired/ replaced by the Supplier prior to the agreed delivery date at his own cost.

33.8 The above mentioned inspection and testing shall be in accordance with the Quality Assurance Plan to be approved by the Purchaser

Article 34

BOUGHT OUT EQUIPMENT

34.1 Prior approval shall be taken from the Purchaser for bought-out equipment from Sub-Supplier/ Contractors, which are not mentioned in the approved list (Technical Specifications) of the Purchaser.

34.2 This however shall not have any bearing on delivery and shall not relieve the Supplier/ Contractor from his obligations of the Contract.

Article-35

MAXIMUM LIABILITY

35.1 The maximum liability of the Principal Contractor in aggregate under this Guarantee shall not exceed 100% (one hundred percent) of the total Contract Price, provided however, such limit shall not apply to Liquidated Damages and liability against indemnity and infringement of intellectual property rights. It is clarified that in the event of any claim for Liquidated Damages and liability against indemnity and infringement of intellectual property rights the same shall be over and above the maximum liability of 100% (one hundred percent) of the Total Contract Price

Article – 36

CONSEQUENTIAL DAMAGE

36.1 Except as expressly provided in the Contract, in no event shall any Party hereto be liable to the other Party, by way of indemnity or by reason of any breach of the Contract or otherwise, for any loss of profit, loss of use, loss of contracts, idle labour or for any indirect, incidental or consequential damage whatsoever that may be suffered by the other Party.

36.2 It is hereby agreed and clarified that this exclusion of liability shall not apply in respect of :

c) statutory penalties and sanctions and legal expenses for which the Owner is indemnified under Article 17 hereof; and

d) the indemnity to Owner against infringement given under Article 18 hereof

Article-37

GOVERNING LAW & JURISDICTION

This Contract shall be construed in accordance with and governed by the laws of India and in the event of any litigation the jurisdiction of this Contract shall be that of the appropriate courts in Korba, Chattisgarh, India.

APPROVED and PREFERRED VENDOR LIST

Sl No.	Item Description	Name of the Manufacturers
1	**MECHANICAL EQUIPMENTS**	
A	**VENTILATION, AIR CONDITIONING & AIR POLLUTION CONTROL EQUIPMENT**	
1	CENTRIFUGAL FANS FOR VENTILLATION	C. DOCTOR, EFE, FLOW LINK ,REITZ INDIA LTD
2	CENTRIFUGAL FANS FOR DUSTING	TLT/ THERMA/ C. DOCTOR/ ANDREW YULE/ ALSTOM/ BATLIBOI/ DUSTVEN/ FLAKTWOODS/REITZ INDIA LTD
3	TUBE AXIAL FANS	C. DOCTOR/ EFE/ FLOW LINK/REITZ INDIA LTD
4	PROPELLER FANS	EFE/ C.DOCTOR/ ALSTOM/ FLOW LINK/REITZ INDIA LTD
5	PANEL FILTER FOR AIR WASHER	EFE/ FLOW LINK/ FMI/ ALSTOM/ C.DOCTOR
6	SPLIT AIR CONDITIONERS	FEDDERS LLOYD/ VOLTAS/ BLUE STAR/ CARRIER AIRCON/ AMTREX
7	PACKAGED AIR CONDITIONERS	VOLTAS/ FRICK/ BLUE STAR/ CARRIER/ BATLIBOI
8	CONDENSING UNITS	VOLTAS/ BLUE STAR/ BATLIBOI/ FRICK
9	PACKAGED CHILLERS	VOLTAS/ BLUE STAR/ BATLIBOI/ ACCEL/ FRICK
10	AIR HANDLING UNITS	VOLTAS/ BLUE STAR/ BATLIBOI/ FRICK
11	COOLING TOWERS	PAHARPUR/ MIHIR/ ADVANCE/ VOLTAS/ HIMGIRI
12	CYCLONES	THERMAX/ BATLIBOI/ EFE/ ALSTOM/ MULTICLONES
13	BAG FILTERS	THERMAX/ ALSTOM/ BATLIBOI ANDREW YULE/ DUSTVEN/ C. DOCTOR/ ACC/ F HARLEY/ALSTOM
14	INSULATION	FGP/ METTUR-BEARDSELL/ LIOYDS/ TWIGA/ BAKELITE HYLAM
15	VALVES FOR AIR CONDITIONING	DANFOSS/ HONEYWELL/ BLUE STAR
16	VIBRATION ISOLATORS	DUNLOP/ EMERALD/ GERB/POLYBOND
17	CENTRIFUGAL PUMPS	KIRLOSKAR/ KSB/ JOYTI/ CROMPTON GREAVES/ VOLTAS/ MATHER & PLATT
18	HORIZONTAL SPLIT CASING PUMPS	VOLTAS/ BEACON/ MATHER & PLATT/ KSB/ KIRLOSKAR

19	VENTILATION SYSTEM	C.DOCTOR/ S K SYSTEM/ WRC/ DUSTVEN/ EFE/ APC SYSTEM
20	DUST EXTRACTION SYSTEM	DUSTVEN/ F-HARLEY/ FLAKT INDIA / BATLIBOI/ C DOCTOR/ THERMAX/ KAVERI/ APC SYSTEM/ALSTOM
B	**HANDLING & HOISTING EQUIPMENT & COMPONENTS**	
1	EOT CRANE (UP TO 10T CAPACITY)	WMI/ARMSEL/ KALINGA ENGINEERS/ MM ENGINEERS/ HABEN KRAFT/ FAFECO/ ALTROTH ENGINEERS/DEMAG
2	EOT CRANE (UP TO 50T CAPACITY)	HEC/ JESSOP/ MUKAND/ BRAITHWAITE/ WMI/ ACME/ FAFECO/ HABEN KRAFT/ SOUTHERN STRUCTURALS/DEMAG
3	HOT CRANE/ UNDER SLUNG CRANES	ARMSEL/ KALINGA ENGINEERS/ VIDYUT ENGG./ WHBRADY/ VOLTAS LTD./ TURBO FURGUSON/ TRACTEL TIRFOR/ HI-TECH/WMI
4	MANUAL HOISTS	WH BRADY/ KANUBHAI/ HERCULES/ TRACTEL TIRFOR/ REVA ENGG/ HI-TECH/ CENTURY/INDEF
5	ELECTRIC HOISTS	BOMBAY CRANES/ ARMSEL/ KALINGA ENGGS/ VIDYUT ENGG./ WHBRADY/ VOLTAS LTD./ TURBO FURGUSON/ TRACTEL TIRFOR/ HI-TECH/INDEF
6	CHAIN PULLEY BLOCKS & HAND OPERATED TRAVELING CRANES	BATLIBOI/ W.H. BRADY/ TRACTEL TIRFOR/ REVA INDUSTRIES/ KALINGA ENGINEERS/ SIMPLICITY PROJECTS/ CRUSHMORE MAXBAN /INDEF
7	LIFTING EQUIPMENT & ACCESSORIES	ARMSEL, MR ENGG, EDDY CRANES, UNITEK ENGRS, HI-TECH, CENTURY
8	HOOKS	HERMAN MOHTA/ FREE TRADING CORPORATION/ NEW STANDARD ENGG./ EASTERN ENGG SYNDICATE/ STEEL FORGINGS & ENGG. COMPANY
9	WIRE ROPE	BOMBAY WIRE ROPE/ USHA MARTIN/ ORION ROPES/ SHREE STEEL WIRE ROPES
C	**MECHANICAL EQUIPMENT/ COMPONENTS**	
1	AIR COMPRESSOR	ATLAS COPCO/ KIRLOSKAR/ IR
2	AIR RECEIVER	IR/ ATLAS COPCO/ KIRLOSKAR/ ELGI/ CPT/ MBPL
3	AIR DRIER	TRIDENT/ INDCON/ SUMMIT
4	FLUIDIZING BLOWER	KAY INTERNATIONAL/ SWAM/ USHA
5	TELESCOPIC SPOUT	DCL/ MBE/ MBPL/MIDWEST/LISTENOW
6	RUBBER LINER	FMG/ GREAVES COTTON/ NEW ALLENBURRY/ ELECON/ BRIVENI/ BONFIGLIOLI
7	FLUID (HYDRAULIC) COUPLING	VOITH (GERMANY)/ PEMBRIL/ FLUIDOMAT/ ELECON
8	FLEXIBLE COUPLING	FENNER/ GREAVES COTTON/ NAW/ ELECON/GBM
9	FLEXIBLE GEARED COUPLING	HI-CLIFF/ CONCORD/ WELLMAN/ GBM/ FMG/ DAVID BROWN/ ROMA/ GREAVES LTD./ NAW/ ALLFLEX/ FENNER
10	BEARING FOR CRANES	SKF/ FAG/ NBC/ TIMKEN/ BALDOR DODGE/ NTN/ NORMA
11	BEARING FOR OTHER EQUIPMENTS	SKF/ FAG/ RBC BEARING/ TIMKEN/ NTN/ NEEDLE ROLLER BEARING
12	FASTENERS	GKW/ SUNDARAM/ PRECISION FASTENERS

13	BRAKE DRUMS	HICLIFF/ AEI/ RUPEX/ KAPSEK/BCH
14	BRAKE	BCH/ ELECTROMAG/ STORMKRAFT
15	HOSES	AEROLEX/ HYDROKRIMP/ SONI/ TEKSON/ SRIDHAR/FLSMITH
16	BELT SWITCHES	JAYSHREE/ PROTO CONTROL/ IND. SYNDICATE/ ELEPOW/BCH
17	BELT CLEANERS (SCRAPPERS)	HOSCH/ KAVERI/ TECHNOFAB/ TEGA/ SYNERGY
18	OIL SEALS	VACO OIL SEALS/ RUBBER EQUIPMENT & ENGG./ SEALJET INDIA (PUNE)/ SEALPACK/SKF/PARKER
19	LUBRICATION FITTINGS	SURMAC/ LUBCON/ AFMC/ PRAKASH/ TECALMIT/SKF/PARKER
20	LUBRICATION SYSTEMS	AFMC/ PRAKASH/ TECALMIT/ GRINDWELL NORTON/ LINCOLN HELIOS/ NIYATI IND.
21	HYDRAULIC SYSTEMS & POWER PACK	PARKER/ HUGGLANDS DENISON/ EATON (VICKERS)/ SPERRY/ YUKEN/ MANESMANN/ REXROTH/ CARTER
22	HYDRAULIC POWER CYLINDERS	PARKER/VICKERS/ WIPRO/ USHA TELEHOIST/ VELJAN/ REXROTH/ CARTER/ MONTECH/ OSCAR
23	HIGH PRESSURE VANE/ PISTON PUMP	VICKERS SPERRY/ YUKEN/ REXROTH/ HUGGLANDG DENISON/PARKER
24	CONVEYOR BELT	DUNLOP/ FORECH/ HINDUSTAN RUBBERS/ NORTHLAND RUBBER/ MERCURY RUBBER/ ORIENTAL RUBBER/ HILTON/ NIRLON/ ANDREW YULE/ MRF
25	CONVEYOR BELT PULLEYS	ELECON/ TRF/ MCNALLY BHARAT/ HINDUSTAN UDYOG LTD./ KALI/ JOYA/ CLEANCAT
26	CONVEYOR BELT IDLERS	ELECON/ TRF/ MCNALLY BHARAT/ KALI/ HINDUSTAN UDYOG LTD/ ROLLWELL/ JOYA/ CLEANCAT
27	SKIRT BOARD SEALING	TEGA/ TECHNOFAB
28	VIBRATING SCREEN	DUNLOP/ FORECH/ HINDUSTAN RUBBERS/ NORTHLAND RUBBER/ MERCURY RUBBER/ ORIENTAL RUBBER/ HILTON/ NIRLON/ ANDREW YULE/ MRF/ROTEX/ELECTROMAG
29	VIBRATING FEEDER/ VIBRATING GRIZZLY FEEDER	IC/ ELECTROMAG/ TRF/ ORIEN ENGINEERS/ ELECON/ METSO/ MBE
30	BIN VIBRATOR	IC/ ELECTROMAG/ BMP ENGINEERS (REXNORD)
31	MAGNETIC SEPARATORS	ELECTROMAG/ POWERBUILD/ MAGNETICS/ MBIL/ ELECTRO-ZAVOD
32	PNEUMATIC ACTUATORS	ELECTRO PNEUMATIC & HYDRAULICS/ INDIAN PNEUMATIC HYDRAULICS/ NUCON INDUSTRIES/ OSCAR EQUIPT/ VELJAN HYDAIR/ ROTEX/PARKER/FESTO
33	ELECTRO MECHANICAL ACTUATORS	PREPEC/ TECHNOMECH/ PEBCO/FESTO/PARKER
34	RUBBER LINER	TEGA/ HILTON/ IC/ KAVERI
35	POLYETHYLENE LINER	KAVERI/ SHALIMAR/ ELASTOLAN/ GARWARE & TEFA/ IC
36	POLYURETHANE LINER	ELASTOLAN/ IC/ KAVERI/ TEGA
37	CAST BASALT LINER	DEMECH/ VIDYUT GREEN BANK/ ENVIRO
38	BELT VULCANISER	SHAW ALMEX/ NILOS INDIA/ SV DATTAR
39	SECTOR GATES, DIVERTER GATES, RACK & PINION GATES ETC.	IDC/ PEBCO/ TECHNOW ECH/ TRF/ MBE

40	FLEXOWEL BELTING	IC/ METSO INDUSTRIES (I)/ TRF/ FLEXOWEL/ HINDUSTAN RUBBERS/ PHOENIX/ YULE/ HILTON/ NIRLON/ MRF
41	ELECTRO MAGNETS	ELECTROMAG/ MAGNET CORPN./ STROM – KRAFT CONTROLS/ STERLING MAGNETICS
42	METAL DETECTOR	ELECTROMAG/ ERIEZ MBE/ PBL
43	BELT WEIGH FEEDERS	TRANSWEIGH/ J&N WEIGH HOPPER/MERRICK Industries/ INTEGRATED PROCESS AUTOMATION (IPA)/PBL
44	BELT WEIGH SCALE	ELECTRO CORPORATION/ NARNE TULAMAN/ PBL/ INTEGRATED PROCESS AUTOMATION (IPA)/ SHENCK J&N/ TRANSWEIGH/ AVERY
45	PNEUMATIC HANDLING EQUIPMENT	KERRY JOST/ MACAWBER BEEKAY/ TTG/FLSMITH
46	Thruster Brake	Electromag Devices, Mumbai/ Bengal Technocrat/ Strom Craft/ Industries Syndicate/BCH/KAKU
D	**PIPES/ FLANGES/ VALVES/ PAINT /STEEL ETC.**	
1	MS ERW (UPTO 400 NB)	SAIL/ JINDAL/ RINL/ TATA/ SURYA ROSHNI/ RATNAMANI
2	MS ERW (MORE THAN 400 NB)	WELSPUN/ SURYA GLOBAL/ SAIL/ JINDAL SAW PIPES/ TATA/ MAN INDUSTRIES
3	CS SEAMLESS PIPES	JINDAL/ MAHARASHTRA SEAMLESS LTD./ INDIAN SEAMLESS METAL TUBES LIMITED
4	CS PIPES	JINDAL/ TATA/ SAIL
5	GI PIPES	JINDAL/ SURYA ROSHNI/ RATNAMANI
6	PIPE FITTINGS & FLANGES	RAJENDRA FORGE INDUSTRIES/ VENUS/ SAGINI FORGE/ BRITECH
7	WATER LINE & AIR LINE VALVES (GATE/ GLOBE/ CHECK ETC.)	LEADER/weir- BDK/ L&T/TYCO/KSB/ PARKER/HAWA/Crawleyandray/EBRO
8	PNEMATICALLY OPERATED (GATE/GLOBE/DISC/BALL)	EBRO/IFC/FESTO/Crawleyandray
9	MOTORIZED VALVES (GATE/GLOBE/DISC/BALL)	Honeywell/Belimo
10	SAFETY VALVE	Forbesmarshall/Fluid Tech valve/brightechvalves
11	PRESSURE REGULATING VALVE	Samson/Brightech valves
12	FILTERS/ STRAINERS	THERMOSYSTEMS PVT.LTD/ FILTRATION ENGINEERS/ PROCEDYNE/ PERFECT SERVICES/ OMEGA
13	OIL SKIMMER	THERMOSYSTEMS PVT.LTD/ POTENTIAL ENGINEERING/ PREMIER ENTERPRISES
14	SOFTENERS/ SAND FILTERS	IONEXCHANGE/ DOSHIONEXCHANGE/ THERMAX/ TECHNOTECH
15	WATER COOLERS CUM PURIFIER	BLUE STAR/ CARRIER/ AQUA GUARD/ KENT
16	PAINT	ASIAN/ BERGER/ SHALIMAR/ NEROLAC
17	ANTI-CORROSIVE TAPE	WL/ RUSTECH/ HIMADRI CHEMICALS & INDUSTRIES/ CORPOTEX/ HYDROTECH

18	Steel supplier- reinforcement steel & plates, TMT bars	All prime vendors - SAIL, TISCO, RINL
2	**ELECTRICAL & INSTRUMENTATION EQUIPMENTS:**	
A	**APPROVED ELECTRICAL VENDORS**	
1	11/0.415 KV DISTRIBUTION TRANSFORMER	SIEMENS/ABB/ BBL/VOLTAMP/HHE/CGL/ AREVA
	6.6/0.415 KV, DISTRIBUTION TRANSFORMERS	SIEMENS/ABB/EMCO/ BBL/VOLTAMP/TELK/AREVA/ HHE
2	11 kV / 6.6 kVSWITCHGEAR	ABB / AREVA / SIEMENS
3	11 kV/ 6.6 kV SWITCHBOARD	SIEMENS/ABB/AREVA
4	6.6 KV VCB SWITCHGEAR	ABB/AREVA/ SIEMENS
5	6.6KV INDOOR ISOLATOR	SIEMENS/ ABB/ MEGAWIN
6	1.1 KV CONTROL & POWER CABLE	FORT GLOSTER /RPG/ CCI /UNIVERSAL/ NICCO/ POLYCAB/ HAVELLS/ DELTON/ FINOLEX
7	33, 11 & 6.6 kV HT CABLES	FORT GLOSTER/RPG/ CCI /UNIVERSAL/ NICCO/POLYCAB /TORRENT
8	NUMERICAL RELAYS	ABB EQVLNT/ AREVA MICOM SERIES / SIEMENS - SIPROTEC
9	LIGHTING TRANSFORMER	EMCO/SAI ELECTRICALS/ SAI ELECTRICALS/ RAYCHEM
10	HT & LT BUSDUCT	BEST & CROMPTON/STAR DRIVE/ELFAB ZETA/ ENPRO/ SPACEAGE
11	MCC(415V) DRAWOUT	SEIMENS
	MCC(415V) FIXED TYPE	SEIMENS
12	MOTORS HT	ALSTOM (MARATHON)/BHEL/ABB/SEIMENS
13	MOTORS LT	SEIMENS/ALSTOM (MARATHON)/ABB/BHARAT BIJLEE
14	HT CABLES	RPG/ CCI /UNIVERSAL/ NICCO/ POLYCAB /FINOLEX
15	LT SWITCHBOARD AND SWITCHGEAR	SIEMENS / ABB / L&T/ SCHNIDER
16	LT CABLES	RPG/ CCI /UNIVERSAL/ NICCO/ POLYCAB/FORT GLOSTER /FINOLEX
17	TRAILING/FLEXIBLE CABLE	FORT GLOSTER/NICCO/UNIVERSAL/LAPP/BELDEN
18	CONTROL PANNEL	RITTAL
19	ELECTRICAL PANNEL	SWITCHING CIRCUITS/ SELLWYN/ MDSHAVELL'S/ INDO ASIAN/ CONTROLAND SWITCH GEAR/PYROTECH
20	LAMPS AND FITTINGS	BAJAJ/CROMPTON/WIPRO
21	BELT SAFETY SWITCHES A. PULL CHORD AND BELT-SWAY SWITCH B. ELECTRIC SPEED SWITCH	INDUSTRIAL COMPONENTS/AG SYSTEMS/ JAYSHREE/ BENGAL TECHNOCRATS PROTOCONTROL TELEMECHANIQUE/ FM ELECTRONICS / SEIMENS/ JAYSHREE
22	LIGHTING PANNELS	HORIZON/DHARIA/SYMATIC/JAYSHREE/ RYB SWGR
23	ACB	SIEMENS L&T/ABB
24	MCCB	SIEMENS/ L&T/ABB
25	LUGS AND GLANDS	DOWELLS / COSMOS / COMET
26	LIGHTING TRAFO	AUTOMATIC ELECTRIC LIMITED

27	MULTIFUNCTION METER	CONSERVE / SEMS/ SATEC
28	CONTROL SWITCH	SIEMENS/ L & T/ KAYCEE /BCH/ Manufacture's Approved Make
29	SELECTOR SWITCH	SIEMEN/ L & T/ KAYCEE /BCH
30	FUSES	SIEMENS/ L & T / ABB/ SCHNEIDER
31	CONTACTORS AND OVERLOAD RELAYS	SIEMENS/ L & T/ -DO-
32	INDICATION LAMPS	SIEMENS/ L & T/ TECHNIC
33	TIMERS	SEIMENS/L & T / GEPC
34	INDICATING METERS	AE/ IMP GECA/ MECO
35	MFM	SATEC/CONSZERVE
36	PUSH BUTTONS	SEIMENS/ L & T/ ABB/ SCHNEIDER
37	CT & PT	ABB / CGL/ TELK/ Approved Manufacturer's sub-vendor
38	HT CABLE TERMINATION KIT / JOINTS	RAYCHEM
39	LT ISOLATORS	SEIMENS/ L & T / GEPC
40	TERMINALS	CONNECTWELL/ ELMEX
41	MCB	SIEMENS / LEGRAND/MDS/ GE
42	PROTECTIVE RELAYS	ABB/ SEIMENS/ GE/ L&T/ AREVA/ SCHNEIDER
43	SWITCH SOCKET RECEPTACLES	BCH/BEST AND CROMPTON/CGL
44	CABLE TRAYS / SUPPORT	INDUSTRIAL PERFORATION/INDIANA JAMNA METALS/UNITECH/ PREMIER CABLE TRAY NEW DELHI/ PREMIER CABLE TRAY KOLKATA
45	BATTERY-NI-CD	HBL NIFE /AMCO
46	BATTERY AND BATTERY CHARGER	AMARA RAJA/ EXIDE/ SAB KNIFE/ AMCO
47	TERMINATION KITS	RAYCHEM
48	AC DRIVES	ROCKWELL AUTOMATION/Allen breadly
49	NEUTRAL GROUNDING RESISTORS	RSI/RESITECH/INDUSTRIES SYNDICATE BCH/ NATIONAL SWITCH GEAR
50	LOCAL POWER ISOLATION CABINET	L & T/ ABB/ SEIMENS/SCHNEIDER
51	PROGRAMMABLE LOGIC CONTROLLER	ALLEN BRADLEY
52	I /O MODULES	ALLEN BRADLEY
B	**APPROVED INSTRUMENTATION VENDORS**	
1	ANNUNCIATOR	YOKOGAWA/PROCON
2	UPS	EMERSON
3	CONTROL PANEL AND DESK	RITTAL
4	RTDS/ TC	INDUSTRIAL INSTRUMENTATION/ GENERAL INSTRUMENT
5	LEVEL MEASURING INSTRUMENTS a. TUNING FORK TYPE b. CAPACITANCE TYPE c. ULTRASONIC TYPE d. FLOAT / DISPLACER TYPE e. RADAR TYPE f. R F TYPE	E&H IS PREFERRED MAKE VEGA/ E & H
6	PRESSURE / DP/ FLOW/TEMPERATURE	YOKOGAWA /EMERSON/ HONEYWELL/ ABB/ E & H

7	PRESSURE SWITCH	DANFUSS/SWITZER/IFM/ TRAFAG
8	FLOW SWITCH	SWITZER/ DANFUSS/FORBES MARSHAL/IFM
9	PRESSURE GAUGE	WIKA/ PRECISION/S.S PROCESS CONTROL
10	TEMPERATURE SWITCH	SWITZER/ TRAFAG/ INDFOSS
11	CONTROL VALVES	FISCHER / IL PALGHAT /FORBES MARSHALL/ LIMITORQUE
12	PLC	ROCKWELL
13	VVVF PANEL	ROCKWELL/Allen breadly
14	ELECTRIC ACTUATORS	IL PALGHAT/ SEIMENS/ LIMITORQUE
15	PNEUMATIC ACTUATORS	FISCHER / IL PALGHAT /FORBES MARSHALL/ LIMITORQUE
16	I / P CONVERTORS	ROSEMOUNT/ ABB/ FORBES
17	AIR FILTER REGULATOR	NORGEN/FESTO/SHAVO NORGEN/ BELLS/PALGHAT
18	CONTROL AND DATA CABLES	LAPP /BELDEN /FINOLEX
19	SAFETY VALVE	FOURESS/Forbes Marshall/brightechvalves
20	LIMIT SWITCHES	BCH/ KAYCEE /TELEMECHANIQUE/SEIMENS
21	SCANNERS	YOKOGAWA /MICROSYSTEMS/ M B CONTROLS/ MASIBUS

NOTE: IF ANY PARTICULAR ITEM IS NOT INCLUDED HERE, BIDDER SHALL TAKE PRIOR APPROVAL FROM THE OWNER AGAINST THAT PARTICULAR ITEM; IF THE ITEM IS INCLUDED HERE, NO ALTERATIONS SHALL BE POSSIBLE

AHS - BOQ - Electrical and Instrumentation Package

INDEX- ELECTRICAL

NAME OF PACKAGE: ALUMINA HANDLING SYSTEM

ANNEXURE # 2
GTP- DISTRIBUTION TRANSFORMERS
NAME OF PACKAGE: ALUMINA HANDLING SYSTEM(RATING TO BE DECEIDED AS PER TOTAL LOAD)

Sr.No.	Description	BALCO Requirement	Bidder's Confirmation.
1	**Transformer Rating**	**Bidder to specify**	
2	NAME OF THE MANUFACTURER	AS per approved list	
3	Reference Standards	IS 2026/IEC 60076	
4	Duty	Continious	
5	Voltage HV & LV - kV	11/0.433	
6	Frequency - Hz	50	
7	No. of Phases	3	
8	Continous Rating	Rated	
9	Overload design	As per IS 6600	
10	Insulation Class	class F	
11	Cooling	ONAN	
12	Winding Connection	Delta - Star	
13	Vector Group	Dyn11	
14	Neutral Grounding	Solid earthing	
15	Short Circuit rating	40 KA for 1 sec on 11 kV Bus side	
		40 KA for 3 sec all 11 kv equipments	
		50 KA for 1 sec on LT side	
16	Termination		
	HV	Cable Box	
	LV	Bus Duct	
17	Temp. rise over ambient Temp.:		
	a) In oil (measured by thermometer) - deg C	50	
	b) In winding (measured by Resistance method)- degC	55	
18	Neutral CT	To be decided during detail engg	
19	Tap Changer on primary side		
	a) Range	+/- 5% @2.5%	
	b) Total tap positions	5	
	c) Taps above nominal voltage	2	
	d) Taps below nominal voltage	2	
	e) Voltage per step variation	± 2.50%	
	f) Tap Change controls	Off circuit type	
	g) Make	**Paragon**	

20	Impulse Test Withstand Voltage- KVP	75	
21	One minute power frequency withstand voltage - kV rms	HV side- 28 kV LV side 3	
22	Induced over voltage withstand voltage- V	866	
23	Withstand time without injury for 3 phase short circuit at terminals	2 sec As per IS	
24	Auxilliary Supply voltage- V	230 VAC	
25	Overload Capactiy	As per IS 6600	
26	Radiators	Detachable type	
27	No Load loss (as per IS tolerance.)	Bidder to specify	
28	Full Load loss (as per IS tolerance.)	Bidder to specify	
29	Paint shade	RAL 7030 / RAL 7032 (Epoxy coated)	
30	Reference max. Ambient temp.- deg C	50	
31	Performance figures	As per IS 2026 Part I	
	No Load Loss in KW (IS tol)		
	Load Loss in KW (IS tol)		
	Impedence in % (IS tol)		
32	% Efficiency at 75degC/Unity P.F		
	a)At 100% load	Bidder to specify	
	b)At 75% load	Bidder to specify	
	c)At 50% load	Bidder to specify	
33	%Efficiency at 75degC/0.8P.F		
	a)At 100%load	Bidder to specify	
	b)At 75% load	Bidder to specify	
	c)At 50% load	Bidder to specify	
34	% Regulation at full load at 75 deg.C		
	a) At unity PF	Bidder to specify	
	b) At 0.8 lagging PF	Bidder to specify	
35	current density	2.7 A/sq.mm	
36	flux density	1.73 tesla	
37	**Standards to be followed for oil immersed Distribution transformer**		
	Distribution transformer method of construction	IS 2026	
	Thermal evaluation and classification of electrical insulation	IS 1271	
	Fittings and accessories for distribution transformers	IS 3639	
	Bushing for alternating voltage	IS 2029	
	Dimension of porcelain transformer bushing	IS 2029/3347	
	New insulating oil for trnasformer	IS 335	

ANNEXURE # 3
GTP- LT MCC AND BUSDUCTS
NAME OF PACKAGE: ALUMINA HANDLING SYSTEM.

Sr.No.	Description	BALCO Requirement	Bidder's confirmation
1	**MCC**		
	Enclosure class	IP 55	
	Feeders	Single front fully draw out design,CRCA sheet steel of thickness 2 mm & for doors & covers 1.6 mm.Double front construction in case of layout constraints and shall be subject to specific approval of owner	
	Incomer	The incoming feeders shall be 2 nos. with a bus coupler with **4 pole arrangement.** Suitably rated ACBs or MCCBs with u/V, S/c, E/F ,O/C with microprocessor release shall be used for the purpose through castle key interlocking Incoming feeder shall have phase indicating lamps, voltmeter with SS and ammeter with SS. Bus coupler shall have phase indicating lamps & voltmeter with SS	
	Bus Bar	TPN, Main horizontal & vertical bus bars suitable for S.C. level 50KA for 1 sec. Material shall be electrolytic grade aluminium	
	Motor Feeders	Motor feeders shall have Motor protection CB, contactor rated for 125% of motor rated current, thermal overload relay and auxiliary contactors as required. Indicating lamps of LED type for status indication. Ammeters for motor rating of 15 k W & above. Minimum rating of contactors shall be 16A. Type II co-ordination shall be ensured. Auxiliary & trip contact shall be provided for MPCB/MCCB	
	Power Feeders	Power supply feeders shall have MCCB of suitable rating with S/c, E/F ,O/C with microprocessor release . Ammeter shall be provided for 100A & above rating. Auxiliary & trip contact shall be provided for MPCB/MCCB	
	Spare Feeders	20 % spare feeders shall be provided	
	Control Bus	Copper control bus bars as required	
	Earth Bus	Earth bus of G.I .with minimum size of 50 x	

		6 mm	
	Internal wireing	Power cabling through PVC insulated single core flexible cable of minimum size 2.5 sq. mm. and of stranded copper conductor. Control cabling through PVC insulated single core flexible cable of minimum size 1.5 sq. mm. and of stranded copper conductor	
	Paint	Painting material should be Alkyd melamine epoxy base Power coating of colour Pebble Grey(No. RAL 7032)	
		For feeder above 630 A three pole ACB should be considered	
	IS stanards	Design shall conform to relevant IS/IEC standards	
		All feeders shall be either ACB or MCCB only .	
		The short circuit level shall be 55 KA for 1 sec for bus and all LT componenets shall be rated for 50 kA for 1 sec.	
		feeder above 630 A- three pole ACB	
		The incomer feeders shall have MFM with RS 485 output , Analog voltemeter and Analog ammeter with selector switch , PT , CT ,Indication lamps for R-Y-B, On/OFF, Trip ,Trip circyuit healthy, T/N/C breaker control switch , test and service position limit switch , counter meter.	
		The outgoing feeders (MCCB/MCB) shall have Analog ammeter with selector switch , CT ,Indication lamps for R-Y-B, On/OFF, Trip ,Trip circyuit healthy .**Upto 250A - only ON/OFF/TRIP LED Lamp.**	
		The outgoing feeders (DOL/Star delta) shall have MPCB , Ammeter with selector switch , CT ,Indication lamps for R-Y-B, ON/OFF/ Trip , Local/ remote S/S , Start/Stop Push button.**Upto 110 KW - DOL only.All pump house feeders above 5.5KW shall only have ammeter with ASS and CT in all 3 Phases .Below 5.5KW ,no ammeter is required.** **Other than pump house in all PCC/MCC Ammeter to be provided only above 55KW feeders for 3 Phase for motor feeders.**	
		The Outgoing feeders (ACBs) shall have Analog ammeter with selector switch , CT ,Indication lamps for R-Y-B, On/OFF, Trip ,Trip circyuit healthy, T/N/C breaker control switch , test and service position limit switch , ~~hour counter.~~ **Operation counter.**	

		Auto Change Over Scheme with check syncronising relay to be provided in all 2 Incomer PCC/MCC arrangement .**Only in ACB incomers and Buscoupler .**	
		Type of busbar- Aluminium with R-Y-B coloured PVC sleeve . The bus bar should be designed /rated for contineous running at rated current of incomer rating.	
		The Busbar shall be Aluminium with R-Y-B coloured PVC sleeve , Rated for short Circuit rating of 55 KA and above for 1 sec and the Bus duct shall have inspection window and porper earthing arragement .	
		Soft starter feeders shall have conventional by pass arrangemnet	
		14/16 SWG CRCA ,Powder coated Siemens gray colour	
		Paint shed- RAL 7032 both internal and External	
		Protection Cl : IP 52 /IP 42	
		Earth bus 50 x 6 mm GI Flat	
		Accuracy class of CT for metering /display is Cl= 0.5 and protection CL= 5P10	
		CT secondary wiring by 2.5 sq.mm. PVC flexible stranded Cu wire	
		All PCC shall have its own control trasformer for control supply to outgoing feeders wherever required . The control supply shall have bus arrangment.	
		Max Height of panel $\leq$ 2300 mm including base frame	
		Designed for max ambient temp 50 deg C .	
		Earth bus bar shall be extended at both ends of the panels.	
		No fuses in control circuit. All should be MCB only	
	ACB	Three pole , 50KA for 1 sec with ETU45B unit or equivalent with LSIG protection and universal motor with supply voltage 80-220 VAC/DC with standard features.	
		All Incomers ACBs shall have multi function meters of 0.5 accuracy class (SATEC MAKE with three line display).	
		All ACBs should have EDO with microprocessor release having protection O/C,S/C & E/F,fault level 50 kA for 1 sec for normal inverse and instanetous protections.	
		All incomers feeder ACBs shall have under voltage protection	

	MCCB	Three/four Pole , 50 KA , rated service volatge = 690 V with 1 No+1 NC Aux conatct and 1 No alarm contact	
		Ics= 100 % Icu	
		The MCCB shall be thermal relase type or micor processore relase type.	
		MCCB- Below 250 A- Thermal relase type with adjustable current setting for O/C and short circuit from 80-100 % . No earth fault below 250 A.	
		MCCB- 250 A to 630 Amp - Micro processor relase for O/C ,S/C and E/F . The release shall be detachable type with adjustable current setting for O/C and short circuit from 40-100 % . Earth fault protection shall be a seperated unit with netural CT arrangement.	
	MCB	Three pole rated for 10KA used in power supply and 10 KA used in control supply.	
	CT	Cast rasin CT	
	Space heater	To be provided wherevere necessary- To be decided during detail engg	
	Indication lamps	LED Type	
	Ammeter/ Voltameter	72 x 72 sqmm	
	MFM	SATEC make with communication port RS 485 port	
		To be provided in incomer feeders of all panels whether ACB or MCCB used.	
2	**LT Busduct**	Aluminium bus bar , segrregated/ Sandwich type rated for **50KA** for 1 sec with all supporting arrangement, insulator earthing arrangement and inspection windows in duct enclosure and flxible bends at fixed interval and bimetallic strip at aluminium to copper busbar joint whereever it is required.	
		Busduct enclosure shall be of **CRCA Powder coated** of 2mm thickness.	
		The suppport structure of Busduct shall be fabricated of MS with one coat Primer and two coats of Epoxy Painting as per TS General Specification for Painting. **The qty of support structure shall be a part of steel qty as considered in the scope.**	

		Flexibles shall be of tinned copper	
		The bus duct enclosure shall be powder coated with siemens grey colour RAL 7032	
		Degree of protection - IP 55 for outdoor transformer and IP 54 for Indoor transformer	
		Max Allowable temperature on busbar- 55 deg C over 50 degC	
		Dehydrating silica gel breather connection - 2 nos	
		Earth Bus - Aluminium , 50 x 10 mm minimum	
		Earth bus bar rated short circuit withstand current 30 KA for 1 sec	
3	**MLDB**		
	MCCB	Thermal magnetic microprocessor release with breaking capacity of 36 kA with Ics= 100 % Icu	
	MCB	Suitable type rated for 10 KA	
	CT	Cast rasin	
	Protection	As required	
	On/OFF Timer	Not required (will be provided in individual lighting box)	
	Accessories	MFM without commnication port ,	
		R-Y-B indicating lamp LED type	
		Analog Ammeter and Voltmeter with ASS /VSS for Incomer	
	Bus bar	Aluminium type with PVC sleeve , suitable for required current rating	
	Panel	Suitable type power coated siemens gray colour RAL 7032	
4	**Lighting Boxex / Emergeancy Lighting Boxex at shops**		
	MCCB	Thermal magnetic microprocessor release with breaking capacity of 36 kA with Ics= 100 % Icu	
	MCB	Suitable type rated for 10 KA	
	On/OFF Timer	To be provided in all boxex in the incomer with Auto/Manual by passSwitch (Not in Emergency Boxex)	
	Accessories	R-Y-B indicating lamp LED type	
	Panel	wall mounted , power coated siemens gray colour RAL 7032 , double door with front opening to be consiedred in lighting panels , single door in emergency panels.	

5	**Lighting Transformer in all shops**	Indoor Dry type vacuum impregnated type with enclosure with Digital Temperature rise indicator for 315KV transformer.	
		Voltage Ratio : 415 V/415 V	
		Vector Group : Ynyn0	
		Off circuit links provided on primary side range : +/- 5% @ 2.5 %	
		Cl. Of Insulation : F	
		Protection Cl : IP2X	
		Temperature rise of winding shall be limited to ~~70~~ **55** deg.C at an ambient of 50 deg.C.	
6	**Light Fixture**		
	1x36W CFL	Equivalenet to Bajaj WCF 81236 SERIES IN WIPRO or BSP 136 IN BAJAJ or equivalent in CGL	
	1x150/250/400W High Bay	Equivalenet to Bajaj BJHB I or Bajaj BJHB NI series Bajaj or WHS 25400 series in Wipro or equivalnet in CGL	
	1x250W Street Light	Equivalenet to Bajaj BGEST 250W SV IP65 or WST 71250 series in wipro or equivalnet in CGL.	
	1x18W / 2x18W CFL	Equivalenet to WVF 90118 SERIES IN WIPRO or BSP 136 IN BAJAJ or equivalent in CGL	
	1x150/400W Flood Light	Equivalenet to BJFL 150SV series in BAJAJ or VECTOR series in Wipro or equivalnet in CGL	
	1x70/150W Well Glass	Equivalenet to BJVWIS SERIES IN BAJAJ or VECTOR series in Wipro or equivalnet in CGL	
	2x36W CFL (Recess mounted)	Equivalenet to Bajaj BMMR 236 CFL Equ.	
	(Surface mounted)	Equivalenet to Bajaj WVP24336 APF SERIES IN WIPRO or BMMR 336 IN BAJAJ or equivalent in CGL	
	Mounting Accessories	Down rods - part of supply.	
7	**VFD's**	Normal Duty	
		Nominal Currrent Rating as per motor rated current	
		Complete panel - self standing	
		Input disconnect and protection device provided	
		Conventional bypass arrangement provided	
		Outgoing cable suitable to 2x3cx300 sq. mm. Al. cable	

		Aux. supply is 220 V AC in built through control trasformer.	
		The control philosophy should be designed for working of the 3 nos. of VFD drives supplied for Rectifier Pump House . The preliminary philosphy shall be as per the Annexure-I enclosedhowvere the detailing shall be done later at design stage.	
		Input choke / Output choke provided	
		communications port as required	
		Enclosure shall be RITTAL MAKE	
		Incomer /outgoing MCCB or ACB as per the current specfication as defined above for PCC /MCC	
		-	
8	**Cable Trays/Step Through bridge**	Galvanised Cable tray to be taken of 3 Sizes only ,600, 300 and 150 mm width. Height of 600mm cable tray to be taken as 75 mm,Height of 300mm and 150 mm cable tray to be taken as 50mm	
		Thickness of all the trays is 2mm	
		2 nos. of coupler plates per joint considered	
		Length of each set considered is 2000 mm	
9	**Earthing**		
	Electrode	Medium duty GI pipe of 40 mm dia	
		Galvanising thickness min 86 microns (as per IS)	
		Length of pipe min 2500 mm with perforations	
		Flange provided suitable for double connections	
		Treated earth pits considered as per IS 3043	
	GI Flats	25x4 mm and 40x6 mm are only flats considered	
	Rod	ISRO 12/14 mm dia MS rod is considered for lightning and earthing	
	Spike or Finials	Lightning finials consisting of 25mm dia. GI solid rod, 1.5 mtr long with 50mm dia. copper sphere of thickness 3mm with 5nos, 10mm dia, 125mm long spikes. Base plate dimension are 150x150x6 mm.	
10	**Safety Items**	As per system requirements and statutory	
	Rubber Mat	Suitable for 11 kV / 6 mm thickness, minimum size- 3 mtr x 1.8 mtr	
	Fire Extinguisher	bidder to include in supply.	
11	**UPS**	Bidder to specify.	

		Ni-Cd Battery for 1 Hr Backup	
		Isolating transformer provided in input side	
12	**SWITCH - SOCKET**	Bidder to specfy	

ANNEXURE # 4
GTP- MOTORS - HT /LT
NAME OF PACKAGE: ALUMINA HANDLING SYSTEM(AS PER REQUIREMENT)

-

Sr.No.	Description	BALCO Requirement	Bidder's confirmation
1	Motor type	bidder to specfy	
2	Voltage fluctuations	bidder to specfy	
3	Frequency fluctuation	bidder to specfy	
4	Degree of protection	IP 55	
5	Type of construction	IM B 3	
6	Cooling method	IC 411	
7	Insulation class	F	
8	Permissible number of consecutive starts co;d/ hot	3\2	
9	Efficiency	bidder to specfy	
10	Short Circit rating		
11	Color	RAL 7030	

ANNEXURE # 5
PREFERRED MAKES
NAME OF PACKAGE: ALUMINA HANDLING SYSTEM.

Sr.No.	Item Description	BALCO Requirement	Bidder Confirmation
HT SYSTEM			
1	11/0.415 kV Distribution Transformer	Siemens/ABB/ BBL/Voltamp/HHE/CGL	
2	11 kV Switchgear	ABB / Areva / Siemens	
3	11 kV Switchboard	**Siemens**/ABB/Rittal	
4	1.1 kV Control & Power Cable	RPG/ CCI /Universal/ Nicco/ Polycab/Fort Gloster /Finolex	
5	11 kV HT Cable	RPG/ CCI /Universal/ Nicco/ **Polycab** /Finolex	
6	AC and DC Distribution board	ABB/L&T/ Siemens	
7	Marshalling Kiosk	Siemens/ABB/Rittal	
8	Lighting panel	Legrand /Havells/Siemens /ABB	
9	Ni-CD Battery	HBL Nife /Amco / Exide	
10	Battery Charger	Amaraja / Caldyne / Hansa	
11	11 kv Busduct	Enpro / Star Drive / C&S	
12	Off Load tap Changer	**Paragon/Alwaye**	
13	LT switchgear and components	**Siemens** / ABB / L&T	
14	Numerical relays	ABB eqvlnt/ Areva Micom series / Siemens - Siprotec	
15	Light fittings	Philips / Bajaj/Wipro	
16	Lighting Distribution box	Siemens / Legrand/MDS/Havells	
17	MCB	Siemens / Legrand/MDS/ GE	
18	MCCB	Siemens / GE	
19	5/15 A switch and sockets	Anchor / Roma / Siemens	
20	Multifunction meter	SATEC	
21	HT Cable termination kit / joints	Raychem	
22	HT DRIVE	bidder to specify	

LT System	-	-	-
1	Lighting transformer	EMCO/CGL/VOLTAMP/RAYCHEM	
2	LT busduct	Best & Crompton/Star Drive/Elfab Zeta/ C&S/ENPRO	
3	Pot room Bus slot	Best & Crompton/Star Drive/Elfab Zeta/ C&S/ENPRO/NAXSO	
4	MCC(415V) Drawout	L & T / Seimens/ABB	
5	Motors LT	Seimens/Alstom/ABB/Bharat Bijlee	
6	LT cables	RPG/ CCI /Universal/ Nicco/ Polycab/Fort Gloster /Finolex/Havells	
7	Trailing/flexible cable	RPG/ CCI /Universal/ Nicco/ Polycab/Fort Gloster /Finolex/Havells	
8	VFD panels	Rittal	
9	Lighting Box	MDS/HAVELLS/ SIEMENS/ABB/L&T	
10	Local Control box for motor start/stop (FRP type)	Pushtron	
11	Maintenance Repair box	L & T/ ABB/ Seimens/Schneider	
12	Load Break switch	L & T/ ABB/ Seimens/Schneider	
13	Junction Box	Reputated make	
14	Lamps and fittings	Bajaj/Crompton/Wipro/GE	
15	MLDB	HAVELLS/ legrand/ MDS	
16	ACB	Siemens / L&T/ABB	
17	MCCB	Siemens / L&T/ABB	
18	Control switch	Siemens/ L & T/ Kaycee /BCH/GEPC	
19	Selector Switch	Siemen/ L & T/ Kaycee /BCH	
20	Fuses	Siemens/ L & T /ABB	
21	Contactors and Overload relays	Siemens/ L & T/ABB	
22	Indication lamps	Siemens/ L & T/ Technic	
23	Timers	Seimens/L & T / GEPC /ABB	
24	Indicating Meters	AE/ IMP GECA/ MECO	

25	MFM	SATEC	
26	Push Buttons	Seimens/ L & T /ABB	
27	CT & PT	CGL/ AE	
28	LT isolators	Seimens/ L & T / GEPC	
29	Terminals	Elmex	
30	MCB	Siemens / Legrand/MDS/ GE	
31	Protective Relays	ABB/ Seimens/ GE/ L&T	
32	Switch Socket receptacles	BCH/Best and Crompton/CGL	
33	Cable trays / Support	Industrial Perforation/INDIANA Jamna Metals/Unitech	
34	Battery- Ni-cd	amco/exide/amararaja/hbl nife	
35	UPS	EMERSON/HI-REL/DB	
36	Battery and Battery Charger	Amara Raja/ Exide/ HBL/ HANSA/ ChabbiAMCO	
37	Termination Kits	Raychem	
38	AC Drives	Rockwell / ABB/Siemens/TMEIC	
39	Neutral Grounding Resistors	RSI/Resitech/Industries Syndicate BCH/ National Switch gear	
40	Local Power Isolation Cabinet	L & T/ ABB/ Seimens/Schneider	
41	Programmable logic Controller	Allen Bradley	
INSTRUMENTATION			
1	Annunciator:	Yokogawa/Procon	
2	UPS	Emerson	
3	Control Panel and desk	Rittal	
4	RTDS/ TC	Industrial instrumentation/ General Instrument	
5	Level measuring instruments	Vega	
6	Tuning fork type	Vega/ Yokogawa /Emerson/ Honeywell.	
7	Capacitance Type	Vega/ Yokogawa /Emerson/ Honeywell	
8	Ultrasonic Type	Vega/ Yokogawa /Emerson/ Honeywell.	
9	Float / Displacer type	Vega/ Yokogawa /Emerson/ Honeywell	

10	Radar Type	Vega/ Yokogawa /Emerson/ Honeywell	
11	R F type	Vega/ Yokogawa /Emerson/ Honeywell	
12	Pressure /DP/ Flow/Temperature	Yokogawa /Emerson/ Honeywell/ ABB	
13	Pressure Switch	Danfuss/Switzer/IFM	
14	Flow Switch	Switzer/ Danfuss/Forbes Marshal/IFM	
15	Pressure Gauge	WIKA	
16	Temperature Switch	Switzer	
17	Control valves	Fischer / IL Palghat /Forbes Marshall/ Limitorque	
18	Electric Actuators	IL Palghat/ Seimens/ Limitorque	
19	Pneumatic Actuators	Fischer / IL Palghat /Forbes Marshall/ Limitorque	
20	I / P convertors	Rosemount/ ABB/ Forbes	
21	Air Filter regulator	Shavo Norgan/ Bells/Palghat	
22	Control and data Cables	LAPP /Belden /Finolex	
23	Safety Valve	Fouress	
24	Limit Switches	BCH/ KAYCEE / Telemechanique/ Seimens	
25	Scanners	Yokogawa /Microsystems/ M B Controls Masibus	

ANNEXURE # 6

BATTERY LIMITS(ELECTRICAL SYSTEM)

NAME OF PACKAGE: ALUMINA HANDLING SYSTEM.

Sr.No.	Point	Bidder's Confirmation
1	Unloading ,storage, Security of all materails at site till the handover is supplier repsonsbility	

2	The site establishment shall be in conatrctor scope . BALCO shall provide the suitable space as per the requirement . Fine grading and area development shall be done by the supplier. Power for site office and at working place shall be provided by the BALCO at one single location within 500 mtr of pehripehrial area. The supplier is to install the distribution panel with ELCB and other BALCO safety requirement at site .	
3	The scope shall start from outgoing of 11 kV switchboard of ETP 11kv ,switchgear room /HVD#12 and end at respective area switchboard and all outgoing termination from respective switchboard to O/G transformers and HT SYSTEM.	
4	All temporary lighting in working area shall be arranged by the supplier .	
5	All base frame , mounting steel structure and fasteners with minor chipping in panel cut out area shall be in supplier scope within the order.	
6	Any temporary approach road for loading ,unloading ,placement or wiring area shall be made by the supplier as per the site requirement	
7	All the testing instruments during field commissiong shall be arranged by the supplier.Test /caliberation certificates to be submitted at the time of bringing the instrument at site prior using.	
8	All Electrical statutory clearances as required for charging and operation of the electrical system within the contract shall be in supplier scope	
9	The cable jointing shall be carried out by certified and license holder jointer person only	
10	All Govt . Statutory fees as required for statutory clearance shall be in BALCO scope. The same shall be paid by the supplier and re-imbursed by the BALCO on submission of bill	
11	The size of cable trenches shall be considered as per IS standard and it is to be made of RCC with RCC slab cover . The insert plate , tray supporting steel etc shall be supplied ,fabricated and erected by the supplier.	
12	The chequred plate cover in cable trenches inside the switchgear room for HT switchboard area and battery area shall be provided by the supplier.The thickness should be minimum 8 mm. The qty shall be taken in BOQ on estimation basis.	
13	Necessary safety boards,fire cylinder etc during the execution of work to be provided at workplace.	
14	The cable tray should not be filled more than 70 %	
15	The cable tag to be provided at all termination for proper cable identification.Rout marker to be provided for HT cable routing	
16	Earthing MAT, Danger board, Electrical shock treatment and operation guideline board are to be provided in each switchgear room in sufficient qty as mentioned in technical specfication.	

17	The cable laying shall be mostly preferred on overhead cable bridge. Cable Trench and cable buried shall be preferred only in non feasible area. The same shall be decided during detail engg and on site. The design is to be provided during detail engg.	
18	The qty of steel material and cable trays as required for the cable laying are taken on estimation basis. The same shall be quantified during detail engg . In case of any increase /decrease in qty the same shall be adjusted in the contract on per MT rate	
19	The civil qty as required for cable overhead bridge / trenches are taken on estimation basis. In case of any increase /decrease in qty the same shall be adjusted in the contract on per unit rate basis	
20	All the consumables and other accessories as required for fabrication and erection of steel structure of overhead and cable trenches ,buried trenches ,switchgear and other equipments as considered in the contract shall be part of the original contract .	
21	10 NO+10 NC aux conatcts to be provided in all breaker.	
22	Battery charger AH capacity to be determined w.r.t to board requirement plus 5 x 40 watt tubelight on emergeancy lighting of switchgear room	
23	Temporary lighting in working area shall be arranged by the supplier .	
24	Site team should have regular and qualified safety in charge at site during the execution.	
25	All Electrical rooms shall have double entry /exit .	
26	HV & LV Equipments before startup to be checked by OEM only.Their visit to site and testing is in suppler scope.	
27	HT motors for compressor (compressor house) to be tested in site as per FQP by supplier along with OEM .	
28	Cable termination for Compressor motors along with control cabling and earthing is in supplier scope.	
29	All drawing approval and statutory approval of HT motors for Air compressor is in supplier scope.	
30	Construction DB to be as per safety standard with shed and ELCB.	

ANNEXURE # 7
SCOPE MATRIX
NAME OF PACKAGE: ALUMINA HANDLING SYSTEM

		Scope	
Sr.No	**Description**	**BIDDER**	**BALCO**
A	**ENGINEERING**		

1	HT distribution system	**x**	**Only ICOG panel and HT cable will be given by BALCO**
2	LT distribution system	**x**	
3	HT switcgear room location and general arrangement .	**x**	
4	LT PMCC room - Location and general arrangement	**x**	
5	Aux trasformer room - location and general arrangement.	**x**	
6	MCC and PLC control room- Location and general arrangement	**x**	
7	Room Lighting system- inside	**x**	
8	Conveyor lighting system	**x**	
9	Plant earthing system	**x**	
10	Plant Lightining protection scheme	**x**	
11	Plant HT cabling schematcis- sizing, scheduling etc	**x**	
12	Plant LT cabling schematcis- sizing, scheduling etc	**x**	
13	cable trench or cable overhead arrangement	**x**	
14	cable tray and laying schematics	**x**	
B	**SUPPLY**		
a	**HT SYSTEM .**		
1	HT Switchgear 11KV		**x**
2	HT Cables - XLPE unearthed cable alongwith HT termination kits		**x**
3	11KV/0.415 KV transformer along with suitable rated Busduct	**x**	
4	Battery Charger FCB+FCB with Battery Bank Ni-Cd		**x**
5	ACDB & DCDB	**x**	
6	Pressuirzed ventilation	**x**	
b	**LT SYSTEM**		
1	MCC/PCC/PMCC required for AHS	**x**	
2	Conveyor system Lighting	**x**	
3	Shop Lighting + Emergency lighting in critical areas	**x**	
3	Lighting- MCC room, PLC room, HT switchgear room ,PMCC or LVMD room	**x**	
4	Air condtioning in control room and PLC and VFD rooms and Exhaust or pressuirized ventilation in MCC rooms	**x**	
5	Welding sockets & Power sockets - 3Ph and 1 PH in shop area whereever reud (to be decided during layout finalisation)	**x**	

6	Crane DSL and DSL Power supply Box.(NOTE : the no. of feeding points for each DSL should be minimum 2 Nos or more depending upon length of the DSL , accordingly DSL power supply box at field to be considered .)	x	
7	Motor start/Stop Local push button station at field	x	
8	LT Power and control cables as per shop requirement	x	
9	PLC and drive system- As per shop requirement	x	
10	All communication and instrumentaion cables.	x	
11	Cable trays, tray supporting strcture, cabling acceoosries, LT termination kits etc as require for LT system	x	
12	Plant earthing system- treated earth pit, electrinic earth pit,spike gurad earthing and its earthing strips, wires, etc	x	
14	Plant outside lighting	x	
15	Plant Lightning system	x	
16	All erection and installation accessories as required	x	
17	UPS for PLC & SCADA system with 1 Hr Back up	x	
18	UPS for Emergency Light system with 1 Hr. Back Up	x	
C	**2 YRS O& M SPARES (List to be submitted by bidder)**	x	
D	**COMMISSIONING SPARES-(List to be submitted by bidder)**	x	
E	**SERVICES**		
1	Transporation , unlaoding stoarge and erection of all electrical materail as part of total package	x	
2	Erection of complete LT system which in BIDDERS scope of supply	x	
3	No load and load commissioning	x	
4	Performance testing	x	
5	All Electrical statutory approvales and drawing submission as required	x	
6	All govt fees for statutory approvales as required		x
F	**Civil Works for Electrical systems**		
1	MCC/PMCC/PCC Room	x	
2	Transformer Room.	x	
3	Cable Trenches / Overhead cable bridge.	x	
4	Treated / Burried/Electronic Earth pits needed for AHS	x	
G	**BATTERY LIMITS**		

	Refer Annexure		

ANNEXURE # 8
SPARES
NAME OF PACKAGE: ALUMINA HANDLING SYSTEM

S.No	Item Description	Qty	Bidder confirmation
HT SYSTEM			
1	**Transformer – 1 set for each type of transformer**		
	HV Bushing		
	LV Bushing		
	LV Neutral Bushing		
	Silica gel breather		
	Complete set of gaskets		
	Buchholz relay with complete contacts		
2	**11kV switchboard**		
	Spring charging motor		
	Closing coil		
	Tripping coil		
	Indicating Lamp(assorted)		
	HT PT Fuse		
	Multi function meter		
	Breaker control switch		
	L/R selector switch		
	Bus support insulators		
3	**Spares of Battery charger (220V)**		
	Set of control cards (All PCB cards)		
	Set of relays		
	Set of contactor		
	Micro switches (if applicable)		
	Filter capacitor		
	Three phase full wave bridge rectifier (Thyrister/diode)		
	Set of wound resistor (if applicable)		
	Set of switches		
	Potentiometer		
	Fuses of thyristor with indicator		
	LT SYSTEM		
1	**LT SWITCHGEAR (Per Board)**		
	ACB - Moving conatcts		
	ACB- Fixed Contacts		

	ACB- Auxiliary contacts		
	Limit switch for test and service position		
	Closing coil		
	Tripping coil		
	Spring charging motor		
	Aux iliary contractor		
	Power Conatctor		
	MCCB		
	MCB		
	MPCB		
2	**Instrument transformers**		
	CTs		
	PTs		
	Voltmeter		
	Ammeter		
	Overload relays of motor feeders whereever provided		
	Auxillary relays whereever provided		
	Timers- ON/OFF		
3	**Misc. Items**		
	LED illuminating type Push button switch unit	Sets	10 Nos of each type
	Voltmeter selector switch	No	2
	Ammeter selector switch	No	2
	Local remote selector switch	No	2
	TNC switch	No	1
	I ndicating lamp units	No	10
	I ndicating lamp	No	10
	Lens covers		
	Red	No	10
	Green	No	10
	Amber	No	10
	Terminal blocks	Sets	20 Nos of each type
	Control Transformer	No	1
4	**Maintenance repair Box/ AC Plug socket box (For each shop)**		
	Top Plug	No	5 Nos of each type
	Socket	No	5 Nos of each type
5	**MEASURING INSTRUMENTS (for complete package)**		
	Mul;timeter (Fluke Make)	No	2
	Digital Megger 5kV	No	2
	Digital clampmeter	No	2

Alumina Handling system – Price bid format

COST BREAK UP SHEET							
S. No	**ITEM**	**UOM**	**QTY**	**SUPPLY**		**SERVICE**	
				UNIT PRICE	**TOTAL**	**UNIT PRICE**	**TOTAL**
			QTY AND PRICE TO BE FILLED BY BIDDER				
A	**CIVIL**						
A - 1	RCC	CUM					
A - 2	PCC	CUM					
A - 3	Civil dismantling	CUM					
A - 4	Excavation	CUM					
A - 5	Area Grading & Levelling	CUM					
A - 6	Reinforced Steel	MT					
A - 7	Roads	Sqm					
A - 8	Pavement	Sqm					
A - 9	Drains	RM					
A - 10	MCC Room and office	CUM					
A - 11	Piling	RM					
A - 12	Shuttering	SQM					
A - 13	Civil Activities- Rubble & brickwork	SQM					
A- 14	Control room Furnishing	Lot					
	TOTAL CIVIL						
B	**STRUCTURAL**						
B - 1	Structural Steel -silo	MT					
B -	Structural Steel - conveyor	MT					

2	system & Pipe rack						
B - 3	Sheeting	SQM					
B - 4	Iron Mesh	SQM					
B - 5	Structural Steel - shed unloading station	MT					
B - 6	Silo Access tower & miscllaneous	MT					
	TOTAL STRUCTURAL						
C	**MECHANICAL**						
C-1	Wagon unloading station system (excluding structural)	NO					
C-2	Dust collection equpiments (w.r.t capacity)	NO					
C-3	Anti segregation system top and bottom of silo	NO					
C-4	Airslide fluidation equpiments (blowers etc)	NO					
C-5	Extra 280 m3 compressor centrifugal LP 2 STAGE-ATLAS COPCO	NO					
C-6	Silo bottom extraction sytem	SET					
C-7	Pipe conveyor system(incl tech. structure, bearings, instruments etc) to FTP 1	RM					
C-8	Pipe Conveyor (incl tech. structure, bearings, instruments etc)- to FTP-2	RM					
C-9	ILMS System	NO					
C-10	Metal detector	NO					
C-11	Vibro screen	NO					
C-12	Surge Hopper	NO					
C-13	Mechanical and Motorised valves	NO					
C-14	Belt Weigher	Nos					
C-15	Hoists	NO					
C-16	Equipment erection	Lot					
C-17	Other Mechanical Items	Lot					
	TOTAL MECHANICAL						
D	**UTILITIES**						

D-1	Piping	IM					
D-2	DE System & Ducting - Covered in Sr. C-2	Lot					
D-3	Valves	No					
D-4	Fire Fighting System	Lot					
D-5	P & V System (MCC + Tunnel) + ACs + Exhaust as applicable	Lot					
D-6	Compressors	No					
D-7	Blower/ fans	No					
D-8	Other Utilities	Lot					
	TOTAL MECHANICAL & UTILITIES						
E	**ELECTRICAL & C&I**						
E-1	Power Cables	KM					
E-2	Control Cables	KM					
E-3	Transformer	Nos					
E-4	Busduct	RM					
E-5	Panels (HT Isolator+MCC+MLDB+VFD panels)	Nos					
E-6	Cable Tray & cover	KM					
E-7	Earthing and Lighting Material	Lot					
E-8	Fire Detection System	Lot					
E-9	Lighting	Lot					
E-10	PLC	Lot					
E-11	PA system Part of PLC	Lot					
E-12	Instruments & Equipment(Guages, Switches, Sensors, etc)	Lot					
E - 13	Installation Work	Lot					
E-14	Others	Lot					
	TOTAL ELECTRICAL AND C&I						
F	**TOTAL MISCELLANEOUS**						
F-1	Cost of 2 years O&M Spares (List to be attached)	Lot					
F-2	Insurance	Lot					
	TOTAL TILL ITEM F						
G	**Other Costs**						
G-1	Design Engineering charges						
G-2	Site Expenses / Establishment & Cranage,						

G-3	Site Survey, Soil Testing and Consultancy, Electrical Inspectorate charge						
	FINAL TOTAL						