RASHTRIYA ISPAT NIGAM LIMITED, VISAKHAPATNAM STEEL PLANT
WORKS CONTRACTS DEPARTMENT, VISAKHAPATNAM – 530 031 (A.P.)
INDIA
TELEFAX: 0891-2518763, 0891-2518631 TEL NO: 0891-2758705, 2518763

GLOBAL EOI NOTICE NO:VSP/WC/SMS/70334-0/G/2010–2011 DATED 27.09.2010

VISAKHAPATNAM STEEL PLANT INVITES “EXPRESSION OF INTEREST” FOR THE WORK OF “TOTAL MAINTENANCE OF EQUIPMENT IN CONVERTER SHOP AND SECONDARY METALLURGY SECTIONS OF STEEL MELTING SHOP # 2”. VISAKHAPATNAM STEEL PLANT IS LOOKING FOR COMPETENT AGENCIES HAVING THE REQUIRED EXPERTISE & EXPERIENCE.

The details of Specification, terms & conditions, criteria for pre-qualification, Tentative Planned Maintenance schedule, etc. along with Notice are placed in VSP’s Website www.vizagsteel.com

Interested and eligible Persons / Agencies may submit their “EXPRESSION OF INTEREST” with all relevant details and supporting Documents on or before 30th October 2010 to the Dy General Manager – Works Contracts I/c, Visakhapatnam Steel Plant, Visakhapatnam – 530 031, India. For any queries Sri R.A. Kale, AGM (Works Contracts) may be contacted through his e-mail address rakale@vizagsteel.com

Dy General Manager - Works Contracts I/c
Vishakhapatnam Steel Plant

Specification for seeking Expression Of Interest for “Total maintenance of equipment in Converter shop and Secondary Metallurgy Sections of Steel Melting Shop # 2”.

Scope : Total Mechanical, Electrical, Instrumentation and Automation maintenance of equipment in Converter Shop and Secondary Metallurgy Sections of SMS #2

Attached documents

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</table>
CRITERIA FOR AGENCIES

The Agency should have following capabilities:

1. Agencies should have experience either in
   a. Design, Supply and Erection of the following equipments
      
      **OR**
   
   b. Complete Mechanical, electrical, instrumentation and automation maintenance of the following units.
      
      i. **BOF and its auxiliary equipment**: LD Converters, Oxygen lancing systems, Slag cut off devices, Steel Transfer Cars, Slag Pot Transfer cars etc.,
      
      ii. **Gas Cleaning System of BOF**: Water cooled skirt, hoods, stack, Scrubber, ID fan, Change Over Stations and utility systems etc.,
      
      iii. **Bulk Material Charging Systems**: Belt conveyors, Vibrating feeders, Screens, diversion gates, Chutes etc.,
      
      iv. **Ladle Heating Furnaces and RH de gasser units**: water cooled hoods, Feero alloy charging systems, Steel Transfer Cars, Aluminum wire feeders, multi purpose oxygen blowing lances and all other associated equipments.
      
      v. **E.S.P and other DE Systems**: Electrostatic Precipitator System and Pneumatic Dust Evacuation System.

2. Should have resources to mobilize manpower and act as principal employer for qualified degree engineers, diploma engineers and work force to meet site requirement.

3. Should have all the statutory certification/licenses from state/central government to execute the contract.

4. Should be in sound financial position to mobilize resources and execute contract.

5. The agencies must submit the documentary evidence to support their qualification.
GENERAL INFORMATION ABOUT THE AGENCY

1. Name of company:
..............................................................................................................................................................
..............................................................................................................................................................

2. Registered address:
..............................................................................................................................................................
..............................................................................................................................................................
Telephone................................ Fax.................... Telex ....................E-mail.....................

3. Names and nationalities of principals/directors and associates
..............................................................................................................................................................
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4. Type of company (natural person, partnership, corporation, etc.):
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5. Description of company (e.g. general maintenance contractor):
..............................................................................................................................................................

6. Company's nationality:............................................................................................................................

EXPERIENCE AS CONTRACTOR:

7. List of contracts of similar nature and extent performed during the past 5 years

<table>
<thead>
<tr>
<th>Sl. no</th>
<th>Name of work</th>
<th>Work value</th>
<th>Period of contract</th>
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</table>

A separate sheet may be attached along with copy of the each work order.

Signature: .................................................................................................................................
(a person or persons authorized to sign on behalf of the tenderer)
Date:.........................}
General information about equipment in Converter Shop and Secondary Metallurgy sections of SMS #2

A. Overview of Visakhapatnam Steel Plant

I. Visakhapatnam Steel Plant (VSP) is an integrated public sector steel plant owned by Rashtriya Ispat Nigam Limited (RINL), located at Visakhapatnam city in Andhra Pradesh state of India. It is built with an annual production capacity of 3.0 MTPA (Million Tons Per Anum) of liquid steel with provisions for future expansion.

II. Keeping in view the upturn in global and domestic steel demand, VSP is expanding their annual liquid steel capacity from the 3.5 Million ton to 6.3 million tons. As part of this expansion, a new Steel Melting shop with a capacity of 2.8 MTPA liquid steel with secondary refining facilities is coming up. Presently these expansion units are under final stages of erection and are likely to be commissioned in coming months. The detailed project report for capacity expansion was prepared by the Principal Consultant, M.N. Dastur & Company (P) Ltd.

B. Brief on Converter Shop of SMS #2

I. The converter shop of Steel Melting Shop No-2, hereafter referred to as SMS # 2, consists of Two (02) BOF's along with Oxygen blowing lances, Gas cleaning / cooling system, Secondary de-dusting system, on-line argon rinsing station, Ladle preparation facility, Scrap / Slag handling facilities, etc supplied by consortium of SMS-Siemag and M/s BHEL-India. It has an envisaged design production capacity of 2.8 MTPA.

II. Secondary Refining facilities consists of two (02) Ladle heating Furnace (LHF) and one RH De-gasser station. These facilities are offline. Secondary refining equipment is supplied by consortium of SMS Siemag and SMS Mevac.

III. Hot metal received from Blast Furnace through torpedo ladle cars is unloaded in to hot metal ladles placed on self propelled hot metal transfer cars. Hot metal is charged into BOF using Charging crane after treatment at desulphurization station. Flux and other additions are added to BOF during oxygen blowing through the Material handling system consisting of conveyors, bunkers, vibro-screens, vibro feeders, weigh hoppers, chutes, etc.

IV. Gases evolved during blowing process is cooled, cleaned and collected by GCP system, consisting of water cooled hoods, wet scrubber, ID fan, change over valve and water seals. BOF Gas is flared if the calorific value is out of range.

V. During blowing slag is formed as impurity which is tapped from mouth of converter into slag pot placed on slag pot transfer car and taken to slag aisle for dumping.

VI. Steel is tapped in steel ladle placed on steel transfer car and taken to on-line argon rinsing station after which it is taken to common secondary metallurgy facilities of Ladle heating furnace (LHF) or RH De-gasser. There are two LHF station in SMS#2,
called LHF-1 and LHF-2. There is only one RH degasser station. After treatment at secondary metallurgical facilities Steel ladle is sent to Continuous Casting Shop.

C. Major facilities of Converter Shop & Secondary Metallurgy
(Covered under the proposed contract).

I. Basic Oxygen Furnace and its accessories

1. Two numbers of 150 cubic mtr LD converters are installed side by side with centre to centre distance of 27 mtrs. The BOF tilt mechanism is driven by 4 nos. squirrel cage induction motors of 250 KW, each driven by VVVF drive. Salient features of BOF are as follows,

   a. Converter operation mode : 2/2
   b. Nominal Capacity of each BOF : 150 tons
   c. Maximum capacity of each BOF : 160 tons
   d. No of heats per day : 56 from 2 converter days
   e. Lining life expected : 3000 heats
   f. Suspension system : 8 lamellas and 2 vessel guides
   g. Tilt drive speed : 0 to 1.3 RPM
   h. Bottom Stirring : 8 no. single hole tuyeres plugs
   i. Emergency drive : Pneumatic – 2 air motors
   j. Slag splashing : Yes, using nitrogen

2. Each BOF is equipped with independent Oxygen lancing system which consists of two oxygen lances. one lance will be in blowing position and the other lance in stand by position. An emergency pneumatic drive is also provided. Detail of lance mechanism are as follows,

   a. Type of Lance lifting Mechanism : Rope drive
   b. Total height of lift : 17.74 mtr
   c. Overall length of the lance : 22.00 mtrs
   d. lance outer diameter : 323 mm
   e. Maximum Lifting speed (electric motor) : 31.08 mtr / Min
   f. lifting speed – Emergency : 6.31 mtr / min

3. Slag retaining device consisting of trolley and winch drives is provided to drop dart into BOF during steel tapping to prevent slag from entering the steel ladle.

4. Slag detection system

5. Mechanized sampling and temperature measurement car of TML make for each converter

6. Lacam for laser profiling of BOF refractory lining

7. Guniting machine
8. Refractory relining car for top lining of each converter.

9. 400 LP model tire mounted debricking machine of TML make

10. Tap hole drilling machine of TML make.

11. Thermal imager – 1 nos

II. **Hot metal handling equipment**

    Hot metal from blast furnace is transported by rail in torpedo ladles and is unloaded into Hot Metal (HM) ladles placed on self propelled HM ladle transfer cars at the TLC unloading station in Converter Shop of SMS#2. Equipment in this area are

1. 2 nos. of Hot metal ladle transfer cars with weighing facility - 250 Ton Load capacity, traveling speed 30 mtr / min.

2. 4 nos. of hot metal ladles 160 / 165 ton capacity with bale arm arrangement.

3. 2 nos. of sampling and temperature measurement stations.

4. 1 no of hot metal ladle heater (vertical)

5. 2 nos. of hot metal ladle stands etc.,

III. **Scrap Handling Equipment**:

1. 4 nos. of 25 M³ volume scrap boxes

2. 2 nos. of self propelled 50 ton load carrying capacity scrap box transfer cars.

3. 2 nos. of 50 ton capacity Weigh bridges.

IV. **Liquid steel Handling System**: consisting of the following equipment

1. Steel Teeming ladles 160 Ton Capacity – Flat bottom – bale arm arrangement – provided with auto coupling for inert gas purging – New generation slide gate – 2 nos. of bottom purge plugs

2. One number self propelled Steel teeming ladle transfer car for each BOF – Two Wheel Drive – Load capacity 250 Ton and travel speed 50 m / min.

3. One number of platform car for Teeming ladle / slag pot – Load capacity 250 tons – Travel speed 30 Mtr / min.

4. 2 nos. of hydraulically operated ladle tilting stands – hydraulic pressure 180 bar.

5. 2 numbers of online ladle driers.

6. 2 nos. of horizontal ladle heaters - fuel is CO gas.
7. 3 nos. of vertical ladle driers – Fuel Co gas.

8. On line Rinsing station for each converter - With 2 strand aluminum wire feeder for feeding up to 12 mm dia. wires at a speed up to 300 m / min. – Emergency top lance system – mechanized temperature measurement and sampling station.

9. 400 LP model, TML make lining wrecking machine for ladle debricking.


V. Slag handling system : consisting of the following equipment.

1. 12 numbers of 18 Mtr cube slag pots.

2. 3 numbers of self propelled slag pot transfer Cars – Four wheel diven - Load capacity 100 tons – traveling speed 60 m / min.

3. Lime coating facility.


5. Slag feeding system to slag pot.

VI. Gas Cooling system –

1. Adjustable water cooled skirt – made out of 38.0 mm od x 4.5 thick tubes (290 nos.) - skirt lifting & lowering by 4 nos of hydraulic cylinders – stroke 900 mm – operating pressure of hydraulic system 110 bar.

2. Lower hood with openings for lance, addition chutes etc., – length 8 mtrs – made out of 38.0 x 4.5 thk. tubes (220 nos.) - lower hood mounted on self propelled.

3. Upper cooling hood / stack – made out of 51 x 5 mm thk tubes (144 nos.) – 37 mtr. lengths.

4. 5 nos. of fin fan heat exchangers –
   (a) 5 nos. of tube bundles for each converter with 285 tubes per bundle and 37.58x10^6 kcal/hr heat exchange rate.
   (b) 2 nos. of fans under each tube bundle and motor rating is 45kw/1470 rpm.

5. Storage expansion vessel – 3.2 mtr. dia, 29 mtr height, 167 m^3 capacity.

6. 5 nos of cooling water pumps – 500 m^3/ hour at 6.5 bar capacity – three working, two stand by

7. Make up water tank of 20 m^3 capacity and 3 make up water pumps of 26 m^3/ hour – common for two converters.
VII. **Gas cleaning System**

1. Scrubbing tower – Quencher (saturator venture) - 23 mtr high – 5000 mm shell dia – differential pressure 250 mm of WC with
   
   a. Quencher venture unit (1st stage cleaning) – spray nozzles for quencher water
   
   b. Venturi Scrubber (2nd stage cleaning) – hydraulic throat actuation – differential pressure up to 1450 mm of WC – Gas dust content before and after venturi scrubber are 120 g/m³, 50 mg/m³ respectively.
   
   c. Total gas flow rate 115000 m³/hr (app)
   
   d. Pressure drop across scrubber 1800 mm WC (app)
   
   e. Water flow rate to Venturi throat is 360 m³/hr
   
   f. Water flow rate (recirculated to Scrubber) is 360 m³/hr

2. 3 nos. of 360 M³/ Hour capacity quencher pumps (one working and two stand by).

3. 2000 mm dia gas ducts to ID fan.

4. ID Fan station with the following specification
   
   a. Type : Radial fan
   
   b. Drive : Electrical Motor, 2500 KW, VVVF
   
   c. Speed : 1440 RPM
   
   d. Inlet flow rate : 272000 M³/ Hour
   
   e. Total pressure : 2300 mm WC

5. 1800 mm dia gas ducts to flare stack

6. 1800 mm dia and 75 mtr tall flare stacks – ignition system at 10 mtr level – system operated with LPG for ignition and Coke oven gas for pilot burner.

VIII. **Gas Recovery Change over station**

1. hydraulically operated, 1800 mm size, gas directing damper
2. hydraulically operated, 1800 mm size, pressure control damper
3. hydraulically operated, 1600 mm size, bypass damper
4. hydraulically operated water sealed check valve.
5. U type seal and ducts at switch over station

IX. **Secondary de-dusting systems**

1. Dog house for each converter - doors on taping side and charging side with drives – a set of fume collection hoods at charging side and taping side.

2. hoods at torpedo reladling stations, on line rinsing station, ferro alloy addition station, ladle break out stand, desulphurization station.
3. Dampers at each suction position, gas mixer for emergency operation, inlet and outlet of ESP and at inlet and outlet of ID fans.

4. Gas mixer at inlet of ESP – 8 mtr dia and 10 mtr height

5. 2 nos. of Electro Static Precipitators - Dry, horizontal type - Collecting area 19,161 M² - Dust load at inlet 3 g /M³ – dust load at outlet 50 mg /M³

6. Id fan station located on the down stream of ESP - with the following details
   a. No of fans : 3
   b. Type : Radial fan
   c. Drive : Electrical Motor, 1200 KW, VVVF
   d. Speed : 980RPM
   e. Inlet flow rate : 765000 M³/ Hour
   f. Differential pressure : 375 mm WC

7. Clean Gas Stack Of 80 mtr Height

8. Dust discharge and transport equipment.

X. **Flux and Ore charging system**

1. Common for Two converters :
   a. Two belt conveyors of 1200 mm belt width and 725 mtr horizontal length connects existing Intermediate Stock Bin House – 1 with the New Intermediate Stock Bin House – 2 of SMS 2
   b. Storage bunkers, vibrating feeders, belt conveyors etc at ISBH 2.
   c. Conveyor system carrying material between and Converter storage bunkers.
   d. Conveyor system with Silos for disposal of lime fines

2. Equipment for each individual converter
   a. 11 high level storage hoppers with bin vibrators and vibrating feeders
   b. 5 numbers of vibrating screens
   c. Weighing bins (10 m³ and 5.5 m³), pneumatically operated clam shell gates, gas flaps, diverting gates and connected chute work etc for feeding material through addition chute opening of cooling hood.

XI. **Ferro-alloy handling and charging system – ladle treatment addition.**

1. 4 emergency storage hoppers of 30 M³ along with vibrating feeders – common for two converters.
2. Handling of ferro alloys between storage hoppers and converter storage hoppers by bottom discharge buckets, forklift and electrical hoist
3. 8 nos of storage hoppers along with vibrating feeders and hopper gates for each converters
4. Conveyor system (3 conveyors for each converter) with weigh bins for collecting ferro alloys from storage hoppers and feeding the same to the ladles either at converter taping position or at on line rinsing station.
5. Bag filter type dedusting system


1. Each ladle furnace equipped with 2 nos of 250 ton load capacity self propelled ladle transfer cars

2. Salient features of ladle heating Furnace are as follows
   a. Heat Size : 150 Ton (nominal) / 160 ton (Max)
   b. Heating rate : 4 deg C / min
   c. Transformer rating : 24000 KVA, 33 KV, Continuous
   d. Roof Type : Tube to tube design, water cooled
   e. Roof Stroke : 800 mm, hydraulically operated
   f. Electrode diameter : 450 mm
   g. Electrode arm type : Conventional
   h. Pitch circle diameter : 900 mm
   i. Electrode Stroke : 2500 mm
   j. Electrode lifting speed : 80 mm/sec
   k. Mast Guiding : 8 rollers / mast
   l. Hydraulic system : 180 bar, 140 l/min

3. Bottom inert gas stirring system

4. Argon top lance - lance travel 8 mtr, lifting speed 3 to 4 mtr /min, swiveling speed 0.5 RPM.

5. Carbon graphite injection device

6. Temperature / oxygen measurement and sampling lance equipment

7. 2 Strand wire feeding system

8. Bag filter type dust extraction system

9. FAFA system with 8 bunkers, vibrating feeders, belt conveyor etc.

XIII. Secondary Metallurgy – RH Degasser

1. Salient features of RH degasser are as follows
   a. Heat size : 150 Ton (Nominal) / 160 Ton (max)
   b. Vacuum level : 1 m bar
   c. No of Heats / day : 21
   d. Vacuum vessel : Single piece design
   e. Vessel life expectancy : 100 heats
   f. Hot of take : U tube shape
   g. Exhaust Gas cooler : Cylindrical
   h. Vessel lifting and lowering : Moving platform and rocker system
      Actuated by hydraulic ram
   i. Stroke of hydraulic ram : 3.5 mtr
j. Steam ejector – no. of stages : 4  
k. No of inter condenser : 2  
l. No of After condenser : 1  
m. Steam pressure, consumption : 10 bar, 21 tons / hour  
n. Hot well pumps : 4 nos (2 W + 2 S), 600 M³/ hour

2. Equipped with multi function top lance – with oxygen and LPG for heating and oxygen for blowing.  
3. Alloy addition system - with bunkers, 2 conveyors, vacuum locks etc  
4. Lances for temperature, oxygen, hydrogen measurement and sampling  
5. Vessel pre heater –  
6. Hydraulically operated mobile pecking machine for nozzle deskulling  
7. Self propelled Snorkel exchange car

XIV. Electrical power system

1. Load center Sub stations (LCSS) makes power available to Converter Shop at 415 V & 690 V, 50 Hz, 3-phase, which are in turn fed to MCCs, PDBs, MLDBs and Crane power systems.

2. All critical motors are fed from VVVF drives at 415 V. Rest of the motors have DOL starting. ID fan motors of Primary de-dusting and cooling system of BOF are fed from HT VVVF drives at 3.3 KV.

3. Shop lighting system consists of high and medium bay light fittings, Lighting distribution boards, fluorescent fittings in Office / control rooms / Pulpits and Electrical control buildings.

4. DG set and emergency power system including UPS and DC battery chargers

5. Shop cabling is through an extensive underground cable tunnels network provided with cable trays, ventilation, lighting, etc. Each Electrical control building (ECR) is provided with a cable basement. Cable Vaults are provided wherever electrical panels are located at higher levels of ECRs

XV. Level -1 Automation

1. AB Control logix -Hot Standby PLC with distributed I/o racks with control net for BOF and associated systems. Safety PLC is also of AB make with no stand-by

2. S7-414-4H siemens make Dual Redundant PLC for LHF and RH

3. Extensive use of HMI is made in all control station control rooms and operator pulpits.

4. Level-1 Servers, PC based HMI station, PLC programmer units, Ethernet switches, network cabling, OFC, etc.
## XVI. The Level-2 Automation

### LEVEL-2Hardware for Converter Shop of SMS # 2

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<tr>
<th>SL.NO</th>
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<th>ITEM TYPE</th>
<th>MAKE</th>
<th>QTY</th>
<th>REMARKS</th>
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### LEVEL-2 Hardware for LHF and RH of SMS # 2

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<td>HP</td>
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<td>SCSI Tape Drive</td>
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### D. General Job description / Scope of Work:

I. Details of Jobs, scope of work and exclusions of Mechanical, Electrical, Instrumentation and Automation are separately elaborated in Annexure - B, C, D and E respectively.
Annexure A

General Terms and conditions

I. Complete Mechanical, Electrical, instrumentation and automation Maintenance of the equipment of Converter shop and secondary metallurgy section area are in the scope of the proposed contract. Maintenance of EOT cranes is not covered under the scope of this Contract.

II. Round the clock maintenance coverage in A, B, C and General shift is required. Separate Groups along with trained and qualified Engineers, supervisors and Work force are to be deployed in each shift for mechanical, electrical, instrumentation and automation.

III. Complete maintenance including record keeping of the above mentioned equipment is to be carried out by the contractor as per the instructions of Engineer In Charge. Contractor has to maintain all the log books and equipment history records in soft and hard form.

IV. Inspection of all the equipment is to be carried out at regular intervals by the contractors personnel. Defects / abnormalities noticed during inspection are to be recorded with priority 1, 2, 3. Immediate liquidation of priority -1 defects noticed during inspection is to be carried out. Priority 2 & 3 defects are to be liquidated during preventive maintenance and during period whenever equipment is spared for maintenance.

V. Preventive maintenance of each equipment is to be carried out as per the agreed schedules. In consultation with VSP engineers, contractor shall prepare suitable checklists and plans for preventive maintenance jobs. Contractor shall also plan for liquidation of the pending defects during PM. Contractor shall maintain record for the jobs carried out during preventive maintenance.

VI. All the breakdowns are to be attended by the contractor immediately apart from preventive / planned maintenance activities. For attending planned maintenance, break downs and complaints, contractor shall depute adequate group of man power with experienced supervisors in all the shifts (A, B, C and G). The weekly off- days, holidays and leave reserves for man power and supervisors is to be organized by the contractor.

VII. Reclamation of different assemblies like gear boxes, brake assemblies, hydraulic and pneumatic cylinders, valve blocks, hydro motors, pulleys, roller assemblies, sprockets, motors, cable trolleys, instrument valves along with actuators etc removed from equipment are to be opened and repaired by replacing damaged internals / components. Contractor has to ensure the availability of all the emergency spares in ready to replace condition. Contractor has to carry out all the preparatory activities in advance for campaign repairs.

VIII. Contractor shall carry out minor modifications if any on different mechanisms as per the instructions of Engineer In Charge. Also coordination and dismantling of various assemblies when ever required for development of manufacturing drawings by VSP is in the scope of the contractor.
IX. All the tools and tackles necessary to carry out the maintenance activities (including break downs) of equipment shall be in the scope of the contractor and kept in good working condition.

X. All the tools and instruments required for periodic inspection / testing should be arranged by the contractor and the same shall be maintained with valid test certificates. All the lifting tackles shall have valid statutory certificates.

XI. Based on the inspection reports, contractor shall prepare and submit the requirement for spares and consumables needed for maintenance of the equipment to VSP at mutually agreed intervals. All the spares and consumables will be issued by VSP free of cost. The contractor has to collect these materials from VSP Sub Stores /Site Stores/Area repair shop. Store Keeping and maintaining records of spares and consumables issued by VSP shall be done by store keeper of the contractor.

XII. The contractor shall take safety precautions and follow safety rules prevailing at VSP. The contractor shall ensure that all personnel are provided with required safety appliances like safety belts for height working, good quality helmets, safety shoes, safety goggles, dust masks etc.

XIII. VSP will provide space for establishment of duty stations. Contractor shall make their own office inside the plant. The location and site for office will be shown / allotted by VSP. At the end of the contract period, contractor shall vacate the site handing over all the drawings, documents and records.

XIV. At the end of the contract period all the equipment under the scope shall be handed over in satisfactory running condition.

XV. Proposed period of the contract is 3 Years
1. Man power along with experienced engineers and supervisors are required to be deployed round the clock in A/B/C and G shifts, separately for Converter, Gas Cleaning Plant and Secondary Metallurgy (LHF&RH) sections.

2. Mechanical maintenance jobs envisaged on different equipment are listed below,

A. BOF and its Auxiliaries
   a. Complete preventive, break down and proactive maintenance of BOF and its auxiliaries including repairs during relining campaigns
   b. Daily inspection of tilt drive system including its lubrication system. Analysing the inspection data and taking appropriate actions.
   c. Lubrication of pedestal bearings of converter drive at specified intervals.
   d. Regular inspection and Maintenance of converter emergency pneumatic drive system including replacement hoses valve blocks etc.
   e. Complete maintenance of doors and its drive mechanisms on charging side and tapping side (dog house)
   f. Jobs during relining campaigns includes
      i. Repair of converter vessel, tap hole, trunnion, suspension system, slag hood / umbrella plates, radial and bottom heat shields of converter etc. Shell pieces, segments of slag hood, heat shields are to be replaced as per the requirement.
      ii. Providing the anchors, brick retaining plates inside the vessel as per the requirement.
      iii. Replacement of lip rings as per the requirement.
      iv. Thorough inspection of drive – inspection of internals, bearing clearances, replacement of oils based on condition monitoring reports etc. Replacement of hung reducers, pinion connecting hung reducer and bull gear as per the requirement.
      v. Repair of bottom stirring pipe lines, hoses etc.
   g. Complete maintenance of sampling and temperature measurement cars etc.
   h. Repair and replacement of chutes for addition of lime/ferro alloys to ladle.

B. Oxygen lance:
   a. Regular Inspection of lance hoist Drive & Testing emergency lifting at regular intervals.
   b. Complete preventive, break down and proactive maintenance of lance hoist and lance trolley mechanism, lance changing platforms with winch drives etc in all respects.
   c. Replacement of wire rope of lance hoisting mechanism at regular intervals.
   d. Replacement of jammed lances / lances with leaks etc.
   e. Deskulling and repair of the lance assemblies – including replacement of pipes, tips, elbow flanges etc.
   f. Replacement and repair of water and oxygen hoses of lance system.
g. Replacement gaskets, clamps etc in oxygen lance mechanism.

h. Structural repair of lance deskulling stands.

i. Maintenance of all the valves and fittings of oxygen, water and nitrogen service connected to the oxygen lancing system.

j. Repair of lance guide and other structures related to lance mechanism as per the requirement.

k. Reclamation of Assemblies - different assemblies like Gear boxes, brakes, brake shoes, carriages, pulleys, etc removed from equipment are to be opened and repaired by replacing damaged internals / components.

C. Slag detection and slag stopper (slag cut off devices)

a. Regular inspection and complete maintenance of slag stopper and slag detection devices.

b. Repair / Replacement of winch drive and trolley Gear boxes, pinions, rack, cylinders, hoses, hose drag chains etc of slag stopper device.

c. Replacement of rope for slag stopper device based on inspection reports.

d. Replacement of pipe assembly of slag stopper.

e. Regular inspection and maintenance of emergency pneumatic drive of slag stopper.

D. Transfer Cars : (Hot metal ladle transfer car, Steel Teeming ladle Transfer car, slag Pot Transfer car, Platform transfer Car, Scrap Chute transfer car, ladle furnace STC, RH degasser STC etc.)

a. Regular inspection of transfer Car.

b. Complete preventive, break down and proactive maintenance of transfer Car along with its Cable reeling drum and hose reeling drum arrangements with connected drives.

c. Maintaining track system of cars by repairing / replacing the clamps, rails, Buffer posts etc.,

d. Maintenance of weighing system in case of Hot Metal Transfer Car and Steel Transfer Car)

e. Repair / Replacement of drive gear boxes / geared motors, drive, non drive wheel assemblies, buffers, track cleaners, brake assemblies, load cells etc.,

f. Thorough inspection of the structure of cars and cable arm at regular intervals and rectification of welding cracks and body cracks etc in the structure of cars.

g. Repair / Replacement of rollers of cable diversion units and hose diversion units etc.

h. Replacement of axle box springs of scrap chute transfer car.

i. Reclamation of Assemblies - different assemblies like Gear boxes, brakes, brake shoes, carriages, pulleys, etc removed from equipment are to be opened and repaired by replacing damaged internals / components.

E. Hot Metal Ladles, Steel Teeming ladles

a. Complete maintenance and repair of ladle tilter and bale arms.

b. Repair of Shell by replacing the damaged portions, Repair of structures in trunion area.
c. Providing retainer plates at top and other areas as per the requirement.

F. Scrap Chute
   a. Structural repairs and replacement of shell segments and other parts as per the requirement.

G. Slag Pots
   a. Repairing of cracks by arc gauzing and welding
   b. Repair and maintenance of slag pot tilter arrangement.

H. Argon Rinsing Station
   a. Regular inspection and complete maintenance of the equipment in Argon rinsing stations.
   b. Maintenance of bottom purging system including repair and replacement of auto couplers, replacement of hoses, fittings etc.
   c. Maintenance of top lance, temperature and sampling lance, slag breaker etc including their drive system with Gear boxes/ geared motors, chains, sprockets etc.
   d. Maintenance of top lance, temperature and sampling lance, slag breaker etc including their drive system with Gear boxes/ geared motors, chains, sprockets etc.
   e. Repair and replacement of Gear boxes/ geared motors etc as per the requirement.

I. Temperature measurement, sampling and slag breaker arrangement at Torpedo aisle
   a. Complete maintenance drive system including repair and replacement of Gear boxes/ geared motors, sprockets, chains etc.

J. Hot metal ladle Heater, Horizontal ladle heater, Vertical ladle heater and Online Ladle Heater
   a. Regular inspection and complete maintenance of heaters
   c. Maintenance of hood transfer car with it drive of horizontal ladle drier
   d. Maintenance of combustion air blower
   e. Maintenance of COG, LPG, Combustion air. Nitrogen and instrument air piping including connected valves, hoses and other fittings.

K. Ladle Tilter
   a. Complete maintenance of ladle tilter
   b. Maintenance of hydraulic system including repair and replacement of pumps, filters, cylinders, valve blocks, hoses, piping etc.
   c. Revisioning of cylinders by replacing spare seal kits etc.

L. Converter Relining device
   a. Thorough inspection of converter relining device before the starting of the converter relining campaign. Rectification of all the defects noticed during inspection. Replacement of wire ropes etc as per the requirement.
   b. Repair and maintenance of trolley, tower segments, pallet trolleys etc.
   c. Repair and maintenance of fresh air fan
M. Lining Wrecking machines
   a. Complete maintenance of debricking machines including the engine, hydraulic system and pneumatic hammer system.
   b. Trouble shooting for identification of the problem and rectification of the same.
   c. Regular inspection and checking of oil levels of diesel engine, hydraulic system and other mechanisms of debricking machines. Rectification of defects noticed during inspection and rectification of the same.
   d. Regular Adjustment of telescopic boom by adjusting rollers.
   e. Complete maintenance of engine including replacement. Maintenance of oil levels & replacement of filters etc
   f. Repair and replacement of ripper / ripper tips, tap hole drilling attachment, hammer chisels etc
   g. Complete maintenance of hydraulic system including repair and replacement of tool cylinder, telescopic cylinder, lift cylinder, ball rotation collars, hydro motors and gear boxes of transmission, slew, boom rotation, replacement of hydraulic pumps, hydraulic hoses, oil coolers, return and suction filters etc.
   h. Repair and replacement of boom, boom guide rollers, tyres, jacking cylinders etc.,

N. Tap Hole Drilling Machine
   a. Complete maintenance of tap hole drilling machine including the engine and hydraulic system
   b. Trouble shooting for identification of the problem and rectification of the same.
   c. Regular inspection and checking of oil levels of diesel engine, hydraulic system and other mechanisms of machines. Rectification of defects noticed during inspection and rectification of the same.
   d. Regular Adjustment of telescopic boom by adjusting rollers.
   e. Complete maintenance of engine including replacement. Maintenance of oil levels & replacement of filters etc
   f. Repair of drill tips by metal built up and grinding. Replacement of drill bits, drill tubes etc
   g. Complete maintenance of hydraulic system including repair and replacement of cylinders, ball rotation collars, hydro motors and gear boxes, replacement of hydraulic pumps, hydraulic hoses, oil coolers, return and suction filters etc.

O. Bulk Material Charging System:
   a. Complete maintenance of the following
      i. Reversible conveyor, shuttle conveyor, lime fine collection conveyor, lime fine intermediate conveyor
      ii. Chute system of these conveyors
      iii. 22 nos. of storage hoppers with bin vibrators and needle gates and 120 mtr. cube / hour capacity vibrating feeders
      iv. 8 nos. vibrating screens
      v. Weighing bins and connected pneumatic clam shell gates and closed type unbalanced vibro feeders.
      vi. Pneumatic driven Gas flaps, gas lock valves, sliding compensators etc
      vii. All chute system between storage bunkers and GCP hood
viii. Maintenance of silos and its related screw conveyors, rotary valves, vent fans and filters etc.,
ix. Emergency containers
b. Revisioning and replacement pneumatic cylinders, solenoid valve, replacement of pneumatic hoses, fittings, connected instrument air and nitrogen piping work.
c. Replacement of chute liners and repair of chutes as per the requirement.
d. Conveyors - Replacement pulleys, idlers, gear boxes and all other jobs except belt replacement & belt repair.

P. Ferro alloy charging and storage system:

a. Complete maintenance of the following
   i. Ferro alloy collecting, Ferro Alloy Intermediate and feeding conveyors
   ii. Chute system of these conveyors
   iii. 16 nos. of 10 mtr cube ferro alloy charging bunkers and 4 nos of 30 mtr cube ferro alloy storage bunkers
   iv. Vibrating feeders bellow charging and storage bunkers, weigh bins etc
   v. Weigh bins for ladle addition at converter and ARS.
b. Replacement of chute liners and repair of chutes as per the requirement.
c. Conveyors - Replacement pulleys, idlers, gear boxes and all other jobs except belt replacement & belt repair.
d. Maintenance of self discharging buckets at converter, LF & RH

Q. Ladle Heating Furnace

a. Complete maintenance of the equipment in ladle furnaces which includes the following
   i. Electrical Heating System including water cooled cable changing.
   ii. Hydraulic System including repair and replacement of pumps, revisioning and replacement of hydraulic cylinders, replacement of valves, hoses, filters, pressure gauges etc
   iii. Cooling water system including replacement and repairs of water cooled hood, hoses, valves and fittings. Cooling hoses of transformers and cables.
   iv. Cooling water pumps, heat exchangers, filters etc
   v. Flux and Ferro Alloy addition system including belt conveyor, storage bunkers, vibrating feeders, pneumatically operated gates etc
   vi. Temperature and sampling lance system along with its drive gear boxes / geared motors, sprockets and chains
   vii. Injection Lance drive system
   viii. Aluminum wire feeding equipment
   ix. Inert gas stirring system
   x. Fume extraction system including ID fan and bag filter unit.
   xi. Carbon injection system
   xii. Fire fighting and ventilation system

R. RH degasser Unit

a. Complete maintenance of the following
i. Vessel lifting & off take lifting Hydraulic System including repair and replacement of pumps, revisioning and replacement of hydraulic cylinders, replacement of valves, hoses, filters, pressure gauges etc.

ii. Maintenance of vessel. Replacement of vessel and fixing of snorkel and injectors to the vessel.

iii. Complete maintenance, repair and replacement of hot offtake, compensator, gas cooler etc.

iv. Complete maintenance of vacuum system including replacement of ejector nozzles, water nozzles, repair of pipe lines, repair of condensers etc.

v. Hot well pumps, filtration units and connected valves etc.

vi. Steam system including PRDS. All Piping and valve system.

vii. Ejector cleaning system

viii. Temperature, sampling and slag breaker arrangement along with its drive system with gear boxes, geared motors, sprockets and chains.

ix. Multifunction Top lance system along with its drive gear boxes, sprockets and chains. Maintenance of Co gas, oxygen, compressed air lines with connected hoses and valve trains.

x. Flux and Ferro Alloy addition system including belt conveyor, storage bunkers, vibrating feeders, weigh hoppers, pneumatically operated gates etc.

xi. Repair and maintenance of snorkel exchange car.

xii. Fume extraction system including ID fan and bag filter unit.

xiii. Maintenance of equipment at vessel pre_heater.

xiv. Deskulling machine. Fume extraction system including ID fan and bag filter unit.

xv. Carbon injection system

xvi. Fire fighting and ventilation system

S. GAS CLEANING PLANT

a. REGULAR MAINTENANCE
   i. Inspection & maintenance of skirt drive and its hydraulic system
   ii. Repair and replacement of tubes in skirt, hood and stack assemblies
   iii. Revisioning and replacement of saturator nozzles.
   iv. Repair and replacement of water& utility valves and utility pipelines.
   v. Inspection & maintenance of venturi hydraulics.
   vi. Revisioning, repair & replacement of GCP pumps.
   vii. Repair of fin fan tube bundles and maintenance of Fin fans.

b. SHUT DOWN/ MID CAMPAIGN MAINTENANCE
   i. Shutting down of gas recovery system, ID fan after filling safety seals
   ii. Inspection of skirt, hood, stack for leakages and rectifying the same.
   iii. Revisioning & replacement of hoses, cylinders, valves in hyd. systems of skirt, ventury etc.,
   iv. cleaning of id fan
   v. cleaning & maintenance of scrubber.
   vi. Repair of chutes & jackets.
c. **CAMPAIGN MAINTENANCE DURING RELINING OF CONVERTER**
   
   i. Removal of hood stack connecting joints  
   ii. Shifting of hood traverse to parking position.  
   iii. Repair & replacement of chutes, jackets, gas flaps, water & utility lines  
   iv. Repair & replacement of tubes for skirt, hood & stack.  
   v. Id fan cleaning  
   vi. Startup activities of ID fan  
   vii. Repair & revisioning of dampers  
   viii. Maintenance of sos hydraulic system  

T. **SECONDARY VENTILATION SYSTEMS**

   a. Maintenance of Dog houses, Suction hoods, ducts, dampers and its drive units.  
   b. Maintenance of gas mixer.  
   c. Maintenance of ESPs  
   d. Maintenance of ID fans of ESP  
   e. Maintenance of dust disposal and transport equipment  
   f. Maintenance of dust silos  
   g. Maintenance of FFA De-dusting system  

3. The following jobs are excluded from the scope of the proposed contract.

   a. Balancing and replacement of ID Fan Rotors.  
   b. Carrying out vibration measurement / condition monitoring jobs at places where ever online provisions are not existing. However where ever online provisions are existing these areas are to be monitored by agency.  
   c. Replacement of Belts, Piece insertion of belts, lagging of conveyor pulleys.  
   d. Reclamation & repair of major assemblies, shaft assemblies etc that require machining and/or hydraulic press for mounting and dismantling.  
   e. Collection of spares from VSP central stores and shifting of various assemblies between Engineering Shops and SMS.  

4. Tentative planned maintenance Schedule is for the equipment in Converter Shop and Secondary metallurgy section is Given in Separate file maintschedule.xls.
Annexure – C

Scope – Electrical maintenance

A. Introduction to outsourcing philosophy

a. Manpower will be deployed round the clock in A/B/C shifts, separately for Converter and Secondary Metallurgy (LHF&RH).

b. Separate G-Shift posts shall be operated for Converter Shop and Secondary Metallurgy (LHF&RH).

c. Motor management and maintenance of electronics for Converter Shop and Secondary Metallurgy (LHF&RH) will be part of respective G-Shift stations.

d. Maintenance of Electronic cards / modules of PLCs, VVVF drive, UPS, inverters, rectifiers, etc.

e. Setting up of mini workshop and duty stations in premises allotted to party by VSP.

B. Broad distribution of electrical equipment:

a. High Voltage Boards - 33, 11 and 6.6 kV (Operation only, maintenance is excluded).

b. Load Center Substations, 415 / 690 V, 50 Hz, 3-Phase board/s - 35 nos.

c. LT MCCs, 415 V, 3-phase - 23 Nos.

d. LT Power Dist. Boards (PDB) – 6 Nos.

e. LT Lighting Dist. Boards (LDB) – 3 Nos.

f. HT VVVF drives at 3.3Kv for ID fan motors of GCP of BOF – 2 nos.

g. HT Motors, 6.6 KV, 3-phase – (limited to cable termination only)

h. HT motors, 3.3 KV – 2nos – (limited to cable termination only)

i. LT motors, 415 V, 3-phase – approx. 500 nos. up to 200 KW.

j. Torque motors for CRD and HRD.

k. UPS Systems, battery banks, battery chargers –

l. Level-1 system (PLC, HMI, PC servers, Ethernet switches, OFC, Serial data communication Networks, etc)

m. DG set for Emergency power and lighting.

C. Scope of work in A / B/ C - Shifts:

a. Issue and Normalization of Electrical Shutdowns and implementation of safe shutdown work practices, as per VSP guidelines.

b. Complaint logging and tracking of fault status of all electrical breakdowns by entering data on PC and also in a registers.

c. Trouble shooting of faults in relay logic, PLC logic, VVVF drives using modern diagnostic tools including PLC programming terminals, Hand held parameterization devices etc., referring electrical schematics and single line diagrams, etc.

d. Attending to Electrical Breakdowns in all equipment of Converter Shop and Secondary Metallurgy areas (except High voltage boards and EOT cranes) and liquidating them in the shortest possible time, without affecting production.
e. Providing connections to Welding machines, hand tools and temporary lighting based on request from other agencies.
f. Operation of 3-phase 33 KV, 11 KV, 6,6 KV and 415 V Substations / switch boards, including racking IN / OUT of HT / LT breakers, insertion of earthing trucks, etc.
g. Inspection, monitoring and record keeping of critical electrical equipment.
h. Liaisoning with G-shift electrical, with other agencies of shop and external departments.
i. Housekeeping of duty station and proper disposal of waste generated after liquidation of complaints.
j. Shift maintenance of Converter cranes are not in this scope.
k. Instruments, Tools and Tackles required are in the scope of the party. Any special tools, required in course of work are also in scope of party.

D. Terms and Conditions of Jobs in A / B/ C - Shifts:
   a. There will be two (02) A/B/C Shift posts, one at Converter, another at Secondary metallurgy at LHF/RH area, located at a convenient geographic location.
   b. A/B/C-Shift posts of Converter shall be manned by suitable no of Engineer, Supervisors, Technicians and un-skilled labor. Total manpower to be deployed shall take into account staggered weekly offs and other statutory paid holidays as per labor laws in force.
   c. A/B/C-Shift post of Secondary Metallurgy (LHF&RH) shall be manned by suitable no of Engineer, Supervisors, Technicians and un-skilled labor. Total manpower to be deployed shall take into account staggered weekly offs and other statutory paid holidays as per labor laws in force.
   d. Supervisors and Technicians shall possess valid electrical License to perform operations on HT boards from 3.3 KV to 33 KV and carry out maintenance on LT boards up to 690 Volts. The Engineer of the contractor should authorize all other personnel for handling electrical equipments and keep the same in a record.
   e. Jobs in each shift shall be completed in same shift within time as decided by engineer-in-charge or his representative.
   f. All contract personnel shall be provided with BIS marked and approved Personal protective safety appliances like Safety shoes, safety helmets, hand gloves, dust masks, ear plugs, etc. Suitably grade, ISI marked rubber hand gloves shall be provided for operation of HT equipment.

E. Scope of Jobs in G-Shift:
   a. Carrying out Planned Preventive Maintenance (PPM) jobs as per schedule jointly made by party and VSP.
   b. Carrying out Condition based maintenance, where applicable. List to be furnished by VSP.
   c. Inspection, monitoring of status & recording in PC and Registers for all electrical equipment.
   d. Planned Preventive Maintenance (PPM) all MCCs, VFD panels, PLC Panels, Motors, etc.
   e. Jointing and termination of outgoing power and control cables of MCCs, VFD Panels, PLC panels, etc
   f. Laying of data / comm. Cables including OFC cables in cases of damages.
g. Repair / jointing / Termination of data communication cables Ethernet, serial, single and multi-mode optical fiber cables including splicing and end termination.

h. Assisting Shift crew during major breakdowns and providing logistic support.

i. Liquidation of inspection defects and safety related jobs.

j. Ensuring availability of working documents, spares and consumables to shift duty station.

k. Carrying out modifications based on suggestions, Quality improvement projects and recommendations of various authorized committees.

l. Implementation of various AMR, Non-AMR and in-house Projects.

m. Housekeeping of ECRs and cable tunnels.

n. Maintaining / Up-dation of master documents, backup of PLC programs, backup of VFD parameters, etc.

o. Planning for spares / consumables and initiation of procurement.

p. Preparation of specifications for indenting.

q. Ensuring adherence to statutory obligation like IE rules, AP state electricity rules, implementation of safe work practices, etc.

r. Ensuring implementation and regular follow up of 5-S activities.

s. Preparation and up-dation of SOPs’ and SMPs’

t. Conducting regular refresher classes and training on safety, SMPs, SOPs, etc.

u. Storage, Issue and tracking of spares / consumables received.

v. Internal movement of electrical equipment and spares.

w. G-Shift maintenance of Converter cranes are not in this scope.

x. Instruments, Tools and Tackles required are in the scope of the party. Any special tools, required in course of work are also in scope of party.

F. Terms and Conditions of Jobs in G – Shift:

i. There will be two (02) G Shift posts, one at Converter and another at secondary metallurgy (LHF/RH), located at a convenient geographic location.

ii. Converter G-shift post shall be manned by required no of Engineers, Supervisors, Technicians and un-skilled labour. Total manpower to be deployed shall take into account staggered weekly offs and other statutory paid holidays as per labour laws in force.

iii. Sec metallurgy G-shift post shall be manned by required no. of Engineers, Supervisors, Technicians and un-skilled labour. Total manpower to be deployed shall take into account staggered weekly offs and other statutory paid holidays as per labour laws in force.

iv. Supervisors and Technicians shall possess valid electrical License to perform operations on HT boards from 3.3 KV to 33 KV and carry out maintenance on LT boards up to 690 Volts. The Engineer of the contractor should authorize all others for handling electrical equipments and keep the same in a record.

v. All contract personnel shall be provided with BIS marked and approved Personal protective safety appliances like Safety shoes, safety helmets, hand gloves, dust masks, ear plugs, etc. Suitably grade, ISI marked rubber hand gloves shall be provided for operation of HT equipment.

G. Scope of Jobs for motor management of Converter Shop and Secondary metallurgy:
a. Collection of spare motors from designated motor storage / workshop, within Shop and keeping it ready for use.
b. Tagging of motors for ease of identification and storing them in proper designated places for easy retrieval including record keeping of the same.
c. Confirmation of motor fault status by using megger, Motor checker, etc, before removal from equipment.
d. Removal of motor from field equipment and transporting it to designated location within Shop for repairs.
e. De-coupling or motor, removal of coupling, brake drum, encoder, etc on motor.
f. Fixing of coupling, brake drum, Tacho, encoder, etc on motor.
g. Installation, alignment, coupling and termination of motor including minor bed modification, drilling of foundation holes, repairs to jacking bolts.
h. Minor repairs and overhauling of motors below 20 KW, except rewinding.
i. Routine / Preventive maintenance and minor repairs of motors up to 200 KW.
j. Upkeep of spare motors in storage by periodic cleaning, meggering and steps to improve insulation resistance if low.
k. Making list of spares required for motors.

H. Scope of Jobs for Maint. of Electronics of Converter shop and Sec. met.

a. Maintenance of all PLC and VFD panels and hardware within them, including dedicated and PC based programming units.
b. Maintenance of digital encoders and their cables.
c. Parameterization and tuning of VFD in event of motor replacement.
d. Maintenance of PLC, VFD and MHI software including taking of backups and safe storage.
e. Maintenance of all HMI terminals including PC based HMI.
f. Application Software modifications and tracking of change history.
g. Maintenance of networking hardware and data cabling including OFC. Networking hardware includes switches, routers, gateways, OFC converter, SMSP power supplies, etc.
h. Repair and replacement of serial / parallel digital data cables (Ethernet, DH+, Control net, Profibus, Profinet, MPI net, Modbus, Genius bus, RS-232, RS-485, etc) and connectors (RJ-45, RJ-11, D-type, BNC, etc).
i. Repair to OFC and termination, including OFC jointing.
j. Maintenance and repair of Electronic power devices like Thyristor / IGBT rectifiers, Soft starters, Digital / Micro processor based Motor protection relays, Numeric relays, etc.
k. Maintenance of 0-4-20 mA and -10 to 0 to +10 V analog signal cables from PLC / VFD panel to Field JB.
l. Maintenance of wireless remote controller units of mobile equipment, including cranes.

I. Exclusions

a. Re-winding of electric motors is not in the scope of party.
b. Major repairs and maintenance of motors above 20 KW, where electrical motor overhauling workshop facility is required, is not in scope of party.
c. All kinds of Maintenance of motors above 200 KW is not in scope of party.
Annexure – D

**Scope – Instrumentation and Automation maintenance**

1. **Inspection and running maintenance of system (Daily basis)**
   a) Checking and logging of alarms in PLCs(HMIs) of various instruments, rectification of causes of these alarms.
   b) Checking of any faulty field Instruments like RTDs, Thermocouples, Pressure, Flow, Temp. switches, Transmitters etc..
   c) Checking of Zero’s of measuring field Instruments.
   d) Trouble shooting of faulty field instruments if not possible replace the same with VSP spares.
   e) Cleaning of Field Instruments, Purging of impulse lines, blowing and cleaning of Analyser panels, Junction boxes etc.
   f) Daily maintenance of Gas Analyser sampling system.
   g) Cleaning of Belt scales, Load cells, weighing systems and zero checking’s, calibration.
   h) Maintenance of Pneumatic actuators with positioners, Air filter regulators etc.
   i) Maintaining of Impulse lines, cables and junction boxes etc.
   j) Maintenance of HMIs.
   k) The instruments are not covered in the above list may also include in the maintenance schedule.

2. **Break down maintenance**
   a) Identification of breakdown cause.
   b) Repair, rectification or replacement of the Instrument causing the breakdown.
   c) Maintaining logs and reports of all breakdowns.
   d) Coordinating with other sections like Electrical, Mechanical, Operation etc till the breakdown is over.

3. **Scheduled preventive maintenance**
   a) Preventive maintenance planning and scheduling with VSP operation and maintenance team.
   b) Breakdown and root cause analysis of all previous breakdowns if any during the period.
   c) Checking of all critical interlocks with Electrical, mechanical and operation dept. and maintain the record.
   d) All instruments are to be calibrated as per ISO schedule and maintain the record as per ISO requirement. ISO secondary masters shall have the traceability to National standards.
   e) Maintain working areas clean for OHSMS, 5S certification.

4. **All Tools and Personal protective appliances** required to operate the contract is under the scope of contractor. Measuring instruments like Multi-meter, Tong Tester, Meggars, Lamp Testers, calibration kits like Pneumatic calibrator, mA/mv/RTD and thermocouple simulators, deadweight testers etc. are under the scope of contractor.
5. **Transport of material** from VSP Stores to site and vice versa is under the scope of contractor.

6. **Issue of Spares part** required for the purpose of repairs, replacement etc. is under the scope of VSP.

7. The contractor is required to deploy team of manpower as per the requirement, **round the clock**, in order to successfully execute the contract. The Team of manpower deployed must include a Qualified Engineer for 24 Hrs * 7 days with working experience on the different type of field instruments and instrumentation systems. The other workmen deployed also must be experienced at PLC system.

8. Man power along with experienced engineers and supervisors are required to be deployed round the clock in A/B/C and G shifts, separately for Converter, Gas Cleaning Plant and Secondary Metallurgy (LHF&RH) sections

9. The contractor is **responsible for the safety and security** compensation there of with reference to all connected industrial laws of both state and central Govt.

10. The agency will maintain the record of work progress, material reconciliation weekly & monthly and will be verified by Engg- in-charge.

11. The agency will **follow all statutory rules for operating and maintaining** the equipment that are used in the execution of works.

12. If any workmen are found unsuitable for the job assigned by the engineer-in-charge, the contractor has to **replace the workmen** with a suitable one immediately.

The areas of the Instruments covered in SMS-2 are TLC, LD Converters, Gas Cleaning Plant and Secondary Metallurgy (LHF&RH) sections. The broad scope for the areas under SMS-2 are TLC, LD Converters, Secondary metallurgy areas is as follows

**HMDP, TLC, LD Converter and Gas cleaning plant**

Maintenance of Pressure transmitters, Flow transmitters, orifice plates Magnetic flow meters, mass flow meters, level probes, switches, Analysers and associated sampling system, weigh hoppers of Bulk material charging and Ferro alloy charging, Scrap and hot metal Weigh bridges, crane weighing system, Weight indicators, Bath level Instruments, Vibration monitoring equipment, Control valves and associated hardware, HMI's and associated cable networks, Fire detection and Alarm systems.

**Secondary Metallurgy:**

Maintenance of Analysers along with sampling systems, weigh hoppers, pressure and DP transmitters, orifice plates, mass flow meters, electro magnetic flow meters, control valves and associated equipment, Vibration monitoring equipment, Moisture measuring equipment, HMI's and associated cable networks, Fire detection and Alarm systems.
Scope – Level 2 Automation systems

1.0) Objective :

1.1) To maintain Level-2 computer systems Software and Hardware including Servers, Client PCs / MMI, Switches, OFC and UTP Cabling and other Network devices by Supplying Manpower (present at site) with spares being provided by VSP.

2.0 Scope of the work:

The scope of the work of the successful Tenderer shall include but not be limited to the following and shall be as per the conditions given below and as per the procedures laid down by VSP.

2.1 Round the clock maintenance coverage in A, B, C and General shift is required including on Sundays and Holidays. The tenderer should assess and provide the required qualified and experienced manpower with reliever for maintenance of Automation equipments.

3.0 Manpower and Establishment :

3.1 The tenderer will train their engineers in line with the manufacturer's recommendations and schedule before their posting at site. The engineers shall have the sound knowledge in C++, Crystal reports, Oracle database and Windows XP / 2003 OS along with their administration.

3.2 The tenderer shall be able to render assistance for reduction of any down time of equipment in the most expeditious manner. The tenderer shall deploy personnel of their own or from the manufacturers of the system, Specialists / Experts from India or abroad within a reasonable time frame to fix faults for minimal down time, wherever necessary. For this, no additional charge will be payable by VSP.

4.0 Maintenance Coverage:

4.1 The tenderer shall provide maintenance service round the clock (24 hours) seven days a week to keep the Computer Systems in good working order. The service consists of preventive and corrective / breakdown maintenance and includes carrying out of necessary works incidental to maintenance. The tenderer will ensure availability of engineers for this purpose.

4.2 The Maintenance Services to be provided by the tenderer will cover the following sub-units of each Automation System.

4.2.1 All Level-2 Computer Systems hardware including cabling / networking.
4.2.2 All the remote peripherals and terminals including the cabling at the respective locations.

4.2.3 All communication links within Computer Room and at rooms where peripherals are located.

4.2.4 All modems, switches, device drivers, media convertors, backbone cables, down cables, UTP cables and other communication hardware.

4.2.5 All interfaces to computer peripherals and terminals including the regular house keeping of the Computer rooms.

4.3 The tenderer will identify all external cable faults related to the computer room, terminal/ peripheral rooms and rectification of these faults will be done under the technical supervision of the tenderer.

4.4 The tenderer shall maintain up-to-date records of maintenance work done and also regular complaint logging and tracking on shift basis.

4.5 Schedules for preventive maintenance will be drawn up in consultation with VSP and will be reviewed from time to time to achieve high availability.

4.6 The tenderer, with the available assistance of VSP personnel, will ensure starting and operation of the computer system and synchronization with the process after maintenance work.

4.7 The contractor shall take adequate measures to prevent the corruption/erasure of the data stored in the computer/Server while carrying out the maintenance/repair work. The contractor shall take extreme care while doing the maintenance. Any damages taking place while this contractor is at work, shall be repaired/replaced by the contractor at no extra cost to VSP. Regular backups of the data also to be taken as per the schedule agreed by VSP.

4.8 The tenderer shall perform acceptance testing of Computer Systems as per agreements of VSP with equipment suppliers, whenever required.

4.9 The tenderer shall perform Software tuning, modification of software, addition of extra signal / data transfer to/from Level-2 from/to other systems and development of extra reports / screens whenever required as per Operation requirement.

5.0 Spares:

5.1 The tenderer shall do necessary re-engineering for replacement of defective components/ modules and repair them. Cost of components required for repair/replacement would be payable by VSP, subject to satisfactory documentary evidence.

5.2 The tenderer will periodically advise VSP about the requirement of critical spares for un-interrupted operation of the computer systems. These list of spares are to be mutually agreed by the tenderer and VSP, within the resources available.
6.0 Tools, Test equipment and Documentation:

6.1 The tenderer shall provide the necessary tools and tackles to the Engineers deployed to carry out the day to day activities of maintenance.

6.2 All computer hardware documentation received from the manufacturers will be made available in the respective computer rooms. The tenderer shall utilize these documentation for maintenance without infringing any trade mark or license rights of VSP or its supplier.

6.3 The tenderer shall integrate its Maintenance Management Package software used for day to day activities and inventory data update with the Level-2 system so that data of equipments for which maintenance are due can be fetched readily.

7.0 System availability:

7.1 The tenderer shall maintain minimum system availability of 99% for all the Automation Computer systems. The system availability will be calculated monthly. However, the tenderer shall endeavor to maintain and improve on these figures at VSP.

7.2 The tenderer shall ensure full working of the system and take all measures to make the system run at full capacity, without any partial breakdown.

7.3 The tenderer shall ensure that the service provided to the systems is uninterrupted and regular work is not hampered. Any non-performance on the part of the tenderer will be viewed seriously and VSP reserves the right to take suitable action at its discretion.
## Tentative Planned Maintenance Schedule for equipment in Converter and Secondary Metallurgy Sections

<table>
<thead>
<tr>
<th>EQPT NAME</th>
<th>ASSLY NAME</th>
<th>QTY / equip</th>
<th>MAINTENANCE ACTIVITY</th>
<th>Inspect &amp; repair Freq( in days)</th>
<th>Lubrication freq( in days)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOF and its auxiliaries</td>
<td>Tilt drive system of Converter</td>
<td>1</td>
<td>Visual inspection &amp; taking corrective action&lt;br&gt;Inspection of oil levels , flow etc in lub system&lt;br&gt;Inspection of wear pattern &amp; clearances in gear boxes, condition of couplings , condition of brakes etc., &amp; take corrective action.</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Pedestal Bearings</td>
<td>2</td>
<td>Inspection &amp; Repair and lubrication</td>
<td>90</td>
<td>90</td>
<td>Two numbers of converters are being installed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Converter Vessel along with lips &amp; tap hole</td>
<td>1</td>
<td>Inspection and complete repair of vessel , brick retainers tap hole etc.</td>
<td>90</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Trunnion ring along with suspension system</td>
<td>1</td>
<td>Inspection and complete repair</td>
<td>90</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Slag skirts and other heat shields</td>
<td>1</td>
<td>Inspection and complete repair . Replacement of damaged segments/ parts.</td>
<td>90</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bottom stirring system</td>
<td>1</td>
<td>Repair of pipes, replacement of hoses &amp; fittings</td>
<td>90</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sampling cars</td>
<td>1</td>
<td>Inspection and complete repair</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ladle Addition chutes near converter</td>
<td>1</td>
<td>Inspection and complete repair</td>
<td>90</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oxygen Lance installation</td>
<td>Hoist drive</td>
<td>2</td>
<td>Visual inspection &amp; taking corrective action&lt;br&gt;Check for healthy operation of lance emergency drive&lt;br&gt;Lubrication of bearings &amp; rollers , oil top up etc&lt;br&gt;Through inspection &amp; Repair of carriages , guide , gear boxes,rope drum etc&lt;br&gt;Replacement of wire ropes</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lance bodies , lance hoses</td>
<td>2 sets</td>
<td>Inspection and replacement . Repair of removed lances after dskulling and making the same ready</td>
<td>1</td>
<td></td>
<td>one lance installation for each converter</td>
</tr>
<tr>
<td></td>
<td>Lance trolley mechanism</td>
<td>1</td>
<td>Complete Checks &amp; Rectification</td>
<td>90</td>
<td>90</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lance maintenance platforms</td>
<td>2</td>
<td>Lubrication of bearings &amp; rollers , oil top up etc&lt;br&gt;Complete Checks &amp; Rectification</td>
<td>90</td>
<td>90</td>
<td></td>
</tr>
<tr>
<td>Slag stopper</td>
<td>Winch assembly</td>
<td>1</td>
<td>Inspection and repair</td>
<td>30</td>
<td></td>
<td>One slag stoper for each converter</td>
</tr>
<tr>
<td></td>
<td>Trolley assembly</td>
<td>1</td>
<td>Inspection and repair</td>
<td>30</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pipe assembly</td>
<td>1</td>
<td>Inspection and repair</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transfer cars</td>
<td>Drive system and wheel assemblies</td>
<td>1</td>
<td>Check for alignment, wear pattern , coupling condition, brake condition etc &amp; take corrective action</td>
<td>30</td>
<td></td>
<td>2 nos. each Steel ladle transfer car , hot metal ladle transfer cars, scrap chute transfer cars - 3 nos of Slag pot transfer cars - one no</td>
</tr>
<tr>
<td></td>
<td>Frame assembly , heat shields , stands, buffers, cable arms etc</td>
<td>1</td>
<td>Check for weld cracks, deformations and other damages and take corrective action</td>
<td>30</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Signature of the Contractor
<table>
<thead>
<tr>
<th>EQPT NAME</th>
<th>ASSLY NAME</th>
<th>QTY / equip</th>
<th>MAINTENANCE ACTIVITY</th>
<th>Inspect &amp; reapir freq( in days)</th>
<th>Lubrication freq( in days)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cable reeling / hose reeling mechanism</td>
<td>1</td>
<td>Checking drums, drive, diversion units, supporting rolls, hoses etc and taking corrective action Lubrication of bearings &amp; toping up oil in gear boxes</td>
<td>30</td>
<td>30</td>
<td>platform transfer car - 2 nos of LF steel transfer cars - one no RH steel transfer cars are beeing installed.</td>
</tr>
<tr>
<td>Hot metal &amp; Steel ladles</td>
<td>Shell assembly</td>
<td>1</td>
<td>Inspection and replacement of damaged portions in shell, adopter plates of slide gate and bottom purging Providing retainer plates inspection and repairs</td>
<td>15</td>
<td>15</td>
<td>14 nos of steel ladles and 4 hot metal ladles are beeing installed.</td>
</tr>
<tr>
<td></td>
<td>Tiling arangement and bale arms</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scrap Chutes</td>
<td>Body</td>
<td>1</td>
<td>Structural repairs and replacement of damaged portions.</td>
<td>90</td>
<td></td>
<td>4 scrap chutes are installed.</td>
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<tr>
<td>Slag pots</td>
<td>Body</td>
<td>1</td>
<td>Inspection for body cracks &amp; rectification by welding</td>
<td>30</td>
<td></td>
<td>12 slag pots are installed.</td>
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<tr>
<td>Argon rinsing station</td>
<td>Top lance system</td>
<td>1</td>
<td>Inspection and maintenance Lubrication of carriages, chain, toping of oil in geared motors etc</td>
<td>30</td>
<td></td>
<td>One Argon Rinsing Station</td>
</tr>
<tr>
<td></td>
<td>Sampling lances &amp; Slag breaker</td>
<td>1</td>
<td>Inspection and maintenance Lubrication of carriages, chain, toping of oil in geared motors etc</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bottom purging system</td>
<td>1</td>
<td>Inspection and replacement of damaged part</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Aluminium wire feeders</td>
<td>2</td>
<td>Inspection and replacement of belts, guides etc</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temp Measurement, sampling and slag breaker at torpedo aisle</td>
<td>Sampling lances &amp; Slag breaker</td>
<td>1</td>
<td>Inspection and maintenance Lubrication of carriages, chain, toping of oil in geared motors etc</td>
<td>30</td>
<td></td>
<td>Two stations</td>
</tr>
<tr>
<td>Ladle heaters</td>
<td>Lid lifting / movement mechanisms</td>
<td>1</td>
<td>Inspection and rectification Lubrication</td>
<td>30</td>
<td></td>
<td>2 nos each online ladle driers, horzontal ladle heaters, hot metal ladle heaters and 3 nos of vertical steel ladle heaters are installed.</td>
</tr>
<tr>
<td></td>
<td>Lid / Hood assemblies</td>
<td>1</td>
<td>Inspection and rectification in poistion Replacement based on condition</td>
<td>30</td>
<td>360</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Valve trains - air, nitrogen, CO gas, LPG</td>
<td>1</td>
<td>Inspection and rectification</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Blower assemblies</td>
<td>1</td>
<td>Inspection and rectification</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ladle Tilter</td>
<td>hydraulic system</td>
<td>1</td>
<td>Checking oil levels &amp; top up, inspection for leaks and rectification</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tilter frame, swivel frame, platforms</td>
<td>1</td>
<td>Inspection and carrying out structural repairs</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Maintenance Car</td>
<td>1</td>
<td>checking the drive system, wheels, heat shields, car frame etc &amp; taking corrective action</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relining Car</td>
<td>trolleys and roller table</td>
<td>1</td>
<td>Lubrication of bearings and rectifications Inspection and carrying out structural repairs</td>
<td>90</td>
<td></td>
<td>One Relining car for every converter</td>
</tr>
<tr>
<td></td>
<td>Tower segments, platforms etc.</td>
<td>1</td>
<td>Inspection and carrying out repairs</td>
<td>90</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fresh air fan</td>
<td>1</td>
<td>Inspection and carrying out repairs</td>
<td>90</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lining Wrecking machines</td>
<td>Engine</td>
<td>1</td>
<td>check for engine oil level, coolant etc inspection and maintenance including cleaning of air filters, fuels filters, replacement of filters, adjustment of belts, maintenance of batteries etc.,</td>
<td>7</td>
<td></td>
<td>2 lining wrecking machines are beeing installed.</td>
</tr>
<tr>
<td></td>
<td>Hydraulic system</td>
<td>1</td>
<td>Checking for leaks etc &amp; rectification of the same. Oil level checking and top up Thorough inspection and carrying out corrective actions</td>
<td>7</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Under carrie</td>
<td>1</td>
<td>inspection and rectification of defects Lubrication</td>
<td>7</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rotating platform, cradle</td>
<td>1</td>
<td>inspection and rectification of defects</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EQPT NAME</td>
<td>ASSLY NAME</td>
<td>QTY / equip</td>
<td>MAINTENANCE ACTIVITY</td>
<td>Inspect &amp; reapir Freq( in days)</td>
<td>Lubrication freq( in days)</td>
<td>Remarks</td>
</tr>
<tr>
<td>-----------</td>
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<td>---------</td>
</tr>
<tr>
<td></td>
<td>Fixed boom and telescopic boom</td>
<td>1 equip</td>
<td>lubrication</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tool arrangement</td>
<td>1</td>
<td>built up of ripper hooks / replacement</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tool arrangement</td>
<td>1</td>
<td>Lubrication of tool axle points etc</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tool arrangement</td>
<td>1</td>
<td>Through inspection and rectification of defects</td>
<td>7</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Tap hole drilling machine</td>
<td>Engine</td>
<td>1</td>
<td>check for engine oil level , coolant etc</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hydraulic system</td>
<td>1</td>
<td>inspection and maintenance including cleaning of air filters , fuels filters , replacement of filters, adjustment of belts, maintenance of batteries etc.,</td>
<td>15</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Under carrige</td>
<td>1</td>
<td>Checking for leaks etc &amp; rectification of the same. Oil level checking and top up</td>
<td>15</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rotating platform , cradle</td>
<td>1</td>
<td>inspection and rectification of defects</td>
<td>15</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td></td>
<td>hammer and reamer travel mechanism</td>
<td>1</td>
<td>inspection and rectification of defects</td>
<td>15</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tool arrangement</td>
<td>1</td>
<td>built up of drill tips / replacement</td>
<td>2</td>
<td>2</td>
<td></td>
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<tr>
<td>Bulk Material Charging System</td>
<td>Belt conveyors</td>
<td>1 lot</td>
<td>complete inspection with respect to drive alignment, condition of pulleys, idlers,scrapers, belt centering etc and rectification of defects</td>
<td>30</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vibrating feeders</td>
<td>1 lot</td>
<td>inspection and rectification of defects</td>
<td>30</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vibrating screens</td>
<td>1 lot</td>
<td>inspecting the condition of screen mats , springs and other components and rectification of defects</td>
<td>30</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clam shell gates, diversion gates, gas flaps , compensators</td>
<td>1 lot</td>
<td>Inspection and rectification of defects</td>
<td>30</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pneumatic pannels</td>
<td>1 lot</td>
<td>Inspection and rectification of defects</td>
<td>30</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chutes</td>
<td>1 lot</td>
<td>Inspection and replacement of damaged liners etc</td>
<td>90</td>
<td>90</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lime fine silos and related equipment</td>
<td>1 lot</td>
<td>Inspection and rectification of defects</td>
<td>30</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Fero alloy charging system</td>
<td>Belt conveyors</td>
<td>1 lot</td>
<td>complete inspection with respect to drive alignment, condition of pulleys, idlers,scrapers, belt centering etc and rectification of defects</td>
<td>30</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vibrating feeders</td>
<td>1 lot</td>
<td>inspection and rectification of defects</td>
<td>30</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clam shell gates &amp; diversion gates</td>
<td>1 lot</td>
<td>Inspection and rectification of defects</td>
<td>30</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chutes</td>
<td>1 lot</td>
<td>Inspection and replacement of damaged liners etc</td>
<td>90</td>
<td>90</td>
<td></td>
</tr>
</tbody>
</table>

*9 belt conveyors, 4 vibrating screens, 30 vibrating feeders, 30 storage bunkers, 2 lime fine silos are installed in BMCS system of two converters ( put together)*

*8 belt conveyors, 26 vibrating feeders, 20 storage bunkers are installed in Ferro Alloy Charging system of two converters ( put together)*
<table>
<thead>
<tr>
<th>EQPT NAME</th>
<th>ASSLY NAME</th>
<th>QTY / equip</th>
<th>MAINTENANCE ACTIVITY</th>
<th>Inspect &amp; repair Freq( in days)</th>
<th>Lubrication freq( in days)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bottom discharge buckets</td>
<td></td>
<td></td>
<td>Inspection and rectification of deflects</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
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<td>ROUTINE CHECK UP &amp; MAINTENANCE of hyd.system</td>
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1 no. of RH Degasser is being installed